Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Anions and Nutrients (QCLot: 551636)						
nitrate (as N)	14797-55-8	E235.NO3	0.02	mg/L	<0.020	----
Organic / Inorganic Carbon (QCLot: 556472)						
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	<0.50	----
Total Metals (QCLot: 554041)						
aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----
antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
cesium, total	7440-46-2	E420	0.00001	mg/L	<0.000010	----
chromium, total	7440-47-3	E420	0.0005	mg/L	<0.00050	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	----
magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	----
manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	<0.050	----
potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
rubidium, total	7440-17-7	E420	0.0002	mg/L	<0.00020	----
selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
silicon, total	7440-21-3	E420	0.1	mg/L	<0.10	----
silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	----
sodium, total	7440-23-5	E420	0.05	mg/L	<0.050	----
strontium, total	7440-24-6	E420	0.0002	mg/L	<0.00020	----
sulfur, total	7704-34-9	E420	0.5	mg/L	<0.50	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 554041) - continued						
tellurium, total	13494-80-9	E420	0.0002	mg/L	<0.00020	----
thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----
thorium, total	7440-29-1	E420	0.0001	mg/L	<0.00010	----
tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----
tungsten, total	7440-33-7	E420	0.0001	mg/L	<0.00010	----
uranium, total	7440-61-1	E420	0.00001	mg/L	<0.000010	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	<0.00050	----
zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	<0.00020	----
Dissolved Metals (QCLot: 553879)						
selenium, dissolved	7782-49-2	E423BSe	0.00005	mg/L	# 0.000062	B
Dissolved Metals (QCLot: 554698)						
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	<0.0010	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	<0.00010	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	<0.00010	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	<0.00010	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	<0.000020	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	<0.000050	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	<0.010	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	<0.0000050	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	<0.050	----
cesium, dissolved	7440-46-2	E421	0.00001	mg/L	<0.000010	----
chromium, dissolved	7440-47-3	E421	0.0005	mg/L	<0.00050	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	----
phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	<0.050	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	<0.00020	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 554698) - continued						
silicon, dissolved	7440-21-3	E421	0.05	mg/L	<0.050	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	<0.000010	----
sodium, dissolved	7440-23-5	E421	0.05	mg/L	<0.050	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	<0.00020	----
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	<0.50	----
tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	<0.00020	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----
thorium, dissolved	7440-29-1	E421	0.0001	mg/L	<0.00010	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----
tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	<0.00010	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	<0.000010	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	<0.00050	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	<0.0010	----
zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	<0.00020	----

Qualifiers

Qualifier	Description
B	*Method Blank exceeds ALS DQO. Associated sample results which are < Limit of Reporting or > 5 times blank level are considered reliable.*

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Anions and Nutrients (QCLot: 551636)									
nitrate (as N)	14797-55-8	E235.NO3	0.02	mg/L	2.5 mg/L	101	90.0	110	----
Organic / Inorganic Carbon (QCLot: 556472)									
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	8.57 mg/L	100	80.0	120	----
Total Metals (QCLot: 554041)									
aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	97.0	80.0	120	----
antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	103	80.0	120	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	93.3	80.0	120	----
barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	97.0	80.0	120	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	93.5	80.0	120	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	92.7	80.0	120	----
boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	107	80.0	120	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	97.8	80.0	120	----
calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	94.0	80.0	120	----
cesium, total	7440-46-2	E420	0.00001	mg/L	0.05 mg/L	97.8	80.0	120	----
chromium, total	7440-47-3	E420	0.0005	mg/L	0.25 mg/L	91.4	80.0	120	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	98.3	80.0	120	----
copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	96.5	80.0	120	----
iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	95.7	80.0	120	----
lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	94.4	80.0	120	----
lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	91.4	80.0	120	----
magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	98.4	80.0	120	----
manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	94.3	80.0	120	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	99.7	80.0	120	----
nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	96.1	80.0	120	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	10 mg/L	99.7	70.0	130	----
potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	98.9	80.0	120	----
rubidium, total	7440-17-7	E420	0.0002	mg/L	0.1 mg/L	102	80.0	120	----
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	93.7	80.0	120	----
silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	96.0	60.0	140	----
silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	92.8	80.0	120	----
sodium, total	7440-23-5	E420	0.05	mg/L	50 mg/L	97.9	80.0	120	----
strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	96.3	80.0	120	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Total Metals (QCLot: 554041) - continued									
sulfur, total	7704-34-9	E420	0.5	mg/L	50 mg/L	102	80.0	120	----
tellurium, total	13494-80-9	E420	0.0002	mg/L	0.1 mg/L	94.3	80.0	120	----
thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	92.7	80.0	120	----
thorium, total	7440-29-1	E420	0.0001	mg/L	0.1 mg/L	93.4	80.0	120	----
tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	99.2	80.0	120	----
titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	90.6	80.0	120	----
tungsten, total	7440-33-7	E420	0.0001	mg/L	0.1 mg/L	99.6	80.0	120	----
uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	96.1	80.0	120	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	97.6	80.0	120	----
zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	82.1	80.0	120	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	0.1 mg/L	94.7	80.0	120	----
Dissolved Metals (QCLot: 553879)									
selenium, dissolved	7782-49-2	E423BSe	0.00005	mg/L	1 mg/L	98.2	80.0	120	----
Dissolved Metals (QCLot: 554698)									
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	101	80.0	120	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	113	80.0	120	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	103	80.0	120	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	103	80.0	120	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	106	80.0	120	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	107	80.0	120	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	92.4	80.0	120	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	105	80.0	120	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	106	80.0	120	----
cesium, dissolved	7440-46-2	E421	0.00001	mg/L	0.05 mg/L	109	80.0	120	----
chromium, dissolved	7440-47-3	E421	0.0005	mg/L	0.25 mg/L	102	80.0	120	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	101	80.0	120	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	101	80.0	120	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	102	80.0	120	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	109	80.0	120	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	112	80.0	120	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	104	80.0	120	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	105	80.0	120	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	109	80.0	120	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	100	80.0	120	----
phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	10 mg/L	108	70.0	130	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	104	80.0	120	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 554698) - continued									
rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	0.1 mg/L	108	80.0	120	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	102	60.0	140	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	102	80.0	120	----
sodium, dissolved	7440-23-5	E421	0.05	mg/L	50 mg/L	104	80.0	120	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	107	80.0	120	----
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	50 mg/L	93.4	80.0	120	----
tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	0.1 mg/L	109	80.0	120	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	109	80.0	120	----
thorium, dissolved	7440-29-1	E421	0.0001	mg/L	0.1 mg/L	106	80.0	120	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	108	80.0	120	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	104	80.0	120	----
tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	0.1 mg/L	111	80.0	120	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	108	80.0	120	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	108	80.0	120	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	91.3	80.0	120	----
zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	0.1 mg/L	110	80.0	120	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 551636)										
GP2200945-001	Anonymous	nitrate (as N)	14797-55-8	E235.NO3	2.46 mg/L	2.5 mg/L	98.6	75.0	125	----
Organic / Inorganic Carbon (QCLot: 556472)										
CG2208648-001	SRF-04-Jul-2022	carbon, total organic [TOC]	----	E355-L	ND mg/L	5 mg/L	ND	70.0	130	----
Total Metals (QCLot: 554041)										
CG2208608-003	Anonymous	aluminum, total	7429-90-5	E420	2.52 mg/L	2 mg/L	126	70.0	130	----
		antimony, total	7440-36-0	E420	0.249 mg/L	0.2 mg/L	124	70.0	130	----
		arsenic, total	7440-38-2	E420	0.226 mg/L	0.2 mg/L	113	70.0	130	----
		barium, total	7440-39-3	E420	0.251 mg/L	0.2 mg/L	126	70.0	130	----
		beryllium, total	7440-41-7	E420	0.519 mg/L	0.4 mg/L	130	70.0	130	----
		bismuth, total	7440-69-9	E420	0.120 mg/L	0.1 mg/L	120	70.0	130	----
		boron, total	7440-42-8	E420	1.28 mg/L	1 mg/L	128	70.0	130	----
		cadmium, total	7440-43-9	E420	0.0464 mg/L	0.04 mg/L	116	70.0	130	----
		calcium, total	7440-70-2	E420	ND mg/L	40 mg/L	ND	70.0	130	----
		cesium, total	7440-46-2	E420	0.124 mg/L	0.1 mg/L	124	70.0	130	----
		chromium, total	7440-47-3	E420	0.469 mg/L	0.4 mg/L	117	70.0	130	----
		cobalt, total	7440-48-4	E420	0.234 mg/L	0.2 mg/L	117	70.0	130	----
		copper, total	7440-50-8	E420	0.240 mg/L	0.2 mg/L	120	70.0	130	----
		iron, total	7439-89-6	E420	23.8 mg/L	20 mg/L	119	70.0	130	----
		lead, total	7439-92-1	E420	0.251 mg/L	0.2 mg/L	125	70.0	130	----
		magnesium, total	7439-95-4	E420	ND mg/L	10 mg/L	ND	70.0	130	----
		manganese, total	7439-96-5	E420	ND mg/L	0.2 mg/L	ND	70.0	130	----
		molybdenum, total	7439-98-7	E420	0.246 mg/L	0.2 mg/L	123	70.0	130	----
		nickel, total	7440-02-0	E420	0.462 mg/L	0.4 mg/L	116	70.0	130	----
		phosphorus, total	7723-14-0	E420	124 mg/L	100 mg/L	124	70.0	130	----
		potassium, total	7440-09-7	E420	50.6 mg/L	40 mg/L	126	70.0	130	----
		rubidium, total	7440-17-7	E420	0.245 mg/L	0.2 mg/L	122	70.0	130	----
		selenium, total	7782-49-2	E420	0.507 mg/L	0.4 mg/L	127	70.0	130	----
		silicon, total	7440-21-3	E420	122 mg/L	100 mg/L	122	70.0	130	----
		silver, total	7440-22-4	E420	0.0522 mg/L	0.04 mg/L	130	70.0	130	----
		sodium, total	7440-23-5	E420	ND mg/L	20 mg/L	ND	70.0	130	----
		strontium, total	7440-24-6	E420	ND mg/L	0.2 mg/L	ND	70.0	130	----
		tellurium, total	13494-80-9	E420	0.487 mg/L	0.4 mg/L	122	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Total Metals (QCLot: 554041) - continued										
CG2208608-003	Anonymous	thallium, total	7440-28-0	E420	0.0480 mg/L	0.04 mg/L	120	70.0	130	----
		thorium, total	7440-29-1	E420	0.254 mg/L	0.2 mg/L	127	70.0	130	----
		tin, total	7440-31-5	E420	0.234 mg/L	0.2 mg/L	117	70.0	130	----
		titanium, total	7440-32-6	E420	0.449 mg/L	0.4 mg/L	112	70.0	130	----
		tungsten, total	7440-33-7	E420	0.237 mg/L	0.2 mg/L	118	70.0	130	----
		uranium, total	7440-61-1	E420	0.0490 mg/L	0.04 mg/L	122	70.0	130	----
		vanadium, total	7440-62-2	E420	1.19 mg/L	1 mg/L	119	70.0	130	----
		zinc, total	7440-66-6	E420	4.65 mg/L	4 mg/L	116	70.0	130	----
		zirconium, total	7440-67-7	E420	0.500 mg/L	0.4 mg/L	125	70.0	130	----
Dissolved Metals (QCLot: 554698)										
CG2208527-002	Anonymous	aluminum, dissolved	7429-90-5	E421	1.97 mg/L	2 mg/L	98.4	70.0	130	----
		antimony, dissolved	7440-36-0	E421	0.224 mg/L	0.2 mg/L	112	70.0	130	----
		arsenic, dissolved	7440-38-2	E421	0.196 mg/L	0.2 mg/L	98.1	70.0	130	----
		barium, dissolved	7440-39-3	E421	0.200 mg/L	0.2 mg/L	100	70.0	130	----
		beryllium, dissolved	7440-41-7	E421	0.405 mg/L	0.4 mg/L	101	70.0	130	----
		bismuth, dissolved	7440-69-9	E421	0.100 mg/L	0.1 mg/L	100	70.0	130	----
		boron, dissolved	7440-42-8	E421	1.08 mg/L	1 mg/L	108	70.0	130	----
		cadmium, dissolved	7440-43-9	E421	0.0410 mg/L	0.04 mg/L	102	70.0	130	----
		calcium, dissolved	7440-70-2	E421	ND mg/L	40 mg/L	ND	70.0	130	----
		cesium, dissolved	7440-46-2	E421	0.104 mg/L	0.1 mg/L	104	70.0	130	----
		chromium, dissolved	7440-47-3	E421	0.386 mg/L	0.4 mg/L	96.6	70.0	130	----
		cobalt, dissolved	7440-48-4	E421	0.198 mg/L	0.2 mg/L	99.2	70.0	130	----
		copper, dissolved	7440-50-8	E421	0.197 mg/L	0.2 mg/L	98.5	70.0	130	----
		iron, dissolved	7439-89-6	E421	19.8 mg/L	20 mg/L	99.0	70.0	130	----
		lead, dissolved	7439-92-1	E421	0.203 mg/L	0.2 mg/L	101	70.0	130	----
		lithium, dissolved	7439-93-2	E421	1.09 mg/L	1 mg/L	109	70.0	130	----
		magnesium, dissolved	7439-95-4	E421	ND mg/L	10 mg/L	ND	70.0	130	----
		manganese, dissolved	7439-96-5	E421	0.202 mg/L	0.2 mg/L	101	70.0	130	----
		molybdenum, dissolved	7439-98-7	E421	0.214 mg/L	0.2 mg/L	107	70.0	130	----
		nickel, dissolved	7440-02-0	E421	0.389 mg/L	0.4 mg/L	97.2	70.0	130	----
		phosphorus, dissolved	7723-14-0	E421	101 mg/L	100 mg/L	101	70.0	130	----
		potassium, dissolved	7440-09-7	E421	39.9 mg/L	40 mg/L	99.8	70.0	130	----
		rubidium, dissolved	7440-17-7	E421	0.199 mg/L	0.2 mg/L	99.7	70.0	130	----
		silicon, dissolved	7440-21-3	E421	98.8 mg/L	100 mg/L	98.8	70.0	130	----
		silver, dissolved	7440-22-4	E421	0.0442 mg/L	0.04 mg/L	110	70.0	130	----
		sodium, dissolved	7440-23-5	E421	ND mg/L	20 mg/L	ND	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Dissolved Metals (QCLot: 554698) - continued										
CG2208527-002	Anonymous	strontium, dissolved	7440-24-6	E421	ND mg/L	0.2 mg/L	ND	70.0	130	----
		sulfur, dissolved	7704-34-9	E421	192 mg/L	200 mg/L	96.1	70.0	130	----
		tellurium, dissolved	13494-80-9	E421	0.433 mg/L	0.4 mg/L	108	70.0	130	----
		thallium, dissolved	7440-28-0	E421	0.0400 mg/L	0.04 mg/L	100	70.0	130	----
		thorium, dissolved	7440-29-1	E421	0.204 mg/L	0.2 mg/L	102	70.0	130	----
		tin, dissolved	7440-31-5	E421	0.210 mg/L	0.2 mg/L	105	70.0	130	----
		titanium, dissolved	7440-32-6	E421	0.406 mg/L	0.4 mg/L	101	70.0	130	----
		tungsten, dissolved	7440-33-7	E421	0.210 mg/L	0.2 mg/L	105	70.0	130	----
		uranium, dissolved	7440-61-1	E421	0.0406 mg/L	0.04 mg/L	102	70.0	130	----
		vanadium, dissolved	7440-62-2	E421	1.04 mg/L	1 mg/L	104	70.0	130	----
		zinc, dissolved	7440-66-6	E421	3.67 mg/L	4 mg/L	91.8	70.0	130	----
		zirconium, dissolved	7440-67-7	E421	0.421 mg/L	0.4 mg/L	105	70.0	130	----

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

COC # _____

Page 1 of 1

Report to:		**Report Format / Distribution**		**Service Requested:** (rush - subject to availability)
Company:	MOUNT POLLEY MINING CORP.	☑ Standard ☑ Other		◉ Regular (Default)
Contact:	Kala Ivens	☑ PDF ☑ Excel ☐ Digital ☐ Fax		○ Priority (2-3 Business Days) - 50% Surcharge
Address:	PO BOX 12, Likely, BC, V0L 1N0	Email 1:	mxu@golder.com	○ Emergency (1 Business Day) - 100% Surcharge
		Email 2:		○ For Emergency < 1 Day, ASAP or Weekend - Contact ALS
Phone:	250-790-2215 Fax:			
Invoice To:	Same as Report ? ◉ Yes ○ No	**Client / Project Information:**		**Analysis Request**
Company:	ernie.guevarra@imperialmetals.com	Job #:	21452039/31400/31427	Please indicate below Filtered, Preserved or both (F, P, F/P)
Contact:		PO / AFE:		
Address:		Legal Site Description:		
Phone:	Fax:	Quote #:	MPMC100 / CG2021MPMC1000001	
Lab Work Order # (lab use only)		**ALS Contact:**	Can Dang	**Sampler:**

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Sulphate	Nitrate	Sulphide (dissolved)	Ammonia	Total Phosphorus	Total Metals	Dissolved Se (E423BSe)	Dissolved Metals	Turbidity	TSS	BOD	Total Organic Carbon	Number of Containers
										P	P/F	P/F				P	
	SRF-04-Jul-2022	04-Jul-22	10:15	Water		X				X	X	X				X	

Environmental Division
Calgary
Work Order Reference
CG2208648

Telephone : +1 403 407 1800

Special Instructions / Regulations / Hazardous Details

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)		SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)		
Released by:	Date & Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date & Time:	Observations: Yes / No ? If Yes attach SIF
			7/14	14:45	16			

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **CG2208996**	Page	: 1 of 3
Client	: **Golder Associates Ltd.**	Laboratory	: Calgary - Environmental
Contact	: Michelle Xu	Account Manager	: Patryk Wojciak
Address	: 2800, 700 - 2nd Street SW Calgary AB Canada T2P 2W2	Address	: 2559 29th Street NE Calgary AB Canada T1Y 7B5
Telephone	: 403 874-3411	Telephone	: +1 403 407 1800
Project	: 21452039/31400/31427	Date Samples Received	: 11-Jul-2022 16:25
PO	: 5590008044	Date Analysis Commenced	: 12-Jul-2022
C-O-C number	: ----	Issue Date	: 19-Jul-2022 14:38
Sampler	: ----		
Site	: ----		
Quote number	: CG21-MPMC100-0001		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Elke Tabora		Inorganics, Calgary, Alberta
Millicent Brentnall	Laboratory Analyst	Metals, Calgary, Alberta
Sara Niroomand		Metals, Calgary, Alberta
Shirley Li		Metals, Calgary, Alberta
Vladka Stamenova	Analyst	Inorganics, Calgary, Alberta

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

Unit	*Description*
-	No Unit
mg/L	milligrams per litre

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Qualifiers

Qualifier	*Description*
DLDS	*Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.*

Analytical Results

Sub-Matrix: **Water** (Matrix: **Water**)					Client sample ID	SRF-11-Jul-2022	----	----	----	----
					Client sampling date / time	11-Jul-2022 01:00	----	----	----	----
Analyte	*CAS Number*	*Method*	*LOR*	*Unit*	**CG2208996-001**	--------	--------	--------	--------
					Result	----	----	----	----
Anions and Nutrients									
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	<0.0050 DLDS	----	----	----	----
Organic / Inorganic Carbon									
carbon, total organic [TOC]	----	E355-L	0.50	mg/L	4.34	----	----	----	----
Metals									
selenium, dissolved	7782-49-2	E423BSe	0.000050	mg/L	0.000861	----	----	----	----
Total Metals									
selenium, total	7782-49-2	E420	0.000050	mg/L	0.000562	----	----	----	----
Dissolved Metals									
dissolved metals filtration location	----	EP423	-	-	Field	----	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **CG2208996**	Page	: 1 of 5
Client	: **Golder Associates Ltd.**	Laboratory	: Calgary - Environmental
Contact	: Michelle Xu	Account Manager	: Patryk Wojciak
Address	: 2800, 700 - 2nd Street SW Calgary AB Canada T2P 2W2	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: 21452039/31400/31427	Date Samples Received	: 11-Jul-2022 16:25
PO	: 5590008044	Issue Date	: 19-Jul-2022 14:38
C-O-C number	: ----		
Sampler	: ----		
Site	: ----		
Quote number	: CG21-MPMC100-0001		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
SRF-11-Jul-2022	E235.NO3-L	11-Jul-2022	----	----	----		12-Jul-2022	3 days	2 days	✓
Metals : Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS										
Amber glass vial dissolved (nitric acid)										
SRF-11-Jul-2022	E423BSe	11-Jul-2022	13-Jul-2022	----	----		14-Jul-2022	180 days	3 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid)										
SRF-11-Jul-2022	E355-L	11-Jul-2022	17-Jul-2022	----	----		18-Jul-2022	28 days	7 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid)										
SRF-11-Jul-2022	E420	11-Jul-2022	----	----	----		16-Jul-2022	180 days	5 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	561192	1	8	12.5	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	559262	1	15	6.6	5.0	✓
Total Metals in Water by CRC ICPMS	E420	563758	1	19	5.2	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	565960	1	8	12.5	5.0	✓
Laboratory Control Samples (LCS)							
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	561192	1	8	12.5	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	559262	1	15	6.6	5.0	✓
Total Metals in Water by CRC ICPMS	E420	563758	1	19	5.2	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	565960	1	8	12.5	5.0	✓
Method Blanks (MB)							
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	561192	1	8	12.5	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	559262	1	15	6.6	5.0	✓
Total Metals in Water by CRC ICPMS	E420	563758	1	19	5.2	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	565960	1	8	12.5	5.0	✓
Matrix Spikes (MS)							
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	561192	1	8	12.5	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	559262	1	15	6.6	5.0	✓
Total Metals in Water by CRC ICPMS	E420	563758	1	19	5.2	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	565960	1	8	12.5	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Nitrate in Water by IC (Low Level)	E235.NO3-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L Calgary - Environmental	Water	APHA 5310 B (mod)	Total Organic Carbon (Non-Purgeable), also known as NPOC (total), is a direct measurement of TOC after an acidified sample has been purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO_2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of total carbon (TC) is comprised of IC (which is common), this method is more accurate and more reliable than the TOC by subtraction method (i.e. TC minus TIC).
Total Metals in Water by CRC ICPMS	E420 Calgary - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe Calgary - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45um), digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS with matrix matching (carbon).

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Total Organic Carbon by Combustion	EP355 Calgary - Environmental	Water		Preparation for Total Organic Carbon by Combustion
Dissolved Metals Water Digestion and Filtration	EP423 Calgary - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um) and digested with nitric and hydrochloric acids.

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **CG2208996**	Page	: 1 of 4
Client	: Golder Associates Ltd.	Laboratory	: Calgary - Environmental
Contact	: Michelle Xu	Account Manager	: Patryk Wojciak
Address	: PO BOX 12 Likely BC Canada V0L 1N0	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: 21452039/31400/31427	Date Samples Received	: 11-Jul-2022 16:25
PO	: 5590008044	Date Analysis Commenced	: 12-Jul-2022
C-O-C number	: ----	Issue Date	: 19-Jul-2022 14:38
Sampler	: ----		
Site	: ----		
Quote number	: CG21-MPMC100-0001		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Elke Tabora		Calgary Inorganics, Calgary, Alberta
Millicent Brentnall	Laboratory Analyst	Calgary Metals, Calgary, Alberta
Sara Niroomand		Calgary Metals, Calgary, Alberta
Shirley Li		Calgary Metals, Calgary, Alberta
Vladka Stamenova	Analyst	Calgary Inorganics, Calgary, Alberta

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Anions and Nutrients (QC Lot: 559262)											
CG2209000-012	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	0.0250	mg/L	27.2	27.2	0.141%	20%	----
Organic / Inorganic Carbon (QC Lot: 565960)											
CG2208996-001	SRF-11-Jul-2022	carbon, total organic [TOC]	----	E355-L	0.50	mg/L	4.34	4.28	0.06	Diff <2x LOR	----
Total Metals (QC Lot: 563758)											
CG2208945-005	Anonymous	selenium, total	7782-49-2	E420	0.000100	mg/L	5.20 µg/L	0.00524	0.802%	20%	----
Dissolved Metals (QC Lot: 561192)											
CG2208940-003	Anonymous	selenium, dissolved	7782-49-2	E423BSe	0.000100	mg/L	0.00948	0.00917	3.24%	20%	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Anions and Nutrients (QCLot: 559262)						
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Organic / Inorganic Carbon (QCLot: 565960)						
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	<0.50	----
Total Metals (QCLot: 563758)						
selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
Dissolved Metals (QCLot: 561192)						
selenium, dissolved	7782-49-2	E423BSe	0.00005	mg/L	<0.000050	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Anions and Nutrients (QCLot: 559262)									
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	109	90.0	110	----
Organic / Inorganic Carbon (QCLot: 565960)									
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	8.57 mg/L	81.0	80.0	120	----
Total Metals (QCLot: 563758)									
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	94.8	80.0	120	----
selenium, dissolved	7782-49-2	E423BSe	0.00005	mg/L	1 mg/L	97.6	80.0	120	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 559262)										
CG2209000-013	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	2.59 mg/L	2.5 mg/L	104	75.0	125	----
Organic / Inorganic Carbon (QCLot: 565960)										
CG2208996-001	SRF-11-Jul-2022	carbon, total organic [TOC]	----	E355-L	5.18 mg/L	5 mg/L	104	70.0	130	----
Total Metals (QCLot: 563758)										
CG2208947-001	Anonymous	selenium, total	7782-49-2	E420	0.391 mg/L	0.4 mg/L	97.7	70.0	130	----
Dissolved Metals (QCLot: 561192)										
CG2208940-003	Anonymous	selenium, dissolved	7782-49-2	E423BSe	0.416 mg/L	0.4 mg/L	104	70.0	130	----

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878
www.alsglobal.com

COC # _____

Page 1 of 1

Report to:		**Report Format / Distribution**		**Service Requested:** (rush - subject to availability)
Company:	MOUNT POLLEY MINING CORP.	☑ Standard ☑ Other		◉ Regular (Default)
Contact:	Kala Ivens	☑ PDF ☑ Excel ☐ Digital ☐ Fax		○ Priority (2-3 Business Days) - 50% Surcharge
Address:	PO BOX 12, Likely, BC, V0L 1N0	Email 1:	mxu@golder.com	○ Emergency (1 Business Day) - 100% Surcharge
		Email 2:		○ For Emergency < 1 Day, ASAP or Weekend - Contact ALS
Phone:	250-790-2215 Fax:			**Analysis Request**
Invoice To:	Same as Report ? ◉ Yes ○ No	**Client / Project Information:**		Please indicate below Filtered, Preserved or both (F, P, F/P)
Company:	ernie.guevarra@imperialmetals.com	Job #:	21452039/31400/31427	
Contact:		PO / AFE:		
Address:		Legal Site Description:		
Phone:	Fax:	Quote #:	MPMC100 / CG2021MPMC1000001	
Lab Work Order # (lab use only)		**ALS Contact:**	Can Dang	**Sampler:**

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Sulphate	Nitrate	Sulphide (dissolved)	Ammonia	Total Phosphorus	Total Se	Dissolved Se (E423BSe)	Dissolved Metals	Turbidity	TSS	BOD	Total Organic Carbon	Number of Containers
	SRF-11-Jul-2022	11-Jul-22	1:60	Water		X				X	X					X	

Environmental Division
Calgary
Work Order Reference
CG2208996

Telephone : +1 403 407 1800

Special Instructions / Regulations / Hazardous Details

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)		SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)		
Released by:	Date & Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date & Time:	Observations: Yes / No ? If Yes attach SIF
			7/11	16:25	15			

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **CG2209480**	Page	: 1 of 5
Amendment	: **1**		
Client	: **Golder Associates Ltd.**	Laboratory	: Calgary - Environmental
Contact	: Michelle Xu	Account Manager	: Patryk Wojciak
Address	: 2800, 700 - 2nd Street SW Calgary AB Canada T2P 2W2	Address	: 2559 29th Street NE Calgary AB Canada T1Y 7B5
Telephone	: 403 874-3411	Telephone	: +1 403 407 1800
Project	: 21452039/31400/31427	Date Samples Received	: 19-Jul-2022 13:05
PO	: 5590008044	Date Analysis Commenced	: 20-Jul-2022
C-O-C number	: ----	Issue Date	: 31-Jul-2022 09:03
Sampler	: DS		
Site	: ----		
Quote number	: CG21-MPMC100-0001		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Angela Ren	Team Leader - Metals	Metals, Burnaby, British Columbia
Anthony Calero	Team Leader - Inorganics	Inorganics, Calgary, Alberta
Anthony Calero	Team Leader - Inorganics	Metals, Calgary, Alberta
Elke Tabora		Inorganics, Calgary, Alberta
Summie Lo	Lab Assistant	Metals, Calgary, Alberta

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

Unit	*Description*
-	No Unit
mg/L	milligrams per litre

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Sample Comments

Sample	Client Id	*Comment*
CG2209480-001	SRF-18-Jul-2022	**Received extra sample for D-met HDPE bottle, sample on HOLD**

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	SRF-18-Jul-2022	----	----	----	----
					Client sampling date / time	18-Jul-2022 11:00	----	----	----	----
					CG2209480-001	--------	--------	--------	--------	--------
					Result	----	----	----	----
Anions and Nutrients										
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	0.0262	----	----	----	----
Organic / Inorganic Carbon										
carbon, total organic [TOC]	----	E355-L	0.50	mg/L	5.20	----	----	----	----
Metals										
selenium, dissolved	7782-49-2	E423BSe	0.000050	mg/L	0.000863	----	----	----	----
Total Metals										
aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0081	----	----	----	----
antimony, total	7440-36-0	E420	0.00010	mg/L	<0.00010	----	----	----	----
arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00116	----	----	----	----
barium, total	7440-39-3	E420	0.00010	mg/L	0.0283	----	----	----	----
beryllium, total	7440-41-7	E420	0.000020	mg/L	<0.000020	----	----	----	----
bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	----	----	----	----
boron, total	7440-42-8	E420	0.010	mg/L	0.082	----	----	----	----
cadmium, total	7440-43-9	E420	0.0000050	mg/L	0.0000077	----	----	----	----
calcium, total	7440-70-2	E420	0.050	mg/L	259	----	----	----	----
cesium, total	7440-46-2	E420	0.000010	mg/L	0.000265	----	----	----	----
chromium, total	7440-47-3	E420	0.00050	mg/L	<0.00050	----	----	----	----
cobalt, total	7440-48-4	E420	0.00010	mg/L	0.00018	----	----	----	----
copper, total	7440-50-8	E420	0.00050	mg/L	0.00317	----	----	----	----
iron, total	7439-89-6	E420	0.010	mg/L	0.158	----	----	----	----
lead, total	7439-92-1	E420	0.000050	mg/L	0.000086	----	----	----	----
lithium, total	7439-93-2	E420	0.0010	mg/L	0.0033	----	----	----	----
magnesium, total	7439-95-4	E420	0.0050	mg/L	47.7	----	----	----	----
manganese, total	7439-96-5	E420	0.00010	mg/L	0.144	----	----	----	----
molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.00441	----	----	----	----
nickel, total	7440-02-0	E420	0.00050	mg/L	<0.00050	----	----	----	----
phosphorus, total	7723-14-0	E420	0.050	mg/L	2.07	----	----	----	----
potassium, total	7440-09-7	E420	0.050	mg/L	1.30	----	----	----	----
rubidium, total	7440-17-7	E420	0.00020	mg/L	0.00360	----	----	----	----
selenium, total	7782-49-2	E420	0.000050	mg/L	0.000924	----	----	----	----
silicon, total	7440-21-3	E420	0.10	mg/L	7.88	----	----	----	----

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	SRF-18-Jul-2022	----	----	----	----
					Client sampling date / time	18-Jul-2022 11:00	----	----	----	----
						CG2209480-001	--------	--------	--------	--------
						Result	----	----	----	----
Total Metals										
silver, total	7440-22-4	E420	0.000010	mg/L		<0.000010	----	----	----	----
sodium, total	7440-23-5	E420	0.050	mg/L		14.2	----	----	----	----
strontium, total	7440-24-6	E420	0.00020	mg/L		2.24	----	----	----	----
sulfur, total	7704-34-9	E420	0.50	mg/L		223	----	----	----	----
tellurium, total	13494-80-9	E420	0.00020	mg/L		<0.00020	----	----	----	----
thallium, total	7440-28-0	E420	0.000010	mg/L		<0.000010	----	----	----	----
thorium, total	7440-29-1	E420	0.00010	mg/L		<0.00010	----	----	----	----
tin, total	7440-31-5	E420	0.00010	mg/L		<0.00010	----	----	----	----
titanium, total	7440-32-6	E420	0.00030	mg/L		<0.00030	----	----	----	----
tungsten, total	7440-33-7	E420	0.00010	mg/L		0.00023	----	----	----	----
uranium, total	7440-61-1	E420	0.000010	mg/L		0.000040	----	----	----	----
vanadium, total	7440-62-2	E420	0.00050	mg/L		0.00218	----	----	----	----
zinc, total	7440-66-6	E420	0.0030	mg/L		<0.0030	----	----	----	----
zirconium, total	7440-67-7	E420	0.00020	mg/L		<0.00020	----	----	----	----
Dissolved Metals										
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L		0.0043	----	----	----	----
antimony, dissolved	7440-36-0	E421	0.00010	mg/L		<0.00010	----	----	----	----
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L		0.00098	----	----	----	----
barium, dissolved	7440-39-3	E421	0.00010	mg/L		0.0294	----	----	----	----
beryllium, dissolved	7440-41-7	E421	0.000020	mg/L		<0.000020	----	----	----	----
bismuth, dissolved	7440-69-9	E421	0.000050	mg/L		<0.000050	----	----	----	----
boron, dissolved	7440-42-8	E421	0.010	mg/L		0.067	----	----	----	----
cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L		<0.0000050	----	----	----	----
calcium, dissolved	7440-70-2	E421	0.050	mg/L		236	----	----	----	----
cesium, dissolved	7440-46-2	E421	0.000010	mg/L		0.000256	----	----	----	----
chromium, dissolved	7440-47-3	E421	0.00050	mg/L		<0.00050	----	----	----	----
cobalt, dissolved	7440-48-4	E421	0.00010	mg/L		0.00011	----	----	----	----
copper, dissolved	7440-50-8	E421	0.00020	mg/L		<0.00020	----	----	----	----
iron, dissolved	7439-89-6	E421	0.010	mg/L		0.165	----	----	----	----
lead, dissolved	7439-92-1	E421	0.000050	mg/L		<0.000050	----	----	----	----
lithium, dissolved	7439-93-2	E421	0.0010	mg/L		0.0034	----	----	----	----
magnesium, dissolved	7439-95-4	E421	0.0050	mg/L		45.3	----	----	----	----

Analytical Results

Sub-Matrix: Water (Matrix: Water)					Client sample ID	SRF-18-Jul-2022	----	----	----	----
					Client sampling date / time	18-Jul-2022 11:00	----	----	----	----
Analyte	CAS Number	Method	LOR	Unit		CG2209480-001	--------	--------	--------	--------
						Result	----	----	----	----
Dissolved Metals										
manganese, dissolved	7439-96-5	E421	0.00010	mg/L		0.137	----	----	----	----
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L		0.00200	----	----	----	----
nickel, dissolved	7440-02-0	E421	0.00050	mg/L		<0.00050	----	----	----	----
phosphorus, dissolved	7723-14-0	E421	0.050	mg/L		2.31	----	----	----	----
potassium, dissolved	7440-09-7	E421	0.050	mg/L		1.33	----	----	----	----
rubidium, dissolved	7440-17-7	E421	0.00020	mg/L		0.00322	----	----	----	----
silicon, dissolved	7440-21-3	E421	0.050	mg/L		8.58	----	----	----	----
silver, dissolved	7440-22-4	E421	0.000010	mg/L		<0.000010	----	----	----	----
sodium, dissolved	7440-23-5	E421	0.050	mg/L		13.6	----	----	----	----
strontium, dissolved	7440-24-6	E421	0.00020	mg/L		2.10	----	----	----	----
sulfur, dissolved	7704-34-9	E421	0.50	mg/L		191	----	----	----	----
tellurium, dissolved	13494-80-9	E421	0.00020	mg/L		<0.00020	----	----	----	----
thallium, dissolved	7440-28-0	E421	0.000010	mg/L		<0.000010	----	----	----	----
thorium, dissolved	7440-29-1	E421	0.00010	mg/L		<0.00010	----	----	----	----
tin, dissolved	7440-31-5	E421	0.00010	mg/L		<0.00010	----	----	----	----
titanium, dissolved	7440-32-6	E421	0.00030	mg/L		<0.00030	----	----	----	----
tungsten, dissolved	7440-33-7	E421	0.00010	mg/L		0.00021	----	----	----	----
uranium, dissolved	7440-61-1	E421	0.000010	mg/L		0.000040	----	----	----	----
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L		0.00175	----	----	----	----
zinc, dissolved	7440-66-6	E421	0.0010	mg/L		<0.0010	----	----	----	----
zirconium, dissolved	7440-67-7	E421	0.00030	mg/L		<0.00030	----	----	----	----
dissolved metals filtration location	----	EP421	-	-		Field	----	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **CG2209480**	Page	: 1 of 5
Amendment	: 1		
Client	: **Golder Associates Ltd.**	Laboratory	: Calgary - Environmental
Contact	: Michelle Xu	Account Manager	: Patryk Wojciak
Address	: 2800, 700 - 2nd Street SW Calgary AB Canada T2P 2W2	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: 21452039/31400/31427	Date Samples Received	: 19-Jul-2022 13:05
PO	: 5590008044	Issue Date	: 31-Jul-2022 09:03
C-O-C number	: ----		
Sampler	: DS		
Site	: ----		
Quote number	: CG21-MPMC100-0001		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
SRF-18-Jul-2022	E235.NO3-L	18-Jul-2022	----	----	----		20-Jul-2022	3 days	2 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid)										
SRF-18-Jul-2022	E421	18-Jul-2022	29-Jul-2022	----	----		29-Jul-2022	180 days	11 days	✓
Metals : Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS										
HDPE dissolved (nitric acid)										
SRF-18-Jul-2022	E423BSe	18-Jul-2022	23-Jul-2022	----	----		26-Jul-2022	180 days	8 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid)										
SRF-18-Jul-2022	E355-L	18-Jul-2022	21-Jul-2022	----	----		21-Jul-2022	28 days	3 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid)										
SRF-18-Jul-2022	E420	18-Jul-2022	----	----	----		25-Jul-2022	180 days	7 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	573980	1	2	50.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	583200	1	20	5.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	570047	1	18	5.5	5.0	✓
Total Metals in Water by CRC ICPMS	E420	574381	1	20	5.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	572262	1	8	12.5	5.0	✓
Laboratory Control Samples (LCS)							
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	573980	1	2	50.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	583200	1	20	5.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	570047	1	18	5.5	5.0	✓
Total Metals in Water by CRC ICPMS	E420	574381	1	20	5.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	572262	1	8	12.5	5.0	✓
Method Blanks (MB)							
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	573980	1	2	50.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	583200	1	20	5.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	570047	1	18	5.5	5.0	✓
Total Metals in Water by CRC ICPMS	E420	574381	1	20	5.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	572262	1	8	12.5	5.0	✓
Matrix Spikes (MS)							
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	573980	1	2	50.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	583200	1	20	5.0	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	570047	1	18	5.5	5.0	✓
Total Metals in Water by CRC ICPMS	E420	574381	1	20	5.0	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	572262	1	8	12.5	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Nitrate in Water by IC (Low Level)	E235.NO3-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L Calgary - Environmental	Water	APHA 5310 B (mod)	Total Organic Carbon (Non-Purgeable), also known as NPOC (total), is a direct measurement of TOC after an acidified sample has been purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO_2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of total carbon (TC) is comprised of IC (which is common), this method is more accurate and more reliable than the TOC by subtraction method (i.e. TC minus TIC).
Total Metals in Water by CRC ICPMS	E420 Calgary - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Dissolved Metals in Water by CRC ICPMS	E421 Calgary - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe Vancouver - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45um), digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS with matrix matching (carbon).

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Total Organic Carbon by Combustion	EP355 Calgary - Environmental	Water		Preparation for Total Organic Carbon by Combustion
Dissolved Metals Water Filtration	EP421 Calgary - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.
Dissolved Metals Water Digestion and Filtration	EP423 Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um) and digested with nitric and hydrochloric acids.

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **CG2209480**	Page	: 1 of 14
Amendment	: **1**		
Client	: Golder Associates Ltd.	Laboratory	: Calgary - Environmental
Contact	: Michelle Xu	Account Manager	: Patryk Wojciak
Address	: PO BOX 12 Likely BC Canada V0L 1N0	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: 21452039/31400/31427	Date Samples Received	: 19-Jul-2022 13:05
PO	: 5590008044	Date Analysis Commenced	: 20-Jul-2022
C-O-C number	: ----	Issue Date	: 31-Jul-2022 09:03
Sampler	: DS		
Site	: ----		
Quote number	: CG21-MPMC100-0001		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Angela Ren	Team Leader - Metals	Vancouver Metals, Burnaby, British Columbia
Anthony Calero	Team Leader - Inorganics	Calgary Inorganics, Calgary, Alberta
Anthony Calero	Team Leader - Inorganics	Calgary Metals, Calgary, Alberta
Elke Tabora		Calgary Inorganics, Calgary, Alberta
Summie Lo	Lab Assistant	Calgary Metals, Calgary, Alberta

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Anions and Nutrients (QC Lot: 570047)											
CG2209449-001	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	13.8	13.8	0.133%	20%	----
Organic / Inorganic Carbon (QC Lot: 572262)											
CG2209480-001	SRF-18-Jul-2022	carbon, total organic [TOC]	----	E355-L	0.50	mg/L	5.20	5.87	12.1%	20%	----
Total Metals (QC Lot: 574381)											
CG2209436-001	Anonymous	aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0033	<0.0030	0.0003	Diff <2x LOR	----
		antimony, total	7440-36-0	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		arsenic, total	7440-38-2	E420	0.00010	mg/L	<0.00010	0.00011	0.000007	Diff <2x LOR	----
		barium, total	7440-39-3	E420	0.00010	mg/L	0.0688	0.0688	0.0482%	20%	----
		beryllium, total	7440-41-7	E420	0.000020	mg/L	<0.020 µg/L	<0.000020	0	Diff <2x LOR	----
		bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, total	7440-42-8	E420	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		cadmium, total	7440-43-9	E420	0.0000050	mg/L	0.0050 µg/L	<0.0000050	0.00000002	Diff <2x LOR	----
		calcium, total	7440-70-2	E420	0.050	mg/L	56.8	57.6	1.49%	20%	----
		cesium, total	7440-46-2	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		chromium, total	7440-47-3	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		cobalt, total	7440-48-4	E420	0.00010	mg/L	<0.10 µg/L	<0.00010	0	Diff <2x LOR	----
		copper, total	7440-50-8	E420	0.00050	mg/L	0.00332	0.00314	0.00018	Diff <2x LOR	----
		iron, total	7439-89-6	E420	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		lead, total	7439-92-1	E420	0.000050	mg/L	0.000116	0.000115	0.0000004	Diff <2x LOR	----
		lithium, total	7439-93-2	E420	0.0010	mg/L	0.0030	0.0029	0.00002	Diff <2x LOR	----
		magnesium, total	7439-95-4	E420	0.0050	mg/L	15.7	15.0	4.70%	20%	----
		manganese, total	7439-96-5	E420	0.00010	mg/L	0.00155	0.00136	13.1%	20%	----
		molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.000895	0.000888	0.771%	20%	----
		nickel, total	7440-02-0	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		phosphorus, total	7723-14-0	E420	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		potassium, total	7440-09-7	E420	0.050	mg/L	0.431	0.424	0.007	Diff <2x LOR	----
		rubidium, total	7440-17-7	E420	0.00020	mg/L	0.00021	0.00020	0.000006	Diff <2x LOR	----
		selenium, total	7782-49-2	E420	0.000050	mg/L	6.06 µg/L	0.00604	0.411%	20%	----
		silicon, total	7440-21-3	E420	0.10	mg/L	2.06	2.00	3.03%	20%	----
		silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, total	7440-23-5	E420	0.050	mg/L	1.35	1.30	3.91%	20%	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Total Metals (QC Lot: 574381) - continued											
CG2209436-001	Anonymous	strontium, total	7440-24-6	E420	0.00020	mg/L	0.226	0.229	1.65%	20%	----
		sulfur, total	7704-34-9	E420	0.50	mg/L	17.6	17.4	0.736%	20%	----
		tellurium, total	13494-80-9	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		thorium, total	7440-29-1	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		titanium, total	7440-32-6	E420	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
		tungsten, total	7440-33-7	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		uranium, total	7440-61-1	E420	0.000010	mg/L	0.000818	0.000836	2.17%	20%	----
		vanadium, total	7440-62-2	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		zinc, total	7440-66-6	E420	0.0030	mg/L	0.0063	0.0057	0.0006	Diff <2x LOR	----
		zirconium, total	7440-67-7	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 573980)											
CG2209480-001	SRF-18-Jul-2022	selenium, dissolved	7782-49-2	E423BSe	0.000050	mg/L	0.000863	0.000818	5.46%	20%	----
Dissolved Metals (QC Lot: 583200)											
CG2209958-001	Anonymous	aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0026	0.0027	0.0001	Diff <2x LOR	----
		antimony, dissolved	7440-36-0	E421	0.00010	mg/L	0.00124	0.00125	0.555%	20%	----
		arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00019	0.00020	0.00001	Diff <2x LOR	----
		barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0805	0.0815	1.23%	20%	----
		beryllium, dissolved	7440-41-7	E421	0.000020	mg/L	<0.020 µg/L	<0.000020	0	Diff <2x LOR	----
		bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, dissolved	7440-42-8	E421	0.010	mg/L	0.020	0.020	0.0003	Diff <2x LOR	----
		cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	0.0396 µg/L	0.0000470	0.0000075	Diff <2x LOR	----
		calcium, dissolved	7440-70-2	E421	0.050	mg/L	87.7	86.6	1.22%	20%	----
		cesium, dissolved	7440-46-2	E421	0.000010	mg/L	0.000026	0.000024	0.000002	Diff <2x LOR	----
		chromium, dissolved	7440-47-3	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	0.29 µg/L	0.00029	0.0000010	Diff <2x LOR	----
		copper, dissolved	7440-50-8	E421	0.00020	mg/L	0.00218	0.00216	0.976%	20%	----
		iron, dissolved	7439-89-6	E421	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.0651	0.0635	2.56%	20%	----
		magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	72.4	72.4	0.0832%	20%	----
		manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.00016	0.00015	0.000005	Diff <2x LOR	----
		molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.00934	0.00933	0.0582%	20%	----
		nickel, dissolved	7440-02-0	E421	0.00050	mg/L	0.00441	0.00437	0.00004	Diff <2x LOR	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Dissolved Metals (QC Lot: 583200) - continued											
CG2209958-001	Anonymous	phosphorus, dissolved	7723-14-0	E421	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		potassium, dissolved	7440-09-7	E421	0.050	mg/L	2.62	2.66	1.41%	20%	----
		rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	0.00203	0.00204	0.664%	20%	----
		silicon, dissolved	7440-21-3	E421	0.050	mg/L	0.766	0.764	0.265%	20%	----
		silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, dissolved	7440-23-5	E421	0.050	mg/L	4.30	4.32	0.534%	20%	----
		strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.142	0.142	0.0313%	20%	----
		sulfur, dissolved	7704-34-9	E421	0.50	mg/L	140	142	1.14%	20%	----
		tellurium, dissolved	13494-80-9	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		thallium, dissolved	7440-28-0	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		thorium, dissolved	7440-29-1	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		tin, dissolved	7440-31-5	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		titanium, dissolved	7440-32-6	E421	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
		tungsten, dissolved	7440-33-7	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.00518	0.00520	0.371%	20%	----
		vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		zinc, dissolved	7440-66-6	E421	0.0010	mg/L	0.0017	0.0017	0.000010	Diff <2x LOR	----
		zirconium, dissolved	7440-67-7	E421	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Anions and Nutrients (QCLot: 570047)						
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Organic / Inorganic Carbon (QCLot: 572262)						
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	<0.50	----
Total Metals (QCLot: 574381)						
aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----
antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
cesium, total	7440-46-2	E420	0.00001	mg/L	<0.000010	----
chromium, total	7440-47-3	E420	0.0005	mg/L	<0.00050	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	----
magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	----
manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	<0.050	----
potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
rubidium, total	7440-17-7	E420	0.0002	mg/L	<0.00020	----
selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
silicon, total	7440-21-3	E420	0.1	mg/L	<0.10	----
silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	----
sodium, total	7440-23-5	E420	0.05	mg/L	<0.050	----
strontium, total	7440-24-6	E420	0.0002	mg/L	<0.00020	----
sulfur, total	7704-34-9	E420	0.5	mg/L	<0.50	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 574381) - continued						
tellurium, total	13494-80-9	E420	0.0002	mg/L	<0.00020	----
thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----
thorium, total	7440-29-1	E420	0.0001	mg/L	<0.00010	----
tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----
tungsten, total	7440-33-7	E420	0.0001	mg/L	<0.00010	----
uranium, total	7440-61-1	E420	0.00001	mg/L	<0.000010	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	<0.00050	----
zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	<0.00020	----
Dissolved Metals (QCLot: 573980)						
selenium, dissolved	7782-49-2	E423BSe	0.00005	mg/L	<0.000050	----
Dissolved Metals (QCLot: 583200)						
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	<0.0010	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	<0.00010	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	<0.00010	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	<0.00010	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	<0.000020	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	<0.000050	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	<0.010	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	<0.0000050	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	<0.050	----
cesium, dissolved	7440-46-2	E421	0.00001	mg/L	<0.000010	----
chromium, dissolved	7440-47-3	E421	0.0005	mg/L	<0.00050	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	----
phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	<0.050	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	<0.00020	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 583200) - continued						
silicon, dissolved	7440-21-3	E421	0.05	mg/L	<0.050	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	<0.000010	----
sodium, dissolved	7440-23-5	E421	0.05	mg/L	<0.050	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	<0.00020	----
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	<0.50	----
tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	<0.00020	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----
thorium, dissolved	7440-29-1	E421	0.0001	mg/L	<0.00010	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----
tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	<0.00010	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	<0.000010	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	<0.00050	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	<0.0010	----
zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	<0.00020	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Anions and Nutrients (QCLot: 570047)									
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	101	90.0	110	----
Organic / Inorganic Carbon (QCLot: 572262)									
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	8.57 mg/L	105	80.0	120	----
Total Metals (QCLot: 574381)									
aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	99.5	80.0	120	----
antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	95.8	80.0	120	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	97.1	80.0	120	----
barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	93.0	80.0	120	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	104	80.0	120	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	95.1	80.0	120	----
boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	104	80.0	120	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	95.2	80.0	120	----
calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	92.8	80.0	120	----
cesium, total	7440-46-2	E420	0.00001	mg/L	0.05 mg/L	94.6	80.0	120	----
chromium, total	7440-47-3	E420	0.0005	mg/L	0.25 mg/L	95.8	80.0	120	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	95.2	80.0	120	----
copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	95.4	80.0	120	----
iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	92.7	80.0	120	----
lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	95.8	80.0	120	----
lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	98.5	80.0	120	----
magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	94.6	80.0	120	----
manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	92.1	80.0	120	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	94.2	80.0	120	----
nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	98.9	80.0	120	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	10 mg/L	107	70.0	130	----
potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	98.7	80.0	120	----
rubidium, total	7440-17-7	E420	0.0002	mg/L	0.1 mg/L	102	80.0	120	----
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	93.5	80.0	120	----
silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	98.3	60.0	140	----
silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	90.6	80.0	120	----
sodium, total	7440-23-5	E420	0.05	mg/L	50 mg/L	101	80.0	120	----
strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	93.1	80.0	120	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Total Metals (QCLot: 574381) - continued									
sulfur, total	7704-34-9	E420	0.5	mg/L	50 mg/L	88.1	80.0	120	----
tellurium, total	13494-80-9	E420	0.0002	mg/L	0.1 mg/L	89.9	80.0	120	----
thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	96.0	80.0	120	----
thorium, total	7440-29-1	E420	0.0001	mg/L	0.1 mg/L	93.2	80.0	120	----
tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	95.8	80.0	120	----
titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	95.8	80.0	120	----
tungsten, total	7440-33-7	E420	0.0001	mg/L	0.1 mg/L	96.6	80.0	120	----
uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	95.9	80.0	120	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	98.1	80.0	120	----
zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	93.0	80.0	120	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	0.1 mg/L	93.7	80.0	120	----
Dissolved Metals (QCLot: 573980)									
selenium, dissolved	7782-49-2	E423BSe	0.00005	mg/L	1 mg/L	101	80.0	120	----
Dissolved Metals (QCLot: 583200)									
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	103	80.0	120	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	103	80.0	120	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	99.9	80.0	120	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	106	80.0	120	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	101	80.0	120	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	101	80.0	120	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	105	80.0	120	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	103	80.0	120	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	102	80.0	120	----
cesium, dissolved	7440-46-2	E421	0.00001	mg/L	0.05 mg/L	104	80.0	120	----
chromium, dissolved	7440-47-3	E421	0.0005	mg/L	0.25 mg/L	101	80.0	120	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	100	80.0	120	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	101	80.0	120	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	118	80.0	120	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	102	80.0	120	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	102	80.0	120	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	99.1	80.0	120	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	102	80.0	120	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	104	80.0	120	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	100	80.0	120	----
phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	10 mg/L	108	70.0	130	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	102	80.0	120	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 583200) - continued									
rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	0.1 mg/L	105	80.0	120	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	106	60.0	140	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	82.5	80.0	120	----
sodium, dissolved	7440-23-5	E421	0.05	mg/L	50 mg/L	103	80.0	120	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	104	80.0	120	----
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	50 mg/L	94.4	80.0	120	----
tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	0.1 mg/L	96.4	80.0	120	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	103	80.0	120	----
thorium, dissolved	7440-29-1	E421	0.0001	mg/L	0.1 mg/L	105	80.0	120	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	103	80.0	120	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	94.9	80.0	120	----
tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	0.1 mg/L	101	80.0	120	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	106	80.0	120	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	103	80.0	120	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	102	80.0	120	----
zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	0.1 mg/L	107	80.0	120	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 570047)										
CG2209449-002	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	2.04 mg/L	2.5 mg/L	81.6	75.0	125	----
Organic / Inorganic Carbon (QCLot: 572262)										
CG2209480-001	SRF-18-Jul-2022	carbon, total organic [TOC]	----	E355-L	ND mg/L	5 mg/L	ND	70.0	130	----
Total Metals (QCLot: 574381)										
CG2209437-001	Anonymous	aluminum, total	7429-90-5	E420	1.90 mg/L	2 mg/L	95.2	70.0	130	----
		antimony, total	7440-36-0	E420	0.192 mg/L	0.2 mg/L	95.8	70.0	130	----
		arsenic, total	7440-38-2	E420	0.183 mg/L	0.2 mg/L	91.6	70.0	130	----
		barium, total	7440-39-3	E420	0.182 mg/L	0.2 mg/L	91.2	70.0	130	----
		beryllium, total	7440-41-7	E420	0.382 mg/L	0.4 mg/L	95.6	70.0	130	----
		bismuth, total	7440-69-9	E420	0.0927 mg/L	0.1 mg/L	92.7	70.0	130	----
		boron, total	7440-42-8	E420	0.995 mg/L	1 mg/L	99.5	70.0	130	----
		cadmium, total	7440-43-9	E420	0.0381 mg/L	0.04 mg/L	95.2	70.0	130	----
		calcium, total	7440-70-2	E420	ND mg/L	40 mg/L	ND	70.0	130	----
		cesium, total	7440-46-2	E420	0.0946 mg/L	0.1 mg/L	94.6	70.0	130	----
		chromium, total	7440-47-3	E420	0.375 mg/L	0.4 mg/L	93.8	70.0	130	----
		cobalt, total	7440-48-4	E420	0.183 mg/L	0.2 mg/L	91.6	70.0	130	----
		copper, total	7440-50-8	E420	0.187 mg/L	0.2 mg/L	93.4	70.0	130	----
		iron, total	7439-89-6	E420	18.6 mg/L	20 mg/L	93.1	70.0	130	----
		lead, total	7439-92-1	E420	0.189 mg/L	0.2 mg/L	94.4	70.0	130	----
		lithium, total	7439-93-2	E420	0.953 mg/L	1 mg/L	95.3	70.0	130	----
		magnesium, total	7439-95-4	E420	ND mg/L	10 mg/L	ND	70.0	130	----
		manganese, total	7439-96-5	E420	0.184 mg/L	0.2 mg/L	92.0	70.0	130	----
		molybdenum, total	7439-98-7	E420	0.190 mg/L	0.2 mg/L	95.2	70.0	130	----
		nickel, total	7440-02-0	E420	0.379 mg/L	0.4 mg/L	94.6	70.0	130	----
		phosphorus, total	7723-14-0	E420	96.2 mg/L	100 mg/L	96.2	70.0	130	----
		potassium, total	7440-09-7	E420	37.7 mg/L	40 mg/L	94.2	70.0	130	----
		rubidium, total	7440-17-7	E420	0.196 mg/L	0.2 mg/L	98.0	70.0	130	----
		selenium, total	7782-49-2	E420	0.401 mg/L	0.4 mg/L	100	70.0	130	----
		silicon, total	7440-21-3	E420	98.3 mg/L	100 mg/L	98.3	70.0	130	----
		silver, total	7440-22-4	E420	0.0392 mg/L	0.04 mg/L	98.1	70.0	130	----
		sodium, total	7440-23-5	E420	18.2 mg/L	20 mg/L	90.9	70.0	130	----
		strontium, total	7440-24-6	E420	ND mg/L	0.2 mg/L	ND	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Total Metals (QCLot: 574381) - continued										
CG2209437-001	Anonymous	sulfur, total	7704-34-9	E420	181 mg/L	200 mg/L	90.7	70.0	130	----
		tellurium, total	13494-80-9	E420	0.364 mg/L	0.4 mg/L	91.1	70.0	130	----
		thallium, total	7440-28-0	E420	0.0378 mg/L	0.04 mg/L	94.6	70.0	130	----
		thorium, total	7440-29-1	E420	0.189 mg/L	0.2 mg/L	94.5	70.0	130	----
		tin, total	7440-31-5	E420	0.189 mg/L	0.2 mg/L	94.4	70.0	130	----
		titanium, total	7440-32-6	E420	0.379 mg/L	0.4 mg/L	94.7	70.0	130	----
		tungsten, total	7440-33-7	E420	0.191 mg/L	0.2 mg/L	95.3	70.0	130	----
		uranium, total	7440-61-1	E420	0.0375 mg/L	0.04 mg/L	93.8	70.0	130	----
		vanadium, total	7440-62-2	E420	0.948 mg/L	1 mg/L	94.8	70.0	130	----
		zinc, total	7440-66-6	E420	3.75 mg/L	4 mg/L	93.9	70.0	130	----
		zirconium, total	7440-67-7	E420	0.378 mg/L	0.4 mg/L	94.5	70.0	130	----
Dissolved Metals (QCLot: 573980)										
VA22B6878-009	Anonymous	selenium, dissolved	7782-49-2	E423BSe	0.0424 mg/L	0.04 mg/L	106	70.0	130	----
Dissolved Metals (QCLot: 583200)										
CG2209958-002	Anonymous	aluminum, dissolved	7429-90-5	E421	1.97 mg/L	2 mg/L	98.5	70.0	130	----
		antimony, dissolved	7440-36-0	E421	0.201 mg/L	0.2 mg/L	100	70.0	130	----
		arsenic, dissolved	7440-38-2	E421	0.192 mg/L	0.2 mg/L	96.2	70.0	130	----
		barium, dissolved	7440-39-3	E421	0.198 mg/L	0.2 mg/L	99.1	70.0	130	----
		beryllium, dissolved	7440-41-7	E421	0.383 mg/L	0.4 mg/L	95.8	70.0	130	----
		bismuth, dissolved	7440-69-9	E421	0.0970 mg/L	0.1 mg/L	97.0	70.0	130	----
		boron, dissolved	7440-42-8	E421	0.932 mg/L	1 mg/L	93.2	70.0	130	----
		cadmium, dissolved	7440-43-9	E421	0.0392 mg/L	0.04 mg/L	97.9	70.0	130	----
		calcium, dissolved	7440-70-2	E421	41.3 mg/L	40 mg/L	103	70.0	130	----
		cesium, dissolved	7440-46-2	E421	0.101 mg/L	0.1 mg/L	101	70.0	130	----
		chromium, dissolved	7440-47-3	E421	0.393 mg/L	0.4 mg/L	98.4	70.0	130	----
		cobalt, dissolved	7440-48-4	E421	0.195 mg/L	0.2 mg/L	97.4	70.0	130	----
		copper, dissolved	7440-50-8	E421	0.196 mg/L	0.2 mg/L	98.3	70.0	130	----
		iron, dissolved	7439-89-6	E421	19.8 mg/L	20 mg/L	99.0	70.0	130	----
		lead, dissolved	7439-92-1	E421	0.195 mg/L	0.2 mg/L	97.7	70.0	130	----
		lithium, dissolved	7439-93-2	E421	0.933 mg/L	1 mg/L	93.3	70.0	130	----
		magnesium, dissolved	7439-95-4	E421	ND mg/L	10 mg/L	ND	70.0	130	----
		manganese, dissolved	7439-96-5	E421	0.196 mg/L	0.2 mg/L	98.0	70.0	130	----
		molybdenum, dissolved	7439-98-7	E421	0.204 mg/L	0.2 mg/L	102	70.0	130	----
		nickel, dissolved	7440-02-0	E421	0.394 mg/L	0.4 mg/L	98.6	70.0	130	----
		phosphorus, dissolved	7723-14-0	E421	104 mg/L	100 mg/L	104	70.0	130	----
		potassium, dissolved	7440-09-7	E421	39.0 mg/L	40 mg/L	97.5	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Dissolved Metals (QCLot: 583200) - continued										
CG2209958-002	Anonymous	rubidium, dissolved	7440-17-7	E421	0.201 mg/L	0.2 mg/L	100	70.0	130	----
		silicon, dissolved	7440-21-3	E421	98.2 mg/L	100 mg/L	98.2	70.0	130	----
		silver, dissolved	7440-22-4	E421	0.0425 mg/L	0.04 mg/L	106	70.0	130	----
		sodium, dissolved	7440-23-5	E421	19.1 mg/L	20 mg/L	95.6	70.0	130	----
		strontium, dissolved	7440-24-6	E421	0.193 mg/L	0.2 mg/L	96.7	70.0	130	----
		sulfur, dissolved	7704-34-9	E421	187 mg/L	200 mg/L	93.7	70.0	130	----
		tellurium, dissolved	13494-80-9	E421	0.394 mg/L	0.4 mg/L	98.4	70.0	130	----
		thallium, dissolved	7440-28-0	E421	0.0394 mg/L	0.04 mg/L	98.6	70.0	130	----
		thorium, dissolved	7440-29-1	E421	0.220 mg/L	0.2 mg/L	110	70.0	130	----
		tin, dissolved	7440-31-5	E421	0.198 mg/L	0.2 mg/L	99.1	70.0	130	----
		titanium, dissolved	7440-32-6	E421	0.373 mg/L	0.4 mg/L	93.3	70.0	130	----
		tungsten, dissolved	7440-33-7	E421	0.189 mg/L	0.2 mg/L	94.4	70.0	130	----
		uranium, dissolved	7440-61-1	E421	0.0402 mg/L	0.04 mg/L	100	70.0	130	----
		vanadium, dissolved	7440-62-2	E421	0.981 mg/L	1 mg/L	98.1	70.0	130	----
		zinc, dissolved	7440-66-6	E421	4.00 mg/L	4 mg/L	100	70.0	130	----
		zirconium, dissolved	7440-67-7	E421	0.400 mg/L	0.4 mg/L	100	70.0	130	----

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878
www.alsglobal.com

COC #

Page 1 of 1

Report to:		**Report Format / Distribution**		**Service Requested:** (rush - subject to availability)
Company:	MOUNT POLLEY MINING CORP.	☑ Standard ☑ Other		◉ Regular (Default)
Contact:	Kala Ivens	☑ PDF ☑ Excel ☐ Digital ☐ Fax		○ Priority (2-3 Business Days) - 50% Surcharge
Address:	PO BOX 12, Likely, BC, V0L 1N0	Email 1: mxu@golder.com		○ Emergency (1 Business Day) - 100% Surcharge
		Email 2:		○ For Emergency < 1 Day, ASAP or Weekend - Contact ALS
Phone:	250-790-2215 Fax:			**Analysis Request**
Invoice To:	Same as Report ? ◉ Yes ○ No	**Client / Project Information:**		Please indicate below Filtered, Preserved or both (F, P, F/P)
Company:	ernie.guevarra@imperialmetals.com	Job #: 21452039/31400/31427		
Contact:		PO / AFE: 5590008044		
Address:		Legal Site Description:		
PO: 5590008044				
Phone:	Fax:	Quote #: MPMC100 / CG2021MPMC1000001		
Lab Work Order # (lab use only)		**ALS Contact:** Can Dang	**Sampler:** DS	

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Sulphate	Nitrate	Sulphide (dissolved)	Ammonia	Total Phosphorus	P Total Se	F/P Dissolved Se (E423BSe)	Dissolved Metals	Turbidity	TSS	BOD	P Total Organic Carbon	Number of Containers
	SRF-18-Jul-2022	18-Jul-22	11:00	Water		X				X	X					X	

Environmental Division
Calgary
Work Order Reference
CG2209480

Telephone : +1 403 407 1800

Special Instructions / Regulations / Hazardous Details

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)		SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)		
Released by:	Date & Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date & Time:	Observations: Yes / No ? If Yes attach SIF
D.Sobredo	19 July 2022/ 9:30				10°C	WN	07/19/22 1:08pm	

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **CG2209737**	Page	: 1 of 6
Client	: **Golder Associates Ltd.**	Laboratory	: Calgary - Environmental
Contact	: Michelle Xu	Account Manager	: Patryk Wojciak
Address	: 2800, 700 - 2nd Street SW Calgary AB Canada T2P 2W2	Address	: 2559 29th Street NE Calgary AB Canada T1Y 7B5
Telephone	: 403 874-3411	Telephone	: +1 403 407 1800
Project	: 21452039/31400/31427	Date Samples Received	: 25-Jul-2022 14:04
PO	: 5590008044	Date Analysis Commenced	: 25-Jul-2022
C-O-C number	: ----	Issue Date	: 02-Aug-2022 18:15
Sampler	: ----		
Site	: ----		
Quote number	: CG21-MPMC100-0001		
No. of samples received	: 2		
No. of samples analysed	: 2		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Anthony Calero	Team Leader - Inorganics	Inorganics, Calgary, Alberta
Anthony Calero	Team Leader - Inorganics	Metals, Calgary, Alberta
Dwayne Bennett	Supervisor - Inorganic	Metals, Calgary, Alberta
Elke Tabora		Inorganics, Calgary, Alberta
Harpreet Chawla	Team Leader - Inorganics	Metals, Calgary, Alberta
Katarzyna Glinka	Analyst	Inorganics, Calgary, Alberta
Mackenzie Lamoureux	Laboratory Analyst	Metals, Calgary, Alberta
Maria Tuguinay	Lab Assistant	Inorganics, Calgary, Alberta
Parker Sgarbossa	Laboratory Analyst	Inorganics, Calgary, Alberta
Ruifang Zheng	Analyst	Inorganics, Calgary, Alberta
Sara Niroomand		Inorganics, Calgary, Alberta

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

Unit	*Description*
-	No Unit
mg/L	milligrams per litre
NTU	nephelometric turbidity units

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Qualifiers

Qualifier	*Description*
DLDS	*Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.*
RRV	*Reported result verified by repeat analysis.*

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	SRF-25-JUL-2022	INF-25-JUL-2022	----	----	----
					Client sampling date / time	25-Jul-2022 11:15	25-Jul-2022 11:00	----	----	----
						CG2209737-001	CG2209737-002	--------	--------	--------
						Result	Result	----	----	----
Physical Tests										
alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L		114	75.5	----	----	----
alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L		<1.0	<1.0	----	----	----
alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L		<1.0	<1.0	----	----	----
alkalinity, total (as CaCO3)	----	E290	1.0	mg/L		114	75.5	----	----	----
hardness (as CaCO3), dissolved	----	EC100	0.60	mg/L		830	808	----	----	----
hardness (as CaCO3), from total Ca/Mg	----	EC100A	0.60	mg/L		775	770	----	----	----
solids, total dissolved [TDS]	----	E162	10	mg/L		1270	1240	----	----	----
solids, total suspended [TSS]	----	E160	3.0	mg/L		6.1	<3.0	----	----	----
turbidity	----	E121	0.10	NTU		3.36	0.22	----	----	----
Anions and Nutrients										
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L		0.561	<0.0050	----	----	----
bromide	24959-67-9	E235.Br-L	0.050	mg/L		<0.250 DLDS	<0.250 DLDS	----	----	----
chloride	16887-00-6	E235.Cl-L	0.10	mg/L		3.23	2.93	----	----	----
fluoride	16984-48-8	E235.F	0.020	mg/L		0.214	0.200	----	----	----
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L		0.0767	6.60	----	----	----
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L		0.0190	<0.0050 DLDS	----	----	----
phosphorus, total	7723-14-0	E372-U	0.0020	mg/L		1.14	0.0074	----	----	----
sulfate (as SO4)	14808-79-8	E235.SO4-L	0.050	mg/L		750	759	----	----	----
Organic / Inorganic Carbon										
carbon, total organic [TOC]	----	E355-L	0.50	mg/L		6.35	5.25	----	----	----
Metals										
selenium, dissolved	7782-49-2	E423BSe	0.000050	mg/L		0.00477	0.0886	----	----	----
Total Metals										
aluminum, total	7429-90-5	E420	0.0030	mg/L		0.0110	0.0047	----	----	----
antimony, total	7440-36-0	E420	0.00010	mg/L		<0.00020 DLDS	0.00049	----	----	----
arsenic, total	7440-38-2	E420	0.00010	mg/L		0.00448	0.00126	----	----	----
barium, total	7440-39-3	E420	0.00010	mg/L		0.0305	0.0349	----	----	----
beryllium, total	7440-41-7	E420	0.000020	mg/L		<0.000040 DLDS	<0.000020	----	----	----
bismuth, total	7440-69-9	E420	0.000050	mg/L		<0.000100 DLDS	<0.000050	----	----	----
boron, total	7440-42-8	E420	0.010	mg/L		0.068	0.067	----	----	----
cadmium, total	7440-43-9	E420	0.0000050	mg/L		0.000110	0.0000616	----	----	----

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	SRF-25-JUL-2022	INF-25-JUL-2022	----	----	----
					Client sampling date / time	25-Jul-2022 11:15	25-Jul-2022 11:00	----	----	----
						CG2209737-001	CG2209737-002	--------	--------	--------
						Result	Result	----	----	----
Total Metals										
calcium, total	7440-70-2	E420	0.050	mg/L		236	232	----	----	----
chromium, total	7440-47-3	E420	0.00050	mg/L		<0.00050	<0.00050	----	----	----
cobalt, total	7440-48-4	E420	0.00010	mg/L		0.00200	<0.00010	----	----	----
copper, total	7440-50-8	E420	0.00050	mg/L		0.0865	0.0128	----	----	----
iron, total	7439-89-6	E420	0.010	mg/L		0.718	<0.010	----	----	----
lead, total	7439-92-1	E420	0.000050	mg/L		0.000381	<0.000050	----	----	----
lithium, total	7439-93-2	E420	0.0010	mg/L		0.0038	0.0036	----	----	----
magnesium, total	7439-95-4	E420	0.100	mg/L		45.0	46.2	----	----	----
manganese, total	7439-96-5	E420	0.00010	mg/L		0.177	0.00036	----	----	----
mercury, total	7439-97-6	E508	0.0000050	mg/L		0.0000917 RRV	<0.0000050	----	----	----
molybdenum, total	7439-98-7	E420	0.000050	mg/L		0.0512	0.0787	----	----	----
nickel, total	7440-02-0	E420	0.00050	mg/L		<0.00100 DLDS	<0.00050	----	----	----
phosphorus, total	7723-14-0	E420	0.050	mg/L		1.21	<0.050	----	----	----
potassium, total	7440-09-7	E420	0.100	mg/L		1.34	1.63	----	----	----
selenium, total	7782-49-2	E420	0.000050	mg/L		0.00738	0.100	----	----	----
silicon, total	7440-21-3	E420	0.10	mg/L		7.90	6.49	----	----	----
silver, total	7440-22-4	E420	0.000010	mg/L		0.000022	0.000013	----	----	----
sodium, total	7440-23-5	E420	0.050	mg/L		13.6	13.4	----	----	----
strontium, total	7440-24-6	E420	0.00020	mg/L		2.05	2.30 RRV	----	----	----
sulfur, total	7704-34-9	E420	0.50	mg/L		260 RRV	200	----	----	----
thallium, total	7440-28-0	E420	0.000010	mg/L		<0.000020 DLDS	<0.000010	----	----	----
tin, total	7440-31-5	E420	0.00010	mg/L		<0.00020 DLDS	<0.00010	----	----	----
titanium, total	7440-32-6	E420	0.00030	mg/L		<0.00060 DLDS	<0.00030	----	----	----
uranium, total	7440-61-1	E420	0.000010	mg/L		0.000157	0.000983	----	----	----
vanadium, total	7440-62-2	E420	0.00050	mg/L		0.00198	0.00093	----	----	----
zinc, total	7440-66-6	E420	0.0030	mg/L		<0.0060 DLDS	0.0049	----	----	----
zirconium, total	7440-67-7	E420	0.00020	mg/L		<0.00040 DLDS	<0.00020	----	----	----
Dissolved Metals										
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L		0.0031	0.0020	----	----	----
antimony, dissolved	7440-36-0	E421	0.00010	mg/L		<0.00010	0.00048	----	----	----
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L		0.00392	0.00119	----	----	----
barium, dissolved	7440-39-3	E421	0.00010	mg/L		0.0295	0.0341	----	----	----

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	SRF-25-JUL-2022	INF-25-JUL-2022	----	----	----
					Client sampling date / time	25-Jul-2022 11:15	25-Jul-2022 11:00	----	----	----
						CG2209737-001	CG2209737-002	--------	--------	--------
						Result	Result	----	----	----
Dissolved Metals										
beryllium, dissolved	7440-41-7	E421	0.000020	mg/L		<0.000020	<0.000020	----	----	----
bismuth, dissolved	7440-69-9	E421	0.000050	mg/L		<0.000050	<0.000050	----	----	----
boron, dissolved	7440-42-8	E421	0.010	mg/L		0.065	0.064	----	----	----
cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L		0.0000216	0.0000503	----	----	----
calcium, dissolved	7440-70-2	E421	0.050	mg/L		255	247	----	----	----
chromium, dissolved	7440-47-3	E421	0.00050	mg/L		<0.00050	<0.00050	----	----	----
cobalt, dissolved	7440-48-4	E421	0.00010	mg/L		0.00176	<0.00010	----	----	----
copper, dissolved	7440-50-8	E421	0.00020	mg/L		0.00168	0.0123	----	----	----
iron, dissolved	7439-89-6	E421	0.010	mg/L		0.484	<0.010	----	----	----
lead, dissolved	7439-92-1	E421	0.000050	mg/L		<0.000050	<0.000050	----	----	----
lithium, dissolved	7439-93-2	E421	0.0010	mg/L		0.0038	0.0039	----	----	----
magnesium, dissolved	7439-95-4	E421	0.100	mg/L		47.0	46.5	----	----	----
manganese, dissolved	7439-96-5	E421	0.00010	mg/L		0.188	0.00011	----	----	----
mercury, dissolved	7439-97-6	E509	0.0000050	mg/L		<0.0000050	<0.0000050	----	----	----
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L		0.0426	0.0790	----	----	----
nickel, dissolved	7440-02-0	E421	0.00050	mg/L		<0.00050	<0.00050	----	----	----
phosphorus, dissolved	7723-14-0	E421	0.050	mg/L		1.23	<0.050	----	----	----
potassium, dissolved	7440-09-7	E421	0.100	mg/L		1.31	1.53	----	----	----
silicon, dissolved	7440-21-3	E421	0.050	mg/L		7.62	5.93	----	----	----
silver, dissolved	7440-22-4	E421	0.000010	mg/L		<0.000010	<0.000010	----	----	----
sodium, dissolved	7440-23-5	E421	0.050	mg/L		13.8	13.2	----	----	----
strontium, dissolved	7440-24-6	E421	0.00020	mg/L		2.10 RRV	2.29 RRV	----	----	----
sulfur, dissolved	7704-34-9	E421	0.50	mg/L		283	218	----	----	----
thallium, dissolved	7440-28-0	E421	0.000010	mg/L		<0.000010	<0.000010	----	----	----
tin, dissolved	7440-31-5	E421	0.00010	mg/L		<0.00010	<0.00010	----	----	----
titanium, dissolved	7440-32-6	E421	0.00030	mg/L		<0.00030	<0.00030	----	----	----
uranium, dissolved	7440-61-1	E421	0.000010	mg/L		0.000144	0.000984	----	----	----
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L		0.00146	0.00054	----	----	----
zinc, dissolved	7440-66-6	E421	0.0010	mg/L		0.0037	0.0051	----	----	----
zirconium, dissolved	7440-67-7	E421	0.00020	mg/L		<0.00020	<0.00020	----	----	----
dissolved mercury filtration location	----	EP509	-	-		Field	Field	----	----	----
dissolved metals filtration location	----	EP421	-	-		Field	Field	----	----	----

Analytical Results

Sub-Matrix: **Water** (Matrix: **Water**)					Client sample ID	**SRF-25-JUL-2022**	**INF-25-JUL-2022**	**----**	**----**	**----**
					Client sampling date / time	25-Jul-2022 11:15	25-Jul-2022 11:00	----	----	----
Analyte	*CAS Number*	*Method*	*LOR*	*Unit*		**CG2209737-001**	**CG2209737-002**	--------	--------	--------
						Result	Result	----	----	----
Aggregate Organics										
biochemical oxygen demand [BOD]	----	E550	2.0	mg/L		<2.0	<2.0	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **CG2209737**	Page	: 1 of 12
Client	: **Golder Associates Ltd.**	Laboratory	: Calgary - Environmental
Contact	: Michelle Xu	Account Manager	: Patryk Wojciak
Address	: 2800, 700 - 2nd Street SW Calgary AB Canada T2P 2W2	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: 21452039/31400/31427	Date Samples Received	: 25-Jul-2022 14:04
PO	: 5590008044	Issue Date	: 02-Aug-2022 18:15
C-O-C number	: ----		
Sampler	: ----		
Site	: ----		
Quote number	: CG21-MPMC100-0001		
No. of samples received	: 2		
No. of samples analysed	: 2		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Aggregate Organics : Biochemical Oxygen Demand - 5 day										
HDPE [BOD HT 3d]										
INF-25-JUL-2022	E550	25-Jul-2022	----	----	----		26-Jul-2022	3 days	1 days	✓
Aggregate Organics : Biochemical Oxygen Demand - 5 day										
HDPE [BOD HT 3d]										
SRF-25-JUL-2022	E550	25-Jul-2022	----	----	----		26-Jul-2022	3 days	1 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
INF-25-JUL-2022	E298	25-Jul-2022	26-Jul-2022	----	----		26-Jul-2022	28 days	1 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
SRF-25-JUL-2022	E298	25-Jul-2022	26-Jul-2022	----	----		26-Jul-2022	28 days	1 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE										
INF-25-JUL-2022	E235.Br-L	25-Jul-2022	25-Jul-2022	----	----		25-Jul-2022	28 days	0 days	✓
Anions and Nutrients : Bromide in Water by IC (Low Level)										
HDPE										
SRF-25-JUL-2022	E235.Br-L	25-Jul-2022	25-Jul-2022	----	----		25-Jul-2022	28 days	0 days	✓
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE										
INF-25-JUL-2022	E235.Cl-L	25-Jul-2022	25-Jul-2022	----	----		25-Jul-2022	28 days	0 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Chloride in Water by IC (Low Level)										
HDPE										
SRF-25-JUL-2022	E235.Cl-L	25-Jul-2022	25-Jul-2022	----	----		25-Jul-2022	28 days	0 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE										
INF-25-JUL-2022	E235.F	25-Jul-2022	25-Jul-2022	----	----		25-Jul-2022	28 days	0 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE										
SRF-25-JUL-2022	E235.F	25-Jul-2022	25-Jul-2022	----	----		25-Jul-2022	28 days	0 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
INF-25-JUL-2022	E235.NO3-L	25-Jul-2022	25-Jul-2022	3 days	0 days	✓	25-Jul-2022	3 days	0 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
SRF-25-JUL-2022	E235.NO3-L	25-Jul-2022	25-Jul-2022	3 days	0 days	✓	25-Jul-2022	3 days	0 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
INF-25-JUL-2022	E235.NO2-L	25-Jul-2022	25-Jul-2022	----	----		25-Jul-2022	3 days	0 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
SRF-25-JUL-2022	E235.NO2-L	25-Jul-2022	25-Jul-2022	----	----		25-Jul-2022	3 days	0 days	✓
Anions and Nutrients : Sulfate in Water by IC (Low Level)										
HDPE										
INF-25-JUL-2022	E235.SO4-L	25-Jul-2022	25-Jul-2022	----	----		25-Jul-2022	28 days	0 days	✓
Anions and Nutrients : Sulfate in Water by IC (Low Level)										
HDPE										
SRF-25-JUL-2022	E235.SO4-L	25-Jul-2022	25-Jul-2022	----	----		25-Jul-2022	28 days	0 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) INF-25-JUL-2022	E372-U	25-Jul-2022	27-Jul-2022	----	----		27-Jul-2022	28 days	2 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) SRF-25-JUL-2022	E372-U	25-Jul-2022	27-Jul-2022	----	----		27-Jul-2022	28 days	2 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) INF-25-JUL-2022	E509	25-Jul-2022	28-Jul-2022	----	----		28-Jul-2022	28 days	3 days	✓
Dissolved Metals : Dissolved Mercury in Water by CVAAS										
Glass vial dissolved (hydrochloric acid) SRF-25-JUL-2022	E509	25-Jul-2022	28-Jul-2022	----	----		28-Jul-2022	28 days	3 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) INF-25-JUL-2022	E421	25-Jul-2022	27-Jul-2022	----	----		27-Jul-2022	180 days	2 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) SRF-25-JUL-2022	E421	25-Jul-2022	27-Jul-2022	----	----		27-Jul-2022	180 days	2 days	✓
Metals : Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS										
Amber glass vial dissolved (nitric acid) INF-25-JUL-2022	E423BSe	25-Jul-2022	27-Jul-2022	----	----		28-Jul-2022	180 days	3 days	✓
Metals : Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS										
Amber glass vial dissolved (nitric acid) SRF-25-JUL-2022	E423BSe	25-Jul-2022	27-Jul-2022	----	----		28-Jul-2022	180 days	3 days	✓
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid) INF-25-JUL-2022	E355-L	25-Jul-2022	25-Jul-2022	----	----		26-Jul-2022	28 days	1 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)										
Amber glass total (sulfuric acid)										
SRF-25-JUL-2022	E355-L	25-Jul-2022	25-Jul-2022	----	----		26-Jul-2022	28 days	1 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE										
INF-25-JUL-2022	E290	25-Jul-2022	26-Jul-2022	----	----		26-Jul-2022	14 days	1 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE										
SRF-25-JUL-2022	E290	25-Jul-2022	26-Jul-2022	----	----		26-Jul-2022	14 days	1 days	✓
Physical Tests : TDS by Gravimetry										
HDPE										
INF-25-JUL-2022	E162	25-Jul-2022	----	----	----		27-Jul-2022	7 days	2 days	✓
Physical Tests : TDS by Gravimetry										
HDPE										
SRF-25-JUL-2022	E162	25-Jul-2022	----	----	----		27-Jul-2022	7 days	2 days	✓
Physical Tests : TSS by Gravimetry										
HDPE										
INF-25-JUL-2022	E160	25-Jul-2022	----	----	----		26-Jul-2022	7 days	1 days	✓
Physical Tests : TSS by Gravimetry										
HDPE										
SRF-25-JUL-2022	E160	25-Jul-2022	----	----	----		26-Jul-2022	7 days	1 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE										
INF-25-JUL-2022	E121	25-Jul-2022	----	----	----		25-Jul-2022	3 days	0 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE										
SRF-25-JUL-2022	E121	25-Jul-2022	----	----	----		25-Jul-2022	3 days	0 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid)										
INF-25-JUL-2022	E508	25-Jul-2022	29-Jul-2022	----	----		29-Jul-2022	28 days	4 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid)										
SRF-25-JUL-2022	E508	25-Jul-2022	29-Jul-2022	----	----		29-Jul-2022	28 days	4 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid)										
INF-25-JUL-2022	E420	25-Jul-2022	29-Jul-2022	----	----		29-Jul-2022	180 days	4 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid)										
SRF-25-JUL-2022	E420	25-Jul-2022	29-Jul-2022	----	----		29-Jul-2022	180 days	4 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = QC frequency outside specification; ✓ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Alkalinity Species by Titration	E290	577202	1	15	6.6	5.0	✓
Ammonia by Fluorescence	E298	577502	1	20	5.0	5.0	✓
Biochemical Oxygen Demand - 5 day	E550	578419	1	20	5.0	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	576221	1	2	50.0	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	576217	1	2	50.0	5.0	✓
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	579401	1	8	12.5	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	581251	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	579239	1	20	5.0	5.0	✓
Fluoride in Water by IC	E235.F	576216	1	7	14.2	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	576218	1	5	20.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	576219	1	5	20.0	5.0	✓
Sulfate in Water by IC (Low Level)	E235.SO4-L	576220	1	2	50.0	5.0	✓
TDS by Gravimetry	E162	576160	1	17	5.8	5.0	✓
Total Mercury in Water by CVAAS	E508	582808	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	581313	1	19	5.2	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	576360	1	20	5.0	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	578759	1	20	5.0	5.0	✓
TSS by Gravimetry	E160	577696	1	20	5.0	5.0	✓
Turbidity by Nephelometry	E121	576183	1	2	50.0	5.0	✓
Laboratory Control Samples (LCS)							
Alkalinity Species by Titration	E290	577202	1	15	6.6	5.0	✓
Ammonia by Fluorescence	E298	577502	1	20	5.0	5.0	✓
Biochemical Oxygen Demand - 5 day	E550	578419	1	20	5.0	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	576221	1	2	50.0	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	576217	1	2	50.0	5.0	✓
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	579401	1	8	12.5	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	581251	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	579239	1	20	5.0	5.0	✓
Fluoride in Water by IC	E235.F	576216	1	7	14.2	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	576218	1	5	20.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	576219	1	5	20.0	5.0	✓
Sulfate in Water by IC (Low Level)	E235.SO4-L	576220	1	2	50.0	5.0	✓
TDS by Gravimetry	E162	576160	1	17	5.8	5.0	✓
Total Mercury in Water by CVAAS	E508	582808	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	581313	1	19	5.2	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	576360	1	20	5.0	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	578759	1	20	5.0	5.0	✓

Matrix: **Water**

Evaluation: × = QC frequency outside specification; ✓ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Control Samples (LCS) - Continued							
TSS by Gravimetry	E160	577696	1	20	5.0	5.0	✓
Turbidity by Nephelometry	E121	576183	1	2	50.0	5.0	✓
Method Blanks (MB)							
Alkalinity Species by Titration	E290	577202	1	15	6.6	5.0	✓
Ammonia by Fluorescence	E298	577502	1	20	5.0	5.0	✓
Biochemical Oxygen Demand - 5 day	E550	578419	1	20	5.0	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	576221	1	2	50.0	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	576217	1	2	50.0	5.0	✓
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	579401	1	8	12.5	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	581251	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	579239	1	20	5.0	5.0	✓
Fluoride in Water by IC	E235.F	576216	1	7	14.2	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	576218	1	5	20.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	576219	1	5	20.0	5.0	✓
Sulfate in Water by IC (Low Level)	E235.SO4-L	576220	1	2	50.0	5.0	✓
TDS by Gravimetry	E162	576160	1	17	5.8	5.0	✓
Total Mercury in Water by CVAAS	E508	582808	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	581313	1	19	5.2	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	576360	1	20	5.0	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	578759	1	20	5.0	5.0	✓
TSS by Gravimetry	E160	577696	1	20	5.0	5.0	✓
Turbidity by Nephelometry	E121	576183	1	2	50.0	5.0	✓
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	577502	1	20	5.0	5.0	✓
Bromide in Water by IC (Low Level)	E235.Br-L	576221	1	2	50.0	5.0	✓
Chloride in Water by IC (Low Level)	E235.Cl-L	576217	1	2	50.0	5.0	✓
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe	579401	1	8	12.5	5.0	✓
Dissolved Mercury in Water by CVAAS	E509	581251	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	579239	1	20	5.0	5.0	✓
Fluoride in Water by IC	E235.F	576216	1	7	14.2	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	576218	1	5	20.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	576219	1	5	20.0	5.0	✓
Sulfate in Water by IC (Low Level)	E235.SO4-L	576220	1	2	50.0	5.0	✓
Total Mercury in Water by CVAAS	E508	582808	1	20	5.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	581313	1	19	5.2	5.0	✓
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L	576360	1	20	5.0	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	578759	1	20	5.0	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Turbidity by Nephelometry	E121 Calgary - Environmental	Water	APHA 2130 B (mod)	Turbidity is measured by the nephelometric method, by measuring the intensity of light scatter under defined conditions.
TSS by Gravimetry	E160 Calgary - Environmental	Water	APHA 2540 D (mod)	Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, following by drying of the filter at 104 ± 1°C, with gravimetric measurement of the filtered solids. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.
TDS by Gravimetry	E162 Calgary - Environmental	Water	APHA 2540 C (mod)	Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, with evaporation of the filtrate at 180 ± 2°C for 16 hours or to constant weight, with gravimetric measurement of the residue.
Bromide in Water by IC (Low Level)	E235.Br-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Chloride in Water by IC (Low Level)	E235.Cl-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Fluoride in Water by IC	E235.F Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrite in Water by IC (Low Level)	E235.NO2-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrate in Water by IC (Low Level)	E235.NO3-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Sulfate in Water by IC (Low Level)	E235.SO4-L Calgary - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Alkalinity Species by Titration	E290 Calgary - Environmental	Water	APHA 2320 B (mod)	Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.
Ammonia by Fluorescence	E298 Calgary - Environmental	Water	Method Fialab 100, 2018	Ammonia in water is determined by automated continuous flow analysis with membrane diffusion and fluorescence detection, after reaction with OPA (ortho-phthalaldehyde). This method is approved under US EPA 40 CFR Part 136 (May 2021)

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)	E355-L Calgary - Environmental	Water	APHA 5310 B (mod)	Total Organic Carbon (Non-Purgeable), also known as NPOC (total), is a direct measurement of TOC after an acidified sample has been purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO_2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of total carbon (TC) is comprised of IC (which is common), this method is more accurate and more reliable than the TOC by subtraction method (i.e. TC minus TIC).
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U Calgary - Environmental	Water	APHA 4500-P E (mod).	Total Phosphorus is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Total Metals in Water by CRC ICPMS	E420 Calgary - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Dissolved Metals in Water by CRC ICPMS	E421 Calgary - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Digested Dissolved Selenium in Water (Matrix Matched) by CRC ICPMS	E423BSe Calgary - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45um), digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS with matrix matching (carbon).
Total Mercury in Water by CVAAS	E508 Calgary - Environmental	Water	EPA 1631E (mod)	Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS
Dissolved Mercury in Water by CVAAS	E509 Calgary - Environmental	Water	APHA 3030B/EPA 1631E (mod)	Water samples are filtered (0.45 um), preserved with HCl, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.
Biochemical Oxygen Demand - 5 day	E550 Calgary - Environmental	Water	APHA 5210 B (mod)	Samples are diluted and incubated for a specified time period, after which the oxygen depletion is measured using a dissolved oxygen meter. Free chlorine is a negative interference in the BOD method; please advise ALS when free chlorine is present in samples.
Dissolved Hardness (Calculated)	EC100 Calgary - Environmental	Water	APHA 2340B	“Hardness (as $CaCO_3$), dissolved” is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in $CaCO_3$ equivalents. “Total Hardness” refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.
Hardness (Calculated) from Total Ca/Mg	EC100A Calgary - Environmental	Water	APHA 2340B	“Hardness (as $CaCO_3$), from total Ca/Mg” is calculated from the sum of total Calcium and Magnesium concentrations, expressed in $CaCO_3$ equivalents. “Total Hardness” refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations. Hardness from total Ca/Mg is normally comparable to Dissolved Hardness in non-turbid waters.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Ammonia	EP298 Calgary - Environmental	Water		Sample preparation for Preserved Nutrients Water Quality Analysis.
Preparation for Total Organic Carbon by Combustion	EP355 Calgary - Environmental	Water		Preparation for Total Organic Carbon by Combustion
Digestion for Total Phosphorus in water	EP372 Calgary - Environmental	Water	APHA 4500-P E (mod).	Samples are heated with a persulfate digestion reagent.
Dissolved Metals Water Filtration	EP421 Calgary - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.
Dissolved Metals Water Digestion and Filtration	EP423 Calgary - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um) and digested with nitric and hydrochloric acids.
Dissolved Mercury Water Filtration	EP509 Calgary - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HCl.

QUALITY CONTROL REPORT

Work Order	: **CG2209737**	Page	: 1 of 18
Client	: Golder Associates Ltd.	Laboratory	: Calgary - Environmental
Contact	: Michelle Xu	Account Manager	: Patryk Wojciak
Address	: PO BOX 12 Likely BC Canada V0L 1N0	Address	: 2559 29th Street NE Calgary, Alberta Canada T1Y 7B5
Telephone	: ----	Telephone	: +1 403 407 1800
Project	: 21452039/31400/31427	Date Samples Received	: 25-Jul-2022 14:04
PO	: 5590008044	Date Analysis Commenced	: 25-Jul-2022
C-O-C number	: ----	Issue Date	: 02-Aug-2022 18:15
Sampler	: ----		
Site	: ----		
Quote number	: CG21-MPMC100-0001		
No. of samples received	: 2		
No. of samples analysed	: 2		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
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General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Physical Tests (QC Lot: 576160)											
CG2209700-005	Anonymous	solids, total dissolved [TDS]	----	E162	10	mg/L	<10	<10	0	Diff <2x LOR	----
Physical Tests (QC Lot: 576183)											
CG2209737-001	SRF-25-JUL-2022	turbidity	----	E121	0.10	NTU	3.36	3.38	0.594%	15%	----
Physical Tests (QC Lot: 577202)											
CG2209697-021	Anonymous	alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L	821	797	3.00%	20%	----
		alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L	<1.0	<1.0	0	Diff <2x LOR	----
		alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	821	797	3.00%	20%	----
Physical Tests (QC Lot: 577696)											
CG2209713-001	Anonymous	solids, total suspended [TSS]	----	E160	5.0	mg/L	24.2	28.2	4.0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 576216)											
CG2209737-001	SRF-25-JUL-2022	fluoride	16984-48-8	E235.F	0.100	mg/L	0.214	0.211	0.003	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 576217)											
CG2209737-001	SRF-25-JUL-2022	chloride	16887-00-6	E235.Cl-L	0.50	mg/L	3.23	3.22	0.001	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 576218)											
CG2209737-001	SRF-25-JUL-2022	nitrate (as N)	14797-55-8	E235.NO3-L	0.0250	mg/L	0.0767	0.0804	0.0037	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 576219)											
CG2209737-001	SRF-25-JUL-2022	nitrite (as N)	14797-65-0	E235.NO2-L	0.0050	mg/L	0.0190	0.0190	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 576220)											
CG2209737-001	SRF-25-JUL-2022	sulfate (as SO4)	14808-79-8	E235.SO4-L	0.250	mg/L	750	747	0.450%	20%	----
Anions and Nutrients (QC Lot: 576221)											
CG2209737-001	SRF-25-JUL-2022	bromide	24959-67-9	E235.Br-L	0.250	mg/L	<0.250	<0.250	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 577502)											
CG2209725-001	Anonymous	ammonia, total (as N)	7664-41-7	E298	0.125	mg/L	5.33	5.21	2.26%	20%	----
Anions and Nutrients (QC Lot: 578759)											
CG2209716-001	Anonymous	phosphorus, total	7723-14-0	E372-U	0.0200	mg/L	0.110	0.112	0.0017	Diff <2x LOR	----
Organic / Inorganic Carbon (QC Lot: 576360)											
CG2209725-001	Anonymous	carbon, total organic [TOC]	----	E355-L	1.00	mg/L	48.2	49.1	1.76%	20%	----
Total Metals (QC Lot: 581313)											
CG2209720-001	Anonymous	aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0269	0.0260	0.0009	Diff <2x LOR	----
		antimony, total	7440-36-0	E420	0.00010	mg/L	0.00042	0.00043	0.00001	Diff <2x LOR	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Total Metals (QC Lot: 581313) - continued											
CG2209720-001	Anonymous	arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00219	0.00219	0.101%	20%	----
		barium, total	7440-39-3	E420	0.00010	mg/L	0.120	0.122	1.46%	20%	----
		beryllium, total	7440-41-7	E420	0.000020	mg/L	<0.000020	<0.000020	0	Diff <2x LOR	----
		bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, total	7440-42-8	E420	0.010	mg/L	0.052	0.054	0.001	Diff <2x LOR	----
		cadmium, total	7440-43-9	E420	0.0000050	mg/L	0.0000106	0.0000074	0.0000032	Diff <2x LOR	----
		calcium, total	7440-70-2	E420	0.050	mg/L	70.0	70.9	1.38%	20%	----
		chromium, total	7440-47-3	E420	0.00050	mg/L	0.00114	0.00130	0.00016	Diff <2x LOR	----
		cobalt, total	7440-48-4	E420	0.00010	mg/L	0.00044	0.00045	0.000007	Diff <2x LOR	----
		copper, total	7440-50-8	E420	0.00050	mg/L	0.00124	0.00116	0.00008	Diff <2x LOR	----
		iron, total	7439-89-6	E420	0.010	mg/L	2.37	2.37	0.205%	20%	----
		lead, total	7439-92-1	E420	0.000050	mg/L	0.000103	0.000096	0.000007	Diff <2x LOR	----
		lithium, total	7439-93-2	E420	0.0010	mg/L	0.0153	0.0157	2.20%	20%	----
		magnesium, total	7439-95-4	E420	0.0050	mg/L	34.7	35.1	1.24%	20%	----
		manganese, total	7439-96-5	E420	0.00010	mg/L	0.228	0.230	1.10%	20%	----
		molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.00283	0.00285	0.742%	20%	----
		nickel, total	7440-02-0	E420	0.00050	mg/L	0.00153	0.00156	0.00003	Diff <2x LOR	----
		phosphorus, total	7723-14-0	E420	0.050	mg/L	0.078	0.074	0.004	Diff <2x LOR	----
		potassium, total	7440-09-7	E420	0.050	mg/L	7.73	7.83	1.33%	20%	----
		selenium, total	7782-49-2	E420	0.000050	mg/L	0.000297	0.000332	0.000035	Diff <2x LOR	----
		silicon, total	7440-21-3	E420	0.10	mg/L	3.07	3.11	1.11%	20%	----
		silver, total	7440-22-4	E420	0.000010	mg/L	0.00169	0.00170	0.0425%	20%	----
		sodium, total	7440-23-5	E420	0.050	mg/L	73.0	73.8	1.13%	20%	----
		strontium, total	7440-24-6	E420	0.00020	mg/L	0.458	0.462	0.839%	20%	----
		sulfur, total	7704-34-9	E420	0.50	mg/L	80.0	81.3	1.70%	20%	----
		thallium, total	7440-28-0	E420	0.000010	mg/L	0.000025	<0.000010	0.000015	Diff <2x LOR	----
		tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		titanium, total	7440-32-6	E420	0.00030	mg/L	0.00068	0.00069	0.000007	Diff <2x LOR	----
		uranium, total	7440-61-1	E420	0.000010	mg/L	0.00310	0.00314	1.08%	20%	----
		vanadium, total	7440-62-2	E420	0.00050	mg/L	0.00137	0.00133	0.00005	Diff <2x LOR	----
		zinc, total	7440-66-6	E420	0.0030	mg/L	0.0087	0.0080	0.0006	Diff <2x LOR	----
		zirconium, total	7440-67-7	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
Total Metals (QC Lot: 582808)											
CG2209698-003	Anonymous	mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 579239)											

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Dissolved Metals (QC Lot: 579239) - continued											
CG2209722-001	Anonymous	aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.224	0.222	0.774%	20%	----
		antimony, dissolved	7440-36-0	E421	0.00010	mg/L	0.00105	0.00105	0.620%	20%	----
		arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00121	0.00123	1.50%	20%	----
		barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0492	0.0490	0.354%	20%	----
		beryllium, dissolved	7440-41-7	E421	0.000020	mg/L	<0.000020	<0.000020	0	Diff <2x LOR	----
		bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, dissolved	7440-42-8	E421	0.010	mg/L	0.012	0.013	0.0001	Diff <2x LOR	----
		cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
		calcium, dissolved	7440-70-2	E421	0.050	mg/L	28.2	28.7	1.71%	20%	----
		chromium, dissolved	7440-47-3	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		copper, dissolved	7440-50-8	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		iron, dissolved	7439-89-6	E421	0.030	mg/L	<0.030	<0.030	0	Diff <2x LOR	----
		lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.0122	0.0122	0.370%	20%	----
		magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	6.73	6.81	1.17%	20%	----
		manganese, dissolved	7439-96-5	E421	0.00500	mg/L	<0.00500	<0.00500	0	Diff <2x LOR	----
		molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.00291	0.00290	0.521%	20%	----
		nickel, dissolved	7440-02-0	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		phosphorus, dissolved	7723-14-0	E421	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		potassium, dissolved	7440-09-7	E421	0.050	mg/L	5.64	5.68	0.631%	20%	----
		silicon, dissolved	7440-21-3	E421	0.050	mg/L	1.66	1.67	0.738%	20%	----
		silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, dissolved	7440-23-5	E421	0.050	mg/L	1.54	1.54	0.366%	20%	----
		strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.0837	0.0836	0.147%	20%	----
		sulfur, dissolved	7704-34-9	E421	0.50	mg/L	34.7	34.6	0.157%	20%	----
		thallium, dissolved	7440-28-0	E421	0.000010	mg/L	0.000038	0.000040	0.000002	Diff <2x LOR	----
		tin, dissolved	7440-31-5	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		titanium, dissolved	7440-32-6	E421	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
		uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.00226	0.00222	1.37%	20%	----
		vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	0.00185	0.00188	0.00004	Diff <2x LOR	----
		zinc, dissolved	7440-66-6	E421	0.0010	mg/L	0.0025	0.0024	0.0001	Diff <2x LOR	----
		zirconium, dissolved	7440-67-7	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 579401)											
CG2209514-003	Anonymous	selenium, dissolved	7782-49-2	E423BSe	0.000100	mg/L	0.00788	0.00765	2.94%	20%	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Dissolved Metals (QC Lot: 581251)											
CG2209105-001	Anonymous	mercury, dissolved	7439-97-6	E509	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Aggregate Organics (QC Lot: 578419)											
CG2209739-008	Anonymous	biochemical oxygen demand [BOD]	----	E550	2.0	mg/L	<2.0	<2.0	0.0%	30%	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 576160)						
solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Physical Tests (QCLot: 576183)						
turbidity	----	E121	0.1	NTU	<0.10	----
Physical Tests (QCLot: 577202)						
alkalinity, bicarbonate (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, carbonate (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, hydroxide (as CaCO3)	----	E290	1	mg/L	<1.0	----
alkalinity, total (as CaCO3)	----	E290	1	mg/L	<1.0	----
Physical Tests (QCLot: 577696)						
solids, total suspended [TSS]	----	E160	3	mg/L	<3.0	----
Anions and Nutrients (QCLot: 576216)						
fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 576217)						
chloride	16887-00-6	E235.Cl-L	0.1	mg/L	<0.10	----
Anions and Nutrients (QCLot: 576218)						
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 576219)						
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 576220)						
sulfate (as SO4)	14808-79-8	E235.SO4-L	0.05	mg/L	<0.050	----
Anions and Nutrients (QCLot: 576221)						
bromide	24959-67-9	E235.Br-L	0.05	mg/L	<0.050	----
Anions and Nutrients (QCLot: 577502)						
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 578759)						
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----
Organic / Inorganic Carbon (QCLot: 576360)						
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	<0.50	----
Total Metals (QCLot: 581313)						
aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----
antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 581313) - continued						
beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
chromium, total	7440-47-3	E420	0.0005	mg/L	<0.00050	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	----
magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	----
manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	<0.050	----
potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
silicon, total	7440-21-3	E420	0.1	mg/L	<0.10	----
silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	----
sodium, total	7440-23-5	E420	0.05	mg/L	<0.050	----
strontium, total	7440-24-6	E420	0.0002	mg/L	<0.00020	----
sulfur, total	7704-34-9	E420	0.5	mg/L	<0.50	----
thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----
tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----
uranium, total	7440-61-1	E420	0.00001	mg/L	<0.000010	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	<0.00050	----
zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	<0.00020	----
Total Metals (QCLot: 582808)						
mercury, total	7439-97-6	E508	0.000005	mg/L	<0.0000050	----
Dissolved Metals (QCLot: 579239)						
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	<0.0010	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	<0.00010	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	<0.00010	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 579239) - continued						
barium, dissolved	7440-39-3	E421	0.0001	mg/L	<0.00010	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	<0.000020	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	<0.000050	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	<0.010	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	<0.0000050	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	<0.050	----
chromium, dissolved	7440-47-3	E421	0.0005	mg/L	<0.00050	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	----
phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	<0.050	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	<0.050	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	<0.000010	----
sodium, dissolved	7440-23-5	E421	0.05	mg/L	<0.050	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	<0.00020	----
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	<0.50	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	<0.000010	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	<0.00050	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	<0.0010	----
zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	<0.00020	----
Dissolved Metals (QCLot: 579401)						
selenium, dissolved	7782-49-2	E423BSe	0.00005	mg/L	<0.000050	----
Dissolved Metals (QCLot: 581251)						
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	<0.0000050	----
Aggregate Organics (QCLot: 578419)						
biochemical oxygen demand [BOD]	----	E550	2	mg/L	<2.0	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 576160)									
solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	101	85.0	115	----
Physical Tests (QCLot: 576183)									
turbidity	----	E121	0.1	NTU	200 NTU	95.5	85.0	115	----
Physical Tests (QCLot: 577202)									
alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	108	85.0	115	----
Physical Tests (QCLot: 577696)									
solids, total suspended [TSS]	----	E160	3	mg/L	150 mg/L	98.7	85.0	115	----
Anions and Nutrients (QCLot: 576216)									
fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	99.8	90.0	110	----
Anions and Nutrients (QCLot: 576217)									
chloride	16887-00-6	E235.Cl-L	0.1	mg/L	100 mg/L	98.5	90.0	110	----
Anions and Nutrients (QCLot: 576218)									
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	99.7	90.0	110	----
Anions and Nutrients (QCLot: 576219)									
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	99.3	90.0	110	----
Anions and Nutrients (QCLot: 576220)									
sulfate (as SO4)	14808-79-8	E235.SO4-L	0.05	mg/L	100 mg/L	100	90.0	110	----
Anions and Nutrients (QCLot: 576221)									
bromide	24959-67-9	E235.Br-L	0.05	mg/L	0.5 mg/L	100	85.0	115	----
Anions and Nutrients (QCLot: 577502)									
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	110	85.0	115	----
Anions and Nutrients (QCLot: 578759)									
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	8.02 mg/L	109	80.0	120	----
Organic / Inorganic Carbon (QCLot: 576360)									
carbon, total organic [TOC]	----	E355-L	0.5	mg/L	8.57 mg/L	93.6	80.0	120	----
Total Metals (QCLot: 581313)									
aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	97.4	80.0	120	----
antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	99.6	80.0	120	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	94.4	80.0	120	----
barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	100	80.0	120	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	95.9	80.0	120	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Total Metals (QCLot: 581313) - continued									
bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	95.0	80.0	120	----
boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	94.9	80.0	120	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	94.9	80.0	120	----
calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	95.2	80.0	120	----
chromium, total	7440-47-3	E420	0.0005	mg/L	0.25 mg/L	95.3	80.0	120	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	93.8	80.0	120	----
copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	94.6	80.0	120	----
iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	111	80.0	120	----
lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	96.2	80.0	120	----
lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	94.0	80.0	120	----
magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	92.1	80.0	120	----
manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	95.5	80.0	120	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	98.5	80.0	120	----
nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	95.1	80.0	120	----
phosphorus, total	7723-14-0	E420	0.05	mg/L	10 mg/L	105	70.0	130	----
potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	95.8	80.0	120	----
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	91.2	80.0	120	----
silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	99.9	60.0	140	----
silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	92.5	80.0	120	----
sodium, total	7440-23-5	E420	0.05	mg/L	50 mg/L	95.5	80.0	120	----
strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	97.2	80.0	120	----
sulfur, total	7704-34-9	E420	0.5	mg/L	50 mg/L	92.7	80.0	120	----
thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	97.1	80.0	120	----
tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	96.9	80.0	120	----
titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	87.4	80.0	120	----
uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	99.2	80.0	120	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	97.4	80.0	120	----
zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	94.0	80.0	120	----
zirconium, total	7440-67-7	E420	0.0002	mg/L	0.1 mg/L	99.6	80.0	120	----
Total Metals (QCLot: 582808)									
mercury, total	7439-97-6	E508	0.000005	mg/L	0.0001 mg/L	99.3	80.0	120	----
Dissolved Metals (QCLot: 579239)									
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	98.3	80.0	120	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	102	80.0	120	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	96.8	80.0	120	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	99.3	80.0	120	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 579239) - continued									
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	106	80.0	120	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	99.0	80.0	120	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	103	80.0	120	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	98.2	80.0	120	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	96.4	80.0	120	----
chromium, dissolved	7440-47-3	E421	0.0005	mg/L	0.25 mg/L	97.7	80.0	120	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	96.8	80.0	120	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	94.6	80.0	120	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	95.4	80.0	120	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	99.4	80.0	120	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	110	80.0	120	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	99.3	80.0	120	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	99.9	80.0	120	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	99.2	80.0	120	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	97.2	80.0	120	----
phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	10 mg/L	99.5	70.0	130	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	97.5	80.0	120	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	102	60.0	140	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	95.5	80.0	120	----
sodium, dissolved	7440-23-5	E421	0.05	mg/L	50 mg/L	98.7	80.0	120	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	96.6	80.0	120	----
sulfur, dissolved	7704-34-9	E421	0.5	mg/L	50 mg/L	102	80.0	120	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	99.5	80.0	120	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	98.9	80.0	120	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	97.2	80.0	120	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	102	80.0	120	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	98.2	80.0	120	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	101	80.0	120	----
zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	0.1 mg/L	98.3	80.0	120	----
Dissolved Metals (QCLot: 579401)									
selenium, dissolved	7782-49-2	E423BSe	0.00005	mg/L	1 mg/L	103	80.0	120	----
mercury, dissolved	7439-97-6	E509	0.000005	mg/L	0.0001 mg/L	94.7	80.0	120	----
Aggregate Organics (QCLot: 578419)									
biochemical oxygen demand [BOD]	----	E550	2	mg/L	198 mg/L	104	85.0	115	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 576216)										
CG2209737-002	INF-25-JUL-2022	fluoride	16984-48-8	E235.F	1.02 mg/L	1 mg/L	102	75.0	125	----
Anions and Nutrients (QCLot: 576217)										
CG2209737-002	INF-25-JUL-2022	chloride	16887-00-6	E235.Cl-L	105 mg/L	100 mg/L	105	75.0	125	----
Anions and Nutrients (QCLot: 576218)										
CG2209737-002	INF-25-JUL-2022	nitrate (as N)	14797-55-8	E235.NO3-L	ND mg/L	2.5 mg/L	ND	75.0	125	----
Anions and Nutrients (QCLot: 576219)										
CG2209737-002	INF-25-JUL-2022	nitrite (as N)	14797-65-0	E235.NO2-L	0.540 mg/L	0.5 mg/L	108	75.0	125	----
Anions and Nutrients (QCLot: 576220)										
CG2209737-002	INF-25-JUL-2022	sulfate (as SO4)	14808-79-8	E235.SO4-L	ND mg/L	100 mg/L	ND	75.0	125	----
Anions and Nutrients (QCLot: 576221)										
CG2209737-002	INF-25-JUL-2022	bromide	24959-67-9	E235.Br-L	0.474 mg/L	0.5 mg/L	94.7	75.0	125	----
Anions and Nutrients (QCLot: 577502)										
CG2209725-002	Anonymous	ammonia, total (as N)	7664-41-7	E298	ND mg/L	0.1 mg/L	ND	75.0	125	----
Anions and Nutrients (QCLot: 578759)										
CG2209716-002	Anonymous	phosphorus, total	7723-14-0	E372-U	ND mg/L	0.0676 mg/L	ND	70.0	130	----
Organic / Inorganic Carbon (QCLot: 576360)										
CG2209725-001	Anonymous	carbon, total organic [TOC]	----	E355-L	ND mg/L	5 mg/L	ND	70.0	130	----
Total Metals (QCLot: 581313)										
CG2209720-002	Anonymous	aluminum, total	7429-90-5	E420	2.06 mg/L	2 mg/L	103	70.0	130	----
		antimony, total	7440-36-0	E420	0.208 mg/L	0.2 mg/L	104	70.0	130	----
		arsenic, total	7440-38-2	E420	0.197 mg/L	0.2 mg/L	98.7	70.0	130	----
		barium, total	7440-39-3	E420	0.208 mg/L	0.2 mg/L	104	70.0	130	----
		beryllium, total	7440-41-7	E420	0.391 mg/L	0.4 mg/L	97.8	70.0	130	----
		bismuth, total	7440-69-9	E420	0.0922 mg/L	0.1 mg/L	92.2	70.0	130	----
		boron, total	7440-42-8	E420	1.08 mg/L	1 mg/L	108	70.0	130	----
		cadmium, total	7440-43-9	E420	0.0403 mg/L	0.04 mg/L	101	70.0	130	----
		calcium, total	7440-70-2	E420	ND mg/L	40 mg/L	ND	70.0	130	----
		chromium, total	7440-47-3	E420	0.407 mg/L	0.4 mg/L	102	70.0	130	----
		cobalt, total	7440-48-4	E420	0.201 mg/L	0.2 mg/L	100	70.0	130	----
		copper, total	7440-50-8	E420	0.200 mg/L	0.2 mg/L	99.8	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Total Metals (QCLot: 581313) - continued										
CG2209720-002	Anonymous	iron, total	7439-89-6	E420	20.2 mg/L	20 mg/L	101	70.0	130	----
		lead, total	7439-92-1	E420	0.189 mg/L	0.2 mg/L	94.5	70.0	130	----
		lithium, total	7439-93-2	E420	0.998 mg/L	1 mg/L	99.8	70.0	130	----
		magnesium, total	7439-95-4	E420	ND mg/L	10 mg/L	ND	70.0	130	----
		manganese, total	7439-96-5	E420	0.204 mg/L	0.2 mg/L	102	70.0	130	----
		molybdenum, total	7439-98-7	E420	0.214 mg/L	0.2 mg/L	107	70.0	130	----
		nickel, total	7440-02-0	E420	0.394 mg/L	0.4 mg/L	98.6	70.0	130	----
		phosphorus, total	7723-14-0	E420	103 mg/L	100 mg/L	103	70.0	130	----
		potassium, total	7440-09-7	E420	42.2 mg/L	40 mg/L	105	70.0	130	----
		selenium, total	7782-49-2	E420	0.399 mg/L	0.4 mg/L	99.8	70.0	130	----
		silicon, total	7440-21-3	E420	110 mg/L	100 mg/L	110	70.0	130	----
		silver, total	7440-22-4	E420	0.0417 mg/L	0.04 mg/L	104	70.0	130	----
		sodium, total	7440-23-5	E420	ND mg/L	20 mg/L	ND	70.0	130	----
		strontium, total	7440-24-6	E420	ND mg/L	0.2 mg/L	ND	70.0	130	----
		sulfur, total	7704-34-9	E420	ND mg/L	200 mg/L	ND	70.0	130	----
		thallium, total	7440-28-0	E420	0.0372 mg/L	0.04 mg/L	92.9	70.0	130	----
		tin, total	7440-31-5	E420	0.213 mg/L	0.2 mg/L	107	70.0	130	----
		titanium, total	7440-32-6	E420	0.450 mg/L	0.4 mg/L	112	70.0	130	----
		uranium, total	7440-61-1	E420	0.0384 mg/L	0.04 mg/L	96.0	70.0	130	----
		vanadium, total	7440-62-2	E420	1.03 mg/L	1 mg/L	103	70.0	130	----
		zinc, total	7440-66-6	E420	3.84 mg/L	4 mg/L	96.0	70.0	130	----
		zirconium, total	7440-67-7	E420	0.415 mg/L	0.4 mg/L	104	70.0	130	----
Total Metals (QCLot: 582808)										
CG2209720-001	Anonymous	mercury, total	7439-97-6	E508	ND mg/L	0.0001 mg/L	ND	70.0	130	----
Dissolved Metals (QCLot: 579239)										
CG2209722-002	Anonymous	aluminum, dissolved	7429-90-5	E421	1.80 mg/L	2 mg/L	90.0	70.0	130	----
		antimony, dissolved	7440-36-0	E421	0.178 mg/L	0.2 mg/L	88.9	70.0	130	----
		arsenic, dissolved	7440-38-2	E421	0.173 mg/L	0.2 mg/L	86.5	70.0	130	----
		barium, dissolved	7440-39-3	E421	0.169 mg/L	0.2 mg/L	84.5	70.0	130	----
		beryllium, dissolved	7440-41-7	E421	0.361 mg/L	0.4 mg/L	90.2	70.0	130	----
		bismuth, dissolved	7440-69-9	E421	0.0873 mg/L	0.1 mg/L	87.3	70.0	130	----
		boron, dissolved	7440-42-8	E421	0.874 mg/L	1 mg/L	87.4	70.0	130	----
		cadmium, dissolved	7440-43-9	E421	0.0359 mg/L	0.04 mg/L	89.9	70.0	130	----
		calcium, dissolved	7440-70-2	E421	33.9 mg/L	40 mg/L	84.7	70.0	130	----
		chromium, dissolved	7440-47-3	E421	0.352 mg/L	0.4 mg/L	88.0	70.0	130	----
		cobalt, dissolved	7440-48-4	E421	0.179 mg/L	0.2 mg/L	89.7	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Dissolved Metals (QCLot: 579239) - continued										
CG2209722-002	Anonymous	copper, dissolved	7440-50-8	E421	0.181 mg/L	0.2 mg/L	90.6	70.0	130	----
		iron, dissolved	7439-89-6	E421	18.1 mg/L	20 mg/L	90.5	70.0	130	----
		lead, dissolved	7439-92-1	E421	0.178 mg/L	0.2 mg/L	89.0	70.0	130	----
		lithium, dissolved	7439-93-2	E421	0.942 mg/L	1 mg/L	94.2	70.0	130	----
		magnesium, dissolved	7439-95-4	E421	8.01 mg/L	10 mg/L	80.1	70.0	130	----
		manganese, dissolved	7439-96-5	E421	0.184 mg/L	0.2 mg/L	92.1	70.0	130	----
		molybdenum, dissolved	7439-98-7	E421	0.176 mg/L	0.2 mg/L	87.9	70.0	130	----
		nickel, dissolved	7440-02-0	E421	0.361 mg/L	0.4 mg/L	90.2	70.0	130	----
		phosphorus, dissolved	7723-14-0	E421	89.8 mg/L	100 mg/L	89.8	70.0	130	----
		potassium, dissolved	7440-09-7	E421	36.5 mg/L	40 mg/L	91.3	70.0	130	----
		silicon, dissolved	7440-21-3	E421	93.1 mg/L	100 mg/L	93.1	70.0	130	----
		silver, dissolved	7440-22-4	E421	0.0390 mg/L	0.04 mg/L	97.6	70.0	130	----
		sodium, dissolved	7440-23-5	E421	18.0 mg/L	20 mg/L	89.8	70.0	130	----
		strontium, dissolved	7440-24-6	E421	0.180 mg/L	0.2 mg/L	89.9	70.0	130	----
		sulfur, dissolved	7704-34-9	E421	180 mg/L	200 mg/L	90.0	70.0	130	----
		thallium, dissolved	7440-28-0	E421	0.0351 mg/L	0.04 mg/L	87.8	70.0	130	----
		tin, dissolved	7440-31-5	E421	0.180 mg/L	0.2 mg/L	90.0	70.0	130	----
		titanium, dissolved	7440-32-6	E421	0.373 mg/L	0.4 mg/L	93.3	70.0	130	----
		uranium, dissolved	7440-61-1	E421	0.0351 mg/L	0.04 mg/L	87.8	70.0	130	----
		vanadium, dissolved	7440-62-2	E421	0.866 mg/L	1 mg/L	86.6	70.0	130	----
		zinc, dissolved	7440-66-6	E421	3.70 mg/L	4 mg/L	92.6	70.0	130	----
		zirconium, dissolved	7440-67-7	E421	0.365 mg/L	0.4 mg/L	91.2	70.0	130	----
Dissolved Metals (QCLot: 579401)										
CG2209514-003	Anonymous	selenium, dissolved	7782-49-2	E423BSe	0.400 mg/L	0.4 mg/L	100	70.0	130	----
Dissolved Metals (QCLot: 581251)										
CG2209105-002	Anonymous	mercury, dissolved	7439-97-6	E509	0.0000911 mg/L	0.0001 mg/L	91.1	70.0	130	----

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878
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COC # _____

Page 1 of 1

Report to:		**Report Format / Distribution**		**Service Requested:** (rush - subject to availability)
Company:	MOUNT POLLEY MINING CORP.	☑ Standard ☑ Other		◉ Regular (Default)
Contact:	Kala Ivens	☑ PDF ☑ Excel ☐ Digital ☐ Fax		○ Priority (2-3 Business Days) - 50% Surcharge
Address:	PO BOX 12, Likely, BC, V0L 1N0	Email 1:	mxu@golder.com	○ Emergency (1 Business Day) - 100% Surcharge
		Email 2:		○ For Emergency < 1 Day, ASAP or Weekend - Contact ALS
Phone:	250-790-2215 Fax:			
Invoice To:	Same as Report ? ◉ Yes ○ No	**Client / Project Information:**		**Analysis Request**
Company:	ernie.guevarra@imperialmetals.com	Job #:	22514095/31400/31427	Please indicate below Filtered, Preserved or both (F, P, F/P)
Contact:		PO / AFE:	5590008044	
Address:		Legal Site Description:		
Phone:	Fax:	Quote #:	CG2021MPMC1000001	
Lab Work Order # (lab use only)		**ALS Contact:**	Can Dang **Sampler:**	

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Alkalinity (as CaCO3)	Anions (Cl, Br, F, NO2, NO3, SO4)	~~Sulphide (dissolved)~~	Ammonia	Total Phosphorus	Total Metal	Dissolved Metals	Total dissolved solis	Turbidty	TSS & BOD	Dissolved Se (E423BSe)	Total Organic Carbon	Number of Containers
										P	P/F	P/F			P/F	P	
	SRF-25-JUL-2022	25-Jul-22	11:15	Water	X	X	X	X	X	X	X	X	X	X	X	X	
	INF-25-JUL-2022	25-Jul-22	11:30	Water	X	X	X	X	X	X	X	X	X	X	X	X	

Environmental Division
Calgary
Work Order Reference
CG2209737

Telephone : +1 403 407 1800

Special Instructions / Regulations / Hazardous Details

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)		SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)		
Released by:	Date & Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date & Time:	Observations: Yes / No ? If Yes attach SIF
			7/25	14:04	22			

APPENDIX G

Quality Assurance and Quality Control Data

Parameter	Units	Lowest Detection Limit	Field Blank 8/3/2021
Physical Parameters			
Hardness (as CaCO3)	mg/L	0.5	<0.50
Total Suspended Solids	mg/L	3	<3.0
Total Dissolved Solids	mg/L	10	<10
Turbidity	NTU	0.1	<0.10
Major Ions and Nutrients			
Alkalinity, Bicarbonate (as CaCO3)	mg/L	1	<1.0
Alkalinity, Carbonate (as CaCO3)	mg/L	1	<1.0
Alkalinity, Hydroxide (as CaCO3)	mg/L	1	<1.0
Alkalinity, Total (as CaCO3)	mg/L	1	<1.0
Ammonia as N	mg/L	0.005	<0.0050
Bromide (Br)	mg/L	0.05	<0.050
Chloride (Cl)	mg/L	0.1	<0.10
Fluoride (F)	mg/L	0.02	<0.020
Nitrate (as N)	mg/L	0.005	<0.0050
Nitrite (as N)	mg/L	0.001	<0.0010
Phosphorus (P)-Total	mg/L	0.002	<0.0020
Sulfate (SO4)	mg/L	0.05	<0.050
Sulphide as S (Dissolved)	mg/L	0.018	<0.018
Sulphide as H2S (Dissolved)	mg/L	0.019	<0.019
Organics			
Total Organic Carbon	mg/L	0.5	<0.50
Biochemical Oxygen Demand	mg/L	2	<2.0
Total Metals			
Aluminum (Al)-Total	mg/L	0.003	<0.0030
Antimony (Sb)-Total	mg/L	0.0001	<0.00010
Arsenic (As)-Total	mg/L	0.0001	<0.00010
Barium (Ba)-Total	mg/L	0.0001	<0.00010
Beryllium (Be)-Total	mg/L	0.0001	<0.00010
Boron (B)-Total	mg/L	0.01	<0.010
Cadmium (Cd)-Total	mg/L	0.000005	<0.0000050
Calcium (Ca)-Total	mg/L	0.05	<0.050
Chromium (Cr)-Total	mg/L	0.0001	<0.00010
Cobalt (Co)-Total	mg/L	0.0001	<0.00010
Copper (Cu)-Total	mg/L	0.0005	<0.00050
Iron (Fe)-Total	mg/L	0.01	<0.010
Lead (Pb)-Total	mg/L	0.00005	<0.000050
Lithium (Li)-Total	mg/L	0.001	<0.0010
Manganese (Mn)-Total	mg/L	0.0001	<0.00010
Mercury (Hg)-Total	mg/L	0.000005	<0.0000050
Molybdenum (Mo)-Total	mg/L	0.00005	<0.000050
Nickel (Ni)-Total	mg/L	0.0005	<0.00050
Selenium (Se)-Total	mg/L	0.00005	<0.000050
Silver (Ag)-Total	mg/L	0.00001	<0.000010
Sodium (Na)-Total	mg/L	0.05	<0.050

Parameter	Units	Lowest Detection Limit	Field Blank 8/3/2021
Strontium (Sr)-Total	mg/L	0.0002	<0.00020
Thallium (Tl)-Total	mg/L	0.00001	<0.000010
Tin (Sn)-Total	mg/L	0.0001	<0.00010
Titanium (Ti)-Total	mg/L	0.0003	<0.00030
Tungsten (W)-Total	mg/L	0.0001	<0.00010
Uranium (U)-Total	mg/L	0.00001	<0.000010
Vanadium (V)-Total	mg/L	0.0005	<0.00050
Zinc (Zn)-Total	mg/L	0.003	<0.0030
Dissolved Metals			
Aluminum (Al)-Dissolved	mg/L	0.001	<0.0010
Antimony (Sb)-Dissolved	mg/L	0.0001	<0.00010
Arsenic (As)-Dissolved	mg/L	0.0001	<0.00010
Barium (Ba)-Dissolved	mg/L	0.0001	<0.00010
Beryllium (Be)-Dissolved	mg/L	0.0001	<0.00010
Boron (B)-Dissolved	mg/L	0.01	<0.010
Cadmium (Cd)-Dissolved	mg/L	0.000005	<0.0000050
Calcium (Ca)-Dissolved	mg/L	0.05	<0.050
Chromium (Cr)-Dissolved	mg/L	0.0001	<0.00010
Cobalt (Co)-Dissolved	mg/L	0.0001	<0.00010
Copper (Cu)-Dissolved	mg/L	0.0002	<0.00020
Iron (Fe)-Dissolved	mg/L	0.01	<0.010
Lead (Pb)-Dissolved	mg/L	0.00005	<0.000050
Lithium (Li)-Dissolved	mg/L	0.001	<0.0010
Magnesium (Mg)-Dissolved	mg/L	0.005	<0.0050
Manganese (Mn)-Dissolved	mg/L	0.0001	<0.00010
Mercury (Hg)-Dissolved	mg/L	0.000005	<0.0000050
Molybdenum (Mo)-Dissolved	mg/L	0.00005	<0.000050
Nickel (Ni)-Dissolved	mg/L	0.0005	<0.00050
Selenium (Se)-Dissolved	mg/L	0.00005	<0.000050
Silver (Ag)-Dissolved	mg/L	0.00001	<0.000010
Sodium (Na)-Dissolved	mg/L	0.05	<0.050
Strontium (Sr)-Dissolved	mg/L	0.0002	<0.00020
Thallium (Tl)-Dissolved	mg/L	0.00001	<0.000010
Tin (Sn)-Dissolved	mg/L	0.0001	<0.00010
Titanium (Ti)-Dissolved	mg/L	0.0003	<0.00030
Tungsten (W)-Dissolved	mg/L	0.0001	<0.00010
Uranium (U)-Dissolved	mg/L	0.00001	<0.000010
Vanadium (V)-Dissolved	mg/L	0.0005	<0.00050
Zinc (Zn)-Dissolved	mg/L	0.001	<0.0010

Parameter	Units	SRF Effluent	DUP	RPD (%)	SRF Effluent	DUP	RPD (%)	INF	DUP	RPD (%)
		13-Dec-2021	13-Dec-2021		14-Mar-2022	14-Mar-2022		20-Jun-2022	20-Jun-2022	
Physical Parameters										
Hardness (as CaCO3)	mg/L	791	802	1.38	787	786	0.13	787	784	0.38
Total Suspended Solids	mg/L	337	324	3.93	<3.0	5.6	-	<3.0	3.1	-
Total Dissolved Solids	mg/L	1200	1210	0.83	1120	1130	0.89	1120	1140	1.77
Turbidity	NTU	109	107	1.85	1.55	1.7	9.23	0.21	0.22	4.65
Major Ions and Nutrients										
Alkalinity, Bicarbonate (as CaCO3)	mg/L	n/a	n/a	-	117	111	5.26	72.2	82.6	13.44
Alkalinity, Carbonate (as CaCO3)	mg/L	n/a	n/a	-	<1.0	<1.0	-	<1.0	<1.0	-
Alkalinity, Hydroxide (as CaCO3)	mg/L	n/a	n/a	-	<1.0	<1.0	-	<1.0	<1.0	-
Alkalinity, Total (as CaCO3)	mg/L	224	221	1.35	117	111	5.26	72.2	82.6	13.44
Ammonia as N	mg/L	0.492	0.502	2.01	0.535	0.543	1.48	0.005	<0.0050	-
Bromide (Br)	mg/L	<0.250	<0.250	-	<0.250	<0.250	-	<0.250	<0.250	-
Chloride (Cl)	mg/L	2.88	2.95	2.40	2.64	2.75	4.08	2.57	3.19	21.53
Fluoride (F)	mg/L	0.202	0.198	2.00	0.175	0.173	1.15	0.154	0.18	15.57
Nitrate (as N)	mg/L	0.108	0.12	10.53	0.284	0.242	15.97	6.31	6.5	2.97
Nitrite (as N)	mg/L	<0.0050	<0.0050	-	0.0056	0.0106	61.73	<0.0050	<0.0050	-
Phosphorus (P)-Total	mg/L	1.82	1.97	7.92	1.3	1.29	0.77	0.004	0.0054	29.79
Sulfate (SO4)	mg/L	618	630	1.92	744	743	0.13	711	720	1.26
Sulphide as S (Dissolved)	mg/L	15.1	15.7	3.90	0.408	0.391	4.26	<0.010	n/a	-
Sulphide as H2S (Dissolved)	mg/L	16.1	16.7	3.66	0.434	0.416	4.24	<0.011	n/a	-
Organics										
Total Organic Carbon	mg/L	7.83	7.59	3.11	4.55	4.85	6.38	5.9	5.54	6.29
Biochemical Oxygen Demand	mg/L	7.5	7.4	1.34	<2.0	<2.0	-	<2.0	<2.0	-
Total Metals										
Aluminum (Al)-Total	mg/L	<0.0150	<0.0150	-	<0.0150	<0.0150	-	0.0052	0.0048	8.00
Antimony (Sb)-Total	mg/L	<0.00050	<0.00050	-	<0.00050	<0.00050	-	0.00046	0.00045	2.20
Arsenic (As)-Total	mg/L	0.00391	0.004	2.28	0.00145	0.00168	14.70	0.00119	0.00115	3.42
Barium (Ba)-Total	mg/L	0.031	0.0309	0.32	0.0295	0.0298	1.01	0.0343	0.034	0.88
Beryllium (Be)-Total	mg/L	<0.000100	<0.000100	-	<0.000100	<0.000100	-	<0.000020	<0.000020	-
Bismuth (Bi)-Total	mg/L	<0.000250	<0.000250	-	<0.000250	<0.000250	-	<0.000050	<0.000050	-
Boron (B)-Total	mg/L	0.061	0.06	1.65	0.065	0.064	1.55	0.064	0.064	0.00
Cadmium (Cd)-Total	mg/L	<0.0000250	0.0000287	-	<0.0000250	<0.0000250	-	0.0000534	0.0000545	2.04
Calcium (Ca)-Total	mg/L	250	253	1.19	242	242	0.00	237	237	0.00
Chromium (Cr)-Total	mg/L	<0.00250	<0.00250	-	<0.00050	<0.00050	-	<0.00050	<0.00050	-

Parameter	Units	SRF Effluent	DUP	RPD (%)	SRF Effluent	DUP	RPD (%)	INF	DUP	RPD (%)
		13-Dec-2021	13-Dec-2021		14-Mar-2022	14-Mar-2022		20-Jun-2022	20-Jun-2022	
Cobalt (Co)-Total	mg/L	<0.00050	<0.00050	-	<0.00050	<0.00050	-	<0.00010	<0.00010	-
Copper (Cu)-Total	mg/L	0.00707	0.0073	3.20	0.00304	0.0031	1.95	0.0132	0.013	1.53
Iron (Fe)-Total	mg/L	0.088	0.09	2.25	0.351	0.355	1.13	<0.010	<0.010	-
Lead (Pb)-Total	mg/L	<0.000250	<0.000250	-	<0.000250	<0.000250	-	<0.000050	<0.000050	-
Lithium (Li)-Total	mg/L	<0.0050	<0.0050	-	<0.0050	<0.0050	-	0.0033	0.0033	0.00
Magnesium (Mg)-Total	mg/L	40.4	41.3	2.20	44.4	44.1	0.68	47.4	46.8	1.27
Manganese (Mn)-Total	mg/L	0.363	0.38	4.58	0.216	0.215	0.46	0.00062	0.00057	8.40
Mercury (Hg)-Total	mg/L	<0.0000050	<0.0000050	-	<0.0000050	<0.0000050	-	<0.0000050	<0.0000050	-
Molybdenum (Mo)-Total	mg/L	0.00496	0.00531	6.82	0.0344	0.0362	5.10	0.08	0.0809	1.12
Nickel (Ni)-Total	mg/L	<0.00250	<0.00250	-	<0.00250	<0.00250	-	<0.00050	<0.00050	-
Phosphorus (P)-Total	mg/L	1.96	1.81	7.96	1.32	1.25	5.45	<0.050	<0.050	-
Potassium (K)-Total	mg/L	1.29	1.31	1.54	1.24	1.24	0.00	1.53	1.51	1.32
Selenium (Se)-Total	mg/L	0.000714	0.00097	30.40	0.000693	0.000923	28.47	0.101	0.0983	2.71
Silicon (Si)-Total	mg/L	10	10.2	1.98	7.66	7.71	0.65	6.12	6.04	1.32
Silver (Ag)-Total	mg/L	<0.000050	<0.000050	-	<0.000050	<0.000050	-	<0.000010	<0.000010	-
Sodium (Na)-Total	mg/L	12.6	12.8	1.57	12.6	12.7	0.79	13.4	13.3	0.75
Strontium (Sr)-Total	mg/L	1.83	1.87	2.16	2.05	2.11	2.88	2.4	2.38	0.84
Sulfur(S)-Total	mg/L	202	202	0.00	248	254	2.39	204	203	0.49
Thallium (Tl)-Total	mg/L	<0.000050	<0.000050	-	<0.000050	<0.000050	-	<0.000010	<0.000010	-
Tin (Sn)-Total	mg/L	<0.00050	<0.00050	-	<0.00050	<0.00050	-	<0.00010	<0.00010	-
Titanium (Ti)-Total	mg/L	<0.00150	<0.00150	-	<0.00150	<0.00150	-	<0.00030	<0.00030	-
Uranium (U)-Total	mg/L	<0.000050	0.00006	-	0.000156	0.000166	6.21	0.000916	0.000911	0.55
Vanadium (V)-Total	mg/L	0.00268	0.00284	5.80	<0.00250	<0.00250	-	0.00077	0.00076	1.31
Zinc (Zn)-Total	mg/L	<0.0150	<0.0150	-	<0.0150	<0.0150	-	0.0043	0.0054	22.68
Zirconium (Zr)-Total	mg/L	<0.00100	<0.00100	-	<0.00100	<0.00100	-	<0.00020	<0.00020	-
Dissolved Metals										
Aluminum (Al)-Dissolved	mg/L	0.0053	0.0066	21.85	0.007	0.0058	18.75	0.0027	0.0034	22.95
Antimony (Sb)-Dissolved	mg/L	<0.00050	<0.00050	-	<0.00050	<0.00050	-	0.00046	0.00047	2.15
Arsenic (As)-Dissolved	mg/L	0.00371	0.00349	6.11	0.00159	0.00152	4.50	0.00115	0.00112	2.64
Barium (Ba)-Dissolved	mg/L	0.0296	0.0301	1.68	0.0294	0.0283	3.81	0.036	0.0357	0.84
Beryllium (Be)-Dissolved	mg/L	<0.000100	<0.000100	-	<0.000100	<0.000100	-	<0.000020	<0.000020	-
Bismuth (Bi)-Dissolved	mg/L	<0.000250	<0.000250	-	<0.000250	<0.000250	-	<0.000050	<0.000050	-
Boron (B)-Dissolved	mg/L	0.06	0.06	0.00	0.063	0.06	4.88	0.062	0.061	1.63
Cadmium (Cd)-Dissolved	mg/L	<0.0000250	<0.0000250	-	<0.0000250	<0.0000250	-	0.0000462	0.0000464	0.43
Calcium (Ca)-Dissolved	mg/L	243	248	2.04	231	232	0.43	253	250	1.19

Parameter	Units	SRF Effluent	DUP	RPD (%)	SRF Effluent	DUP	RPD (%)	INF	DUP	RPD (%)
		13-Dec-2021	13-Dec-2021		14-Mar-2022	14-Mar-2022		20-Jun-2022	20-Jun-2022	
Chromium (Cr)-Dissolved	mg/L	<0.00250	<0.00250	-	<0.00050	<0.00050	-	<0.00050	<0.00050	-
Cobalt (Co)-Dissolved	mg/L	<0.00050	<0.00050	-	<0.00050	<0.00050	-	<0.00010	<0.00010	-
Copper (Cu)-Dissolved	mg/L	0.00218	0.00228	4.48	<0.00100	<0.00100	-	0.0128	0.0134	4.58
Iron (Fe)-Dissolved	mg/L	0.057	0.063	10.00	0.399	0.383	4.09	<0.010	<0.010	-
Lead (Pb)-Dissolved	mg/L	<0.000250	<0.000250	-	<0.000250	<0.000250	-	<0.000050	<0.000050	-
Lithium (Li)-Dissolved	mg/L	<0.0050	<0.0050	-	<0.0050	<0.0050	-	0.0034	0.0034	0.00
Magnesium (Mg)-Dissolved	mg/L	38.9	39.9	2.54	43.1	41.3	4.27	51.5	51.2	0.58
Manganese (Mn)-Dissolved	mg/L	0.363	0.366	0.82	0.196	0.184	6.32	0.00021	0.0006	**96.30**
Mercury (Hg)-Dissolved	mg/L	0.0000084	<0.0000050	-	<0.0000050	<0.0000050	-	<0.0000050	<0.0000050	-
Molybdenum (Mo)-Dissolved	mg/L	0.00321	0.00329	2.46	0.0391	0.0367	6.33	0.0876	0.0873	0.34
Nickel (Ni)-Dissolved	mg/L	<0.00250	<0.00250	-	<0.00250	<0.00250	-	<0.00050	<0.00050	-
Phosphorus (P)-Dissolved	mg/L	1.71	1.84	7.32	1.22	1.2	1.65	<0.050	<0.050	-
Potassium (K)-Dissolved	mg/L	1.25	1.23	1.61	1.24	1.19	4.12	1.61	1.61	0.00
Selenium (Se)-Dissolved	mg/L	0.00647	0.00746	14.21	0.00298	0.00279	6.59	0.0893	0.0907	1.56
Silicon (Si)-Dissolved	mg/L	9.66	9.88	2.25	7.17	7.06	1.55	6.54	6.5	0.61
Silver (Ag)-Dissolved	mg/L	<0.000050	<0.000050	-	<0.000050	<0.000050	-	<0.000010	<0.000010	-
Sodium (Na)-Dissolved	mg/L	12.5	12.4	0.80	12.7	12.2	4.02	13.8	13.7	0.73
Strontium (Sr)-Dissolved	mg/L	1.77	1.85	4.42	2.03	1.94	4.53	2.46	2.42	1.64
Sulfur (S)-Dissolved	mg/L	294	294	0.00	245	241	1.65	219	217	0.92
Thallium (Tl)-Dissolved	mg/L	<0.000050	<0.000050	-	<0.000050	<0.000050	-	<0.000010	<0.000010	-
Tin (Sn)-Dissolved	mg/L	<0.00050	<0.00050	-	<0.00050	<0.00050	-	<0.00010	<0.00010	-
Titanium (Ti)-Dissolved	mg/L	<0.00150	<0.00150	-	<0.00150	<0.00150	-	<0.00030	<0.00030	-
Uranium (U)-Dissolved	mg/L	<0.000050	0.00005	-	0.000217	0.000206	5.20	0.000965	0.000951	1.46
Vanadium (V)-Dissolved	mg/L	<0.00250	<0.00250	-	<0.00250	<0.00250	-	0.00058	0.00058	0.00
Zinc (Zn)-Dissolved	mg/L	<0.0050	<0.0050	-	<0.0050	<0.0050	-	0.0037	0.0048	25.88
Zirconium (Zr)-Dissolved	mg/L	<0.00100	<0.00100	-	<0.00100	<0.00100	-	<0.00020	<0.00020	-

Notes:

n/a = not analyzed

- =RPD (Relative Percentage Difference) not calculated as concentrations were below detection limit

X = RPD exceeded BCWQG acceptability criteria for Relative Percentage Difference (BC ENV 2013). The acceptability criteria for laboratory duplicates for concentration below 5 times the method detection limit, the difference between two duplicates shall not exceed twice the reported DL. For concentration at or greater than 5 times reported DL, the RPD shall not exceed 20%.

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Appendix B

TECHNICAL MEMORANDUM

DATE 15 June 2023 **Reference No.** 22514095-073-TM-Rev0-31429

TO Mathieu O'Leary
Mount Polley Mining Corporation

FROM Jesse Maddaloni and Lee Nikl **EMAIL Jesse.Maddaloni@wsp.com; Lee.Nikl@wsp.com**

INVESTIGATION OF POTENTIAL SATURATED ROCK FILL AT WIGHT PIT – DNA SAMPLING RESULTS

1.0 INTRODUCTION

Mount Polley Mining Corporation (MPMC) has retained WSP Canada Inc., (WSP) to investigate the possibility of using Wight Pit as a Saturated Rock Fill (SRF) for semi-passive water treatment at closure. Mount Polley observed that despite water of higher constituent concentrations entering Wight Pit, the water extracted from the pit had considerably lower concentrations. WSP had conducted a bench-scale trial and demonstrated that SRF technology is capable of reducing concentrations of the target analytes (selenium, nitrate, and possibly copper through sulfide precipitation) from the Site water (Golder 2021a). WSP also conducted an evaluation of the chemistry of Wight Pit waters to whether dilution could explain the observations or if there was a reduction mechanism. Based on the analysis of available data, WSP was of the opinion that something more than simple dilution was responsible for the observed parameter reduction (Golder 2021b).

Currently, the Wight Pit, which contains waste rock, is being used as a water storage facility on site and has been flooded to a considerably higher elevation than when the present sampling program and preceding chemistry evaluation were conducted (Golder 2021b). It is expected that the present use of Wight Pit will have altered the conditions from those investigated; however, these results remain useful for closure planning as the pit could be returned to its previous or other conditions. There are some 90 m of waste rock in Wight Pit so the ability to measure conditions and reactions at this depth were limited by the physical configuration. However, because it is known that certain reduction mechanisms are mediated by microbial activity, we sampled the effluent water to see if the presence of genetic material could be used to indicate the presence of these bacteria and their beneficial activity.

To confirm the microbial activity in removal of COCs, WSP collected samples from different locations on site to perform DNA analysis for the genes coding for 16S ribsomal Ribonucleic Acid (rRNA) to identify the presence of microbial species, based on their 16S rRNA genes, that could function in the removal of these COCs. The 16S subunit of ribosomes is part of the cellular “machinery” that converts genetic messages into functional components of cells. Ribosomal RNA is ubiquitously present in self-replicating systems and its sequence changes slowly with time, making this a useful molecule for detecting the relatedness of among distant species (Woese & Fox, 1977).

1.1 Background

The SRF is an emerging passive or semi-passive (if carbon source is added externally) biological treatment technology working as a fixed-film anaerobic reactor for removal of COCs. The SRF consists of a submerged waste rock bed where oxygen is consumed by microorganisms and anaerobic conditions prevail in the interstices. The waste rock media provides a biofilm growth surface for attachment and growth of bacteria.

Comparison of the predicted post-closure water quality with the proposed target limits revealed that constituents of concern (COCs) during post-closure are predicted to be selenium, nitrate and nitrite, and copper. The COCs were identified as the ones with predicted concentrations approaching or exceeding the target limits based on post-closure influent water quality models (Golder 2020a). The target limits are based on the 2020 post-closure treatment targets (Golder 2020b). The concentration of nitrate is predicted to be close to the effluent discharge limit during operations but is expected to decrease considerably below the limit after closure. Although nitrate is not a COC for post closure, nitrate reduction occurs simultaneously with Se reduction in the SRF treatment system. SRF systems are more typically viewed as systems for the removal of selenium and nitrate; however, copper is also being examined in the Mount Polley SRF investigations because copper is a current and (predicted) future COC for the site, albeit with a different removal mechanism.

The Se removal mechanism includes reduction of soluble oxidized forms of Se to particulate elemental Se by selenium-reducing bacteria (SeRB). Nitrate is removed by the process of denitrification where denitrifiers facilitate the reduction of nitrate to nitrogen gas. The nitrate reduction process is more energetically favourable to the microbial community than the Se reduction pathway, so nitrate is generally reduced prior to Se reduction. However, some nitrate reducing bacteria (NRB) can reduce Se as well. Because Cu is one of the COCs, the possibility of Cu precipitation by sulfate reducing bacteria (SRB), that transform sulfate to sulfide which then precipitates with Cu as the insoluble copper sulfide in the SRF, is investigated.

1.2 Objectives and Scope

In bioremediation of mine-influenced water, the microbial community inside the system is the core of the treatment process. The microbial community of an environmental system is often a complex consortium of different types of bacteria. To explore whether the observed reduction of COC concentrations in Wight Pit (Golder Associates Ltd. (Golder), 2021) was due to biological activity, the presence of copper-transforming bacteria, SeRB, NRB, and sulfate-reducing bacteria should be confirmed. Consequently, the microbial community composition and interactions were studied by DNA analysis of the microbial communities from different locations on Site. To achieve this objective, different steps were taken for sample collection and analysis:

- DNA samples were collected from various locations on and adjacent to the site.
- DNA samples were also collected from the bench-scale SRF leaching test being conducted on water from the Site in WSP laboratory.
- DNA extraction and sequencing was conducted by a third-party laboratory (Department of Cell & Systems Biology, University of Toronto).
- The bioinformatics analysis was done on raw sequencing data by a sub-contractor (Amplytica). The attached report (Attachment 1) was generated by Amplytica.
- Interpretation of bioinformatics data, and comparison between locations sampled and the bench-scale samples to find similarities or differences, was done by WSP.

2.0 SITE DESCRIPTION

Wight Pit is a mined area on Site that is partly filled with waste rock (Figure 1). Beginning in November of 2020, water from the NEZ sump was redirected to Wight Pit such that it infiltrates into this waste rock bed. Water extracted from Wight Pit ("effluent") was directed to the Long Ditch where it flows to the Water Treatment Plant located at the base of the Perimeter Embankment of the Tailings Storage Facility.

Figure 1: Wight Pit and Rock Back Fill

3.0 METHODS

Site locations were selected for DNA sampling to represent water quality of diverted influent from the NEZ Sump into Wight Pit, groundwater that is representative of what may be entering Wight Pit, and effluent pumped from Wight Pit. Additional samples were collected from the TSF seepage water, Cariboo Pit and from the bed of Polley Lake and a QA/QC sample to test for cross-contamination during sampling was also collected from the tap water at the Environmental Department's trailer.

The samples collected from various locations as part of this program and from the bench scale test are summarized in Table 1.

Table 1 Summary of Selected On-Site and Bench Samples For DNA Analysis

General Location Description	Sample ID in Amplytica Report	Volume of Filtered Sample (mL)	Sample Collection Date
Polly Lake	Pl	50	28 February 2022
Tailings Storage Facility Seepage	Tsf	300	28 February 2022
Wight Pit	Wp	500	1 March 2022
NEZ Seep	Nez	500	1 March 2022
Wight Pit Sump	Wps	500	1 March 2022
Kynoch Pump	Kp	500	1 March 2022
Cariboo Pit	Cp	250	2 March 2022
Environmental Trailer	Et	500	2 March 2022
Bench-scale SRF Influent	Inf	825	28 February 2022
Bench-scale SRF Effluent	Eff	165	28 February 2022

Replicate samples were taken from each location as back-up in case of sample contamination. As no contamination was observed, the replicate samples were not extracted nor sequenced. The following steps were taken for sample collection, DNA sequencing, and data analysis:

1) Samples were collected in clean 50 mL syringes. A new syringe and filter apparatus was used for each sample location.

2) Samples were filtered using a 0.22 µm cellulose filter placed in a 25 mm diameter filter holder. So that enough DNA was collected on the filter for extraction, for some Site locations with low TSS, more than 50 mL of sample was filtered. The volume of water filtered in each sample is provided in Table 1. The same volume of water was sampled for the replicate sample as well, although the replicates were not analyzed as noted above.

3) Filtering of water was continued for each sample location until the filter paper was clogged (as determined by considerable backpressure).

4) Filter papers were carefully extracted from the filter holder with decontaminated forceps, wrapped in sterile aluminum foil, and labeled properly with the site location names.

5) Samples were stored on ice or in a freezer while on site, until transferring to dry ice for shipping.

6) Samples were shipped on dry ice to Department of Cell & Systems Biology at the University of Toronto for DNA extraction and V4 16S rRNA gene sequencing (Bacteria/Archaea).

7) The bioinformatics analysis was done on raw sequencing data by Amplytica using clustering-free techniques for identifying Amplicon Sequence Variants (ASVs).

8) Information on the required data analysis was provided to Amplytica by WSP. A report summarizing the present functional genes in each sample was generated by Amplytica.

9) Interpretation of results and data analysis was done by WSP.

4.0 RESULTS

The results of the microbial taxonomy analyses are presented in the Amplytica report (Attachment 1) with details on the abundance of metabolic categories and gene abundances in each sample. Some of the noteworthy findings of the study are summarized below:

Cross-Contamination Check

Because even small amounts of DNA can be amplified through the polymerase chain reaction (PCR) process, a negative control was collected from the sink tap in Mount Polley's environmental trailer. The water at the tap is non-potable water and is not chlorinated. There were very low sequencing reads in the Environmental trailer sample (Et) meaning that the other samples (with the exception of the Tailings Storage Facility Seepage (Tsf)) contained DNA that originated from the sample and not as a result of cross-contamination through the sampling, transport, and analysis procedures used. These two samples were not further analyzed for DNA composition.

Community Diversity

- The sample collected from Polley Lake had the most unique number of identified genera which indicates that the microbial community is diverse.
- The bench-scale influent (Inf) and effluent (Eff) had the lowest number of identified genera. The fact that effluent of the bench-scale test had the lowest diversity of genera confirms that WSP was successful in selectively growing selenium and nitrate reducing bacteria in the bench-scale SRF. Selectively growing microorganisms under controlled conditions provides higher efficiency in targeted removal of COCs from the water as opposed to the high-diversity microbial community in environmental samples.

Community Relatedness Among Different Samples

- The analysis of the microbial community structure (Fig. 4 of Attachment 1) revealed that the proportion of microbial genera shared between samples Wight Pit (Wp), Wight Pit Sump (Wps), Polly Lake (Pl), and Kynoch Pump (Kp) appeared to be more similar at the genus level. Wp, Wps, Pl, and Kp also were predicted to have similar levels of nitrifying and denitrifying genes.
- Samples collected from the bench-scale effluent (Eff) was unique and quite distant from all other samples collected from the site. This could be due to the source of the inoculum used in the bench-scale tests, which came from previous bench test trials in the WSP laboratory as well as the provision of a consistent organic carbon source. Consequently, it is expected that the microbial community is different from what is seen on site locations. However, it is the function performed by the microbes that matters vis-à-vis the potential for water treatment.

Significant Identified Families

- Relative abundance of microorganisms present in each sample was analyzed in family and genus levels. The dominant families (more than 3.5% of total population) present in Pl, Wp and Wps were quite similar among all samples.

- The families that are known to be involved in selenium or nitrogen transformation which were dominant in Wp, Wps, and Pl are *Rhodocyclaceae, Comamonadaceae, Nitrosomonadaceae,* and *Gallionellaceae* from the order *Burkholderiales*. The *Rhodocyclaceae* family has been identified as a putative selenate reducer through the NarG enzyme (Baldwin et al., 2019). The *Comamonadaceae* family is in the betaproteobacteria class that has been identified as a putative reducer in nitrate and selenate bioremediation from mine influenced water (MIW) (Baldwin et al., 2019). The selenate reduction in the microorganisms of this family is possibly carried out using their nitrate reductase enzyme NarG. The *Nitrosomonadaceae* family is an ammonia oxidizing family that initiates the nitrification reaction by oxidizing ammonia to nitrite, which is subsequently oxidized by bacterial nitrite oxidizers to nitrate. These microorganisms have a major role in the nitrogen cycle in the environment and in wastewater treatment processes (Prosser et al. 2014; Atlas & Bartha, 1981). *Gallionellaceae* family can also be classified as potential participants in nitrate removal in aquatic environments. However, the pathways and the enzymes involved in the removal nitrate from groundwater have not been identified. Genetic analysis of the strains had shown that these bacteria contain genes related to nitrogen, iron and carbon metabolism which allow to grow under anoxic conditions. Although this family is involved in nitrate reduction, the study does not identify that the bacteria are capable of transforming nitrate all the way to nitrogen gas (Jakus et al. 2021).
- For the bench-scale samples, the dominant families in Eff were considerably different from the ones in Inf. The Eff contained *Rhodocyclaceae*, *Hydrogenophilacea*, *Latescribacterota*, *Desulfitobacteriaceae,* Geobacteraceae, and *Sulfurimonadacea*. Bacteria from *Desulfitobacteriaceae* family are known for their capacity to grow by anaerobic respiration using many different organic and inorganic electron acceptors such as sulfate, nitrate, nitrite, fumarate, or polysulfide. *Rhodocyclaceae* which was also dominant in multiple locations in the environmental samples, is a putative selenate reductase through NarG enzyme as described earlier.

Significant Identified Genera

- *Sulfurifustis,* which was an abundant genus in Pl, Wp, and Wps is a type of autotrophic sulfur-oxidizing bacteria belonging to the family *Acidiferrobacteraceae* in the order *Acidiferrobacterales* that are involved in sulfur oxidation and inorganic carbon fixation pathways. By contributing to the sulfur cycle, these bacteria are possibly involved in removal of copper through precipitation as a metal sulfide.
- Members of the genus *Sulfuritalea* were present in Pl, Wp, and Wps. These bacteria, from the class *Betaproteobacteria,* have been identified in activated sludge, lake water, ground water, soil, and sediment (Watanabe et al., 2016). Members of this genus are facultatively anaerobic and can reduce nitrate to nitrogen under anaerobic conditions. Under denitrifying conditions, this bacterium grows autotrophically on hydrogen, thiosulfate, and elemental sulfur, or it grows heterotrophically on various organic substrates. Members of this genus can also oxidize sulfur, thiosulfate, or hydrogen and are potentially involved in copper precipitation.
- The *Thiobacillus* genus that was abundant in Eff, Wp, and Wps can convert Se^0 to hydrogen selenide (H_2Se) under anaerobic conditions (Eswayah et al., 2016). This genus is categorized within sulfur chemolithotrophs which have been shown to be capable of oxidizing sulfide or sulfur to sulfate under aerobic condition where the final electron acceptor is O_2 (Bacon et al. 1989).

Gene Abundance Prediction

- Gene abundance prediction was done to identify the overall abundance of nitrification, denitrification, and selenate reduction genes in each sample. Gene abundance predictions indicate that selenate reduction (i.e., selenate to selenite) was present in all samples, except for the Inf (which is expected to be low in the feed water to the bench-scale reactor). The selenate reduction gene abundance predictions were slightly higher in Wp and Pl and significantly higher in Eff.
- Based on the gene abundance predictions for both Wp and Eff, although selenate reductase K17050 (Schröder et al. 1997) are predicted to be present, the abundance of nitrate reductase K15864 (Zumft 1997) and nitric oxide reductase K04561 (Heiss et al. 1989) is considerably higher; meaning that the Se reduction is potentially mainly carried out by denitrifiers.
- A list of known selenate reducing and methylating genera derived from literature was provided by WSP so that Amplytica could produce a comprehensive list for selenate reducing organisms. As a result, Wp, Eff, and Cp were found to have elevated concentrations of putative selenate reducers.

5.0 SUMMARY

Overall, the analysis of the microbial communities in the samples confirmed the presence of a diverse microbial community in all samples collected (with the exception of Et and Tsf) from different site locations and from the bench-scale SRF. The analysis of the samples collected from the site provided proof-of-concept for the biological activity in terms of selenate and nitrate reduction in Wight Pit. Several species that are potentially involved in selenium and/or nitrate removal were present in the microbial community in the Wp.

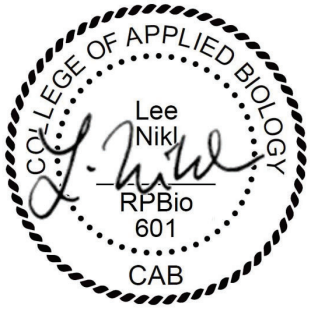
Because Cu is one of the COCs post-closure, the possibility of Cu removal through precipitation as copper sulfide was investigated. Although some sulfur/sulfide oxidizing bacteria were present in the Wp, with potential roles in the sulfur cycle, the sulfate reducing bacteria were not sufficiently present among the dominant genus or families. This could be attributed to the sequencing method or statistical tools that were used to analyze the sequencing data. To better understand the microbial community, more precise sequencing techniques such as shotgun sequencing may be an option. However, because Wight Pit is now used for water storage and lacks the general features of an SRF, such further analysis would not be possible at present, other than in the bench scale SRF reactor.

6.0 CLOSURE

The reader is referred to the Study Limitations section, which follows the text and forms an integral part of this memorandum.

We trust that the information provided herein is sufficient for your needs at this time. If you have any questions or need additional information, please do not hesitate to contact us.

WSP Canada Inc.



15 June 2023

Jesse Maddaloni, P.Eng.
Lead Mechanical Engineer

Lee Nikl, MSc, RPBio
Senior Environmental Scientist, Fellow

EM/JM/LN/ca/hp

PERMIT TO PRACTICE #1000200
Engineers & Geoscientists BC

Attachment 1: Amplytica Report

https://golderassociates.sharepoint.com/sites/10023g/22514095 deliverables/002_issued/073-tm-31429-wight pit dna sampling results/rev0_final/22514095-073-tm-rev0-31429-dna analysis 15jun_23.docx

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STUDY LIMITATIONS

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ATTACHMENT 1

Amplytica Report

Amplytica

Prepared For: WSP/ Golder Associates Inc.

Microbiome Functionality Report of a Suspected Saturated Rock Fill Reactor

Revised, June 22, 2022

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Microbiome Functionality Report

Prepared for: WSP/ Golder Associates Inc.

Sample Overview

Golder Associates Inc. suspects their client's rock pile may possess naturally occurring Saturated Rock Fill (SRF) reactor activity. In mine remediation, operators use SRF reactors to remove excess selenium and nutrients from contaminated mine wastewaters. As part of Golder's project, ten water filter samples were collected from the field site and laboratory bench-scale tests and sent for microbiome assays. Golder sent samples to Amplytica in a blinded fashion where samples were labelled, but they provided no other sample information. Each sample is referred to in this analysis by an alphanumeric code to simplify the text and figure labels (Tab. 1).

Table 1: Sample Information

Sample Identifier	**Bioinformatics Analysis Identifier**	**Passed Quality Control**
INF-1	Inf	True
EFF-1	Eff	True
PL-1	Pl	True
TSF-1a	Tsf	False
WP1	Wp	True
KP-1	Kp	True
WPS 1	Wps	True
NEZ1	Nez	True
ET1	Et	False
CP1	Cp	True

Overview of Quality Control and Methodologies Used

DNA Sequencing and Bioinformatics Analysis

The V4 region of the 16S rRNA gene was amplified and isolated from each sample sent for microbiome assays. One or more V4 regions were amplified for each microbe in these samples. An Illumina MiSeq instrument sequenced the resulting V4 fragments. Sequencing reads were quality trimmed and quality filtered, resulting from the instrument reading each fragment's genetic sequence. Low-quality reads were removed. Later, sequencing errors were also removed from the remaining quality-filtered reads. The resulting quality-controlled reads were used to identify the samples' microbial taxa. Alpha rarefaction curves were generated for each sample. The Silva taxonomy database (Release 138.1) was used to classify the sequencing reads taxonomically, which characterized each sample's microbial taxa. Taxa represented by only two sequencing reads were removed from the overall dataset. Custom scripts were used to generate alpha rarefaction, bubble, and heatmap plots of the taxa present in samples at class, family, and genera levels. The abundance of metabolic categories and gene abundances in each sample was calculated using FAPROTAX and PICRUSt2, respectively. Custom scripts were also used to plot the FAPROTAX and PICRUSt2 output.

Samples Removed Due To Low Sequencing Reads

Although a depth of thirty thousand sequencing reads was targeted, Amplytica found some samples to have fewer reads due to a lack of extractable biomass.

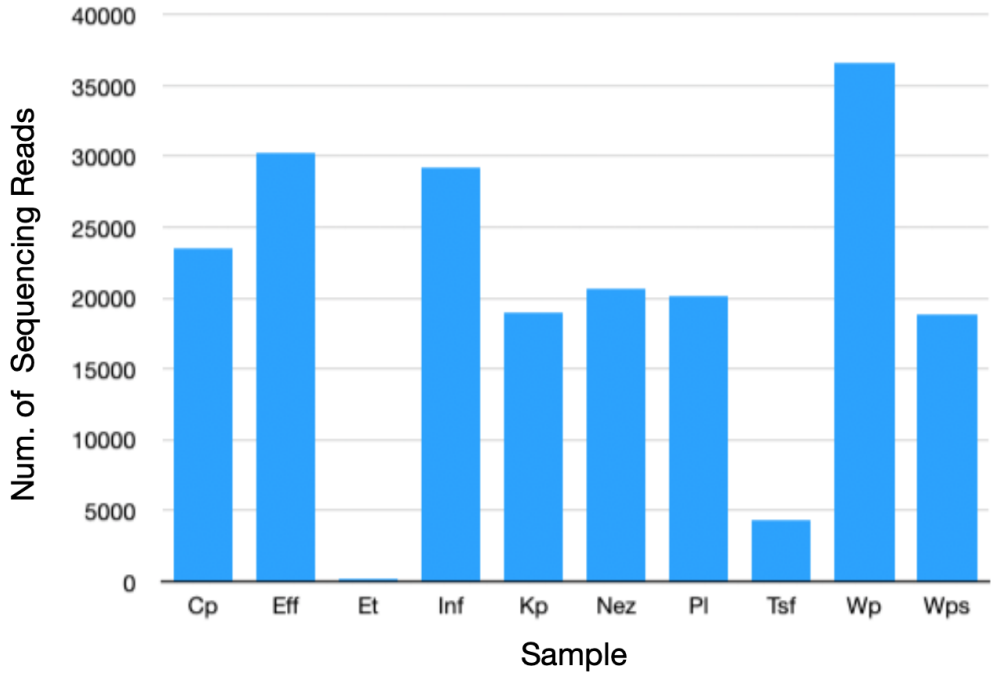

Figure 1: Number of sequencing reads acquired for each sample.

Amplytica's sequencing provider found all samples to have relatively low biomass. However, the biomass of Et and Tsf were exceptionally low, which caused very low read counts for these samples. Amplytica removed Et and Tsf from further analysis to support the analysis of the other samples and remove biases. The remaining samples were subsequently subsampled (i.e., rarefied) to twelve thousand reads to provide even coverage across samples. Amplytica's sequencing provider indicated that it might not be worthwhile to further sequence backup filters for samples like Et as they are unlikely to amplify due to their extremely low starting biomass.

Microbiome Data

Overview of Microbial Diversity

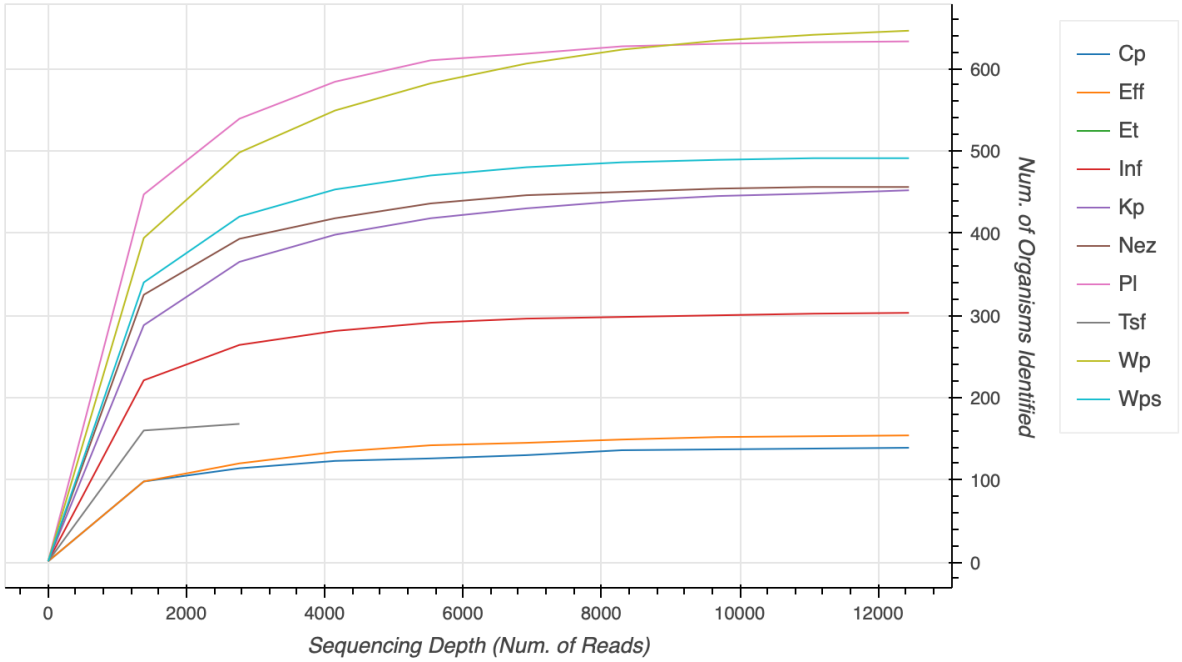

Figure 2: Alpha rarefaction curve showing the effect of sequencing depth on the number of organisms identified.

A rarefaction curve for each sample was generated (Fig. 2). For most samples, the number of organisms identified plateaued at approximately eleven thousand sequencing reads (Fig. 2). Because each sample was sequenced with at least twelve thousand reads, the plateauing indicates that most of the taxa found in each sample were identified. Sample Wp was close to plateauing but may not have plateaued by twelve thousand reads.

Samples Inf, Eff, and Cp, were shown to have lower numbers of genera than the other samples (Fig. 3). Sample Pl was shown to have substantially more unique genera when compared to other samples (Fig. 3). Sample Wp shared more genera with Wps than any other sample (Fig. 3.) Sample Wp also shared many genera with sample Kp (Fig. 3).

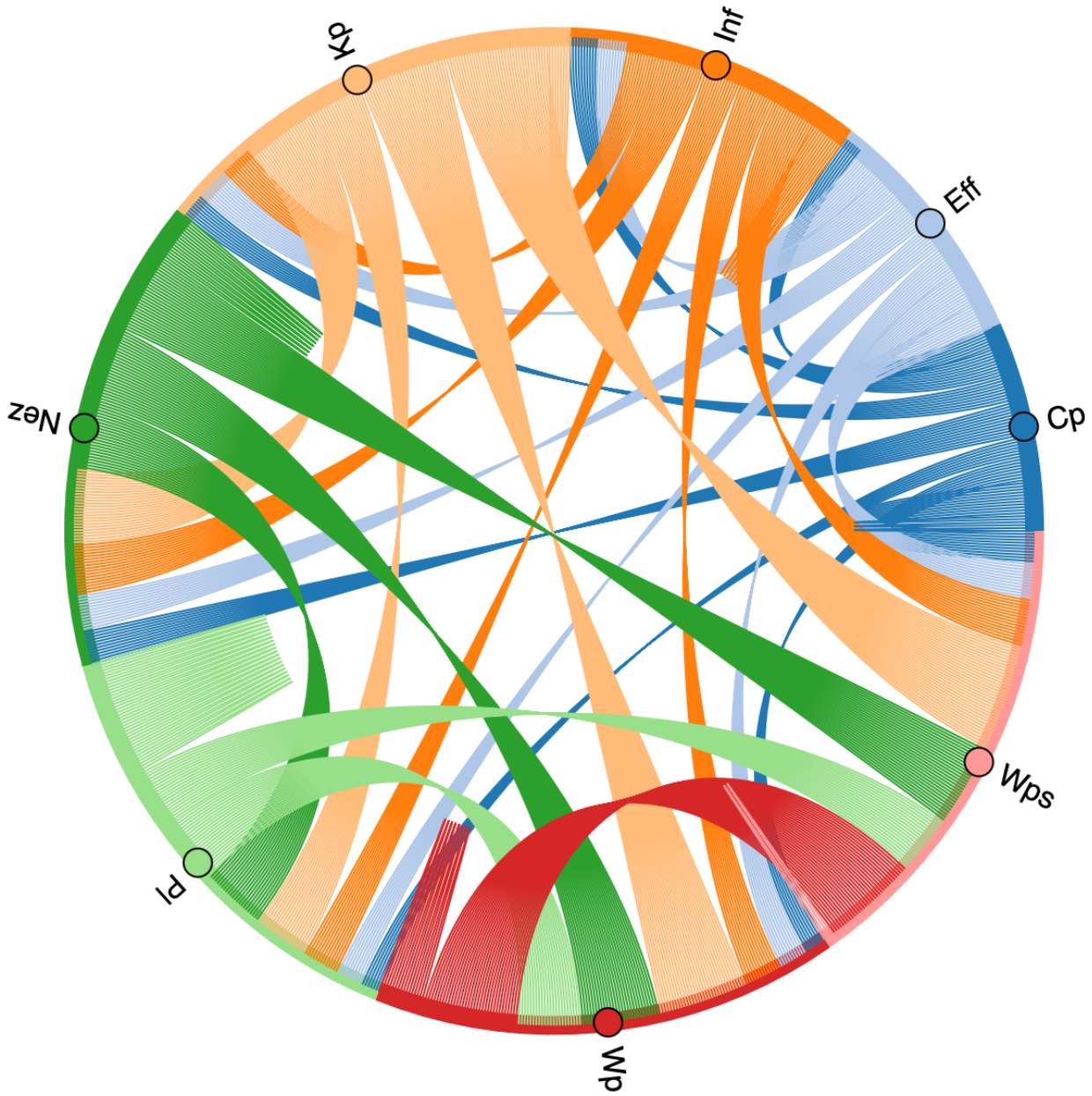

Figure 3: A chord diagram showing the proportion of microbial genera shared between or unique to individual samples. Each sample is assigned an edge fragment, and the total width of each fragment correlates with the total number of genera in its corresponding sample. The width of the arcs that cross the circle between two samples indicates the proportion of genera shared between these two samples. Arcs that fail to cross the circle indicate the proportion of genera unique to a sample.

Overview of Microbial Community Structure

At a genus level, the microbial communities of samples Eff and Cp were quite distant from the other samples and each other (Fig. 4). In contrast, the microbial communities of samples Kp, Wp, and Wps appeared to be more similar at a genus level (Fig. 4). The ordination results shown in Figure 4 correlate with the results presented in Figure 3, which show that Wp, Wps, and Kp have large numbers of overlapping genera.

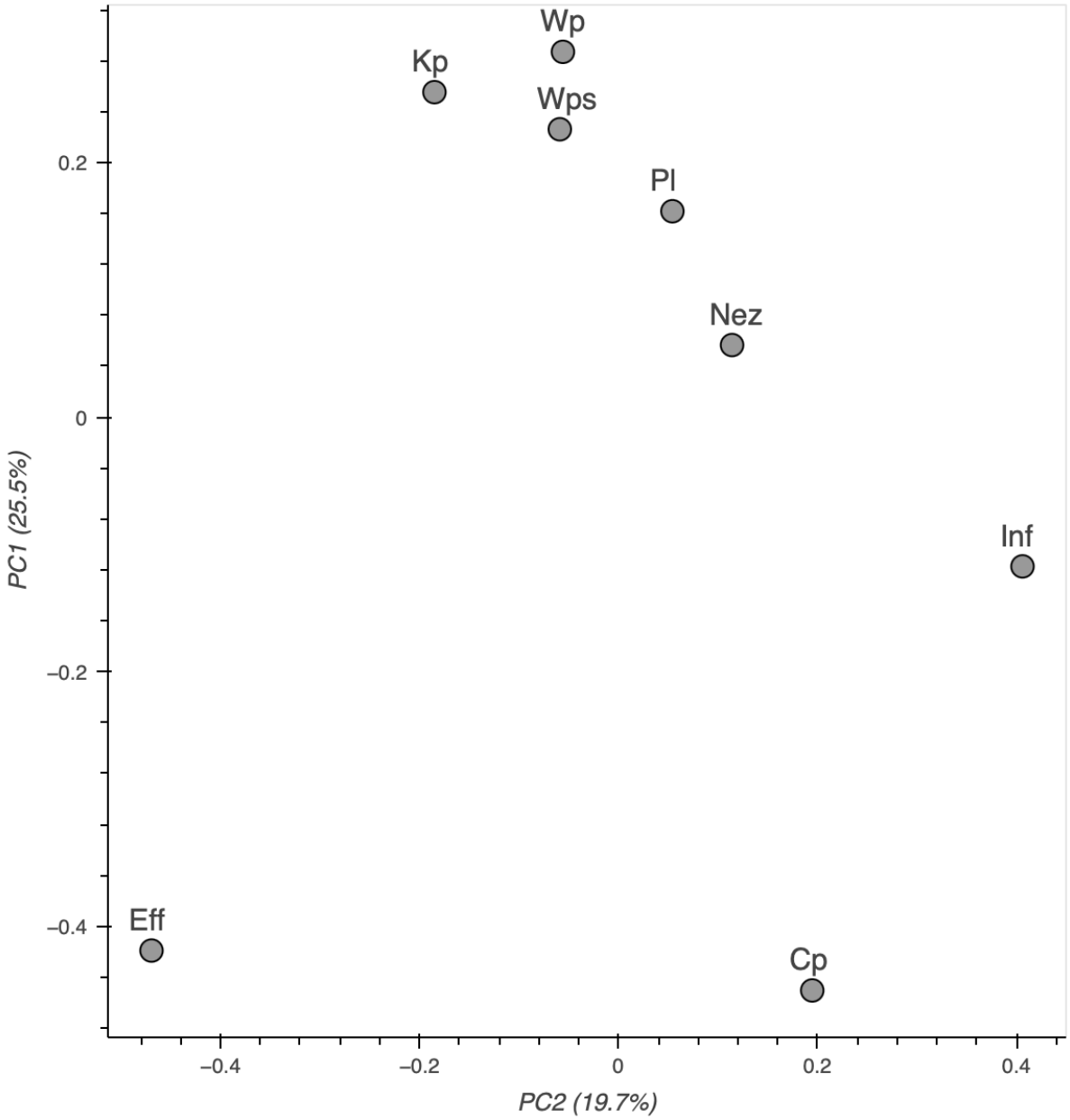

Figure 4: A Principal Coordinates Analysis (PCoA) biplot generated from genus-level prokaryotic Bray-Curtis beta diversity distances between samples. Distances were created from observations of sequencing reads being classified as belonging to a specific genus. Samples that cluster closer to each other on the biplot have similar prokaryotic communities.

Overview of Microbes Present

At a family level, the distribution of taxa appears to be patchy (Fig. 5 and Fig. 6). Sample Cp had elevated abundances of Comamonadace (>15%) and Verrucomicrobiaceae (>20%) (Fig. 5 and Fig. 6). Eff had increased abundance of Hydrogenphilaceae (>20%), Rhodocyclacaeae (>10%), Geobacteraceae (>15%), and Sulfurimonadaceae (>15%) (Fig. 5 and Fig. 6). Sample Kp had elevated levels of Rhodocyclacaeae (>20%). Samples Wp and Wps had elevated levels of Acidiferrobacteraceae (>20%) (Fig. 5 and Fig. 6). Sample Wp (~5%) and Pl (~7%) had much higher levels of KD4-96 than Wps or any other sample (Fig. 5).

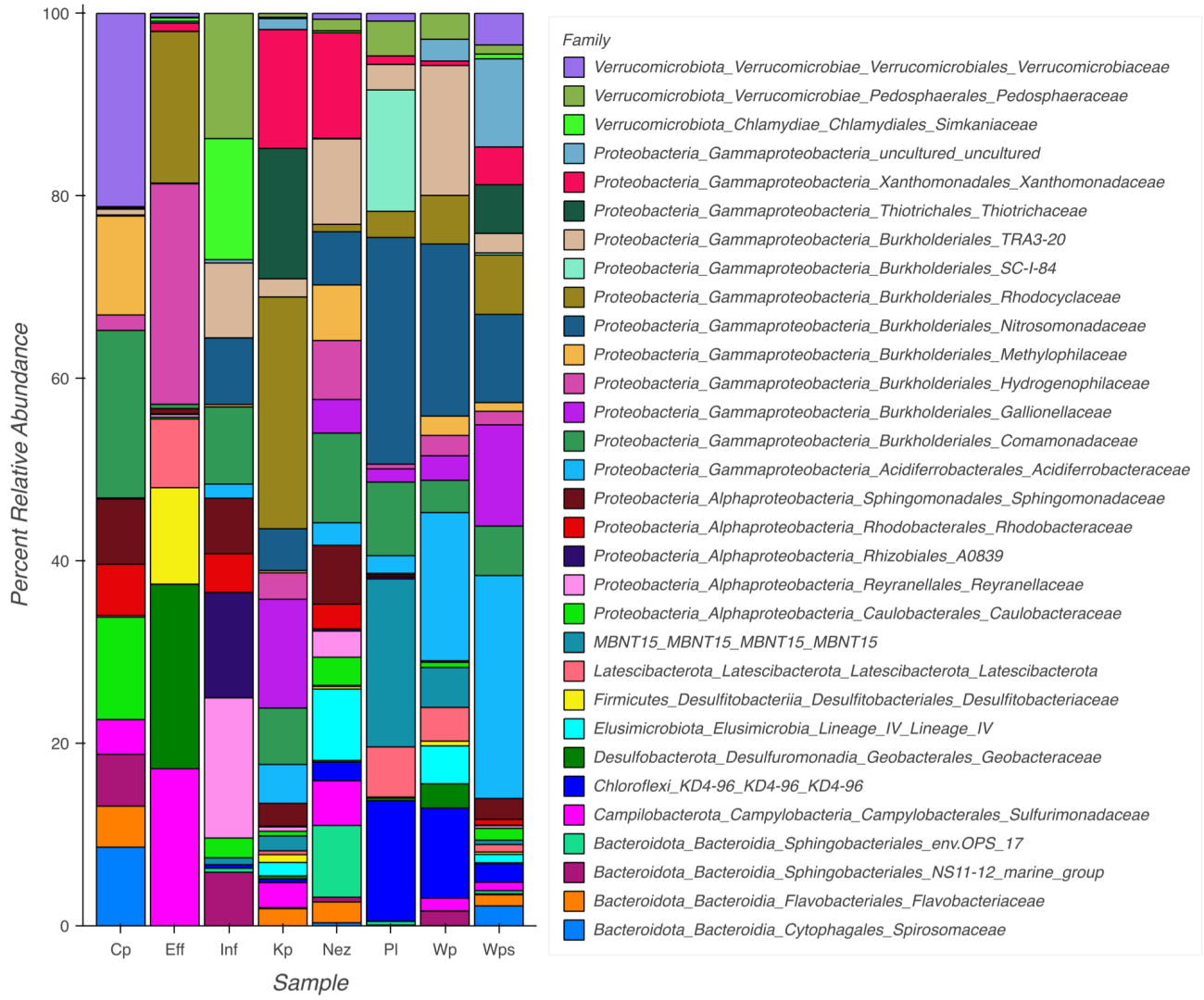

Figure 5: Relative abundance of taxonomic families in each sample with greater than 3.5% abundance.

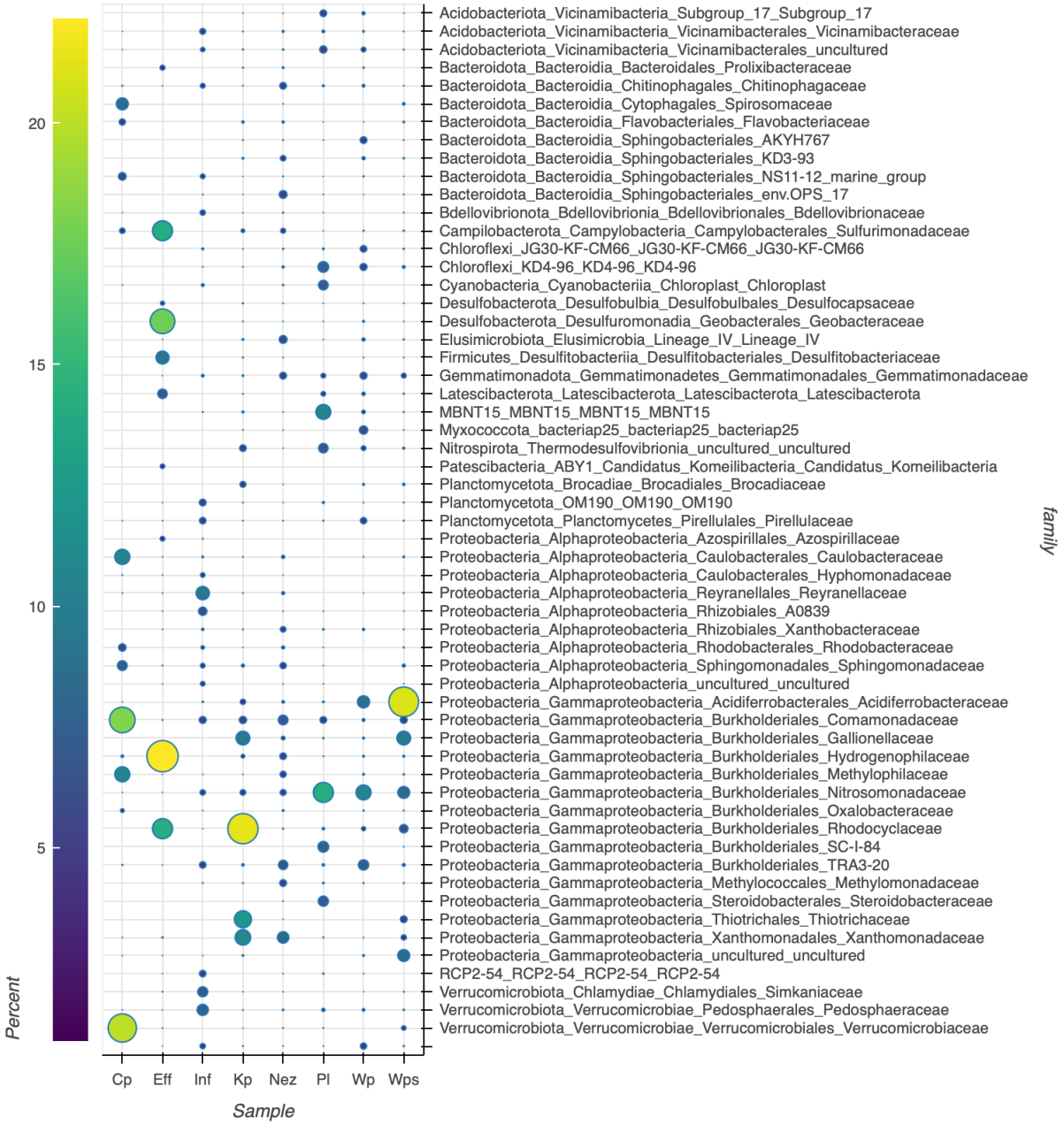

Figure 6: Relative abundance of taxonomic families in each sample with greater than 2% abundance. At the bottom of the figure, the unlabeled class represents bacteria counts that could only be classified to a kingdom level (e.g., bacteria).

At a genus level, sample Cp had high levels of *Prosthecobacter* (>20%) (Fig. 7 and Fig. 8). Kp had high levels of *Sulfuritalea* (>20%). Sample Wps and Wps had increased *Sulfurifustis* (>20%) (Fig. 7 and Fig. 8). The overall distribution of genera appears patchy (Fig. 7). Sample Wp had a much greater abundance of *GOUTA6* (> 7%) than other samples (Fig. 7).

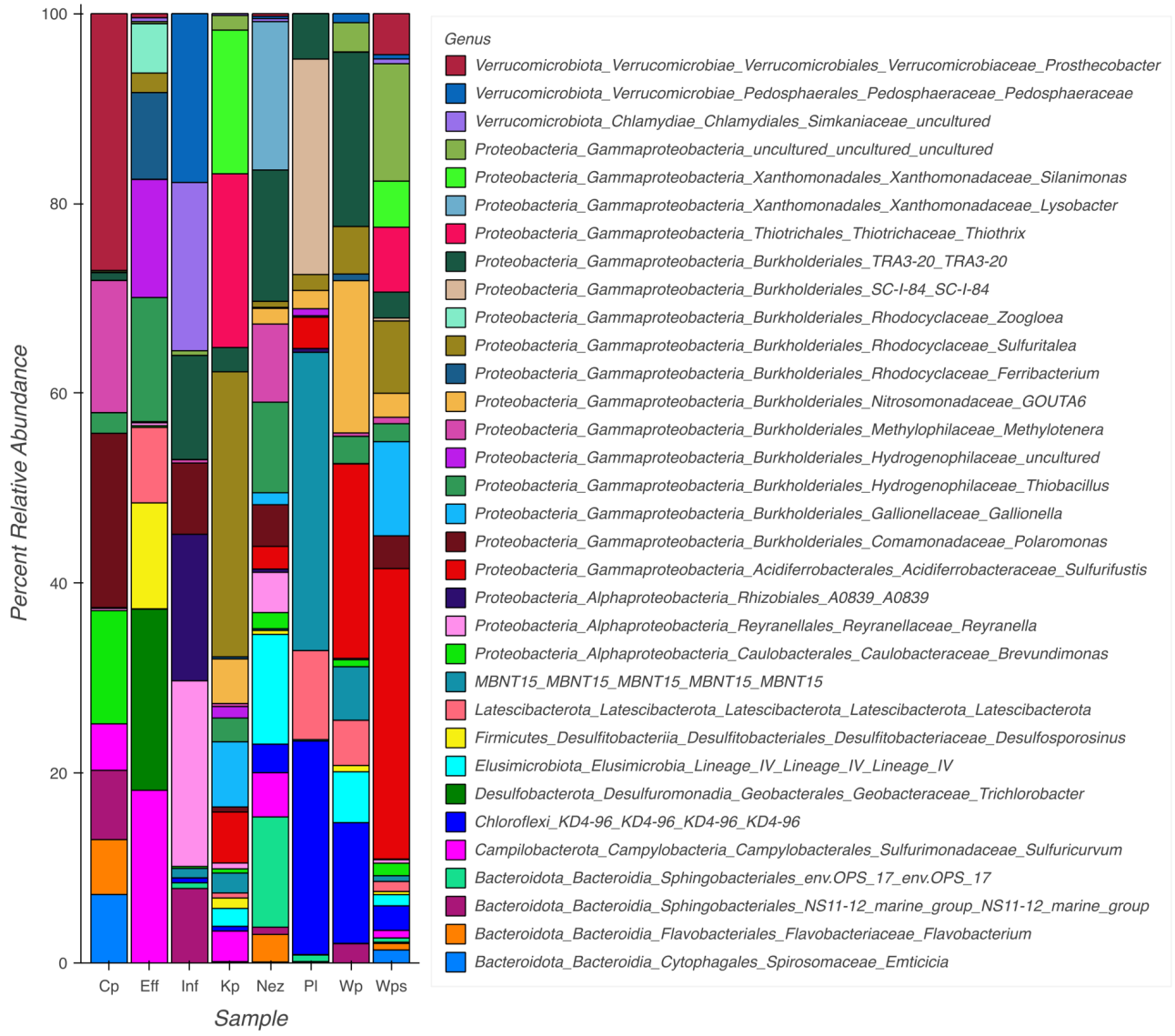

Figure 7: Relative abundance of genera with greater than 3.5% abundance.

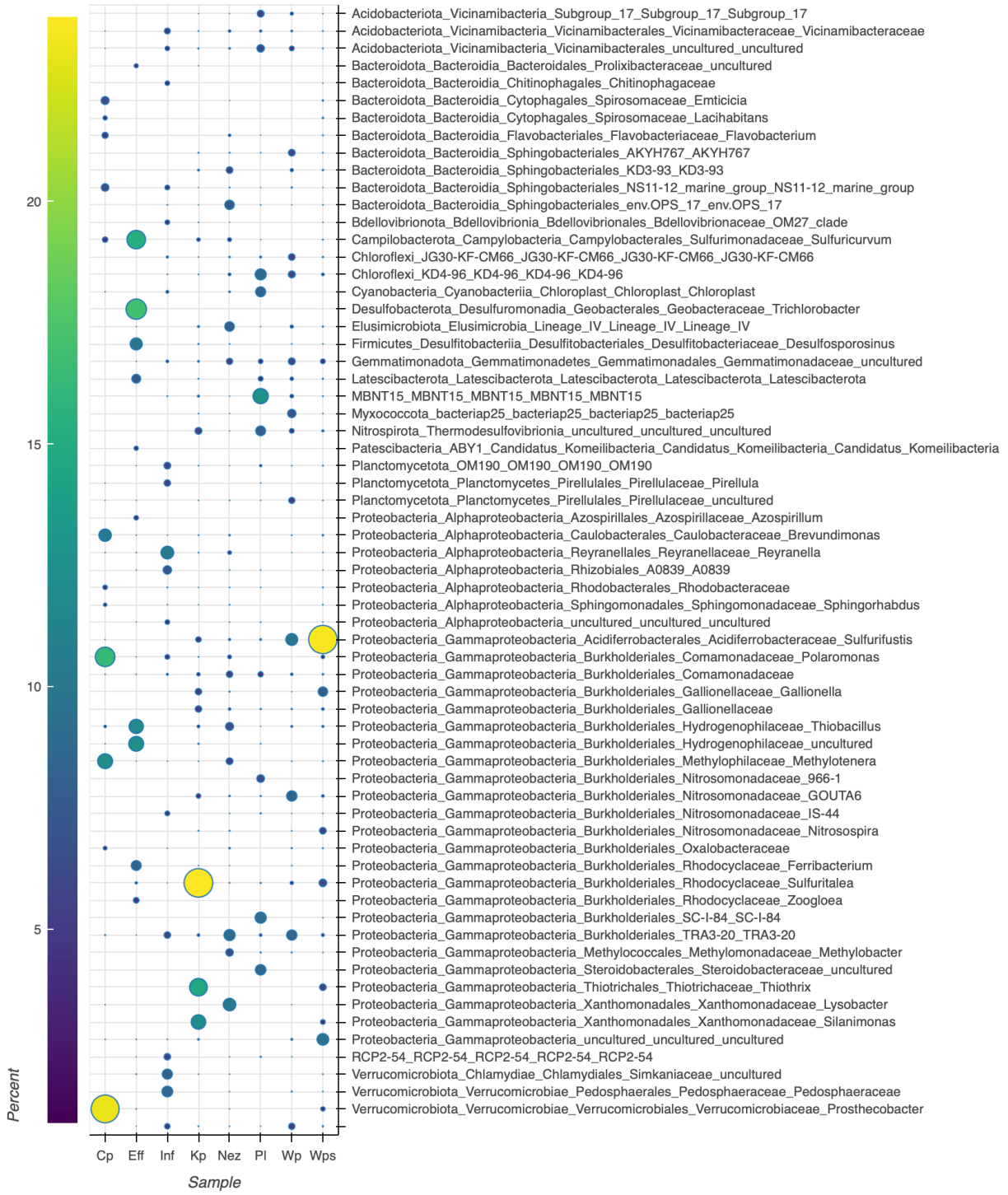

Figure 8: Relative abundance of genera with greater than 2% abundance. At the bottom of the figure, the unlabeled class represents bacteria counts that could only be classified to a kingdom level (e.g., bacteria).

Microbial Functionality Composition

Amplytica used the FAPROTAX and PICRUSt2 databases to predict the abundance of metabolic categories and SRF-relevant gene abundances in each sample. Both techniques use a taxonomy-based approach to predict the abundance of metabolic categories or gene abundances in each sample. In this approach, the taxa in each sample are categorized as having specific metabolic capabilities based on either the functions their sister organisms performed in the previous scientific literature or the genes these sister organisms possess. In some cases, these approaches can lead to miscategorization as some taxa have gained functions through horizontal gene transfer from other organisms within an environment. Also, some taxa may not be found within the databases and thus will not have any metabolic predictions.

Prediction of High-Level Metabolic Capability Using FAPROTAX

Of the highly abundant organisms found within the samples, only a subset could be categorized as carrying out a specific function (Fig. 9). *Zoogloea* was predicted to participate in nitrogen cycling, and *Thiobacillus* was predicted to be participating in sulphur cycling (Fig. 9).

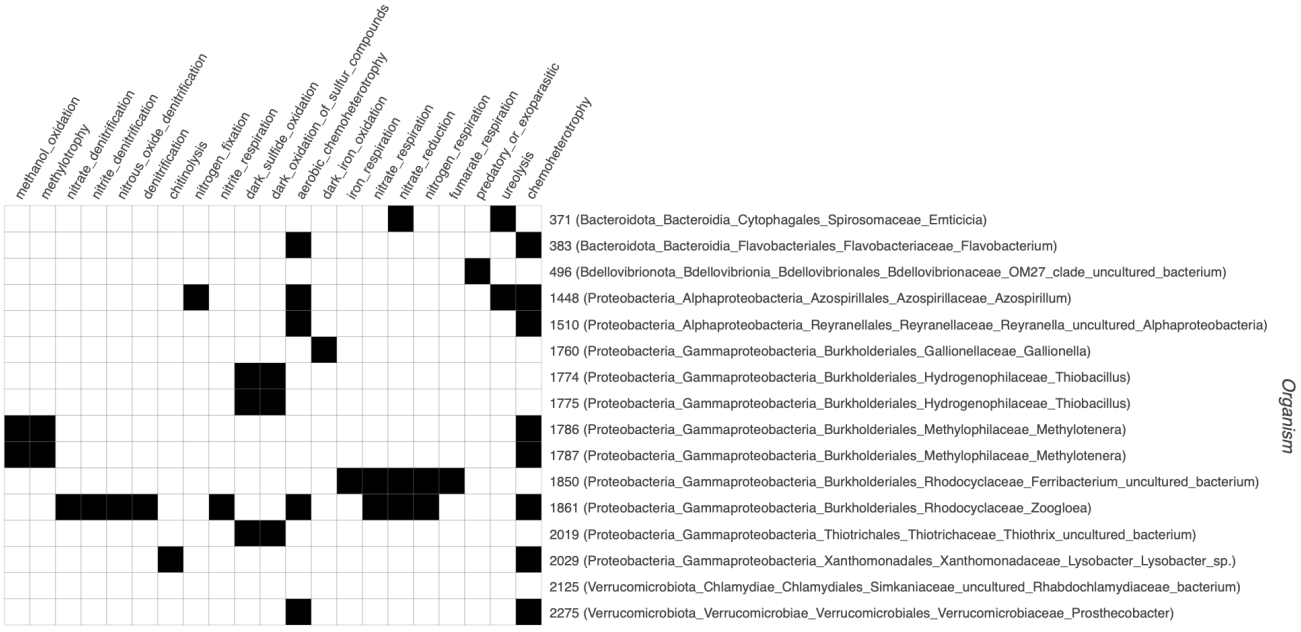

Figure 9: Metabolic capability classifications for metabolically classifiable organisms (i.e., unique sequence variants) with greater than 2% abundance.

Although FAPROTAX could only classify the metabolisms of a subset (~18%) of organisms in the samples, the data showed some trends. FAPROTAX showed that Samples Eff, Kp, and Wps were capable of sulphur oxidation (Fig. 10). Sample Eff also possesses nitrogen cycling organisms (Fig. 10). Like sample Pl, sample Wp also showed evidence of organisms capable of fermentation (Fig. 10). Sample Wp also shows a reduction in the number of organisms associated with aerobic chemoheterotrophy (Fig. 10).

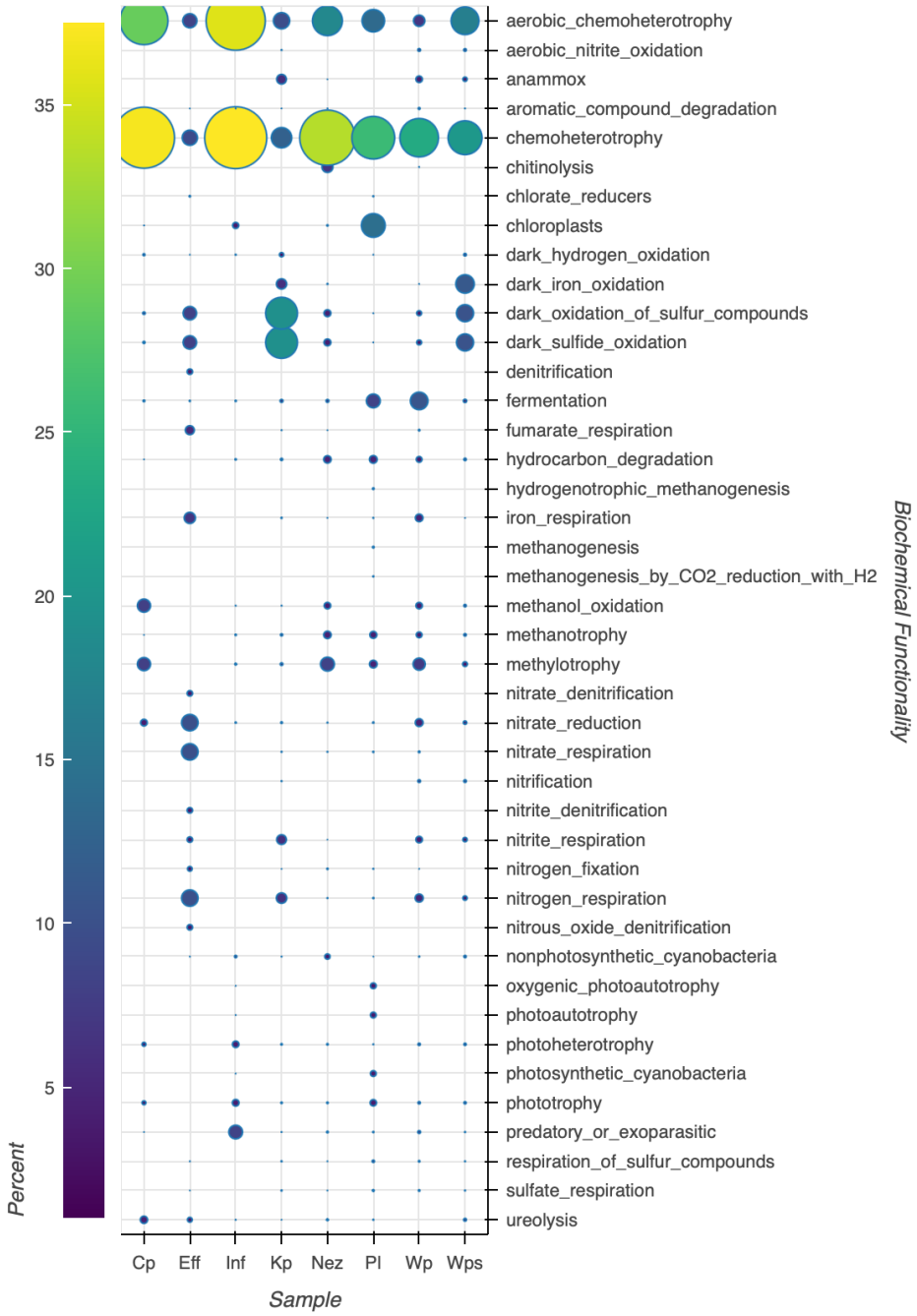

Figure 10: Percentage of total organisms predicted to carry out a metabolic category (via FAPROTAX).

Bioremediating Gene Abundance Prediction Using PICRUSt2

PICRUSt2 uses a more sophisticated mapping technique between an organism's phylogeny and its potential functions. Using phylogenetic methods, PICRUSt2 can predict functional gene abundances for each sample by combining the abundance of each taxonomic group with this group's phylogeny-based predicted genes. The tool can also predict individual taxa as possessing specific genes. PICRUSt2 can only analyze genes found in existing pathway databases like the Kyoto Encyclopedia of Genes and Genomes (KEGG) (kegg.jp).

PICRUSt2 was used to identify the overall abundance of nitrification, denitrification, and selenate reduction genes in each sample. Overall abundances of these genes are presented in Fig. 11. Due to the lack of research into the identification and isolation of selenite reduction (i.e., selenite to elemental selenium) genes (Ojeda *et al.*, 2020), no genes for selenite reduction were found in KEGG or any other pathway databases PICRUSt2 utilizes. Therefore selenite reduction genes were not presented in Figure 11. One or more genes were used to identify each nitrification and denitrification step (Fig. 11). Three types of selenate reductase genes were used to identify selenate reduction (Fig. 11).

PICRUSt2 gene abundance predictions indicate that selenate reduction (i.e., selenate to selenite) was slightly elevated in sample Pl and significantly heightened in sample Eff (Fig. 11). Almost all samples had elevated gene abundances for the third step of nitrification (i.e., nitrite to nitrate), especially sample Kp (Fig. 11). The enzyme used for the third step of nitrification can also be used for the first step of denitrification (kegg.jp/entry/R00798). Cp, Eff, and Nez were predicted to have elevated abundances of genes that carry out the second denitrification step (Fig. 11). Kp, Wp, Wps, and Pl showed similar abundances of nitrogen cycling genes. Sample Eff should have elevated predicted abundances for genes related to denitrification, whereas it lacked genes for nitrification in contrast to the other samples (Fig. 11). Sample Wp showed similar predicted gene abundances to sample Pl for nitrogen cycle genes and Kp, Nez, and Wps for selenate reduction genes (Fig. 11).

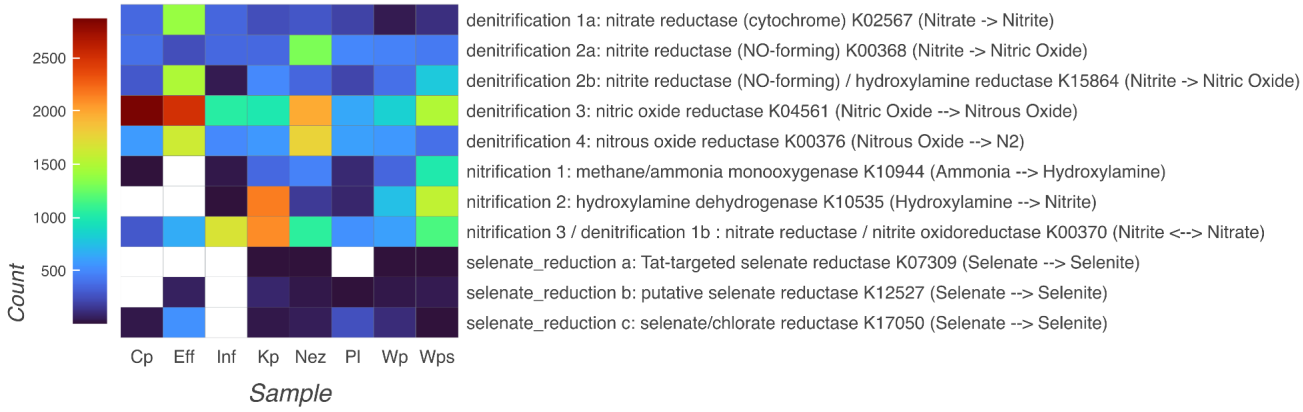

Figure 11: Normalized predicted abundances of genes related to nitrification, denitrification, and selenate reduction.

Readers should note that the gene abundances presented in Fig. 11 correspond to the abundances of organisms predicted to carry out a function. However, gene expression factors and enzyme activity can influence the throughput of a metabolic pathway *in situ*.

Predicted selenate-reducing organisms were also identified using PICRUSt2. This prediction data was combined with a list of known selenate reducing and methylating genera derived from academic literature and provided by Golder. The resulting joint dataset is presented in Fig. 12.

Samples Cp, Eff, and Wp were found to have putative selenate reducers in elevated abundance. Sample Cp had possessed genera *Brevundimonas* (~8%) and *Sulfuricurvum* (~3%) (Fig. 12). Sample Eff included the genera *Desulfosporosinus* (~8%) and *Sulfuricurvum* (~12%) (Fig. 12). *Sulfuricurvum* was also found in more than 1% abundance in Kp and Nez samples. Sample Wp only had one selenate reducer in elevated abundance, *JG30-KF-CM66* (~3%), an uncultured member of the phylum Chloroflexi whose existence was determined by shotgun metagenomic sequencing (Fig. 12) (Mehrshad *et al*., 2018). *JG30-KF-CM66* was previously identified in uranium mine waste rock piles (Mehrshad *et al*., 2018).

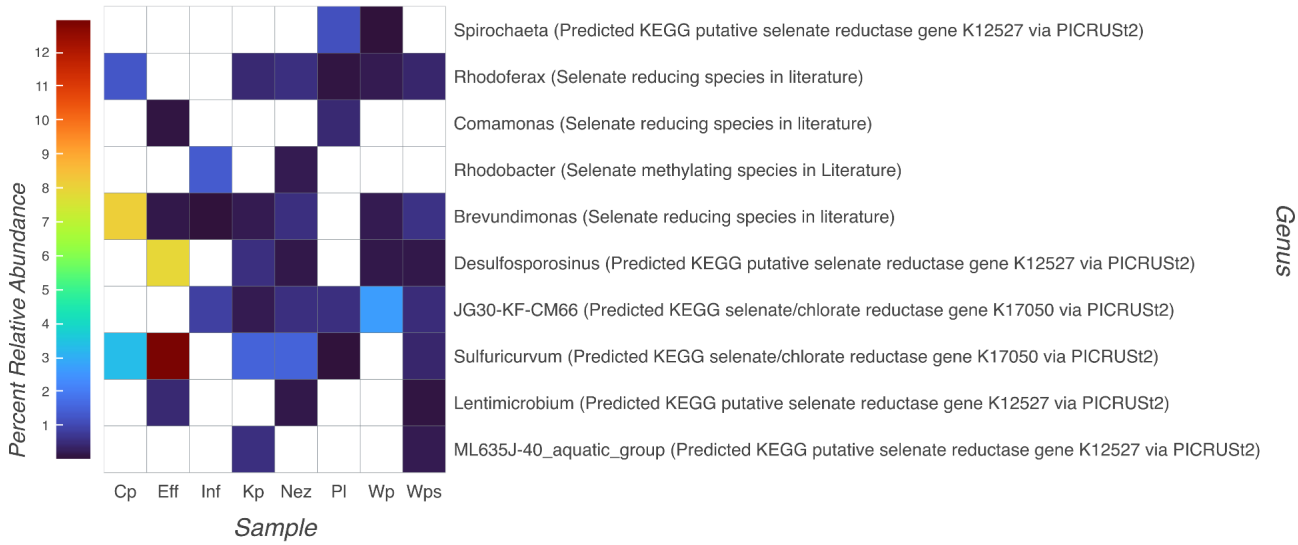

Figure 12: Abundances of genera, with greater than 0.25% abundance, predicted to be capable of selenate reduction or methylation.

One should note that the prediction of the possession of selenate reducing genes presented in Fig. 12 is based on either literature findings of members of a genus being selenate reducing or the identification of selenate reducing genes in the sequenced genomes of members of the genus. Not all organisms within a genus may be selenate reducing.

Interpretation

According to the beta diversity (i.e., diversity between samples) ordination, samples Kp, Wp, Wps, and Pl clustered together according to their microbial community composition (Fig. 4). Kp, Wp, and Wps clustered closer together than they did to Pl (Fig. 4). Kp, Wp, Wps, and Pl also were predicted to have similar levels of predicted nitrifying and denitrifying genes (Fig. 11). Sample Eff had much higher levels of predicted denitrifying genes than any other sample (Fig. 11). Due to their similar microbial and functional characteristics, Kp, Wp, Wps, and Pl likely came from similar environments.

Estimated selenate reduction gene abundance was highest in samples Eff, Pl, and Wp (Fig. 11). Cp, Eff, and Wp had elevated abundances of genera associated with selenate reduction (Fig. 12). However, the genera most likely to perform these reactions are not the same across all samples. Sample Wp had different and less selenate remediating genera than Cp or Eff (Fig. 12). Because Golder collected the samples from different environments, their selenate remediating organisms may differ due to the differences in the biogeochemical properties of the samples.

The techniques used in this analysis to determine the presence of selenate remediating organisms rely upon these organisms' phylogenetic closeness to known selenate reducers with sequenced genomes. To further prove the presence of selenate-reducing organisms, one would have to perform genome-resolved metagenomic sequencing on the samples, isolate individual genomes, taxonomically classify them, and then scan these genomes for genes encoding selenate reductases. It is possible to have selenate reducing or methylating genes on mobile genetic elements such as plasmids. Such plasmids can spread throughout microbial communities and thus result in unexpected organisms having selenate reduction or methylation capability.

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Submission in Compliance with Conditions of *EMA* Permit 11678 s 2.12

Water Treatment and Discharge Program

PROGRESS REPORT #13

PREPARED FOR

THE MINISTRY OF ENVIRONMENT AND CLIMATE CHANGE STRATEGY

PREPARED BY

MOUNT POLLEY MINING CORPORATION

December 31, 2023

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1. INTRODUCTION

Mount Polley Mining Corporation (MPMC) is submitting this progress report as required by Section (s) 2.12 of *Environmental Management Act (EMA)* Permit 11678, issued on December 1, 2022. This progress report provides an update on progress on all aspects of s 2.11 under a general heading titled *Water Treatment and Discharge Program*. Progress Report #13 covers the period between July 1, 2023 and December 31, 2023, and includes relevant past work that falls under the requirements of s 2.11.

The Mount Polley mine was in care and maintenance from May 2019 through October 2021. Mining operations resumed November 2021 with the mining of Springer Phase 4, beginning with the removal of the saddle between Springer Pit and Cariboo Pit. The crusher and concentrator were refurbished, milling operations began June 2022, as did operation of the Tailings Storage Facility.

MPMC is currently mining the tailings that were deposited in the Springer Pit in 2015/2016. Ore reserves are located beneath the tailings, which are expected to provide an additional 2 years of production. MPMC is pursuing further operational permits to extend the mine life to 2032.

2. BACKGROUND

This Progress Report #13 references the newest version of *EMA* Permit 11678 (Dec 2022), which extends the effluent discharge into Quesnel Lake to June 30, 2025. A permit amendment application has been submitted through the Major Mine Office to extend the discharge to Quesnel Lake for the operating period of Mount Polley Mine.

EMA Permit 11678 (Dec 2022) includes s 2.11.2, a Numeric Performance Metric (NPM) of 0.012 mg/L total copper. The NPM value is a treatment optimization target for effluent discharge, which differs from the permit limit of 0.033 mg/L total copper.

MPMC recently filed a 5-year update to the Mine Plan and Reclamation Update 2022 (MRP) (Golder 2022g) submitted to the Ministry of Energy, Mines and Low Carbon Initiative (EMLI) in compliance with sections in *Mines Act* Permit M-200 dated December 10, 2020. Excerpts from the MRP Appendix G – Water Treatment Update are extracted to provide the update on water treatment technology development.

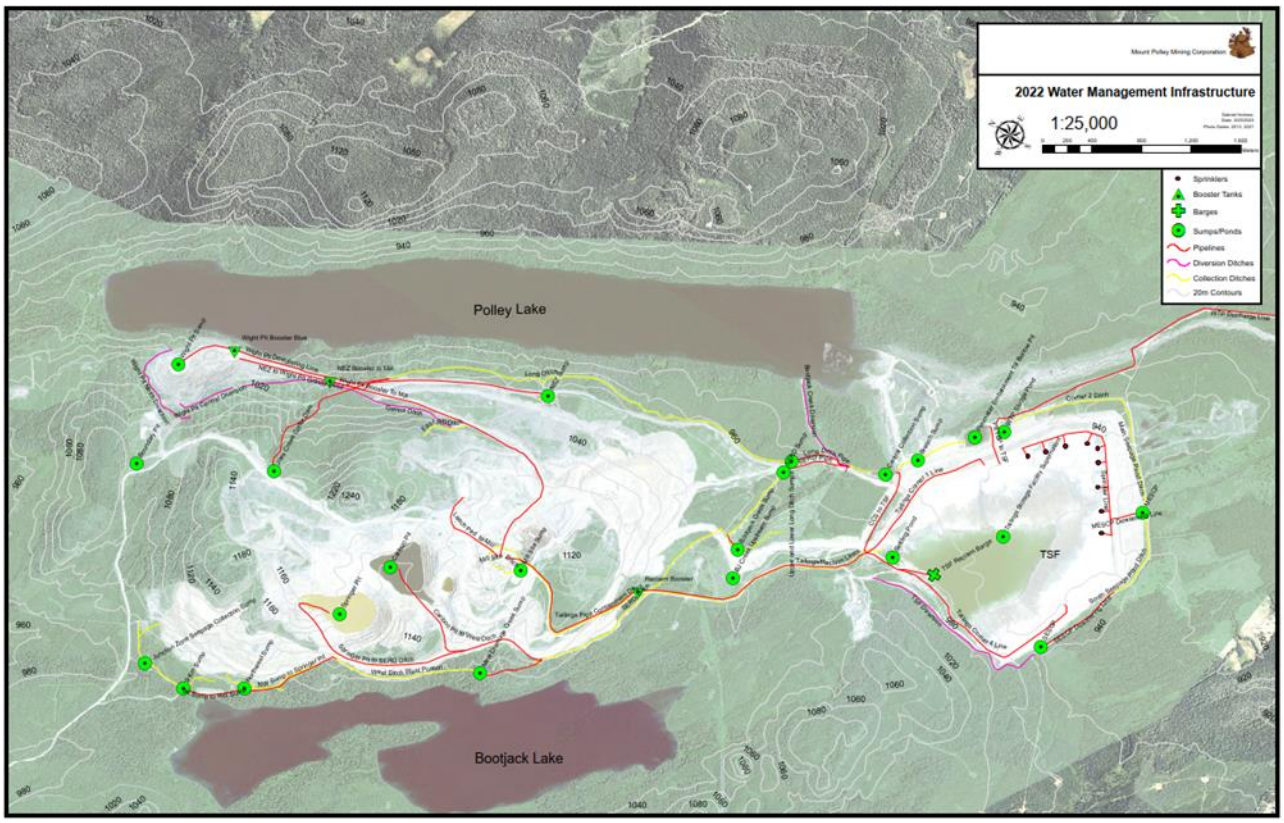


Figure 1. Water Management Infrastructure

3. WATER TREATMENT TECHNOLOGY DEVELOPMENT

Water treatment technology development is a cumulation of Best Available Technology (BAT) assessments through bench and pilot testing of treatment systems. This section of the report addresses Permit 11678 s 2.12(a) and s 2.12(b). What follows is an excerpt from the Mine Plan and Reclamation Update 2022 (MRP Appendix G) with updates of the results of BAT assessments, bench and pilot testing of treatment systems.

MPMC has been progressing and evaluating multiple technologies to support the treatment of identified constituents of concern (COCs) and to support potential decentralized treatment and discharge during closure/post-closure. Various studies have been completed since 2017 to support these efforts as an important component of closure refinement. An inventory of treatment technologies and a summary of their development is presented in Table 1.

Good engineering practice typically requires a project to follow a standardized engineering design process for the selection and progressive refinement of the final project concept. A project

progresses from a pre-concept phase for the identification of multiple treatment options, through concept, pre-feasibility, and feasibility phases to project execution. Generally, the engineering studies performed for each of these project phases are supported by test work that progresses from proof-of-concept and detailed bench-scale testing to pilot-scale and demonstration-scale test work. Some of the treatment technologies tested may not progress to the next stage of development. For example, a treatment technology may be eliminated if its treatment capacity is insufficient to treat the forecast volumes. This framework takes a staged approach, such that input assumptions, design, and cost for the total system can be refined as each stage is completed and the information that the plan relies on becomes more certain. This allows input assumptions to be less conservative as they become more accurate with accumulated knowledge. The technology development stages presented in Table 1 align with this approach. Additional details regarding this project development framework and how it aligns with the BC Ministry of Environment and Climate Change Strategy's BAT policy is provided in Golder 2020a.

This water treatment update technical memorandum assumes that the reader is familiar with the technologies in Table 1 and only provides updates on work completed by MPMC since 2017 to support the development of these technologies. Detailed descriptions of the technologies and associated process flow schematics can be found in Golder 2020a.

Table 1. Treatment Technology Inventory and Stage of Development

Technology / Stage of Development	Targeted COCs	Proof-of-Concept Bench-Scale Testing	Detailed Bench-Scale Testing	Pilot-Scale Testing	Demo-Scale Testing	Full-Scale Execution	Work Completed
Actiflo	TSS, total copper					→	Bench and full-scale testing.
Lime Treatment	Dissolved copper					→	N/A
TMT Treatment	Dissolved copper	→	→	→	→		Bench and full-scale testing. Toxicity evaluation.
Pit-Lake Treatment	Selenium, nitrate	→	→	→			Preliminary concept design and proof-of-concept bench-scale testing. Pilot-scale testing workplan.
Saturated Rock Fill (SRF)	Selenium, nitrate	→	→				Concept design, proof-of-concept bench-scale testing, detailed bench-scale testing workplan (in progress), and long-term substrate leach testing. Wight Pit SRF assessments.

Technology / Stage of Development	Targeted COCs	Proof-of-Concept Bench-Scale Testing	Detailed Bench-Scale Testing	Pilot-Scale Testing	Demo-Scale Testing	Full-Scale Execution	Work Completed
Packed Bed Reactor (PBR)	Selenium, nitrate						Concept design, proof-of-concept bench-scale testing, and detailed bench scale testing workplan (in progress).
Biochemical Reactor (BCR)	Selenium, nitrate						Concept design and proof-of-concept bench-scale testing.
Submerged Sand Reactor (SSR)	Selenium, nitrate						Screening analysis.
Constructed Wetland Treatment (CWT)	Selenium, nitrate						Concept design, bench-scale testing, and on-site pilot scale testing (by others).

3.1 Actiflo

Actiflo, the tradename of a technology supplied by Veolia, is the technology currently in use as the site's WTP and is considered the BAT for TSS removal during operations and closure/post-closure. The main targeted COC of this technology is TSS, with total copper removal also occurring via TSS removal. Polyaluminum chloride (PAC) is dosed into the influent water in the Actiflo process, which produces aluminum hydroxide precipitates that adsorb to copper complexes, thus removing copper during the solids-liquids separation step of the process. The Actiflo technology is currently implemented at full-scale on-site, as indicated in Table 1.

Concept design, bench-scale, and full-scale testing have been completed for the Actiflo technology, including assessment and optimization of PAC and various chelating agent dosages (including TMT) to assist copper removal (Golder 2016b, Golder 2017a, Golder 2018a, Golder 2019a, Golder 2019b, Golder 2020b).

Actiflo treatment is currently operating as the core component of the treatment system during operations and is currently assumed as the core component of treatment during closure/post-closure. In Q4 2023, the WTP was shut down from September 21 to October 29, 2023 and October 31 to December 31, 2023 due to limited water availability on site. The WTP will resume operations in early 2024 in preparation for freshet melts in spring 2024.

3.1.1 Flocculant Management Plan

Per Permit s 2.10, a Flocculant Management Plan (FMP) was prepared and outlines the methods for the settling of solids at the WTP using coagulant, flocculant and ballast, while preventing potential detrimental effects in the receiving environment. The FMP also outlines the procedures and equipment used for storage and dosing of the settling aids, including monitoring of the influent and effluent water quality (Golder 2023a). This document, provided by Golder, was appended to

the 2022 Annual Environmental Report and submitted to ENV in March 2023.

3.2 Lime Treatment

Active treatment with lime is currently in use at the site, where existing process plant infrastructure is used to raise contact water pH, resulting in the precipitation of metal hydroxides, particularly dissolved copper. The main targeted COC of this technology is dissolved copper. Lime treatment is currently implemented on-site, as indicated in Table 1, and used as a pre-treatment step of the Actiflo water treatment system to target dissolved copper removal. Use of this technology is well known to industry and technology development to support this has not been required.

Lime treatment, when required, is currently a component of the water treatment system during operations.

3.3 TMT Treatment

TMT is a chelating agent that aids with dissolved copper precipitation that allows copper treatment through TSS removal. The main targeted COC of this technology is dissolved copper.

Bench-scale test work completed showed that TMT is able to effectively precipitate dissolved copper (Golder 2016b, Golder 2017a, Golder 2018a) and the full-scale trials completed showed that the existing Actiflo treatment system was able to remove the copper bound with TMT to below the permit limit (Golder 2019a, Golder 2019b, Golder 2020b). Full-scale trials also showed that copper removal to lower concentrations (total copper < 0.012 mg/L) was challenging for Actiflo with TMT treatment, not due to limitations in dissolved copper precipitation but due to limitations in TSS removal. TMT was effective in precipitating dissolved copper, but the Actiflo system was not effective in subsequently removing the precipitate to result in low effluent copper concentrations. The toxicity of TMT has also been evaluated and showed that its use would not result in an acutely lethal effluent (Golder 2018b).

TMT treatment is still being considered for full-scale implementation.

3.4 Pit-Lake Treatment

Pit-lake treatment targeting COCs of selenium and nitrate is an in-situ technology that requires nutrient and carbon source dosing to create conditions for biological treatment within the pit-lake.

A conceptual assessment of full-scale pit-lake selenium treatment was completed (Golder 2017b) and the technology was deemed a cost-effective approach to managing selenium and was recommended for further bench and pilot-scale testing. Proof-of-concept bench-scale testing for pit-lake selenium treatment was also completed and showed effective removal of selenium and nitrate, with further pilot-scale testing recommended (Golder 2019c). A pilot-scale study for pit-lake treatment was designed for Cariboo Pit (Golder 2020c), but the pit is being dewatered to support future mining activities and this work has not yet been completed.

Pit-lake treatment targeting selenium and nitrate is still being considered for full-scale implementation and is currently assumed as part of the treatment system during closure/post-closure if required.

3.5 Saturated Rock Fill (SRF)

SRF treatment is a fixed-film anaerobic system targeting the treatment of selenium and nitrate and ideally utilizes a mined-out open pit as a bioreactor operated in a horizontal flow configuration.

A concept study for SRF treatment was completed (Golder 2020d) and SRF was recommended for further bench-scale and pilot-scale testing. Proof-of-concept bench-scale testing for SRF was also completed (Golder 2021), which showed effective removal of selenium and nitrate, but also indicated metal leaching. Detailed bench-scale testing and waste rock SRF substrate metal leach testing was recommended following completion of the proof-of-concept work.

Bench-scale leach testing using anticipated SRF substrate waste rock from site was completed (Golder 2022d – draft RevA, Golder 2023d), which monitored leached metals over a long-term test period of 52 weeks. A high-level summary of findings is below and the full report is included in Appendix A:

- The bench-scale SRF reactor used was very effective in removing total and dissolved selenium and nitrate.
- The use of mine waste rock as reactor media for SRF introduces the risk of leaching or release of metals into the SRF effluent. For this treatment technology to be implemented at full-scale as a viable option, the effects of metal leaching should be understood at specific reducing conditions that are required for SRF to achieve effective removal of selenium and nitrate.
- Metal leaching varies over time and differs between metals and must be considered during the start-up phase of SRF implementation (and may lead to additional required polishing treatment steps downstream of the SRF).
- SRF technology can provide copper removal during closure.

Detailed bench-scale testing for SRF has been proposed for 2024 and a test plan has been submitted in draft to MPMC (Golder 2022e – draft RevA). Additional details regarding potential timing of this work are further discussed in Section 4.

Geotechnical and geochemical substrate characterization for SRF media waste rock is currently ongoing with the geotechnical component anticipated for completion in 2023. WSP has completed geotechnical laboratory testing of the SRF substrate and the analytical results were used in a geotechnical settlement assessment of a waste rock SRF bed to estimate porosity that will inform SRF hydraulic retention time and sizing. This geotechnical assessment will be produced in draft before the close of 2023. The geochemical component of this characterization will be conducted by MPMC's geochemical consultant SRK, anticipated for completion in 2024.

SRF treatment is still being evaluated for full-scale implementation and is currently considered a technology option for semi-passive treatment of selenium and nitrate during closure/post-closure if required.

3.5.1 DNA Analysis

Additionally, to investigate if the observed reduction in contaminants of concern in Wight Pit is

facilitated by microbial activity, Golder sampled the effluent water of Wight Pit from the bench scale SRF to determine if the presence of genetic material could be used to indicate the presence of these bacteria and any favorable activity (Golder, 2023b). Microbial community composition and interactions were also studied using DNA analysis of the microbial communities from various locations on site. The analysis of samples collected from the site provided proof-of-concept for the biological activity in terms of selenate and nitrate reduction in Wight Pit as several species that are potentially involved in selenium and/or nitrate removal were present in the microbial community in the pit (Golder, 2023b). Copper removal through precipitation as copper sulfide was also investigated and it was determined that although some sulfur/sulfide reducing bacteria were present, the sulfate reducing bacteria were not sufficient. The full report was appended to Progress Report #12.

3.5.2 waterStrider Testing

MPMC sent Wight Pit water samples to waterStrider Treatment Inc. (waterStrider) in November 2023 where testing targeting the removal of dissolved cadmium, total copper, total zinc and total sulphate concentrations was performed. Reductions in the targeted contaminants of concern were observed, and further testing is being considered.

3.5.3 Water Chemistry Review

MPMC has retained SRK to review the water chemistry in the Wight Pit to help determine the mechanisms for the degradation of the pit water, particularly the concentrations of dissolved cadmium, total copper, total zinc and total sulphate. At the time of this report's submission, the review was being conducted. Results will be discussed in a subsequent Progress Report.

3.6 Packed Bed Reactor (PBR)

PBR treatment is another fixed-film anaerobic system targeting the treatment of selenium and nitrate. PBR treatment differs from SRF treatment through the use of a vertical flow (top to bottom) reactor.

Proof-of-concept bench-scale testing was completed (Golder 2019d) and PBR treatment was shown to be effective in reducing selenium and nitrate. Further detailed bench-scale and pilot-scale testing was recommended following completion of the initial testing. Detailed bench-scale testing for PBR has been proposed and a test plan has been submitted in draft to MPMC (Golder 2022f – draft RevA). PBR detailed bench scale testing has been postponed while focus is placed on immediate permit application priorities regarding the extension of the life-of-mine plan. Water balance, water quality and hydrogeological modelling as well as surface water infrastructure design are currently being completed to support permitting.

PBR treatment is still being evaluated for full-scale implementation and is currently considered a technology option for semi-passive distributed treatment of selenium and nitrate during closure/post-closure if required.

3.7 Biochemical Reactor (BCR)

BCR treatment is another fixed-film anaerobic treatment technology that consists of a lined pond filled with a submerged organic substrate media mix. The main targeted COCs of this technology

are selenium and nitrate. BCR treatment is passive and does not involve continuous dosing of a carbon source to the media bed.

Proof-of-concept bench-scale testing was completed (Golder 2019d) and BCR treatment was shown to be effective in reducing selenium and nitrate, but redox sensitive metals were present in the BCR effluent.

Upon review of the BCR technology in comparison to other passive and semi-passive technologies, MPMC decided to not proceed with further development of this technology (MPMC 2021) for the following reasons:

- Limited lifespan of BCR passive treatment systems based on the availability of a carbon source that is encapsulated in the system during construction – this needs to be replaced periodically at significant cost.
- Emission of elevated levels of biochemical oxygen demand (BOD) from the system during commissioning and start-up of operation that exceed standards for discharge to the environment.
- Persistent emission of phosphorus from the BCR during operation that will likely exceed plausible standards for discharge to the environment.

BCR treatment is no longer being developed as a passive treatment technology option during closure/post-closure.

3.8 Submerged Sand Reactor (SSR)

SSR is similar to other anaerobic reactor technologies, with the use of the existing tailings as media for the bioreactor. The main targeted COCs of this technology are selenium and nitrate.

A concept study was completed for SSR (Golder 2020d), as well as proof-of-concept bench-scale testing (Golder 2019d). Use of MPMC tailings as SSR bioreactor media or use of the site's TSF as an in-situ SSR was not recommended for further investigation. Bench-scale testing resulting in metal release in the reactor effluent when using site tailings as the reactor media. The concept study also concluded that further investigation of SSR was not warranted, based on a review of literature, an evaluation of historical water quality monitoring data, and an evaluation of the feasibility of utilizing the TSF from a hydrogeological and permitting perspective.

SSR treatment is no longer being developed as a treatment technology option during closure/post-closure.

3.9 Constructed Wetland Treatment (CWT)

MPMC retained Ensero Solutions Inc. (Ensero), formerly known as Contango Strategies Ltd., to conduct a detailed assessment and evaluation of the feasibility of a CWT system for passive/semi-passive treatment during closure/post-closure. The main targeted COCs of this technology are selenium and nitrate.

Pilot-scale design, sizing, and testing for CWT was completed by Ensero (Ensero 2020), and the technology demonstrated promising results for treatment of targeted COCs; however other passive/semi-passive technologies have indicated improved treatment capability in comparison.

MPMC may choose to proceed with demonstration-scale on-site testing of CWT once the pilot-scale results have been fully understood and if the performance of competing technologies (SRF and others) indicates an advantage for CWT.

CWT is still being evaluated for full-scale implementation and is currently considered a technology option for passive/semi-passive and distributed treatment of selenium and nitrate during closure/post-closure if required.

4. ANTICIPATED FUTURE WORK

The existing and assumed water treatment systems for operations, closure, and post-closure have been outlined in this memorandum; however, changes may still be implemented during all phases of the mine as knowledge and needs evolve. The water treatment system for closure/post-closure will continue to develop in more detail as MPMC better understands technology capabilities and refines their final approach to water treatment for the closure period.

Table 1 provides a summary of the development stage of the treatment technologies implemented or being considered for operations, closure, and post-closure. Future work is anticipated for any technology still under consideration that has not achieved full-scale implementation. The following items describe the priority treatment work anticipated over approximately the next three years, but do not exhaustively describe all potential remaining work for technologies still under consideration:

- Pit-lake treatment is currently assumed as a component of the closure/post-closure treatment system. Pilot-scale pit-lake work was anticipated for Cariboo Pit, but recent mine operational changes have resulted in the draining of both Springer and Cariboo pits and pit-lake treatment trials are no longer feasible at these locations. Operational changes have also resulted in Wight Pit being used for site storage, resulting in fluctuating water levels not suitable for a pit-lake treatment trial. The previous pilot-scale study designed for Cariboo Pit (Golder 2020c) could be redesigned for Wight Pit for when operational conditions in the future are deemed appropriate, further advancing the development of this technology.
- Two options exist as the BAT for treatment during closure/post-closure: distributed passive/semi-passive treatment systems, and pit-lake treatment followed by the centralized Actiflo plant. WSP has proposed to undertake a treatment option life cycle cost comparison study between the two options, informed by the knowledge gained during recent technology development, to assess pros/cons and capital and operating costs between the options and inform future treatment program development decisions.
    - WSP initiated the treatment option life cycle cost comparison study in Q2 2023, has compiled treatment cost inputs for the study, and has undertaken water balance and water quality modeling during closure/post-closure to be used in the study. The study is still underway and the draft report anticipated to be completed

in Q1 2024.

- SRF and PBR detailed bench scale testing have been proposed to MPMC and this work is expected for completion in the near future to continue the development of these technologies.
    - SRF and PBR detailed bench scale testing have been postponed while focus is placed on immediate permit application priorities regarding the extension of the life-of-mine plan. Water balance, water quality and hydrogeological modelling as well as surface water infrastructure design are currently being completed to support permitting. It is also recommended that the results of the closure treatment life cycle cost comparison study be first interpreted before commencing the detailed bench testing for SRF or PBR, as results may indicate technologies preferences.

5. NUMERIC PERFORMANCE METRIC

5.1 Measurement of the Numeric Performance Metric

A Numeric Performance Metric for total copper has been specified in *EMA* Permit 11678 (Dec 2022), [s 2.11.2], expressed as follows:

a. *"Numeric Performance Metric" (NPM) means a measurable value that quantifies the outcome or result of water treatment and the ability of the treatment to remove specified chemical constituent(s). It forms the basis for a numeric comparison of untreated water, to water that has been treated by the treatment system.*

b. *The permittee must operate and optimize the design and performance of the WTP to target achievement of any prescribed NPM. The stated NPM target value represents WTP operation that achieves annual average effluent quality that is at or below any specified NPM. Assessment of the attainment of NPM values must be reported in an annual optimization update progress report appended to the annual report required in section 4.2. If the effluent qualify does not achieve an NPM value specified by the director, the permittee must identify and propose response actions to bring the effluent quality toward meeting the target value in the annual optimization update progress report. Response action may include treatment plant optimization and/or source control and/or water management improvements, and a schedule for implementing the response action must be included in the annual optimization update progress report.*

The following NPM is established:

Total copper 12 µg/L

c. *"Annual average effluent quality" means the effluent concentration of total copper*

based on a 52-week rolling average, using the average of the 52 grab samples at HAD-3 when the WTP is discharging.

Progress reporting on the implementation of response action(s) for attainment of the NPM target value is a condition of Permit 11678 (Dec 2022) [s 2.12(c)]. Water quality samples of the Water Treatment Plant effluent identified as HAD-3 are taken weekly when the WTP is operating for analysis by a certified laboratory.

A graphical presentation of the weekly total copper concentrations (mg/L) of the Water Treatment Plant (WTP) effluent (HAD-3) discharge to Quesnel Lake is shown:

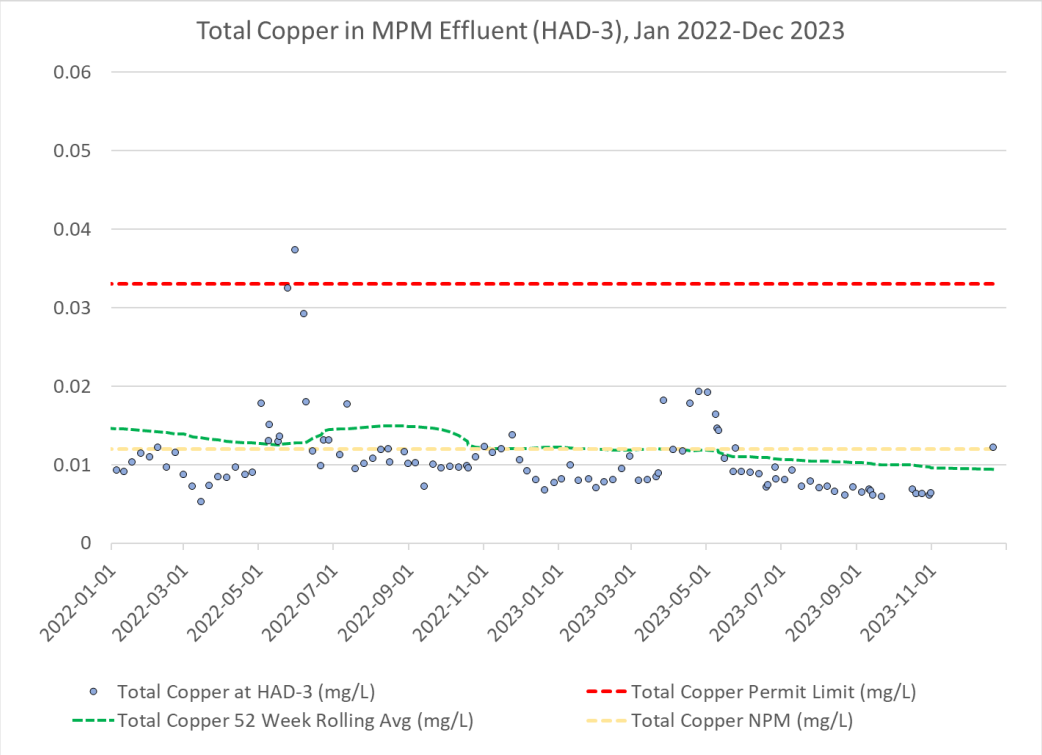


Figure 2. WTP effluent (HAD-3) total copper concentrations relative to the NPM (dashed yellow line), NPM annual average (dashed green line) and Permit 11678 end-of-pipe limit (dashed red line)

The NPM annual average of total copper is based on a 52-week rolling average, calculated using the average of 52 grab samples collected at HAD-3 when the WTP is discharging [s 2.11.2(c)].

In 2023, the NPM target has been achieved in all but one of the 52 WTP samples. In 2022, WTP samples achieved the NPM target approximately 69% of the time, in 38/55 samples. This represents an improvement over 2021 when the NPM was achieved 43% of the time, which is an improvement over 2020, when the NPM was achieved 23% of the time. The NPM annual average of total copper was 0.01217 mg/L as of December 13, 2022 and has continuously decreased to 0.00937 mg/L as of December 21, 2023 (The WTP was shut down on October 31, 2023 due to limited water availability for discharge on site, was restarted in recirculation mode on December 21, 2023 for a sample to be collected before it was shut down again, and remains down at the time of this report's submission. The December 21, 2023 sample is the last collected in 2023).

The year-over-year improvement in reaching the NPM target is a result of improved WTP optimization with the addition of a second Actiflo WTP, and the establishment of pre-treatment processes developed as part of a water treatment train preceding the WTP; in-situ pit lake treatment, pre-treatment with sodium hydrosulphide and improved source control.

The operational response actions in achieving the NPM in 2023 are detailed in later sections of this Progress Report #13.

6. WATER TREATMENT PROGRESS (JULY – DECEMBER 2023)

The site has experienced a year-over-year reduction of water stored on site, from 7.01 Mm^3 on December 28, 2021 to 5.83 Mm^3 on December 27, 2022, to 3.30 Mm^3 on December 27, 2023, a net reduction of 3.71 Mm^3. The return to milling operations in June 2022 and resulting tailings deposition into the tailings storage facility consumes free water into the void spaces of the tailings.

The volume of water treated shows a year-over-year increase in treatment capacity from 6.7 million cubic meters in 2021 to 7.0 million cubic meters in 2022. However, in 2023, there was a reduction in treatment volume. From January to October 31, 2023, 4.4 million cubic meters of water have been treated. This reduction in the volume of water treated in 2023 was due to reduced water storage on site coupled with limited precipitation in the area. The current volume of water stored on site is 3.30 Mm^3.

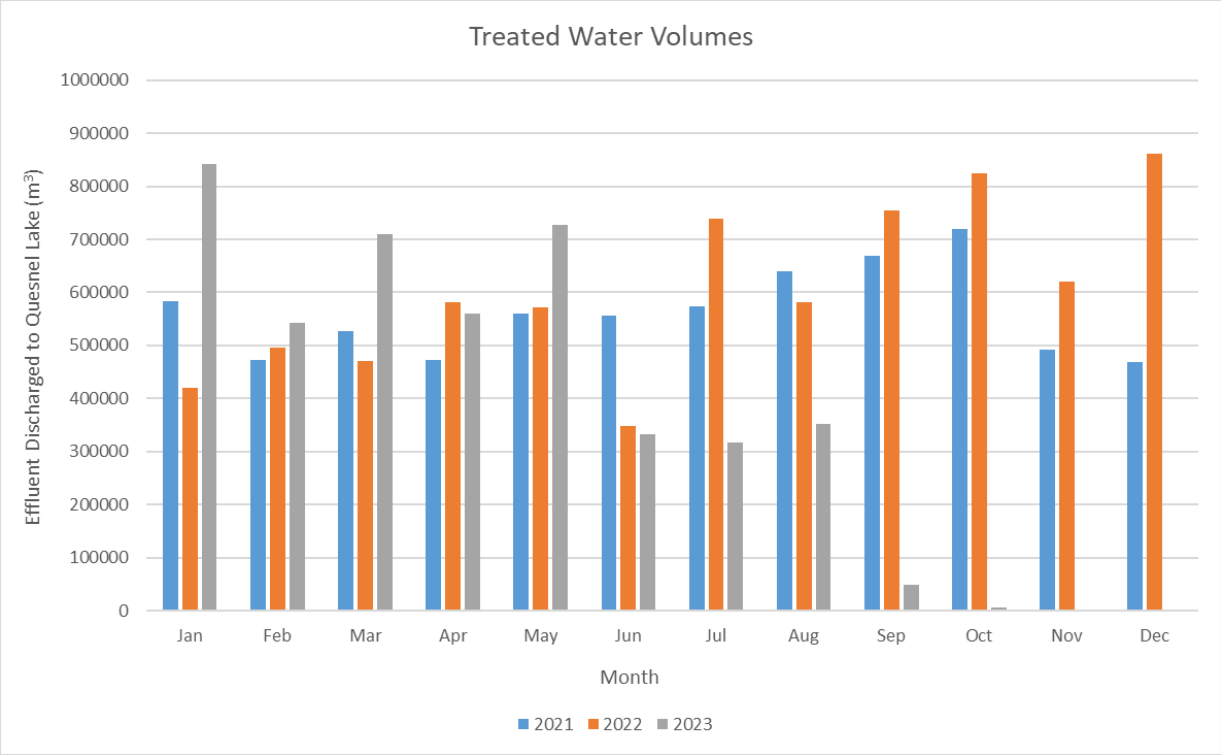


Figure 3. Treated Water Discharged over 2021, 2022 and 2023

6.1 Mobile Water Treatment Plant Installation

MPMC commissioned an interim rental Veolia Actiflo mobile water treatment plant (MWTP) to

increase discharge throughput and assist with management of onsite water inventory, Commissioning of the MWTP began on March 16, 2022, by Veolia automation and process technicians and was completed on April 1, 2022. The MWTP began discharging to Quesnel Lake on April 9, 2022, after approval was granted by BC-ENV and was decommissioned on May 10, 2023 once the Mount Polley mine water balance reached a more manageable level. The HAD-3 sample results from April 12, 2022 to May 9, 2023 represent the combined effluent from both plants. To properly represent end-of-pipe conditions, the sample port was located downstream from the wye where effluent from both plants was mixed. Sample results from May 10, 2023 onward represent effluent from the permanent WTP only.

The MWTP assisted with the optimization of water treatment plant operations by allowing for higher throughput than the permanent WTP alone, with an increased retention time to allow for more complete particle settling, resulting in lower total suspended solids (TSS). Because the NPM limit is in terms of total copper, a reduction in TSS is likely to be associated with lower copper and therefore a higher probability of NPM attainment.

6.2 Pit Lake Treatment

The Cariboo, Springer and Wight Pits have a combined 1.89 Mm^3 of stored water. The site has excess water stored in the pits currently. It is MPMC's objective to continue dewatering the site in 2024 so that mining can occur in the Springer and Cariboo Pits. A temporary mobile water treatment plant was commissioned in Q2 2022 to increase treatment capacity and was decommissioned in Q2 2023.

6.2.1 Cariboo Pit

The Cariboo Pit contains approximately 0.22 Mm^3 of stored water. The concentration of total copper and selenium have over time fallen below the *EMA* Permit 11678 limits of s 1.2.4, Column 2 of Table 1 for the Treatment Plant Outlet. In 2021, MPMC implemented a 'pit profiling' water column monitoring program to record changes in water chemistry at various water depths over time through seasonal temperature changes, lake turnover and ice cover. This data set is provided in Figure 4, supplemented by samples from E8, the regulatory site for Cariboo Pit which is analogous with surface water.

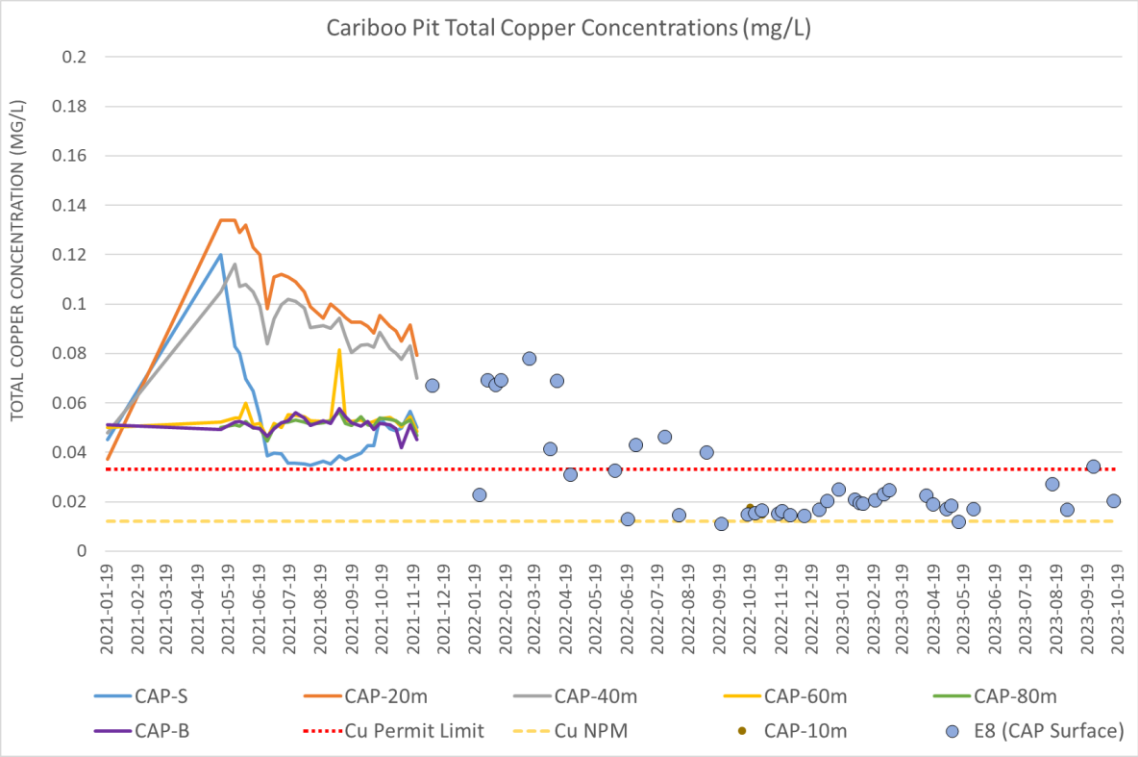


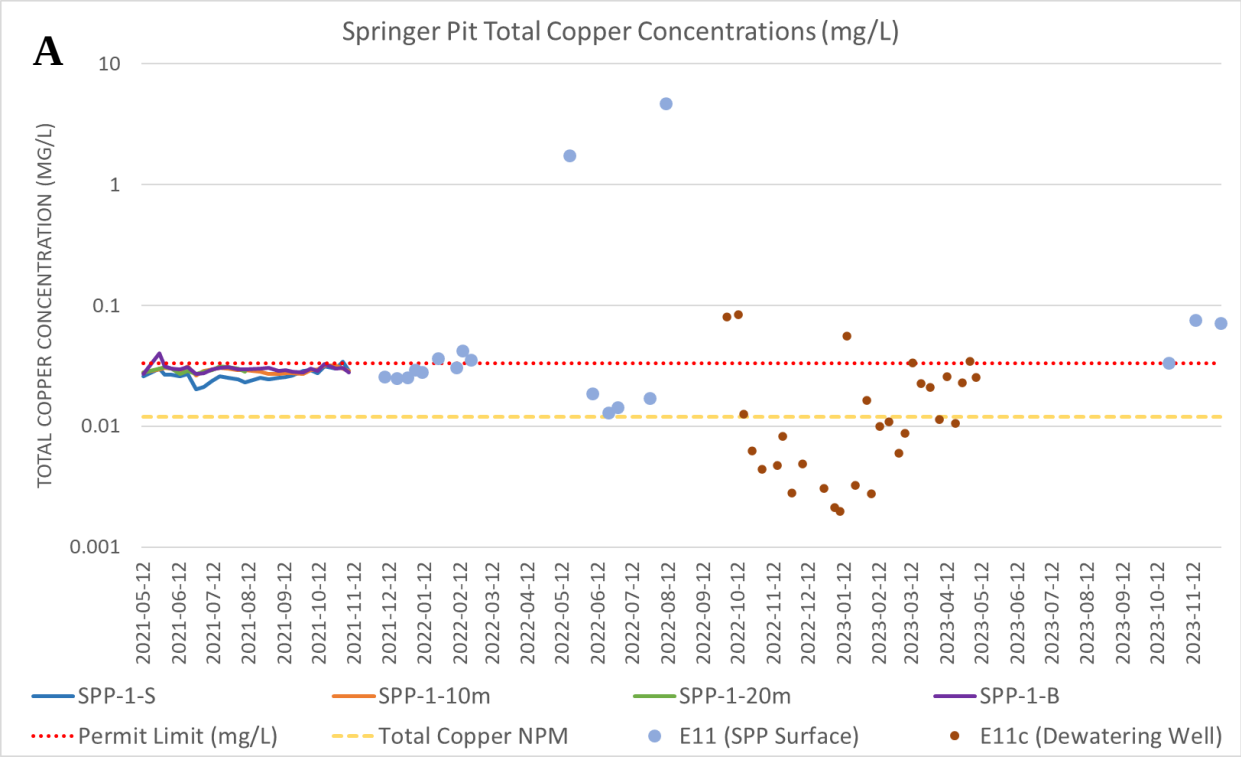
Figure 4. Cariboo Pit total copper concentration at 20 m depth increments 2021-Present.

Copper concentrations in the Cariboo Pit trended downward in 2022, with a dramatic reduction of copper observed between January and May 2022. Historically, the highest copper concentrations have been found at the 20 and 40 m depths, while surface water and water from below 60 m depth contained less copper. In the profile taken May 11, 2022, the Pit Lake was mixed at all depths, with a uniform total copper concentration of approximately 0.017 mg/L. Thus far in 2023, copper concentrations have been relatively constant with copper concentrations ranging from 0.012 mg/L to 0.0343 mg/L.

In-situ treatment processes contribute to this trend. In-situ treatments utilized in 2022 and 2023 include the settling of solids and in 2022 only, dosage with sodium hydrosulfide (NaHS) to sequester copper. More on sodium hydrosulfide treatment can be found in Section 6.3.

6.2.2 Springer Pit

Springer Pit is effectively dewatered to allow mining activities to proceed. During the ice-free season of 2021, passive treatment through settling has contributed to a reduction of total copper to less than the *EMA* Permit 11678 limits. The supernatant water meeting this threshold was removed and treated as a permit requirement through the water treatment plant.


A
Springer Pit Total Copper Concentrations (mg/L)
TOTAL COPPER CONCENTRATION (MG/L)
10
1
0.1
0.01
0.001
2021-05-12
2021-06-12
2021-07-12
2021-08-12
2021-09-12
2021-10-12
2021-11-12
2021-12-12
2022-01-12
2022-02-12
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2023-06-12
2023-07-12
2023-08-12
2023-09-12
2023-10-12
2023-11-12
SPP-1-S
SPP-1-10m
SPP-1-20m
SPP-1-B
Permit Limit (mg/L)
Total Copper NPM
E11 (SPP Surface)
E11c (Dewatering Well)

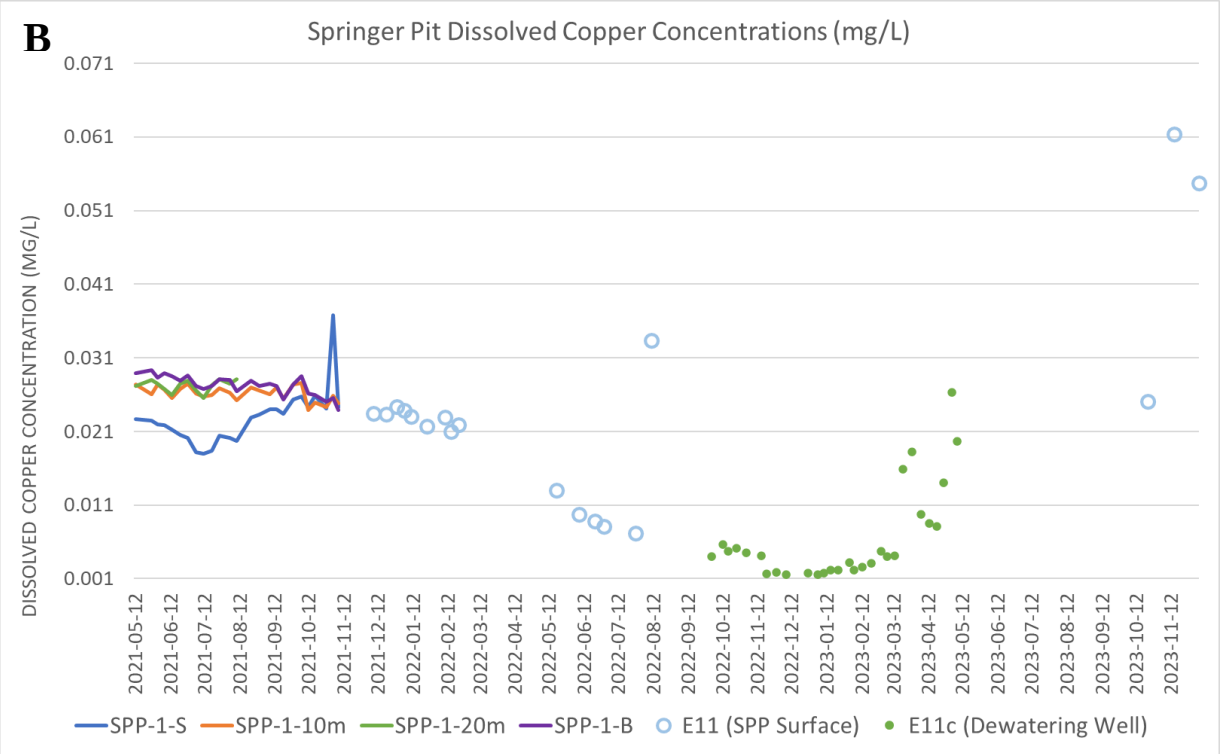


Figure 5. Springer Pit total (A) and dissolved (B) copper concentrations 2021-2023. The divergent trends in total and dissolved values may be a result of copper sequestration in sediment.

The last total copper and selenium concentrations in the Cariboo and Springer pits are shown in Table 2. Note that due to dewatering and 2023 mining activities, it is no longer practicable to profile the Springer or Cariboo pits at depth. The Springer Pit water is represented by the regulatory site E11, corresponding with Springer Pit sump water. Profiling the Cariboo Pit at depth intervals ceased in November 2022 due to winter conditions followed by dewatering of the pit to facilitate mining; therefore, the last profile of the Cariboo Pit was collected on November 1, 2022. The Cariboo Pit water is represented by the regulatory site E8, corresponding with Cariboo Pit surface water.

Table 2. Water parameters of interest as of October 16, 2023 in the Cariboo Pit and December 7, 2023 in the Springer Pit

Sample ID	TSS (mg/L)	pH	Cu Total (mg/L)	Cu Diss (mg/L)	Se Total (mg/L)
Cariboo Pit					
Surface (E8)	<1.0	8.05	0.0202	0.0172	0.0474
Springer Pit					
Sump Surface Water (E11)	4.0	7.82	0.0713	0.0547	0.0393

6.2.3 Wight Pit

Wight Pit contains approximately 1.67 Mm^3 of stored water, sourced primarily from the dewatering of Cariboo Pit earlier in 2022. Investigations are underway to understand passive water treatment which is believed to have occurred in the Wight Pit. Golder was retained to study evidence of a naturally occurring biological reaction reducing nitrate, selenium and copper. A recent technical memorandum, entitled "Mount Polley Mine: Investigation of Potential Saturated Rock Fill at Wight Pit" was included with Progress Report #9 in December 2021 (Golder 2021b). In summary, Golder used multivariate analysis of water chemistry to investigate whether water quality improvement was due to dilution by infiltrating groundwater and found this was not the case (Figure 6). Treatment of the target analytes is occurring due to another process than dilution or displacement.

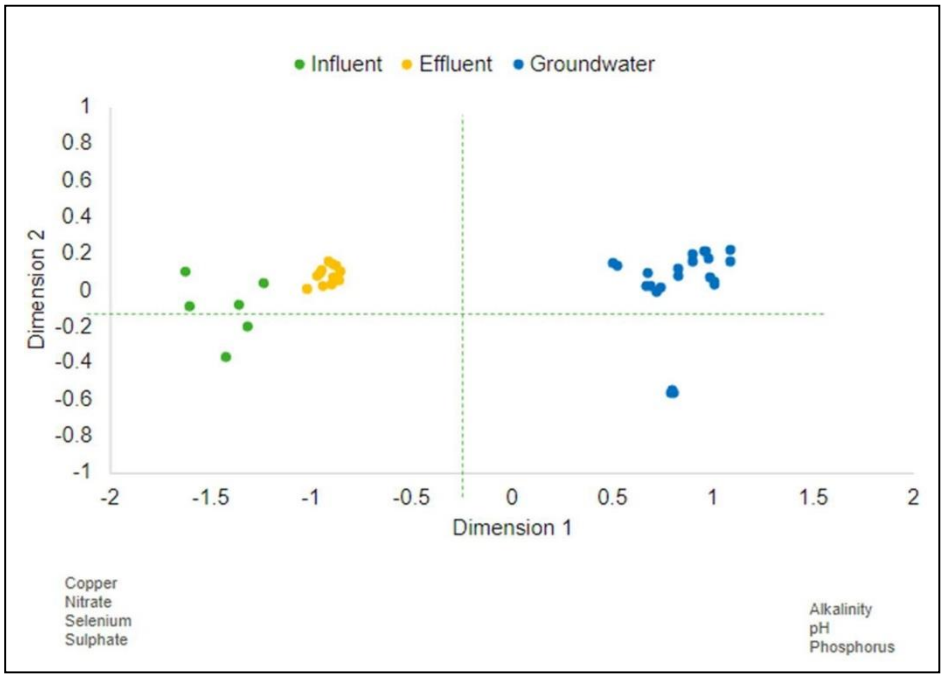


Figure 6. Visualization of Golder's Wight Pit multivariate analysis. Influent, effluent, and groundwater are dissimilar, which indicates a process other than source mixing

Work in the Wight Pit is most recently being expanded to include DNA analysis. Samples were collected from Wight Pit, the TSF, other water storage areas on-site in the winter of 2021-2022, and Golder's bench-scale reactor in the laboratory. Third party laboratory DNA analysis of the sampling was completed and results indicated the presence of several species that are potentially involved in selenium and/or nitrate removal in the pit. Copper removal through precipitation as copper sulfide was also investigated and it was determined that although some sulfur/sulfide reducing bacteria were present, the sulfate reducing bacteria were not sufficient. In addition, Wight Pit water samples were sent to waterStrider for testing targeting the removal of dissolved cadmium, total copper, total zinc and sulphate in Q4 2023. Reductions in the targeted contaminants of concern were observed, and further testing is being considered. SRK has been retained to review

the water chemistry in the Wight Pit to help determine the mechanisms for the degradation of the pit water, particularly in the aforementioned contaminants of concern. At the time of this report's submission the review was underway. Results will be reported in a subsequent Progress Report This, combined with the bench-scale investigation of SRF processes, discussed earlier in this report, will expand on the possibility of passive treatment in the Wight Pit.

6.3 Sodium Hydrosulphide Treatment for Copper

MPMC investigated the use of sodium hydrosulfide (NaHS) as an agent to reduce copper concentrations in water by precipitation of metal sulphides. NaHS is a water-soluble chemical used in the MPMC concentrator as a flotation activator for copper-oxide mineral processing. In the context of water treatment, it can be added to water with high concentrations of dissolved copper. Ionic minerals, including copper, will interact to form insoluble metal sulfides which can be removed from the water by settling, and therefore sequestered.

This process has been demonstrated to be effective at removing copper in bench and pilot-scale trials by MPMC personnel. A series of demonstration-scale trials were conducted in 2021 with favorable results indicating that NaHS could be a worthwhile component of the MPMC water treatment train. NaHS was used to treat water in the Cariboo Pit, Heap Leach Pad (HLP) leachate, and Tailings Storage Facility supernatant. A technical memorandum (Sterling 2021) summarizing these results was submitted with Progress Report #9 in December 2021. The positive results are attributable to NaHS dosage in conjunction with settling and clarification.

A further trial was held between January 24 and March 2, 2022, in which TSF water and HLP leachate were pumped to the Tailings Box in the mill and dosed with 10-100 ml/min of NaHS, then monitored while being pumped back to the TSF. This was designed to inform further NaHS treatment options for water sourced from other areas of the mine. These dosages appear to have been successful (Figure 7), with results from February 16 to March 2, 2022 showing a marked decrease in dissolved copper in mill discharge relative to TSF water.

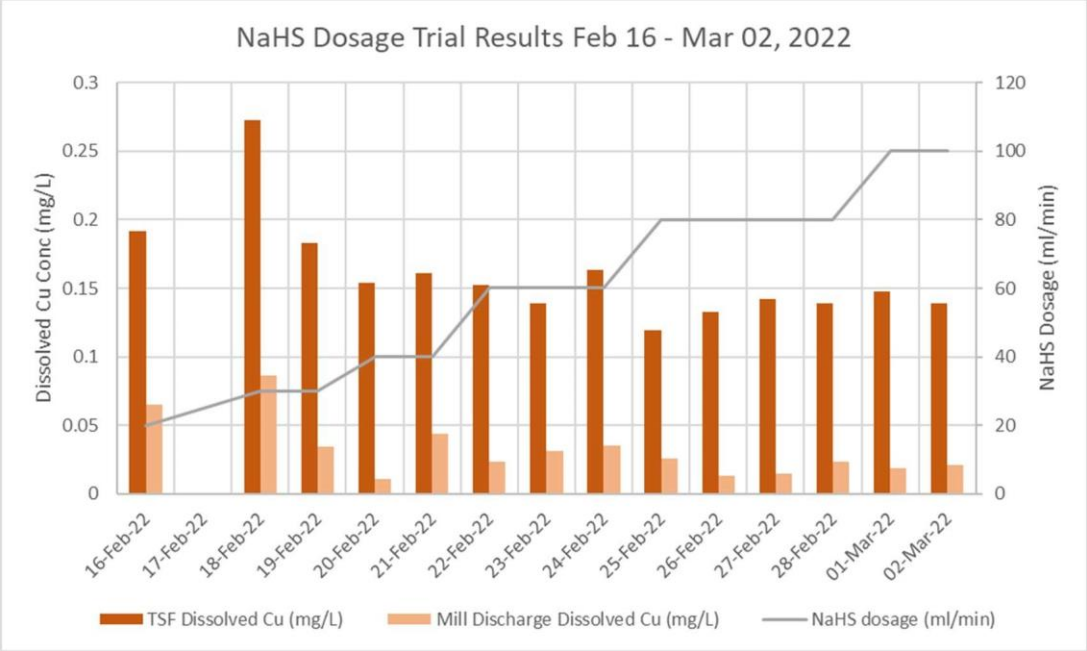


Figure 7. NaHS Dosage Trial Results Feb 16 – Mar 02, 2022. Dissolved Cu in Mill discharge water is lower than TSF source water. Dosages up to 80 ml/min appear to increase treatment efficacy.

The NaHS addition system was installed in the plant concentrator in 1997 during initial construction to assist with flotation of oxide copper minerals. The NaHS system remains in service for this purpose and can be used for future water treatment as required.

6.4 Grafta™ Treatment for Total Copper, Selenium and Other Metals

The newest treatment program being pursued by MPMC is the use of GRAFTA™ technology to remove elevated metal constituents from Northeast Zone (NEZ) seepage water. Water from the NEZ seeps have elevated concentrations of total copper and selenium, and as such NEZ seepage water has to be managed effectively on the mine site. Currently, NEZ seepage water is being pumped to the mill building for use in mineral processing or, in the event of a power outage onsite, transported to the Wight Pit where passive in pit treatment occurs.

GRAFTA™ is a nanotechnology-based adsorbent with several variations that are engineered to remove metals and organic compounds from water. GRAFTA Nanotech Inc. carried out GRAFTA™ lab-scale column adsorption test work at their laboratory in Toronto, ONT, using samples of NEZ seepage water that were shipped from the mine. The samples were used to test GRAFTA™ (fine and coarse) using a single column GRAFTA™ filter or chain of multiple GRAFTA™ filters, with which the influent (NEZ seepage water) was permeated through at a retention time of approximately 45 minutes (on average). The pH of the influent water was acidified in select tests to increase selenium removal. Functionalized GRAFTA™, that is GRAFTA™ with various reducing agents (GRAFTA™-F100 and GRAFTA™-F200), were also applied to select column tests to aid in metal reduction.

A high-level summary of findings is provided below:

- Upon testing different variations of GRAFTA™, it was concluded that the functionalized GRAFTA™-F200 was the most effective in removing both selenium and copper consistently to non-detectable levels. This was achieved through average hydraulic retentions times of approximately 45 minutes.
- Estimating the design parameters is recommended to be ensured through a larger-scale pilot to be implemented at the site and monitored for a longer period of time.
- It is estimated that the longevity of GRAFTA™-F200 should be significantly longer than what was experienced in the lab-scale tests. For an approximate 500 m^3/d flow rate of the contaminated water (i.e., NEZ seepage water), approximately 17 to 18 tons of GRAFTA™-F200 is estimated to be required which would be expected to remain active (until saturation of the adsorption sites) for several weeks to potentially months.
- Improvement in longevity at a lower retention time corresponding to lower GRAFTA™-F200 may also be possible which can be verified through onsite performance evaluation.

The findings in the technical memorandum (GRAFTA 2022) are subject to a confidentially agreement and are under review by MPMC. No further work is planned.

7. SOURCE CONTROL OPTIMIZATION STUDIES

Source control optimization is required to be performed at Mount Polley under *EMA* Permit 11678 (Dec 2022) [s 2.11.3]:

> *The permittee must undertake ongoing maintenance and surveillance of on-site water management systems and activities undertaken to increase source control of any potential contaminants of concern.*
>
> *(a) The permittee must undertake source control optimization yearly.*

MPMC undertakes ongoing maintenance, monitoring and improvements of water management systems and source control measures across the Mount Polley Mine site. This is a well-established part of operations at the Mine. MPMC's progress is described in the following sections.

7.1 Monitoring & Management Plans

Source control optimization is driven through ongoing collection and analysis of water quality and flow data per the Comprehensive Environmental Monitoring Plan (CEMP). Data is interpretated weekly to assess changing conditions and inform pre-treatment requirement, source control and discharge options. Pumping and conveyance systems are arranged to be flexible and stored volumes are managed to ensure water treatment capacity is utilized.

The environmental effects of the discharge to Quesnel Lake are monitored under the CEMP and governed by the Metal and Diamond Mining Effluent Regulations of Environment and Climate Change Canada.

Monitoring and management plans contribute to this effort, recent updates are listed;

- Comprehensive Environmental Monitoring Plan (2019) (CEMP) (MPMC 2019)
- Annual Discharge Plan
- Sediment and Erosion Control Management Plan (Jul 2023)
- ML/ARD Management Procedure Manual (Oct 2023) (MPMC 2023)
- Water Management Plan (Nov 2020) (Golder 2020a)
- Water Balance Model (Golder 2022a)
- Water Quality Model (Golder 2022b)
- Flocculant Management Plan (Golder, 2023a)
- Erosion and Sediment Control Plan Review Report (Mar 2023) (Golder, 2023c)

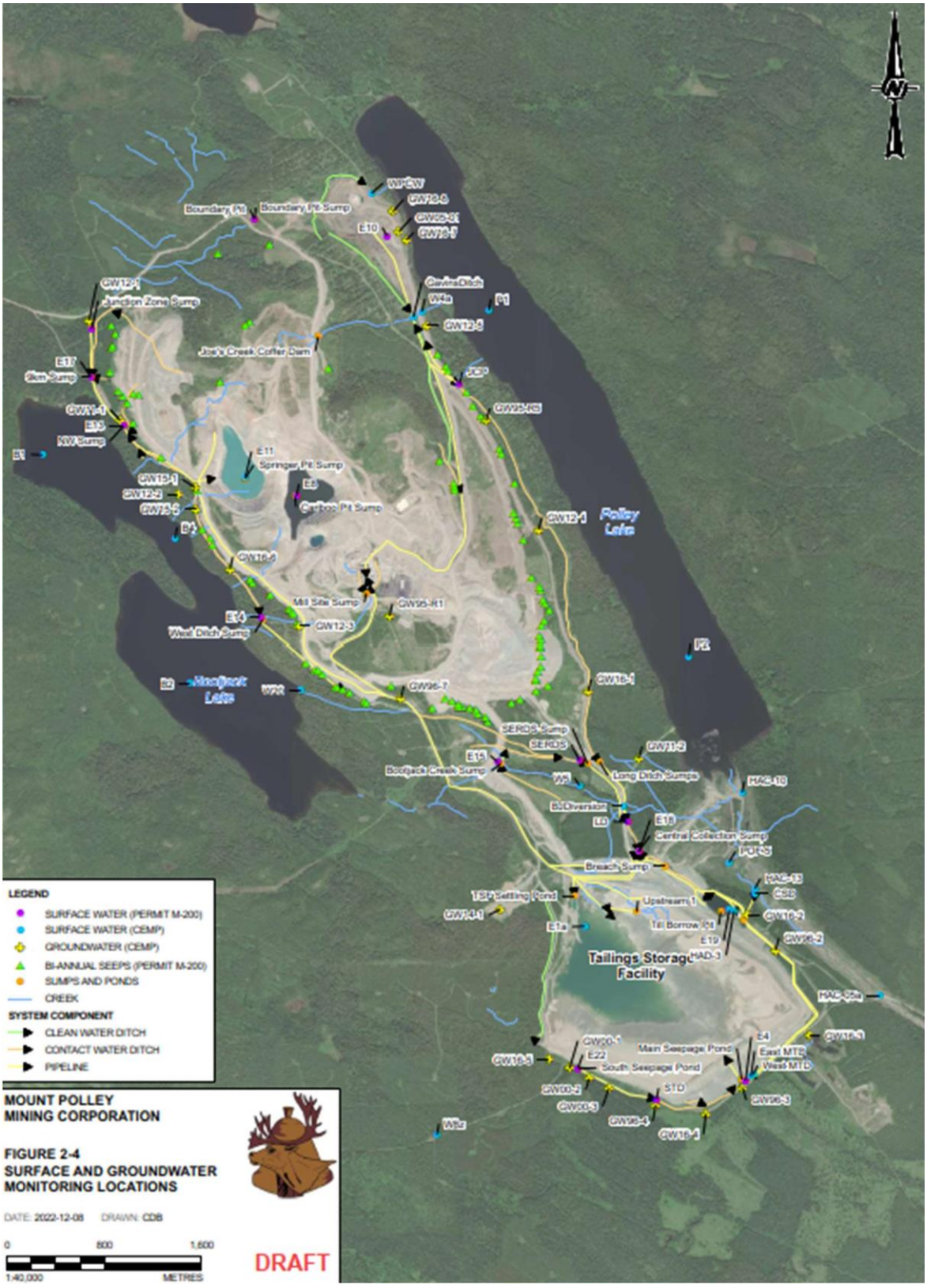
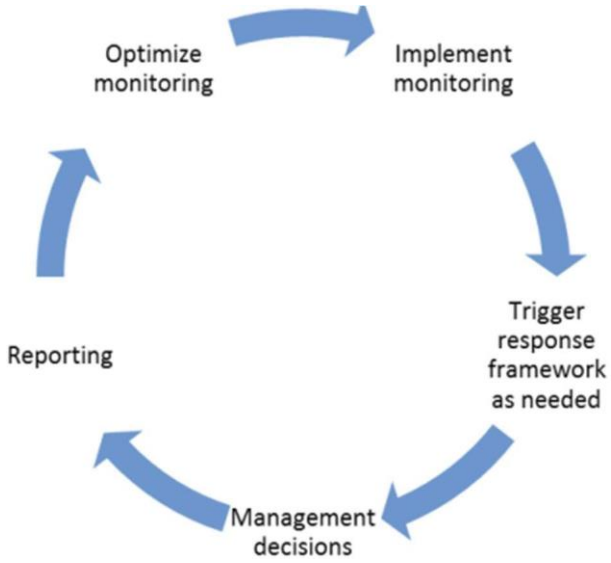


Figure 6. CEMP Monitoring Locations

EMA Permit 11678 (Dec 2022) [s 2.12(d)] requires reporting on source control optimization. Recent interpretative reports influencing treatment options and source control decisions;

- Phase 2 Environmental Effects Monitoring Program Interpretative Report (Minnow 2019)
- 2022 Annual Environmental Report for the Mount Polley Mine. BC Ministry of Environment and Climate Change Strategy. Mount Polley Mining Corporation.

Monitoring for a specific year will be verified in monitoring work plans following the adaptive management framework.



7.2 Booster Station Overflow Alarm System

The TSF Booster Station overflow valve is used to manage supernatant water in the TSF and achieve Engineer of Record specifications for water storage and beach width by sending water from the TSF to the WTP influent pond. Although this system is essential for safe management of the TSF, its use has the potential to overwhelm the water treatment capacity of the plant, and it has been associated with copper exceedances in the past, most recently on May 31, 2022.

A full investigation report was prepared which shed light on the May 2022 permit exceedance and the possible role of the TSF booster station during that event. One planned remedial action was to install an alarm which will alert mine managers and operators when the booster station valve is open, to limit the extent of release. The booster sump water levels and high-level alarm system is monitored by the Control Room operator in the concentrator building. The plant supervisor travels the reclaim and tailings pipeline system once per shift during operations.

7.3 Heap Leach Pad Decommissioning

The experimental lined Heap Leach Pad (HLP) and excessed stockpiled elemental sulfur was identified as a source of acid rock drainage in a report; An Investigation into Determining the

Source of Elevated Metal Concentrations in Seepage at the Mount Polley Mine (Litke 2019). The acidity has been neutralized by reaction with carbonate and silicate minerals in the waste rock, but it resulted in depressed pHs and occasional breakthrough of acidic waters to waste rock seeps. The removal of the elemental sulfur pile seems to have arrested the downward trend in pH and upward trend in copper. (SRK 2022a)

A plan was developed to decommission the infrastructure, drain down and treat the leachate by NaHS addition and dispose the excess sulfur and HLP construction materials in the Tailings Storage Facility.

The decommissioning plan (Sterling 2022) was submitted to the Ministry of Energy, Mines and Low Carbon Innovation (EMLI) in April 2022. The disposal option for each material type was chosen based on geochemical characterization by qualified professionals at SRK Consulting. EMLI commented on the plan in a letter on October 13, 2022. MPMC responded to comments on May 12, 2023 after a meeting with EMLI on May 4, 2023. The decommissioning plan will be finalized once the comment period is completed.

Currently the elemental sulfur has been relocated to the HLP and contained above the HDPE liner. Precipitation on the HLP contributes to leachate production which in managed by intermittent pumping to the concentrator for NaHS treatment and discharge to the TSF. The Northeast Zone seeps at the toe of the Rock Disposal Site is collected and pumped to the concentrator for use as process water.

7.4 Review of Geochemical Source Terms

To support water quality prediction and waste management planning, Mount Polley operates kinetic tests on waste rock and tailings. This work is undertaken by SRK Consulting, with the most recent result from this test reported in a March 22, 2022 memo (SRK 2022a).

While not directly relating to water treatment, this work provides information on site water chemistry and is helpful to understand and predict water quality arising from contact water and rock dump seepage.

In 2022, the Mine Site's geochemical source terms were reviewed by SRK, as a basis for extending MPMC's *EMA* Permit 11678 permitted discharge period. SRK found that no update to the source terms was required (SRK 2022a). The SRK memo indicated that seepage from RDSs has been mostly stable for key parameters over the monitoring period, except for localized influences from sulphuric acid water likely originating from the Test Heap Leach. (Golder 2022g)

7.5 Erosion and Sediment Control Plan Review and Update

In accordance with Permit 11678 s 2.6.2, MPMC's Erosion and Sediment Control Plan (ESCP) was reviewed and an ESCP Review Report provided. Modifications recommended in the review report were applied to MPMC's ESCP. The ESCP Review Report provided by Golder was appended to the 2022 Annual Environmental Report submitted in March 2023. The updated ESCP was submitted on July 31, 2023.

8. REVIEW OF DISCHARGE ALTERNATIVES

EMA Permit 11678 (Dec 2022) s 2.11.4 requests the permittee to review discharge alternatives to Quesnel Lake:

> *The permittee must review discharge alternatives for direct discharge of treated mine water on and around the mine site including considering the following mine phases: operations, care and maintenance, closure, and post-closure.*
>
> *The review of discharge alternatives must include consideration of:*
>
> *(a) Passive and semi-passive water treatment options for distributed discharges across the mine site informed by the Water Management Plan dated November 27, 2020, and most recent Reclamation and Closure Plan for the site,*
>
> *(b) Physical (geomorphological and hydrological), chemical and biological characteristics of potential receiving environments, and*
>
> *(c) The capacity of the proposed discharge locations to receive the additional discharges of treated water and meet applicable environmental benchmarks.*
>
> *(d)* This section of Progress Report #13 addresses *EMA* Permit 11678 (Dec 2022) s 2.12 I*(e) summary and discussion of proposed alternative discharge locations that have the capacity to receive the treated water and changes from the previous progress reports,*

The Mine Plan and Reclamation Program Update 2022 (MRP) (Golder 2022g) s 5.2.4 addresses subjects related to water treatment, water balance and water quality for the periods of operations, closure, and post-closure. Further context is provided in MRP Appendices G, H & I.

The MRP s 5.2.4 discusses the approach to alternative discharge locations;

Currently, one objective for the active and post-closure phases of the Mine Site's life cycle is the development and implementation of a decentralized passive/semi-passive water treatment system. Given that the Mine Site was developed on a watershed divide, it is desired that such a system returns water to its respective pre-development watersheds – an objective consistent with the Environmental Assessment and input from local communities and First Nations. Ultimately, this decentralized system will be achieved using passive/semi-passive technologies developed through bench scale and pilot testing. The status of current research towards this end is discussed in Section 4.4. (*this report Section 3*).

While a distributed system is desired for active and post-closure, there are several challenges that will need to be overcome. For instance, the ability of the receiving environment to accommodate the post-closure flows needs to be carefully assessed. Given that runoff from disturbed areas is

higher than runoff from forested areas (the pre-mine case), the flow volumes during early post-closure may be too great to be accommodated without damaging the existing receiving environment and their associated habitats. Further, water quality receiving environment targets are likely to become more stringent, given the lower assimilative capacity of these receiving environment. Although distributed passive/semi-passive treatment and discharge is a desired closure outcome, these technologies have not yet been fully developed to full scale and face permitting uncertainty. The assumed treatment configuration for active and post-closure is pit lake pre-treatment followed by centralized Actiflo treatment (one the closure BAT options identified (Golder 2016c). Figure 5 1 and Figure 5 2 provide the current models for active closure and post-closure water management. Appendix H and Appendix I provide discussion on predicted water balance, water management, and water quality at closure. Figure 5 3 shows the anticipated catchments for the post-closure environment.

End of Excerpt from the MRP (Golder 2022g)

9. CONCLUSION

Environmentally responsible water management, treatment, and discharge are priorities at Mount Polley Mine. Effluent treatment, and interrelated monitoring and optimization activities, conform with the requirements of Permit 11678, including Sections 2.11 and 2.12. MPMC is actively pursuing the following water treatment or discharge optimization technologies: Actiflo optimization, lime treatment, pit lake treatment, saturated rock fill (SRF), packed bed reactor (PBR), constructed wetland treatment (CWT), and source control improvements.

Attainment of the NPM is becoming more prevalent over time, with 98% of WTP samples collected in 2023 below this threshold. Discharge total copper measured 0.00937 mg/L over a 52-week rolling average to December 21, 2023. This represents superior discharge performance relative to previous 6- month update periods.

As MPMC restarts and builds capacity, treatment actions are being continuously improved. The decommissioning of the Heap Leach Pad with BC-EMLI approval following a staged approach is being planned. Mount Polley strives for continual improvement and adaptive management, in collaboration with technical experts, local communities, First Nations, and regulators.

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11. CONCORDANCE TABLE

Table of Concordance Water Management Progress Reporting

EMA Permit 11678 s 2.12	Requirement Description	Reference
2.12 (a)	Results of all BAT assessments	MPMC 2014 Golder 2015 Golder 2016a MPMC 2021 MPMC 2022
2.12 (b)	Bench and pilot testing of treatment systems,	Golder 2016b Golder 2017a Golder 2017b Golder 2019a Golder 2019b Golder 2019c Golder 2019d Golder 2020b Golder 2020c Golder 2020d (concept) Golder 2021a (concept) Golder 2021b Golder 2022d Golder 2022e Golder 2022f GRAFTA 2022 Golder 2023b Golder 2023d
2.12 (c)	Progress on implementation of response action(s) for attainment of the NPM target value,	Sterling 2021
2.12 (d)	Source control optimization studies	Litke 2019 MPMC 2019 MPMC 2022b Golder 2020a Golder 2022a Golder 2022b Golder 2022c SRK 2022 Sterling 2022

2.12 (e)	Summary and discussion of proposed alternative discharge locations that have the capacity to receive the treated water and changes from the previous progress reports,	Golder 2022g

EMA Permit 11678 s 2.12	Requirement Description	Reference
2.12 (f)	Documentation that the testing and piloting programs are relevant for all the different types of mine influenced water on site and	Golder 2022g
2.12 (g)	Any other studies related to the Water Treatment and Discharge Program outlined in section 2.11.	N/A

Appendix X

Invasive Plant Monitoring Report

(Electronic format only)

DWB Consulting Services Ltd.

Invasive Plant Monitoring Report

Mount Polley Mining Corporation

Engineering | Environmental | Forestry

Prepared for: Mount Polley Mining Corporation
Attn: Gabriel Holmes
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Date: 11.03.2024 | DWB file: 23274-131 (LB) | Revision: 1

OQM | Organizational Quality Management Program

Signature Page

DWB Consulting Services Ltd. is pleased to submit this report for your review. This report has been prepared using sound technical and professional judgement, based on our knowledge and experience, applicable regulatory framework, industry best management practices, and current understanding of project conditions, design, and project setting.

REPORT TITLE: Invasive Plant Management Plan – Mount Polley Mining Corporation

PREPARED FOR: Mount Polley Mining Corporation

REVISION: 1

WRITTEN BY:

Kristen Cradock, Environmental Technician

REVIEWED BY:

Anastasia Ivanusic, MSc, RPBio, PAg

REVISION HISTORY				
DATE	**VERSION**	**REVIEW TYPE[1]**	**Previous Version REVIEWED BY (NAME, COMPANY)**	**Revisions Made Following Review**
07.02.2024	0	Professional	Allan Carson, DWB	
11.03.2024	1	Professional, Editorial	Anastasia Ivanusic, DWB	Section 3.2, 5.2.

[1] Editorial Review: Reviewed for formatting, grammar, spelling, etc.
Professional Review: Reviewed for content and professional signoff
Client Review: Reviewed by client
Regulatory Review: Reviewed by regulatory agency (i.e. DFO) if necessary
Peer Review: Reviewed for content and errors by peer

Disclaimer

This report was prepared and rendered solely for use by the client. By using this report, the client accepts this disclaimer in full. No person or party may utilize or rely on this document for any other purpose without written consent and approval from DWB Consulting Services Ltd (DWB). The information and recommendations presented in this report were based on the diligent review of available environmental review documents, including applicable permits, and available background environmental information using accepted professional practices and standards.

We do not represent, warrant, undertake or guarantee:

- That all project environmental-related information has been received.
- That regulations and standards of practices shall remain constant through the duration of the project.
- That the use of guidance in the report will lead to any particular outcome or result; or, in particular,
- That by using the guidance in the report, the client will be approved by the contract holder for the applied works.

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Table 1 Comprehensive list of priority invasive plants targeted by the Central Chilcotin Coast Invasive Plant Committee (CCCIPC) in 2020 for treatment in the Central Cariboo Invasive Plant Management Area (CCCIPC, 2017). New invaders (newly established species, current limited distribution, or at borders. Management objective is elimination); Containment (well-established species in the Cariboo Chilcotin region, but have no yet infested all potential habitats. New sites will be managed to contain them and prevent further spread); Established (common and widespread species that occupy most or all potential habitats. Widespread control of these species is not currently possible); Biological Control (well-established species in the Cariboo Chilcotin region, for which effective biocontrol agents exist). 4

Table 2. Invasive plants identified at the Mount Polley Mine from July 25 to 28, 2023 including Priority Ranking within the Central Cariboo Sub-Region of the Cariboo Chilcotin Coast Invasive Plant Committee (CCCIPC) Priority Plant List, stockpiles infested by species and total number, and area of species infestation by species and total in hectares (ha). Invasive plants were categorized New Invader, Containment, Established, Biological Control or Not Listed, as listed by the CCCIPC (CCCIPC, 2017; May, 2023). 6

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Table 5. Invasive Plants identified at Mount Polley Min between July 25-28, 2023 including polygon name, survey date, species code, approximately area of infestation (ha), distribution, density and comments. Species found include oxeye daisy (OD), orange hawkweed (OH), Canada thistle (CT), scentless chamomile (SH), bull thistle (BT), mullein (MU), sow thistle (SO), and Western goat's beard (WG). ..... Appendicies

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1.0 INTRODUCTION

1.1 PURPOSE AND SCOPE

DWB Consulting Services Ltd. (DWB) was retained by Mount Polley Mining Corporation (MPMC) to survey and monitor invasive plant presence within stockpiled soil, as well as to prepare this summary report to advise on the inventory, prevention, management, and monitoring of invasive plants at the Mount Polley Mine. This plan was prepared with input from Professional Biologists and Agrologists.

1.2 PROJECT DESCRIPTION

The development of this report included visual surveys conducted in combination with routine assessments of progressive reclamation sites and annual soil stockpile inspections. Invasive plant species present, and their distribution and density are documented and compiled with revegetation results.

Information provided in this report includes:

- Surveying and mapping of infestation locations, with a focus on reclamation areas and soil stockpiles;
- Identification of invasive plant species present;
- Assessment of the degree of invasive plant growth, distribution, and density present at infestation sites;
- Assessment of success of any prevention and control measures that were previously implemented;
- Recommendations for any prevention and control measures that should be implemented; and
- Recommendations for when the next inventory should be conducted.

1.3 PROJECT LOCATION

Mount Polley is located approximately 57 km (geodesic distance) northeast of Williams Lake, BC, as shown in Figure 1. From Williams Lake, the mine site is accessed by driving south on Highway 97 North and turning north just before 150 Mile House onto the Horsefly Likely Road, then driving for 4.5 km before turning west onto Likely Road. After travelling Likely Road for 64.6 km, turn south onto the Morehead-Bootjack Forest Service Road (FSR) for 14 km. Mount Polley is located at the end of the Morehead-Bootjack FSR at UTM 10 U 592897 5822603.

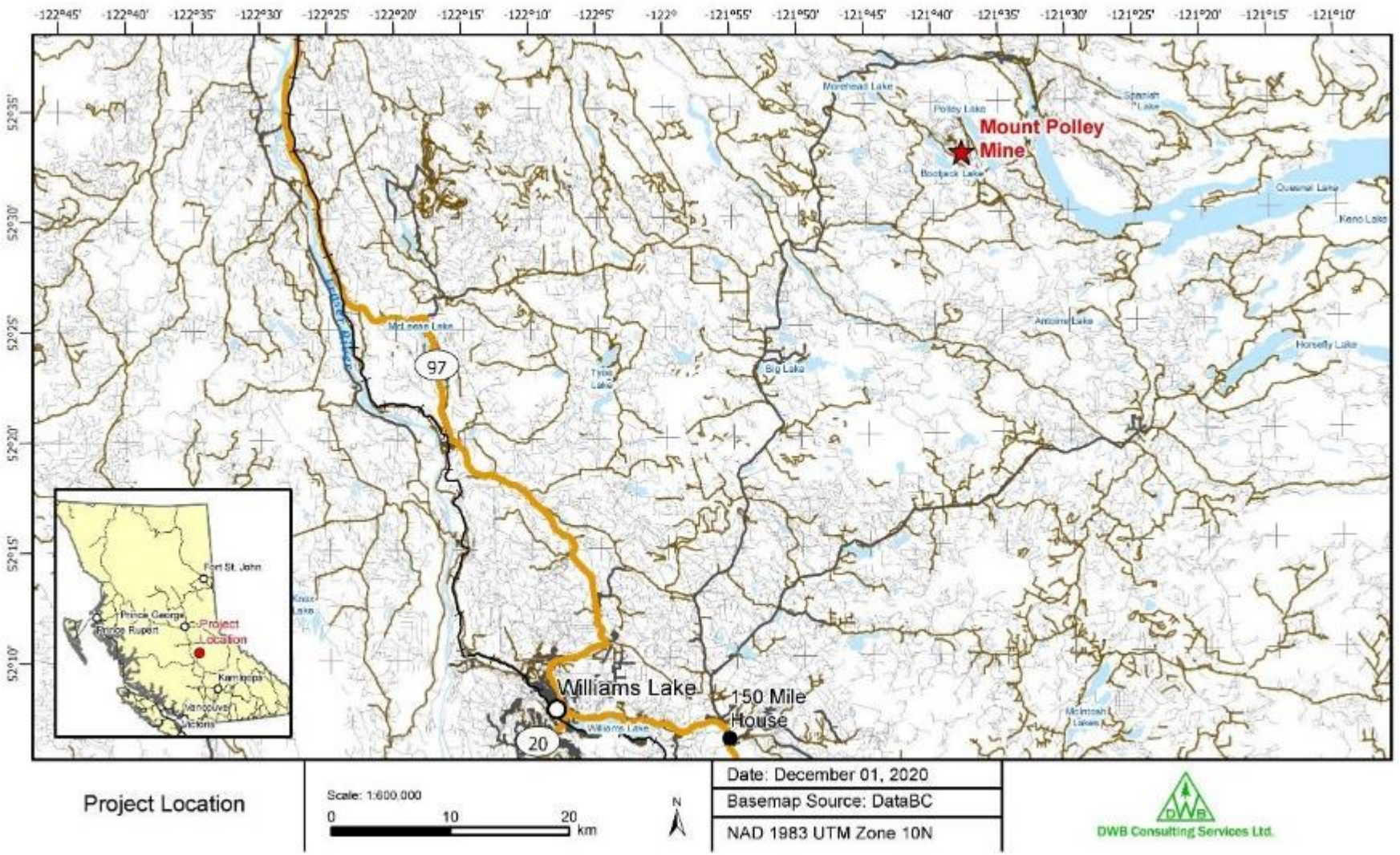

Figure 1. Location of Mount Polley Mine in relation to Williams Lake, BC.

1.4 Regulatory and Permitting Context

The following legislation, guidelines, management plans and governing agencies provide additional support regarding the management of invasive plant species:

- *BC Mines Act* (Province of British Columbia 1996) & *Health, Safety and Reclamation Code for Mines in British Columbia* (Ministry of Energy and Mines 2022); Requires that land reclamation at the end-of-use must be reclaimed at an equal or greater-than-average land capability that was present prior to mining. In addition, construction of an IPMP is required for both acts under the Vegetation Management Plan (Section 7.13 & Section 10.7.7 of the Health, Safety and Reclamation Code),
- *Weed Control Act* (Province of British Columbia 1996); Administered by the BC Ministry of Agriculture, this act requires all land occupiers of public or private lands to control designated noxious plants to prevent introduction or spread to unaffected areas,
- BC *Integrated Pest Management Act* (Environment Canada 2003); Regulates the sale and use of herbicides to control invasive plants,
- *Forest and Range Practices Act* (Province of British Columbia 2002); Requires that forestry activities should reduce establishment and spread of invasive plants,
- *Seeds Act* (Government of Canada 1985); Requires that seed sold, imported, and exported in Canada is free of prohibited noxious weeds and ensures standards of purity are met,
- *The Invasive Alien Plant Program Reference Guide* (BC MOFR 2010)*;* A resource manual for all agencies and partners involved in invasive plant management in BC; and
- *Cariboo Chilcotin Coast Invasive Plant Committee (CCCIPC)/Cariboo Regional District*; Provides information regarding important regional invasive plants and methods to mitigate the introduction and spread of invasive plants (CCCIPC 2017; May, 2023).

1.5 Project Schedule

An inventory of invasive plants was completed at the mine from July 25 to July 28, 2023. Survey timing coincided when the majority of plant species were flowering (summer), as species identification is significantly aided by the presence of inflorescence.

2.0 ENVIRONMENTAL SETTING

2.1 Vegetation

Mount Polley Mine falls within the Interior Cedar Hemlock (ICH) biogeoclimatic (BEC) zone in the moist cool (mk3) variant. Ecosystems within mk3 variant are characterized by forest cover dominated by western redcedar (*Thuja plicata*), interior Douglas-fir (*Pseudotsuga menziesii var. glauca*) and lodgepole pine (*Pinus contorta var. latifolia*). Young forests within this variant are often dominated by interior Douglas-fir and/or lodgepole pine and other seral tree species that may be present including trembling aspen (*Populus tremuloides*) and paper birch (*Betula papyrifera*). Common shrubs in the forest understorey include black huckleberry (*Vaccinium membranaceum*), black gooseberry (*Ribes lacustre*), devils club (*Oplopanax horridus*), falsebox (*Pachistima myrsinites*) and oval-leaved blueberry (*Vaccinium ovalifolium*). Examples of common herbs include rose twistedstalk (*Streptopus lanceolatus*), bunchberry (*Cornus canadensis*), oak fern (*Gymnocarpium dryopteris*), three-leaved foamflower (*Tiarella trifoliata*) and twinflower (*Linnaea borealis*; Steen and Coupe, 1997).

3.0 INVASIVE PLANT INVENTORY

3.1 METHODS

An inventory of invasive plant species was completed of the mine stockpiles from July 25-28, 2023. Prior to commencing field surveys, a desktop review was conducted to pre-determine areas of high potential for invasive plants, such as high-traffic areas, road right-of-way's, disturbed areas, and areas with poor vegetation cover; the desktop review included government websites and background documents from MPMC. Field maps were created utilizing the desktop review and highlighting areas with high potential for invasives (i.e., road right of ways, high-traffic areas). The desktop assessment also included review of existing IMC documents related to previous invasive plant survey and management activities and correspondence with the Invasive Plant Management Coordinator of the Cariboo Regional District for updated information regarding the CCCIPC Priority Plant lists (May, 2023).

As per the recommendations of the *Invasive Alien Plants Pest Management Plan (IAPP) for Provincial Public (Crown) Lands in the Southern Interior of British Columbia* (MOF, 2022) information recorded during surveys included the UTM coordinates (northing, easting and zone), location, date, species, estimated size of the infestation in hectares, distribution, density, photos, and any pertinent site characters or additional information such as soil type or proximity to a riparian area. It is recommended that invasive plant survey and inventory information be documented using the *IAPP Site & Invasive Plant Survey Record* (Appendix A) and submitted into IAPP to add to the Cariboo Chilcotin Coast Invasive Plant Committee (CCCIPC) inventory information. A comprehensive list of priority species created by the CCCIPC for 2020 within the Cariboo Chilcotin Region is included in Table 1 (CCCIPC, 2017).

Table 1 Comprehensive list of priority invasive plants targeted by the Central Chilcotin Coast Invasive Plant Committee (CCCIPC) in 2020 for treatment in the Central Cariboo Invasive Plant Management Area (CCCIPC, 2017). New invaders (newly established species, current limited distribution, or at borders. Management objective is elimination); Containment (well-established species in the Cariboo Chilcotin region, but have no yet infested all potential habitats. New sites will be managed to contain them and prevent further spread); Established (common and widespread species that occupy most or all potential habitats. Widespread control of these species is not currently possible); Biological Control (well-established species in the Cariboo Chilcotin region, for which effective biocontrol agents exist).

COMMON NAME	SCIENTIFIC NAME	Priority Ranking
Baby's-breath	*Gypsophila paniculata*	New Invader
Black henbane	*Hyoscyamus niger*	New Invader
Blueweed	*Echium vulgare*	New Invader
Burdock	*Arctium spp*	Established
Canada thistle	*Cirsium arvense*	Established
Caraway	*Carum carvi*	New Invader
Common tansy	*Tanacetum vulgare*	Containment
Dalmatian toadflax	*Linaria dalmatica*	Biological Control
Diffuse knapweed	*Centaurea diffusa*	Containment
Field scabious	*Knautia arvensis*	New Invader
Flowering rush	*Butomus umbellatus*	New Invader
Himalayan balsam	*Impatiens glandulifera*	New Invader

Common Name	Scientific Name	Priority Ranking
Hoary alyssum	*Berteroa incana*	New Invader
Hoary cress	*Cardaria draba*	New Invader
Hound's-tongue	*Cynoglossum officinale*	New Invader
Knotweed spp	*Polygonum* spps.	New Invader
Leafy spurge	*Euphorbia esula*	New Invader
Marsh plume thistle	*Cirsium palustre*	New Invader
Meadow knapweed	*Centaurea debeauxii*	New Invader
Mountain bluet	*Centaurea montana*	New Invader
Nodding thistle	*Carduus nutans*	Biological Control
Orange hawkweed	*Hieracium aurantiacum*	Established
Oxeye daisy	*Leucanthemum vulgare*	Established
Perennial pepperweed	*Lepidium latifolium*	New Invader
Plumeless thistle	*Carduus acanthoides*	New Invader
Purple loosestrife	*Lythrum salicaria*	New Invader
Russian knapweed	*Acroptilon repens*	New Invader
Scentless chamomile	*Matricaria perforata*	Established
Spotted knapweed	*Centaurea biebersteinii*	Containment
St. John's wort	*Hypericum perforatum*	Containment
Sulphur cinquefoil	*Potentilla recta*	Containment
Tansy ragwort	*Senecio jacobaea*	New Invader
Yellow flag iris	*Iris pseudachorus*	New Invader
Yellow hawkweed	*Hieracium* spp	Established
Wild chervil	*Anthriscus sylvestris*	New Invader
Wild parsnip	*Heracleum maximum*	New Invader

3.2 Results

The desktop review revealed historical presence of orange hawkweed on the site (Government of BC, 2024) and that Mount Polley mine lies inside an orange hawkweed, yellow hawkweed, and spotted knapweed (*Centaurea biebersteinii*) containment area (CCCIPC, 2017). Containment areas are management approaches to prevent existing established plant populations from spreading into new areas.

Previous field surveys conducted in 2017 surveyed 95 polygons (432.0 ha) and identified onsite presence of priority species Canada thistle, oxeye daisy, orange hawkweed, and scentless chamomile and lower priority species bull thistle, yellow hawkweed and shepherd's-purse (Spectrum, 2017). Extensive herbicide treatment of invasive species identified in 2017 was conducted in 2018 (Holmes, 2023). In addition, some incidental hand pulling and mechanical treatments have been conducted onsite (Holmes, 2023).

Field survey results in 2023 determined presence of species with CCCIPC Priority Ranking "Established" including Canada thistle, orange and yellow hawkweed, oxeye daisy, and scentless chamomile. Established species, as per the CCCIPC Strategic Plan, are defined as common and widespread species that occupy most or all potential habitats and widespread control is currently not possible (CCCIPC, 2017). Other

invasives not listed within the CCCIPC priority list included bull thistle (*Cirsium vulgare*), Western goat's-beard (*Tragopogon dubius*), mullein (*Verbascum thapsis*), and sow thistle (*Sonchus* spps; also designated as provincially noxious) within the soil stockpile polygons. Table 2 summarizes the results of the survey, photo documentation is provided in Appendix B, and a detailed summary of the inventory results is provided in Appendix C.

Table 2. Invasive plants identified at the Mount Polley Mine from July 25 to 28, 2023 including Priority Ranking within the Central Cariboo Sub-Region of the Cariboo Chilcotin Coast Invasive Plant Committee (CCCIPC) Priority Plant List, stockpiles infested by species and total number, and area of species infestation by species and total in hectares (ha). Invasive plants were categorized New Invader, Containment, Established, Biological Control or Not Listed, as listed by the CCCIPC (CCCIPC, 2017; May, 2023).

Priority Ranking the Central Cariboo Sub-Region of the CCCIPC	Invasive Plant Species	Scientific Name	Number of Soil Stockpiles Infested	Total Area of Infestation (Ha)
New Invader	-	-	-	-
Containment	-	-	-	-
Established	Canada thistle[1]	*Cirsium arvense*	26	33.1
	Orange hawkweed[2]	*Hieracium aurantiacum*	19	24.8
	Oxeye daisy[1]	*Leucanthemum vulgare*	66	81.2
	Yellow hawkweed	*Hieracium* spp	49	65.9
	Scentless chamomile[1]	*Matricaria perforata*	8	10.0
Biological Control	-	-	-	-
Not listed	Bull thistle	*Cirsium vulare*	50	63.0
	Mullein	*Verbascum thapus*	27	34.2
	Sow thistle[1]	*Sonchus* spps.	21	26.5
	Western goat's beard	*Tragopogon dubius*	48	60.6
Total number of polygons infested			66 stockpiles, Target Area 16 & 17, Junction Zone Seepage Sump Road, North Bail Dump and several access roads.	
Total Area of infestation (ha)			399.3	

[1]These species are also listed as provincially noxious in British Columbia (Province of British Columbia, 1996).

[2]These species are also listed as regionally noxious in the Cariboo region in British Columbia (Province of British Columbia, 1996).

Appendix D provides maps that show the locations of the invasive species found on the mine site.

4.0 INVASIVE PLANT MANAGEMENT PLAN

4.1 PREVENTION

Preventing the introduction of invasive plants, as well as quickly responding to an initial spread, is the most effective way to manage invasive plants. These actions will reduce treatment cost and ensure unmanageable outbreaks do not occur during post-mining activities. Preventative measures include identifying potential sources of invasive plant spread. Table 3 summarizes invasive plant sources, potential vectors, and whether control methods are possible.

Table 3. Potential vectors, sources and possible control of invasive plant spread with remediation activities at the Mount Polley Mine site.

VECTORS	SOURCE	CONTROL METHODS POSSIBLE
Human-mediated	People – footwear, clothing	Y
	Vehicles & equipment – moving onto and off of site	Y
	Permanent forest canopy openings	Y
VECTORS	**SOURCE**	**CONTROL METHODS POSSIBLE**
Reclamation Activities	Movement of soil	Y
	Use of seed mixture or soil contaminated with invasive plants	Y
Animals	Wildlife	N
Natural	Wind	Y
	Rhizome or seed spread	Y

Preventative measures to reduce potential spread of invasive plants include:

- Minimizing disturbance,
- Prompt ground seeding of disturbed areas (right-of-way's, powerline access, inactive sections of mill, storage and equipment yards, etc.) with a rapidly establishing seed mixture to prevent soil erosion and establishment of invasive plants,
- Use only tested and approved seed mixtures that have a Certificate of Analysis,
- Retain natural vegetation in ditches, right-of-way's, powerlines, storage, and equipment areas,
- Soil should not be moved into an area of existing invasive plants,
- Monitor for presence of invasive plants in soil that has been moved and stored,
- Ensure that footwear, clothing, equipment, vehicles, and undercarriages are mud and debris free prior to entering and leaving site as they may contain invasive plants. This includes socks, pant legs and cruise vest,
- Prevent human, equipment and vehicle access through known areas of invasive plant infestation,
- Educate personnel on ways to reduce invasive plant spread and invasive plant identification.

4.2 Treatment

Control and monitoring measures for invasive plant species found on the site will be determined by consulting the appropriate authorities. If treatment of invasive plants is required, timing windows that incorporate the invasive plant will be established that include consideration of the invasive plant species, site conditions, and infestation size.

Treatment of invasive plants may include chemical, mechanical or biological control methods.

4.1.1 Chemical Treatment

Chemical treatments include fertilizers and herbicides. Fertilizer can aid native plant species in competing with invasive plants and increase their competitiveness. Herbicides are useful as a last resort but should be used only if all other options have failed.

If herbicide use is required, selection and application of approved herbicide will be performed in compliance with BC's *Integrated Pest Management Act* (Environment Canada 2003). In order to reduce negative impacts on the environment, chemical spot-treatment will be used instead of broadcast spraying. It is recommended that application information be documented using the BC Ministry of Forests, Lands and Natural Resource Operations *Invasive Plant Chemical and Mechanical Treatment Record* (Appendix E) and submitted into the IAPP (BC MOFR 2010).

In addition, herbicides will not be used under the following conditions:

- Invasive plants are within a Pesticide Free Zone (PFZ), such as near a water source or well,
- Invasive plants are within coarse textured soils that would reduce effectiveness of herbicide,
- Invasive plant treatment is occurring under inappropriate weather conditions (e.g., persistent precipitation, wind >8 km/hr, temperature >28°C,
- Residual herbicides may not be used within 10 m of water source and 30 m from well,
- Non-residual herbicides may not be used within 1 m of water source or well,
- Residual herbicides may not be used within a gravel pit,
- Residual herbicides with the active ingredient 24-D may not be used on areas that fall within Ministry of Transportation and Infrastructure (MOTI) jurisdiction.

4.1.2 Spills & Safety Data Sheets

During the chemical treatment of invasive plants, there is a potential for an inadvertent release of chemical herbicide. It is necessary to provide spill response kits which include the basic contents of a chemical spill kit.

MPMC will ensure that, for all chemical substances used on site, a copy of the Safety Data Sheets (SDS) is made available on site in a clearly marked binder. These sheets will identify: product information, hazardous ingredients, physical data, fire and explosion hazard, reactivity data, toxicological properties, preventative measures, first aid measures, and preparation information as required by the Workers' Compensation Board of BC. In the event of a spill or leak, the Safety Data Sheets will be consulted to determine if there are any potential risks for health and environment related to the product.

4.1.3 Spill Investigation / Spill Report Form

If the spill is a reportable emergency, an investigation report and spill report form must be completed and forwarded to the Emergency Management BC (1-800-663-3456) within 24 hours of the incident occurring. The company responsible for the spill must prepare the investigation and spill report.

4.1.4 Mechanical Treatment

In areas where invasive plants have low distribution/density, mechanical treatment methods are often used because the treatment is simple, effective, and eliminates the potential negative effects of chemical treatment.

Mechanical treatment techniques are frequently utilized in targeted areas of an invasive plant infestation where the use of herbicide is not permitted or feasible. This is particularly relevant near riparian habitats or other environmentally delicate features. Some of examples of mechanical treatment methods include:

- Hand-pulling
- Digging/Excavating
- Cutting
- Mowing
- Mulching
- Controlled Burning (Flaming, Tiger Torch)
- Cultivation/Tilling
- Dead-heading
- Cover/Smother
- Salt water/Vinegar

However, mechanical treatment options can be limited by:

- Safety issues: burning can jeopardize the well-being of employee and have detrimental effects on the environment.
- Timing windows: mowing needs to be considered prior seed dispersal taking place.
- Cost: mechanical treatment may be labour intensive; follow-up treatments may be required throughout the growing season and can be required for a consecutive 3-5 years to ensure effective treatment.
- Effectiveness: mowing is not effective on smaller invasive plant species; digging/deadheading/mowing is not effective on species that grow from adventitious root buds or rhizomes, such as hawkweed species (*Hieracium* spp.).

If mechanical treatment does occur, appropriate disposal of all plant material and propagules is required. This includes placing invasive plants into dark plastic bags and bringing bags to a landfill that has a designated area for invasive plant species. Invasive plant species must not be composted. It is recommended that mechanical treatment of invasive plants is documented using the *Invasive Plant Chemical and Mechanical Treatment Record* and submitted into the IAPP (BC MOFR 2010).

4.1.5 Biological Control

Typically used to address invasive plants, biological control agents include fungi, viruses, nematodes, and insects that lower plant density and seed production. Biological control agents are helpful, but they must be used carefully to prevent off-target damage to adjacent habitats and non-target vegetation. Any use of biological controls is recommended to be documented using the *Biological Control Agent Release and Monitoring Record* (Appendix F) and submitted into the IAPP.

4.3 MONITORING

In order to ensure that management strategies are being implemented and that any alterations to existing infestations of invasive plant species are documented, monitoring protocols are required. Inspections will be conducted by trained personnel in invasive plant species identification that are familiar with the CCCIPC's current targeted species within the Chilcotin Cariboo IPMA.

In order to provide any propagules sufficient time to resume growth and assess the efficacy of the treatment, post-treatment monitoring should take place no later than two weeks following the treatment.

Information including the date, species, UTM coordinates, location description, estimation of distribution and density, distance to sensitive areas, soil texture, previous treatment method, and the efficacy of the treatment method on the population of invasive plants, will be gathered if invasive plant species are discovered during monitoring. Up to five years after treatment, frequent monitoring and further treatment may be necessary, depending on the type of treatment used and its success rate.

If monitoring indicates that a previous mitigation strategy was ineffective, further mitigation techniques will be investigated. Chemical therapy, for example, can be taken into consideration as an alternative if mechanical treatment appears to be unsuccessful. It is recommended that monitoring records be documented using the *Chemical and Mechanical Treatment Monitoring Record* (Appendix G)*, Biological Treatment Monitoring Record* and/or the *Photoplot Record for Biological Control Method* and submitted into the IAPP to add to the CCCIPC's inventory information.

5.0 IMPLENTATION

5.1 Training and Available Resources

A pre-work orientation with all individuals who will be involved in any fieldwork to manage invasive plant species will be held on site at the beginning of the project and as applicable prior to the commencement of each phase (e.g., prior to truck access). These meetings will have the following components:

- A review of this IPMP to ensure that all parties involved understand the objectives of the plan, and what environmental protection measures are to be used; and
- A review of additional mitigation measures outlined by regulatory agencies. Copies of relevant approval documents will be kept on site and it is important that all persons understand these regulatory requirements.

Any new contractors or employees arriving at the work site after the initial meeting will be briefed in subsequent meetings on an as needed basis by the site supervisor or Environmental Monitor (EM).

5.2 Site Access Management

As the Morehead-Bootjack FSR is an existing road system, there is 2WD access to the site along the existing roadway. Any equipment on site should be free from leaks, fluid, fuel/sediment buildup and invasive plant species. During access, the following best management practices apply:

- Minimize disturbance while accessing the site.
- Removal of invasive plants from personnel, vehicles and equipment before entering and leaving site.

In order to adequately ensure all personnel and equipment are free of invasive plants when entering and leaving the site, inspections should be conducted for invasive plants parts/seeds on clothing, tools, equipment/vehicles and undercarriages of vehicles.

It should be noted that areas free of invasive plants on the mine site should be protected from areas on site where invasive plants are present. As such, procedures for inspecting equipment and clothing should apply not only to when entering and leaving the mine site, but also when entering and leaving areas in the mine where invasive plant infestations occur. Emphasis should be placed on inspections of equipment and

clothing when entering or leaving infested areas identified on the Invasive Plant Infestation Maps in Appendix D.

5.3 Invasive Plant Treatment Recommendations

The invasive plant species found at Mount Polley are all considered Established under the Central Cariboo Priority Ranks of the CCCIPC; Canada thistle, orange hawkweed, oxeye daisy, and scentless chamomile are also considered provincially or regionally noxious (Province of British Columbia, 1996). The *Weed Control Act* (1996) requires control of noxious plants to prevent the introduction and spread to unaffected areas. Table 4 provides recommendations for treatment of invasive plants present on site.

Table 4. Recommendations of treatment types for Canada thistle, oxeye daisy, yellow hawkweed, orange hawkweed, and scentless chamomile on the Mount Polley Mine site.

Species	Recommended Treatment Type
Canada thistle	**Chemical & Containment Areas:** The Canada thistle found onsite had high distribution, density, and total area covered. Mechanical treatment of these large infestations would be impractical. Biological control for Canada thistle exists but is not recommended. Targeted chemical treatment at high-use areas and areas where seed susceptibility is high (e.g. road right-of-way's, areas around buildings, infestation with susceptible area downwind) combined with creation of containment polygons around low-use areas (e.g., deactivated road right-of-way's) would be a feasible treatment and management plan.
Hawkweed species (Orange and Yellow)	**Chemical & Containment Areas:** The hawkweed species found onsite had high distribution, density, and total area covered. Mechanical treatment of these species is not recommended as hawkweed has indeterminate growth (i.e., can grow from any plant part left in the soil). No biological control exists for hawkweed. Targeted chemical treatment at high-use areas and areas where seed susceptibility is high (e.g. road right-of-way's, areas around buildings, infestation with susceptible area downwind) combined with creation of containment polygons around low-use areas (e.g., deactivated road right-of-way's) would be a feasible treatment and management plan.
Oxeye daisy	**Chemical & Containment Areas:** The oxeye daisy identified onsite had areas with high distribution and density and large areas of infestation. Mechanical treatment of these large infestations would be impractical. Currently there is no biological control for oxeye daisy. Targeted chemical treatment at high-use areas and areas where seed susceptibility is high (e.g. road right-of-way's, areas around buildings, infestation with susceptible area downwind) combined with creation of containment polygons around low-use areas (e.g., deactivated road right-of-way's) would be a feasible treatment and management plan.
Scentless chamomile	**Chemical, Mechanical & Containment Areas:** The scentless chamomile identified onsite had areas with moderate distribution

Species	Recommended Treatment Type
	and density and moderate areas of infestation. Mechanical treatments for scentless chamomile identified with low density, distribution, and area, is recommended, especially in high-use areas and areas where seed susceptibility is high. Biological control for scentless chamomile exists but is not recommended as efficacy is not certain. Targeted chemical treatment in high-use areas and areas where seed susceptibility is high (e.g. road right-of-way's, areas around buildings, infestation with susceptible area downwind) combined with creation of containment polygons around low-use areas (e.g., deactivated road right-of-way's) is recommended for scentless chamomile.

A novel approach to mechanical treatment onsite could also include a tilling approach that comprises of ripping the top layer of stockpiled soil, containing invasive plant presence, and placing it underneath the remainder of the stockpiled soil followed by heavy seed application. This novel approach would require monitoring by a qualified professional in invasive plants to increase effectiveness. Treatment of invasive plants should be implemented in early summer to avoid seed heads reaching maturity and spreading more individuals.

6.0 DISTRIBUTION OF THE IPMP

Each member of the project team and the client will receive a copy of the IPMP. A pre-project meeting is required to further go over site specific details. Additional copies of the finalized plan will be available on site, and every team member will understand the strategy and how it operates.

8.0 REFERENCES

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APPENDIX A

Site & Invasive Plant Survey Records

IAPP Site & Invasive Plant Survey Record

BRITISH COLUMBIA
The Best Place on Earth

Entered into IAPP (YYYY-MM-DD):	By:	Assigned Site IDs recorded on this form: ☐

Site Created Date (YYYY-MM-DD): *	Invasive Plant Survey Date (YYYY-MM-DD): * (only if different from Site Created Date)	Site ID: (assigned at IAPP data entry)
2023-07-25		

Site Details

Jurisdiction: * (see reverse for choices/codes)	District Lot Nr:	Range Unit:	Site Paper File ID:
Mt. Polley			

UTM Zone: *	UTM Easting: * (no initial zero)	UTM Northing: * (7 digits)	Site Soil Texture:
10 U	5 9 0 5 3 6	5 8 2 3 9 0 5	coarse ☒ fine ☐ organic ☐

Slope:	Aspect:	Elevation (m):	Site specific use: *

Site Location (and directions how to get there):

IMC - road to stockpile 10

Site Comments (anything else important /useful):
- invasives along rd side
- total area 6.33 Ha

Invasive Plant Survey Details

Survey Agency: *	Employer:	Surveyor(s):
DWB Consulting		KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
OD	6.33	8	4	C ☒ O ☐ P ☐	☒	☒	☒
OH	6.33	4	2	C ☒ O ☐ P ☐	☒	☒	☒
YH	6.33	4	2	C ☒ O ☐ P ☐	☒	☒	☒

Site Image Details

Date taken (YYYY-MM-DD):	Reference No. *	Perspective: * (see reverse for codes)	Image Comments:

Site Created Date (YYYY-MM-DD): *	Invasive Plant Survey Date (YYYY-MM-DD): * (only if different from Site Created Date)	Site ID: (assigned at IAPP data entry)
2023-07-25		

Site Details

Jurisdiction: * (see reverse for choices/codes)	District Lot Nr:	Range Unit:	Site Paper File ID:

UTM Zone: *	UTM Easting: * (no initial zero)	UTM Northing: * (7 digits)	Site Soil Texture:
	5 9 0 5 3 6	5 8 2 3 9 0 5	coarse ☒ fine ☐ organic ☐

Slope:	Aspect:	Elevation (m):	

Site Location (and directions how to get there):

IMC - road to stockpile 10 cont.

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: *	Employer:	Surveyor(s):
DWB Consulting		KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
BT	6.33	2	1	C ☒ O ☐ P ☐	☒	☒	☒
WG	6.33	2	1	C ☒ O ☐ P ☐	☒	☒	☒
				C ☐ O ☐ P ☐	☐	☐	☐

Site Image Details

Date taken (YYYY-MM-DD):	Reference No. *	Perspective: * (see reverse for codes)	Image Comments:

* *indicates mandatory field - this form may be used for 2 sites, with their invasive plant surveys, and site images (if taken).*

IAPP Site & Invasive Plant Survey Record

BRITISH COLUMBIA
The Best Place on Earth

Entered into IAPP (YYYY-MM-DD):	By:	Assigned Site IDs recorded on this form: ☐

Site Created Date (YYYY-MM-DD): *	Invasive Plant Survey Date (YYYY-MM-DD): * (only if different from Site Created Date)	Site ID: (assigned at IAPP data entry)
2023-07-25		

Site Details

Jurisdiction: * (see reverse for choices/codes)	District Lot Nr:	Range Unit:	Site Paper File ID:
Mt. Polley			

UTM Zone: *	UTM Easting: * (no initial zero)	UTM Northing: * (7 digits)	Site Soil Texture:
10U	590500	5824625	coarse ☒ fine ☐ organic ☐

Slope:	Aspect:	Elevation (m):	Site specific use: *

Site Location (and directions how to get there):

IMC - Junction zone seepage sump road

Site Comments (anything else important /useful):
- all found along roadside
- total area 1.24 Ha

Invasive Plant Survey Details

Survey Agency: *	Employer:	Surveyor(s):
DWB Consulting		KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
OD	1.24	8	4	C ☒ O ☐ P ☐	☒	☒	☒
OH	1.24	3	2	C ☒ O ☐ P ☐	☒	☒	☒
BT	1.24	4	2	C ☒ O ☐ P ☐	☒	☒	☒

Site Image Details

Date taken (YYYY-MM-DD):	Reference No. *	Perspective: * (see reverse for codes)	Image Comments:

Site Created Date (YYYY-MM-DD): *	Invasive Plant Survey Date (YYYY-MM-DD): * (only if different from Site Created Date)	Site ID: (assigned at IAPP data entry)
2023-07-25		

Site Details

Jurisdiction: * (see reverse for choices/codes)	District Lot Nr:	Range Unit:	Site Paper File ID:
Mt. Polley			

UTM Zone: *	UTM Easting: * (no initial zero)	UTM Northing: * (7 digits)	Site Soil Texture:
	590500	5824625	coarse ☒ fine ☐ organic ☐

Slope:	Aspect:	Elevation (m):	

Site Location (and directions how to get there):

IMC - Junction zone seepage sump road cont.

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: *	Employer:	Surveyor(s):
DWB Consulting		KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
CT	1.24	6	4	C ☒ O ☐ P ☐	☒	☒	☒
				C ☐ O ☐ P ☐	☐	☐	☐
				C ☐ O ☐ P ☐	☐	☐	☐

Site Image Details

Date taken (YYYY-MM-DD):	Reference No. *	Perspective: * (see reverse for codes)	Image Comments:

* *indicates mandatory field - this form may be used for 2 sites, with their invasive plant surveys, and site images (if taken).*

IAPP Site & Invasive Plant Survey Record

BRITISH COLUMBIA
The Best Place on Earth

Entered into IAPP (YYYY-MM-DD):	By:	Assigned Site IDs recorded on this form: ☐

Site Created Date (YYYY-MM-DD): * 2023-07-27 | **Invasive Plant Survey Date** (YYYY-MM-DD): * (only if different from Site Created Date) 2023-07-25 26 | **Site ID:** (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes)	District Lot Nr:	Range Unit:	Site Paper File ID:
Mt. Polley			

UTM Zone: *	UTM Easting: * (no initial zero)	UTM Northing: * (7 digits)	Site Soil Texture:
10 U	5 9 3 5 6 1	5 8 2 3 5 8 7	coarse ☒ fine ☐ organic ☐

Slope: | Aspect: | Elevation (m): | Site specific use: *

Site Location (and directions how to get there):

IMC - Stockpile O ext.

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: *	Employer:	Surveyor(s):
DWB Consulting		KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
WG	2.78	6	4	C ☒ O ☐ P ☐	☒	☒	☒
YH	2.78	6	4	C ☒ O ☐ P ☐	☒	☒	☒
				C ☒ O ☐ P ☐	☒	☒	☒

Site Image Details

Date taken (YYYY-MM-DD):	Reference No. *	Perspective: * (see reverse for codes)	Image Comments:

Site Created Date (YYYY-MM-DD): *	Invasive Plant Survey Date (YYYY-MM-DD): * (only if different from Site Created Date)	Site ID: (assigned at IAPP data entry)
2023-07-27		

Site Details

Jurisdiction: * (see reverse for choices/codes)	District Lot Nr:	Range Unit:	Site Paper File ID:
Mt. Polley			

UTM Zone: *	UTM Easting: * (no initial zero)	UTM Northing: * (7 digits)	Site Soil Texture:
10 U	5 9 3 4 1 1	5 8 2 2 0 8 1	coarse ☒ fine ☐ organic ☐

Slope: | Aspect: | Elevation (m):

Site Location (and directions how to get there):

IMC - Stockpile 17

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: *	Employer:	Surveyor(s):
DWB		KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
OH	0.91	4	2	C ☒ O ☐ P ☐	☒	☒	☒
OD	0.91	8	4	C ☒ O ☐ P ☐	☒	☒	☒
SO	0.91	4	3	C ☒ O ☐ P ☐	☒	☒	☒

Site Image Details

Date taken (YYYY-MM-DD):	Reference No. *	Perspective: * (see reverse for codes)	Image Comments:

* *indicates mandatory field - this form may be used for 2 sites, with their invasive plant surveys, and site images (if taken).*

IAPP Site & Invasive Plant Survey Record

BRITISH COLUMBIA (The Best Place on Earth)

Entered into IAPP (YYYY-MM-DD):	By:	Assigned Site IDs recorded on this form: ☐

Site Created Date (YYYY-MM-DD): * 2023-07-26 | **Invasive Plant Survey Date** (YYYY-MM-DD): * (only if different from Site Created Date) 2023-07-~~25~~ 26 | **Site ID:** (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes) Mt. Polley | District Lot Nr: | Range Unit: | Site Paper File ID:

UTM Zone: * 10 U | **UTM Easting:** * (no initial zero) 5 9 4 2 2 4 | **UTM Northing:** * (7 digits) 5 8 2 2 4 5 4 | Site Soil Texture: coarse ☒ fine ☐ organic ☐

Slope: | Aspect: | Elevation (m): | Site specific use: *

Site Location (and directions how to get there):

IMC - Stockpile 1

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: * DWB Consulting | Employer: | Surveyor(s): KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
OD	2.45	7	4	C [X] O [ ] P [ ]	[X]	[X]	[X]
CT	2.45	6	4	C [X] O [ ] P [ ]	[X]	[X]	[X]
BT	2.45	6	3	C [X] O [ ] P [ ]	[X]	[X]	[X]

Site Image Details

Date taken (YYYY-MM-DD):	Reference No. *	Perspective: * (see reverse for codes)	Image Comments:

Site Created Date (YYYY-MM-DD): * 2023-07-26 | **Invasive Plant Survey Date** (YYYY-MM-DD): * (only if different from Site Created Date) | **Site ID:** (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes) Mt. Polley | District Lot Nr: | Range Unit: | Site Paper File ID:

UTM Zone: * 10 U | **UTM Easting:** * (no initial zero) 5 9 4 2 2 4 | **UTM Northing:** * (7 digits) 5 8 2 [illegible] 5 4 | Site Soil Texture: coarse ☒ fine ☐ organic ☐

Slope: | Aspect: | Elevation (m): | Site Comments (anything else important /useful):

Site Location (and directions how to get there):

IMC - Stockpile 1 cont.

Invasive Plant Survey Details

Survey Agency: * DWB Consulting | Employer: | Surveyor(s): KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
SO	2.45	2	1	C [X] O [ ] P [ ]	[X]	[X]	[X]
WG	2.45	4	2	C [X] O [ ] P [ ]	[X]	[X]	[X]
YH	2.45	3	3	C [X] O [ ] P [ ]	[X]	[X]	[X]

Site Image Details

Date taken (YYYY-MM-DD):	Reference No. *	Perspective: * (see reverse for codes)	Image Comments:

* *indicates mandatory field - this form may be used for 2 sites, with their invasive plant surveys, and site images (if taken).*

IAPP Site & Invasive Plant Survey Record

BRITISH COLUMBIA
The Best Place on Earth

Entered into IAPP (YYYY-MM-DD):	By:	Assigned Site IDs recorded on this form: ☐

Site Created Date (YYYY-MM-DD): * 2023-07-27
Invasive Plant Survey Date (YYYY-MM-DD): * (only if different from Site Created Date) 2023-07-25
Site ID: (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes) Mt. Polley
District Lot Nr:
Range Unit:
Site Paper File ID:

UTM Zone: * 10 U
UTM Easting: * (no initial zero) 594224
UTM Northing: * (7 digits) 5822454
Site Soil Texture: coarse ☒ fine ☐ organic ☐

Slope:
Aspect:
Elevation (m):
Site specific use: *

Site Location (and directions how to get there):
IMC - Stockpile 1 cont.

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: * DWB Consulting
Employer:
Surveyor(s): KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
SH	2.45	6	3	C [X] O [ ] P [ ]	[X]	[X]	[X]
MU	2.45	3	3	C [X] O [ ] P [ ]	[X]	[X]	[X]
				C [X] O [ ] P [ ]	[X]	[X]	[X]

Site Image Details

Date taken (YYYY-MM-DD): **Reference No.** * **Perspective:** * (see reverse for codes)
Image Comments:

Site Created Date (YYYY-MM-DD): * 2023-07-27
Invasive Plant Survey Date (YYYY-MM-DD): * (only if different from Site Created Date)
Site ID: (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes) Mt. Polley
District Lot Nr:
Range Unit:
Site Paper File ID:

UTM Zone: * 10 U
UTM Easting: * (no initial zero) 594088
UTM Northing: * (7 digits) 5822063
Site Soil Texture: coarse ☒ fine ☐ organic ☐

Slope:
Aspect:
Elevation (m):

Site Location (and directions how to get there):
IMC - Stockpile 64

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: * DWB Consulting
Employer:
Surveyor(s): KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
BT	1.93	8	4	C [X] O [ ] P [ ]	[X]	[X]	[X]
CT	1.93	7	3	C [X] O [ ] P [ ]	[X]	[X]	[X]
OD	1.93	6	4	C [X] O [ ] P [ ]	[X]	[X]	[X]

Site Image Details

Date taken (YYYY-MM-DD): **Reference No.** * **Perspective:** * (see reverse for codes)
Image Comments:

* *indicates mandatory field - this form may be used for 2 sites, with their invasive plant surveys, and site images (if taken).*

IAPP Site & Invasive Plant Survey Record

BRITISH COLUMBIA
The Best Place on Earth

Entered into IAPP (YYYY-MM-DD):	By:	Assigned Site IDs recorded on this form: ☐

Site Created Date (YYYY-MM-DD): * 2023-07-28
Invasive Plant Survey Date (YYYY-MM-DD): * (only if different from Site Created Date) 2023-07-~~25~~ 28
Site ID: (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes) Mt. Polley
District Lot Nr:
Range Unit:
Site Paper File ID:

UTM Zone: * 10 U
UTM Easting: * (no initial zero) 5 9 3 6 5 1
UTM Northing: * (7 digits) 5 8 2 3 3 1 6
Site Soil Texture: coarse ☒ fine ☐ organic ☐

Slope:
Aspect:
Elevation (m):
Site specific use: *

Site Location (and directions how to get there):
IMC - Stockpile 2

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: * DWB Consulting
Employer:
Surveyor(s): KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
CT	1	6	4	C ☒ O ☐ P ☐	☒	☒	☒
BT	2.84	2	2	C ☒ O ☐ P ☐	☒	☒	☒
WG	2.84	2	2	C ☒ O ☐ P ☐	☒	☒	☒

Site Image Details

Date taken (YYYY-MM-DD):	Reference No. *	Perspective: * (see reverse for codes)	Image Comments:

Site Created Date (YYYY-MM-DD): * 2023-07-28
Invasive Plant Survey Date (YYYY-MM-DD): * (only if different from Site Created Date)
Site ID: (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes) Mt. Polley
District Lot Nr:
Range Unit:
Site Paper File ID:

UTM Zone: * 10 U
UTM Easting: * (no initial zero) 5 9 3 6 5 1
UTM Northing: * (7 digits) 5 8 2 3 3 1 6
Site Soil Texture: coarse ☒ fine ☐ organic ☐

Slope:
Aspect:
Elevation (m):

Site Location (and directions how to get there):
IMC - Stockpile 2 cont.

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: * DWB Consulting
Employer:
Surveyor(s): KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
YH	2.84	7	3	C ☒ O ☐ P ☐	☒	☒	☒
OA	3.01	6	2	C ☐ O ☐ P ☐	☐	☐	☐
OD	2.84	7	3	C ☐ O ☐ P ☐	☐	☐	☐

Site Image Details

Date taken (YYYY-MM-DD):	Reference No. *	Perspective: * (see reverse for codes)	Image Comments:

* *indicates mandatory field - this form may be used for 2 sites, with their invasive plant surveys, and site images (if taken).*

IAPP Site & Invasive Plant Survey Record

BRITISH COLUMBIA
The Best Place on Earth

Entered into IAPP (YYYY-MM-DD):	By:	Assigned Site IDs recorded on this form: ☐

Site Created Date (YYYY-MM-DD): * 2023-07-26
Invasive Plant Survey Date (YYYY-MM-DD): * (only if different from Site Created Date) 2023-07-~~25~~ 28
Site ID: (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes) Mt. Polley
District Lot Nr:
Range Unit:
Site Paper File ID:

UTM Zone: * 10 U
UTM Easting: * (no initial zero) 5 9 3 6 0 8
UTM Northing: * (7 digits) 5 8 2 3 4 9 4
Site Soil Texture: coarse ☒ fine ☐ organic ☐

Slope:
Aspect:
Elevation (m):
Site specific use: *

Site Location (and directions how to get there): IMC - Stockpile 3

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: * DWB Consulting
Employer:
Surveyor(s): KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
MU	0.2	4	2	C [X] O [ ] P [ ]	[X]	[X]	[X]
YH	6.73	6	4	C [X] O [ ] P [ ]	[X]	[X]	[X]
GG	6.73	2	2	C [X] O [ ] P [ ]	[X]	[X]	[X]

Site Image Details

Date taken (YYYY-MM-DD):	Reference No. *	Perspective: * (see reverse for codes)	Image Comments:

Site Created Date (YYYY-MM-DD): * 2023-07-26
Invasive Plant Survey Date (YYYY-MM-DD): * (only if different from Site Created Date)
Site ID: (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes) Mt. Polley
District Lot Nr:
Range Unit:
Site Paper File ID:

UTM Zone: * 10 U
UTM Easting: * (no initial zero) 5 9 4 3 1 6
UTM Northing: * (7 digits) 5 8 2 1 2 2 6
Site Soil Texture: coarse ☒ fine ☐ organic ☐

Slope:
Aspect:
Elevation (m):

Site Location (and directions how to get there): IMC - Stockpile 50

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: * DWB Consulting
Employer:
Surveyor(s): KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
CT	1.3	6	4	C [X] O [ ] P [ ]	[X]	[X]	[X]
BT	1.8	4	3	C [ ] O [ ] P [ ]	[ ]	[ ]	[ ]
OD	1.8	7	3	C [ ] O [ ] P [ ]	[ ]	[ ]	[ ]

Site Image Details

Date taken (YYYY-MM-DD):	Reference No. *	Perspective: * (see reverse for codes)	Image Comments:

* *indicates mandatory field - this form may be used for 2 sites, with their invasive plant surveys, and site images (if taken).*

IAPP Site & Invasive Plant Survey Record

BRITISH COLUMBIA
The Best Place on Earth

Entered into IAPP (YYYY-MM-DD):	By:	Assigned Site IDs recorded on this form: ☐

Site Created Date (YYYY-MM-DD): * 2023-07-26 | **Invasive Plant Survey Date** (YYYY-MM-DD): * (only if different from Site Created Date) 2023-07-26 | **Site ID:** (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes) Mt. Polley | District Lot Nr: | Range Unit: | Site Paper File ID:

UTM Zone: * 10 U | **UTM Easting:** * (no initial zero) 5 9 3 3 4 5 | **UTM Northing:** * (7 digits) 5 8 2 3 2 4 6 | Site Soil Texture: coarse ☒ fine ☐ organic ☐

Slope: | Aspect: | Elevation (m): | Site specific use: *

Site Location (and directions how to get there): IMC - Stockpile 4

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: * DWB Consulting | Employer: | Surveyor(s): KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
OD	0.27	8	4	C [X] O [ ] P [ ]	[X]	[X]	[X]
YH	0.0004	3	3	C [X] O [ ] P [ ]	[X]	[X]	[X]
BT	0.27	2	1	C [X] O [ ] P [ ]	[X]	[X]	[X]

Site Image Details

Date taken (YYYY-MM-DD): | **Reference No.** * | **Perspective:** * (see reverse for codes) | Image Comments:

Site Created Date (YYYY-MM-DD): * 2023-07-26 | **Invasive Plant Survey Date** (YYYY-MM-DD): * (only if different from Site Created Date) | **Site ID:** (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes) Mt. Polley | District Lot Nr: | Range Unit: | Site Paper File ID:

UTM Zone: * 10 U | **UTM Easting:** * (no initial zero) 5 9 3 3 4 5 | **UTM Northing:** * (7 digits) 5 8 2 3 2 4 6 | Site Soil Texture: coarse ☒ fine ☐ organic ☐

Slope: | Aspect: | Elevation (m):

Site Location (and directions how to get there): IMC - Stockpile 4 cont.

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: * DWB Consulting | Employer: | Surveyor(s): KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
WG	0.27	4	2	C [X] O [ ] P [ ]	[X]	[X]	[X]
				C [ ] O [ ] P [ ]	[ ]	[ ]	[ ]
				C [ ] O [ ] P [ ]	[ ]	[ ]	[ ]

Site Image Details

Date taken (YYYY-MM-DD): | **Reference No.** * | **Perspective:** * (see reverse for codes) | Image Comments:

* *indicates mandatory field - this form may be used for 2 sites, with their invasive plant surveys, and site images (if taken).*

IAPP Site & Invasive Plant Survey Record

BRITISH COLUMBIA
The Best Place on Earth

Entered into IAPP (YYYY-MM-DD):	By:	Assigned Site IDs recorded on this form: ☐

Site Created Date (YYYY-MM-DD): * | **Invasive Plant Survey Date** (YYYY-MM-DD): * (only if different from Site Created Date) 2023-07-25 | **Site ID:** (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes) Mt. Polley | District Lot Nr: | Range Unit: | Site Paper File ID:

UTM Zone: * 10 U | **UTM Easting:** * (no initial zero) 591918 | **UTM Northing:** * (7 digits) 5824281 | Site Soil Texture: coarse ☒ fine ☐ organic ☐

Slope: | Aspect: | Elevation (m): | Site specific use: *

Site Location (and directions how to get there): IMC- Stockpile 6 cont. | Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: * DWB Consulting | Employer: | Surveyor(s): KC, AI

Invasive Plants * Species name or code	Area * Dimension or (Ha)	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory / Operational / Precise	Proposed Activity Man	Chem	Bio
BT	0.0014	2	1	C ☒ O ☐ P ☐	☒	☒	☒
WG	0.2	2	2	C ☒ O ☐ P ☐	☒	☒	☒
				C ☒ O ☐ P ☐	☒	☒	☒

Site Image Details

Date taken (YYYY-MM-DD):	Reference No. *	Perspective: * (see reverse for codes)	Image Comments:

Site Created Date (YYYY-MM-DD): * 2023-07 | **Invasive Plant Survey Date** (YYYY-MM-DD): * (only if different from Site Created Date) | **Site ID:** (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes) Mt Polley | District Lot Nr: | Range Unit: | Site Paper File ID:

UTM Zone: * 10 U | **UTM Easting:** * (no initial zero) 592140 | **UTM Northing:** * (7 digits) 5824169 | Site Soil Texture: coarse ☒ fine ☐ organic ☐

Slope: | Aspect: | Elevation (m): |

Site Location (and directions how to get there): IMC - Stockpile 8 | Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: * DWB Consulting | Employer: | Surveyor(s): KC, AI

Invasive Plants * Species name or code	Area * Dimension or (Ha)	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory / Operational / Precise	Proposed Activity Man	Chem	Bio
OD	0.62	7	4	C ☒ O ☐ P ☐	☒	☒	☒
WG	0.62	4	2	C ☒ O ☐ P ☐	☒	☒	☒
MU	0.62	7	4	C ☒ O ☐ P ☐	☒	☒	☒

Site Image Details

Date taken (YYYY-MM-DD):	Reference No. *	Perspective: * (see reverse for codes)	Image Comments:

* *indicates mandatory field - this form may be used for 2 sites, with their invasive plant surveys, and site images (if taken).*

IAPP Site & Invasive Plant Survey Record

BRITISH COLUMBIA
The Best Place on Earth

Entered into IAPP (YYYY-MM-DD):	By:	Assigned Site IDs recorded on this form: ☐

Site Created Date (YYYY-MM-DD): * 2023-07-25 | **Invasive Plant Survey Date** (YYYY-MM-DD): * (only if different from Site Created Date) 2023-07-25 | **Site ID:** (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes) Mt. Polley | District Lot Nr: | Range Unit: | Site Paper File ID:

UTM Zone: * 10 U | **UTM Easting:** * (no initial zero) 5 9 2 0 8 1 | **UTM Northing:** * (7 digits) 5 8 2 4 1 8 7 | Site Soil Texture: coarse ☒ fine ☐ organic ☐

Slope: | Aspect: | Elevation (m): | Site specific use: *

Site Location (and directions how to get there):

IMC - Stockpile 7

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: * DWB Consulting | Employer: | Surveyor(s): KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
OD	0.18	4	2	C [X] O [ ] P [ ]	[X]	[X]	[X]
MU	0.18	2	2	C [X] O [ ] P [ ]	[X]	[X]	[X]
SO	0.002	2	2	C [X] O [ ] P [ ]	[X]	[X]	[X]

Site Image Details

Date taken (YYYY-MM-DD): | **Reference No.** * | **Perspective:** * (see reverse for codes) | Image Comments:

Site Created Date (YYYY-MM-DD): * 2023-07-25 | **Invasive Plant Survey Date** (YYYY-MM-DD): * (only if different from Site Created Date) | **Site ID:** (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes) Mt. Polley | District Lot Nr: | Range Unit: | Site Paper File ID:

UTM Zone: * 10 U | **UTM Easting:** * (no initial zero) 5 9 2 0 8 1 | **UTM Northing:** * (7 digits) 5 8 2 4 1 8 7 | Site Soil Texture: coarse ☒ fine ☐ organic ☐

Slope: | Aspect: | Elevation (m):

Site Location (and directions how to get there):

IMC - Stockpile 7 cont.

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: * DWB Consulting | Employer: | Surveyor(s): KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
WG	0.18	2	1	C [X] O [ ] P [ ]	[X]	[X]	[X]
SH	0.18	2	3	C [X] O [ ] P [ ]	[X]	[X]	[X]
				C [ ] O [ ] P [ ]	[ ]	[ ]	[ ]

Site Image Details

Date taken (YYYY-MM-DD): | **Reference No.** * | **Perspective:** * (see reverse for codes) | Image Comments:

* *indicates mandatory field - this form may be used for 2 sites, with their invasive plant surveys, and site images (if taken).*

IAPP Site & Invasive Plant Survey Record

BRITISH COLUMBIA
The Best Place on Earth

Entered into IAPP (YYYY-MM-DD):	By:	Assigned Site IDs recorded on this form: ☐

Site Created Date (YYYY-MM-DD): * | **Invasive Plant Survey Date** (YYYY-MM-DD): * (only if different from Site Created Date) 2023-07-25 | **Site ID:** (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes)	District Lot Nr:	Range Unit:	Site Paper File ID:
Mt. Polley			

UTM Zone: *	UTM Easting: * (no initial zero)	UTM Northing: * (7 digits)	Site Soil Texture:
10 U	5 9 2 0 7 7	5 8 2 4 1 8 1	coarse ☒ fine ☐ organic ☐

Slope:	Aspect:	Elevation (m):	Site specific use: *

Site Location (and directions how to get there):

IMC - Stockpile 7

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: *	Employer:	Surveyor(s):
DWB Consulting		KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory / Operational / Precise	Proposed Activity Man	Chem	Bio
OD	0.18	4	2	C ☒ O ☐ P ☐	☒	☒	☒
MU	0.18	2	2	C ☒ O ☐ P ☐	☒	☒	☒
SO	0.002	2	2	C ☒ O ☐ P ☐	☒	☒	☒

Site Image Details

Date taken (YYYY-MM-DD):	Reference No. *	Perspective: * (see reverse for codes)	Image Comments:

Site Created Date (YYYY-MM-DD): * | **Invasive Plant Survey Date** (YYYY-MM-DD): * (only if different from Site Created Date) | **Site ID:** (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes)	District Lot Nr:	Range Unit:	Site Paper File ID:
Mt. Polley			

UTM Zone: *	UTM Easting: * (no initial zero)	UTM Northing: * (7 digits)	Site Soil Texture:
	5 9 2 0 7 7	5 8 2 4 1 8 1	coarse ☒ fine ☐ organic ☐

Slope:	Aspect:	Elevation (m):	

Site Location (and directions how to get there):

IMC - Stockpile 7 cont.

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: *	Employer:	Surveyor(s):
DWB Consulting		KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory / Operational / Precise	Proposed Activity Man	Chem	Bio
WG	0.18	2	1	C ☒ O ☐ P ☐	☒	☒	☒
SH	0.18	2	3	C ☒ O ☐ P ☐	☒	☒	☒
				C ☐ O ☐ P ☐	☐	☐	☐

Site Image Details

Date taken (YYYY-MM-DD):	Reference No. *	Perspective: * (see reverse for codes)	Image Comments:

* *indicates mandatory field - this form may be used for 2 sites, with their invasive plant surveys, and site images (if taken).*

IAPP Site & Invasive Plant Survey Record

BRITISH COLUMBIA
The Best Place on Earth

Entered into IAPP (YYYY-MM-DD):	By:	Assigned Site IDs recorded on this form: ☐

Site Created Date (YYYY-MM-DD): *	Invasive Plant Survey Date (YYYY-MM-DD): * (only if different from Site Created Date) 2023-07-25	Site ID: (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes)	District Lot Nr:	Range Unit:	Site Paper File ID:
Mt. Polley			

UTM Zone: *	UTM Easting: * (no initial zero)	UTM Northing: * (7 digits)	Site Soil Texture:
10 U	5 9 2 1 4 0	5 8 2 4 1 6 9	coarse ☒ fine ☐ organic ☐

Slope:	Aspect:	Elevation (m):	Site specific use: *

Site Location (and directions how to get there):

IMC - Stockpile 8 cont.

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: *	Employer:	Surveyor(s):
DWB Consulting		KC, AI

Invasive Plants * Species name or code	Area * Dimension or (Ha)	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory / Operational / Precise	Proposed Activity Man	Chem	Bio
BT	0.62	1	1	C ☒ O ☐ P ☐	☒	☒	☒
SH	0.62	6	3	C ☒ O ☐ P ☐	☒	☒	☒
YH	0.62	4	2	C ☒ O ☐ P ☐	☒	☒	☒

Site Image Details

Date taken (YYYY-MM-DD):	Reference No. *	Perspective: * (see reverse for codes)	Image Comments:

Site Created Date (YYYY-MM-DD): *	Invasive Plant Survey Date (YYYY-MM-DD): * (only if different from Site Created Date)	Site ID: (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes)	District Lot Nr:	Range Unit:	Site Paper File ID:
Mt. Polley			

UTM Zone: *	UTM Easting: * (no initial zero)	UTM Northing: * (7 digits)	Site Soil Texture:
10 U	5 9 2 3 1 8	5 8 2 4 2 8 5	coarse ☒ fine ☐ organic ☐

Slope:	Aspect:	Elevation (m):	

Site Location (and directions how to get there):

IMC - Stockpile 25

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: *	Employer:	Surveyor(s):
DWB Consulting		KC, AI

Invasive Plants * Species name or code	Area * Dimension of (Ha)	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory / Operational / Precise	Proposed Activity Man	Chem	Bio
OD	0.41	6	3	C ☒ O ☐ P ☐	☒	☒	☒
CT	0.41	3	3	C ☒ O ☐ P ☐	☒	☒	☒
YH	0.41	3	4	C ☒ O ☐ P ☐	☒	☒	☒

Site Image Details

Date taken (YYYY-MM-DD):	Reference No. *	Perspective: * (see reverse for codes)	Image Comments:

* *indicates mandatory field - this form may be used for 2 sites, with their invasive plant surveys, and site images (if taken).*

IAPP Site & Invasive Plant Survey Record

BRITISH COLUMBIA
The Best Place on Earth

Entered into IAPP (YYYY-MM-DD):	By:	Assigned Site IDs recorded on this form: ☐

Site Created Date (YYYY-MM-DD): * 2023-07-28

Invasive Plant Survey Date (YYYY-MM-DD): * (only if different from Site Created Date) 2023-07-~~25~~28

Site ID: (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes) Mt. Polley

District Lot Nr:

Range Unit:

Site Paper File ID:

UTM Zone: * 10 U

UTM Easting: * (no initial zero) 5 9 2 9 6 1

UTM Northing: * (7 digits) 5 8 6 5 4 6 8

Site Soil Texture: coarse ☒ fine ☐ organic ☐

Slope:

Aspect:

Elevation (m):

Site Location (and directions how to get there):

IMC - Stockpile 9

Site specific use: *

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: * DWB Consulting

Employer:

Surveyor(s): KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
CT	2.92	5	3	C ☒ O ☐ P ☐	☒	☒	☒
RT	2.96	6	3	C ☒ O ☐ P ☐	☒	☒	☒
YH	2.92	7	3	C ☒ O ☐ P ☐	☒	☒	☒

Site Image Details

Date taken (YYYY-MM-DD):	Reference No. *	Perspective: * (see reverse for codes)	Image Comments:

Site Created Date (YYYY-MM-DD): *

Invasive Plant Survey Date (YYYY-MM-DD): * (only if different from Site Created Date)

Site ID: (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes) Mt. Polley

District Lot Nr:

Range Unit:

Site Paper File ID:

UTM Zone: * 10 U

UTM Easting: * (no initial zero) 5 9 2 9 6 1

UTM Northing: * (7 digits) 5 8 2 3 4 6 8

Site Soil Texture: coarse ☒ fine ☐ organic ☐

Slope:

Aspect:

Elevation (m):

Site Location (and directions how to get there):

IMC- Stockpile 9 Cont.

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: * DWB

Employer:

Surveyor(s): KC, A

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
SD	2.92	7	3	C ☒ O ☐ P ☐	☒	☒	☒
WG	2.92	4	3	C ☒ O ☐ P ☐	☒	☒	☒
OH	2.92	5	2	C ☒ O ☐ P ☐	☒	☒	☒

Site Image Details

Date taken (YYYY-MM-DD):	Reference No. *	Perspective: * (see reverse for codes)	Image Comments:

* *indicates mandatory field - this form may be used for 2 sites, with their invasive plant surveys, and site images (if taken).*

IAPP Site & Invasive Plant Survey Record

BRITISH COLUMBIA
The Best Place on Earth

Entered into IAPP (YYYY-MM-DD):	By:	Assigned Site IDs recorded on this form: ☐

Site Created Date (YYYY-MM-DD): *	Invasive Plant Survey Date (YYYY-MM-DD): * (only if different from Site Created Date) 2023-07-~~25~~ 26	Site ID: (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes)	District Lot Nr:	Range Unit:	Site Paper File ID:
Mt. Polley			

UTM Zone: *	UTM Easting: * (no initial zero)	UTM Northing: * (7 digits)	Site Soil Texture:
10 U	5 9 2 9 6 1	5 8 8 2 4 6 8	coarse ☒ fine ☐ organic ☐

Slope:	Aspect:	Elevation (m):	Site specific use: *

Site Location (and directions how to get there):

IMC - Stockpile 9 cont.

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: *	Employer:	Surveyor(s):
DWB Consulting		KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code / Density Code (see reverse for codes)	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
MU	2.92	5 / 3	C ☒ O ☐ P ☐	☒	☒	☒
			C ☒ O ☐ P ☐	☒	☒	☒
			C ☒ O ☐ P ☐	☒	☒	☒

Site Image Details

Date taken (YYYY-MM-DD):	Reference No. *	Perspective: * (see reverse for codes)	Image Comments:

Site Created Date (YYYY-MM-DD): *	Invasive Plant Survey Date (YYYY-MM-DD): * (only if different from Site Created Date)	Site ID: (assigned at IAPP data entry)
2023-07-26		

Site Details

Jurisdiction: * (see reverse for choices/codes)	District Lot Nr:	Range Unit:	Site Paper File ID:
Mt. Polley			

UTM Zone: *	UTM Easting: * (no initial zero)	UTM Northing: * (7 digits)	Site Soil Texture:
10 U	5 9 4 2 1 5	5 8 8 0 2 3 2	coarse ☒ fine ☐ organic ☐

Slope:	Aspect:	Elevation (m):	

Site Location (and directions how to get there):

IMC - Stockpile 12

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: *	Employer:	Surveyor(s):
DWB		KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code / Density Code (see reverse for codes)	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
YH	2.21	7 / 4	C ☒ O ☐ P ☐	☒	☒	☒
OH	2.21	7 / 3	C ☒ O ☐ P ☐	☒	☒	☒
OD	2.21	4 / 3	C ☒ O ☐ P ☐	☒	☒	☒

Site Image Details

Date taken (YYYY-MM-DD):	Reference No. *	Perspective: * (see reverse for codes)	Image Comments:

* *indicates mandatory field - this form may be used for 2 sites, with their invasive plant surveys, and site images (if taken).*

IAPP Site & Invasive Plant Survey Record

BRITISH COLUMBIA
The Best Place on Earth

Entered into IAPP (YYYY-MM-DD):	By:	Assigned Site IDs ☐ recorded on this form:

Site Created Date (YYYY-MM-DD): *	Invasive Plant Survey Date (YYYY-MM-DD): * (only if different from Site Created Date) 2023-07-25	Site ID: (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes)	District Lot Nr:	Range Unit:	Site Paper File ID:
Mt. Polley			

UTM Zone: *	UTM Easting: * (no initial zero)	UTM Northing: * (7 digits)	Site Soil Texture:
10 U	591047	5823450	coarse ☒ fine ☐ organic ☐

Slope:	Aspect:	Elevation (m):	Site specific use: *

Site Location (and directions how to get there):
IMC - Stockpile 10

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: *	Employer:	Surveyor(s):
DWB Consulting		KC, AI

Invasive Plants * Species name or code	Area * Dimension of (Ha)	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
OD	0.52	8	4	C ☒ O ☐ P ☐	☒	☒	☒
BT	0.52	2	1	C ☒ O ☐ P ☐	☒	☒	☒
CT	0.52	8	4	C ☒ O ☐ P ☐	☒	☒	☒

Site Image Details

Date taken (YYYY-MM-DD):	Reference No. *	Perspective: * (see reverse for codes)	Image Comments:

Site Created Date (YYYY-MM-DD): *	Invasive Plant Survey Date (YYYY-MM-DD): * (only if different from Site Created Date)	Site ID: (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes)	District Lot Nr:	Range Unit:	Site Paper File ID:

UTM Zone: *	UTM Easting: * (no initial zero)	UTM Northing: * (7 digits)	Site Soil Texture:
10 U	591047	5823450	coarse ☒ fine ☐ organic ☐

Slope:	Aspect:	Elevation (m):	

Site Location (and directions how to get there):
IMC - Stockpile 10 cont.

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: *	Employer:	Surveyor(s):
DWB Consulting		KC, AI

Invasive Plants * Species name or code	Area * Dimension of (Ha)	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
YH	0.52	7	2	C ☒ O ☐ P ☐	☒	☒	☒
				C ☐ O ☐ P ☐	☐	☐	☐
				C ☐ O ☐ P ☐	☐	☐	☐

Site Image Details

Date taken (YYYY-MM-DD):	Reference No. *	Perspective: * (see reverse for codes)	Image Comments:

* *indicates mandatory field - this form may be used for 2 sites, with their invasive plant surveys, and site images (if taken).*

IAPP Site & Invasive Plant Survey Record

BRITISH COLUMBIA
The Best Place on Earth

Entered into IAPP (YYYY-MM-DD):	By:	Assigned Site IDs recorded on this form: ☐

Site Created Date (YYYY-MM-DD): * 2023-07-26 | **Invasive Plant Survey Date** (YYYY-MM-DD): * (only if different from Site Created Date) | **Site ID:** (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes): Mt. Polley | District Lot Nr: | Range Unit: | Site Paper File ID:

UTM Zone: * 10 | **UTM Easting:** * (no initial zero) 5 9 3 2 0 0 | **UTM Northing:** * (7 digits) 5 8 2 1 2 3 9 | Site Soil Texture: coarse ☒ fine ☐ organic ☐

Slope: | Aspect: | Elevation (m): | Site specific use: *

Site Location (and directions how to get there): IMC - Stockpile 11

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: * DWB Consulting | Employer: | Surveyor(s): KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
CT	0.29	5	3	C ☒ O ☐ P ☐	☒	☒	☒
OD	0.29	7	4	C ☒ O ☐ P ☐	☒	☒	☒
MU	0.29	4	2	C ☒ O ☐ P ☐	☒	☒	☒

Site Image Details

Date taken (YYYY-MM-DD):	Reference No. *	Perspective: * (see reverse for codes)	Image Comments:

Site Created Date (YYYY-MM-DD): * | **Invasive Plant Survey Date** (YYYY-MM-DD): * (only if different from Site Created Date) | **Site ID:** (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes): Mt. Polley | District Lot Nr: | Range Unit: | Site Paper File ID:

UTM Zone: * 10 U | **UTM Easting:** * (no initial zero) 5 9 3 2 0 0 | **UTM Northing:** * (7 digits) 5 8 2 1 2 3 9 | Site Soil Texture: coarse ☒ fine ☐ organic ☐

Slope: | Aspect: | Elevation (m):

Site Location (and directions how to get there): IMC - Stockpile 11 cont.

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: * | Employer: | Surveyor(s): KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
BT	0.29	4	2	C ☒ O ☐ P ☐	☒	☒	☒
WG	0.29	4	4	C ☒ O ☐ P ☐	☒	☒	☒
				C ☐ O ☐ P ☐	☐	☐	☐

Site Image Details

Date taken (YYYY-MM-DD):	Reference No. *	Perspective: * (see reverse for codes)	Image Comments:

* *indicates mandatory field - this form may be used for 2 sites, with their invasive plant surveys, and site images (if taken).*

IAPP Site & Invasive Plant Survey Record

BRITISH COLUMBIA
The Best Place on Earth

Entered into IAPP (YYYY-MM-DD):	By:	Assigned Site IDs recorded on this form: ☐

Site Created Date (YYYY-MM-DD): *
Invasive Plant Survey Date (YYYY-MM-DD): * (only if different from Site Created Date) 2023-07-~~28~~ 26
Site ID: (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes) Mt. Polley
District Lot Nr:
Range Unit:
Site Paper File ID:

UTM Zone: * 10 U
UTM Easting: * (no initial zero) 5 2 [illegible] [illegible] [illegible] [illegible]
UTM Northing: * (7 digits) 5 8 2 0 2 5 3
Site Soil Texture: coarse ☒ fine ☐ organic ☐

Slope:
Aspect:
Elevation (m):
Site specific use: *

Site Location (and directions how to get there):
IMC - Stockpile [illegible]

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: * DWB Consulting
Employer:
Surveyor(s): KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
CT	0.025	5	4	C ☒ O ☐ P ☐	☒	☒	☒
WG	[illegible]	1	1	C ☒ O ☐ P ☐	☒	☒	☒
BT	0.04	4	2	C ☒ O ☐ P ☐	☒	☒	☒

Site Image Details

Date taken (YYYY-MM-DD):	Reference No. *	Perspective: * (see reverse for codes)	Image Comments:

Site Created Date (YYYY-MM-DD): * 2023-07-26
Invasive Plant Survey Date (YYYY-MM-DD): * (only if different from Site Created Date)
Site ID: (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes) Mt. Polley
District Lot Nr:
Range Unit:
Site Paper File ID:

UTM Zone: * 10U
UTM Easting: * (no initial zero) 1 9 2 5 6 3
UTM Northing: * (7 digits) 5 9 2 3 5 8 7
Site Soil Texture: coarse ☒ fine ☐ organic ☐

Slope:
Aspect:
Elevation (m):

Site Location (and directions how to get there):
IMC - Stockpile O

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: * DWB
Employer:
Surveyor(s): KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
CT	[illegible]	5	4	C ☒ O ☐ P ☐	☒	☒	☒
OD	2.78	7	3	C ☒ O ☐ P ☐	☒	☒	☒
BT	2.78	4	2	C ☒ O ☐ P ☐	☒	☒	☒

Site Image Details

Date taken (YYYY-MM-DD):	Reference No. *	Perspective: * (see reverse for codes)	Image Comments:

* *indicates mandatory field - this form may be used for 2 sites, with their invasive plant surveys, and site images (if taken).*

IAPP Site & Invasive Plant Survey Record

BRITISH COLUMBIA
The Best Place on Earth

Entered into IAPP (YYYY-MM-DD):	By:	Assigned Site IDs recorded on this form: ☐

Site Created Date (YYYY-MM-DD): * 2023-07-26 | **Invasive Plant Survey Date** (YYYY-MM-DD): * (only if different from Site Created Date) 2023-07-26 | **Site ID:** (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes) Mt. Polley | District Lot Nr: | Range Unit: | Site Paper File ID:

UTM Zone: * 10 U | **UTM Easting:** * (no initial zero) 5 9 2 9 2 0 | **UTM Northing:** * (7 digits) 5 8 2 1 5 3 5 | Site Soil Texture: coarse ☒ fine ☐ organic ☐

Slope: | Aspect: | Elevation (m):

Site Location (and directions how to get there):

IMC - Stockpile 13

Site specific use: *

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: * DWB Consulting | Employer: | Surveyor(s): KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code	Survey Type * Cursory / Operational / Precise	Proposed Activity Man	Chem	Bio
CT	0.35	6	3	C ☒ O ☐ P ☐	☒	☒	☒
BT	0.35	2	2	C ☒ O ☐ P ☐	☒	☒	☒
OD	0.35	6	2	C ☒ O ☐ P ☐	☒	☒	☒

Site Image Details

Date taken (YYYY-MM-DD): | **Reference No.** * | **Perspective:** * (see reverse for codes) | Image Comments:

Site Created Date (YYYY-MM-DD): * 2023-07-26 | **Invasive Plant Survey Date** (YYYY-MM-DD): * (only if different from Site Created Date) | **Site ID:** (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes) Mt. Polley | District Lot Nr: | Range Unit: | Site Paper File ID:

UTM Zone: * 10 U | **UTM Easting:** * (no initial zero) 5 9 2 9 2 0 | **UTM Northing:** * (7 digits) 5 8 2 1 5 3 5 | Site Soil Texture: coarse ☒ fine ☐ organic ☐

Slope: | Aspect: | Elevation (m):

Site Location (and directions how to get there):

IMC - Stockpile 13 cont.

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: * DWB Consulting | Employer: | Surveyor(s): KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code	Survey Type * Cursory / Operational / Precise	Proposed Activity Man	Chem	Bio
WG	0.175	4	3	C ☒ O ☐ P ☐	☒	☒	☒
				C ☐ O ☐ P ☐	☐	☐	☐
				C ☐ O ☐ P ☐	☐	☐	☐

Site Image Details

Date taken (YYYY-MM-DD): | **Reference No.** * | **Perspective:** * (see reverse for codes) | Image Comments:

* *indicates mandatory field - this form may be used for 2 sites, with their invasive plant surveys, and site images (if taken).*

IAPP Site & Invasive Plant Survey Record

BRITISH COLUMBIA
the Best Place on Earth

Entered into IAPP (YYYY-MM-DD):	By:	Assigned Site IDs recorded on this form: ☐

Site Created Date (YYYY-MM-DD): *	Invasive Plant Survey Date (YYYY-MM-DD): * (only if different from Site Created Date)	Site ID: (assigned at IAPP data entry)
2023-07-25	2023-07-25	

Site Details

Jurisdiction: * (see reverse for choices/codes)	District Lot Nr:	Range Unit:	Site Paper File ID:
Mt. Polley			

UTM Zone: *	UTM Easting: * (no initial zero)	UTM Northing: * (7 digits)	Site Soil Texture:
10 U	5 9 2 5 3 7	5 8 2 1 9 5 0	coarse ☒ fine ☐ organic ☐

Slope:	Aspect:	Elevation (m):	Site specific use: *

Site Location (and directions how to get there):

IMC - Stockpile 14

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: *	Employer:	Surveyor(s):
DWB Consulting		KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
OD	1	8	4	C ☒ O ☐ P ☐	☒	☒	☒
QH	0.0002	2	1	C ☒ O ☐ P ☐	☒	☒	☒
WG	1	2	1	C ☒ O ☐ P ☐	☒	☒	☒

Site Image Details

Date taken (YYYY-MM-DD):	Reference No. *	Perspective: * (see reverse for codes)	Image Comments:

Site Created Date (YYYY-MM-DD): *	Invasive Plant Survey Date (YYYY-MM-DD): * (only if different from Site Created Date)	Site ID: (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes)	District Lot Nr:	Range Unit:	Site Paper File ID:
Mt. Polley			

UTM Zone: *	UTM Easting: * (no initial zero)	UTM Northing: * (7 digits)	Site Soil Texture:
10 U	5 9 2 5 3 7	5 8 2 1 9 5 0	coarse ☒ fine ☐ organic ☐

Slope:	Aspect:	Elevation (m):	

Site Location (and directions how to get there):

IMC - Stockpile 14 cont.

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: *	Employer:	Surveyor(s):
DWB Consulting		KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
MD	1	7	3	C ☒ O ☐ P ☐	☒	☒	☒
YH	1	2	3	C ☒ O ☐ P ☐	☒	☒	☒
SO	1	4	2	C ☒ O ☐ P ☐	☒	☒	☒

Site Image Details

Date taken (YYYY-MM-DD):	Reference No. *	Perspective: * (see reverse for codes)	Image Comments:

* *indicates mandatory field - this form may be used for 2 sites, with their invasive plant surveys, and site images (if taken).*

IAPP Site & Invasive Plant Survey Record

BRITISH COLUMBIA
The Best Place on Earth

Entered into IAPP (YYYY-MM-DD):	By:	Assigned Site IDs recorded on this form: ☐

Site Created Date (YYYY-MM-DD): *	Invasive Plant Survey Date (YYYY-MM-DD): * (only if different from Site Created Date)	Site ID: (assigned at IAPP data entry)
2023-07-25	2023-07-25	

Site Details

Jurisdiction: * (see reverse for choices/codes)	District Lot Nr:	Range Unit:	Site Paper File ID:
Mt. Polley			

UTM Zone: *	UTM Easting: * (no initial zero)	UTM Northing: * (7 digits)	Site Soil Texture:
10 U	592537	5821950	coarse ☒ fine ☐ organic ☐

Slope:	Aspect:	Elevation (m):	Site specific use: *

Site Location (and directions how to get there):

IMC - Stockpile 14 cont.

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: *	Employer:	Surveyor(s):
DWB Consulting		KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory / Operational / Precise	Proposed Activity Man	Chem	Bio
SH	0.0001	3	2	C ☒ O ☐ P ☐	☒	☒	☒
BT	1	2	1	C ☒ O ☐ P ☐	☒	☒	☒
				C ☒ O ☐ P ☐	☒	☒	☒

Site Image Details

Date taken (YYYY-MM-DD):	Reference No. *	Perspective: * (see reverse for codes)	Image Comments:

Site Created Date (YYYY-MM-DD): *	Invasive Plant Survey Date (YYYY-MM-DD): * (only if different from Site Created Date)	Site ID: (assigned at IAPP data entry)
2023-07-26		

Site Details

Jurisdiction: * (see reverse for choices/codes)	District Lot Nr:	Range Unit:	Site Paper File ID:
Mt. Polley			

UTM Zone: *	UTM Easting: * (no initial zero)	UTM Northing: * (7 digits)	Site Soil Texture:
10 U	594869	5820073	coarse ☒ fine ☐ organic ☐

Slope:	Aspect:	Elevation (m):	

Site Location (and directions how to get there):

IMC - Stockpile 46

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: *	Employer:	Surveyor(s):
DWB Consulting		KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory / Operational / Precise	Proposed Activity Man	Chem	Bio
OD	0.21	4	2	C ☒ O ☐ P ☐	☒	☒	☒
MU	0.21	4	2	C ☒ O ☐ P ☐	☒	☒	☒
				C ☐ O ☐ P ☐	☐	☐	☐

Site Image Details

Date taken (YYYY-MM-DD):	Reference No. *	Perspective: * (see reverse for codes)	Image Comments:

* *indicates mandatory field - this form may be used for 2 sites, with their invasive plant surveys, and site images (if taken).*

IAPP Site & Invasive Plant Survey Record

BRITISH COLUMBIA
The Best Place on Earth

Entered into IAPP (YYYY-MM-DD):	By:	Assigned Site IDs recorded on this form: ☐

Site Created Date (YYYY-MM-DD): *	Invasive Plant Survey Date (YYYY-MM-DD): * (only if different from Site Created Date) 2023-07-25	Site ID: (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes)	District Lot Nr:	Range Unit:	Site Paper File ID:
Mt. Polley			

UTM Zone: *	UTM Easting: * (no initial zero)	UTM Northing: * (7 digits)	Site Soil Texture:
10 U	591952	5824419	coarse ☒ fine ☐ organic ☐

Slope:	Aspect:	Elevation (m):	Site specific use: *

Site Location (and directions how to get there):
IMC - Stockpile 15

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: *	Employer:	Surveyor(s):
DWB Consulting		KC, AI

Invasive Plants * Species name or code	Area * Dimension of (Ha)	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory / Operational / Precise	Proposed Activity Man	Chem	Bio
BT	3.63	4	2	C ☒ O ☐ P ☐	☒	☒	☒
CT	0.0025	2	2	C ☒ O ☐ P ☐	☒	☒	☒
OD	3.63	7	3	C ☒ O ☐ P ☐	☒	☒	☒

Site Image Details

Date taken (YYYY-MM-DD):	Reference No. *	Perspective: * (see reverse for codes)	Image Comments:

Site Created Date (YYYY-MM-DD): *	Invasive Plant Survey Date (YYYY-MM-DD): * (only if different from Site Created Date)	Site ID: (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes)	District Lot Nr:	Range Unit:	Site Paper File ID:

UTM Zone: *	UTM Easting: * (no initial zero)	UTM Northing: * (7 digits)	Site Soil Texture:
10	591952	5824419	coarse ☒ fine ☐ organic ☐

Slope:	Aspect:	Elevation (m):	

Site Location (and directions how to get there):
IMC - Stockpile 15 cont

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: *	Employer:	Surveyor(s):
DWB Consulting		KC, AI

Invasive Plants * Species name or code	Area * Dimension of (Ha)	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory / Operational / Precise	Proposed Activity Man	Chem	Bio
WG	3.63	2	1	C ☒ O ☐ P ☐	☒	☒	☒
SH	3.63	6	3	C ☒ O ☐ P ☐	☒	☒	☒
MU	3.63	6	3	C ☒ O ☐ P ☐	☒	☒	☒

Site Image Details

Date taken (YYYY-MM-DD):	Reference No. *	Perspective: * (see reverse for codes)	Image Comments:

* *indicates mandatory field - this form may be used for 2 sites, with their invasive plant surveys, and site images (if taken).*

IAPP Site & Invasive Plant Survey Record

BRITISH COLUMBIA
The Best Place on Earth

Entered into IAPP (YYYY-MM-DD):	By:	Assigned Site IDs recorded on this form: ☐

Site Created Date (YYYY-MM-DD): *	Invasive Plant Survey Date (YYYY-MM-DD): * (only if different from Site Created Date) 2023-07-25	Site ID: (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes)	District Lot Nr:	Range Unit:	Site Paper File ID:
Mt. Polley			

UTM Zone: *	UTM Easting: * (no initial zero)	UTM Northing: * (7 digits)	Site Soil Texture:
10 U	591952	5824449	coarse ☒ fine ☐ organic ☐

Slope:	Aspect:	Elevation (m):	Site specific use: *

Site Location (and directions how to get there):

IMC- Stockpile 15 Cont.

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: *	Employer:	Surveyor(s):
DWB Consulting		KC, AI

Invasive Plants * Species name or code	Area * Dimension of Ha	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
YH	3.63	7	2	C ☒ O ☐ P ☐	☒	☒	☒
				C ☒ O ☐ P ☐	☒	☒	☒
				C ☒ O ☐ P ☐	☒	☒	☒

Site Image Details

Date taken (YYYY-MM-DD):	Reference No. *	Perspective: * (see reverse for codes)	Image Comments:

Site Created Date (YYYY-MM-DD): *	Invasive Plant Survey Date (YYYY-MM-DD): * (only if different from Site Created Date)	Site ID: (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes)	District Lot Nr:	Range Unit:	Site Paper File ID:

UTM Zone: *	UTM Easting: * (no initial zero)	UTM Northing: * (7 digits)	Site Soil Texture:
	591918	5824281	coarse ☒ fine ☐ organic ☐

Slope:	Aspect:	Elevation (m):	

Site Location (and directions how to get there):

IMC- Stockpile 6

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: *	Employer:	Surveyor(s):
DWB Consulting		KC, AI

Invasive Plants * Species name or code	Area * Dimension of Ha	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
OD	0.4	7	3	C ☒ O ☐ P ☐	☒	☒	☒
CT	0.4	8	4	C ☒ O ☐ P ☐	☒	☒	☒
OH	0.0001	1	1	C ☒ O ☐ P ☐	☒	☒	☒

Site Image Details

Date taken (YYYY-MM-DD):	Reference No. *	Perspective: * (see reverse for codes)	Image Comments:

* *indicates mandatory field - this form may be used for 2 sites, with their invasive plant surveys, and site images (if taken).*

IAPP Site & Invasive Plant Survey Record

BRITISH COLUMBIA
The Best Place on Earth

Entered into IAPP (YYYY-MM-DD):	By:	Assigned Site IDs recorded on this form: ☐

Site Created Date (YYYY-MM-DD): * 2023-07-27 | **Invasive Plant Survey Date** (YYYY-MM-DD): * (only if different from Site Created Date) 2023-07-~~25~~ 27 | **Site ID:** (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes) Mt. Polley | District Lot Nr: | Range Unit: | Site Paper File ID:

UTM Zone: * 10 U | **UTM Easting:** * (no initial zero) 5 9 3 3 0 9 | **UTM Northing:** * (7 digits) 5 8 8 1 8 7 6 | Site Soil Texture: coarse ☒ fine ☐ organic ☐

Slope: | Aspect: | Elevation (m): | Site specific use: *

Site Location (and directions how to get there):

IMC - Stockpile 16

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: * DWB Consulting | Employer: | Surveyor(s): KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
BT	2	4	2	C [X] O [ ] P [ ]	[X]	[X]	[X]
CT	2.1	5	4	C [X] O [ ] P [ ]	[X]	[X]	[X]
MU	2	4	2	C [X] O [ ] P [ ]	[X]	[X]	[X]

Site Image Details

Date taken (YYYY-MM-DD): | **Reference No.** * | **Perspective:** * (see reverse for codes) | Image Comments:

Site Created Date (YYYY-MM-DD): * | **Invasive Plant Survey Date** (YYYY-MM-DD): * (only if different from Site Created Date) | **Site ID:** (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes) Mt. Polley | District Lot Nr: | Range Unit: | Site Paper File ID:

UTM Zone: * 10 U | **UTM Easting:** * (no initial zero) 5 9 3 3 0 9 | **UTM Northing:** * (7 digits) 5 8 2 1 8 7 6 | Site Soil Texture: coarse ☒ fine ☐ organic ☐

Slope: | Aspect: | Elevation (m):

Site Location (and directions how to get there):

IMC - Stockpile 16 cont.

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: * DWB Consulting | Employer: | Surveyor(s): KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
LDC	2.1	2	2	C [X] O [ ] P [ ]	[X]	[X]	[X]
YH	2.1	4	3	C [X] O [ ] P [ ]	[X]	[X]	[X]
OD	2.1	7	3	C [X] O [ ] P [ ]	[X]	[X]	[X]

Site Image Details

Date taken (YYYY-MM-DD): | **Reference No.** * | **Perspective:** * (see reverse for codes) | Image Comments:

* *indicates mandatory field - this form may be used for 2 sites, with their invasive plant surveys, and site images (if taken).*

IAPP Site & Invasive Plant Survey Record

BRITISH COLUMBIA
The Best Place on Earth

Entered into IAPP (YYYY-MM-DD):	By:	Assigned Site IDs recorded on this form: ☐

Site Created Date (YYYY-MM-DD): * | **Invasive Plant Survey Date** (YYYY-MM-DD): * (only if different from Site Created Date) 2023-07-25 | **Site ID:** (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes) Mt. Polley | District Lot Nr: | Range Unit: | Site Paper File ID:

UTM Zone: * 10 U | **UTM Easting:** * (no initial zero) 5 9 3 3 0 9 | **UTM Northing:** * (7 digits) 5 8 2 1 8 7 6 | Site Soil Texture: coarse ☒ fine ☐ organic ☐

Slope: | Aspect: | Elevation (m):

Site Location (and directions how to get there):

IMC - Stockpile 16 cont.

Site specific use: *

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: * DWB Consulting | Employer: | Surveyor(s): KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory / Operational / Precise	Proposed Activity Man	Chem	Bio
SO	2	7	3	C [X] O [ ] P [ ]	[X]	[X]	[X]
				C [X] O [ ] P [ ]	[X]	[X]	[X]
				C [X] O [ ] P [ ]	[X]	[X]	[X]

Site Image Details

Date taken (YYYY-MM-DD): | **Reference No.** * | **Perspective:** * (see reverse for codes) | Image Comments:

Site Created Date (YYYY-MM-DD): * 2023-07-27 | **Invasive Plant Survey Date** (YYYY-MM-DD): * (only if different from Site Created Date) | **Site ID:** (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes) Mt. Polley | District Lot Nr: | Range Unit: | Site Paper File ID:

UTM Zone: * 10 U | **UTM Easting:** * (no initial zero) 5 9 6 1 3 4 | **UTM Northing:** * (7 digits) 5 8 1 9 5 6 5 | Site Soil Texture: coarse ☒ fine ☐ organic ☐

Slope: | Aspect: | Elevation (m):

Site Location (and directions how to get there):

IMC - Stockpile 45

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: * DWB Consulting | Employer: | Surveyor(s): KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory / Operational / Precise	Proposed Activity Man	Chem	Bio
CT	1.4	6	4	C [X] O [ ] P [ ]	[X]	[X]	[X]
OD	1.4	7	4	C [X] O [ ] P [ ]	[X]	[X]	[X]
SO	1.1	4	2	C [X] O [ ] P [ ]	[X]	[X]	[X]

Site Image Details

Date taken (YYYY-MM-DD): | **Reference No.** * | **Perspective:** * (see reverse for codes) | Image Comments:

* *indicates mandatory field - this form may be used for 2 sites, with their invasive plant surveys, and site images (if taken).*

IAPP Site & Invasive Plant Survey Record

BRITISH COLUMBIA
The Best Place on Earth

Entered into IAPP (YYYY-MM-DD):	By:	Assigned Site IDs recorded on this form: ☐

Site Created Date (YYYY-MM-DD): * 2023-07-27 | **Invasive Plant Survey Date** (YYYY-MM-DD): * (only if different from Site Created Date) 2023-07-27 | **Site ID:** (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes) Mt. Polley | District Lot Nr: | Range Unit: | Site Paper File ID:

UTM Zone: * 10 U | **UTM Easting:** * (no initial zero) 5 9 3 0 8 6 | **UTM Northing:** * (7 digits) 5 8 2 1 0 5 7 | Site Soil Texture: coarse ☒ fine ☐ organic ☐

Slope: | Aspect: | Elevation (m): | Site specific use: *

Site Location (and directions how to get there):

IMC - Stockpile 16 (target area)

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: * DWB Consulting | Employer: | Surveyor(s): KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
OD	2.1	7	4	C [X] O [ ] P [ ]	[X]	[X]	[X]
CT	2.1	5	4	C [X] O [ ] P [ ]	[X]	[X]	[X]
YH	0.26	4	2	C [X] O [ ] P [ ]	[X]	[X]	[X]

Site Image Details

Date taken (YYYY-MM-DD): | **Reference No.** * | **Perspective:** * (see reverse for codes) | Image Comments:

Site Created Date (YYYY-MM-DD): * | **Invasive Plant Survey Date** (YYYY-MM-DD): * (only if different from Site Created Date) | **Site ID:** (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes) Mt. Polley | District Lot Nr: | Range Unit: | Site Paper File ID:

UTM Zone: * 10 U | **UTM Easting:** * (no initial zero) 5 9 3 0 8 6 | **UTM Northing:** * (7 digits) 5 8 2 1 0 5 7 | Site Soil Texture: coarse ☒ fine ☐ organic ☐

Slope: | Aspect: | Elevation (m): |

Site Location (and directions how to get there):

IMC - Stockpile 16 (target area) cont.

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: * DWB Consulting | Employer: | Surveyor(s): KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
OH	0.16	2	2	C [X] O [ ] P [ ]	[X]	[X]	[X]
BT	2.1	2	2	C [X] O [ ] P [ ]	[X]	[X]	[X]
WG	2.1	2	2	C [X] O [ ] P [ ]	[X]	[X]	[X]

Site Image Details

Date taken (YYYY-MM-DD): | **Reference No.** * | **Perspective:** * (see reverse for codes) | Image Comments:

* *indicates mandatory field - this form may be used for 2 sites, with their invasive plant surveys, and site images (if taken).*

IAPP Site & Invasive Plant Survey Record

BRITISH COLUMBIA
The Best Place on Earth

Entered into IAPP (YYYY-MM-DD):	By:	Assigned Site IDs recorded on this form: ☐

Site Created Date (YYYY-MM-DD): * | **Invasive Plant Survey Date** (YYYY-MM-DD): * (only if different from Site Created Date) 2023-07-25 | **Site ID:** (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes) Mt. Polley | District Lot Nr: | Range Unit: | Site Paper File ID:

UTM Zone: * 10 U | **UTM Easting:** * (no initial zero) 592206 | **UTM Northing:** * (7 digits) 5821057 | Site Soil Texture: coarse ☒ fine ☐ organic ☐

Slope: | Aspect: | Elevation (m): | Site specific use: *

Site Location (and directions how to get there):

IMC - Stockpile 16 (target area) cont.

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: * DWB Consulting | Employer: | Surveyor(s): KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory / Operational / Precise	Proposed Activity Man	Chem	Bio
SO	0.0002	3	3	C [X] O [ ] P [ ]	[X]	[X]	[X]
				C [X] O [ ] P [ ]	[X]	[X]	[X]
				C [X] O [ ] P [ ]	[X]	[X]	[X]

Site Image Details

Date taken (YYYY-MM-DD): | **Reference No.** * | **Perspective:** * (see reverse for codes) | Image Comments:

Site Created Date (YYYY-MM-DD): * 2023-07-25 | **Invasive Plant Survey Date** (YYYY-MM-DD): * (only if different from Site Created Date) | **Site ID:** (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes) Mt. Polley | District Lot Nr: | Range Unit: | Site Paper File ID:

UTM Zone: * 10 U | **UTM Easting:** * (no initial zero) 592753 | **UTM Northing:** * (7 digits) 5821264 | Site Soil Texture: coarse ☒ fine ☐ organic ☐

Slope: | Aspect: | Elevation (m):

Site Location (and directions how to get there):

IMC - Stockpile 31

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: * DWB Consulting | Employer: | Surveyor(s): KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory / Operational / Precise	Proposed Activity Man	Chem	Bio
CT	0.1	8	4	C [X] O [ ] P [ ]	[X]	[X]	[X]
OD	0.1	9	4	C [X] O [ ] P [ ]	[X]	[X]	[X]
LXG	0.1	4	2	C [X] O [ ] P [ ]	[X]	[X]	[X]

Site Image Details

Date taken (YYYY-MM-DD): | **Reference No.** * | **Perspective:** * (see reverse for codes) | Image Comments:

* *indicates mandatory field - this form may be used for 2 sites, with their invasive plant surveys, and site images (if taken).*

IAPP Site & Invasive Plant Survey Record

BRITISH COLUMBIA
The Best Place on Earth

Entered into IAPP (YYYY-MM-DD):	By:	Assigned Site IDs recorded on this form: ☐

Site Created Date (YYYY-MM-DD): * 2023-07-28

Invasive Plant Survey Date (YYYY-MM-DD): * (only if different from Site Created Date) 2023-07-28

Site ID: (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes) Mt. Polley

District Lot Nr:

Range Unit:

Site Paper File ID:

UTM Zone: * 10 U

UTM Easting: * (no initial zero) 592552

UTM Northing: * (7 digits) 5821372

Site Soil Texture: coarse ☒ fine ☐ organic ☐

Slope:

Aspect:

Elevation (m):

Site Location (and directions how to get there): IMC - Stockpile 17 (target area)

Site specific use: *

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: * DWB Consulting

Employer:

Surveyor(s): KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
CT	0.57	6	4	C ☒ O ☐ P ☐	☒	☒	☒
OD	0.57	7	3	C ☒ O ☐ P ☐	☒	☒	☒
WG	0.57	2	2	C ☒ O ☐ P ☐	☒	☒	☒

Site Image Details

Date taken (YYYY-MM-DD):	Reference No. *	Perspective: * (see reverse for codes)	Image Comments:

Site Created Date (YYYY-MM-DD): *

Invasive Plant Survey Date (YYYY-MM-DD): * (only if different from Site Created Date)

Site ID: (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes) Mt. Polley

District Lot Nr:

Range Unit:

Site Paper File ID:

UTM Zone: * 10 U

UTM Easting: * (no initial zero) 592552

UTM Northing: * (7 digits) 5821372

Site Soil Texture: coarse ☒ fine ☐ organic ☐

Slope:

Aspect:

Elevation (m):

Site Location (and directions how to get there): IMC - Stockpile 17 (target area) cont.

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: * DWB Consulting

Employer:

Surveyor(s): KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
YH	0.0025	2	1	C ☒ O ☐ P ☐	☒	☒	☒
BT	0.005	2	1	C ☐ O ☐ P ☐	☐	☐	☐
				C ☐ O ☐ P ☐	☐	☐	☐

Site Image Details

Date taken (YYYY-MM-DD):	Reference No. *	Perspective: * (see reverse for codes)	Image Comments:

* *indicates mandatory field - this form may be used for 2 sites, with their invasive plant surveys, and site images (if taken).*

IAPP Site & Invasive Plant Survey Record

BRITISH COLUMBIA
The Best Place on Earth

Entered into IAPP (YYYY-MM-DD):	By:	Assigned Site IDs ☐ recorded on this form:

Site Created Date (YYYY-MM-DD): *	Invasive Plant Survey Date (YYYY-MM-DD): * (only if different from Site Created Date) 2023-07-~~25~~ 27	Site ID: (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes)	District Lot Nr:	Range Unit:	Site Paper File ID:
Mt. Polley			

UTM Zone: *	UTM Easting: * (no initial zero)	UTM Northing: * (7 digits)	Site Soil Texture:
10 U	5 9 3 4 1 1	5 8 2 2 0 8 1	coarse ☐ fine ☐ organic ☐

Slope:	Aspect:	Elevation (m):	Site specific use: *

Site Location (and directions how to get there):

IMC - Stockpile 17 cont.

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: *	Employer:	Surveyor(s):
DWB Consulting		KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
MU	0.91	4	2	C [X] O ☐ P ☐	[X]	[X]	[X]
BT	0.91	5	2	C [X] O ☐ P ☐	[X]	[X]	[X]
CT	0.91	5	2	C [X] O ☐ P ☐	[X]	[X]	[X]

Site Image Details

Date taken (YYYY-MM-DD):	Reference No. *	Perspective: * (see reverse for codes)	Image Comments:

Site Created Date (YYYY-MM-DD): * 2023-07-27	Invasive Plant Survey Date (YYYY-MM-DD): * (only if different from Site Created Date)	Site ID: (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes)	District Lot Nr:	Range Unit:	Site Paper File ID:
Mt Polley			

UTM Zone: *	UTM Easting: * (no initial zero)	UTM Northing: * (7 digits)	Site Soil Texture:
10 U	5 9 3 4 1 1	5 8 2 2 0 8 1	coarse [X] fine ☐ organic ☐

Slope:	Aspect:	Elevation (m):	

Site Location (and directions how to get there):

IMC - Stockpile 17 cont.

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: *	Employer:	Surveyor(s):
DWB		KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
HWG	3.91	4	2	C [X] O ☐ P ☐	[X]	[X]	[X]
YH	0.91	7	3	C [X] O ☐ P ☐	[X]	[X]	[X]
				C ☐ O ☐ P ☐	☐	☐	☐

Site Image Details

Date taken (YYYY-MM-DD):	Reference No. *	Perspective: * (see reverse for codes)	Image Comments:

* *indicates mandatory field - this form may be used for 2 sites, with their invasive plant surveys, and site images (if taken).*

IAPP Site & Invasive Plant Survey Record

BRITISH COLUMBIA
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Entered into IAPP (YYYY-MM-DD):	By:	Assigned Site IDs recorded on this form: ☐

Site Created Date (YYYY-MM-DD): * | **Invasive Plant Survey Date** (YYYY-MM-DD): * (only if different from Site Created Date) 2023-07-25 | **Site ID:** (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes) Mt. Polley | District Lot Nr: | Range Unit: | Site Paper File ID:

UTM Zone: * 10 U | **UTM Easting:** * (no initial zero) 5 9 1 8 4 6 | **UTM Northing:** * (7 digits) 5 8 2 3 9 9 8 | Site Soil Texture: coarse ☒ fine ☐ organic ☐

Slope: | Aspect: | Elevation (m): | Site specific use: *

Site Location (and directions how to get there): IMC - Stockpile 18

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: * DWB Consulting | Employer: | Surveyor(s): KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
OH	0.57	6	2	C ☒ O ☐ P ☐	☒	☒	☒
OD	0.57	7	3	C ☒ O ☐ P ☐	☒	☒	☒
YH	0.57	4	2	C ☒ O ☐ P ☐	☒	☒	☒

Site Image Details

Date taken (YYYY-MM-DD): | **Reference No.** * | **Perspective:** * (see reverse for codes) | Image Comments:

Site Created Date (YYYY-MM-DD): * | **Invasive Plant Survey Date** (YYYY-MM-DD): * (only if different from Site Created Date) | **Site ID:** (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes) Mt Polley | District Lot Nr: | Range Unit: | Site Paper File ID:

UTM Zone: * | **UTM Easting:** * (no initial zero) 5 9 1 8 4 6 | **UTM Northing:** * (7 digits) 5 8 2 3 9 9 8 | Site Soil Texture: coarse ☒ fine ☐ organic ☐

Slope: | Aspect: | Elevation (m): |

Site Location (and directions how to get there): IMC - Stockpile 18 cont.

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: * DWB Consulting | Employer: | Surveyor(s): KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
CT	0.57	6	4	C ☒ O ☐ P ☐	☒	☒	☒
BT	0.57	2	2	C ☒ O ☐ P ☐	☒	☒	☒
WG	0.19	2	1	C ☒ O ☐ P ☐	☒	☒	☒

Site Image Details

Date taken (YYYY-MM-DD): | **Reference No.** * | **Perspective:** * (see reverse for codes) | Image Comments:

* *indicates mandatory field - this form may be used for 2 sites, with their invasive plant surveys, and site images (if taken).*

IAPP Site & Invasive Plant Survey Record

BRITISH COLUMBIA
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Entered into IAPP (YYYY-MM-DD):	By:	Assigned Site IDs recorded on this form: ☐

Site Created Date (YYYY-MM-DD): *	Invasive Plant Survey Date (YYYY-MM-DD): * (only if different from Site Created Date) 2023-07-25	Site ID: (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes)	District Lot Nr:	Range Unit:	Site Paper File ID:
Mt. Polley			

UTM Zone: *	UTM Easting: * (no initial zero)	UTM Northing: * (7 digits)	Site Soil Texture:
10 U	5 9 1 7 3 6	5 8 2 3 9 6 9	coarse ☒ fine ☐ organic ☐

Slope:	Aspect:	Elevation (m):	Site specific use: *

Site Location (and directions how to get there):

IMC - Stockpile 19

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: *	Employer:	Surveyor(s):
DWB Consulting		KC, AI

Invasive Plants * Species name or code	Area * Dimension or (Ha)	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
CT	0.010	3	4	C ☒ O ☐ P ☐	☒	☒	☒
OD	0.39	2	2	C ☒ O ☐ P ☐	☒	☒	☒
WG	0.195	2	2	C ☒ O ☐ P ☐	☒	☒	☒

Site Image Details

Date taken (YYYY-MM-DD):	Reference No. *	Perspective: * (see reverse for codes)	Image Comments:

Site Created Date (YYYY-MM-DD): *	Invasive Plant Survey Date (YYYY-MM-DD): * (only if different from Site Created Date)	Site ID: (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes)	District Lot Nr:	Range Unit:	Site Paper File ID:

UTM Zone: *	UTM Easting: * (no initial zero)	UTM Northing: * (7 digits)	Site Soil Texture:
10 U	5 9 1 7 3 6	5 8 2 3 9 6 9	coarse ☒ fine ☐ organic ☐

Slope:	Aspect:	Elevation (m):	

Site Location (and directions how to get there):

IMC - Stockpile 19 cont.

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: *	Employer:	Surveyor(s):
DWB Consulting		KC, AI

Invasive Plants * Species name or code	Area * Dimension or (Ha)	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
YH	0.39	2	2	C ☒ O ☐ P ☐	☒	☒	☒
				C ☐ O ☐ P ☐	☐	☐	☐
				C ☐ O ☐ P ☐	☐	☐	☐

Site Image Details

Date taken (YYYY-MM-DD):	Reference No. *	Perspective: * (see reverse for codes)	Image Comments:
2023/07/25			

* *indicates mandatory field - this form may be used for 2 sites, with their invasive plant surveys, and site images (if taken).*

IAPP Site & Invasive Plant Survey Record

BRITISH COLUMBIA
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Entered into IAPP (YYYY-MM-DD):	By:	Assigned Site IDs recorded on this form: ☐

Site Created Date (YYYY-MM-DD): *	Invasive Plant Survey Date (YYYY-MM-DD): * (only if different from Site Created Date) 2023-07-25	Site ID: (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes)	District Lot Nr:	Range Unit:	Site Paper File ID:
Mt. Polley			

UTM Zone: *	UTM Easting: * (no initial zero)	UTM Northing: * (7 digits)	Site Soil Texture:
10 U	591776	5824031	coarse ☒ fine ☐ organic ☐

Slope:	Aspect:	Elevation (m):	Site specific use: *

Site Location (and directions how to get there):

MC - Stockpile 20 cont.

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: *	Employer:	Surveyor(s):
DWB Consulting		KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
OD	0.59	7	3	C ☒ O ☐ P ☐	☒	☒	☒
WG	0.59	2	1	C ☒ O ☐ P ☐	☒	☒	☒
				C ☒ O ☐ P ☐	☒	☒	☒

Site Image Details

Date taken (YYYY-MM-DD):	Reference No. *	Perspective: * (see reverse for codes)	Image Comments:

Site Created Date (YYYY-MM-DD): *	Invasive Plant Survey Date (YYYY-MM-DD): * (only if different from Site Created Date)	Site ID: (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes)	District Lot Nr:	Range Unit:	Site Paper File ID:

UTM Zone: *	UTM Easting: * (no initial zero)	UTM Northing: * (7 digits)	Site Soil Texture:
			coarse ☐ fine ☐ organic ☐

Slope:	Aspect:	Elevation (m):	

Site Location (and directions how to get there):

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: *	Employer:	Surveyor(s):

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
				C ☐ O ☐ P ☐	☐	☐	☐
				C ☐ O ☐ P ☐	☐	☐	☐
				C ☐ O ☐ P ☐	☐	☐	☐

Site Image Details

Date taken (YYYY-MM-DD):	Reference No. *	Perspective: * (see reverse for codes)	Image Comments:

* *indicates mandatory field - this form may be used for 2 sites, with their invasive plant surveys, and site images (if taken).*

IAPP Site & Invasive Plant Survey Record

BRITISH COLUMBIA
The Best Place on Earth

Entered into IAPP (YYYY-MM-DD):	By:	Assigned Site IDs recorded on this form: ☐

Site Created Date (YYYY-MM-DD): * 2023-07-26

Invasive Plant Survey Date (YYYY-MM-DD): * (only if different from Site Created Date) 2023-07-~~25~~26

Site ID: (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes) Mt. Polley

District Lot Nr:

Range Unit:

Site Paper File ID:

UTM Zone: * 10 U

UTM Easting: * (no initial zero) 594410

UTM Northing: * (7 digits) 5821810

Site Soil Texture: coarse ☒ fine ☐ organic ☐

Slope:

Aspect:

Elevation (m):

Site specific use: *

Site Location (and directions how to get there): IMC - Stockpile 22

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: * DWB Consulting

Employer:

Surveyor(s): KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
YH	1.61	8	3	C ☒ O ☐ P ☐	☒	☒	☒
OD	1.61	8	4	C ☒ O ☐ P ☐	☒	☒	☒
SO	1.61	4	2	C ☒ O ☐ P ☐	☒	☒	☒

Site Image Details

Date taken (YYYY-MM-DD):	Reference No. *	Perspective: * (see reverse for codes)	Image Comments:

Site Created Date (YYYY-MM-DD): *

Invasive Plant Survey Date (YYYY-MM-DD): * (only if different from Site Created Date)

Site ID: (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes)

District Lot Nr:

Range Unit:

Site Paper File ID:

UTM Zone: * 10 U

UTM Easting: * (no initial zero) 594410

UTM Northing: * (7 digits) 5821810

Site Soil Texture: coarse ☒ fine ☐ organic ☐

Slope:

Aspect:

Elevation (m):

Site Location (and directions how to get there): IMC - Stockpile 22 continued

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: * DWB

Employer:

Surveyor(s): KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
HW	1.61	3	3	C ☒ O ☐ P ☐	☒	☒	☒
CT	1.61	7	4	C ☒ O ☐ P ☐	☒	☒	☒
SJ	1.61	5	4	C ☒ O ☐ P ☐	☒	☒	☒

Site Image Details

Date taken (YYYY-MM-DD):	Reference No. *	Perspective: * (see reverse for codes)	Image Comments:

* *indicates mandatory field - this form may be used for 2 sites, with their invasive plant surveys, and site images (if taken).*

IAPP Site & Invasive Plant Survey Record

BRITISH COLUMBIA
The Best Place on Earth

Entered into IAPP (YYYY-MM-DD):	By:	Assigned Site IDs recorded on this form: ☐

Site Created Date (YYYY-MM-DD): *	Invasive Plant Survey Date (YYYY-MM-DD): * (only if different from Site Created Date)	Site ID: (assigned at IAPP data entry)
2023-07-27	2023-07-~~25~~ 27	

Site Details

Jurisdiction: * (see reverse for choices/codes)	District Lot Nr:	Range Unit:	Site Paper File ID:
Mt. Polley			

UTM Zone: *	UTM Easting: * (no initial zero)	UTM Northing: * (7 digits)	Site Soil Texture:
10 U	593708	5821280	coarse ☒ fine ☐ organic ☐

Slope:	Aspect:	Elevation (m):	Site specific use: *

Site Location (and directions how to get there):

IMC - Stockpile [illegible]

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: *	Employer:	Surveyor(s):
DWB Consulting		KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
CT	0.11	6	4	C ☒ O ☐ P ☐	☒	☒	☒
OD	0.11	6	4	C ☒ O ☐ P ☐	☒	☒	☒
SO	0.11	2	2	C ☒ O ☐ P ☐	☒	☒	☒

Site Image Details

Date taken (YYYY-MM-DD):	Reference No. *	Perspective: * (see reverse for codes)	Image Comments:

Site Created Date (YYYY-MM-DD): *	Invasive Plant Survey Date (YYYY-MM-DD): * (only if different from Site Created Date)	Site ID: (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes)	District Lot Nr:	Range Unit:	Site Paper File ID:
Mt. Polley			

UTM Zone: *	UTM Easting: * (no initial zero)	UTM Northing: * (7 digits)	Site Soil Texture:
10 U	593708	5821280	coarse ☒ fine ☐ organic ☐

Slope:	Aspect:	Elevation (m):	

Site Location (and directions how to get there):

IMC - Stockpile [illegible] cont.

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: *	Employer:	Surveyor(s):
DWB Consulting		KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
WG	0.11	2	2	C ☒ O ☐ P ☐	☒	☒	☒
				C ☐ O ☐ P ☐	☐	☐	☐
				C ☐ O ☐ P ☐	☐	☐	☐

Site Image Details

Date taken (YYYY-MM-DD):	Reference No. *	Perspective: * (see reverse for codes)	Image Comments:

* *indicates mandatory field - this form may be used for 2 sites, with their invasive plant surveys, and site images (if taken).*

IAPP Site & Invasive Plant Survey Record

BRITISH COLUMBIA
The Best Place on Earth

Entered into IAPP (YYYY-MM-DD):	By:	Assigned Site IDs recorded on this form: ☐

Site Created Date (YYYY-MM-DD): *	Invasive Plant Survey Date (YYYY-MM-DD): * (only if different from Site Created Date)	Site ID: (assigned at IAPP data entry)
2023-07-28	2023-07-~~25~~ 28	

Site Details

Jurisdiction: * (see reverse for choices/codes)	District Lot Nr:	Range Unit:	Site Paper File ID:
Mt. Polley			

UTM Zone: *	UTM Easting: * (no initial zero)	UTM Northing: * (7 digits)	Site Soil Texture:
10 U	5 9 3 8 4 2	5 8 2 2 4 9 3	coarse ☒ fine ☐ organic ☐

Slope:	Aspect:	Elevation (m):	Site specific use: *

Site Location (and directions how to get there):

IMC - Stockpile 24

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: *	Employer:	Surveyor(s):
DWB Consulting		KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
CT	3.38	5	4	C ☒ O ☐ P ☐	☒	☒	☒
BT	3.38	2	2	C ☒ O ☐ P ☐	☒	☒	☒
CD	3.38	7	3	C ☒ O ☐ P ☐	☒	☒	☒

Site Image Details

Date taken (YYYY-MM-DD):	Reference No. *	Perspective: * (see reverse for codes)	Image Comments:

Site Created Date (YYYY-MM-DD): *	Invasive Plant Survey Date (YYYY-MM-DD): * (only if different from Site Created Date)	Site ID: (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes)	District Lot Nr:	Range Unit:	Site Paper File ID:
Mt. Polley			

UTM Zone: *	UTM Easting: * (no initial zero)	UTM Northing: * (7 digits)	Site Soil Texture:
10 U	5 9 3 8 4 2	5 8 2 2 4 9 3	coarse ☒ fine ☐ organic ☐

Slope:	Aspect:	Elevation (m):

Site Location (and directions how to get there):

IMC - Stockpile 24 cont.

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: *	Employer:	Surveyor(s):
DWB		KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
SO	3.38	4	2	C ☒ O ☐ P ☐	☒	☒	☒
SH	1.1	4	2	C ☒ O ☐ P ☐	☒	☒	☒
WG	3.38	2	2	C ☒ O ☐ P ☐	☒	☒	☒

Site Image Details

Date taken (YYYY-MM-DD):	Reference No. *	Perspective: * (see reverse for codes)	Image Comments:

* *indicates mandatory field - this form may be used for 2 sites, with their invasive plant surveys, and site images (if taken).*

IAPP Site & Invasive Plant Survey Record

BRITISH COLUMBIA
The Best Place on Earth

Entered into IAPP (YYYY-MM-DD):	By:	Assigned Site IDs recorded on this form: ☐

Site Created Date (YYYY-MM-DD): * | **Invasive Plant Survey Date** (YYYY-MM-DD): * (only if different from Site Created Date) 2023-07-25 | **Site ID:** (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes) Mt. Polley | District Lot Nr: | Range Unit: | Site Paper File ID:

UTM Zone: * 10 U | **UTM Easting:** * (no initial zero) 5 9 3 3 4 2 | **UTM Northing:** * (7 digits) 5 8 2 6 4 9 3 | Site Soil Texture: coarse ☒ fine ☐ organic ☐

Slope: | Aspect: | Elevation (m): | Site specific use: *

Site Location (and directions how to get there):

IMC - Stockpile 24 cont.

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: * DWB Consulting | Employer: | Surveyor(s): KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
YH	3.38	7	4	C [X] O [ ] P [ ]	[X]	[X]	[X]
OH	0.55	5	4	C [X] O [ ] P [ ]	[X]	[X]	[X]
				C [X] O [ ] P [ ]	[X]	[X]	[X]

Site Image Details

Date taken (YYYY-MM-DD): | **Reference No.** * | **Perspective:** * (see reverse for codes) | Image Comments:

Site Created Date (YYYY-MM-DD): * 2023-07- | **Invasive Plant Survey Date** (YYYY-MM-DD): * (only if different from Site Created Date) | **Site ID:** (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes) Mt. Polley | District Lot Nr: | Range Unit: | Site Paper File ID:

UTM Zone: * 10 U | **UTM Easting:** * (no initial zero) 5 9 4 2 6 3 | **UTM Northing:** * (7 digits) 5 8 2 6 3 4 1 | Site Soil Texture: coarse ☒ fine ☐ organic ☐

Slope: | Aspect: | Elevation (m):

Site Location (and directions how to get there):

IMC - Stockpile 57

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: * DWB Consulting | Employer: | Surveyor(s): KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
OD	0.58	3	2	C [X] O [ ] P [ ]	[X]	[X]	[X]
YH	0.32	3	3	C [X] O [ ] P [ ]	[X]	[X]	[X]
				C [ ] O [ ] P [ ]	[ ]	[ ]	[ ]

Site Image Details

Date taken (YYYY-MM-DD): | **Reference No.** * | **Perspective:** * (see reverse for codes) | Image Comments:

* *indicates mandatory field - this form may be used for 2 sites, with their invasive plant surveys, and site images (if taken).*

IAPP Site & Invasive Plant Survey Record

BRITISH COLUMBIA
The Best Place on Earth

Entered into IAPP (YYYY-MM-DD):	By:	Assigned Site IDs recorded on this form: ☐

Site Created Date (YYYY-MM-DD): *	Invasive Plant Survey Date (YYYY-MM-DD): * (only if different from Site Created Date) 2023-07-25	Site ID: (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes)	District Lot Nr:	Range Unit:	Site Paper File ID:
Mt. Polley			

UTM Zone: *	UTM Easting: * (no initial zero)	UTM Northing: * (7 digits)	Site Soil Texture:
10 U	591831	5824285	coarse ☒ fine ☐ organic ☐

Slope:	Aspect:	Elevation (m):	Site specific use: *

Site Location (and directions how to get there):
IMC - Stockpile 25 cont.

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: *	Employer:	Surveyor(s):
DWB Consulting		KC, AI

Invasive Plants * Species name or code	Area * Dimension of Ha	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
WG	0.41	5	2	C ☒ O ☐ P ☐	☒	☒	☒
MU	0.41	2	2	C ☒ O ☐ P ☐	☒	☒	☒
				C ☒ O ☐ P ☐	☒	☒	☒

Site Image Details

Date taken (YYYY-MM-DD):	Reference No. *	Perspective: * (see reverse for codes)	Image Comments:

Site Created Date (YYYY-MM-DD): *	Invasive Plant Survey Date (YYYY-MM-DD): * (only if different from Site Created Date)	Site ID: (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes)	District Lot Nr:	Range Unit:	Site Paper File ID:
Mt Polley			

UTM Zone: *	UTM Easting: * (no initial zero)	UTM Northing: * (7 digits)	Site Soil Texture:
10 U	591653	5824175	coarse ☒ fine ☐ organic ☐

Slope:	Aspect:	Elevation (m):	Site Comments (anything else important /useful):

Site Location (and directions how to get there):
IMC - Stockpile 21

Invasive Plant Survey Details

Survey Agency: *	Employer:	Surveyor(s):
DWB Consulting		KC, AI

Invasive Plants * Species name or code	Area * Dimension of Ha	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
OD	0.46	4	3	C ☒ O ☐ P ☐	☒	☒	☒
YH	0.23	4	2	C ☒ O ☐ P ☐	☒	☒	☒
MU	0.0001	1	1	C ☒ O ☐ P ☐	☒	☒	☒

Site Image Details

Date taken (YYYY-MM-DD):	Reference No. *	Perspective: * (see reverse for codes)	Image Comments:

* indicates mandatory field - this form may be used for 2 sites, with their invasive plant surveys, and site images (if taken).

IAPP Site & Invasive Plant Survey Record

BRITISH COLUMBIA
The Best Place on Earth

Entered into IAPP (YYYY-MM-DD):	By:	Assigned Site IDs recorded on this form: ☐

Site Created Date (YYYY-MM-DD): * 2023-07-28

Invasive Plant Survey Date (YYYY-MM-DD): * (only if different from Site Created Date) 2023-07-~~25~~ 28

Site ID: (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes) Mt. Polley

District Lot Nr:

Range Unit:

Site Paper File ID:

UTM Zone: * 10 U

UTM Easting: * (no initial zero) 5 9 3 7 8 1

UTM Northing: * (7 digits) 5 8 2 2 8 5 2

Site Soil Texture: coarse ☒ fine ☐ organic ☐

Slope:

Aspect:

Elevation (m):

Site specific use: *

Site Location (and directions how to get there):

WRC - Stockpile 26

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: * DWB Consulting

Employer:

Surveyor(s): KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
CT	0.84	5	4	C ☒ O ☐ P ☐	☒	☒	☒
BT	1.73	2	2	C ☒ O ☐ P ☐	☒	☒	☒
OD	1.73	7	4	C ☒ O ☐ P ☐	☒	☒	☒

Site Image Details

Date taken (YYYY-MM-DD):	Reference No. *	Perspective: * (see reverse for codes)	Image Comments:

Site Created Date (YYYY-MM-DD): *

Invasive Plant Survey Date (YYYY-MM-DD): * (only if different from Site Created Date)

Site ID: (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes) Mt. Polley

District Lot Nr:

Range Unit:

Site Paper File ID:

UTM Zone: * 10 U

UTM Easting: * (no initial zero) 5 9 3 7 8 1

UTM Northing: * (7 digits) 5 8 2 2 8 5 2

Site Soil Texture: coarse ☒ fine ☐ organic ☐

Slope:

Aspect:

Elevation (m):

Site Location (and directions how to get there):

WRC - Stockpile [illegible]

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: * DWB

Employer:

Surveyor(s): KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
SO	1.72	5	2	C ☒ O ☐ P ☐	☒	☒	☒
[illegible]	[illegible]	3	4	C ☒ O ☐ P ☐	☒	☒	☒
YH	1.73	7	4	C ☒ O ☐ P ☐	☒	☒	☒

Site Image Details

Date taken (YYYY-MM-DD):	Reference No. *	Perspective: * (see reverse for codes)	Image Comments:

* *indicates mandatory field - this form may be used for 2 sites, with their invasive plant surveys, and site images (if taken).*

IAPP Site & Invasive Plant Survey Record

BRITISH COLUMBIA
The Best Place on Earth

Entered into IAPP (YYYY-MM-DD):	By:	Assigned Site IDs recorded on this form: ☐

Site Created Date (YYYY-MM-DD): * | **Invasive Plant Survey Date** (YYYY-MM-DD): * (only if different from Site Created Date) 2023-07-~~28~~ | **Site ID:** (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes) Mt. Polley | District Lot Nr: | Range Unit: | Site Paper File ID:

UTM Zone: * 10 U | **UTM Easting:** * (no initial zero) 5 9 3 7 8 1 | **UTM Northing:** * (7 digits) 5 8 2 2 8 5 0 | Site Soil Texture: coarse ☒ fine ☐ organic ☐

Slope: | Aspect: | Elevation (m): | Site specific use: *

Site Location (and directions how to get there): IMC- Stockpile 26 Conveyor

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: * DWB Consulting | Employer: | Surveyor(s): KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
SH	1.73	8	4	C ☒ O ☐ P ☐	☒	☒	☒
WG	1.73	2	2	C ☒ O ☐ P ☐	☒	☒	☒
				C ☒ O ☐ P ☐	☒	☒	☒

Site Image Details

Date taken (YYYY-MM-DD): | **Reference No.** * | **Perspective:** * (see reverse for codes) | Image Comments:

Site Created Date (YYYY-MM-DD): * 2023-07-27 | **Invasive Plant Survey Date** (YYYY-MM-DD): * (only if different from Site Created Date) | **Site ID:** (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes) Mt Polley | District Lot Nr: | Range Unit: | Site Paper File ID:

UTM Zone: * 10U | **UTM Easting:** * (no initial zero) 5 9 3 7 2 8 | **UTM Northing:** * (7 digits) 5 8 3 1 4 9 6 | Site Soil Texture: coarse ☒ fine ☐ organic ☐

Slope: | Aspect: | Elevation (m): |

Site Location (and directions how to get there): IMC- Stockpile 66

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: * DWB | Employer: | Surveyor(s): KC AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
YH	0.15	7	3	C ☒ O ☐ P ☐	☒	☒	☒
OD	0.15	7	3	C ☒ O ☐ P ☐	☒	☒	☒
SO	0.15	4	6	C ☒ O ☐ P ☐	☒	☒	☒

Site Image Details

Date taken (YYYY-MM-DD): | **Reference No.** * | **Perspective:** * (see reverse for codes) | Image Comments:

* *indicates mandatory field - this form may be used for 2 sites, with their invasive plant surveys, and site images (if taken).*

IAPP Site & Invasive Plant Survey Record

BRITISH COLUMBIA
the Best Place on Earth

Entered into IAPP (YYYY-MM-DD):	By:	Assigned Site IDs recorded on this form: ☐

Site Created Date (YYYY-MM-DD): * 2023-07-26

Invasive Plant Survey Date (YYYY-MM-DD): * (only if different from Site Created Date) 2023-07-26

Site ID: (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes) Mt. Polley

District Lot Nr:

Range Unit:

Site Paper File ID:

UTM Zone: * 10 U

UTM Easting: * (no initial zero) 599330

UTM Northing: * (7 digits) 5821587

Site Soil Texture: coarse ☒ fine ☐ organic ☐

Slope:

Aspect:

Elevation (m):

Site specific use: *

Site Location (and directions how to get there):

IMC - Stockpile 26

Site Comments (anything else important /useful):
only E side of stockpile observed,
[illegible] was [illegible]

Invasive Plant Survey Details

Survey Agency: * DWB Consulting

Employer:

Surveyor(s): KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
CT	1.28	8	4	C ☒ O ☐ P ☐	☒	☒	☒
BT	1.28	2	1	C ☒ O ☐ P ☐	☒	☒	☒
OH	1.28	3	2	C ☒ O ☐ P ☐	☒	☒	☒

Site Image Details

Date taken (YYYY-MM-DD): *	Reference No. *	Perspective: * (see reverse for codes)	Image Comments:

Site Created Date (YYYY-MM-DD): *

Invasive Plant Survey Date (YYYY-MM-DD): * (only if different from Site Created Date)

Site ID: (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes) Mt. Polley

District Lot Nr:

Range Unit:

Site Paper File ID:

UTM Zone: * 10 U

UTM Easting: * (no initial zero) 599330

UTM Northing: * (7 digits) 5821587

Site Soil Texture: coarse ☒ fine ☐ organic ☐

Slope:

Aspect:

Elevation (m):

Site Location (and directions how to get there):

IMC - Stockpile 26 cont

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: * DWB Consulting

Employer:

Surveyor(s): KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
OD	1.28	6	4	C ☒ O ☐ P ☐	☒	☒	☒
SO	1.28	4	2	C ☒ O ☐ P ☐	☒	☒	☒
WG	1.28	4	2	C ☒ O ☐ P ☐	☒	☒	☒

Site Image Details

Date taken (YYYY-MM-DD): *	Reference No. *	Perspective: * (see reverse for codes)	Image Comments:

* indicates mandatory field - this form may be used for 2 sites, with their invasive plant surveys, and site images (if taken).

IAPP Site & Invasive Plant Survey Record

BRITISH COLUMBIA
The Best Place on Earth

Entered into IAPP (YYYY-MM-DD):	By:	Assigned Site IDs recorded on this form: ☐

Site Created Date (YYYY-MM-DD): * 2023-07-26

Invasive Plant Survey Date (YYYY-MM-DD): * (only if different from Site Created Date) 2023-07-26

Site ID: (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes) Mt. Polley

District Lot Nr:

Range Unit:

Site Paper File ID:

UTM Zone: * 10 U

UTM Easting: * (no initial zero) 594367

UTM Northing: * (7 digits) 5801333

Site Soil Texture: coarse ☒ fine ☐ organic ☐

Slope:

Aspect:

Elevation (m):

Site specific use: *

Site Location (and directions how to get there):

IMC - Stockpile 29

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: * DWB Consulting

Employer:

Surveyor(s): KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
MU	2.81	7	3	C ☒ O ☐ P ☐	☒	☒	☒
WG	2.81	4	2	C ☒ O ☐ P ☐	☒	☒	☒
OD	2.81	7	4	C ☒ O ☐ P ☐	☒	☒	☒

Site Image Details

Date taken (YYYY-MM-DD): **Reference No.** *

Perspective: * (see reverse for codes)

Image Comments:

Site Created Date (YYYY-MM-DD): *

Invasive Plant Survey Date (YYYY-MM-DD): * (only if different from Site Created Date)

Site ID: (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes) Mt. Polley

District Lot Nr:

Range Unit:

Site Paper File ID:

UTM Zone: * 10 U

UTM Easting: * (no initial zero) 594367

UTM Northing: * (7 digits) 5801333

Site Soil Texture: coarse ☒ fine ☐ organic ☐

Slope:

Aspect:

Elevation (m):

Site Location (and directions how to get there):

IMC - Stockpile 29 cont.

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: * DWB Consulting

Employer:

Surveyor(s): KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
CT	2.81	5	4	C ☒ O ☐ P ☐	☒	☒	☒
				C ☐ O ☐ P ☐	☐	☐	☐
				C ☐ O ☐ P ☐	☐	☐	☐

Site Image Details

Date taken (YYYY-MM-DD): **Reference No.** *

Perspective: * (see reverse for codes)

Image Comments:

* *indicates mandatory field - this form may be used for 2 sites, with their invasive plant surveys, and site images (if taken).*

IAPP Site & Invasive Plant Survey Record

BRITISH COLUMBIA
The Best Place on Earth

Entered into IAPP (YYYY-MM-DD):	By:	Assigned Site IDs recorded on this form: ☐

Site Created Date (YYYY-MM-DD): * | **Invasive Plant Survey Date** (YYYY-MM-DD): * (only if different from Site Created Date) 2023-07-~~25~~ 26 | **Site ID:** (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes) Mt. Polley | District Lot Nr: | Range Unit: | Site Paper File ID:

UTM Zone: * 10 U | **UTM Easting:** * (no initial zero) 594195 | **UTM Northing:** * (7 digits) 5821458 | Site Soil Texture: coarse ☒ fine ☐ organic ☐

Slope: | Aspect: | Elevation (m): | Site specific use: *

Site Location (and directions how to get there): IMC - Stockpile 30 cont.

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: * DWB Consulting | Employer: | Surveyor(s): KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
OD	0.62	7	4	C ☒ O ☐ P ☐	☒	☒	☒
CT	0.05	8	4	C ☒ O ☐ P ☐	☒	☒	☒
				C ☒ O ☐ P ☐	☒	☒	☒

Site Image Details

Date taken (YYYY-MM-DD): | **Reference No.** * | **Perspective:** * (see reverse for codes) | Image Comments:

Site Created Date (YYYY-MM-DD): * 2023-07-26 | **Invasive Plant Survey Date** (YYYY-MM-DD): * (only if different from Site Created Date) | **Site ID:** (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes) Mt. Polley | District Lot Nr: | Range Unit: | Site Paper File ID:

UTM Zone: * 10 U | **UTM Easting:** * (no initial zero) 594134 | **UTM Northing:** * (7 digits) 5821627 | Site Soil Texture: coarse ☒ fine ☐ organic ☐

Slope: | Aspect: | Elevation (m):

Site Location (and directions how to get there): IMC - Stockpile 51

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: * DWB Consulting | Employer: | Surveyor(s): KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
MU	1.41	5	4	C ☒ O ☐ P ☐	☒	☒	☒
OD	1.41	6	3	C ☐ O ☐ P ☐	☐	☐	☐
YH	1.41	5	3	C ☐ O ☐ P ☐	☐	☐	☐

Site Image Details

Date taken (YYYY-MM-DD): | **Reference No.** * | **Perspective:** * (see reverse for codes) | Image Comments:

* *indicates mandatory field - this form may be used for 2 sites, with their invasive plant surveys, and site images (if taken).*

IAPP Site & Invasive Plant Survey Record

BRITISH COLUMBIA
The Best Place on Earth

Entered into IAPP (YYYY-MM-DD):	By:	Assigned Site IDs recorded on this form: ☐

Site Created Date (YYYY-MM-DD): * | **Invasive Plant Survey Date** (YYYY-MM-DD): * (only if different from Site Created Date) 2023-07-25 | **Site ID:** (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes) Mt. Polley | District Lot Nr: | Range Unit: | Site Paper File ID:

UTM Zone: * 10 U | **UTM Easting:** * (no initial zero) 5 9 2 7 5 3 | **UTM Northing:** * (7 digits) 5 8 2 2 7 6 4 | Site Soil Texture: coarse ☒ fine ☐ organic ☐

Slope: | Aspect: | Elevation (m): | Site specific use: *

Site Location (and directions how to get there):

IMC - Stockpile 31 cont.

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: * DWB Consulting | Employer: | Surveyor(s): KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
BT	0.0005	2	1	C [X] O [ ] P [ ]	[X]	[X]	[X]
				C [X] O [ ] P [ ]	[X]	[X]	[X]
				C [X] O [ ] P [ ]	[X]	[X]	[X]

Site Image Details

Date taken (YYYY-MM-DD):	Reference No. *	Perspective: * (see reverse for codes)	Image Comments:

Site Created Date (YYYY-MM-DD): * 2023-07-28 | **Invasive Plant Survey Date** (YYYY-MM-DD): * (only if different from Site Created Date) | **Site ID:** (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes) Mt. Polley | District Lot Nr: | Range Unit: | Site Paper File ID:

UTM Zone: * 10 U | **UTM Easting:** * (no initial zero) 5 9 3 6 0 8 | **UTM Northing:** * (7 digits) 5 8 2 3 4 9 4 | Site Soil Texture: coarse ☒ fine ☐ organic ☐

Slope: | Aspect: | Elevation (m):

Site Location (and directions how to get there):

IMC - Stockpile 3

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: * DWB Consulting | Employer: | Surveyor(s): KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
CT	6.73	4	2	C [X] O [ ] P [ ]	[X]	[X]	[X]
BT	6.73	2	2	C [X] O [ ] P [ ]	[X]	[X]	[X]
OD	6.73	7	3	C [X] O [ ] P [ ]	[X]	[X]	[X]

Site Image Details

Date taken (YYYY-MM-DD):	Reference No. *	Perspective: * (see reverse for codes)	Image Comments:

* *indicates mandatory field - this form may be used for 2 sites, with their invasive plant surveys, and site images (if taken).*

IAPP Site & Invasive Plant Survey Record

BRITISH COLUMBIA
The Best Place on Earth

Entered into IAPP (YYYY-MM-DD):	By:	Assigned Site IDs recorded on this form: ☐

Site Created Date (YYYY-MM-DD): *	Invasive Plant Survey Date (YYYY-MM-DD): * (only if different from Site Created Date)	Site ID: (assigned at IAPP data entry)
2023-07-26	2023-07-26	

Site Details

Jurisdiction: * (see reverse for choices/codes)	District Lot Nr:	Range Unit:	Site Paper File ID:
Mt. Polley			

UTM Zone: *	UTM Easting: * (no initial zero)	UTM Northing: * (7 digits)	Site Soil Texture:
10 U	593377	5823201	coarse ☒ fine ☐ organic ☐

Slope:	Aspect:	Elevation (m):	Site specific use: *

Site Location (and directions how to get there):

IMC - Stockpile 32

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: *	Employer:	Surveyor(s):
DWB Consulting		KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
OD	0.23	6	3	C ☒ O ☐ P ☐	☒	☒	☒
BT	0.23	4	2	C ☒ O ☐ P ☐	☒	☒	☒
WG	0.23	4	2	C ☒ O ☐ P ☐	☒	☒	☒

Site Image Details

Date taken (YYYY-MM-DD):	Reference No. *	Perspective: * (see reverse for codes)	Image Comments:

Site Created Date (YYYY-MM-DD): *	Invasive Plant Survey Date (YYYY-MM-DD): * (only if different from Site Created Date)	Site ID: (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes)	District Lot Nr:	Range Unit:	Site Paper File ID:
Mt. Polley			

UTM Zone: *	UTM Easting: * (no initial zero)	UTM Northing: * (7 digits)	Site Soil Texture:
10 U	593377	5823201	coarse ☒ fine ☐ organic ☐

Slope:	Aspect:	Elevation (m):	

Site Location (and directions how to get there):

IMC - Stockpile 32 cont.

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: *	Employer:	Surveyor(s):
DWB Consulting		KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
CT	0.23	2	2	C ☒ O ☐ P ☐	☒	☒	☒
				C ☐ O ☐ P ☐	☐	☐	☐
				C ☐ O ☐ P ☐	☐	☐	☐

Site Image Details

Date taken (YYYY-MM-DD):	Reference No. *	Perspective: * (see reverse for codes)	Image Comments:

* *indicates mandatory field - this form may be used for 2 sites, with their invasive plant surveys, and site images (if taken).*

IAPP Site & Invasive Plant Survey Record

BRITISH COLUMBIA
The Best Place on Earth

Entered into IAPP (YYYY-MM-DD):	By:	Assigned Site IDs recorded on this form: ☐

Site Created Date (YYYY-MM-DD): *	Invasive Plant Survey Date (YYYY-MM-DD): * (only if different from Site Created Date)	Site ID: (assigned at IAPP data entry)
2023-07-26	2023-07-26	

Site Details

Jurisdiction: * (see reverse for choices/codes)	District Lot Nr:	Range Unit:	Site Paper File ID:
Mt. Polley			

UTM Zone: *	UTM Easting: * (no initial zero)	UTM Northing: * (7 digits)	Site Soil Texture:
10 U	5 9 3 4 4 0	5 8 2 2 9 2 6	coarse ☒ fine ☐ organic ☐

Slope:	Aspect:	Elevation (m):	Site specific use: *

Site Location (and directions how to get there):

IMC - Stockpile 33

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: *	Employer:	Surveyor(s):
DWB Consulting		KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
OD	0.1	8	4	C ☒ O ☐ P ☐	☒	☒	☒
WG	0.1	2	1	C ☒ O ☐ P ☐	☒	☒	☒
YH	0.0004	7	4	C ☒ O ☐ P ☐	☒	☒	☒

Site Image Details

Date taken (YYYY-MM-DD):	Reference No. *	Perspective: * (see reverse for codes)	Image Comments:

Site Created Date (YYYY-MM-DD): *	Invasive Plant Survey Date (YYYY-MM-DD): * (only if different from Site Created Date)	Site ID: (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes)	District Lot Nr:	Range Unit:	Site Paper File ID:
Mt. Polley			

UTM Zone: *	UTM Easting: * (no initial zero)	UTM Northing: * (7 digits)	Site Soil Texture:
10 U			coarse ☒ fine ☐ organic ☐

Slope:	Aspect:	Elevation (m):	

Site Location (and directions how to get there):

IMC -

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: *	Employer:	Surveyor(s):
DWB Consulting		KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
				C ☒ O ☐ P ☐	☒	☒	☒
				C ☐ O ☐ P ☐	☐	☐	☐
				C ☐ O ☐ P ☐	☐	☐	☐

Site Image Details

Date taken (YYYY-MM-DD):	Reference No. *	Perspective: * (see reverse for codes)	Image Comments:

* *indicates mandatory field - this form may be used for 2 sites, with their invasive plant surveys, and site images (if taken).*

IAPP Site & Invasive Plant Survey Record

BRITISH COLUMBIA
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Entered into IAPP (YYYY-MM-DD):	By:	Assigned Site IDs recorded on this form: ☐

Site Created Date (YYYY-MM-DD): * 2023-07-27 | **Invasive Plant Survey Date** (YYYY-MM-DD): * (only if different from Site Created Date) 2023-07-27 | **Site ID:** (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes) Mt. Polley | District Lot Nr: | Range Unit: | Site Paper File ID:

UTM Zone: * 10 U | **UTM Easting:** * (no initial zero) 596688 | **UTM Northing:** * (7 digits) 5818038 | Site Soil Texture: coarse ☒ fine ☐ organic ☐

Slope: | Aspect: | Elevation (m): | Site specific use: *

Site Location (and directions how to get there): IMC - Stockpile 34

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: * DWB Consulting | Employer: | Surveyor(s): KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
CT	4.21	6	4	C [X] O [ ] P [ ]	[X]	[X]	[X]
BT	0.5	2	2	C [X] O [ ] P [ ]	[X]	[X]	[X]
OH	4.21	2	2	C [X] O [ ] P [ ]	[X]	[X]	[X]

Site Image Details

Date taken (YYYY-MM-DD):	Reference No. *	Perspective: * (see reverse for codes)	Image Comments:

Site Created Date (YYYY-MM-DD): * 2023-07-27 | **Invasive Plant Survey Date** (YYYY-MM-DD): * (only if different from Site Created Date) | **Site ID:** (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes) Mt. Polley | District Lot Nr: | Range Unit: | Site Paper File ID:

UTM Zone: * 10 U | **UTM Easting:** * (no initial zero) 596688 | **UTM Northing:** * (7 digits) 5818038 | Site Soil Texture: coarse ☒ fine ☐ organic ☐

Slope: | Aspect: | Elevation (m):

Site Location (and directions how to get there): IMC - Stockpile 34 cont.

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: * DWB Consulting | Employer: | Surveyor(s): KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
YH	1.75	7	4	C [X] O [ ] P [ ]	[X]	[X]	[X]
OD	4.21	7	3	C [X] O [X] P [ ]	[X]	[X]	[X]
WG	4.21	4	2	C [X] O [X] P [ ]	[X]	[X]	[X]

Site Image Details

Date taken (YYYY-MM-DD):	Reference No. *	Perspective: * (see reverse for codes)	Image Comments:

* *indicates mandatory field - this form may be used for 2 sites, with their invasive plant surveys, and site images (if taken).*

IAPP Site & Invasive Plant Survey Record

BRITISH COLUMBIA
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Entered into IAPP (YYYY-MM-DD):	By:	Assigned Site IDs recorded on this form: ☐

Site Created Date (YYYY-MM-DD): * 2023-07-27 | **Invasive Plant Survey Date** (YYYY-MM-DD): * (only if different from Site Created Date) 2023-07-~~25~~27 | **Site ID:** (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes) Mt. Polley | District Lot Nr: | Range Unit: | Site Paper File ID:

UTM Zone: * 10 U | **UTM Easting:** * (no initial zero) 5 9 4 6 2 0 | **UTM Northing:** * (7 digits) 5 8 1 8 3 9 8 | Site Soil Texture: coarse ☒ fine ☐ organic ☐

Slope: | Aspect: | Elevation (m): | Site specific use: *

Site Location (and directions how to get there):

IMC - Stockpile 37 cont

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: * DWB Consulting | Employer: | Surveyor(s): KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
OD	0.69	7	4	C [X] O [ ] P [ ]	[X]	[X]	[X]
				C [X] O [ ] P [ ]	[X]	[X]	[X]
				C [X] O [ ] P [ ]	[X]	[X]	[X]

Site Image Details

Date taken (YYYY-MM-DD):	Reference No. *	Perspective: * (see reverse for codes)	Image Comments:

Site Created Date (YYYY-MM-DD): * 2023-07-27 | **Invasive Plant Survey Date** (YYYY-MM-DD): * (only if different from Site Created Date) | **Site ID:** (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes) Mt. Polley | District Lot Nr: | Range Unit: | Site Paper File ID:

UTM Zone: * 10 U | **UTM Easting:** * (no initial zero) 5 9 5 5 0 6 | **UTM Northing:** * (7 digits) 5 8 1 8 1 6 2 | Site Soil Texture: coarse ☒ fine ☐ organic ☐

Slope: | Aspect: | Elevation (m):

Site Location (and directions how to get there):

IMC - Stockpile 38

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: * DWB Consulting | Employer: | Surveyor(s): KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
CT	1.24	8	4	C [X] O [ ] P [ ]	[X]	[X]	[X]
OD	1.24	8	4	C [X] O [ ] P [ ]	[X]	[X]	[X]
YH	1.24	7	3	C [X] O [ ] P [ ]	[X]	[X]	[X]

Site Image Details

Date taken (YYYY-MM-DD):	Reference No. *	Perspective: * (see reverse for codes)	Image Comments:

* *indicates mandatory field - this form may be used for 2 sites, with their invasive plant surveys, and site images (if taken).*

IAPP Site & Invasive Plant Survey Record

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Entered into IAPP (YYYY-MM-DD):	By:	Assigned Site IDs recorded on this form: ☐

Site Created Date (YYYY-MM-DD): * 2023-07-27 | **Invasive Plant Survey Date** (YYYY-MM-DD): * (only if different from Site Created Date) 2023-07-~~25~~27 | **Site ID:** (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes) Mt. Polley | District Lot Nr: | Range Unit: | Site Paper File ID:

UTM Zone: * 10 U | **UTM Easting:** * (no initial zero) 595256 | **UTM Northing:** * (7 digits) 5818143 | Site Soil Texture: coarse ☒ fine ☐ organic ☐

Slope: | Aspect: | Elevation (m):

Site Location (and directions how to get there): IMC - Stockpile 39

Site specific use: *

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: * DWB Consulting | Employer: | Surveyor(s): KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
CT	1.42	6	4	C [X] O [ ] P [ ]	[X]	[X]	[X]
BT	1	2	2	C [X] O [ ] P [ ]	[X]	[X]	[X]
YH	1.42	7	4	C [X] O [ ] P [ ]	[X]	[X]	[X]

Site Image Details

Date taken (YYYY-MM-DD):	Reference No. *	Perspective: * (see reverse for codes)	Image Comments:

Site Created Date (YYYY-MM-DD): * 2023-07-27 | **Invasive Plant Survey Date** (YYYY-MM-DD): * (only if different from Site Created Date) | **Site ID:** (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes) Mt. Polley | District Lot Nr: | Range Unit: | Site Paper File ID:

UTM Zone: * 10 U | **UTM Easting:** * (no initial zero) 595256 | **UTM Northing:** * (7 digits) 5818143 | Site Soil Texture: coarse ☒ fine ☐ organic ☐

Slope: | Aspect: | Elevation (m):

Site Location (and directions how to get there): IMC - Stockpile 39 cont.

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: * DWB Consulting | Employer: | Surveyor(s): KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
OH	1.42	3	3	C [X] O [ ] P [ ]	[X]	[X]	[X]
OD	1.42	7	4	C [X] O [ ] P [ ]	[X]	[X]	[X]
WG	1.42	4	3	C [X] O [ ] P [ ]	[X]	[X]	[X]

Site Image Details

Date taken (YYYY-MM-DD):	Reference No. *	Perspective: * (see reverse for codes)	Image Comments:

* *indicates mandatory field - this form may be used for 2 sites, with their invasive plant surveys, and site images (if taken).*

IAPP Site & Invasive Plant Survey Record

BRITISH COLUMBIA
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Entered into IAPP (YYYY-MM-DD):	By:	Assigned Site IDs recorded on this form: ☐

Site Created Date (YYYY-MM-DD): * 2023-07-27
Invasive Plant Survey Date (YYYY-MM-DD): * (only if different from Site Created Date) 2023-07-27
Site ID: (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes) Mt. Polley
District Lot Nr:
Range Unit:
Site Paper File ID:

UTM Zone: * 10 U
UTM Easting: * (no initial zero) 595256
UTM Northing: * (7 digits) 5818143
Site Soil Texture: coarse ☒ fine ☐ organic ☐

Slope:
Aspect:
Elevation (m):
Site specific use: *

Site Location (and directions how to get there):
IMC - Stockpile 39 cont.

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: * DWB Consulting
Employer:
Surveyor(s): KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
MU	0.05	3	3	C [X] O [ ] P [ ]	[X]	[X]	[X]
				C [X] O [ ] P [ ]	[X]	[X]	[X]
				C [X] O [ ] P [ ]	[X]	[X]	[X]

Site Image Details

Date taken (YYYY-MM-DD):	Reference No. *	Perspective: * (see reverse for codes)	Image Comments:

Site Created Date (YYYY-MM-DD): * 2023-07-27
Invasive Plant Survey Date (YYYY-MM-DD): * (only if different from Site Created Date)
Site ID: (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes) Mt. Polley
District Lot Nr:
Range Unit:
Site Paper File ID:

UTM Zone: * 10 U
UTM Easting: * (no initial zero) 594620
UTM Northing: * (7 digits) 5818398
Site Soil Texture: coarse ☒ fine ☐ organic ☐

Slope:
Aspect:
Elevation (m):

Site Location (and directions how to get there):
IMC - Stockpile 37

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: * DWB Consulting
Employer:
Surveyor(s): KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
CT	0.69	8	4	C [X] O [ ] P [ ]	[X]	[X]	[X]
OH	0.69	7	3	C [X] O [ ] P [ ]	[X]	[X]	[X]
YH	0.69	7	4	C [X] O [ ] P [ ]	[X]	[X]	[X]

Site Image Details

Date taken (YYYY-MM-DD):	Reference No. *	Perspective: * (see reverse for codes)	Image Comments:

* indicates mandatory field - this form may be used for 2 sites, with their invasive plant surveys, and site images (if taken).

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IAPP Site & Invasive Plant Survey Record

Entered into IAPP (YYYY-MM-DD):	By:	Assigned Site IDs recorded on this form: ☐

Site Created Date (YYYY-MM-DD): * 2023-07-27 | **Invasive Plant Survey Date** (YYYY-MM-DD): * (only if different from Site Created Date) 2023-07-~~25~~27 | **Site ID:** (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes) Mt. Polley | District Lot Nr: | Range Unit: | Site Paper File ID:

UTM Zone: * 10 U | **UTM Easting:** * (no initial zero) 5 9 5 7 4 0 | **UTM Northing:** * (7 digits) 5 8 1 9 8 8 2 | Site Soil Texture: coarse ☒ fine ☐ organic ☐

Slope: | Aspect: | Elevation (m):

Site Location (and directions how to get there): IMC - Stockpile 40

Site specific use: *

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: * DWB Consulting | Employer: | Surveyor(s): KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
CT	0.64	8	4	C ☒ O ☐ P ☐	☒	☒	☒
OD	0.64	7	3	C ☒ O ☐ P ☐	☒	☒	☒
YH	0.64	7	2	C ☒ O ☐ P ☐	☒	☒	☒

Site Image Details

Date taken (YYYY-MM-DD):	Reference No. *	Perspective: * (see reverse for codes)	Image Comments:

Site Created Date (YYYY-MM-DD): * | **Invasive Plant Survey Date** (YYYY-MM-DD): * (only if different from Site Created Date) | **Site ID:** (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes) Mt. Polley | District Lot Nr: | Range Unit: | Site Paper File ID:

UTM Zone: * 10 U | **UTM Easting:** * (no initial zero) 5 9 5 7 4 0 | **UTM Northing:** * (7 digits) 5 8 1 9 8 8 2 | Site Soil Texture: coarse ☒ fine ☐ organic ☐

Slope: | Aspect: | Elevation (m):

Site Location (and directions how to get there): IMC - Stockpile 40 cont.

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: * DWB Consulting | Employer: | Surveyor(s): KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
SO	0.64	4	3	C ☒ O ☐ P ☐	☒	☒	☒
BT	0.64	4	2	C ☒ O ☐ P ☐	☒	☒	☒
				C ☐ O ☐ P ☐	☐	☐	☐

Site Image Details

Date taken (YYYY-MM-DD):	Reference No. *	Perspective: * (see reverse for codes)	Image Comments:

* *indicates mandatory field - this form may be used for 2 sites, with their invasive plant surveys, and site images (if taken).*

IAPP Site & Invasive Plant Survey Record

BRITISH COLUMBIA
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Entered into IAPP (YYYY-MM-DD):	By:	Assigned Site IDs recorded on this form: ☐

Site Created Date (YYYY-MM-DD): * 2023-07-27
Invasive Plant Survey Date (YYYY-MM-DD): * (only if different from Site Created Date) 2023-07-27
Site ID: (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes) Mt. Polley
District Lot Nr:
Range Unit:
Site Paper File ID:

UTM Zone: * 10 U
UTM Easting: * (no initial zero) 596323
UTM Northing: * (7 digits) 5818453
Site Soil Texture: coarse ☒ fine ☐ organic ☐

Slope:
Aspect:
Elevation (m):
Site specific use: *

Site Location (and directions how to get there):

IMC - Stockpile 41

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: * DWB Consulting
Employer:
Surveyor(s): KC, Al

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
CT	0.77	6	4	C X O ☐ P ☐	X	X	X
YH	0.77	6	4	C X O ☐ P ☐	X	X	X
OD	0.77	7	3	C X O ☐ P ☐	X	X	X

Site Image Details

Date taken (YYYY-MM-DD):	Reference No. *	Perspective: * (see reverse for codes)	Image Comments:

Site Created Date (YYYY-MM-DD): * 2023-07-27
Invasive Plant Survey Date (YYYY-MM-DD): * (only if different from Site Created Date)
Site ID: (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes) Mt. Polley
District Lot Nr:
Range Unit:
Site Paper File ID:

UTM Zone: * 10 U
UTM Easting: * (no initial zero) 596323
UTM Northing: * (7 digits) 5818453
Site Soil Texture: coarse ☒ fine ☐ organic ☐

Slope:
Aspect:
Elevation (m):

Site Location (and directions how to get there):

IMC - Stockpile 41 cont.

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: * DWB Consulting
Employer:
Surveyor(s): KC, Al

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
BT	0.77	2	2	C ☒ O ☐ P ☐	☒	☒	☒
WG	0.77	4	4	C ☒ O ☐ P ☐	☒	☒	☒
				C ☐ O ☐ P ☐	☐	☐	☐

Site Image Details

Date taken (YYYY-MM-DD):	Reference No. *	Perspective: * (see reverse for codes)	Image Comments:

* *indicates mandatory field - this form may be used for 2 sites, with their invasive plant surveys, and site images (if taken).*

IAPP Site & Invasive Plant Survey Record

BRITISH COLUMBIA
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Entered into IAPP (YYYY-MM-DD):	By:	Assigned Site IDs recorded on this form: ☐

Site Created Date (YYYY-MM-DD): * 2023-07-26 | **Invasive Plant Survey Date** (YYYY-MM-DD): * (only if different from Site Created Date) 2023-07-25 26 | **Site ID:** (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes) Mt. Polley | District Lot Nr: | Range Unit: | Site Paper File ID:

UTM Zone: * 10 U | **UTM Easting:** * (no initial zero) 5 9 4 7 9 7 | **UTM Northing:** * (7 digits) 5 8 2 3 0 9 3 | Site Soil Texture: coarse ☒ fine ☐ organic ☐

Slope: | Aspect: | Elevation (m):

Site Location (and directions how to get there): IMC - Stockpile 46

Site specific use: *

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: * DWB Consulting | Employer: | Surveyor(s): KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
CT	0.11	7	4	C ☒ O ☐ P ☐	☒	☒	☒
OD	0.11	7	4	C ☒ O ☐ P ☐	☒	☒	☒
WG	0.11	4	2	C ☒ O ☐ P ☐	☒	☒	☒

Site Image Details

Date taken (YYYY-MM-DD):	Reference No. *	Perspective: * (see reverse for codes)	Image Comments:

Site Created Date (YYYY-MM-DD): * 2023-07-25 | **Invasive Plant Survey Date** (YYYY-MM-DD): * (only if different from Site Created Date) | **Site ID:** (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes) Mt. Polley | District Lot Nr: | Range Unit: | Site Paper File ID:

UTM Zone: * 10 U | **UTM Easting:** * (no initial zero) 5 9 2 7 4 0 | **UTM Northing:** * (7 digits) 5 8 2 2 5 0 6 | Site Soil Texture: coarse ☒ fine ☐ organic ☐

Slope: | Aspect: | Elevation (m):

Site Location (and directions how to get there): IMC - Stockpile 5

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: * DWB Consulting | Employer: | Surveyor(s): KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
CT	0.29	3	3	C ☒ O ☐ P ☐	☒	☒	☒
WG	0.29	2	1	C ☒ O ☐ P ☐	☒	☒	☒
3	[illegible]			C ☒ O ☐ P ☐	☒	☒	☒

Site Image Details

Date taken (YYYY-MM-DD):	Reference No. *	Perspective: * (see reverse for codes)	Image Comments:

* *indicates mandatory field - this form may be used for 2 sites, with their invasive plant surveys, and site images (if taken).*

IAPP Site & Invasive Plant Survey Record

BRITISH COLUMBIA
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Entered into IAPP (YYYY-MM-DD):	By:	Assigned Site IDs recorded on this form: ☐

Site Created Date (YYYY-MM-DD): * 2023-07-27 | **Invasive Plant Survey Date** (YYYY-MM-DD): * (only if different from Site Created Date) 2023-07-27 | **Site ID:** (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes) Mt. Polley | District Lot Nr: | Range Unit: | Site Paper File ID:

UTM Zone: * 10 U | **UTM Easting:** * (no initial zero) 595993 | **UTM Northing:** * (7 digits) 5818506 | Site Soil Texture: coarse ☒ fine ☐ organic ☐

Slope: | Aspect: | Elevation (m): | Site specific use: *

Site Location (and directions how to get there):

IMC - Stockpile 43

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: * DWB Consulting | Employer: | Surveyor(s): KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
CT	0.49	6	4	C [X] O [ ] P [ ]	[X]	[X]	[X]
OD	0.49	7	4	C [X] O [ ] P [ ]	[X]	[X]	[X]
YH	0.49	7	4	C [X] O [ ] P [ ]	[X]	[X]	[X]

Site Image Details

Date taken (YYYY-MM-DD): | **Reference No.** * | **Perspective:** * (see reverse for codes) | Image Comments:

Site Created Date (YYYY-MM-DD): * 2023-07-27 | **Invasive Plant Survey Date** (YYYY-MM-DD): * (only if different from Site Created Date) | **Site ID:** (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes) Mt. Polley | District Lot Nr: | Range Unit: | Site Paper File ID:

UTM Zone: * 10 U | **UTM Easting:** * (no initial zero) 595993 | **UTM Northing:** * (7 digits) 5818506 | Site Soil Texture: coarse ☒ fine ☐ organic ☐

Slope: | Aspect: | Elevation (m):

Site Location (and directions how to get there):

IMC - Stockpile 43 cont.

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: * DWB Consulting | Employer: | Surveyor(s): KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
WG	0.49	5	3	C [X] O [ ] P [ ]	[X]	[X]	[X]
				C [ ] O [ ] P [ ]	[ ]	[ ]	[ ]
				C [ ] O [ ] P [ ]	[ ]	[ ]	[ ]

Site Image Details

Date taken (YYYY-MM-DD): | **Reference No.** * | **Perspective:** * (see reverse for codes) | Image Comments:

* *indicates mandatory field - this form may be used for 2 sites, with their invasive plant surveys, and site images (if taken).*

IAPP Site & Invasive Plant Survey Record

BRITISH COLUMBIA
The Best Place on Earth

Entered into IAPP (YYYY-MM-DD):	By:	Assigned Site IDs recorded on this form: ☐

Site Created Date (YYYY-MM-DD): * 2023-07-27 | **Invasive Plant Survey Date** (YYYY-MM-DD): * (only if different from Site Created Date) 2023-07-25 | **Site ID:** (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes) Mt. Polley | District Lot Nr: | Range Unit: | Site Paper File ID:

UTM Zone: * 10 U | **UTM Easting:** * (no initial zero) 5 9 6 1 8 4 | **UTM Northing:** * (7 digits) 5 8 1 9 2 2 3 | Site Soil Texture: coarse ☒ fine ☐ organic ☐

Slope: | Aspect: | Elevation (m):

Site Location (and directions how to get there): IMC - Stockpile 44

Site specific use: *

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: * DWB Consulting | Employer: | Surveyor(s): KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
CT	0.35	5	4	C [X] O [ ] P [ ]	[X]	[X]	[X]
VH	0.35	9	4	C [X] O [ ] P [ ]	[X]	[X]	[X]
OD	0.35	7	3	C [X] O [ ] P [ ]	[X]	[X]	[X]

Site Image Details

Date taken (YYYY-MM-DD):	Reference No. *	Perspective: * (see reverse for codes)	Image Comments:

Site Created Date (YYYY-MM-DD): * | **Invasive Plant Survey Date** (YYYY-MM-DD): * (only if different from Site Created Date) | **Site ID:** (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes) Mt. Polley | District Lot Nr: | Range Unit: | Site Paper File ID:

UTM Zone: * 10 U | **UTM Easting:** * (no initial zero) 5 9 6 1 8 4 | **UTM Northing:** * (7 digits) 5 8 1 9 2 2 3 | Site Soil Texture: coarse ☒ fine ☐ organic ☐

Slope: | Aspect: | Elevation (m):

Site Location (and directions how to get there): IMC - Stockpile 44

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: * DWB Consulting | Employer: | Surveyor(s): KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
BT	0.35	6	3	C [X] O [ ] P [ ]	[X]	[X]	[X]
OH	0.35	5	2	C [X] O [ ] P [ ]	[X]	[X]	[X]
				C [ ] O [ ] P [ ]	[ ]	[ ]	[ ]

Site Image Details

Date taken (YYYY-MM-DD):	Reference No. *	Perspective: * (see reverse for codes)	Image Comments:

* *indicates mandatory field - this form may be used for 2 sites, with their invasive plant surveys, and site images (if taken).*

IAPP Site & Invasive Plant Survey Record

BRITISH COLUMBIA
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Entered into IAPP (YYYY-MM-DD):	By:	Assigned Site IDs recorded on this form: ☐

Site Created Date (YYYY-MM-DD): * | **Invasive Plant Survey Date** (YYYY-MM-DD): * (only if different from Site Created Date) 2023-07-25 27 | **Site ID:** (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes) Mt. Polley | District Lot Nr: | Range Unit: | Site Paper File ID:

UTM Zone: * 10 U | **UTM Easting:** * (no initial zero) 5 9 6 1 3 4 | **UTM Northing:** * (7 digits) 5 8 1 9 5 6 5 | Site Soil Texture: coarse ☒ fine ☐ organic ☐

Slope: | Aspect: | Elevation (m): | Site specific use: *

Site Location (and directions how to get there): IMC - Stockpile 45 cont.

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: * DWB Consulting | Employer: | Surveyor(s): KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
BT	1.0	5	3	C [X] O [ ] P [ ]	[X]	[X]	[X]
YH	1.4	7	3	C [X] O [ ] P [ ]	[X]	[X]	[X]
WG	1.0	4	2	C [X] O [ ] P [ ]	[X]	[X]	[X]

Site Image Details

Date taken (YYYY-MM-DD): | **Reference No.** * | **Perspective:** * (see reverse for codes) | Image Comments:

Site Created Date (YYYY-MM-DD): * 2023-07-27 | **Invasive Plant Survey Date** (YYYY-MM-DD): * (only if different from Site Created Date) | **Site ID:** (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes) Mt. Polley | District Lot Nr: | Range Unit: | Site Paper File ID:

UTM Zone: * 10 U | **UTM Easting:** * (no initial zero) 5 9 4 3 7 5 | **UTM Northing:** * (7 digits) 5 8 1 8 6 0 2 | Site Soil Texture: coarse ☒ fine ☐ organic ☐

Slope: | Aspect: | Elevation (m):

Site Location (and directions how to get there): polygon: 0.136 ha total IMC - Stockpile 36

Site Comments (anything else important /useful):
- 1) area not assessed due to active construction
- mature vegetation throughout majority of the site

Invasive Plant Survey Details

Survey Agency: * DWB Consulting | Employer: | Surveyor(s): KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
OD	0.136	7	4	C [X] O [ ] P [ ]	[X]	[X]	[X]
YH	0.136	7	4	C [X] O [ ] P [ ]	[X]	[X]	[X]
CT	0.136	6	3	C [X] O [ ] P [ ]	[X]	[X]	[X]

Site Image Details

Date taken (YYYY-MM-DD): | **Reference No.** * | **Perspective:** * (see reverse for codes) | Image Comments:

* *indicates mandatory field - this form may be used for 2 sites, with their invasive plant surveys, and site images (if taken).*

IAPP Site & Invasive Plant Survey Record

BRITISH COLUMBIA
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Entered into IAPP (YYYY-MM-DD):	By:	Assigned Site IDs recorded on this form: ☐

Site Created Date (YYYY-MM-DD): * | **Invasive Plant Survey Date** (YYYY-MM-DD): * (only if different from Site Created Date) 2023-07-~~25~~ 26 | **Site ID:** (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes) Mt. Polley | District Lot Nr: | Range Unit: | Site Paper File ID:

UTM Zone: * 10 U | **UTM Easting:** * (no initial zero) 5 9 5 2 6 2 | **UTM Northing:** * (7 digits) 5 8 2 0 4 3 2 | Site Soil Texture: coarse ☒ fine ☐ organic ☐

Slope: | Aspect: | Elevation (m):

Site Location (and directions how to get there):

IMC - Stockpile 47 cont.

Site specific use: *

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: * DWB Consulting | Employer: | Surveyor(s): KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
MU	1.58	2	2	C [X] O [ ] P [ ]	[X]	[X]	[X]
SO	1.58	2	2	C [X] O [ ] P [ ]	[X]	[X]	[X]
YH	1.58	5	2	C [X] O [ ] P [ ]	[X]	[X]	[X]

Site Image Details

Date taken (YYYY-MM-DD): | **Reference No.** * | **Perspective:** * (see reverse for codes) | Image Comments:

Site Created Date (YYYY-MM-DD): * | **Invasive Plant Survey Date** (YYYY-MM-DD): * (only if different from Site Created Date) | **Site ID:** (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes) Mt. Polley | District Lot Nr: | Range Unit: | Site Paper File ID:

UTM Zone: * 10 U | **UTM Easting:** * (no initial zero) 5 9 5 2 6 2 | **UTM Northing:** * (7 digits) 5 8 2 0 4 3 2 | Site Soil Texture: coarse ☒ fine ☐ organic ☐

Slope: | Aspect: | Elevation (m):

Site Location (and directions how to get there):

IMC - Stockpile 47 cont.

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: * DWB Consulting | Employer: | Surveyor(s): KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
WG	0.0025	3	3	C [X] O [ ] P [ ]	[X]	[X]	[X]
				C [ ] O [ ] P [ ]	[ ]	[ ]	[ ]
				C [ ] O [ ] P [ ]	[ ]	[ ]	[ ]

Site Image Details

Date taken (YYYY-MM-DD): | **Reference No.** * | **Perspective:** * (see reverse for codes) | Image Comments:

* *indicates mandatory field - this form may be used for 2 sites, with their invasive plant surveys, and site images (if taken).*

IAPP Site & Invasive Plant Survey Record

BRITISH COLUMBIA
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Entered into IAPP (YYYY-MM-DD):	By:	Assigned Site IDs recorded on this form: ☐

Site Created Date (YYYY-MM-DD): *	Invasive Plant Survey Date (YYYY-MM-DD): * (only if different from Site Created Date) 2023-07-~~25~~ 26	Site ID: (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes)	District Lot Nr:	Range Unit:	Site Paper File ID:
Mt. Polley			

UTM Zone: *	UTM Easting: * (no initial zero)	UTM Northing: * (7 digits)	Site Soil Texture:
10 U	595356	5820348	coarse ☒ fine ☐ organic ☐

Slope:	Aspect:	Elevation (m):	Site specific use: *

Site Location (and directions how to get there):

IMC - Stockpile 48 cont.

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: *	Employer:	Surveyor(s):
DWB Consulting		KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
SO	3.4	4	2	C [X] O [ ] P [ ]	[X]	[X]	[X]
BT	3.4	4	2	C [X] O [ ] P [ ]	[X]	[X]	[X]
YH	3.4	5	2	C [X] O [ ] P [ ]	[X]	[X]	[X]

Site Image Details

Date taken (YYYY-MM-DD):	Reference No. *	Perspective: * (see reverse for codes)	Image Comments:

Site Created Date (YYYY-MM-DD): *	Invasive Plant Survey Date (YYYY-MM-DD): * (only if different from Site Created Date)	Site ID: (assigned at IAPP data entry)
2023-07-26		

Site Details

Jurisdiction: * (see reverse for choices/codes)	District Lot Nr:	Range Unit:	Site Paper File ID:
Mt. Polley			

UTM Zone: *	UTM Easting: * (no initial zero)	UTM Northing: * (7 digits)	Site Soil Texture:
10 U	595262	5820343	coarse ☒ fine ☐ organic ☐

Slope:	Aspect:	Elevation (m):	

Site Location (and directions how to get there):

IMC - Stockpile 47

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: *	Employer:	Surveyor(s):
DWB Consulting		KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
CT	1.58	6	4	C [X] O [ ] P [ ]	[X]	[X]	[X]
OD	1.58	4	2	C [X] O [ ] P [ ]	[X]	[X]	[X]
BT	1.58	2	2	C [X] O [ ] P [ ]	[X]	[X]	[X]

Site Image Details

Date taken (YYYY-MM-DD):	Reference No. *	Perspective: * (see reverse for codes)	Image Comments:

* *indicates mandatory field - this form may be used for 2 sites, with their invasive plant surveys, and site images (if taken).*

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IAPP Site & Invasive Plant Survey Record

Entered into IAPP (YYYY-MM-DD):	By:	Assigned Site IDs recorded on this form: ☐

Site Created Date (YYYY-MM-DD): *	Invasive Plant Survey Date (YYYY-MM-DD): * (only if different from Site Created Date)	Site ID: (assigned at IAPP data entry)
2023-07-27	2023-07-~~25~~27	

Site Details

Jurisdiction: * (see reverse for choices/codes)	District Lot Nr:	Range Unit:	Site Paper File ID:
Mt. Polley			

UTM Zone: *	UTM Easting: * (no initial zero)	UTM Northing: * (7 digits)	Site Soil Texture:
10 U	5 9 5 4 6 6	5 8 1 9 9 6 3	coarse ☒ fine ☐ organic ☐

Slope:	Aspect:	Elevation (m):	Site specific use: *

Site Location (and directions how to get there):

IMC - Stockpile 49

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: *	Employer:	Surveyor(s):
DWB Consulting		KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
CT	0.35	6	3	C [X] O [ ] P [ ]	[X]	[X]	[X]
BT	0.35	4	3	C [X] O [ ] P [ ]	[X]	[X]	[X]
OD	0.35	4	4	C [X] O [ ] P [ ]	[X]	[X]	[X]

Site Image Details

Date taken (YYYY-MM-DD):	Reference No. *	Perspective: * (see reverse for codes)	Image Comments:

Site Created Date (YYYY-MM-DD): *	Invasive Plant Survey Date (YYYY-MM-DD): * (only if different from Site Created Date)	Site ID: (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes)	District Lot Nr:	Range Unit:	Site Paper File ID:
Mt. Polley			

UTM Zone: *	UTM Easting: * (no initial zero)	UTM Northing: * (7 digits)	Site Soil Texture:
10 U	5 9 5 4 6 6	5 8 1 9 9 6 3	coarse ☒ fine ☐ organic ☐

Slope:	Aspect:	Elevation (m):	

Site Location (and directions how to get there):

IMC - Stockpile 49 cont.

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: *	Employer:	Surveyor(s):
DWB Consulting		KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
SO	0.0004	3	4	C [X] O [ ] P [ ]	[X]	[X]	[X]
YH	0.0006	3	3	C [X] O [ ] P [ ]	[X]	[X]	[X]
				C [ ] O [ ] P [ ]	[ ]	[ ]	[ ]

Site Image Details

Date taken (YYYY-MM-DD):	Reference No. *	Perspective: * (see reverse for codes)	Image Comments:

* *indicates mandatory field - this form may be used for 2 sites, with their invasive plant surveys, and site images (if taken).*

IAPP Site & Invasive Plant Survey Record

BRITISH COLUMBIA
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Entered into IAPP (YYYY-MM-DD):	By:	Assigned Site IDs recorded on this form: ☐

Site Created Date (YYYY-MM-DD): * | **Invasive Plant Survey Date** (YYYY-MM-DD): * (only if different from Site Created Date) 2023-07-~~25~~26 | **Site ID:** (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes) Mt. Polley | District Lot Nr: | Range Unit: | Site Paper File ID:

UTM Zone: * 10 U | **UTM Easting:** * (no initial zero) 5 9 4 3 1 6 | **UTM Northing:** * (7 digits) 5 8 2 1 2 2 6 | Site Soil Texture: coarse ☒ fine ☐ organic ☐

Slope: | Aspect: | Elevation (m):

Site Location (and directions how to get there): IMC - Stockpile 50 cont.

Site specific use: *

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: * DWB Consulting | Employer: | Surveyor(s): KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
WG	1.8	4	2	C X O ☐ P ☐	X	X	X
SO	1.8	4	2	C X O ☐ P ☐	X	X	X
MU	1.8	5	3	C X O ☐ P ☐	X	X	X

Site Image Details

Date taken (YYYY-MM-DD):	Reference No. *	Perspective: * (see reverse for codes)	Image Comments:

Site Created Date (YYYY-MM-DD): * | **Invasive Plant Survey Date** (YYYY-MM-DD): * (only if different from Site Created Date) | **Site ID:** (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes) Mt. Polley | District Lot Nr: | Range Unit: | Site Paper File ID:

UTM Zone: * 10 U | **UTM Easting:** * (no initial zero) 5 9 4 1 9 5 | **UTM Northing:** * (7 digits) 5 8 2 1 4 5 8 | Site Soil Texture: coarse ☒ fine ☐ organic ☐

Slope: | Aspect: | Elevation (m):

Site Location (and directions how to get there): IMC - Stockpile 30

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: * DWB Consulting | Employer: | Surveyor(s): KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
WG	0.001	2	1	C ☒ O ☐ P ☐	☒	☒	☒
MU	0.0003	2	2	C ☒ O ☐ P ☐	☒	☒	☒
SO	0.0005	2	2	C ☒ O ☐ P ☐	☒	☒	☒

Site Image Details

Date taken (YYYY-MM-DD):	Reference No. *	Perspective: * (see reverse for codes)	Image Comments:

* *indicates mandatory field - this form may be used for 2 sites, with their invasive plant surveys, and site images (if taken).*

IAPP Site & Invasive Plant Survey Record

BRITISH COLUMBIA
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Entered into IAPP (YYYY-MM-DD):	By:	Assigned Site IDs recorded on this form: ☐

Site Created Date (YYYY-MM-DD): * | **Invasive Plant Survey Date** (YYYY-MM-DD): * (only if different from Site Created Date) 2023-07-~~28~~ 26 | **Site ID:** (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes) Mt. Polley | District Lot Nr: | Range Unit: | Site Paper File ID:

UTM Zone: * 10 U | **UTM Easting:** * (no initial zero) 5 9 4 4 3 4 | **UTM Northing:** * (7 digits) 5 8 2 1 6 2 7 | Site Soil Texture: coarse ☒ fine ☐ organic ☐

Slope: | Aspect: | Elevation (m): | Site specific use: *

Site Location (and directions how to get there): IMC - Stockpile 51 cont.

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: * DWB Consulting | Employer: | Surveyor(s): KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
BT	1.41	4	2	C [X] O [ ] P [ ]	[X]	[X]	[X]
CT	1.41	4	2	C [X] O [ ] P [ ]	[X]	[X]	[X]
SO	1.41	4	2	C [X] O [ ] P [ ]	[X]	[X]	[X]

Site Image Details

Date taken (YYYY-MM-DD): | **Reference No.** * | **Perspective:** * (see reverse for codes) | Image Comments:

Site Created Date (YYYY-MM-DD): * 2023-07-26 | **Invasive Plant Survey Date** (YYYY-MM-DD): * (only if different from Site Created Date) | **Site ID:** (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes) Mt. Polley | District Lot Nr: | Range Unit: | Site Paper File ID:

UTM Zone: * 10 U | **UTM Easting:** * (no initial zero) 5 9 5 3 5 6 | **UTM Northing:** * (7 digits) 5 8 2 0 3 4 8 | Site Soil Texture: coarse ☒ fine ☐ organic ☐

Slope: | Aspect: | Elevation (m):

Site Location (and directions how to get there): IMC - Stockpile 48

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: * DWB Consulting | Employer: | Surveyor(s): KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
CT	3.4	7	4	C [X] O [ ] P [ ]	[X]	[X]	[X]
OD	3.4	7	3	C [X] O [ ] P [ ]	[X]	[X]	[X]
MU	3.4	4	2	C [X] O [ ] P [ ]	[X]	[X]	[X]

Site Image Details

Date taken (YYYY-MM-DD): | **Reference No.** * | **Perspective:** * (see reverse for codes) | Image Comments:

* *indicates mandatory field - this form may be used for 2 sites, with their invasive plant surveys, and site images (if taken).*

IAPP Site & Invasive Plant Survey Record

BRITISH COLUMBIA
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Entered into IAPP (YYYY-MM-DD):	By:	Assigned Site IDs recorded on this form: ☐

Site Created Date (YYYY-MM-DD): *	Invasive Plant Survey Date (YYYY-MM-DD): * (only if different from Site Created Date)	Site ID: (assigned at IAPP data entry)
2023-07-25		

Site Details

Jurisdiction: * (see reverse for choices/codes)	District Lot Nr:	Range Unit:	Site Paper File ID:
Mt. Polley			

UTM Zone: *	UTM Easting: * (no initial zero)	UTM Northing: * (7 digits)	Site Soil Texture:
10 U	597283	5822369	coarse ☒ fine ☐ organic ☐

Slope:	Aspect:	Elevation (m):	Site specific use: *

Site Location (and directions how to get there):

IMC - Stockpile 53

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: *	Employer:	Surveyor(s):
DWB Consulting		KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
CT	0.29	6	4	C ☒ O ☐ P ☐	☒	☒	☒
SH	0.29	5	3	C ☒ O ☐ P ☐	☒	☒	☒
OD	0.29	8	4	C ☒ O ☐ P ☐	☒	☒	☒

Site Image Details

Date taken (YYYY-MM-DD):	Reference No. *	Perspective: * (see reverse for codes)	Image Comments:

Site Created Date (YYYY-MM-DD): *	Invasive Plant Survey Date (YYYY-MM-DD): * (only if different from Site Created Date)	Site ID: (assigned at IAPP data entry)
2023-07-25		

Site Details

Jurisdiction: * (see reverse for choices/codes)	District Lot Nr:	Range Unit:	Site Paper File ID:

UTM Zone: *	UTM Easting: * (no initial zero)	UTM Northing: * (7 digits)	Site Soil Texture:
	597283	5822369	coarse ☒ fine ☐ organic ☐

Slope:	Aspect:	Elevation (m):	

Site Location (and directions how to get there):

IMC - Stockpile 53 cont.

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: *	Employer:	Surveyor(s):
DWB Consulting		KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
BT	0.29	5	2	C ☐ O ☐ P ☐	☐	☐	☐
WG	0.29	2	2	C ☐ O ☐ P ☐	☐	☐	☐
				C ☐ O ☐ P ☐	☐	☐	☐

Site Image Details

Date taken (YYYY-MM-DD):	Reference No. *	Perspective: * (see reverse for codes)	Image Comments:

* *indicates mandatory field - this form may be used for 2 sites, with their invasive plant surveys, and site images (if taken).*

IAPP Site & Invasive Plant Survey Record

BRITISH COLUMBIA
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Entered into IAPP (YYYY-MM-DD):	By:	Assigned Site IDs recorded on this form: ☐

Site Created Date (YYYY-MM-DD): * 2023-07-27 | **Invasive Plant Survey Date** (YYYY-MM-DD): * (only if different from Site Created Date) 2023-07-~~28~~ 27 | **Site ID:** (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes) Mt. Polley | District Lot Nr: | Range Unit: | Site Paper File ID:

UTM Zone: * 10 U | **UTM Easting:** * (no initial zero) 594442 | **UTM Northing:** * (7 digits) 5822123 | Site Soil Texture: coarse ☒ fine ☐ organic ☐

Slope: | Aspect: | Elevation (m): | Site specific use: *

Site Location (and directions how to get there):

IMC - Stockpile 55

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: * DWB Consulting | Employer: | Surveyor(s): KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
OD	1.3	7	3	C [X] O [ ] P [ ]	[X]	[X]	[X]
CT	1.3	6	4	C [X] O [ ] P [ ]	[X]	[X]	[X]
BT	1.3	2	2	C [X] O [ ] P [ ]	[X]	[X]	[X]

Site Image Details

Date taken (YYYY-MM-DD): | **Reference No.** * | **Perspective:** * (see reverse for codes) | Image Comments:

Site Created Date (YYYY-MM-DD): * | **Invasive Plant Survey Date** (YYYY-MM-DD): * (only if different from Site Created Date) | **Site ID:** (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes) Mt. Polley | District Lot Nr: | Range Unit: | Site Paper File ID:

UTM Zone: * 10 U | **UTM Easting:** * (no initial zero) 594442 | **UTM Northing:** * (7 digits) 5822123 | Site Soil Texture: coarse ☒ fine ☐ organic ☐

Slope: | Aspect: | Elevation (m):

Site Location (and directions how to get there):

IMC - Stockpile 55 cont.

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: * DWB Consulting | Employer: | Surveyor(s): KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
MU	6	7	3	C [X] O [ ] P [ ]	[X]	[X]	[X]
YH	2.5	7	3	C [X] O [ ] P [ ]	[X]	[X]	[X]
				C [ ] O [ ] P [ ]	[ ]	[ ]	[ ]

Site Image Details

Date taken (YYYY-MM-DD): | **Reference No.** * | **Perspective:** * (see reverse for codes) | Image Comments:

* *indicates mandatory field - this form may be used for 2 sites, with their invasive plant surveys, and site images (if taken).*

IAPP Site & Invasive Plant Survey Record

BRITISH COLUMBIA
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Entered into IAPP (YYYY-MM-DD):	By:	Assigned Site IDs recorded on this form: ☐

Site Created Date (YYYY-MM-DD): * 2023-07-26

Invasive Plant Survey Date (YYYY-MM-DD): * (only if different from Site Created Date) 2023-07-~~25~~ 26

Site ID: (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes) Mt. Polley

District Lot Nr:

Range Unit:

Site Paper File ID:

UTM Zone: * 10 U

UTM Easting: * (no initial zero) 5 9 3 1 3 3

UTM Northing: * (7 digits) 5 8 2 3 3 9 2

Site Soil Texture: coarse ☒ fine ☐ organic ☐

Slope:

Aspect:

Elevation (m):

Site Location (and directions how to get there):

IMC - Stockpile 56

Site specific use: *

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: * DWB Consulting

Employer:

Surveyor(s): KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
WG	0.34	5	2	C ☒ O ☐ P ☐	☒	☒	☒
OD	0.34	7	3	C ☒ O ☐ P ☐	☒	☒	☒
MU	0.0008	2	1	C ☒ O ☐ P ☐	☒	☒	☒

Site Image Details

Date taken (YYYY-MM-DD):	Reference No. *	Perspective: * (see reverse for codes)	Image Comments:

Site Created Date (YYYY-MM-DD): *

Invasive Plant Survey Date (YYYY-MM-DD): * (only if different from Site Created Date)

Site ID: (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes) Mt. Polley

District Lot Nr:

Range Unit:

Site Paper File ID:

UTM Zone: * 10 U

UTM Easting: * (no initial zero) 5 9 3 1 3 3

UTM Northing: * (7 digits) 5 8 2 3 3 9 2

Site Soil Texture: coarse ☒ fine ☐ organic ☐

Slope:

Aspect:

Elevation (m):

Site Location (and directions how to get there):

IMC - Stockpile 56 cont.

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: * DWB Consulting

Employer:

Surveyor(s): KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
BT	0.34	2	1	C ☒ O ☐ P ☐	☒	☒	☒
YH	0.34	7	3	C ☒ O ☐ P ☐	☒	☒	☒
				C ☐ O ☐ P ☐	☐	☐	☐

Site Image Details

Date taken (YYYY-MM-DD):	Reference No. *	Perspective: * (see reverse for codes)	Image Comments:

* *indicates mandatory field - this form may be used for 2 sites, with their invasive plant surveys, and site images (if taken).*

IAPP Site & Invasive Plant Survey Record

BRITISH COLUMBIA
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Entered into IAPP (YYYY-MM-DD):	By:	Assigned Site IDs recorded on this form: ☐

Site Created Date (YYYY-MM-DD): * 2023-07-26 | **Invasive Plant Survey Date** (YYYY-MM-DD): * (only if different from Site Created Date) 2023-07-~~25~~26 | **Site ID:** (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes)	District Lot Nr:	Range Unit:	Site Paper File ID:
Mt. Polley			

UTM Zone: *	UTM Easting: * (no initial zero)	UTM Northing: * (7 digits)	Site Soil Texture:
10 U	5 9 3 2 1 2	5 3 [illegible] 3 0 9 2	coarse ☒ fine ☐ organic ☐

Slope:	Aspect:	Elevation (m):	Site specific use: *

Site Location (and directions how to get there):

IMC - Stockpile 57

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: *	Employer:	Surveyor(s):
DWB Consulting		KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
OD	0.32	5	3	C ☒ O ☐ P ☐	☒	☒	☒
BT	0.32	2	1	C ☒ O ☐ P ☐	☒	☒	☒
YH	0.32	5	2	C ☒ O ☐ P ☐	☒	☒	☒

Site Image Details

Date taken (YYYY-MM-DD):	Reference No. *	Perspective: * (see reverse for codes)	Image Comments:

Site Created Date (YYYY-MM-DD): * | **Invasive Plant Survey Date** (YYYY-MM-DD): * (only if different from Site Created Date) | **Site ID:** (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes)	District Lot Nr:	Range Unit:	Site Paper File ID:
Mt. Polley			

UTM Zone: *	UTM Easting: * (no initial zero)	UTM Northing: * (7 digits)	Site Soil Texture:
10 U	5 9 3 2 1 2	5 3 [illegible] 3 0 9 2	coarse ☒ fine ☐ organic ☐

Slope:	Aspect:	Elevation (m):	

Site Location (and directions how to get there):

IMC - Stockpile 57 cont.

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: *	Employer:	Surveyor(s):
DWB Consulting		KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
WG	0.32	2	2	C ☒ O ☐ P ☐	☒	☒	☒
				C ☐ O ☐ P ☐	☐	☐	☐
				C ☐ O ☐ P ☐	☐	☐	☐

Site Image Details

Date taken (YYYY-MM-DD):	Reference No. *	Perspective: * (see reverse for codes)	Image Comments:

* *indicates mandatory field - this form may be used for 2 sites, with their invasive plant surveys, and site images (if taken).*

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IAPP Site & Invasive Plant Survey Record

Entered into IAPP (YYYY-MM-DD):	By:	Assigned Site IDs recorded on this form: ☐

Site Created Date (YYYY-MM-DD): * 2023-07-26 | **Invasive Plant Survey Date** (YYYY-MM-DD): * (only if different from Site Created Date) 2023-07-26 | **Site ID:** (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes) Mt. Polley | District Lot Nr: | Range Unit: | Site Paper File ID:

UTM Zone: * 10 U | **UTM Easting:** * (no initial zero) 594050 | **UTM Northing:** * (7 digits) 5820377 | Site Soil Texture: coarse ☒ fine ☐ organic ☐

Slope: | Aspect: | Elevation (m):

Site Location (and directions how to get there):

IMC - Stockpile 58

Site specific use: *

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: * DWB Consulting | Employer: | Surveyor(s): KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
CT	0.31	8	4	C ☒ O ☐ P ☐	☒	☒	☒
OD	0.31	6	4	C ☒ O ☐ P ☐	☒	☒	☒
YH	0.31	7	3	C ☒ O ☐ P ☐	☒	☒	☒

Site Image Details

Date taken (YYYY-MM-DD): | **Reference No.** * | **Perspective:** * (see reverse for codes) | Image Comments:

Site Created Date (YYYY-MM-DD): * | **Invasive Plant Survey Date** (YYYY-MM-DD): * (only if different from Site Created Date) | **Site ID:** (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes) Mt. Polley | District Lot Nr: | Range Unit: | Site Paper File ID:

UTM Zone: * 10 U | **UTM Easting:** * (no initial zero) 594050 | **UTM Northing:** * (7 digits) 5820377 | Site Soil Texture: coarse ☒ fine ☐ organic ☐

Slope: | Aspect: | Elevation (m):

Site Location (and directions how to get there):

IMC - Stockpile 58 cont.

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: * DWB Consulting | Employer: | Surveyor(s): KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
MU	0.0001	1	1	C ☒ O ☐ P ☐	☒	☒	☒
WG	0.005	4	2	C ☒ O ☐ P ☐	☒	☒	☒
				C ☐ O ☐ P ☐	☐	☐	☐

Site Image Details

Date taken (YYYY-MM-DD): | **Reference No.** * | **Perspective:** * (see reverse for codes) | Image Comments:

* *indicates mandatory field - this form may be used for 2 sites, with their invasive plant surveys, and site images (if taken).*

IAPP Site & Invasive Plant Survey Record

BRITISH COLUMBIA
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Entered into IAPP (YYYY-MM-DD):	By:	Assigned Site IDs recorded on this form: ☐

Site Created Date (YYYY-MM-DD): * 2023-07-26 | **Invasive Plant Survey Date** (YYYY-MM-DD): * (only if different from Site Created Date) 2023-07-~~28~~ 26 | **Site ID:** (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes) Mt. Polley | District Lot Nr: | Range Unit: | Site Paper File ID:

UTM Zone: * 10 U | **UTM Easting:** * (no initial zero) 5 0 3 8 8 3 | **UTM Northing:** * (7 digits) 5 8 2 1 1 4 9 | Site Soil Texture: coarse ☒ fine ☐ organic ☐

Slope: | Aspect: | Elevation (m): | Site specific use: *

Site Location (and directions how to get there):

IMC - Stockpile 60

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: * DWB Consulting | Employer: | Surveyor(s): KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
CT	0.044	4	3	C [X] O [ ] P [ ]	[X]	[X]	[X]
BC	0.044	4	3	C [X] O [ ] P [ ]	[X]	[X]	[X]
BT	0.044	5	2	C [X] O [ ] P [ ]	[X]	[X]	[X]

Site Image Details

Date taken (YYYY-MM-DD): | **Reference No.** * | **Perspective:** * (see reverse for codes) | Image Comments:

Site Created Date (YYYY-MM-DD): * | **Invasive Plant Survey Date** (YYYY-MM-DD): * (only if different from Site Created Date) | **Site ID:** (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes) Mt. Polley | District Lot Nr: | Range Unit: | Site Paper File ID:

UTM Zone: * 10 U | **UTM Easting:** * (no initial zero) 5 9 3 8 8 0 | **UTM Northing:** * (7 digits) 5 8 2 1 1 4 9 | Site Soil Texture: coarse ☒ fine ☐ organic ☐

Slope: | Aspect: | Elevation (m): |

Site Location (and directions how to get there):

IMC - Stockpile 60 cont.

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: * DWB Consulting | Employer: | Surveyor(s): KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
MU	0.03	3	3	C [X] O [ ] P [ ]	[X]	[X]	[X]
				C [ ] O [ ] P [ ]	[ ]	[ ]	[ ]
				C [ ] O [ ] P [ ]	[ ]	[ ]	[ ]

Site Image Details

Date taken (YYYY-MM-DD): | **Reference No.** * | **Perspective:** * (see reverse for codes) | Image Comments:

* *indicates mandatory field - this form may be used for 2 sites, with their invasive plant surveys, and site images (if taken).*

IAPP Site & Invasive Plant Survey Record

BRITISH COLUMBIA
The Best Place on Earth

Entered into IAPP (YYYY-MM-DD):	By:	Assigned Site IDs recorded on this form: ☐

Site Created Date (YYYY-MM-DD): * 2023-07-26

Invasive Plant Survey Date (YYYY-MM-DD): * (only if different from Site Created Date) 2023-07-~~28~~ 26

Site ID: (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes) Mt. Polley

District Lot Nr:

Range Unit:

Site Paper File ID:

UTM Zone: * 10 U

UTM Easting: * (no initial zero) 594524

UTM Northing: * (7 digits) 5862142

Site Soil Texture: coarse ☒ fine ☐ organic ☐

Slope:

Aspect:

Elevation (m):

Site specific use: *

Site Location (and directions how to get there):

IMC - Stockpile 61

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: * DWB Consulting

Employer:

Surveyor(s): KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
CT	0.52	8	4	C [X] O [ ] P [ ]	[X]	[X]	[X]
BT	0.52	4	2	C [X] O [ ] P [ ]	[X]	[X]	[X]
WG	0.003	4	2	C [X] O [ ] P [ ]	[X]	[X]	[X]

Site Image Details

Date taken (YYYY-MM-DD):	Reference No. *	Perspective: * (see reverse for codes)	Image Comments:

Site Created Date (YYYY-MM-DD): *

Invasive Plant Survey Date (YYYY-MM-DD): * (only if different from Site Created Date)

Site ID: (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes) Mt. Polley

District Lot Nr:

Range Unit:

Site Paper File ID:

UTM Zone: * 10 U

UTM Easting: * (no initial zero) 593452

UTM Northing: * (7 digits) 5862142

Site Soil Texture: coarse ☒ fine ☐ organic ☐

Slope:

Aspect:

Elevation (m):

Site Location (and directions how to get there):

IMC - Stockpile 61 cont.

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: * DWB Consulting

Employer:

Surveyor(s): KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
OD	0.52	7	3	C [X] O [ ] P [ ]	[X]	[X]	[X]
				C [ ] O [ ] P [ ]	[ ]	[ ]	[ ]
				C [ ] O [ ] P [ ]	[ ]	[ ]	[ ]

Site Image Details

Date taken (YYYY-MM-DD):	Reference No. *	Perspective: * (see reverse for codes)	Image Comments:

* *indicates mandatory field - this form may be used for 2 sites, with their invasive plant surveys, and site images (if taken).*

IAPP Site & Invasive Plant Survey Record

BRITISH COLUMBIA
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Entered into IAPP (YYYY-MM-DD):	By:	Assigned Site IDs recorded on this form: ☐

Site Created Date (YYYY-MM-DD): *	Invasive Plant Survey Date (YYYY-MM-DD): * (only if different from Site Created Date)	Site ID: (assigned at IAPP data entry)
2023-07-26	2023-07-~~25~~ 26	

Site Details

Jurisdiction: * (see reverse for choices/codes)	District Lot Nr:	Range Unit:	Site Paper File ID:
Mt. Polley			

UTM Zone: *	UTM Easting: * (no initial zero)	UTM Northing: * (7 digits)	Site Soil Texture:
10 U	5 9 3 8 5 3	5 8 2 1 1 0 3	coarse ☒ fine ☐ organic ☐

Slope:	Aspect:	Elevation (m):	Site specific use: *

Site Location (and directions how to get there):

IMC - Stockpile 63

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: *	Employer:	Surveyor(s):
DWB Consulting		KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
CT	0.1	6	4	C ☒ O ☐ P ☐	☒	☒	☒
PT	0.1	4	2	C ☒ O ☐ P ☐	☒	☒	☒
[illegible]	0.1	5	3	C ☒ O ☐ P ☐	☒	☒	☒

Site Image Details

Date taken (YYYY-MM-DD):	Reference No. *	Perspective: * (see reverse for codes)	Image Comments:

Site Created Date (YYYY-MM-DD): *	Invasive Plant Survey Date (YYYY-MM-DD): * (only if different from Site Created Date)	Site ID: (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes)	District Lot Nr:	Range Unit:	Site Paper File ID:
Mt. Polley			

UTM Zone: *	UTM Easting: * (no initial zero)	UTM Northing: * (7 digits)	Site Soil Texture:
10 U	5 9 3 8 5 3	5 8 2 1 1 0 3	coarse ☒ fine ☐ organic ☐

Slope:	Aspect:	Elevation (m):	

Site Location (and directions how to get there):

IMC - Stockpile 65 cont.

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: *	Employer:	Surveyor(s):
DWB Consulting		KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
OH	3.0	6	1	C ☒ O ☐ P ☐	☒	☒	☒
[illegible]	[illegible]	[illegible]	[illegible]	C ☒ O ☐ P ☐	☒	☒	☒
YH	[illegible]	[illegible]	[illegible]	C ☒ O ☐ P ☐	☒	☒	☒

Site Image Details

Date taken (YYYY-MM-DD):	Reference No. *	Perspective: * (see reverse for codes)	Image Comments:

* *indicates mandatory field - this form may be used for 2 sites, with their invasive plant surveys, and site images (if taken).*

IAPP Site & Invasive Plant Survey Record

BRITISH COLUMBIA
The Best Place on Earth

Entered into IAPP (YYYY-MM-DD):	By:	Assigned Site IDs recorded on this form: ☐

Site Created Date (YYYY-MM-DD): * | **Invasive Plant Survey Date** (YYYY-MM-DD): * (only if different from Site Created Date) 2023-07-~~25~~ 27 | **Site ID:** (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes) Mt. Polley | District Lot Nr: | Range Unit: | Site Paper File ID:

UTM Zone: * 10 U | **UTM Easting:** * (no initial zero) 5 9 4 0 8 8 | **UTM Northing:** * (7 digits) 5 8 2 0 6 8 3 | Site Soil Texture: coarse ☒ fine ☐ organic ☐

Slope: | Aspect: | Elevation (m):

Site Location (and directions how to get there): IMC - Stockpile 64 cont

Site specific use: *

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: * DWB Consulting | Employer: | Surveyor(s): KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
MU	1.35	6	2	C [X] O [ ] P [ ]	[X]	[X]	[X]
SO	1.93	4	3	C [X] O [ ] P [ ]	[X]	[X]	[X]
YH	1.93	8	3	C [X] O [ ] P [ ]	[X]	[X]	[X]

Site Image Details

Date taken (YYYY-MM-DD): | **Reference No.** * | **Perspective:** * (see reverse for codes) | Image Comments:

Site Created Date (YYYY-MM-DD): * | **Invasive Plant Survey Date** (YYYY-MM-DD): * (only if different from Site Created Date) | **Site ID:** (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes) Mt. Polley | District Lot Nr: | Range Unit: | Site Paper File ID:

UTM Zone: * 10 U | **UTM Easting:** * (no initial zero) 5 9 4 0 8 8 | **UTM Northing:** * (7 digits) 5 8 2 0 6 8 3 | Site Soil Texture: coarse ☒ fine ☐ organic ☐

Slope: | Aspect: | Elevation (m):

Site Location (and directions how to get there): IMC - Stockpile 64 cont

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: * DWB Consulting | Employer: | Surveyor(s): KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
OH	1.93	6	4	C [X] O [ ] P [ ]	[X]	[X]	[X]
				C [ ] O [ ] P [ ]	[ ]	[ ]	[ ]
				C [ ] O [ ] P [ ]	[ ]	[ ]	[ ]

Site Image Details

Date taken (YYYY-MM-DD): | **Reference No.** * | **Perspective:** * (see reverse for codes) | Image Comments:

* *indicates mandatory field - this form may be used for 2 sites, with their invasive plant surveys, and site images (if taken).*

IAPP Site & Invasive Plant Survey Record

BRITISH COLUMBIA
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Entered into IAPP (YYYY-MM-DD):	By:	Assigned Site IDs recorded on this form: ☐

Site Created Date (YYYY-MM-DD): *	Invasive Plant Survey Date (YYYY-MM-DD): * (only if different from Site Created Date)	Site ID: (assigned at IAPP data entry)
2023-07-27	2023-07-27	

Site Details

Jurisdiction: * (see reverse for choices/codes)	District Lot Nr:	Range Unit:	Site Paper File ID:
Mt. Polley			

UTM Zone: *	UTM Easting: * (no initial zero)	UTM Northing: * (7 digits)	Site Soil Texture:
10 U	5 9 6 3 1 5	5 8 1 8 6 5 6	coarse ☒ fine ☐ organic ☐

Slope:	Aspect:	Elevation (m):	Site specific use: *

Site Location (and directions how to get there):

IMC - Stockpile 65

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: *	Employer:	Surveyor(s):
DWB Consulting		KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
CT	0.64	8	4	C ☒ O ☐ P ☐	☒	☒	☒
OD	0.5	8	3	C ☒ O ☐ P ☐	☒	☒	☒
MU	0.9	3	4	C ☒ O ☐ P ☐	☒	☒	☒

Site Image Details

Date taken (YYYY-MM-DD):	Reference No. *	Perspective: * (see reverse for codes)	Image Comments:

Site Created Date (YYYY-MM-DD): *	Invasive Plant Survey Date (YYYY-MM-DD): * (only if different from Site Created Date)	Site ID: (assigned at IAPP data entry)
2023-07-27		

Site Details

Jurisdiction: * (see reverse for choices/codes)	District Lot Nr:	Range Unit:	Site Paper File ID:
Mt. Polley			

UTM Zone: *	UTM Easting: * (no initial zero)	UTM Northing: * (7 digits)	Site Soil Texture:
10 U	5 9 6 3 1 5	5 8 1 8 6 5 6	coarse ☒ fine ☐ organic ☐

Slope:	Aspect:	Elevation (m):

Site Location (and directions how to get there):

IMC - Stockpile 65 cont.

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: *	Employer:	Surveyor(s):
DWB Consulting		KC, AI

Invasive Plants * Species name or code	Area * Dimension or Ha	Distr. Code (see reverse for codes)	Density Code	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
VH	0.64	8	4	C ☒ O ☐ P ☐	☒	☒	☒
BT	0.3	2	1	C ☒ O ☐ P ☐	☒	☒	☒
				C ☐ O ☐ P ☐	☐	☐	☐

Site Image Details

Date taken (YYYY-MM-DD):	Reference No. *	Perspective: * (see reverse for codes)	Image Comments:

* *indicates mandatory field - this form may be used for 2 sites, with their invasive plant surveys, and site images (if taken).*

IAPP Site & Invasive Plant Survey Record

BRITISH COLUMBIA
The Best Place on Earth

Entered into IAPP (YYYY-MM-DD):	By:	Assigned Site IDs recorded on this form: ☐

Site Created Date (YYYY-MM-DD): *	Invasive Plant Survey Date (YYYY-MM-DD): * (only if different from Site Created Date)	Site ID: (assigned at IAPP data entry)
	2023-07-25	

Site Details

Jurisdiction: * (see reverse for choices/codes)	District Lot Nr:	Range Unit:	Site Paper File ID:
Mt. Polley			

UTM Zone: *	UTM Easting: * (no initial zero)	UTM Northing: * (7 digits)	Site Soil Texture:
10 U	591385	5824746	coarse ☒ fine ☐ organic ☐

Slope:	Aspect:	Elevation (m):	Site specific use: *

Site Location (and directions how to get there):

IMC - Stockpile 66

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: *	Employer:	Surveyor(s):
DWB Consulting		KC, AI

Invasive Plants * Species name or code	Area * Dimension of (Ha)	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
OD	0.1	7	4	C ☒ O ☐ P ☐	☒	☒	☒
YH	0.1	3	3	C ☒ O ☐ P ☐	☒	☒	☒
BT	0.1	2	1	C ☒ O ☐ P ☐	☒	☒	☒

Site Image Details

Date taken (YYYY-MM-DD):	Reference No. *	Perspective: * (see reverse for codes)	Image Comments:

Site Created Date (YYYY-MM-DD): *	Invasive Plant Survey Date (YYYY-MM-DD): * (only if different from Site Created Date)	Site ID: (assigned at IAPP data entry)

Site Details

Jurisdiction: * (see reverse for choices/codes)	District Lot Nr:	Range Unit:	Site Paper File ID:
Mt Polley			

UTM Zone: *	UTM Easting: * (no initial zero)	UTM Northing: * (7 digits)	Site Soil Texture:
	591776	5824031	coarse ☒ fine ☐ organic ☐

Slope:	Aspect:	Elevation (m):	

Site Location (and directions how to get there):

IMC - Stockpile 20

Site Comments (anything else important /useful):

Invasive Plant Survey Details

Survey Agency: *	Employer:	Surveyor(s):
DWB Consulting		KC, AI

Invasive Plants * Species name or code	Area * Dimension of (Ha)	Distr. Code (see reverse for codes)	Density Code (see reverse for codes)	Survey Type * Cursory /Operational /Precise	Proposed Activity Man	Chem	Bio
YH	0.59	4	2	C ☒ O ☐ P ☐	☒	☒	☒
OH	0.001	2	1	C ☒ O ☐ P ☐	☒	☒	☒
BT	0.001	2	1	C ☒ O ☐ P ☐	☒	☒	☒

Site Image Details

Date taken (YYYY-MM-DD):	Reference No. *	Perspective: * (see reverse for codes)	Image Comments:

* *indicates mandatory field - this form may be used for 2 sites, with their invasive plant surveys, and site images (if taken).*

APPENDIX B

Site Photographs (July 25 to 28, 2023)

Photo 1. Stockpile 2: Oxeye daisy (*Leucanthemum vulgare*), Western goat's-beard (*Tragopogon dubius*), bull thistle (*Cirsium vulgare*), yellow hawkweed (*Hieracium* spps), orange hawkweed (*Hieracium aurantiacum*), and Canada thistle (*Cirsium arvense*) present. July 28th 2023.

Photo 2. Stockpile 3: Bull thistle (*Cirsium vulgare*), Canada thistle (*Cirsium arvense*), oxeye daisy (*Leucanthemum vulgare*), yellow hawkweed (*Hieracium pratense*), Mullein (*Verbascum thapsis*), and Western goat's-beard (*Tragopogon dubius*) present. July 26, 2023.

Photo 3. Stockpile 4: Oxeye daisy (*Leucanthemum vulgare*), Western goat's-beard (*Tragopogon dubius*), bull thistle (*Cirsium vulgare*), and yellow hawkweed (*Hieracium* spps) all present. July 26th 2023.

Photo 4. Stockpile 5: Western goat's-beard (*Tragopogon dubius*), bull thistle (*Cirsium vulgare*), and Canada thistle (*Cirsium arvense*) present. July 25th 2023.

Photo 5. Stockpile 6: Oxeye daisy (*Leucanthemum vulgare*), orange hawkweed (*Hieracium aurantiacum*), Western goat's-beard (*Tragopogon dubius*), bull thistle (*Cirsium vulgare*), and Canada thistle (*Cirsium arvense*) present. July 26th 2023.

Photo 6. Stockpile 7: Oxeye daisy (*Leucanthemum vulgare*), scentless chamomile (*Matricaria perforate*), Western goat's-beard (*Tragopogon dubius*), sow thistle (*Sonchus* spps), and Mullein (*Verbascum thapsis*) all present. July 25th 2023.

Photo 7. Stockpile 8: Oxeye daisy (*Leucanthemum vulgare*), scentless chamomile (*Matricaria perforate*), Western goat's-beard (*Tragopogon dubius*), Mullein (*Verbascum thapsis*), bull thistle (*Cirsium vulgare*), and yellow hawkweed (*Hieracium* spps) present. July 25th 2023.

Photo 8. Stockpile 10: Oxeye daisy (*Leucanthemum vulgare*), bull thistle (*Cirsium vulgare*), Canada thistle (*Cirsium arvense*), and yellow hawkweed (*Hieracium* spps) present. July 25th 2023.

Photo 9. Stockpile 12: Western goat's-beard (*Tragopogon dubius*), orange hawkweed (*Hieracium aurantiacum*), oxeye daisy (*Leucanthemum vulgare*), bull thistle (*Cirsium vulgare*)**,** Canada thistle (*Cirsium arvense*)**,** and yellow hawkweed (*Hieracium* spps) present. July 26th 2023.

Photo 10. Stockpile 13: Oxeye daisy (*Leucanthemum vulgare*), bull thistle (*Cirsium vulgare*)**,** Canada thistle (*Cirsium arvense*)**,** and Western goat's-beard (*Tragopogon dubius*) present. July 26th

Photo 11. Stockpile 14: Oxeye daisy (*Leucanthemum vulgare*), orange hawkweed (*Hieracium aurantiacum*), yellow hawkweed (*Hieracium* spps), Western goat's-beard (*Tragopogon dubius*), Mullein **(***Verbascum thapsis*), scentless chamomile **(***Matricaria perforate*), sow thistle (*Sonchus* spps)**,** and bull thistle (*Cirsium vulgare*) present. July 25th 2023.

Photo 12. Stockpile 15: Bull thistle (*Cirsium vulgare*)**,** Canada thistle (*Cirsium arvense*)**,** yellow hawkweed (*Hieracium* spps), oxeye daisy (*Leucanthemum vulgare*), Western goat's-beard (*Tragopogon dubius*), scentless chamomile **(***Matricaria perforate*), and Mullein **(***Verbascum thapsis*) present. July 25th 2023.

Photo 13. Stockpile 16: Bull thistle (*Cirsium vulgare*)**,** Canada thistle (*Cirsium arvense*)**,** yellow hawkweed (*Hieracium* spps), oxeye daisy (*Leucanthemum vulgare*), Western goat's-beard (*Tragopogon dubius*), Mullein **(***Verbascum thapsis*), and sow thistle (*Sonchus* spps) present. July 27th 2023.

Photo 14. Stockpile 17: Bull thistle (*Cirsium vulgare*)**,** Canada thistle (*Cirsium arvense*)**,** yellow hawkweed (*Hieracium* spps), oxeye daisy (*Leucanthemum vulgare*), Western goat's-beard (*Tragopogon dubius*), Mullein **(***Verbascum thapsis*), and sow thistle (*Sonchus* spps), and orange hawkweed (*Hieracium aurantiacum*) present. July 27th 2023.

Photo 15. Stockpile 18: Bull thistle (*Cirsium vulgare*)**,** Canada thistle (*Cirsium arvense*)**,** yellow hawkweed (*Hieracium* spps), oxeye daisy (*Leucanthemum vulgare*), Western goat's-beard (*Tragopogon dubius*), and orange hawkweed (*Hieracium aurantiacum*) present. July 25th 2023.

Photo 16. Stockpile 19: Canada thistle (*Cirsium arvense*)**,** yellow hawkweed (*Hieracium* spps), oxeye daisy (*Leucanthemum vulgare*), and Western goat's-beard (*Tragopogon dubius*). July 25th 2023.

Photo 17. Stockpile 20: Bull thistle (*Cirsium vulgare*)**,** orange hawkweed (*Hieracium aurantiacum*)**,** yellow hawkweed (*Hieracium* spps), oxeye daisy (*Leucanthemum vulgare*), and Western goat's-beard (*Tragopogon dubius*) present. July 25th 2023.

Photo 18. Stockpile 21: Yellow hawkweed (*Hieracium* spps), oxeye daisy (*Leucanthemum vulgare*), and Mullein **(***Verbascum thapsis*) present. July 25th 2023.

Photo 19. Stockpile 22: Yellow hawkweed (*Hieracium* spps), oxeye daisy (*Leucanthemum vulgare*), Western goat's-beard (*Tragopogon dubius*), sow thistle (*Sonchus* spps), Canada thistle (*Cirsium arvense*)**,** and bull thistle (*Cirsium vulgare*) present. July 27th 2023.

Photo 20. Stockpile 23: Canada thistle (*Cirsium arvense*)**,** Western goat's-beard (*Tragopogon dubius*), oxeye daisy (*Leucanthemum vulgare*), and sow thistle (*Sonchus* spps) present. July 27th 2023.

Photo 21. Stockpile 24: Oxeye daisy (*Leucanthemum vulgare*), Canada thistle (*Cirsium arvense*), bull thistle (*Cirsium vulgare*), scentless chamomile **(***Matricaria perforate*), Western goat's-beard (*Tragopogon dubius*), sow thistle (*Sonchus* spps), yellow hawkweed (*Hieracium* spps), and orange hawkweed (*Hieracium aurantiacum*) present. July 28th 2023.

Photo 22. Stockpile 25: Oxeye daisy (*Leucanthemum vulgare*), Western goat's-beard (*Tragopogon dubius*), yellow hawkweed (*Hieracium* spps), Canada thistle (*Cirsium arvense*), and Mullein **(***Verbascum thapsis*) present. July 25th 2023.

Photo 23. Stockpile 28: Canada thistle (*Cirsium arvense*), bull thistle (*Cirsium vulgare*), Western goat's-beard (*Tragopogon dubius*), sow thistle (*Sonchus* spps), orange hawkweed (*Hieracium aurantiacum*), and oxeye daisy (*Leucanthemum vulgare*) present. July 26th 2023.

Photo 24. Stockpile 30: Mullein **(***Verbascum thapsis*), Western goat's-beard (*Tragopogon dubius*), Canada thistle (*Cirsium arvense*), oxeye daisy (*Leucanthemum vulgare*), and sow thistle (*Sonchus* spps) present. July 26th 2023.

Photo 25. Stockpile 31: Western goat's-beard (*Tragopogon dubius*), Canada thistle (*Cirsium arvense*), oxeye daisy (*Leucanthemum vulgare*), and bull thistle (*Cirsium vulgare*). July 25th 2023.

Photo 26. Stockpile 32: Western goat's-beard (*Tragopogon dubius*), Canada thistle (*Cirsium arvense*), oxeye daisy (*Leucanthemum vulgare*), and bull thistle (*Cirsium vulgare*). July 26th 2023.

Photo 27. Stockpile 33: Western goat's-beard (*Tragopogon dubius*), oxeye daisy (*Leucanthemum vulgare*), and yellow hawkweed (*Hieracium* spps) present. July 26th 2023.

Photo 28. Stockpile 34: Canada thistle (*Cirsium arvense*), bull thistle (*Cirsium vulgare*), oxeye daisy (*Leucanthemum vulgare*), yellow hawkweed (*Hieracium* spps), Western goat's-beard (*Tragopogon dubius*), and orange hawkweed (*Hieracium aurantiacum*) present. July 27th 2023.

Photo 29. Stockpile 35: No invasive plants observed, stockpile buried with rock. July 26th 2023.

Photo 30. Stockpile 36: Oxeye daisy (*Leucanthemum vulgare*), yellow hawkweed (*Hieracium* spps), and Canada thistle (*Cirsium arvense*). July 26th 2023.

Photo 31. Stockpile 38: Canada thistle (*Cirsium arvense*), oxeye daisy (*Leucanthemum vulgare*), yellow hawkweed (*Hieracium* spps), Western goat's-beard (*Tragopogon dubius*), orange hawkweed (*Hieracium aurantiacum*), bull thistle (*Cirsium vulgare*), and Mullein **(***Verbascum thapsis*) present. July 27th 2023.

Photo 32. Stockpile 39: Canada thistle (*Cirsium arvense*), oxeye daisy (*Leucanthemum vulgare*), and yellow hawkweed (*Hieracium* spps) present. July 26th 2023.

Photo 33. Stockpile 40: Canada thistle (*Cirsium arvense*), oxeye daisy (*Leucanthemum vulgare*), sow thistle (*Sonchus* spps), bull thistle (*Cirsium vulgare*), and yellow hawkweed (*Hieracium* spps) present. July 27th 2023.

Photo 34. Stockpile 41: Canada thistle (*Cirsium arvense*), oxeye daisy (*Leucanthemum vulgare*), yellow hawkweed (*Hieracium* spps), Western goat's-beard (*Tragopogon dubius*), and bull thistle (*Cirsium vulgare*) present. July 27th 2023.

Photo 35. Stockpile 42: Canada thistle (*Cirsium arvense*), oxeye daisy (*Leucanthemum vulgare*), and Western goat's-beard (*Tragopogon dubius*) present. July 26th 2023.

Photo 36. Stockpile 44: Canada thistle (*Cirsium arvense*), oxeye daisy (*Leucanthemum vulgare*), bull thistle (*Cirsium vulgare*), yellow hawkweed (*Hieracium* spps), and orange hawkweed (*Hieracium aurantiacum*) present. July 27th 2023.

Photo 37. Stockpile 45: Oxeye daisy (*Leucanthemum vulgare*), bull thistle (*Cirsium vulgare*), Canada thistle (*Cirsium arvense*), yellow hawkweed (*Hieracium* spps), sow thistle (*Sonchus* spps), and Western goat's-beard (*Tragopogon dubius*) present. July 27th 2023.

Photo 38. Stockpile 46: Oxeye daisy (*Leucanthemum vulgare*), and Mullein **(***Verbascum thapsis*) present. July 26th 2023.

Photo 39. Stockpile 49: Oxeye daisy (*Leucanthemum vulgare*), bull thistle (*Cirsium vulgare*), Canada thistle (*Cirsium arvense*), yellow hawkweed (*Hieracium* spps), and sow thistle (*Sonchus* spps) present. July 27th 2023.

Photo 40. Stockpile 50: Mullein **(***Verbascum thapsis*), Western goat's-beard (*Tragopogon dubius*), sow thistle (*Sonchus* spps), oxeye daisy (*Leucanthemum vulgare*), bull thistle (*Cirsium vulgare*), and Canada thistle (*Cirsium arvense*) present. July 26th 2023.

Photo 41. Stockpile 52: No invasive plants observed, stockpile buried with rock. July 26th 2023.

Photo 42. Stockpile 53: Canada thistle (*Cirsium arvense*), oxeye daisy (*Leucanthemum vulgare*), bull thistle (*Cirsium vulgare*), Western goat's-beard (*Tragopogon dubius*), and scentless chamomile **(***Matricaria perforate*) present. July 25th 2023.

Photo 43. Stockpile 54: No invasive plants observed, stockpile buried with rock. July 28th 2023

Photo 44. Stockpile 55: Canada thistle (*Cirsium arvense*), oxeye daisy (*Leucanthemum vulgare*), bull thistle (*Cirsium vulgare*), Mullein **(***Verbascum thapsis*), and yellow hawkweed (*Hieracium* spps) present. July 25th 2023.

Photo 45. Stockpile 56: Oxeye daisy (*Leucanthemum vulgare*), bull thistle (*Cirsium vulgare*), Mullein **(***Verbascum thapsis*), yellow hawkweed (*Hieracium* spps), and Western goat's-beard (*Tragopogon dubius*) present. July 26th 2023.

Photo 46. Stockpile 57: : Oxeye daisy (*Leucanthemum vulgare*), bull thistle (*Cirsium vulgare*), yellow hawkweed (*Hieracium* spps), and Western goat's-beard (*Tragopogon dubius*) present. July 26th 2023.

Photo 47. Stockpile 59: Oxeye daisy (*Leucanthemum vulgare*), and yellow hawkweed (*Hieracium* spps) present. July 26th 2023.

Photo 48. Stockpile 61: Canada thistle (*Cirsium arvense*), oxeye daisy (*Leucanthemum vulgare*), bull thistle (*Cirsium vulgare*), and Western goat's-beard (*Tragopogon dubius*) present. July 26th 2023.

Photo 49. Stockpile 62: Oxeye daisy (*Leucanthemum vulgare*), yellow hawkweed (*Hieracium* spps), sow thistle (*Sonchus* spps) present. July 27th 2023.

Photo 50. Stockpile 63: Canada thistle (*Cirsium arvense*), oxeye daisy (*Leucanthemum vulgare*), bull thistle (*Cirsium vulgare*), yellow hawkweed (*Hieracium* spps), Western goat's-beard (*Tragopogon dubius*), and orange hawkweed (*Hieracium aurantiacum*) present. July 26th 2023.

Photo 51. Stockpile 64: Canada thistle (*Cirsium arvense*), oxeye daisy (*Leucanthemum vulgare*), bull thistle (*Cirsium vulgare*), yellow hawkweed (*Hieracium* spps), orange hawkweed (*Hieracium aurantiacum*), sow thistle (*Sonchus* spps), and Mullein **(***Verbascum thapsis*) present. July 27th 2023.

Photo 52. Stockpile 65: : Canada thistle (*Cirsium arvense*), oxeye daisy (*Leucanthemum vulgare*), bull thistle (*Cirsium vulgare*), yellow hawkweed (*Hieracium* spps), and Mullein **(***Verbascum thapsis*) present. July 27th 2023.

Photo 53. Stockpile 66: Oxeye daisy (*Leucanthemum vulgare*), bull thistle (*Cirsium vulgare*), and yellow hawkweed (*Hieracium* spps) present. July 25th 2023.

APPENDIX C

Results of Inventory of Invasive Plants

Table 5. Invasive Plants identified at Mount Polley Min between July 25-28, 2023 including polygon name, survey date, species code, approximately area of infestation (ha), distribution, density and comments. Species found include oxeye daisy (OD), orange hawkweed (OH), Canada thistle (CT), scentless chamomile (SH), bull thistle (BT), mullein (MU), sow thistle (SO), and Western goat's beard (WG).

Polygon Name	Survey Date	Species Code	Approximate Area of Infestation (ha)	Distribution	Density	Comments
Junction zone seepage sump road	2023-07-25	OD	1.24	8	4	All along road.
Junction zone seepage sump road	2023-07-25	OH	1.24	3	2	All along road.
Junction zone seepage sump road	2023-07-25	BT	1.24	4	2	All along road.
Junction zone seepage sump road	2023-07-25	CT	1.24	6	4	All along road.
North Bail Dump	2023-07-24	CT	1.87	5	2	Patches of CT throughout the polygon.
road to stockpile 10	2023-07-25	OD	6.33	8	4	All along road.
road to stockpile 10	2023-07-25	OH	6.33	4	2	All along road.
road to stockpile 10	2023-07-25	YH	6.33	4	2	All along road.
road to stockpile 10	2023-07-25	BT	6.33	2	1	All along road.
road to stockpile 10	2023-07-25	WG	6.33	2	1	All along road.
stockpile 0	2023-07-26	CT	0.001	3	4	CT in meadow on southeast side of polygon.
stockpile 0	2023-07-26	OD	2.78	7	3	Throughout polygon.
stockpile 0	2023-07-26	BT	2.78	4	2	BT at road entrance
stockpile 0	2023-07-26	WG	2.78	6	4	WG at road entrance and southeast side of polygon.
stockpile 0	2023-07-26	YH	2.78	6	4	YH within disturbed gravel area
stockpile 1	2023-07-26	OD	2.45	7	4	Throughout polygon.
stockpile 1	2023-07-26	CT	2.45	6	4	Patchy along entire length of road, some individuals sporadic throughout.
stockpile 1	2023-07-26	BT	2.45	6	3	Patchy along entire road.

Polygon Name	Survey Date	Species Code	Approximate Area of Infestation (ha)	Distribution	Density	Comments
stockpile 1	2023-07-26	SO	2.45	2	1	Throughout polygon.
stockpile 1	2023-07-26	WG	2.45	4	2	Throughout polygon.
stockpile 1	2023-07-26	YH	2.45	3	3	
stockpile 1	2023-07-26	SH	2.45	6	3	Patchy along entire length of road.
stockpile 1	2023-07-26	MU	2.45	3	3	One patch at southeast end.
stockpile 10	2023-07-25	OD	0.52	8	4	
stockpile 10	2023-07-25	CT	0.52	8	4	
stockpile 10	2023-07-25	BT	0.52	2	1	
stockpile 10	2023-07-25	YH	0.52	7	2	Along road.
stockpile 11	2023-07-26	CT	0.29	5	3	Sporadic throughout polygon.
stockpile 11	2023-07-26	OD	0.29	7	4	Throughout polygon.
stockpile 11	2023-07-26	MU	0.29	4	2	Throughout polygon.
stockpile 11	2023-07-26	BT	0.29	4	2	Sporadic throughout polygon.
stockpile 11	2023-07-26	WG	0.29	4	4	Throughout polygon.
stockpile 12	2023-07-26	YH	2.21	7	4	Throughout polygon.
stockpile 12	2023-07-26	OH	2.21	7	3	Throughout polygon.
stockpile 12	2023-07-26	OD	2.21	4	3	Throughout polygon.
stockpile 12	2023-07-26	CT	0.025	5	4	A few patches on southeast end of polygon
stockpile 12	2023-07-26	WG	0.0001	1	1	
stockpile 12	2023-07-26	BT	0.04	4	2	BT found on the W side of the polygon
stockpile 13	2023-07-26	CT	0.35	6	3	Throughout polygon.
stockpile 13	2023-07-26	BT	0.35	2	2	
stockpile 13	2023-07-26	OD	0.35	6	2	
stockpile 13	2023-07-26	WG	0.175	4	3	Half the polygon.
stockpile 14	2023-07-25	OD	1	8	4	Throughout entire polygon.
stockpile 14	2023-07-25	OH	0.0002	2	1	At southeast end of road.

Polygon Name	Survey Date	Species Code	Approximate Area of Infestation (ha)	Distribution	Density	Comments
stockpile 14	2023-07-25	WG	1	2	1	
stockpile 14	2023-07-25	MU	1	7	3	
stockpile 14	2023-07-25	YH	1	5	3	
stockpile 14	2023-07-25	SO	1	4	2	
stockpile 14	2023-07-25	SH	0.0001	3	2	
stockpile 14	2023-07-25	BT	1	2	1	Sporadic throughout polygon.
stockpile 15	2023-07-25	OD	3.63	7	3	Throughout entire polygon; higher density & distribution along roadway.
stockpile 15	2023-07-25	SH	3.63	6	3	Throughout entire polygon.
stockpile 15	2023-07-25	MU	3.63	6	3	Higher density & distribution along roadway.
stockpile 15	2023-07-25	WG	3.63	2	1	Throughout entire polygon.
stockpile 15	2023-07-25	YH	3.63	7	2	Throughout entire polygon.
stockpile 15	2023-07-25	CT	0.0025	2	2	On north side of polygon.
stockpile 15	2023-07-25	BT	3.63	4	2	On north side of polygon & some throughout.
stockpile 16	2023-07-27	BT	2	4	2	
stockpile 16	2023-07-27	CT	2.1	5	4	Throughout polygon.
stockpile 16	2023-07-27	MU	2	4	2	
stockpile 16	2023-07-27	WG	2.1	2	2	Throughout polygon.
stockpile 16	2023-07-27	YH	2.1	4	3	Throughout polygon.
stockpile 16	2023-07-27	OD	2.1	7	3	Throughout polygon.
stockpile 16	2023-07-27	SO	2	7	3	
stockpile 17	2023-07-27	OH	0.91	4	2	Throughout polygon.; approximately 50 m of the north end of the polygon covered in rock.
stockpile 17	2023-07-27	OD	0.91	8	4	Throughout polygon.; approximately 50 m of the north end of the polygon covered in rock.

Polygon Name	Survey Date	Species Code	Approximate Area of Infestation (ha)	Distribution	Density	Comments
stockpile 17	2023-07-27	SO	0.91	4	3	Throughout polygon.; approximately 50 m of the north end of the polygon covered in rock.
stockpile 17	2023-07-27	MU	0.91	4	2	Half the polygon; approximately 50 m of the north end of the polygon covered in rock.
stockpile 17	2023-07-27	BT	0.91	5	2	Throughout polygon.; approximately 50 m of the north end of the polygon covered in rock.
stockpile 17	2023-07-27	CT	0.91	5	2	Throughout polygon.; approximately 50 m of the north end of the polygon covered in rock.
stockpile 17	2023-07-27	WG	0.91	4	2	Throughout polygon.; approximately 50 m of the north end of the polygon covered in rock.
stockpile 17	2023-07-27	YH	0.91	7	3	Throughout polygon.; approximately 50 m of the north end of the polygon covered in rock.
stockpile 18	2023-07-25	OH	0.57	6	2	
stockpile 18	2023-07-25	OD	0.57	7	3	
stockpile 18	2023-07-25	YH	0.57	4	2	
stockpile 18	2023-07-25	CT	0.57	6	4	
stockpile 18	2023-07-25	BT	0.57	2	2	
stockpile 18	2023-07-25	WG	0.19	2	1	Only in 1/3 of polygon.
stockpile 19	2023-07-25	OD	0.39	2	2	
stockpile 19	2023-07-25	YH	0.39	2	2	
stockpile 19	2023-07-25	CT	0.001	3	4	
stockpile 19	2023-07-25	WG	0.195	2	2	Half the polygon.
stockpile 2	2023-07-28	CT	1	6	4	CT mainly found along the hillside.
stockpile 2	2023-07-28	BT	2.84	2	2	Throughout polygon.

Polygon Name	Survey Date	Species Code	Approximate Area of Infestation (ha)	Distribution	Density	Comments
stockpile 2	2023-07-28	WG	2.84	2	2	Throughout polygon.
stockpile 2	2023-07-28	YH	2.84	7	3	Throughout polygon.
stockpile 2	2023-07-28	OH	0.01	2	2	Found on the north side of the polygon.
stockpile 2	2023-07-28	OD	2.84	7	3	Throughout polygon.
stockpile 20	2023-07-25	YH	0.59	4	2	
stockpile 20	2023-07-25	OH	0.001	2	1	
stockpile 20	2023-07-25	BT	0.001	2	1	
stockpile 20	2023-07-25	OD	0.59	7	3	
stockpile 20	2023-07-25	WG	0.59	2	1	
stockpile 21	2023-07-25	OD	0.46	4	3	
stockpile 21	2023-07-25	YH	0.23	4	2	Half the polygon.
stockpile 21	2023-07-25	MU	0.0001	1	1	High density & distribution on northeast end of polygon along road.
stockpile 22	2023-07-26	YH	1.61	8	3	Throughout polygon.
stockpile 22	2023-07-26	OD	1.61	8	4	Throughout polygon.
stockpile 22	2023-07-26	SO	1.61	4	2	Throughout polygon.
stockpile 22	2023-07-26	WG	1.61	2	2	Throughout polygon.
stockpile 22	2023-07-26	CT	1.61	7	4	Throughout polygon.
stockpile 22	2023-07-26	BT	1.61	5	4	Large patches along road, high density.
stockpile 23	2023-07-27	CT	0.11	6	4	CT Patchy throughout polygon.; a portion of the north side of the polygon is covered with rock.
stockpile 23	2023-07-27	OD	0.11	6	4	OD patches throughout polygon.
stockpile 23	2023-07-27	SO	0.11	2	2	Sow thistle sporadic throughout polygon.
stockpile 23	2023-07-27	WG	0.11	2	2	WG sporadic throughout polygon.
stockpile 24	2023-07-28	CT	3.38	5	4	Throughout polygon.

Polygon Name	Survey Date	Species Code	Approximate Area of Infestation (ha)	Distribution	Density	Comments
stockpile 24	2023-07-28	BT	3.38	2	2	Throughout polygon.
stockpile 24	2023-07-28	OD	3.38	7	3	Throughout polygon.
stockpile 24	2023-07-28	SO	3.38	4	2	Throughout polygon.
stockpile 24	2023-07-28	SH	1.1	4	2	SH only on flat part at top of stockpile.
stockpile 24	2023-07-28	WG	3.38	2	2	Throughout polygon.
stockpile 24	2023-07-28	YH	3.38	7	4	Throughout polygon.
stockpile 24	2023-07-28	OH	0.55	5	4	OH only seen on flat part at top of stockpile.
Stockpile 25	2023-07-25	OD	0.41	6	3	Throughout entire polygon.
Stockpile 25	2023-07-25	CT	0.41	3	3	On north end.
Stockpile 25	2023-07-25	YH	0.41	3	4	On south end.
Stockpile 25	2023-07-25	WG	0.41	5	2	Throughout polygon.
Stockpile 25	2023-07-25	MU	0.41	2	2	Along roadside w of polygon.
stockpile 26	2023-07-28	CT	0.84	5	4	CT found in patches on the north side.
stockpile 26	2023-07-28	BT	1.73	2	2	Throughout polygon.
stockpile 26	2023-07-28	OD	1.73	7	4	Throughout polygon.
stockpile 26	2023-07-28	SO	1.73	5	3	More sow thistle along road, sporadic the rest of the polygon.
stockpile 26	2023-07-28	MU	0.02	3	4	Single patch in center of polygon.
stockpile 26	2023-07-28	YH	1.73	7	4	Throughout polygon.
stockpile 26	2023-07-28	SH	1.73	8	4	SH found on southeast end of polygon near road.
stockpile 26	2023-07-28	WG	1.73	2	2	Throughout polygon.
stockpile 27	2023-07-26	N/A	0	N/A	N/A	Stockpile buried with rock.
stockpile 28	2023-07-26	CT	1.28	8	4	Walked only east side with access area, mature treed vegetation through remainder of polygon.

Polygon Name	Survey Date	Species Code	Approximate Area of Infestation (ha)	Distribution	Density	Comments
stockpile 28	2023-07-26	BT	1.28	2	1	Walked only east side with access area, mature treed vegetation through remainder of polygon.
stockpile 28	2023-07-26	OH	1.28	3	2	Walked only east side with access area, mature treed vegetation through remainder of polygon.
stockpile 28	2023-07-26	OD	1.28	6	4	Walked only east side with access area, mature treed vegetation through remainder of polygon.
stockpile 28	2023-07-26	SO	1.28	4	2	Walked only east side with access area, mature treed vegetation through remainder of polygon.
stockpile 28	2023-07-26	WG	1.28	4	2	Walked only east side with access area, mature treed vegetation through remainder of polygon.
stockpile 29	2023-07-26	MU	2.81	7	3	Throughout polygon.
stockpile 29	2023-07-26	WG	2.81	4	2	Sporadic throughout polygon.
stockpile 29	2023-07-26	OD	2.81	7	4	Throughout polygon.
stockpile 29	2023-07-26	CT	2.81	5	4	Throughout polygon.
stockpile 3	2023-07-28	CT	6.73	4	2	Throughout polygon.
stockpile 3	2023-07-28	BT	6.73	2	2	Throughout polygon.
stockpile 3	2023-07-28	OD	6.73	7	3	Throughout polygon.
stockpile 3	2023-07-28	MU	0.2	4	2	Mullein only on north end of polygon.
stockpile 3	2023-07-28	YH	6.73	6	4	Throughout polygon., greater density on gravel surfaces.
stockpile 3	2023-07-28	WG	6.73	2	2	Throughout polygon.
stockpile 30	2023-07-26	WG	0.001	2	1	Only along road.
stockpile 30	2023-07-26	MU	0.0003	2	2	Only along road.
stockpile 30	2023-07-26	SO	0.0005	2	2	Only along road.
stockpile 30	2023-07-26	OD	0.62	7	4	Half the polygon.

Polygon Name	Survey Date	Species Code	Approximate Area of Infestation (ha)	Distribution	Density	Comments
stockpile 30	2023-07-26	CT	0.05	8	4	
stockpile 31	2023-07-25	CT	0.1	8	4	Throughout polygon.
stockpile 31	2023-07-25	OD	0.1	9	4	Throughout polygon.
stockpile 31	2023-07-25	WG	0.1	4	2	Sporadic throughout polygon.
stockpile 31	2023-07-25	BT	0.0005	2	1	
stockpile 32	2023-07-26	OD	0.23	6	3	Throughout polygon.
stockpile 32	2023-07-26	BT	0.23	4	2	Sporadic throughout polygon.
stockpile 32	2023-07-26	WG	0.23	4	2	Sporadic throughout polygon.
stockpile 32	2023-07-26	CT	0.23	2	2	Sporadic throughout half the polygon.
stockpile 33	2023-07-26	OD	0.1	8	4	Throughout polygon; some rock encroachment.
stockpile 33	2023-07-26	WG	0.1	2	1	Sporadic throughout polygon.
stockpile 33	2023-07-26	YH	0.0004	7	4	High density on northwest side.
stockpile 34	2023-07-27	CT	4.21	6	4	Patchy throughout polygon.
stockpile 34	2023-07-27	BT	0.5	2	2	Only on west end.
stockpile 34	2023-07-27	OH	4.21	2	2	Sporadic throughout polygon.
stockpile 34	2023-07-27	YH	1.75	7	4	Higher density along roadside.
stockpile 34	2023-07-27	OD	4.21	7	3	Throughout polygon.
stockpile 34	2023-07-27	WG	4.21	4	2	Throughout polygon.
stockpile 35	2023-07-26	N/A	0	N/A	N/A	Covered with rock.
stockpile 36	2023-07-27	OD	0.145	7	4	OD along south edge of polygon, mature vegetation throughout the majority of polygon; did not access north due to construction.
stockpile 36	2023-07-27	YH	0.145	7	4	YH along south edge of polygon, mature vegetation throughout the majority of polygon; did not access north due to construction.

Polygon Name	Survey Date	Species Code	Approximate Area of Infestation (ha)	Distribution	Density	Comments
stockpile 36	2023-07-27	CT	0.41	6	3	YH along south edge of polygon, mature vegetation throughout the majority of polygon; did not access north due to construction.
stockpile 37	2023-07-27	CT	0.69	8	4	Throughout polygon.
stockpile 37	2023-07-27	OH	0.69	7	3	Throughout polygon.
stockpile 37	2023-07-27	YH	0.69	7	4	Throughout polygon.
stockpile 37	2023-07-27	OD	0.69	7	4	Throughout polygon.
stockpile 38	2023-07-27	CT	1.24	8	4	throughout entire polygon.
stockpile 38	2023-07-27	OD	1.24	8	4	throughout entire polygon.
stockpile 38	2023-07-27	YH	1.24	7	3	throughout entire polygon.
stockpile 39	2023-07-27	CT	1.42	6	4	Throughout polygon.
stockpile 39	2023-07-27	BT	1	2	2	Sporadic through half of the polygon.
stockpile 39	2023-07-27	YH	1.42	7	4	YH higher density along roadside.
stockpile 39	2023-07-27	OH	1.42	3	3	Found on west end.
stockpile 39	2023-07-27	OD	1.42	7	4	Throughout polygon.
stockpile 39	2023-07-27	WG	1.42	4	3	Throughout polygon.
stockpile 39	2023-07-27	MU	0.05	3	3	Mullein in middle of polygon roughly.
stockpile 4	2023-07-26	OD	0.27	8	4	Throughout polygon.
stockpile 4	2023-07-26	YH	0.0004	3	3	YH in middle of polygon.
stockpile 4	2023-07-26	BT	0.27	2	1	Sporadic throughout polygon.
stockpile 4	2023-07-26	WG	0.27	4	2	Throughout polygon.
stockpile 40	2023-07-27	CT	0.64	8	4	Throughout polygon.
stockpile 40	2023-07-27	OD	0.64	7	3	Throughout polygon.
stockpile 40	2023-07-27	YH	0.64	7	2	Throughout polygon.
stockpile 40	2023-07-27	SO	0.64	4	3	Throughout polygon.
stockpile 40	2023-07-27	BT	0.64	4	2	Throughout polygon.
stockpile 41	2023-07-27	CT	0.77	6	4	Patchy throughout polygon.

Polygon Name	Survey Date	Species Code	Approximate Area of Infestation (ha)	Distribution	Density	Comments
stockpile 41	2023-07-27	YH	0.77	6	4	Higher density along roadside and soil piles directly.
stockpile 41	2023-07-27	OD	0.77	7	3	Throughout polygon.
stockpile 41	2023-07-27	BT	0.77	2	2	Sporadic throughout polygon.
stockpile 41	2023-07-27	WG	0.77	4	4	Throughout polygon.
stockpile 42	2023-07-26	CT	0.11	7	4	Throughout polygon.
stockpile 42	2023-07-26	OD	0.11	7	4	Throughout polygon.
stockpile 42	2023-07-26	WG	0.11	4	2	Sporadic throughout polygon.
stockpile 43	2023-07-27	CT	0.49	6	4	Throughout polygon.
stockpile 43	2023-07-27	OD	0.49	7	4	Throughout polygon.
stockpile 43	2023-07-27	YH	0.49	7	4	Throughout polygon.
stockpile 43	2023-07-27	WG	0.49	5	3	Throughout polygon.
stockpile 44	2023-07-27	CT	0.35	5	4	CT patchy throughout polygon.
stockpile 44	2023-07-27	YH	0.35	9	4	Very dense in most portions of the polygon.
stockpile 44	2023-07-27	OD	0.35	7	3	Throughout polygon.
stockpile 44	2023-07-27	BT	0.35	6	3	BT patchy through polygon.
stockpile 44	2023-07-27	OH	0.35	5	3	OH patchy through polygon.
stockpile 45	2023-07-27	CT	1.4	6	4	Throughout polygon.
stockpile 45	2023-07-27	OD	1.4	7	4	Throughout polygon.
stockpile 45	2023-07-27	SO	1.1	4	2	
stockpile 45	2023-07-27	BT	1.4	5	3	Throughout polygon.
stockpile 45	2023-07-27	YH	1.4	7	3	Throughout polygon.
stockpile 45	2023-07-27	WG	1.4	4	2	Throughout polygon.
stockpile 46	2023-07-26	OD	0.21	4	2	Throughout polygon.
stockpile 46	2023-07-26	MU	0.21	4	2	Throughout polygon.
stockpile 47	2023-07-26	CT	1.58	6	4	Throughout polygon.
stockpile 47	2023-07-26	OD	1.58	4	2	Throughout polygon.

Polygon Name	Survey Date	Species Code	Approximate Area of Infestation (ha)	Distribution	Density	Comments
stockpile 47	2023-07-26	BT	1.58	2	2	
stockpile 47	2023-07-26	MU	1.58	2	2	Sporadic throughout polygon.
stockpile 47	2023-07-26	SO	1.58	2	2	Sporadic throughout polygon.
stockpile 47	2023-07-26	YH	1.58	5	2	Throughout polygon.
stockpile 47	2023-07-26	WG	0.0025	3	3	Patch on southwest end.
stockpile 48	2023-07-26	CT	3.4	7	4	Continuous throughout polygon.
stockpile 48	2023-07-26	OD	3.4	7	3	Continuous throughout polygon.
stockpile 48	2023-07-26	MU	3.4	4	2	Mostly along roadside.
stockpile 48	2023-07-26	SO	3.4	4	2	Throughout polygon, higher along roadway.
stockpile 48	2023-07-26	BT	3.4	4	2	Sporadic throughout polygon.
stockpile 48	2023-07-26	YH	3.4	5	2	Along roadside.
stockpile 49	2023-07-27	CT	0.35	6	3	Throughout polygon; long rectangle is completely covered in rock.
stockpile 49	2023-07-27	BT	0.35	4	3	Sporadic throughout polygon.
stockpile 49	2023-07-27	OD	0.35	4	4	Throughout polygon.
stockpile 49	2023-07-27	SO	0.0004	3	4	SO on south side of polygon.
stockpile 49	2023-07-27	YH	0.0006	3	3	YH on south side of polygon.
Stockpile 5	2023-07-25	CT	0.29	8	3	Throughout polygon.
Stockpile 5	2023-07-25	WG	0.29	2	1	Throughout polygon.
Stockpile 5	2023-07-25	BT	0.0001	1	1	On northwest side.
stockpile 50	2023-07-26	CT	1.8	6	4	High distribution, throughout polygon.
stockpile 50	2023-07-26	BT	1.8	4	3	Throughout polygon.
stockpile 50	2023-07-26	OD	1.8	7	3	Throughout polygon.
stockpile 50	2023-07-26	WG	1.8	4	2	Throughout polygon.
stockpile 50	2023-07-26	SO	1.8	4	2	Throughout polygon.
stockpile 50	2023-07-26	MU	1.8	5	3	Only on the south 1/3 end.
stockpile 51	2023-07-26	MU	1.41	5	4	Throughout polygon.

Polygon Name	Survey Date	Species Code	Approximate Area of Infestation (ha)	Distribution	Density	Comments
stockpile 51	2023-07-26	OD	1.41	6	3	Throughout polygon.
stockpile 51	2023-07-26	YH	1.41	5	3	Throughout polygon.
stockpile 51	2023-07-26	BT	1.41	4	2	Sporadic throughout polygon.
stockpile 51	2023-07-26	CT	1.41	4	2	Sporadic throughout polygon.
stockpile 51	2023-07-26	SO	1.41	4	2	Sporadic throughout polygon.
stockpile 52	2023-07-26	N/A	0	N/A	N/A	Stockpile buried with rock.
Stockpile 53	2023-07-25	CT	0.29	6	4	Throughout polygon, around the wetter areas, part of polygon recently disturbed.
Stockpile 53	2023-07-25	SH	0.29	5	3	Throughout polygon, around the wetter areas, part of polygon recently disturbed.
Stockpile 53	2023-07-25	OD	0.29	8	4	Throughout polygon, around the wetter areas, part of polygon recently disturbed.
Stockpile 53	2023-07-25	BT	0.29	5	2	Throughout polygon, around the wetter areas, part of polygon recently disturbed.
Stockpile 53	2023-07-25	WG	0.29	2	2	Throughout polygon, around the wetter areas, part of polygon recently disturbed.
stockpile 54	2023-07-26	N/A	0	N/A	N/A	Stockpile buried with rock.
stockpile 55	2023-07-27	OD	1.3	7	3	Throughout polygon, greater density on southwest end.
stockpile 55	2023-07-27	CT	1.3	6	4	Throughout polygon in patches.
stockpile 55	2023-07-27	BT	1.3	2	2	Sporadically throughout polygon.
stockpile 55	2023-07-27	MU	6	7	3	Along disturbed edge and roadside.
stockpile 55	2023-07-27	YH	2.5	7	3	Along disturbed edge and roadside.
stockpile 56	2023-07-26	MU	0.0008	2	1	Mullein on the south side of the polygon.

Polygon Name	Survey Date	Species Code	Approximate Area of Infestation (ha)	Distribution	Density	Comments
stockpile 56	2023-07-26	BT	0.34	2	1	BT on the south side of the polygon.
stockpile 56	2023-07-26	OD	0.34	7	3	Throughout polygon.
stockpile 56	2023-07-26	WG	0.34	5	2	Throughout polygon.
stockpile 56	2023-07-26	YH	0.34	7	3	YH only found in north polygon.
stockpile 57	2023-07-26	OD	0.32	5	3	Throughout polygon.
stockpile 57	2023-07-26	BT	0.32	2	1	Sporadic throughout polygon.
stockpile 57	2023-07-26	YH	0.32	5	2	Throughout polygon.
stockpile 57	2023-07-26	WG	0.32	2	2	Throughout polygon.
stockpile 58	2023-07-26	CT	0.31	8	4	Throughout polygon.
stockpile 58	2023-07-26	OD	0.31	6	4	Throughout polygon.
stockpile 58	2023-07-26	YH	0.31	7	3	Throughout polygon.
stockpile 58	2023-07-26	MU	0.0001	1	1	One plant found.
stockpile 58	2023-07-26	WG	0.005	4	2	Found at southwest end.
stockpile 59	2023-07-26	OD	0.22	5	2	Recently disturbed, very little vegetation, plants only see along treeline.
stockpile 59	2023-07-26	YH	0.0001	3	3	Recently disturbed, very little vegetation, plants only see along treeline.
Stockpile 6	2023-07-25	CT	0.4	8	4	Throughout polygon.
Stockpile 6	2023-07-25	OD	0.4	7	3	Throughout polygon.
Stockpile 6	2023-07-25	BT	0.0014	2	1	
Stockpile 6	2023-07-25	WG	0.4	2	2	Throughout half the polygon.
Stockpile 6	2023-07-25	OH	0.0001	1	1	On west side of polygon.
stockpile 60	2023-07-26	CT	0.044	6	4	Throughout polygon.
stockpile 60	2023-07-26	OD	0.044	6	3	Throughout polygon.
stockpile 60	2023-07-26	BT	0.044	5	2	Throughout polygon.
stockpile 60	2023-07-26	MU	0.03	3	3	At north end of polygon.
stockpile 61	2023-07-26	CT	0.52	8	4	Throughout polygon.

Polygon Name	Survey Date	Species Code	Approximate Area of Infestation (ha)	Distribution	Density	Comments
stockpile 61	2023-07-26	BT	0.52	4	2	Sporadic throughout polygon.
stockpile 61	2023-07-26	WG	0.003	4	2	On south side of polygon.
stockpile 61	2023-07-26	OD	0.52	7	3	Throughout polygon.
stockpile 62	2023-07-27	YH	0.15	7	3	Throughout polygon; northwest side of polygon covered with rock.
stockpile 62	2023-07-27	OD	0.15	7	3	Throughout polygon; northwest side of polygon covered with rock.
stockpile 62	2023-07-27	SO	0.15	4	2	Sporadic throughout polygon; northwest side of polygon covered with rock.
stockpile 63	2023-07-26	CT	0.1	6	4	
stockpile 63	2023-07-26	BT	0.1	4	2	
stockpile 63	2023-07-26	OD	0.1	5	3	Half the polygon.
stockpile 63	2023-07-26	OH	0.001	2	1	Only a few individuals.
stockpile 63	2023-07-26	WG	0.1	2	1	Sporadic throughout polygon.
stockpile 63	2023-07-26	YH	0.1	7	3	Throughout polygon.
stockpile 64	2023-07-27	BT	1.93	8	4	Throughout polygon, very dense patches.
stockpile 64	2023-07-27	CT	1.93	7	3	Throughout polygon.
stockpile 64	2023-07-27	OD	1.93	6	4	OD patches throughout polygon.
stockpile 64	2023-07-27	MU	1.35	6	2	Mullein only on east end.
stockpile 64	2023-07-27	SO	1.93	4	3	Throughout polygon.
stockpile 64	2023-07-27	YH	1.93	8	3	Throughout polygon.
stockpile 64	2023-07-27	OH	1.93	6	4	OH seen in patches throughout polygon.
stockpile 65	2023-07-27	CT	0.64	8	4	Throughout polygon.
stockpile 65	2023-07-27	OD	0.5	8	3	OD on west side of polygon.
stockpile 65	2023-07-27	MU	0.9	3	4	Mullein patch on east side of polygon.

Polygon Name	Survey Date	Species Code	Approximate Area of Infestation (ha)	Distribution	Density	Comments
stockpile 65	2023-07-27	YH	0.64	8	4	Throughout polygon.
stockpile 65	2023-07-27	BT	0.3	2	1	BT on the east to middle of polygon.
Stockpile 66	2023-07-25	OD	0.1	7	4	Throughout polygon.
Stockpile 66	2023-07-25	YH	0.1	3	3	
Stockpile 66	2023-07-25	BT	0.1	2	1	Northwest side of polygon.
stockpile 7	2023-07-25	OD	0.18	4	2	Throughout polygon.
stockpile 7	2023-07-25	MU	0.18	2	2	Throughout polygon.
stockpile 7	2023-07-25	SO	0.002	2	2	
stockpile 7	2023-07-25	WG	0.18	2	1	Throughout polygon.
stockpile 7	2023-07-25	SH	0.18	2	3	Throughout polygon.
stockpile 8	2023-07-25	OD	0.62	7	4	Throughout polygon.
stockpile 8	2023-07-25	SH	0.62	6	3	
stockpile 8	2023-07-25	YH	0.62	4	2	Sporadic throughout polygon.
stockpile 8	2023-07-25	MU	0.62	7	4	Very dense on north end of polygon.
stockpile 8	2023-07-25	BT	0.62	2	1	Sporadic throughout polygon.
stockpile 8	2023-07-25	WG	0.62	4	2	Sporadic throughout polygon.
stockpile 9	2023-07-28	CT	2.92	5	3	CT patchy throughout polygon.
stockpile 9	2023-07-28	BT	2.92	2	2	BT throughout polygon.
stockpile 9	2023-07-28	YH	2.92	7	3	Throughout polygon.
stockpile 9	2023-07-28	OD	2.92	7	3	Throughout polygon.
stockpile 9	2023-07-28	WG	2.92	4	3	Throughout polygon.
stockpile 9	2023-07-28	OH	2.92	5	2	Patchy throughout polygon.
stockpile 9	2023-07-28	MU	2.92	5	3	Patchy throughout polygon.
target area 16	2023-07-27	OD	2.1	7	4	Throughout polygon.
target area 16	2023-07-27	CT	2.1	5	4	Patchy throughout polygon.
target area 16	2023-07-27	YH	0.26	4	2	Along roadside.
target area 16	2023-07-27	OH	0.16	2	2	Along roadside.
target area 16	2023-07-27	BT	2.1	2	2	Throughout polygon.

Polygon Name	Survey Date	Species Code	Approximate Area of Infestation (ha)	Distribution	Density	Comments
target area 16	2023-07-27	WG	2.1	2	2	Throughout polygon.
target area 16	2023-07-27	SO	0.0002	3	3	Along roadside on northwest side.
target area 17	2023-07-28	CT	0.57	6	4	Throughout polygon.
target area 17	2023-07-28	OD	0.57	7	3	Throughout polygon.
target area 17	2023-07-28	WG	0.57	2	2	Throughout polygon.
target area 17	2023-07-28	YH	0.0025	2	1	YH only on parking lot side.
target area 17	2023-07-28	BT	0.005	2	1	BT only on parking lot side.

APPENDIX D

Invasive Plant Infestations Maps

IMC 23274-131 Invasive Plant Survey

Map 1 of 3

0 125 250 500 Meters

NAD 1983 UTM Zone 10N

1:5,000

Date: January 30, 2024

IMC_23274-131_InvasivePlant

IMC 23274-131 Invasive Plant Survey

Map 2 of 3

0 125 250 500 Meters

NAD 1983 UTM Zone 10N

1:5,000

Date: January 30, 2024

IMC_23274-131_InvasivePlant

Esri Canada, Maxar, Earthstar Geographics, and the GIS User Community

0: CT, OD, BT, WG, YH

9: CT, BT, YH, OD, WG, OH, MU

56: MU, BT, OD, WG, YH

56: MU, BT, OD, WG, YH

3: CT, BT, OD, MU, YH, WG

4: OD, YH, BT, WG

57: OD, BT, YH, WG

4: OD, YH, BT, WG

32: OD, BT, WG, CT

2: CT, BT, WG, YH, OH, OD

31: CT, OD, WG, BT

5: CT, WG, BT

17: CT, OD, WG, YH, BT

53: CT, SH, OD, BT, WG

53: CT, SH, OD, BT, WG

33: OD, WG, YH

1: OD, CT, BT, SO, WG, YH, SH, MU

26: CT, BT, OD, SO, MU, YH, SH, WG

Bootjack Lake

55: OD, CT, BT, MU, YH

14: OD, OH, WG, MU, YH, SO, SH, BT

24: CT, BT, OD, SO, SH, WG, YH, OH

17: OH, OD, SO, MU, BT, CT, WG, YH

16: BT, CT, MU, WG, YOH, OD, SO

52: N/A

13: CT, BT, OD, WG

11: CT, OD, MU, BT, WG

61: CT, BT, WG, OD

62: YH, OD, SO

22: YH, OD, SO, WG, CT, BT

23: CT, OD, SO, WG

28: CT, BT, OH, OD, SO, WG

30: WG, MU, SO, OD, CT

50: CT, BT, OD, WG, SO, MU

16: OD, CT, YH, OH, BT, WG, SO

12: YH, OH, OD, CT, WG, BT

60: CT, OD, BT, MU

60: CT, OD, BT, MU

63: CT, BT, OD, OH, WG, YH

29: MU, WG, OD, CT

51: MU, OD, YH, BT, CT, SO

12: YH, OH, OD, CT, WG, BT

64: BT, CT, OD, MU, SO, YH, OH

59: OD, YH

58: CT, OD, YH, MU, WG

12: YH, OH, OD, CT, WG, BT

Polley Lake

47: CT, OD, BT, MU, SO, YH, WG

42: CT, OD, WG

35: N/A

48: CT, OD, MU, SO, BT, YH

46: OD, MU

Legend

- Creek
- Target Area
- Soil Stockpiles
- Other

IMC 23274-131 Invasive Plant Survey

Map 3 of 3

0 125 250 500 Meters

NAD 1983 UTM Zone 10N

1:5,000

Date: January 30, 2024

IMC_23274-131_InvasivePlant

Legend

- Creek
- Target Area
- Soil Stockpiles
- Other

APPENDIX E

Chemical and Mechanical Treatment Record

INVASIVE PLANT CHEMICAL & MECHANICAL TREATMENT RECORD

☐ DATA ENTERED INTO IAPP

ENTERED BY

PCP #s 2,4-D 14725; Banvel 18837; Escort 23005; Milestone 28137
Restore 28137/28271; Vanquish 26980; Grazon 26649
Roundup 13644; Tordon 22K 9005; Transline 24084

OTHER HERBICIDE | REGISTRATION #

TREATMENT DATE YY/MM/DD	AGENCY	EMPLOYER	CERTIFIED APPLICATORS	CERT. NUMBER	SUPERVISOR SIGNATURE	OTHER APPLICATORS	CERT. NUMBER
RANGE UNIT	PASTURE	PAPER FILE ID	**PMP NUMBER**				

ACTIVITY	New Site	Site ID OR	Paper File ID	UTM Zone	Easting	Northing	Invasive Plant Not Found	Time of Application	Species 1	%	Distribution Code	Species 2	%	Distribution Code	Species 3	%	Distribution Code	Area Treated (ha)	Temperature (°C)	Windspeed (Km/h)	Wind Direction	Treatment Method	Name of Herbicide	Application Rate (L Herbicide/ha)	Amount of Mix Used (L)	Sprayer Delivery Rate (L Mix/ha)
☐ CHEMICAL ☐ MECHANICAL ☐ SURVEY ONLY	☐						☐																			
JURISDICTION	LOCATION OR ROAD NAME/Km																	COMMENTS								
☐ CHEMICAL ☐ MECHANICAL ☐ SURVEY ONLY	☐						☐																			
JURISDICTION	LOCATION OR ROAD NAME/Km																	COMMENTS								
☐ CHEMICAL ☐ MECHANICAL ☐ SURVEY ONLY	☐						☐																			
JURISDICTION	LOCATION OR ROAD NAME/Km																	COMMENTS								
☐ CHEMICAL ☐ MECHANICAL ☐ SURVEY ONLY	☐						☐																			
JURISDICTION	LOCATION OR ROAD NAME/Km																	COMMENTS								
☐ CHEMICAL ☐ MECHANICAL ☐ SURVEY ONLY	☐						☐																			
JURISDICTION	LOCATION OR ROAD NAME/Km																	COMMENTS								
☐ CHEMICAL ☐ MECHANICAL ☐ SURVEY ONLY	☐						☐																			
JURISDICTION	LOCATION OR ROAD NAME/Km																	COMMENTS								
☐ CHEMICAL ☐ MECHANICAL ☐ SURVEY ONLY	☐						☐																			
JURISDICTION	LOCATION OR ROAD NAME/Km																	COMMENTS								
☐ CHEMICAL ☐ MECHANICAL ☐ SURVEY ONLY	☐						☐																			
JURISDICTION	LOCATION OR ROAD NAME/Km																	COMMENTS								

Mechanical Treatments Mandatory Fields: Date of Treatment Agency Jurisdiction Site ID **OR** UTM Zone, Easting & Northing Species 1 Treatment Method Area Treated

Chemical Treatments Mandatory Fields: All fields indicated in Mech. Treatments, **PLUS**: Certified Applicator and Number Application Time Temperature Windspeed Name of Herbicide Application Rate Amound of Mix Used

INVASIVE PLANT CHEMICAL & MECHANICAL TREATMENT RECORD

MAP

SKETCH MAP (INDICATE NORTH)

IMAGE DETAILS

ID	DATE YY/MM/DD	PERSPECTIVE	REFERENCE NO.

COMMENTS

APPENDIX F

Biocontrol Agent Release and Monitoring Record

Biocontrol Agent Release & Monitoring Record

Entered into IAPP (YYYY-MM-DD):	*By:*	*Assigned Site and/or Treatment IDs recorded below:* ☐

Site Details

Site already exists: ☐

Date (YYYY-MM-DD): *	**Treatment** / **Paper File ID:**	**Site ID:**	**Treatment ID:**

UTM Zone: *	**UTM Easting:** * (no initial zero)	**UTM Northing:** * (7 digits)	**Jurisdiction:** *

Release point UTMs same as site? Y ☐ N ☐	Range Unit:	Pasture:

Agency: *	Employer:	Surveyor/Applicator:

Site Location (and directions how to get there):	**Site Comments:**

Biological Agent Release Details

Invasive Plants * Species name or code	**Area** * Dimension or Ha	Distr. Code	Density Code	**Survey Type** * **C**ursory /**O**perational /**P**recise	Bioagents Released
				C ☐ O ☐ P ☐	Y ☐ N ☐
				C ☐ O ☐ P ☐	Y ☐ N ☐
				C ☐ O ☐ P ☐	Y ☐ N ☐

Bioagent Code *	Bioagent Scource:	Collection Date (YYYY-MM-DD):	**Release Quantity** *

Bioagent Stage:

ADULT ☐	EGG ☐	PUPA ☐	LARVAE ☐	OTHER ☐	ALL ☐

Release Comments:

Image Details

Date Taken (YYYY-MM-DD):	**Perspective** *	Distance from Plot Centre:	Image Reference No:

Image Comments:

* *indicates mandatory field*

Sketch Map:

Biological Monitoring Details

UTM Coordinates *: Same as Site: Y *If not, enter them here:*	**UTM Zone: ***	**UTM Easting: *** (no initial zero)	**UTM Northing: *** (7 digits)

Inspection Date (YYYY-MM-DD)**: ***	Inspection Time (24hr):	Monitoring ID *(assigned at data entry)* :	Agent Destroyed? Y

Agency: *	Employer:	Surveyor:

Invasive Plants * Species name or code	**Area *** Dimension or Ha	Distr. Code	Density Code	**Survey Type *** **C**ursory /**O**perational /**P**recise	Bioagents Released
				C ☐ O ☐ P ☐	Y ☐ N ☐
				C ☐ O ☐ P ☐	Y ☐ N ☐
				C ☐ O ☐ P ☐	Y ☐ N ☐

Bioagent Count: Plant Count: Duration of Count (minutes):

Bioagent Presence *:

Foliar feeding damage	Y ☐	Adults present	Y ☐	Exit holes / tunnels	Y ☐
Root feeding damage	Y ☐	Pupa(e) present	Y ☐	Oviposition marks	Y ☐
Seed feeding damage	Y ☐	Larva(e) present	Y ☐	Other (note in comments)	Y ☐
		Eggs present	Y ☐		

Spread:		**Comments:**
Bearing 1 (degrees)	Distance 1 (degrees)	
Bearing 2 (degrees)	Distance 2 (degrees)	
Bearing 3 (degrees)	Distance 3 (degrees)	
Bearing 4 (degrees)	Distance 4 (degrees)	

* *indicates mandatory field*

APPENDIX G

Chemical and Mechanical Monitoring Record

Chemical & Mechanical Monitoring Record

Entered into IAPP (YYYY-MM-DD):	*By:*	*Assigned Monitoring IDs recorded on this form:* ☐

Inspection Record I

Inspection Date (YYYY-MM-DD): *	**Site ID:** *	**Treatment ID:** *(ID of the treatment being monitored)*	**Monitoring ID:** *(Assigned at Data Entry)*
Agency: *	**Surveyor:**		**Monitoring Paper File ID:**
Activity: * ☐ Chemical Mon. ☐ Mechanical Mon.	**Compliance:**		**Efficacy Rating:** (1-9)
Target Invasive Plant Species *	**Comments:**		

Inspection Record II

Inspection Date (YYYY-MM-DD): *	**Site ID:** *	**Treatment ID:** *(ID of the treatment being monitored)*	**Monitoring ID:** *(Assigned at Data Entry)*
Agency: *	**Surveyor:**		**Monitoring Paper File ID:**
Activity: * ☐ Chemical Mon. ☐ Mechanical Mon.	**Compliance:**		**Efficacy Rating:** (1-9)
Target Invasive Plant Species *	**Comments:**		

Inspection Record III

Inspection Date (YYYY-MM-DD): *	**Site ID:** *	**Treatment ID:** *(ID of the treatment being monitored)*	**Monitoring ID:** *(Assigned at Data Entry)*
Agency: *	**Surveyor:**		**Monitoring Paper File ID:**
Activity: * ☐ Chemical Mon. ☐ Mechanical Mon.	**Compliance:**		**Efficacy Rating:** (1-9)
Target Invasive Plant Species *	**Comments:**		

Inspection Record IV

Inspection Date (YYYY-MM-DD): *	**Site ID:** *	**Treatment ID:** *(ID of the treatment being monitored)*	**Monitoring ID:** *(Assigned at Data Entry)*
Agency: *	**Surveyor:**		**Monitoring Paper File ID:**
Activity: * ☐ Chemical Mon. ☐ Mechanical Mon.	**Compliance:**		**Efficacy Rating:** (1-9)
Target Invasive Plant Species *	**Comments:**		

* *indicates mandatory field*

APPENDIX 2-5: Water Quality Screening Tables

Appendix 2-5
Table 2-4C: Copper Screening at Reference Locations from 2015 to 2023
Mount Polley Mine

Location Type			BC ENV Guideline for the Protection of Aquatic Life		BC ENV Guideline for the Protection of Wildlife Life			Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake
Station								QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a
Sample Point	Unit	BC ENV Drinking Water Screening Criteria	Long-Term Chronic	Short-Term Acute	Long-Term Chronic	Short-Term Acute	Selected Screening Criteria	QUL-120a-80m - Quesnel Lake Beyond Cariboo Island	QUL-120a-0m - Quesnel Lake Beyond Cariboo Island	QUL-120a-0m - Quesnel Lake Beyond Cariboo Island	QUL-120a-0m - Quesnel Lake Beyond Cariboo Island	QUL-120a-0m - Quesnel Lake Beyond Cariboo Island	QUL-120a-0m - Quesnel Lake Beyond Cariboo Island	QUL-120a-0m - Quesnel Lake Beyond Cariboo Island	QUL-120a-0m - Quesnel Lake Beyond Cariboo Island	QUL-120a-0m - Quesnel Lake Beyond Cariboo Island	QUL-120a-0m - Quesnel Lake Beyond Cariboo Island	QUL-120a-0m - Quesnel Lake Beyond Cariboo Island	QUL-120a-0m - Quesnel Lake Beyond Cariboo Island
Date								2017-06-21	2015-03-16	2015-04-29	2015-05-13	2015-06-10	2015-07-22	2015-08-12	2015-09-14	2015-10-15	2015-11-18	2016-04-26	2016-05-19
Parameter																			
Field Parameters																			
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	-	-	-	-	-	7.25	-	7.47	8.27	7.71	7.58	-
Conventional Parameters																			
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	7.95	7.84	7.98	7.98	7.94	7.87	7.98	7.85	7.93	7.85	7.88	7.79
Hardness, as CaCO3	mg/L	-	-	-	-	-	-	50.1	55.3	51.5	51.8	47.9	52.5	51.4	53.6	53.1	53.4	51	46.5
Dissolved organic carbon	mg/L	-	-	-	-	-	-	1.51	1.86	2.11	1.91	2.09	2.22	1.82	1.73	1.67	1.49	1.83	2.56

Appendix 2-5
Table 2-4C: Copper Screening at Reference Locations from 2015 to 2023
Mount Polley Mine

Location Type / Station / Sample Point / Date / Parameter	Unit	BC ENV Drinking Water Screening Criteria	BC ENV Guideline for the Protection of Aquatic Life		BC ENV Guideline for the Protection of Wildlife Life		Selected Screening Criteria	Quesnel Lake QUL-120a QUL-120a-80m - Quesnel Lake Beyond Cariboo Island 2017-06-21	Quesnel Lake QUL-120a QUL-120a-0m - Quesnel Lake Beyond Cariboo Island 2015-03-16	Quesnel Lake QUL-120a QUL-120a-0m - Quesnel Lake Beyond Cariboo Island 2015-04-29	Quesnel Lake QUL-120a QUL-120a-0m - Quesnel Lake Beyond Cariboo Island 2015-05-13	Quesnel Lake QUL-120a QUL-120a-0m - Quesnel Lake Beyond Cariboo Island 2015-06-10	Quesnel Lake QUL-120a QUL-120a-0m - Quesnel Lake Beyond Cariboo Island 2015-07-22	Quesnel Lake QUL-120a QUL-120a-0m - Quesnel Lake Beyond Cariboo Island 2015-08-12	Quesnel Lake QUL-120a QUL-120a-0m - Quesnel Lake Beyond Cariboo Island 2015-09-14	Quesnel Lake QUL-120a QUL-120a-0m - Quesnel Lake Beyond Cariboo Island 2015-10-15	Quesnel Lake QUL-120a QUL-120a-0m - Quesnel Lake Beyond Cariboo Island 2015-11-18	Quesnel Lake QUL-120a QUL-120a-0m - Quesnel Lake Beyond Cariboo Island 2016-04-26	Quesnel Lake QUL-120a QUL-120a-0m - Quesnel Lake Beyond Cariboo Island 2016-05-19
			Long-Term Chronic	Short-Term Acute	Long-Term Chronic	Short-Term Acute												
Dissolved Metals																		
Copper	mg/L	-	0.00040[a]	0.0024[a]	-	-	0.0002 - 0.0062	0.00088	<0.00050	0.00054	0.00059	0.00064	<0.00050	0.00051	<0.00050	<0.00050	<0.00050	0.00062	0.00075
round sample-specific pH	pH units							7.9	7.8	7.9	7.9	7.9	7.2	7.9	7.4	8.2	7.7	7.5	7.7
rounded sample-specific DOC	mg/L							1.5	1.5	2	1.5	2	2	1.5	1.5	1.5	1	1.5	2.5
rounded sample-specific Hardness	mg/L							50	50	50	50	40	50	50	50	50	50	50	40
Chronic guideline from lookup table	mg/L						0.0002 - 0.0062	0.0007	0.0006	0.0009	0.0007	0.0008	0.0004	0.0007	0.0004	0.0008	0.0004	0.0004	0.0009
Acute guideline from lookup table	mg/L						0.0002 - 0.037	0.0039036	0.0035691	0.0051981	0.0039036	0.0049172	0.0023916	0.0039036	0.0023241	0.0048149	0.0021648	0.0026145	0.0051069

Notes

Notes: Values are taken from the approved guidelines unless otherwise noted.

W = working guideline; M = interim guideline, Min = Minimum concentration requirement based on life stage.

Guidelines based on toxicity modifying factors are presented based on the mean baseline values (hardness of 54 mg/L, pH of 7.8, DOC 2.2 mg/L, temperature of 7 oC, and chloride of 0.50 mg/L) in Quesnel Lake, considered representative of average conditions in the receiving environment.

Shaded values indicates concentrations exceed the most conservative guideline of each maximum and chronic WQG for ecological receptors.

a) Hardness, dissolved organic carbon, and pH dependent copper guidelines selected from the BC ENV look up table.

- = no guideline or no data; BC WQGs = British Columbia water quality guidelines; $CaCO_3$ = calcium carbonate; FDA = field duplicate available; FD = field duplicate; mg/L = milligrams per litre; QA/QC = quality assurance/quality control.

Appendix 2-5
Table 2-4C: Copper Screening at Reference Locations from 2015 to 2023
Mount Polley Mine

Location Type			BC ENV Guideline for the Protection of Aquatic Life		BC ENV Guideline for the Protection of Wildlife Life			Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake
Station								QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a
Sample Point	Unit	BC ENV Drinking Water Screening Criteria	Long-Term Chronic	Short-Term Acute	Long-Term Chronic	Short-Term Acute	Selected Screening Criteria	QUL-120a-0m - Quesnel Lake Beyond Cariboo Island	QUL-120a-0m - Quesnel Lake Beyond Cariboo Island	QUL-120a-0m - Quesnel Lake Beyond Cariboo Island	QUL-120a-0m - Quesnel Lake Beyond Cariboo Island	QUL-120a-0m - Quesnel Lake Beyond Cariboo Island	QUL-120a-0m - Quesnel Lake Beyond Cariboo Island	QUL-120a-0m - Quesnel Lake Beyond Cariboo Island	QUL-120a-0m - Quesnel Lake Beyond Cariboo Island	QUL-120a-0m - Quesnel Lake Beyond Cariboo Island	QUL-120a-0m - Quesnel Lake Beyond Cariboo Island	QUL-120a-0m - Quesnel Lake Beyond Cariboo Island	QUL-120a-0m - Quesnel Lake Beyond Cariboo Island	QUL-120a-0m - Quesnel Lake Beyond Cariboo Island	QUL-120a-0m - Quesnel Lake Beyond Cariboo Island	QUL-120a-0m - Quesnel Lake Beyond Cariboo Island
Date								2016-06-27	2016-07-20	2016-08-24	2017-04-10	2017-06-21	2017-08-31	2018-05-23	2018-06-19	2018-08-27	2018-10-17	2019-06-19	2019-08-19	2020-06-16	2020-08-11	2020-09-16
Parameter																						
Field Parameters																						
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	8.26	8.16	8.39	7.56	7.88	7.92	8.14	7.66	8.01	6.88	7.43	8.01	7.73	7.94	8.27
Conventional Parameters																						
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	7.78	7.77	7.83	7.94	7.91	7.83	7.91	7.81	7.94	7.94	7.98	7.93	7.8	7.95	7.99
Hardness, as CaCO3	mg/L	-	-	-	-	-	-	47.1	47.3	49.8	52.5	46.4	49.1	43.5	46.3	48.7	52.4	52.2	49.1	50.9	45.3	51.7
Dissolved organic carbon	mg/L	-	-	-	-	-	-	2.1	2.21	1.83	2.12	2.1	1.86	2.28	2.21	1.82	1.53	1.81	1.72	2.36	2.83	2.32

Appendix 2-5
Table 2-4C: Copper Screening at Reference Locations from 2015 to 2023
Mount Polley Mine

Location Type			BC ENV Guideline for the Protection of Aquatic Life		BC ENV Guideline for the Protection of Wildlife Life			Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake
Station								QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a
Sample Point	Unit	BC ENV Drinking Water Screening Criteria	Long-Term Chronic	Short-Term Acute	Long-Term Chronic	Short-Term Acute	Selected Screening Criteria	QUL-120a-0m - Quesnel Lake Beyond Cariboo Island	QUL-120a-0m - Quesnel Lake Beyond Cariboo Island	QUL-120a-0m - Quesnel Lake Beyond Cariboo Island	QUL-120a-0m - Quesnel Lake Beyond Cariboo Island	QUL-120a-0m - Quesnel Lake Beyond Cariboo Island	QUL-120a-0m - Quesnel Lake Beyond Cariboo Island	QUL-120a-0m - Quesnel Lake Beyond Cariboo Island	QUL-120a-0m - Quesnel Lake Beyond Cariboo Island	QUL-120a-0m - Quesnel Lake Beyond Cariboo Island	QUL-120a-0m - Quesnel Lake Beyond Cariboo Island	QUL-120a-0m - Quesnel Lake Beyond Cariboo Island	QUL-120a-0m - Quesnel Lake Beyond Cariboo Island	QUL-120a-0m - Quesnel Lake Beyond Cariboo Island	QUL-120a-0m - Quesnel Lake Beyond Cariboo Island	QUL-120a-0m - Quesnel Lake Beyond Cariboo Island
Date								2016-06-27	2016-07-20	2016-08-24	2017-04-10	2017-06-21	2017-08-31	2018-05-23	2018-06-19	2018-08-27	2018-10-17	2019-06-19	2019-08-19	2020-06-16	2020-08-11	2020-09-16
Parameter																						
Dissolved Metals																						
Copper	mg/L	-	0.00040[a]	0.0024[a]	-	-	0.0002 - 0.0062	0.00058	<0.00050	<0.00050	<0.00050	0.00059	<0.00050	<0.00050	0.00072	<0.00050	<0.00050	<0.00050	<0.00050	0.0005	0.00053	0.00058
round sample-specific pH	pH units							8.2	8.1	8.3	7.5	7.8	7.9	8.1	7.6	8	7.1	7.4	8	7.7	7.9	8.2
rounded sample-specific DOC	mg/L							2	2	1.5	2	2	1.5	2	2	1.5	1.5	1.5	1.5	2	2.5	2
rounded sample-specific Hardness	mg/L							40	40	40	50	40	40	40	40	40	50	50	40	50	40	50
Chronic guideline from lookup table	mg/L						0.0002 - 0.0062	0.0010	0.0009	0.0008	0.0006	0.0008	0.0006	0.0009	0.0006	0.0007	0.0003	0.0004	0.0007	0.0007	0.0010	0.0011
Acute guideline from lookup table	mg/L						0.0002 - 0.037	0.0059425	0.0056540	0.0046760	0.0034842	0.0044972	0.0036927	0.0056540	0.0036819	0.0040082	0.0015585	0.0023241	0.0040082	0.0043192	0.0061366	0.0063950

Notes

Notes: Values are taken from the approved guidelines unless otherwise noted.

W = working guideline; M = interim guideline, Min = Minimum concentration requirement based on life stage.

Guidelines based on toxicity modifying factors are presented based on the mean baseline values (hardness of 54 mg/L, pH of 7.8, DOC 2.2 mg/L, temperature of 7 oC, and chloride of 0.50 mg/L) in Quesnel Lake, considered representative of average conditions in the receiving environment.

Shaded values indicates concentrations exceed the most conservative guideline of each maximum and chronic WQG for ecological receptors.

a) Hardness, dissolved organic carbon, and pH dependent copper guidelines selected from the BC ENV look up table.

- = no guideline or no data; BC WQGs = British Columbia water quality guidelines; $CaCO_3$ = calcium carbonate; FDA = field duplicate available; FD = field duplicate; mg/L = milligrams per litre; QA/QC = quality assurance/quality control.

Appendix 2-5
Table 2-4C: Copper Screening at Reference Locations from 2015 to 2023
Mount Polley Mine

Location Type			BC ENV Guideline for the Protection of Aquatic Life		BC ENV Guideline for the Protection of Wildlife Life			Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake
Station								QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a
Sample Point	Unit	BC ENV Drinking Water Screening Criteria	Long-Term Chronic	Short-Term Acute	Long-Term Chronic	Short-Term Acute	Selected Screening Criteria	QUL-120a-0m - Quesnel Lake Beyond Cariboo Island	QUL-120a-0m - Quesnel Lake Beyond Cariboo Island	QUL-120a-0m - Quesnel Lake Beyond Cariboo Island	QUL-120a-0m - Quesnel Lake Beyond Cariboo Island	QUL-120a-0m - Quesnel Lake Beyond Cariboo Island	QUL-120a-0m - Quesnel Lake Beyond Cariboo Island	QUL-120a-0m - Quesnel Lake Beyond Cariboo Island	QUL-120a-0m - Quesnel Lake Beyond Cariboo Island	QUL-120a-0m - Quesnel Lake Beyond Cariboo Island	QUL-120a-120m - Quesnel Lake Beyond Cariboo Island	QUL-120a-120m - Quesnel Lake Beyond Cariboo Island	QUL-120a-120m - Quesnel Lake Beyond Cariboo Island	QUL-120a-120m - Quesnel Lake Beyond Cariboo Island	QUL-120a-120m - Quesnel Lake Beyond Cariboo Island	QUL-120a-120m - Quesnel Lake Beyond Cariboo Island
Date								2020-11-04	2021-05-19	2021-07-21	2021-09-15	2021-10-27	2022-05-09	2022-06-27	2022-08-15	2022-10-19	2015-03-16	2015-04-29	2015-05-13	2015-06-10	2015-07-22	2015-08-12
Parameter																						
Field Parameters																						
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	7.97	8.32	7.99	8.88	7.88	7.74	8.04	7.94	8.06	-	-	-	-	7.5	-
Conventional Parameters																						
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	7.85	7.84	7.95	7.91	7.94	7.9	7.8	7.88	7.86	7.85	7.97	7.94	7.93	7.89	7.91
Hardness, as CaCO3	mg/L	-	-	-	-	-	-	52.8	51.7	47.5	51.7	52.1	52.4	45.7	45.6	53.9	54	52.2	50.7	53.7	55.6	53.9
Dissolved organic carbon	mg/L	-	-	-	-	-	-	12.7	2.37	2.23	1.72	1.65	1.96	2.72	2.32	1.67	2.07	2.09	1.81	1.68	1.81	1.74

Appendix 2-5
Table 2-4C: Copper Screening at Reference Locations from 2015 to 2023
Mount Polley Mine

Location Type			BC ENV Guideline for the Protection of Aquatic Life		BC ENV Guideline for the Protection of Wildlife Life			Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake
Station								QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a
Sample Point	Unit	BC ENV Drinking Water Screening Criteria	Long-Term Chronic	Short-Term Acute	Long-Term Chronic	Short-Term Acute	Selected Screening Criteria	QUL-120a-0m - Quesnel Lake Beyond Cariboo Island	QUL-120a-0m - Quesnel Lake Beyond Cariboo Island	QUL-120a-0m - Quesnel Lake Beyond Cariboo Island	QUL-120a-0m - Quesnel Lake Beyond Cariboo Island	QUL-120a-0m - Quesnel Lake Beyond Cariboo Island	QUL-120a-0m - Quesnel Lake Beyond Cariboo Island	QUL-120a-0m - Quesnel Lake Beyond Cariboo Island	QUL-120a-0m - Quesnel Lake Beyond Cariboo Island	QUL-120a-0m - Quesnel Lake Beyond Cariboo Island	QUL-120a-120m - Quesnel Lake Beyond Cariboo Island	QUL-120a-120m - Quesnel Lake Beyond Cariboo Island	QUL-120a-120m - Quesnel Lake Beyond Cariboo Island	QUL-120a-120m - Quesnel Lake Beyond Cariboo Island	QUL-120a-120m - Quesnel Lake Beyond Cariboo Island	QUL-120a-120m - Quesnel Lake Beyond Cariboo Island
Date								2020-11-04	2021-05-19	2021-07-21	2021-09-15	2021-10-27	2022-05-09	2022-06-27	2022-08-15	2022-10-19	2015-03-16	2015-04-29	2015-05-13	2015-06-10	2015-07-22	2015-08-12
Parameter																						
Dissolved Metals																						
Copper	mg/L	-	0.00040[a]	0.0024[a]	-	-	0.0002 - 0.0062	<0.00050	0.0006	<0.00050	<0.00050	0.00069	0.00061	0.00064	<0.00050	<0.00050	0.0007	0.00103	0.0006	0.00077	0.00086	0.00064
round sample-specific pH	pH units							7.9	8.3	7.9	8.8	7.8	7.7	8	7.9	8	7.8	7.9	7.9	7.9	7.5	7.9
rounded sample-specific DOC	mg/L							12.5	2	2	1.5	1.5	1.5	2.5	2	1.5	2	2	1.5	1.5	1.5	1.5
rounded sample-specific Hardness	mg/L							50	50	40	50	50	50	40	40	50	50	50	50	50	50	50
Chronic guideline from lookup table	mg/L						0.0002 - 0.0062	0.0054	0.0011	0.0008	0.0010	0.0006	0.0005	0.0011	0.0008	0.0007	0.0008	0.0009	0.0007	0.0007	0.0004	0.0007
Acute guideline from lookup table	mg/L						0.0002 - 0.037	0.0320685	0.0066879	0.0049172	0.0061760	0.0035691	0.0032424	0.0066539	0.0049172	0.0042385	0.0047542	0.0051981	0.0039036	0.0039036	0.0026145	0.0039036

Notes

Notes: Values are taken from the approved guidelines unless otherwise noted.

W = working guideline; M = interim guideline, Min = Minimum concentration requirement based on life stage.

Guidelines based on toxicity modifying factors are presented based on the mean baseline values (hardness of 54 mg/L, pH of 7.8, DOC 2.2 mg/L, temperature of 7 oC, and chloride of 0.50 mg/L) in Quesnel Lake, considered representative of average conditions in the receiving environment.

Shaded values indicates concentrations exceed the most conservative guideline of each maximum and chronic WQG for ecological receptors.

a) Hardness, dissolved organic carbon, and pH dependent copper guidelines selected from the BC ENV look up table.

- = no guideline or no data; BC WQGs = British Columbia water quality guidelines; $CaCO_3$ = calcium carbonate; FDA = field duplicate available; FD = field duplicate; mg/L = milligrams per litre; QA/QC = quality assurance/quality control.

Appendix 2-5
Table 2-4C: Copper Screening at Reference Locations from 2015 to 2023
Mount Polley Mine

Location Type			BC ENV Guideline for the Protection of Aquatic Life		BC ENV Guideline for the Protection of Wildlife Life			Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake
Station								QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a
Sample Point	Unit	BC ENV Drinking Water Screening Criteria	Long-Term Chronic	Short-Term Acute	Long-Term Chronic	Short-Term Acute	Selected Screening Criteria	QUL-120a-120m - Quesnel Lake Beyond Cariboo Island	QUL-120a-120m - Quesnel Lake Beyond Cariboo Island	QUL-120a-120m - Quesnel Lake Beyond Cariboo Island	QUL-120a-120m - Quesnel Lake Beyond Cariboo Island	QUL-120a-120m - Quesnel Lake Beyond Cariboo Island	QUL-120a-120m - Quesnel Lake Beyond Cariboo Island	QUL-120a-120m - Quesnel Lake Beyond Cariboo Island	QUL-120a-120m - Quesnel Lake Beyond Cariboo Island	QUL-120a-120m - Quesnel Lake Beyond Cariboo Island	QUL-120a-120m - Quesnel Lake Beyond Cariboo Island	QUL-120a-120m - Quesnel Lake Beyond Cariboo Island	QUL-120a-120m - Quesnel Lake Beyond Cariboo Island	QUL-120a-120m - Quesnel Lake Beyond Cariboo Island	QUL-120a-120m - Quesnel Lake Beyond Cariboo Island	QUL-120a-120m - Quesnel Lake Beyond Cariboo Island
Date								2015-09-14	2015-10-15	2015-11-18	2016-04-26	2016-05-19	2016-06-27	2016-08-24	2017-06-21	2017-08-31	2018-06-19	2018-08-27	2018-10-17	2019-08-19	2020-06-16	2020-08-11
Parameter																						
Field Parameters																						
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	-	-	-	-	7.82	7.45	7.85	-	7.72	7.22	7.95	6.69	-	7.64	7.7
Conventional Parameters																						
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	7.75	7.83	7.81	7.9	7.77	7.86	7.79	7.96	7.8	7.89	7.88	7.97	7.98	7.82	7.9
Hardness, as CaCO3	mg/L	-	-	-	-	-	-	56.2	55.1	55.4	53.4	54.2	53.3	52.9	50.1	51.5	54.2	51.3	54.5	50.1	54	52.5
Dissolved organic carbon	mg/L	-	-	-	-	-	-	1.75	1.53	1.31	1.48	1.56	1.46	1.61	1.66	1.53	1.85	1.6	1.38	1.68	1.89	1.72

Appendix 2-5
Table 2-4C: Copper Screening at Reference Locations from 2015 to 2023
Mount Polley Mine

Location Type			BC ENV Guideline for the Protection of Aquatic Life		BC ENV Guideline for the Protection of Wildlife Life			Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake
Station								QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a
Sample Point	Unit	BC ENV Drinking Water Screening Criteria	Long-Term Chronic	Short-Term Acute	Long-Term Chronic	Short-Term Acute	Selected Screening Criteria	QUL-120a-120m - Quesnel Lake Beyond Caribou Island	QUL-120a-120m - Quesnel Lake Beyond Caribou Island	QUL-120a-120m - Quesnel Lake Beyond Caribou Island	QUL-120a-120m - Quesnel Lake Beyond Caribou Island	QUL-120a-120m - Quesnel Lake Beyond Caribou Island	QUL-120a-120m - Quesnel Lake Beyond Caribou Island	QUL-120a-120m - Quesnel Lake Beyond Caribou Island	QUL-120a-120m - Quesnel Lake Beyond Caribou Island	QUL-120a-120m - Quesnel Lake Beyond Caribou Island	QUL-120a-120m - Quesnel Lake Beyond Caribou Island	QUL-120a-120m - Quesnel Lake Beyond Caribou Island	QUL-120a-120m - Quesnel Lake Beyond Caribou Island	QUL-120a-120m - Quesnel Lake Beyond Caribou Island	QUL-120a-120m - Quesnel Lake Beyond Caribou Island
Date								2015-09-14	2015-10-15	2015-11-18	2016-04-26	2016-05-19	2016-06-27	2016-08-24	2017-06-21	2017-08-31	2018-06-19	2018-08-27	2018-10-17	2019-08-19	2020-06-16	2020-08-11
Parameter																						
Dissolved Metals																						
Copper	mg/L	-	0.00040[a]	0.0024[a]	-	-	0.0002 - 0.0062	0.00062	0.00054	0.00069	0.00073	0.00079	0.00066	0.00072	0.00054	0.00078	0.00055	0.00078	0.00094	<0.00050	<0.00050	<0.00050
round sample-specific pH	pH units							7.7	7.8	7.8	7.9	7.8	7.4	7.8	7.9	7.7	7.2	7.9	6.5	7.9	7.6	7.7
rounded sample-specific DOC	mg/L							1.5	1.5	1	1	1.5	1	1.5	1.5	1.5	1.5	1.5	1	1.5	1.5	1.5
rounded sample-specific Hardness	mg/L							50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
Chronic guideline from lookup table	mg/L						0.0002 - 0.0062	0.0005	0.0006	0.0004	0.0004	0.0006	0.0003	0.0006	0.0007	0.0005	0.0003	0.0007	0.0002	0.0007	0.0005	0.0005
Acute guideline from lookup table	mg/L						0.0002 - 0.037	0.0032424	0.0035691	0.0023857	0.0026093	0.0035691	0.0015500	0.0035691	0.0039036	0.0032424	0.0017939	0.0039036	0.0002000	0.0039036	0.0029224	0.0032424

Notes

Notes: Values are taken from the approved guidelines unless otherwise noted.

W = working guideline; M = interim guideline, Min = Minimum concentration requirement based on life stage.

Guidelines based on toxicity modifying factors are presented based on the mean baseline values (hardness of 54 mg/L, pH of 7.8, DOC 2.2 mg/L, temperature of 7 oC, and chloride of 0.50 mg/L) in Quesnel Lake, considered representative of average conditions in the receiving environment.

Shaded values indicates concentrations exceed the most conservative guideline of each maximum and chronic WQG for ecological receptors.

a) Hardness, dissolved organic carbon, and pH dependent copper guidelines selected from the BC ENV look up table.

- = no guideline or no data; BC WQGs = British Columbia water quality guidelines; $CaCO_3$ = calcium carbonate; FDA = field duplicate available; FD = field duplicate; mg/L = milligrams per litre; QA/QC = quality assurance/quality control.

Appendix 2-5
Table 2-4C: Copper Screening at Reference Locations from 2015 to 2023
Mount Polley Mine

Location Type			BC ENV Guideline for the Protection of Aquatic Life		BC ENV Guideline for the Protection of Wildlife Life			Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake
Station								QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a
Sample Point	Unit	BC ENV Drinking Water Screening Criteria	Long-Term Chronic	Short-Term Acute	Long-Term Chronic	Short-Term Acute	Selected Screening Criteria	QUL-120a-120m - Quesnel Lake Beyond Caribou Island	QUL-120a-120m - Quesnel Lake Beyond Caribou Island	QUL-120a-120m - Quesnel Lake Beyond Caribou Island	QUL-120a-120m - Quesnel Lake Beyond Caribou Island	QUL-120a-120m - Quesnel Lake Beyond Caribou Island	QUL-120a-120m - Quesnel Lake Beyond Caribou Island	QUL-120a-120m - Quesnel Lake Beyond Caribou Island	QUL-120a-120m - Quesnel Lake Beyond Caribou Island	QUL-120a-120m - Quesnel Lake Beyond Caribou Island	QUL-120a-120m - Quesnel Lake Beyond Caribou Island	QUL-120a-140m Quesnel Lake Beyond Caribou Island	QUL-120a-140m Quesnel Lake Beyond Caribou Island	QUL-120a-140m Quesnel Lake Beyond Caribou Island	QUL-120a-140m Quesnel Lake Beyond Caribou Island
Date								2020-09-16	2020-11-04	2021-05-19	2021-07-21	2021-09-15	2021-10-27	2022-05-09	2022-06-27	2022-08-15	2022-10-19	2016-04-26	2016-05-19	2016-06-27	2016-08-24	2017-06-21
Parameter																						
Field Parameters																						
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	7.82	7.97	8.36	7.31	8.65	7.63	7.68	7.7	7.54	7.5	-	7.81	7.44	7.96	-
Conventional Parameters																						
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	7.95	7.83	7.86	7.91	7.86	7.91	7.9	7.87	7.85	7.88	7.9	7.77	7.85	7.79	7.95
Hardness, as CaCO3	mg/L	-	-	-	-	-	-	55.1	54	53.1	53	52	53.8	53.4	54.4	51.8	54.9	53.3	53.7	53.3	52.9	50.9
Dissolved organic carbon	mg/L	-	-	-	-	-	-	1.74	12.5	2.06	1.86	1.77	1.64	2.15	2.21	1.95	1.89	1.43	1.67	1.39	1.55	1.45

Appendix 2-5
Table 2-4C: Copper Screening at Reference Locations from 2015 to 2023
Mount Polley Mine

Location Type			BC ENV Guideline for the Protection of Aquatic Life		BC ENV Guideline for the Protection of Wildlife Life			Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake
Station								QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a
Sample Point	Unit	BC ENV Drinking Water Screening Criteria	Long-Term Chronic	Short-Term Acute	Long-Term Chronic	Short-Term Acute	Selected Screening Criteria	QUL-120a-120m - Quesnel Lake Beyond Caribou Island	QUL-120a-120m - Quesnel Lake Beyond Caribou Island	QUL-120a-120m - Quesnel Lake Beyond Caribou Island	QUL-120a-120m - Quesnel Lake Beyond Caribou Island	QUL-120a-120m - Quesnel Lake Beyond Caribou Island	QUL-120a-120m - Quesnel Lake Beyond Caribou Island	QUL-120a-120m - Quesnel Lake Beyond Caribou Island	QUL-120a-120m - Quesnel Lake Beyond Caribou Island	QUL-120a-120m - Quesnel Lake Beyond Caribou Island	QUL-120a-120m - Quesnel Lake Beyond Caribou Island	QUL-120a-140m Quesnel Lake Beyond Caribou Island	QUL-120a-140m Quesnel Lake Beyond Caribou Island	QUL-120a-140m Quesnel Lake Beyond Caribou Island	QUL-120a-140m Quesnel Lake Beyond Caribou Island	QUL-120a-140m Quesnel Lake Beyond Caribou Island
Date								2020-09-16	2020-11-04	2021-05-19	2021-07-21	2021-09-15	2021-10-27	2022-05-09	2022-06-27	2022-08-15	2022-10-19	2016-04-26	2016-05-19	2016-06-27	2016-08-24	2017-06-21
Parameter																						
Dissolved Metals																						
Copper	mg/L	-	0.00040[a]	0.0024[a]	-	-	0.0002 - 0.0062	0.00076	0.00091	0.00057	<0.00050	0.00053	<0.00050	0.00065	<0.00050	0.00052	<0.00050	0.0007	0.00083	0.00068	0.00072	<0.00050
round sample-specific pH	pH units							7.8	7.9	8.3	7.3	8.6	7.6	7.6	7.7	7.5	7.5	7.9	7.8	7.4	7.9	7.9
rounded sample-specific DOC	mg/L							1.5	12.5	2	1.5	1.5	1.5	2	2	1.5	1.5	1	1.5	1	1.5	1
rounded sample-specific Hardness	mg/L							50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
Chronic guideline from lookup table	mg/L						0.0002 - 0.0062	0.0006	0.0054	0.0011	0.0003	0.0009	0.0005	0.0007	0.0007	0.0004	0.0004	0.0004	0.0006	0.0003	0.0007	0.0004
Acute guideline from lookup table	mg/L						0.0002 - 0.037	0.0035691	0.0320685	0.0066879	0.0020495	0.0056816	0.0029224	0.0038941	0.0043192	0.0026145	0.0026145	0.0026093	0.0035691	0.0015500	0.0039036	0.0026093

Notes

Notes: Values are taken from the approved guidelines unless otherwise noted.

W = working guideline; M = interim guideline, Min = Minimum concentration requirement based on life stage.

Guidelines based on toxicity modifying factors are presented based on the mean baseline values (hardness of 54 mg/L, pH of 7.8, DOC 2.2 mg/L, temperature of 7 oC, and chloride of 0.50 mg/L) in Quesnel Lake, considered representative of average conditions in the receiving environment.

Shaded values indicates concentrations exceed the most conservative guideline of each maximum and chronic WQG for ecological receptors.

a) Hardness, dissolved organic carbon, and pH dependent copper guidelines selected from the BC ENV look up table.

- = no guideline or no data; BC WQGs = British Columbia water quality guidelines; $CaCO_3$ = calcium carbonate; FDA = field duplicate available; FD = field duplicate; mg/L = milligrams per litre; QA/QC = quality assurance/quality control.

Appendix 2-5
Table 2-4C: Copper Screening at Reference Locations from 2015 to 2023
Mount Polley Mine

Location Type			BC ENV Guideline for the Protection of Aquatic Life		BC ENV Guideline for the Protection of Wildlife Life			Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake
Station								QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a
Sample Point	Unit	BC ENV Drinking Water Screening Criteria	Long-Term Chronic	Short-Term Acute	Long-Term Chronic	Short-Term Acute	Selected Screening Criteria	QUL-120a-140m Quesnel Lake Beyond Cariboo Island	QUL-120a-140m Quesnel Lake Beyond Cariboo Island	QUL-120a-140m Quesnel Lake Beyond Cariboo Island	QUL-120a-140m Quesnel Lake Beyond Cariboo Island	QUL-120a-140m Quesnel Lake Beyond Cariboo Island	QUL-120a-140m Quesnel Lake Beyond Cariboo Island	QUL-120a-140m Quesnel Lake Beyond Cariboo Island	QUL-120a-140m Quesnel Lake Beyond Cariboo Island	QUL-120a-140m Quesnel Lake Beyond Cariboo Island	QUL-120a-140m Quesnel Lake Beyond Cariboo Island	QUL-120a-140m Quesnel Lake Beyond Cariboo Island	QUL-120a-140m Quesnel Lake Beyond Cariboo Island	QUL-120a-140m Quesnel Lake Beyond Cariboo Island	QUL-120a-140m Quesnel Lake Beyond Cariboo Island
Date								2017-08-31	2018-06-19	2018-08-27	2018-10-17	2019-08-19	2020-06-16	2020-08-11	2020-09-16	2020-11-04	2021-05-19	2021-07-21	2021-09-15	2021-10-27	2022-05-09	2022-06-27
Parameter																						
Field Parameters																						
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	7.67	7.21	7.85	6.7	-	7.65	7.68	7.79	7.95	8.39	7.31	8.73	7.62	7.67	7.67
Conventional Parameters																						
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	7.8	7.88	7.75	7.96	7.97	7.81	7.82	7.94	7.84	7.87	7.87	7.86	7.93	7.9	7.87
Hardness, as CaCO3	mg/L	-	-	-	-	-	-	52.6	54.3	51.5	54.7	53.4	54.4	53.4	55.8	54.4	53.2	54.6	55.3	54.7	53	54.8
Dissolved organic carbon	mg/L	-	-	-	-	-	-	1.46	0.67	1.81	1.24	1.61	2	1.96	1.79	12.8	2.05	2.21	1.86	1.73	2.27	2.18

Appendix 2-5
Table 2-4C: Copper Screening at Reference Locations from 2015 to 2023
Mount Polley Mine

Location Type			BC ENV Guideline for the Protection of Aquatic Life		BC ENV Guideline for the Protection of Wildlife Life			Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake
Station								QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a
Sample Point	Unit	BC ENV Drinking Water Screening Criteria	Long-Term Chronic	Short-Term Acute	Long-Term Chronic	Short-Term Acute	Selected Screening Criteria	QUL-120a-140m Quesnel Lake Beyond Cariboo Island	QUL-120a-140m Quesnel Lake Beyond Cariboo Island	QUL-120a-140m Quesnel Lake Beyond Cariboo Island	QUL-120a-140m Quesnel Lake Beyond Cariboo Island	QUL-120a-140m Quesnel Lake Beyond Cariboo Island	QUL-120a-140m Quesnel Lake Beyond Cariboo Island	QUL-120a-140m Quesnel Lake Beyond Cariboo Island	QUL-120a-140m Quesnel Lake Beyond Cariboo Island	QUL-120a-140m Quesnel Lake Beyond Cariboo Island	QUL-120a-140m Quesnel Lake Beyond Cariboo Island	QUL-120a-140m Quesnel Lake Beyond Cariboo Island	QUL-120a-140m Quesnel Lake Beyond Cariboo Island	QUL-120a-140m Quesnel Lake Beyond Cariboo Island	QUL-120a-140m Quesnel Lake Beyond Cariboo Island
Date								2017-08-31	2018-06-19	2018-08-27	2018-10-17	2019-08-19	2020-06-16	2020-08-11	2020-09-16	2020-11-04	2021-05-19	2021-07-21	2021-09-15	2021-10-27	2022-05-09	2022-06-27
Parameter																						
Dissolved Metals																						
Copper	mg/L	-	0.00040[a]	0.0024[a]	-	-	0.0002 - 0.0062	0.0008	0.00059	<0.00050	0.00078	<0.00050	<0.00050	<0.00050	0.00056	0.00124	0.00061	<0.00050	<0.00050	0.00051	0.00063	<0.00050
round sample-specific pH	pH units							7.6	7.2	7.8	6.5	7.9	7.6	7.6	7.7	7.9	8.3	7.3	8.7	7.6	7.6	7.6
rounded sample-specific DOC	mg/L							1	0.05	1.5	1	1.5	2	1.5	1.5	12.5	2	2	1.5	1.5	2	2
rounded sample-specific Hardness	mg/L							50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
Chronic guideline from lookup table	mg/L						0.0002 - 0.0062	0.0003	0.0002	0.0006	0.0002	0.0007	0.0007	0.0005	0.0005	0.0054	0.0011	0.0005	0.0010	0.0005	0.0007	0.0007
Acute guideline from lookup table	mg/L						0.0002 - 0.037	0.0019500	0.0002000	0.0035691	0.0002000	0.0039036	0.0038941	0.0029224	0.0032424	0.0320685	0.0066879	0.0027323	0.0059069	0.0029224	0.0038941	0.0038941

Notes

Notes: Values are taken from the approved guidelines unless otherwise noted.

W = working guideline; M = interim guideline, Min = Minimum concentration requirement based on life stage.

Guidelines based on toxicity modifying factors are presented based on the mean baseline values (hardness of 54 mg/L, pH of 7.8, DOC 2.2 mg/L, temperature of 7 oC, and chloride of 0.50 mg/L) in Quesnel Lake, considered representative of average conditions in the receiving environment.

Shaded values indicates concentrations exceed the most conservative guideline of each maximum and chronic WQG for ecological receptors.

a) Hardness, dissolved organic carbon, and pH dependent copper guidelines selected from the BC ENV look up table.

- = no guideline or no data; BC WQGs = British Columbia water quality guidelines; $CaCO_3$ = calcium carbonate; FDA = field duplicate available; FD = field duplicate; mg/L = milligrams per litre; QA/QC = quality assurance/quality control.

Appendix 2-5
Table 2-4C: Copper Screening at Reference Locations from 2015 to 2023
Mount Polley Mine

Location Type			BC ENV Guideline for the Protection of Aquatic Life		BC ENV Guideline for the Protection of Wildlife Life			Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake
Station								QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a
Sample Point	Unit	BC ENV Drinking Water Screening Criteria	Long-Term Chronic	Short-Term Acute	Long-Term Chronic	Short-Term Acute	Selected Screening Criteria	QUL-120a-140m Quesnel Lake Beyond Cariboo Island	QUL-120a-140m Quesnel Lake Beyond Cariboo Island	QUL-120a-190m - Quesnel Lake Beyond Cariboo Island	QUL-120a-190m - Quesnel Lake Beyond Cariboo Island	QUL-120a-190m - Quesnel Lake Beyond Cariboo Island	QUL-120a-190m - Quesnel Lake Beyond Cariboo Island	QUL-120a-190m - Quesnel Lake Beyond Cariboo Island	QUL-120a-190m - Quesnel Lake Beyond Cariboo Island	QUL-120a-190m - Quesnel Lake Beyond Cariboo Island	QUL-120a-190m - Quesnel Lake Beyond Cariboo Island	QUL-120a-190m - Quesnel Lake Beyond Cariboo Island	QUL-120a-190m - Quesnel Lake Beyond Cariboo Island	QUL-120a-190m - Quesnel Lake Beyond Cariboo Island	QUL-120a-40m - Quesnel Lake Beyond Cariboo Island
Date								2022-08-15	2022-10-19	2015-03-16	2015-04-29	2015-05-13	2015-06-10	2015-07-22	2015-08-12	2015-09-14	2015-10-15	2015-11-18	2017-04-10	2018-05-23	2019-06-19	2015-03-16
Parameter																						
Field Parameters																						
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	7.53	7.42	-	-	-	-	7.29	-	-	-	-	7.59	7.27	7.73	-
Conventional Parameters																						
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	7.85	7.87	7.86	7.99	7.93	7.9	7.88	7.89	7.79	7.86	7.82	7.92	7.88	8	7.86
Hardness, as CaCO3	mg/L	-	-	-	-	-	-	52.5	53.2	53.4	52.3	50.6	54.2	56.5	54.8	55.4	55.3	55.4	51.9	47	55.4	55.6
Dissolved organic carbon	mg/L	-	-	-	-	-	-	1.87	1.87	2.09	2.28	2.1	1.71	1.75	1.6	1.65	1.51	1.45	1.45	1.81	1.59	2.08

Appendix 2-5
Table 2-4C: Copper Screening at Reference Locations from 2015 to 2023
Mount Polley Mine

Location Type			BC ENV Guideline for the Protection of Aquatic Life		BC ENV Guideline for the Protection of Wildlife Life			Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake
Station								QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a
Sample Point	Unit	BC ENV Drinking Water Screening Criteria	Long-Term Chronic	Short-Term Acute	Long-Term Chronic	Short-Term Acute	Selected Screening Criteria	QUL-120a-140m Quesnel Lake Beyond Cariboo Island	QUL-120a-140m Quesnel Lake Beyond Cariboo Island	QUL-120a-190m - Quesnel Lake Beyond Cariboo Island	QUL-120a-190m - Quesnel Lake Beyond Cariboo Island	QUL-120a-190m - Quesnel Lake Beyond Cariboo Island	QUL-120a-190m - Quesnel Lake Beyond Cariboo Island	QUL-120a-190m - Quesnel Lake Beyond Cariboo Island	QUL-120a-190m - Quesnel Lake Beyond Cariboo Island	QUL-120a-190m - Quesnel Lake Beyond Cariboo Island	QUL-120a-190m - Quesnel Lake Beyond Cariboo Island	QUL-120a-190m - Quesnel Lake Beyond Cariboo Island	QUL-120a-190m - Quesnel Lake Beyond Cariboo Island	QUL-120a-190m - Quesnel Lake Beyond Cariboo Island	QUL-120a-40m - Quesnel Lake Beyond Cariboo Island
Date								2022-08-15	2022-10-19	2015-03-16	2015-04-29	2015-05-13	2015-06-10	2015-07-22	2015-08-12	2015-09-14	2015-10-15	2015-11-18	2017-04-10	2018-05-23	2019-06-19	2015-03-16
Parameter																						
Dissolved Metals																						
Copper	mg/L	-	0.00040[a]	0.0024[a]	-	-	0.0002 - 0.0062	0.00056	<0.00050	0.0007	0.00067	0.00066	0.0006	0.00203	0.00068	0.00074	0.00067	0.00063	0.00059	0.00061	<0.00050	0.00057
round sample-specific pH	pH units							7.5	7.4	7.8	7.9	7.9	7.9	7.2	7.8	7.7	7.8	7.8	7.5	7.2	7.7	7.8
rounded sample-specific DOC	mg/L							1.5	1.5	2	2	2	1.5	1.5	1.5	1.5	1.5	1	1	1.5	1.5	2
rounded sample-specific Hardness	mg/L							50	50	50	50	50	50	50	50	50	50	50	50	40	50	50
Chronic guideline from lookup table	mg/L						0.0002 - 0.0062	0.0004	0.0004	0.0008	0.0009	0.0009	0.0007	0.0003	0.0006	0.0005	0.0006	0.0004	0.0003	0.0003	0.0005	0.0008
Acute guideline from lookup table	mg/L						0.0002 - 0.037	0.0026145	0.0023241	0.0047542	0.0051981	0.0051981	0.0039036	0.0017939	0.0035691	0.0032424	0.0035691	0.0023857	0.0017452	0.0016913	0.0032424	0.0047542

Notes

Notes: Values are taken from the approved guidelines unless otherwise noted.

W = working guideline; M = interim guideline, Min = Minimum concentration requirement based on life stage.

Guidelines based on toxicity modifying factors are presented based on the mean baseline values (hardness of 54 mg/L, pH of 7.8, DOC 2.2 mg/L, temperature of 7 oC, and chloride of 0.50 mg/L) in Quesnel Lake, considered representative of average conditions in the receiving environment.

Shaded values indicates concentrations exceed the most conservative guideline of each maximum and chronic WQG for ecological receptors.

a) Hardness, dissolved organic carbon, and pH dependent copper guidelines selected from the BC ENV look up table.

- = no guideline or no data; BC WQGs = British Columbia water quality guidelines; $CaCO_3$ = calcium carbonate; FDA = field duplicate available; FD = field duplicate; mg/L = milligrams per litre; QA/QC = quality assurance/quality control.

Appendix 2-5
Table 2-4C: Copper Screening at Reference Locations from 2015 to 2023
Mount Polley Mine

Location Type			BC ENV Guideline for the Protection of Aquatic Life		BC ENV Guideline for the Protection of Wildlife Life			Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake
Station								QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a
Sample Point	Unit	BC ENV Drinking Water Screening Criteria	Long-Term Chronic	Short-Term Acute	Long-Term Chronic	Short-Term Acute	Selected Screening Criteria	QUL-120a-40m - Quesnel Lake Beyond Cariboo Island	QUL-120a-40m - Quesnel Lake Beyond Cariboo Island	QUL-120a-40m - Quesnel Lake Beyond Cariboo Island	QUL-120a-40m - Quesnel Lake Beyond Cariboo Island	QUL-120a-40m - Quesnel Lake Beyond Cariboo Island	QUL-120a-40m - Quesnel Lake Beyond Cariboo Island	QUL-120a-40m - Quesnel Lake Beyond Cariboo Island	QUL-120a-40m - Quesnel Lake Beyond Cariboo Island	QUL-120a-40m - Quesnel Lake Beyond Cariboo Island	QUL-120a-40m - Quesnel Lake Beyond Cariboo Island	QUL-120a-40m - Quesnel Lake Beyond Cariboo Island	QUL-120a-40m - Quesnel Lake Beyond Cariboo Island	QUL-120a-40m - Quesnel Lake Beyond Cariboo Island	QUL-120a-40m - Quesnel Lake Beyond Cariboo Island	QUL-120a-40m - Quesnel Lake Beyond Cariboo Island
Date								2015-04-29	2015-05-13	2015-06-10	2015-07-22	2015-08-12	2015-09-14	2015-10-15	2015-11-18	2016-04-26	2016-05-19	2016-06-27	2016-08-24	2017-06-21	2017-08-31	2018-06-19
Parameter																						
Field Parameters																						
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	-	-	-	7.57	7.8	7.75	7.98	7.7	7.33	-	7.71	7.55	7.82	7.5	7.39
Conventional Parameters																						
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	7.99	7.9	7.91	7.88	7.88	7.82	7.95	7.87	7.89	7.8	7.73	7.79	7.95	7.81	7.87
Hardness, as CaCO3	mg/L	-	-	-	-	-	-	52.2	50.9	53.2	55.3	53.7	55.2	54.6	53.8	53	52.5	53.4	53.1	50.2	49.6	54.2
Dissolved organic carbon	mg/L	-	-	-	-	-	-	2.1	1.76	1.58	1.82	1.77	1.77	1.74	1.36	1.42	1.46	1.76	1.56	1.58	1.76	1.68

Appendix 2-5
Table 2-4C: Copper Screening at Reference Locations from 2015 to 2023
Mount Polley Mine

Location Type			BC ENV Guideline for the Protection of Aquatic Life		BC ENV Guideline for the Protection of Wildlife Life			Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake
Station								QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a
Sample Point	Unit	BC ENV Drinking Water Screening Criteria	Long-Term Chronic	Short-Term Acute	Long-Term Chronic	Short-Term Acute	Selected Screening Criteria	QUL-120a-40m - Quesnel Lake Beyond Cariboo Island	QUL-120a-40m - Quesnel Lake Beyond Cariboo Island	QUL-120a-40m - Quesnel Lake Beyond Cariboo Island	QUL-120a-40m - Quesnel Lake Beyond Cariboo Island	QUL-120a-40m - Quesnel Lake Beyond Cariboo Island	QUL-120a-40m - Quesnel Lake Beyond Cariboo Island	QUL-120a-40m - Quesnel Lake Beyond Cariboo Island	QUL-120a-40m - Quesnel Lake Beyond Cariboo Island	QUL-120a-40m - Quesnel Lake Beyond Cariboo Island	QUL-120a-40m - Quesnel Lake Beyond Cariboo Island	QUL-120a-40m - Quesnel Lake Beyond Cariboo Island	QUL-120a-40m - Quesnel Lake Beyond Cariboo Island	QUL-120a-40m - Quesnel Lake Beyond Cariboo Island	QUL-120a-40m - Quesnel Lake Beyond Cariboo Island	QUL-120a-40m - Quesnel Lake Beyond Cariboo Island
Date								2015-04-29	2015-05-13	2015-06-10	2015-07-22	2015-08-12	2015-09-14	2015-10-15	2015-11-18	2016-04-26	2016-05-19	2016-06-27	2016-08-24	2017-06-21	2017-08-31	2018-06-19
Parameter																						
Dissolved Metals																						
Copper	mg/L	-	0.00040[a]	0.0024[a]	-	-	0.0002 - 0.0062	0.00058	0.00061	0.00073	0.00079	0.00134	0.00081	0.00057	0.00064	0.00065	0.00081	0.00091	0.00079	0.00051	0.00054	0.00068
round sample-specific pH	pH units							7.9	7.9	7.9	7.5	7.8	7.7	7.9	7.7	7.3	7.8	7.7	7.5	7.8	7.5	7.3
rounded sample-specific DOC	mg/L							2	1.5	1.5	1.5	1.5	1.5	1.5	1	1	1	1.5	1.5	1.5	1.5	1.5
rounded sample-specific Hardness	mg/L							50	50	50	50	50	50	50	50	50	50	50	50	50	40	50
Chronic guideline from lookup table	mg/L						0.0002 - 0.0062	0.0009	0.0007	0.0007	0.0004	0.0006	0.0005	0.0007	0.0004	0.0002	0.0004	0.0005	0.0004	0.0006	0.0004	0.0003
Acute guideline from lookup table	mg/L						0.0002 - 0.037	0.0051981	0.0039036	0.0039036	0.0026145	0.0035691	0.0032424	0.0039036	0.0021648	0.0013674	0.0023857	0.0032424	0.0026145	0.0035691	0.0024707	0.0020495

Notes

Notes: Values are taken from the approved guidelines unless otherwise noted.

W = working guideline; M = interim guideline, Min = Minimum concentration requirement based on life stage.

Guidelines based on toxicity modifying factors are presented based on the mean baseline values (hardness of 54 mg/L, pH of 7.8, DOC 2.2 mg/L, temperature of 7 oC, and chloride of 0.50 mg/L) in Quesnel Lake, considered representative of average conditions in the receiving environment.

Shaded values indicates concentrations exceed the most conservative guideline of each maximum and chronic WQG for ecological receptors.

a) Hardness, dissolved organic carbon, and pH dependent copper guidelines selected from the BC ENV look up table.

- = no guideline or no data; BC WQGs = British Columbia water quality guidelines; $CaCO_3$ = calcium carbonate; FDA = field duplicate available; FD = field duplicate; mg/L = milligrams per litre; QA/QC = quality assurance/quality control.

Appendix 2-5
Table 2-4C: Copper Screening at Reference Locations from 2015 to 2023
Mount Polley Mine

Location Type			BC ENV Guideline for the Protection of Aquatic Life		BC ENV Guideline for the Protection of Wildlife Life			Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake
Station								QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a
Sample Point	Unit	BC ENV Drinking Water Screening Criteria	Long-Term Chronic	Short-Term Acute	Long-Term Chronic	Short-Term Acute	Selected Screening Criteria	QUL-120a-40m - Quesnel Lake Beyond Cariboo Island	QUL-120a-40m - Quesnel Lake Beyond Cariboo Island	QUL-120a-40m - Quesnel Lake Beyond Cariboo Island	QUL-120a-40m - Quesnel Lake Beyond Cariboo Island	QUL-120a-40m - Quesnel Lake Beyond Cariboo Island	QUL-120a-40m - Quesnel Lake Beyond Cariboo Island	QUL-120a-40m - Quesnel Lake Beyond Cariboo Island	QUL-120a-40m - Quesnel Lake Beyond Cariboo Island	QUL-120a-40m - Quesnel Lake Beyond Cariboo Island	QUL-120a-40m - Quesnel Lake Beyond Cariboo Island	QUL-120a-40m - Quesnel Lake Beyond Cariboo Island	QUL-120a-40m - Quesnel Lake Beyond Cariboo Island	QUL-120a-40m - Quesnel Lake Beyond Cariboo Island	QUL-120a-40m - Quesnel Lake Beyond Cariboo Island	QUL-120a-40m - Quesnel Lake Beyond Cariboo Island
Date								2018-08-27	2018-10-17	2019-08-19	2020-06-16	2020-08-11	2020-09-16	2020-11-04	2021-05-19	2021-07-21	2021-09-15	2021-10-27	2022-05-09	2022-06-27	2022-08-15	2022-10-19
Parameter																						
Field Parameters																						
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	7.8	7.01	7.59	7.73	7.81	7.96	8.12	8.35	7.54	8.75	7.75	7.72	7.87	7.83	7.59
Conventional Parameters																						
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	7.86	7.93	7.96	7.8	7.91	7.92	7.85	7.84	7.87	7.84	7.95	7.89	7.86	7.82	7.87
Hardness, as CaCO3	mg/L	-	-	-	-	-	-	51	53.6	53.3	53.2	52.6	55.1	54.1	54.3	53.8	53.5	54.6	51.5	54.5	53.1	48.4
Dissolved organic carbon	mg/L	-	-	-	-	-	-	1.6	1.56	1.94	2	1.95	1.86	12.5	2.19	1.96	1.78	1.72	1.98	1.93	2.09	1.95

Appendix 2-5
Table 2-4C: Copper Screening at Reference Locations from 2015 to 2023
Mount Polley Mine

Location Type			BC ENV Guideline for the Protection of Aquatic Life		BC ENV Guideline for the Protection of Wildlife Life			Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake
Station								QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a
Sample Point	Unit	BC ENV Drinking Water Screening Criteria	Long-Term Chronic	Short-Term Acute	Long-Term Chronic	Short-Term Acute	Selected Screening Criteria	QUL-120a-40m - Quesnel Lake Beyond Cariboo Island	QUL-120a-40m - Quesnel Lake Beyond Cariboo Island	QUL-120a-40m - Quesnel Lake Beyond Cariboo Island	QUL-120a-40m - Quesnel Lake Beyond Cariboo Island	QUL-120a-40m - Quesnel Lake Beyond Cariboo Island	QUL-120a-40m - Quesnel Lake Beyond Cariboo Island	QUL-120a-40m - Quesnel Lake Beyond Cariboo Island	QUL-120a-40m - Quesnel Lake Beyond Cariboo Island	QUL-120a-40m - Quesnel Lake Beyond Cariboo Island	QUL-120a-40m - Quesnel Lake Beyond Cariboo Island	QUL-120a-40m - Quesnel Lake Beyond Cariboo Island	QUL-120a-40m - Quesnel Lake Beyond Cariboo Island	QUL-120a-40m - Quesnel Lake Beyond Cariboo Island	QUL-120a-40m - Quesnel Lake Beyond Cariboo Island	QUL-120a-40m - Quesnel Lake Beyond Cariboo Island
Date								2018-08-27	2018-10-17	2019-08-19	2020-06-16	2020-08-11	2020-09-16	2020-11-04	2021-05-19	2021-07-21	2021-09-15	2021-10-27	2022-05-09	2022-06-27	2022-08-15	2022-10-19
Parameter																						
Dissolved Metals																						
Copper	mg/L	-	0.00040[a]	0.0024[a]	-	-	0.0002 - 0.0062	0.00056	0.0007	<0.00050	0.00057	<0.00050	0.00074	0.00094	0.00073	0.00053	0.00051	0.00058	0.00063	<0.00050	0.00062	0.00052
round sample-specific pH	pH units							7.8	7.1	7.5	7.7	7.8	7.9	8.1	8.3	7.5	8.7	7.7	7.7	7.8	7.8	7.5
rounded sample-specific DOC	mg/L							1.5	1.5	1.5	2	1.5	1.5	12.5	2	1.5	1.5	1.5	1.5	1.5	2	1.5
rounded sample-specific Hardness	mg/L							50	50	50	50	50	50	50	50	50	50	50	50	50	50	40
Chronic guideline from lookup table	mg/L						0.0002 - 0.0062	0.0006	0.0003	0.0004	0.0007	0.0006	0.0007	0.0062	0.0011	0.0004	0.0010	0.0005	0.0005	0.0006	0.0008	0.0004
Acute guideline from lookup table	mg/L						0.0002 - 0.037	0.0035691	0.0015585	0.0026145	0.0043192	0.0035691	0.0039036	0.0372125	0.0066879	0.0026145	0.0059069	0.0032424	0.0032424	0.0035691	0.0047542	0.0024707

Notes

Notes: Values are taken from the approved guidelines unless otherwise noted.

W = working guideline; M = interim guideline, Min = Minimum concentration requirement based on life stage.

Guidelines based on toxicity modifying factors are presented based on the mean baseline values (hardness of 54 mg/L, pH of 7.8, DOC 2.2 mg/L, temperature of 7 oC, and chloride of 0.50 mg/L) in Quesnel Lake, considered representative of average conditions in the receiving environment.

Shaded values indicates concentrations exceed the most conservative guideline of each maximum and chronic WQG for ecological receptors.

a) Hardness, dissolved organic carbon, and pH dependent copper guidelines selected from the BC ENV look up table.

- = no guideline or no data; BC WQGs = British Columbia water quality guidelines; $CaCO_3$ = calcium carbonate; FDA = field duplicate available; FD = field duplicate; mg/L = milligrams per litre; QA/QC = quality assurance/quality control.

Appendix 2-5
Table 2-4C: Copper Screening at Reference Locations from 2015 to 2023
Mount Polley Mine

Location Type			BC ENV Guideline for the Protection of Aquatic Life		BC ENV Guideline for the Protection of Wildlife Life			Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake
Station								QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a
Sample Point	Unit	BC ENV Drinking Water Screening Criteria	Long-Term Chronic	Short-Term Acute	Long-Term Chronic	Short-Term Acute	Selected Screening Criteria	QUL-120a-80m - Quesnel Lake Beyond Cariboo Island	QUL-120a-80m - Quesnel Lake Beyond Cariboo Island	QUL-120a-80m - Quesnel Lake Beyond Cariboo Island	QUL-120a-80m - Quesnel Lake Beyond Cariboo Island	QUL-120a-80m - Quesnel Lake Beyond Cariboo Island	QUL-120a-80m - Quesnel Lake Beyond Cariboo Island	QUL-120a-80m - Quesnel Lake Beyond Cariboo Island	QUL-120a-80m - Quesnel Lake Beyond Cariboo Island	QUL-120a-80m - Quesnel Lake Beyond Cariboo Island	QUL-120a-80m - Quesnel Lake Beyond Cariboo Island	QUL-120a-80m - Quesnel Lake Beyond Cariboo Island	QUL-120a-80m - Quesnel Lake Beyond Cariboo Island	QUL-120a-80m - Quesnel Lake Beyond Cariboo Island	QUL-120a-80m - Quesnel Lake Beyond Cariboo Island	QUL-120a-80m - Quesnel Lake Beyond Cariboo Island
Date								2015-03-16	2015-04-29	2015-05-13	2015-06-10	2015-07-22	2015-08-12	2015-09-14	2015-10-15	2015-11-18	2016-04-26	2016-05-19	2016-06-27	2016-08-24	2017-04-10	2017-06-21
Parameter																						
Field Parameters																						
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	-	-	-	-	7.53	7.67	7.6	7.78	7.78	7.19	-	7.55	7.39	7.62	-
Conventional Parameters																						
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	7.87	7.98	7.93	7.91	7.88	7.91	7.8	7.85	7.8	7.89	7.77	7.84	7.78	7.93	7.93
Hardness, as CaCO3	mg/L	-	-	-	-	-	-	55.7	52.1	51.1	53	55.9	53.6	55	54.7	54.9	53.3	53.9	53.2	53.2	53.5	50.1
Dissolved organic carbon	mg/L	-	-	-	-	-	-	2.21	2.24	1.81	1.55	1.75	1.6	1.79	1.5	1.44	1.6	1.48	1.61	1.39	1.54	1.71

Appendix 2-5
Table 2-4C: Copper Screening at Reference Locations from 2015 to 2023
Mount Polley Mine

Location Type			BC ENV Guideline for the Protection of Aquatic Life		BC ENV Guideline for the Protection of Wildlife Life			Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake
Station								QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a
Sample Point	Unit	BC ENV Drinking Water Screening Criteria	Long-Term Chronic	Short-Term Acute	Long-Term Chronic	Short-Term Acute	Selected Screening Criteria	QUL-120a-80m - Quesnel Lake Beyond Cariboo Island	QUL-120a-80m - Quesnel Lake Beyond Cariboo Island	QUL-120a-80m - Quesnel Lake Beyond Cariboo Island	QUL-120a-80m - Quesnel Lake Beyond Cariboo Island	QUL-120a-80m - Quesnel Lake Beyond Cariboo Island	QUL-120a-80m - Quesnel Lake Beyond Cariboo Island	QUL-120a-80m - Quesnel Lake Beyond Cariboo Island	QUL-120a-80m - Quesnel Lake Beyond Cariboo Island	QUL-120a-80m - Quesnel Lake Beyond Cariboo Island	QUL-120a-80m - Quesnel Lake Beyond Cariboo Island	QUL-120a-80m - Quesnel Lake Beyond Cariboo Island	QUL-120a-80m - Quesnel Lake Beyond Cariboo Island	QUL-120a-80m - Quesnel Lake Beyond Cariboo Island	QUL-120a-80m - Quesnel Lake Beyond Cariboo Island
Date								2015-03-16	2015-04-29	2015-05-13	2015-06-10	2015-07-22	2015-08-12	2015-09-14	2015-10-15	2015-11-18	2016-04-26	2016-05-19	2016-06-27	2016-08-24	2017-04-10	2017-06-21
Parameter																						
Dissolved Metals																						
Copper	mg/L	-	0.00040[a]	0.0024[a]	-	-	0.0002 - 0.0062	0.0007	0.00095	0.00065	0.00061	0.00162	0.00071	0.00093	0.00064	0.00104	0.00071	0.00087	0.00069	0.00073	0.00051	0.00064
round sample-specific pH	pH units							7.8	7.9	7.9	7.9	7.5	7.6	7.6	7.7	7.7	7.1	7.7	7.5	7.3	7.6	7.9
rounded sample-specific DOC	mg/L							2	2	1.5	1.5	1.5	1.5	1.5	1.5	1	1.5	1	1.5	1	1.5	1.5
rounded sample-specific Hardness	mg/L							50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
Chronic guideline from lookup table	mg/L						0.0002 - 0.0062	0.0008	0.0009	0.0007	0.0007	0.0004	0.0005	0.0005	0.0005	0.0004	0.0003	0.0004	0.0004	0.0002	0.0005	0.0007
Acute guideline from lookup table	mg/L						0.0002 - 0.037	0.0047542	0.0051981	0.0039036	0.0039036	0.0026145	0.0029224	0.0029224	0.0032424	0.0021648	0.0015585	0.0021648	0.0026145	0.0013674	0.0029224	0.0039036

Notes

Notes: Values are taken from the approved guidelines unless otherwise noted.

W = working guideline; M = interim guideline, Min = Minimum concentration requirement based on life stage.

Guidelines based on toxicity modifying factors are presented based on the mean baseline values (hardness of 54 mg/L, pH of 7.8, DOC 2.2 mg/L, temperature of 7 oC, and chloride of 0.50 mg/L) in Quesnel Lake, considered representative of average conditions in the receiving environment.

Shaded values indicates concentrations exceed the most conservative guideline of each maximum and chronic WQG for ecological receptors.

a) Hardness, dissolved organic carbon, and pH dependent copper guidelines selected from the BC ENV look up table.

- = no guideline or no data; BC WQGs = British Columbia water quality guidelines; $CaCO_3$ = calcium carbonate; FDA = field duplicate available; FD = field duplicate; mg/L = milligrams per litre; QA/QC = quality assurance/quality control.

Appendix 2-5
Table 2-4C: Copper Screening at Reference Locations from 2015 to 2023
Mount Polley Mine

Location Type			BC ENV Guideline for the Protection of Aquatic Life		BC ENV Guideline for the Protection of Wildlife Life			Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake
Station								QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a
Sample Point	Unit	BC ENV Drinking Water Screening Criteria	Long-Term Chronic	Short-Term Acute	Long-Term Chronic	Short-Term Acute	Selected Screening Criteria	QUL-120a-80m - Quesnel Lake Beyond Cariboo Island	QUL-120a-80m - Quesnel Lake Beyond Cariboo Island	QUL-120a-80m - Quesnel Lake Beyond Cariboo Island	QUL-120a-80m - Quesnel Lake Beyond Cariboo Island	QUL-120a-80m - Quesnel Lake Beyond Cariboo Island	QUL-120a-80m - Quesnel Lake Beyond Cariboo Island	QUL-120a-80m - Quesnel Lake Beyond Cariboo Island	QUL-120a-80m - Quesnel Lake Beyond Cariboo Island	QUL-120a-80m - Quesnel Lake Beyond Cariboo Island	QUL-120a-80m - Quesnel Lake Beyond Cariboo Island	QUL-120a-80m - Quesnel Lake Beyond Cariboo Island	QUL-120a-80m - Quesnel Lake Beyond Cariboo Island	QUL-120a-80m - Quesnel Lake Beyond Cariboo Island	QUL-120a-80m - Quesnel Lake Beyond Cariboo Island	QUL-120a-80m - Quesnel Lake Beyond Cariboo Island
Date								2017-08-31	2018-05-23	2018-06-19	2018-08-27	2018-10-17	2019-06-19	2019-08-19	2020-06-16	2020-08-11	2020-09-16	2020-11-04	2021-05-19	2021-07-21	2021-09-15	2021-10-27
Parameter																						
Field Parameters																						
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	-	7.37	7.24	7.92	6.71	7.75	-	7.7	7.73	7.84	8.04	8.3	7.42	8.76	7.63
Conventional Parameters																						
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	7.81	7.95	7.86	7.88	7.94	7.99	7.97	7.82	7.9	7.95	7.82	7.84	7.89	7.86	7.93
Hardness, as CaCO3	mg/L	-	-	-	-	-	-	52.6	45.6	52.6	51.2	57.9	55.2	55.4	54.6	53.4	53.6	52.1	52.2	54	54.1	54.6
Dissolved organic carbon	mg/L	-	-	-	-	-	-	1.64	1.75	1.55	1.44	1.3	1.51	1.56	2.16	1.73	1.62	12.7	2	1.81	1.73	1.74

Appendix 2-5
Table 2-4C: Copper Screening at Reference Locations from 2015 to 2023
Mount Polley Mine

Location Type			BC ENV Guideline for the Protection of Aquatic Life		BC ENV Guideline for the Protection of Wildlife Life			Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake
Station								QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-120a
Sample Point	Unit	BC ENV Drinking Water Screening Criteria	Long-Term Chronic	Short-Term Acute	Long-Term Chronic	Short-Term Acute	Selected Screening Criteria	QUL-120a-80m - Quesnel Lake Beyond Cariboo Island	QUL-120a-80m - Quesnel Lake Beyond Cariboo Island	QUL-120a-80m - Quesnel Lake Beyond Cariboo Island	QUL-120a-80m - Quesnel Lake Beyond Cariboo Island	QUL-120a-80m - Quesnel Lake Beyond Cariboo Island	QUL-120a-80m - Quesnel Lake Beyond Cariboo Island	QUL-120a-80m - Quesnel Lake Beyond Cariboo Island	QUL-120a-80m - Quesnel Lake Beyond Cariboo Island	QUL-120a-80m - Quesnel Lake Beyond Cariboo Island	QUL-120a-80m - Quesnel Lake Beyond Cariboo Island	QUL-120a-80m - Quesnel Lake Beyond Cariboo Island	QUL-120a-80m - Quesnel Lake Beyond Cariboo Island	QUL-120a-80m - Quesnel Lake Beyond Cariboo Island	QUL-120a-80m - Quesnel Lake Beyond Cariboo Island
Date								2017-08-31	2018-05-23	2018-06-19	2018-08-27	2018-10-17	2019-06-19	2019-08-19	2020-06-16	2020-08-11	2020-09-16	2020-11-04	2021-05-19	2021-07-21	2021-09-15	2021-10-27
Parameter																						
Dissolved Metals																						
Copper	mg/L	-	0.00040[a]	0.0024[a]	-	-	0.0002 - 0.0062	0.00063	0.0006	0.00078	<0.00050	0.00069	<0.00050	<0.00050	0.00055	<0.00050	0.00074	<0.00050	0.00054	<0.00050	<0.00050	<0.00050
round sample-specific pH	pH units							7.8	7.3	7.2	7.9	6.5	7.7	7.9	7.7	7.7	7.8	8	8.3	7.4	8.7	7.6
rounded sample-specific DOC	mg/L							1.5	1.5	1.5	1	1	1.5	1.5	2	1.5	1.5	12.5	2	1.5	1.5	1.5
rounded sample-specific Hardness	mg/L							50	40	50	50	50	50	50	50	50	50	50	50	50	50	50
Chronic guideline from lookup table	mg/L						0.0002 - 0.0062	0.0006	0.0003	0.0003	0.0004	0.0002	0.0005	0.0007	0.0007	0.0005	0.0006	0.0058	0.0011	0.0004	0.0010	0.0005
Acute guideline from lookup table	mg/L						0.0002 - 0.037	0.0035691	0.0019336	0.0017939	0.0026093	0.0002000	0.0032424	0.0039036	0.0043192	0.0032424	0.0035691	0.0346929	0.0066879	0.0023241	0.0059069	0.0029224

Notes

Notes: Values are taken from the approved guidelines unless otherwise noted.

W = working guideline; M = interim guideline, Min = Minimum concentration requirement based on life stage.

Guidelines based on toxicity modifying factors are presented based on the mean baseline values (hardness of 54 mg/L, pH of 7.8, DOC 2.2 mg/L, temperature of 7 oC, and chloride of 0.50 mg/L) in Quesnel Lake, considered representative of average conditions in the receiving environment.

Shaded values indicates concentrations exceed the most conservative guideline of each maximum and chronic WQG for ecological receptors.

a) Hardness, dissolved organic carbon, and pH dependent copper guidelines selected from the BC ENV look up table.

- = no guideline or no data; BC WQGs = British Columbia water quality guidelines; $CaCO_3$ = calcium carbonate; FDA = field duplicate available; FD = field duplicate; mg/L = milligrams per litre; QA/QC = quality assurance/quality control.

Appendix 2-5
Table 2-4C: Copper Screening at Reference Locations from 2015 to 2023
Mount Polley Mine

Location Type			BC ENV Guideline for the Protection of Aquatic Life		BC ENV Guideline for the Protection of Wildlife Life			Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake
Station								QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a
Sample Point	Unit	BC ENV Drinking Water Screening Criteria	Long-Term Chronic	Short-Term Acute	Long-Term Chronic	Short-Term Acute	Selected Screening Criteria	QUL-120a-80m - Quesnel Lake Beyond Cariboo Island	QUL-120a-80m - Quesnel Lake Beyond Cariboo Island	QUL-120a-80m - Quesnel Lake Beyond Cariboo Island	QUL-120a-80m - Quesnel Lake Beyond Cariboo Island	QUL-2a-0m - QUL Between Cariboo Island and HAC	QUL-2a-0m - QUL Between Cariboo Island and HAC	QUL-2a-0m - QUL Between Cariboo Island and HAC	QUL-2a-0m - QUL Between Cariboo Island and HAC	QUL-2a-0m - QUL Between Cariboo Island and HAC	QUL-2a-0m - QUL Between Cariboo Island and HAC	QUL-2a-0m - QUL Between Cariboo Island and HAC	QUL-2a-0m - QUL Between Cariboo Island and HAC	QUL-2a-0m - QUL Between Cariboo Island and HAC	QUL-2a-0m - QUL Between Cariboo Island and HAC
Date								2022-05-09	2022-06-27	2022-08-15	2022-10-19	2015-03-11	2015-03-18	2015-03-24	2015-04-01	2015-04-08	2015-04-14	2015-05-06	2015-06-03	2015-07-01	2015-08-26	2015-09-14
Parameter																						
Field Parameters																						
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	7.69	7.74	7.58	7.54	-	-	-	-	-	-	-	-	7.35	7.84	-
Conventional Parameters																						
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	7.9	7.86	7.84	7.88	7.92	7.9	7.83	7.89	7.98	7.7	8.01	7.98	8	7.98	7.9
Hardness, as CaCO3	mg/L	-	-	-	-	-	-	52.6	54.4	51.9	52.4	52.9	54.9	53.3	53.4	55.9	51.6	51.9	49.9	48.8	53.1	53.4
Dissolved organic carbon	mg/L	-	-	-	-	-	-	2.06	1.89	1.8	1.7	2.3	1.63	1.76	2.67	2.02	2.22	2.23	2.32	1.97	1.58	1.72

Appendix 2-5
Table 2-4C: Copper Screening at Reference Locations from 2015 to 2023
Mount Polley Mine

Location Type			BC ENV Guideline for the Protection of Aquatic Life		BC ENV Guideline for the Protection of Wildlife Life			Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake
Station								QUL-120a	QUL-120a	QUL-120a	QUL-120a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a
Sample Point	Unit	BC ENV Drinking Water Screening Criteria	Long-Term Chronic	Short-Term Acute	Long-Term Chronic	Short-Term Acute	Selected Screening Criteria	QUL-120a-80m - Quesnel Lake Beyond Cariboo Island	QUL-120a-80m - Quesnel Lake Beyond Cariboo Island	QUL-120a-80m - Quesnel Lake Beyond Cariboo Island	QUL-120a-80m - Quesnel Lake Beyond Cariboo Island	QUL-2a-0m - QUL Between Cariboo Island and HAC	QUL-2a-0m - QUL Between Cariboo Island and HAC	QUL-2a-0m - QUL Between Cariboo Island and HAC	QUL-2a-0m - QUL Between Cariboo Island and HAC	QUL-2a-0m - QUL Between Cariboo Island and HAC	QUL-2a-0m - QUL Between Cariboo Island and HAC	QUL-2a-0m - QUL Between Cariboo Island and HAC	QUL-2a-0m - QUL Between Cariboo Island and HAC	QUL-2a-0m - QUL Between Cariboo Island and HAC	QUL-2a-0m - QUL Between Cariboo Island and HAC
Date								2022-05-09	2022-06-27	2022-08-15	2022-10-19	2015-03-11	2015-03-18	2015-03-24	2015-04-01	2015-04-08	2015-04-14	2015-05-06	2015-06-03	2015-07-01	2015-08-26	2015-09-14
Parameter																						
Dissolved Metals																						
Copper	mg/L	-	0.00040[a]	0.0024[a]	-	-	0.0002 - 0.0062	0.0006	<0.00050	0.0006	<0.00050	0.00108	0.00077	0.00074	0.00064	0.00069	0.00059	0.00082	0.00063	0.00054	<0.00050	<0.00050
round sample-specific pH	pH units							7.6	7.7	7.5	7.5	7.9	7.9	7.8	7.8	7.9	7.7	8	7.9	7.3	7.8	7.9
rounded sample-specific DOC	mg/L							2	1.5	1.5	1.5	2	1.5	1.5	2.5	2	2	2	2	1.5	1.5	1.5
rounded sample-specific Hardness	mg/L							50	50	50	50	50	50	50	50	50	50	50	40	40	50	50
Chronic guideline from lookup table	mg/L						0.0002 - 0.0062	0.0007	0.0005	0.0004	0.0004	0.0009	0.0007	0.0006	0.0010	0.0009	0.0007	0.0009	0.0008	0.0003	0.0006	0.0007
Acute guideline from lookup table	mg/L						0.0002 - 0.037	0.0038941	0.0032424	0.0026145	0.0026145	0.0051981	0.0039036	0.0035691	0.0059352	0.0051981	0.0043192	0.0056375	0.0049172	0.0019336	0.0035691	0.0039036

Notes

Notes: Values are taken from the approved guidelines unless otherwise noted.

W = working guideline; M = interim guideline, Min = Minimum concentration requirement based on life stage.

Guidelines based on toxicity modifying factors are presented based on the mean baseline values (hardness of 54 mg/L, pH of 7.8, DOC 2.2 mg/L, temperature of 7 oC, and chloride of 0.50 mg/L) in Quesnel Lake, considered representative of average conditions in the receiving environment.

Shaded values indicates concentrations exceed the most conservative guideline of each maximum and chronic WQG for ecological receptors.

a) Hardness, dissolved organic carbon, and pH dependent copper guidelines selected from the BC ENV look up table.

- = no guideline or no data; BC WQGs = British Columbia water quality guidelines; $CaCO_3$ = calcium carbonate; FDA = field duplicate available; FD = field duplicate; mg/L = milligrams per litre; QA/QC = quality assurance/quality control.

Appendix 2-5
Table 2-4C: Copper Screening at Reference Locations from 2015 to 2023
Mount Polley Mine

Location Type			BC ENV Guideline for the Protection of Aquatic Life		BC ENV Guideline for the Protection of Wildlife Life			Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake
Station								QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a
Sample Point	Unit	BC ENV Drinking Water Screening Criteria	Long-Term Chronic	Short-Term Acute	Long-Term Chronic	Short-Term Acute	Selected Screening Criteria	QUL-2a-0m - QUL Between Cariboo Island and HAC	QUL-2a-0m - QUL Between Cariboo Island and HAC	QUL-2a-0m - QUL Between Cariboo Island and HAC	QUL-2a-0m - QUL Between Cariboo Island and HAC	QUL-2a-0m - QUL Between Cariboo Island and HAC	QUL-2a-0m - QUL Between Cariboo Island and HAC	QUL-2a-0m - QUL Between Cariboo Island and HAC	QUL-2a-0m - QUL Between Cariboo Island and HAC	QUL-2a-0m - QUL Between Cariboo Island and HAC	QUL-2a-0m - QUL Between Cariboo Island and HAC	QUL-2a-0m - QUL Between Cariboo Island and HAC	QUL-2a-0m - QUL Between Cariboo Island and HAC	QUL-2a-0m - QUL Between Cariboo Island and HAC	QUL-2a-0m - QUL Between Cariboo Island and HAC
Date								2015-10-28	2015-11-09	2015-12-07	2016-01-20	2016-04-26	2016-05-19	2016-06-28	2016-07-20	2016-08-15	2016-09-12	2016-10-26	2016-11-21	2017-04-10	2017-05-09	2017-06-19
Parameter																						
Field Parameters																						
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	7.94	7.67	7.86	7.38	8.06	7.65	7.82	8.35	8.05	7.67	-	7.19	7.6	7.74	7.54
Conventional Parameters																						
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	7.9	7.89	7.77	7.81	7.93	7.85	7.84	7.74	7.85	7.86	7.77	7.88	7.94	7.86	7.86
Hardness, as CaCO3	mg/L	-	-	-	-	-	-	55.8	54.2	55.5	54.7	53.5	51.1	47.1	46.9	50.2	49.6	49.1	51.9	53.8	52.5	47.4
Dissolved organic carbon	mg/L	-	-	-	-	-	-	1.31	1.61	1.84	1.64	2.01	1.87	2.34	2.68	2.31	1.9	1.74	1.99	1.58	1.69	2.04

Appendix 2-5
Table 2-4C: Copper Screening at Reference Locations from 2015 to 2023
Mount Polley Mine

Location Type			BC ENV Guideline for the Protection of Aquatic Life		BC ENV Guideline for the Protection of Wildlife Life			Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake
Station								QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a
Sample Point	Unit	BC ENV Drinking Water Screening Criteria	Long-Term Chronic	Short-Term Acute	Long-Term Chronic	Short-Term Acute	Selected Screening Criteria	QUL-2a-0m - QUL Between Cariboo Island and HAC	QUL-2a-0m - QUL Between Cariboo Island and HAC	QUL-2a-0m - QUL Between Cariboo Island and HAC	QUL-2a-0m - QUL Between Cariboo Island and HAC	QUL-2a-0m - QUL Between Cariboo Island and HAC	QUL-2a-0m - QUL Between Cariboo Island and HAC	QUL-2a-0m - QUL Between Cariboo Island and HAC	QUL-2a-0m - QUL Between Cariboo Island and HAC	QUL-2a-0m - QUL Between Cariboo Island and HAC	QUL-2a-0m - QUL Between Cariboo Island and HAC	QUL-2a-0m - QUL Between Cariboo Island and HAC	QUL-2a-0m - QUL Between Cariboo Island and HAC	QUL-2a-0m - QUL Between Cariboo Island and HAC	QUL-2a-0m - QUL Between Cariboo Island and HAC
Date								2015-10-28	2015-11-09	2015-12-07	2016-01-20	2016-04-26	2016-05-19	2016-06-28	2016-07-20	2016-08-15	2016-09-12	2016-10-26	2016-11-21	2017-04-10	2017-05-09	2017-06-19
Parameter																						
Dissolved Metals																						
Copper	mg/L	-	0.00040[a]	0.0024[a]	-	-	0.0002 - 0.0062	<0.00050	<0.00050	0.00056	0.00051	0.00073	0.00067	0.0006	0.0005	0.00052	0.00052	0.00055	0.00075	0.00057	0.00054	0.00054
round sample-specific pH	pH units							7.9	7.6	7.8	7.3	8	7.6	7.8	8.3	8	7.6	7.7	7.1	7.6	7.7	7.5
rounded sample-specific DOC	mg/L							1	1.5	1.5	1.5	2	1.5	2	2.5	2	1.5	1.5	1.5	1.5	1.5	2
rounded sample-specific Hardness	mg/L							50	50	50	50	50	50	40	40	50	40	40	50	50	50	40
Chronic guideline from lookup table	mg/L						0.0002 - 0.0062	0.0004	0.0005	0.0006	0.0003	0.0009	0.0005	0.0008	0.0013	0.0009	0.0005	0.0005	0.0003	0.0005	0.0005	0.0006
Acute guideline from lookup table	mg/L						0.0002 - 0.037	0.0026093	0.0029224	0.0035691	0.0020495	0.0056375	0.0029224	0.0044972	0.0077329	0.0056375	0.0027629	0.0030664	0.0015585	0.0029224	0.0032424	0.0032930

Notes

Notes: Values are taken from the approved guidelines unless otherwise noted.

W = working guideline; M = interim guideline, Min = Minimum concentration requirement based on life stage.

Guidelines based on toxicity modifying factors are presented based on the mean baseline values (hardness of 54 mg/L, pH of 7.8, DOC 2.2 mg/L, temperature of 7 oC, and chloride of 0.50 mg/L) in Quesnel Lake, considered representative of average conditions in the receiving environment.

Shaded values indicates concentrations exceed the most conservative guideline of each maximum and chronic WQG for ecological receptors.

a) Hardness, dissolved organic carbon, and pH dependent copper guidelines selected from the BC ENV look up table.

- = no guideline or no data; BC WQGs = British Columbia water quality guidelines; $CaCO_3$ = calcium carbonate; FDA = field duplicate available; FD = field duplicate; mg/L = milligrams per litre; QA/QC = quality assurance/quality control.

Appendix 2-5
Table 2-4C: Copper Screening at Reference Locations from 2015 to 2023
Mount Polley Mine

Location Type			BC ENV Guideline for the Protection of Aquatic Life		BC ENV Guideline for the Protection of Wildlife Life			Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake
Station								QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a
Sample Point	Unit	BC ENV Drinking Water Screening Criteria	Long-Term Chronic	Short-Term Acute	Long-Term Chronic	Short-Term Acute	Selected Screening Criteria	QUL-2a-0m - QUL Between Cariboo Island and HAC	QUL-2a-0m - QUL Between Cariboo Island and HAC	QUL-2a-0m - QUL Between Cariboo Island and HAC	QUL-2a-0m - QUL Between Cariboo Island and HAC	QUL-2a-0m - QUL Between Cariboo Island and HAC	QUL-2a-0m - QUL Between Cariboo Island and HAC	QUL-2a-0m - QUL Between Cariboo Island and HAC	QUL-2a-0m - QUL Between Cariboo Island and HAC	QUL-2a-0m - QUL Between Cariboo Island and HAC	QUL-2a-0m - QUL Between Cariboo Island and HAC	QUL-2a-0m - QUL Between Cariboo Island and HAC	QUL-2a-0m - QUL Between Cariboo Island and HAC	QUL-2a-0m - QUL Between Cariboo Island and HAC	QUL-2a-0m - QUL Between Cariboo Island and HAC
Date								2017-08-21	2017-09-12	2017-10-26	2017-11-20	2018-05-22	2018-06-27	2018-07-25	2018-09-04	2018-10-18	2018-12-18	2019-05-08	2019-06-18	2019-06-19	2019-07-25	2019-08-20
Parameter																						
Field Parameters																						
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	-	-	7.92	-	8.1	8.13	7.9	7.8	7.84	7.82	-	7.85	7.9	7.89	7.8
Conventional Parameters																						
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	7.87	7.95	7.93	7.92	7.7	7.85	7.97	7.99	7.9	7.82	8	8	8.01	7.94	7.95
Hardness, as CaCO3	mg/L	-	-	-	-	-	-	52.5	50.4	49.5	49.2	44.9	48.7	46.1	49.2	51.8	56.7	56.4	49	53.8	48.5	47
Dissolved organic carbon	mg/L	-	-	-	-	-	-	1.87	1.61	2.03	1.44	4.05	2.07	1.78	1.53	1.77	1.66	1.74	1.94	1.94	2.29	1.96

Appendix 2-5
Table 2-4C: Copper Screening at Reference Locations from 2015 to 2023
Mount Polley Mine

Location Type			BC ENV Guideline for the Protection of Aquatic Life		BC ENV Guideline for the Protection of Wildlife Life			Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake
Station								QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a
Sample Point	Unit	BC ENV Drinking Water Screening Criteria	Long-Term Chronic	Short-Term Acute	Long-Term Chronic	Short-Term Acute	Selected Screening Criteria	QUL-2a-0m - QUL Between Cariboo Island and HAC	QUL-2a-0m - QUL Between Cariboo Island and HAC	QUL-2a-0m - QUL Between Cariboo Island and HAC	QUL-2a-0m - QUL Between Cariboo Island and HAC	QUL-2a-0m - QUL Between Cariboo Island and HAC	QUL-2a-0m - QUL Between Cariboo Island and HAC	QUL-2a-0m - QUL Between Cariboo Island and HAC	QUL-2a-0m - QUL Between Cariboo Island and HAC	QUL-2a-0m - QUL Between Cariboo Island and HAC	QUL-2a-0m - QUL Between Cariboo Island and HAC	QUL-2a-0m - QUL Between Cariboo Island and HAC	QUL-2a-0m - QUL Between Cariboo Island and HAC	QUL-2a-0m - QUL Between Cariboo Island and HAC	QUL-2a-0m - QUL Between Cariboo Island and HAC
Date								2017-08-21	2017-09-12	2017-10-26	2017-11-20	2018-05-22	2018-06-27	2018-07-25	2018-09-04	2018-10-18	2018-12-18	2019-05-08	2019-06-18	2019-06-19	2019-07-25	2019-08-20
Parameter																						
Dissolved Metals																						
Copper	mg/L	-	0.00040[a]	0.0024[a]	-	-	0.0002 - 0.0062	<0.00050	<0.00050	<0.00050	0.00051	0.00098	<0.00050	0.00148	0.0008	<0.00050	0.00055	<0.00050	<0.00050	<0.00050	0.00051	<0.00050
round sample-specific pH	pH units							7.8	7.9	7.9	7.9	8.1	8.1	7.9	7.8	7.8	7.8	8	7.8	7.9	7.8	7.8
rounded sample-specific DOC	mg/L							1.5	1.5	2	1	4	2	1.5	1.5	1.5	1.5	1.5	1.5	1.5	2	1.5
rounded sample-specific Hardness	mg/L							50	50	40	40	40	40	40	40	50	50	50	40	50	40	40
Chronic guideline from lookup table	mg/L						0.0002 - 0.0062	0.0006	0.0007	0.0008	0.0004	0.0019	0.0009	0.0006	0.0006	0.0006	0.0006	0.0007	0.0006	0.0007	0.0008	0.0006
Acute guideline from lookup table	mg/L						0.0002 - 0.037	0.0035691	0.0039036	0.0049172	0.0024691	0.0112311	0.0056540	0.0036927	0.0033759	0.0035691	0.0035691	0.0042385	0.0033759	0.0039036	0.0044972	0.0033759

Notes

Notes: Values are taken from the approved guidelines unless otherwise noted.

W = working guideline; M = interim guideline, Min = Minimum concentration requirement based on life stage.

Guidelines based on toxicity modifying factors are presented based on the mean baseline values (hardness of 54 mg/L, pH of 7.8, DOC 2.2 mg/L, temperature of 7 oC, and chloride of 0.50 mg/L) in Quesnel Lake, considered representative of average conditions in the receiving environment.

Shaded values indicates concentrations exceed the most conservative guideline of each maximum and chronic WQG for ecological receptors.

a) Hardness, dissolved organic carbon, and pH dependent copper guidelines selected from the BC ENV look up table.

- = no guideline or no data; BC WQGs = British Columbia water quality guidelines; $CaCO_3$ = calcium carbonate; FDA = field duplicate available; FD = field duplicate; mg/L = milligrams per litre; QA/QC = quality assurance/quality control.

Appendix 2-5
Table 2-4C: Copper Screening at Reference Locations from 2015 to 2023
Mount Polley Mine

Location Type			BC ENV Guideline for the Protection of Aquatic Life		BC ENV Guideline for the Protection of Wildlife Life			Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake
Station								QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a
Sample Point	Unit	BC ENV Drinking Water Screening Criteria	Long-Term Chronic	Short-Term Acute	Long-Term Chronic	Short-Term Acute	Selected Screening Criteria	QUL-2a-0m - QUL Between Cariboo Island and HAC	QUL-2a-0m - QUL Between Cariboo Island and HAC	QUL-2a-0m - QUL Between Cariboo Island and HAC	QUL-2a-0m - QUL Between Cariboo Island and HAC	QUL-2a-0m - QUL Between Cariboo Island and HAC	QUL-2a-0m - QUL Between Cariboo Island and HAC	QUL-2a-0m - QUL Between Cariboo Island and HAC	QUL-2a-0m - QUL Between Cariboo Island and HAC	QUL-2a-0m - QUL Between Cariboo Island and HAC	QUL-2a-0m - QUL Between Cariboo Island and HAC	QUL-2a-0m - QUL Between Cariboo Island and HAC	QUL-2a-0m - QUL Between Cariboo Island and HAC	QUL-2a-0m - QUL Between Cariboo Island and HAC	QUL-2a-0m - QUL Between Cariboo Island and HAC	QUL-2a-20m - QUL Between Cariboo Island and HAC
Date								2019-10-30	2020-06-16	2020-07-21	2020-08-11	2020-09-16	2020-11-04	2021-05-19	2021-07-21	2021-09-15	2021-10-27	2022-05-09	2022-06-27	2022-08-15	2022-10-19	2015-12-07
Parameter																						
Field Parameters																						
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	7.86	7.77	-	7.94	8.13	8.01	8.08	8	8.45	7.91	7.79	7.94	7.92	8.1	7.77
Conventional Parameters																						
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	7.89	7.77	7.46	7.93	7.95	7.87	7.87	7.92	7.9	7.95	7.9	7.77	7.86	7.87	7.78
Hardness, as CaCO3	mg/L	-	-	-	-	-	-	50.2	48.2	43.6	46.5	49.1	51.1	52.3	46.9	48.6	50.5	52	44.7	45.9	51.5	54.5
Dissolved organic carbon	mg/L	-	-	-	-	-	-	1.93	3.03	4.13	2.93	2.19	12.5	2.46	2.18	1.73	1.71	2.05	3.36	2.32	1.96	1.53

Appendix 2-5
Table 2-4C: Copper Screening at Reference Locations from 2015 to 2023
Mount Polley Mine

Location Type			BC ENV Guideline for the Protection of Aquatic Life		BC ENV Guideline for the Protection of Wildlife Life			Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake
Station								QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a
Sample Point	Unit	BC ENV Drinking Water Screening Criteria	Long-Term Chronic	Short-Term Acute	Long-Term Chronic	Short-Term Acute	Selected Screening Criteria	QUL-2a-0m - QUL Between Cariboo Island and HAC	QUL-2a-0m - QUL Between Cariboo Island and HAC	QUL-2a-0m - QUL Between Cariboo Island and HAC	QUL-2a-0m - QUL Between Cariboo Island and HAC	QUL-2a-0m - QUL Between Cariboo Island and HAC	QUL-2a-0m - QUL Between Cariboo Island and HAC	QUL-2a-0m - QUL Between Cariboo Island and HAC	QUL-2a-0m - QUL Between Cariboo Island and HAC	QUL-2a-0m - QUL Between Cariboo Island and HAC	QUL-2a-0m - QUL Between Cariboo Island and HAC	QUL-2a-0m - QUL Between Cariboo Island and HAC	QUL-2a-0m - QUL Between Cariboo Island and HAC	QUL-2a-0m - QUL Between Cariboo Island and HAC	QUL-2a-20m - QUL Between Cariboo Island and HAC
Date								2019-10-30	2020-06-16	2020-07-21	2020-08-11	2020-09-16	2020-11-04	2021-05-19	2021-07-21	2021-09-15	2021-10-27	2022-05-09	2022-06-27	2022-08-15	2022-10-19	2015-12-07
Parameter																						
Dissolved Metals																						
Copper	mg/L	-	0.00040[a]	0.0024[a]	-	-	0.0002 - 0.0062	<0.00050	0.00073	0.00077	0.00072	0.00069	<0.00050	0.00061	<0.00050	<0.00050	<0.00050	0.00064	0.0007	<0.00050	<0.00050	0.00055
round sample-specific pH	pH units							7.8	7.7	7.4	7.9	8.1	8	8	8	8.4	7.9	7.7	7.9	7.9	8.1	7.7
rounded sample-specific DOC	mg/L							1.5	3	4	2.5	2	12.5	2	2	1.5	1.5	2	3	2	1.5	1.5
rounded sample-specific Hardness	mg/L							50	40	40	40	40	50	50	40	40	50	50	40	40	50	50
Chronic guideline from lookup table	mg/L						0.0002 - 0.0062	0.0006	0.0010	0.0010	0.0010	0.0009	0.0058	0.0009	0.0009	0.0008	0.0007	0.0007	0.0012	0.0008	0.0008	0.0005
Acute guideline from lookup table	mg/L						0.0002 - 0.037	0.0035691	0.0061271	0.0058539	0.0061366	0.0056540	0.0346929	0.0056375	0.0053331	0.0048654	0.0039036	0.0043192	0.0073621	0.0049172	0.0045655	0.0032424

Notes

Notes: Values are taken from the approved guidelines unless otherwise noted.

W = working guideline; M = interim guideline, Min = Minimum concentration requirement based on life stage.

Guidelines based on toxicity modifying factors are presented based on the mean baseline values (hardness of 54 mg/L, pH of 7.8, DOC 2.2 mg/L, temperature of 7 oC, and chloride of 0.50 mg/L) in Quesnel Lake, considered representative of average conditions in the receiving environment.

Shaded values indicates concentrations exceed the most conservative guideline of each maximum and chronic WQG for ecological receptors.

a) Hardness, dissolved organic carbon, and pH dependent copper guidelines selected from the BC ENV look up table.

- = no guideline or no data; BC WQGs = British Columbia water quality guidelines; $CaCO_3$ = calcium carbonate; FDA = field duplicate available; FD = field duplicate; mg/L = milligrams per litre; QA/QC = quality assurance/quality control.

Appendix 2-5
Table 2-4C: Copper Screening at Reference Locations from 2015 to 2023
Mount Polley Mine

Location Type			BC ENV Guideline for the Protection of Aquatic Life		BC ENV Guideline for the Protection of Wildlife Life			Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake
Station								QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a
Sample Point	Unit	BC ENV Drinking Water Screening Criteria	Long-Term Chronic	Short-Term Acute	Long-Term Chronic	Short-Term Acute	Selected Screening Criteria	QUL-2a-20m - QUL Between Cariboo Island and HAC	QUL-2a-20m - QUL Between Cariboo Island and HAC	QUL-2a-20m - QUL Between Cariboo Island and HAC	QUL-2a-20m - QUL Between Cariboo Island and HAC	QUL-2a-20m - QUL Between Cariboo Island and HAC	QUL-2a-20m - QUL Between Cariboo Island and HAC	QUL-2a-20m - QUL Between Cariboo Island and HAC	QUL-2a-20m - QUL Between Cariboo Island and HAC	QUL-2a-20m - QUL Between Cariboo Island and HAC	QUL-2a-20m - QUL Between Cariboo Island and HAC	QUL-2a-20m - QUL Between Cariboo Island and HAC	QUL-2a-20m - QUL Between Cariboo Island and HAC	QUL-2a-20m - QUL Between Cariboo Island and HAC	QUL-2a-20m - QUL Between Cariboo Island and HAC
Date								2016-01-20	2016-04-26	2016-05-19	2016-06-28	2016-07-20	2016-08-15	2016-09-12	2016-10-26	2016-11-21	2017-04-10	2017-05-09	2017-06-19	2017-08-21	2017-09-12	2017-10-26
Parameter																						
Field Parameters																						
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	7.43	7.95	-	7.17	7.89	-	7.86	-	7.34	7.6	7.76	7.54	-	-	7.74
Conventional Parameters																						
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	7.82	7.92	7.77	7.81	7.73	7.83	7.85	7.91	7.9	7.93	7.83	7.87	7.87	7.94	7.93
Hardness, as CaCO3	mg/L	-	-	-	-	-	-	54.9	53	53.3	52.3	51.5	52.9	51.7	49.4	52	53.4	53.1	49.1	54.3	50.3	48.8
Dissolved organic carbon	mg/L	-	-	-	-	-	-	1.74	1.63	1.81	1.61	1.85	2.19	1.66	1.83	1.94	1.68	1.54	1.79	1.7	1.69	1.8

Appendix 2-5
Table 2-4C: Copper Screening at Reference Locations from 2015 to 2023
Mount Polley Mine

Location Type			BC ENV Guideline for the Protection of Aquatic Life		BC ENV Guideline for the Protection of Wildlife Life			Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake
Station								QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a
Sample Point	Unit	BC ENV Drinking Water Screening Criteria	Long-Term Chronic	Short-Term Acute	Long-Term Chronic	Short-Term Acute	Selected Screening Criteria	QUL-2a-20m - QUL Between Cariboo Island and HAC	QUL-2a-20m - QUL Between Cariboo Island and HAC	QUL-2a-20m - QUL Between Cariboo Island and HAC	QUL-2a-20m - QUL Between Cariboo Island and HAC	QUL-2a-20m - QUL Between Cariboo Island and HAC	QUL-2a-20m - QUL Between Cariboo Island and HAC	QUL-2a-20m - QUL Between Cariboo Island and HAC	QUL-2a-20m - QUL Between Cariboo Island and HAC	QUL-2a-20m - QUL Between Cariboo Island and HAC	QUL-2a-20m - QUL Between Cariboo Island and HAC	QUL-2a-20m - QUL Between Cariboo Island and HAC	QUL-2a-20m - QUL Between Cariboo Island and HAC	QUL-2a-20m - QUL Between Cariboo Island and HAC	QUL-2a-20m - QUL Between Cariboo Island and HAC
Date								2016-01-20	2016-04-26	2016-05-19	2016-06-28	2016-07-20	2016-08-15	2016-09-12	2016-10-26	2016-11-21	2017-04-10	2017-05-09	2017-06-19	2017-08-21	2017-09-12	2017-10-26
Parameter																						
Dissolved Metals																						
Copper	mg/L	-	0.00040[a]	0.0024[a]	-	-	0.0002 - 0.0062	0.00071	0.00109	0.00086	0.00086	0.00055	0.00077	0.00076	0.00075	0.00094	0.0009	0.00101	0.00052	0.00171	<0.00050	0.00079
round sample-specific pH	pH units							7.4	7.9	7.7	7.1	7.8	7.8	7.8	7.9	7.3	7.6	7.7	7.5	7.8	7.9	7.7
rounded sample-specific DOC	mg/L							1.5	1.5	1.5	1.5	1.5	2	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
rounded sample-specific Hardness	mg/L							50	50	50	50	50	50	50	40	50	50	50	40	50	50	40
Chronic guideline from lookup table	mg/L						0.0002 - 0.0062	0.0004	0.0007	0.0005	0.0003	0.0006	0.0008	0.0006	0.0006	0.0003	0.0005	0.0005	0.0004	0.0006	0.0007	0.0005
Acute guideline from lookup table	mg/L						0.0002 - 0.037	0.0023241	0.0039036	0.0032424	0.0015585	0.0035691	0.0047542	0.0035691	0.0036927	0.0020495	0.0029224	0.0032424	0.0024707	0.0035691	0.0039036	0.0030664

Notes

Notes: Values are taken from the approved guidelines unless otherwise noted.

W = working guideline; M = interim guideline, Min = Minimum concentration requirement based on life stage.

Guidelines based on toxicity modifying factors are presented based on the mean baseline values (hardness of 54 mg/L, pH of 7.8, DOC 2.2 mg/L, temperature of 7 oC, and chloride of 0.50 mg/L) in Quesnel Lake, considered representative of average conditions in the receiving environment.

Shaded values indicates concentrations exceed the most conservative guideline of each maximum and chronic WQG for ecological receptors.

a) Hardness, dissolved organic carbon, and pH dependent copper guidelines selected from the BC ENV look up table.

- = no guideline or no data; BC WQGs = British Columbia water quality guidelines; $CaCO_3$ = calcium carbonate; FDA = field duplicate available; FD = field duplicate; mg/L = milligrams per litre; QA/QC = quality assurance/quality control.

Appendix 2-5
Table 2-4C: Copper Screening at Reference Locations from 2015 to 2023
Mount Polley Mine

Location Type			BC ENV Guideline for the Protection of Aquatic Life		BC ENV Guideline for the Protection of Wildlife Life			Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake
Station								QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a
Sample Point	Unit	BC ENV Drinking Water Screening Criteria	Long-Term Chronic	Short-Term Acute	Long-Term Chronic	Short-Term Acute	Selected Screening Criteria	QUL-2a-20m - QUL Between Cariboo Island and HAC	QUL-2a-20m - QUL Between Cariboo Island and HAC	QUL-2a-20m - QUL Between Cariboo Island and HAC	QUL-2a-20m - QUL Between Cariboo Island and HAC	QUL-2a-20m - QUL Between Cariboo Island and HAC	QUL-2a-20m - QUL Between Cariboo Island and HAC	QUL-2a-20m - QUL Between Cariboo Island and HAC	QUL-2a-20m - QUL Between Cariboo Island and HAC	QUL-2a-20m - QUL Between Cariboo Island and HAC	QUL-2a-20m - QUL Between Cariboo Island and HAC	QUL-2a-20m - QUL Between Cariboo Island and HAC	QUL-2a-20m - QUL Between Cariboo Island and HAC	QUL-2a-20m - QUL Between Cariboo Island and HAC	QUL-2a-20m - QUL Between Cariboo Island and HAC
Date								2017-11-20	2018-05-22	2018-06-27	2018-07-25	2018-09-04	2018-10-18	2018-12-18	2019-05-08	2019-06-18	2019-07-25	2019-08-20	2019-10-30	2020-06-16	2020-07-21	2020-08-11
Parameter																						
Field Parameters																						
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	-	7.41	7.58	7.81	7.75	7.62	7.8	-	7.7	7.74	7.89	7.86	7.74	-	7.92
Conventional Parameters																						
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	7.92	7.83	7.89	7.96	7.93	7.91	7.82	8	8	7.88	7.97	7.9	7.76	7.34	7.86
Hardness, as CaCO3	mg/L	-	-	-	-	-	-	52.9	52.7	50.9	49.2	49.8	50.4	55.4	55.7	53.5	49.8	48.8	49.8	50.2	50.2	49.9
Dissolved organic carbon	mg/L	-	-	-	-	-	-	1.33	4.4	2.09	1.77	1.54	1.66	1.71	1.73	1.69	2.03	1.76	2	2.36	2.22	2.17

Appendix 2-5
Table 2-4C: Copper Screening at Reference Locations from 2015 to 2023
Mount Polley Mine

Location Type			BC ENV Guideline for the Protection of Aquatic Life		BC ENV Guideline for the Protection of Wildlife Life			Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake
Station								QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a
Sample Point	Unit	BC ENV Drinking Water Screening Criteria	Long-Term Chronic	Short-Term Acute	Long-Term Chronic	Short-Term Acute	Selected Screening Criteria	QUL-2a-20m - QUL Between Cariboo Island and HAC	QUL-2a-20m - QUL Between Cariboo Island and HAC	QUL-2a-20m - QUL Between Cariboo Island and HAC	QUL-2a-20m - QUL Between Cariboo Island and HAC	QUL-2a-20m - QUL Between Cariboo Island and HAC	QUL-2a-20m - QUL Between Cariboo Island and HAC	QUL-2a-20m - QUL Between Cariboo Island and HAC	QUL-2a-20m - QUL Between Cariboo Island and HAC	QUL-2a-20m - QUL Between Cariboo Island and HAC	QUL-2a-20m - QUL Between Cariboo Island and HAC	QUL-2a-20m - QUL Between Cariboo Island and HAC	QUL-2a-20m - QUL Between Cariboo Island and HAC	QUL-2a-20m - QUL Between Cariboo Island and HAC	QUL-2a-20m - QUL Between Cariboo Island and HAC
Date								2017-11-20	2018-05-22	2018-06-27	2018-07-25	2018-09-04	2018-10-18	2018-12-18	2019-05-08	2019-06-18	2019-07-25	2019-08-20	2019-10-30	2020-06-16	2020-07-21	2020-08-11
Parameter																						
Dissolved Metals																						
Copper	mg/L	-	0.00040[a]	0.0024[a]	-	-	0.0002 - 0.0062	0.0006	0.00058	<0.00050	0.00057	0.00057	0.00069	0.00053	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00056	<0.00050	0.00051
round sample-specific pH	pH units							7.9	7.4	7.5	7.8	7.7	7.6	7.8	8	7.7	7.7	7.8	7.8	7.7	7.3	7.9
rounded sample-specific DOC	mg/L							1	4	2	1.5	1.5	1.5	1.5	1.5	1.5	2	1.5	2	2	2	2
rounded sample-specific Hardness	mg/L							50	50	50	40	40	50	50	50	50	40	40	40	50	50	40
Chronic guideline from lookup table	mg/L						0.0002 - 0.0062	0.0004	0.0010	0.0006	0.0006	0.0005	0.0005	0.0006	0.0007	0.0005	0.0007	0.0006	0.0008	0.0007	0.0005	0.0008
Acute guideline from lookup table	mg/L						0.0002 - 0.037	0.0026093	0.0061900	0.0034842	0.0033759	0.0030664	0.0029224	0.0035691	0.0042385	0.0032424	0.0040854	0.0033759	0.0044972	0.0043192	0.0027323	0.0049172

Notes

Notes: Values are taken from the approved guidelines unless otherwise noted.

W = working guideline; M = interim guideline, Min = Minimum concentration requirement based on life stage.

Guidelines based on toxicity modifying factors are presented based on the mean baseline values (hardness of 54 mg/L, pH of 7.8, DOC 2.2 mg/L, temperature of 7 oC, and chloride of 0.50 mg/L) in Quesnel Lake, considered representative of average conditions in the receiving environment.

Shaded values indicates concentrations exceed the most conservative guideline of each maximum and chronic WQG for ecological receptors.

a) Hardness, dissolved organic carbon, and pH dependent copper guidelines selected from the BC ENV look up table.

- = no guideline or no data; BC WQGs = British Columbia water quality guidelines; $CaCO_3$ = calcium carbonate; FDA = field duplicate available; FD = field duplicate; mg/L = milligrams per litre; QA/QC = quality assurance/quality control.

Appendix 2-5
Table 2-4C: Copper Screening at Reference Locations from 2015 to 2023
Mount Polley Mine

Location Type			BC ENV Guideline for the Protection of Aquatic Life		BC ENV Guideline for the Protection of Wildlife Life			Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake
Station								QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a
Sample Point	Unit	BC ENV Drinking Water Screening Criteria	Long-Term Chronic	Short-Term Acute	Long-Term Chronic	Short-Term Acute	Selected Screening Criteria	QUL-2a-20m - QUL Between Cariboo Island and HAC	QUL-2a-20m - QUL Between Cariboo Island and HAC	QUL-2a-20m - QUL Between Cariboo Island and HAC	QUL-2a-20m - QUL Between Cariboo Island and HAC	QUL-2a-20m - QUL Between Cariboo Island and HAC	QUL-2a-20m - QUL Between Cariboo Island and HAC	QUL-2a-20m - QUL Between Cariboo Island and HAC	QUL-2a-20m - QUL Between Cariboo Island and HAC	QUL-2a-20m - QUL Between Cariboo Island and HAC	QUL-2a-20m - QUL Between Cariboo Island and HAC	QUL-2a-40m - QUL Between Cariboo Island and HAC	QUL-2a-40m - QUL Between Cariboo Island and HAC	QUL-2a-40m - QUL Between Cariboo Island and HAC	QUL-2a-40m - QUL Between Cariboo Island and HAC	QUL-2a-40m - QUL Between Cariboo Island and HAC
Date								2020-09-16	2020-11-04	2021-05-19	2021-07-21	2021-09-15	2021-10-27	2022-05-09	2022-06-27	2022-08-15	2022-10-19	2015-03-11	2015-03-18	2015-03-24	2015-04-01	2015-04-08
Parameter																						
Field Parameters																						
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	8.05	8.09	8.23	7.63	8.48	7.85	7.78	8.01	8.22	7.8	-	-	-	-	-
Conventional Parameters																						
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	7.93	7.87	7.88	7.85	7.87	7.94	7.91	7.86	7.82	7.87	7.98	8	7.84	7.99	7.98
Hardness, as CaCO3	mg/L	-	-	-	-	-	-	52	53.7	52.8	53	50.3	54	53	52.9	51.1	50.7	53.3	55	53.8	53.8	57.1
Dissolved organic carbon	mg/L	-	-	-	-	-	-	1.97	12.8	2.01	2.03	1.72	1.7	1.91	2.51	2.16	2.06	2.07	2.1	2.05	2.62	2.14

Appendix 2-5
Table 2-4C: Copper Screening at Reference Locations from 2015 to 2023
Mount Polley Mine

Location Type			BC ENV Guideline for the Protection of Aquatic Life		BC ENV Guideline for the Protection of Wildlife Life			Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake
Station								QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a
Sample Point	Unit	BC ENV Drinking Water Screening Criteria	Long-Term Chronic	Short-Term Acute	Long-Term Chronic	Short-Term Acute	Selected Screening Criteria	QUL-2a-20m - QUL Between Cariboo Island and HAC	QUL-2a-20m - QUL Between Cariboo Island and HAC	QUL-2a-20m - QUL Between Cariboo Island and HAC	QUL-2a-20m - QUL Between Cariboo Island and HAC	QUL-2a-20m - QUL Between Cariboo Island and HAC	QUL-2a-20m - QUL Between Cariboo Island and HAC	QUL-2a-20m - QUL Between Cariboo Island and HAC	QUL-2a-20m - QUL Between Cariboo Island and HAC	QUL-2a-20m - QUL Between Cariboo Island and HAC	QUL-2a-40m - QUL Between Cariboo Island and HAC	QUL-2a-40m - QUL Between Cariboo Island and HAC	QUL-2a-40m - QUL Between Cariboo Island and HAC	QUL-2a-40m - QUL Between Cariboo Island and HAC	QUL-2a-40m - QUL Between Cariboo Island and HAC
Date								2020-09-16	2020-11-04	2021-05-19	2021-07-21	2021-09-15	2021-10-27	2022-05-09	2022-06-27	2022-08-15	2022-10-19	2015-03-11	2015-03-18	2015-03-24	2015-04-01	2015-04-08
Parameter																						
Dissolved Metals																						
Copper	mg/L	-	0.00040[a]	0.0024[a]	-	-	0.0002 - 0.0062	0.00066	<0.00050	0.0006	<0.00050	0.00052	<0.00050	0.00066	0.00053	0.00077	0.00052	0.00109	0.0009	0.00084	0.00119	0.00072
round sample-specific pH	pH units							8	8	8.2	7.6	8.4	7.8	7.7	8	8.2	7.8	7.9	8	7.8	7.9	7.9
rounded sample-specific DOC	mg/L							1.5	12.5	2	2	1.5	1.5	1.5	2.5	2	2	2	2	2	2.5	2
rounded sample-specific Hardness	mg/L							50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
Chronic guideline from lookup table	mg/L						0.0002 - 0.0062	0.0007	0.0058	0.0011	0.0007	0.0009	0.0006	0.0005	0.0012	0.0011	0.0008	0.0009	0.0009	0.0008	0.0011	0.0009
Acute guideline from lookup table	mg/L						0.0002 - 0.037	0.0042385	0.0346929	0.0063950	0.0038941	0.0052635	0.0035691	0.0032424	0.0070377	0.0063950	0.0047542	0.0051981	0.0056375	0.0047542	0.0064826	0.0051981

Notes

Notes: Values are taken from the approved guidelines unless otherwise noted.

W = working guideline; M = interim guideline, Min = Minimum concentration requirement based on life stage.

Guidelines based on toxicity modifying factors are presented based on the mean baseline values (hardness of 54 mg/L, pH of 7.8, DOC 2.2 mg/L, temperature of 7 oC, and chloride of 0.50 mg/L) in Quesnel Lake, considered representative of average conditions in the receiving environment.

Shaded values indicates concentrations exceed the most conservative guideline of each maximum and chronic WQG for ecological receptors.

a) Hardness, dissolved organic carbon, and pH dependent copper guidelines selected from the BC ENV look up table.

- = no guideline or no data; BC WQGs = British Columbia water quality guidelines; $CaCO_3$ = calcium carbonate; FDA = field duplicate available; FD = field duplicate; mg/L = milligrams per litre; QA/QC = quality assurance/quality control.

Appendix 2-5
Table 2-4C: Copper Screening at Reference Locations from 2015 to 2023
Mount Polley Mine

Location Type			BC ENV Guideline for the Protection of Aquatic Life		BC ENV Guideline for the Protection of Wildlife Life			Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake
Station								QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a
Sample Point	Unit	BC ENV Drinking Water Screening Criteria	Long-Term Chronic	Short-Term Acute	Long-Term Chronic	Short-Term Acute	Selected Screening Criteria	QUL-2a-40m - QUL Between Cariboo Island and HAC	QUL-2a-40m - QUL Between Cariboo Island and HAC	QUL-2a-40m - QUL Between Cariboo Island and HAC	QUL-2a-40m - QUL Between Cariboo Island and HAC	QUL-2a-40m - QUL Between Cariboo Island and HAC	QUL-2a-40m - QUL Between Cariboo Island and HAC	QUL-2a-40m - QUL Between Cariboo Island and HAC	QUL-2a-40m - QUL Between Cariboo Island and HAC	QUL-2a-40m - QUL Between Cariboo Island and HAC	QUL-2a-40m - QUL Between Cariboo Island and HAC	QUL-2a-40m - QUL Between Cariboo Island and HAC	QUL-2a-40m - QUL Between Cariboo Island and HAC	QUL-2a-40m - QUL Between Cariboo Island and HAC	QUL-2a-40m - QUL Between Cariboo Island and HAC
Date								2015-04-14	2015-05-06	2015-06-03	2015-07-01	2015-08-26	2015-09-14	2015-10-28	2015-11-09	2015-12-07	2016-01-20	2016-04-26	2016-05-19	2016-06-28	2016-07-20	2016-08-15
Parameter																					
Field Parameters																					
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	-	-	-	7.69	7.59	7.81	7.91	7.77	7.69	7.4	7.95	7.78	-	7.82	7.67
Conventional Parameters																					
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	7.84	8.03	8.01	7.94	7.8	7.83	7.82	7.84	7.8	7.83	7.91	7.77	7.81	7.77	7.82
Hardness, as CaCO3	mg/L	-	-	-	-	-	-	52.6	51.5	54.5	53.1	53	54.3	57.1	56.1	54.1	54.8	53	53.9	53.2	54.1	53.9
Dissolved organic carbon	mg/L	-	-	-	-	-	-	2.11	2.03	2.16	1.75	1.7	1.73	1.75	1.66	1.67	1.77	1.48	1.5	1.59	1.77	2.14

Appendix 2-5
Table 2-4C: Copper Screening at Reference Locations from 2015 to 2023
Mount Polley Mine

Location Type / Station / Sample Point / Unit / Date / Parameter	Unit	BC ENV Drinking Water Screening Criteria	BC ENV Guideline for the Protection of Aquatic Life		BC ENV Guideline for the Protection of Wildlife Life		Selected Screening Criteria	Quesnel Lake QUL-2a	Quesnel Lake QUL-2a	Quesnel Lake QUL-2a	Quesnel Lake QUL-2a	Quesnel Lake QUL-2a	Quesnel Lake QUL-2a	Quesnel Lake QUL-2a	Quesnel Lake QUL-2a	Quesnel Lake QUL-2a	Quesnel Lake QUL-2a	Quesnel Lake QUL-2a	Quesnel Lake QUL-2a	Quesnel Lake QUL-2a
			Long-Term Chronic	Short-Term Acute	Long-Term Chronic	Short-Term Acute		QUL-2a-40m - QUL Between Cariboo Island and HAC	QUL-2a-40m - QUL Between Cariboo Island and HAC	QUL-2a-40m - QUL Between Cariboo Island and HAC	QUL-2a-40m - QUL Between Cariboo Island and HAC	QUL-2a-40m - QUL Between Cariboo Island and HAC	QUL-2a-40m - QUL Between Cariboo Island and HAC	QUL-2a-40m - QUL Between Cariboo Island and HAC	QUL-2a-40m - QUL Between Cariboo Island and HAC	QUL-2a-40m - QUL Between Cariboo Island and HAC	QUL-2a-40m - QUL Between Cariboo Island and HAC	QUL-2a-40m - QUL Between Cariboo Island and HAC	QUL-2a-40m - QUL Between Cariboo Island and HAC	QUL-2a-40m - QUL Between Cariboo Island and HAC
								2015-04-14	2015-05-06	2015-06-03	2015-07-01	2015-08-26	2015-09-14	2015-10-28	2015-11-09	2015-12-07	2016-01-20	2016-04-26	2016-05-19	2016-06-28	2016-07-20	2016-08-15
Dissolved Metals																					
Copper	mg/L	-	0.00040[a]	0.0024[a]	-	-	0.0002 - 0.0062	0.00074	0.0011	0.0009	0.00098	0.00072	0.00074	0.00078	0.00077	0.00054	0.00072	0.00082	0.00077	0.00107	0.00071	0.00075
round sample-specific pH	pH units							7.8	8	8	7.6	7.5	7.8	7.9	7.7	7.6	7.4	7.9	7.7	7.8	7.8	7.6
rounded sample-specific DOC	mg/L							2	2	2	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1	1.5	1.5	1.5	2
rounded sample-specific Hardness	mg/L							50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
Chronic guideline from lookup table	mg/L						0.0002 - 0.0062	0.0008	0.0009	0.0009	0.0005	0.0004	0.0006	0.0007	0.0005	0.0005	0.0004	0.0004	0.0005	0.0006	0.0006	0.0007
Acute guideline from lookup table	mg/L						0.0002 - 0.037	0.0047542	0.0056375	0.0056375	0.0029224	0.0026145	0.0035691	0.0039036	0.0032424	0.0029224	0.0023241	0.0026093	0.0032424	0.0035691	0.0035691	0.0038941

Notes

Notes: Values are taken from the approved guidelines unless otherwise noted.

W = working guideline; M = interim guideline, Min = Minimum concentration requirement based on life stage.

Guidelines based on toxicity modifying factors are presented based on the mean baseline values (hardness of 54 mg/L, pH of 7.8, DOC 2.2 mg/L, temperature of 7 oC, and chloride of 0.50 mg/L) in Quesnel Lake, considered representative of average conditions in the receiving environment.

Shaded values indicates concentrations exceed the most conservative guideline of each maximum and chronic WQG for ecological receptors.

a) Hardness, dissolved organic carbon, and pH dependent copper guidelines selected from the BC ENV look up table.

- = no guideline or no data; BC WQGs = British Columbia water quality guidelines; $CaCO_3$ = calcium carbonate; FDA = field duplicate available; FD = field duplicate; mg/L = milligrams per litre; QA/QC = quality assurance/quality control.

Appendix 2-5
Table 2-4C: Copper Screening at Reference Locations from 2015 to 2023
Mount Polley Mine

Location Type			BC ENV Guideline for the Protection of Aquatic Life		BC ENV Guideline for the Protection of Wildlife Life			Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake
Station								QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a
Sample Point	Unit	BC ENV Drinking Water Screening Criteria	Long-Term Chronic	Short-Term Acute	Long-Term Chronic	Short-Term Acute	Selected Screening Criteria	QUL-2a-40m - QUL Between Cariboo Island and HAC	QUL-2a-40m - QUL Between Cariboo Island and HAC	QUL-2a-40m - QUL Between Cariboo Island and HAC	QUL-2a-40m - QUL Between Cariboo Island and HAC	QUL-2a-40m - QUL Between Cariboo Island and HAC	QUL-2a-40m - QUL Between Cariboo Island and HAC	QUL-2a-40m - QUL Between Cariboo Island and HAC	QUL-2a-40m - QUL Between Cariboo Island and HAC	QUL-2a-40m - QUL Between Cariboo Island and HAC	QUL-2a-40m - QUL Between Cariboo Island and HAC	QUL-2a-40m - QUL Between Cariboo Island and HAC	QUL-2a-40m - QUL Between Cariboo Island and HAC	QUL-2a-40m - QUL Between Cariboo Island and HAC	QUL-2a-40m - QUL Between Cariboo Island and HAC
Date								2016-09-12	2016-10-26	2016-11-21	2017-04-10	2017-05-09	2017-06-19	2017-08-21	2017-09-12	2017-10-26	2017-11-20	2018-05-22	2018-06-27	2018-07-25	2018-09-04	2018-10-18
Parameter																						
Field Parameters																						
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	7.64	-	7.41	7.59	7.76	7.52	-	-	7.6	-	7.49	7.37	7.64	7.58	7.47
Conventional Parameters																						
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	7.83	7.65	7.9	7.93	7.83	7.87	7.89	7.95	7.92	7.92	7.83	7.9	7.99	7.98	7.9
Hardness, as CaCO3	mg/L	-	-	-	-	-	-	50.5	51.7	52.5	53.4	53.1	51.1	52.3	52.1	47.9	52.1	54.9	52.9	49.3	51.9	53.4
Dissolved organic carbon	mg/L	-	-	-	-	-	-	1.67	1.56	2	1.58	1.63	1.62	1.88	1.75	1.84	1.38	2.02	1.95	1.66	1.64	1.7

Appendix 2-5
Table 2-4C: Copper Screening at Reference Locations from 2015 to 2023
Mount Polley Mine

Location Type			BC ENV Guideline for the Protection of Aquatic Life		BC ENV Guideline for the Protection of Wildlife Life			Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake
Station								QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a
Sample Point	Unit	BC ENV Drinking Water Screening Criteria	Long-Term Chronic	Short-Term Acute	Long-Term Chronic	Short-Term Acute	Selected Screening Criteria	QUL-2a-40m - QUL Between Cariboo Island and HAC	QUL-2a-40m - QUL Between Cariboo Island and HAC	QUL-2a-40m - QUL Between Cariboo Island and HAC	QUL-2a-40m - QUL Between Cariboo Island and HAC	QUL-2a-40m - QUL Between Cariboo Island and HAC	QUL-2a-40m - QUL Between Cariboo Island and HAC	QUL-2a-40m - QUL Between Cariboo Island and HAC	QUL-2a-40m - QUL Between Cariboo Island and HAC	QUL-2a-40m - QUL Between Cariboo Island and HAC	QUL-2a-40m - QUL Between Cariboo Island and HAC	QUL-2a-40m - QUL Between Cariboo Island and HAC	QUL-2a-40m - QUL Between Cariboo Island and HAC	QUL-2a-40m - QUL Between Cariboo Island and HAC	QUL-2a-40m - QUL Between Cariboo Island and HAC
Date								2016-09-12	2016-10-26	2016-11-21	2017-04-10	2017-05-09	2017-06-19	2017-08-21	2017-09-12	2017-10-26	2017-11-20	2018-05-22	2018-06-27	2018-07-25	2018-09-04	2018-10-18
Parameter																						
Dissolved Metals																						
Copper	mg/L	-	0.00040[a]	0.0024[a]	-	-	0.0002 - 0.0062	0.00106	0.00088	0.00089	0.00087	0.00055	0.00061	0.00063	0.00054	0.00085	0.00056	0.00053	0.00051	0.00058	0.00075	0.00057
round sample-specific pH	pH units							7.6	7.6	7.4	7.5	7.7	7.5	7.8	7.9	7.6	7.9	7.4	7.3	7.6	7.5	7.4
rounded sample-specific DOC	mg/L							1.5	1.5	2	1.5	1.5	1.5	1.5	1.5	1.5	1	2	1.5	1.5	1.5	1.5
rounded sample-specific Hardness	mg/L							50	50	50	50	50	50	50	50	40	50	50	50	40	50	50
Chronic guideline from lookup table	mg/L						0.0002 - 0.0062	0.0005	0.0005	0.0005	0.0004	0.0005	0.0004	0.0006	0.0007	0.0005	0.0004	0.0005	0.0003	0.0005	0.0004	0.0004
Acute guideline from lookup table	mg/L						0.0002 - 0.037	0.0029224	0.0029224	0.0030978	0.0026145	0.0032424	0.0026145	0.0035691	0.0039036	0.0027629	0.0026093	0.0030978	0.0020495	0.0027629	0.0026145	0.0023241

Notes

Notes: Values are taken from the approved guidelines unless otherwise noted.

W = working guideline; M = interim guideline, Min = Minimum concentration requirement based on life stage.

Guidelines based on toxicity modifying factors are presented based on the mean baseline values (hardness of 54 mg/L, pH of 7.8, DOC 2.2 mg/L, temperature of 7 oC, and chloride of 0.50 mg/L) in Quesnel Lake, considered representative of average conditions in the receiving environment.

Shaded values indicates concentrations exceed the most conservative guideline of each maximum and chronic WQG for ecological receptors.

a) Hardness, dissolved organic carbon, and pH dependent copper guidelines selected from the BC ENV look up table.

- = no guideline or no data; BC WQGs = British Columbia water quality guidelines; $CaCO_3$ = calcium carbonate; FDA = field duplicate available; FD = field duplicate; mg/L = milligrams per litre; QA/QC = quality assurance/quality control.

Location Type			BC ENV Guideline for the Protection of Aquatic Life		BC ENV Guideline for the Protection of Wildlife Life			Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake
Station								QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a
Sample Point	Unit	BC ENV Drinking Water Screening Criteria	Long-Term Chronic	Short-Term Acute	Long-Term Chronic	Short-Term Acute	Selected Screening Criteria	QUL-2a-40m - QUL Between Cariboo Island and HAC	QUL-2a-40m - QUL Between Cariboo Island and HAC	QUL-2a-40m - QUL Between Cariboo Island and HAC	QUL-2a-40m - QUL Between Cariboo Island and HAC	QUL-2a-40m - QUL Between Cariboo Island and HAC	QUL-2a-40m - QUL Between Cariboo Island and HAC	QUL-2a-40m - QUL Between Cariboo Island and HAC	QUL-2a-40m - QUL Between Cariboo Island and HAC	QUL-2a-40m - QUL Between Cariboo Island and HAC	QUL-2a-40m - QUL Between Cariboo Island and HAC	QUL-2a-40m - QUL Between Cariboo Island and HAC	QUL-2a-40m - QUL Between Cariboo Island and HAC	QUL-2a-40m - QUL Between Cariboo Island and HAC	QUL-2a-40m - QUL Between Cariboo Island and HAC
Date								2018-12-18	2019-05-08	2019-06-18	2019-07-25	2019-08-20	2019-10-30	2020-06-16	2020-07-21	2020-08-11	2020-09-16	2020-11-04	2021-05-19	2021-07-21	2021-09-15	2021-10-27
Parameter																						
Field Parameters																						
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	7.78	-	7.62	7.58	7.63	7.77	7.69	-	7.77	7.83	8.02	8.2	7.51	8.48	7.63
Conventional Parameters																						
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	7.78	7.99	8	7.88	7.98	7.88	7.82	7.46	7.87	7.95	7.84	7.87	7.85	7.86	7.92
Hardness, as CaCO3	mg/L	-	-	-	-	-	-	57.4	55.2	52.4	52.4	52.7	51.5	53.9	51.8	52.4	53.5	55.2	52.4	53	51.2	56
Dissolved organic carbon	mg/L	-	-	-	-	-	-	1.7	1.77	1.68	1.87	1.73	1.76	2.14	2	2.24	1.87	12.8	1.99	1.93	1.71	1.83

Appendix 2-5
Table 2-4C: Copper Screening at Reference Locations from 2015 to 2023
Mount Polley Mine

Location Type			BC ENV Guideline for the Protection of Aquatic Life		BC ENV Guideline for the Protection of Wildlife Life			Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake
Station								QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a
Sample Point	Unit	BC ENV Drinking Water Screening Criteria	Long-Term Chronic	Short-Term Acute	Long-Term Chronic	Short-Term Acute	Selected Screening Criteria	QUL-2a-40m - QUL Between Cariboo Island and HAC	QUL-2a-40m - QUL Between Cariboo Island and HAC	QUL-2a-40m - QUL Between Cariboo Island and HAC	QUL-2a-40m - QUL Between Cariboo Island and HAC	QUL-2a-40m - QUL Between Cariboo Island and HAC	QUL-2a-40m - QUL Between Cariboo Island and HAC	QUL-2a-40m - QUL Between Cariboo Island and HAC	QUL-2a-40m - QUL Between Cariboo Island and HAC	QUL-2a-40m - QUL Between Cariboo Island and HAC	QUL-2a-40m - QUL Between Cariboo Island and HAC	QUL-2a-40m - QUL Between Cariboo Island and HAC	QUL-2a-40m - QUL Between Cariboo Island and HAC	QUL-2a-40m - QUL Between Cariboo Island and HAC	QUL-2a-40m - QUL Between Cariboo Island and HAC
Date								2018-12-18	2019-05-08	2019-06-18	2019-07-25	2019-08-20	2019-10-30	2020-06-16	2020-07-21	2020-08-11	2020-09-16	2020-11-04	2021-05-19	2021-07-21	2021-09-15	2021-10-27
Parameter																						
Dissolved Metals																						
Copper	mg/L	-	0.00040[a]	0.0024[a]	-	-	0.0002 - 0.0062	0.00057	<0.00050	<0.00050	0.00052	0.00051	<0.00050	0.00059	0.00051	<0.00050	0.00064	0.0006	0.00063	0.00066	0.00055	0.00064
round sample-specific pH	pH units							7.7	7.9	7.6	7.5	7.6	7.7	7.6	7.4	7.7	7.8	8	8.2	7.5	8.4	7.6
rounded sample-specific DOC	mg/L							1.5	1.5	1.5	1.5	1.5	1.5	2	2	2	1.5	12.5	1.5	1.5	1.5	1.5
rounded sample-specific Hardness	mg/L							50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
Chronic guideline from lookup table	mg/L						0.0002 - 0.0062	0.0005	0.0007	0.0005	0.0004	0.0005	0.0005	0.0007	0.0005	0.0007	0.0006	0.0058	0.0008	0.0004	0.0009	0.0005
Acute guideline from lookup table	mg/L						0.0002 - 0.037	0.0032424	0.0039036	0.0029224	0.0026145	0.0029224	0.0032424	0.0038941	0.0030978	0.0043192	0.0035691	0.0346929	0.0048149	0.0026145	0.0052635	0.0029224

Notes

Notes: Values are taken from the approved guidelines unless otherwise noted.

W = working guideline; M = interim guideline, Min = Minimum concentration requirement based on life stage.

Guidelines based on toxicity modifying factors are presented based on the mean baseline values (hardness of 54 mg/L, pH of 7.8, DOC 2.2 mg/L, temperature of 7 oC, and chloride of 0.50 mg/L) in Quesnel Lake, considered representative of average conditions in the receiving environment.

Shaded values indicates concentrations exceed the most conservative guideline of each maximum and chronic WQG for ecological receptors.

a) Hardness, dissolved organic carbon, and pH dependent copper guidelines selected from the BC ENV look up table.

- = no guideline or no data; BC WQGs = British Columbia water quality guidelines; $CaCO_3$ = calcium carbonate; FDA = field duplicate available; FD = field duplicate; mg/L = milligrams per litre; QA/QC = quality assurance/quality control.

Appendix 2-5
Table 2-4C: Copper Screening at Reference Locations from 2015 to 2023
Mount Polley Mine

Location Type			BC ENV Guideline for the Protection of Aquatic Life		BC ENV Guideline for the Protection of Wildlife Life			Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake
Station								QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a
Sample Point	Unit	BC ENV Drinking Water Screening Criteria	Long-Term Chronic	Short-Term Acute	Long-Term Chronic	Short-Term Acute	Selected Screening Criteria	QUL-2a-40m - QUL Between Cariboo Island and HAC	QUL-2a-40m - QUL Between Cariboo Island and HAC	QUL-2a-40m - QUL Between Cariboo Island and HAC	QUL-2a-40m - QUL Between Cariboo Island and HAC	QUL-2a-60m - QUL Between Cariboo Island and HAC	QUL-2a-60m - QUL Between Cariboo Island and HAC	QUL-2a-60m - QUL Between Cariboo Island and HAC	QUL-2a-60m - QUL Between Cariboo Island and HAC	QUL-2a-60m - QUL Between Cariboo Island and HAC	QUL-2a-60m - QUL Between Cariboo Island and HAC	QUL-2a-60m - QUL Between Cariboo Island and HAC	QUL-2a-60m - QUL Between Cariboo Island and HAC	QUL-2a-60m - QUL Between Cariboo Island and HAC	QUL-2a-60m - QUL Between Cariboo Island and HAC
Date								2022-05-09	2022-06-27	2022-08-15	2022-10-19	2015-03-11	2015-03-18	2015-03-24	2015-04-01	2015-04-08	2015-04-14	2015-05-06	2015-06-03	2015-07-01	2015-08-26	2015-09-14
Parameter																						
Field Parameters																						
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	7.76	7.86	7.84	7.56	-	-	-	-	-	-	-	-	7.63	7.63	7.67
Conventional Parameters																						
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	7.91	7.87	7.83	7.89	7.98	8	7.87	8.01	7.98	7.86	8.03	8	7.94	7.8	7.82
Hardness, as CaCO3	mg/L	-	-	-	-	-	-	53.5	51.7	51.4	56.6	53.8	55.2	54.1	53.5	56.9	52.8	52.8	54.5	53.5	55.6	54.7
Dissolved organic carbon	mg/L	-	-	-	-	-	-	2.06	2.39	2.11	1.98	1.89	2.34	1.88	2.46	2.12	2.13	2.18	2.04	1.87	1.74	1.76

Appendix 2-5
Table 2-4C: Copper Screening at Reference Locations from 2015 to 2023
Mount Polley Mine

Location Type			BC ENV Guideline for the Protection of Aquatic Life		BC ENV Guideline for the Protection of Wildlife Life			Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake
Station								QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a
Sample Point	Unit	BC ENV Drinking Water Screening Criteria	Long-Term Chronic	Short-Term Acute	Long-Term Chronic	Short-Term Acute	Selected Screening Criteria	QUL-2a-40m - QUL Between Cariboo Island and HAC	QUL-2a-40m - QUL Between Cariboo Island and HAC	QUL-2a-40m - QUL Between Cariboo Island and HAC	QUL-2a-40m - QUL Between Cariboo Island and HAC	QUL-2a-60m - QUL Between Cariboo Island and HAC	QUL-2a-60m - QUL Between Cariboo Island and HAC	QUL-2a-60m - QUL Between Cariboo Island and HAC	QUL-2a-60m - QUL Between Cariboo Island and HAC	QUL-2a-60m - QUL Between Cariboo Island and HAC	QUL-2a-60m - QUL Between Cariboo Island and HAC	QUL-2a-60m - QUL Between Cariboo Island and HAC	QUL-2a-60m - QUL Between Cariboo Island and HAC	QUL-2a-60m - QUL Between Cariboo Island and HAC	QUL-2a-60m - QUL Between Cariboo Island and HAC
Date								2022-05-09	2022-06-27	2022-08-15	2022-10-19	2015-03-11	2015-03-18	2015-03-24	2015-04-01	2015-04-08	2015-04-14	2015-05-06	2015-06-03	2015-07-01	2015-08-26	2015-09-14
Parameter																					
Dissolved Metals																					
Copper	mg/L	-	0.00040[a]	0.0024[a]	-	-	0.0002 - 0.0062	0.00053	0.00051	0.00065	0.00055	0.00118	0.00084	0.00095	0.0016	0.00085	0.00081	0.00118	0.00088	0.00099	0.00101	0.00069
round sample-specific pH	pH units							7.7	7.8	7.8	7.5	7.9	8	7.8	8	7.9	7.8	8	8	7.6	7.6	7.6
rounded sample-specific DOC	mg/L							2	2	2	1.5	1.5	2	1.5	2	2	2	2	2	1.5	1.5	1.5
rounded sample-specific Hardness	mg/L							50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
Chronic guideline from lookup table	mg/L						0.0002 - 0.0062	0.0007	0.0008	0.0008	0.0004	0.0007	0.0009	0.0006	0.0009	0.0009	0.0008	0.0009	0.0009	0.0005	0.0005	0.0005
Acute guideline from lookup table	mg/L						0.0002 - 0.037	0.0043192	0.0047542	0.0047542	0.0026145	0.0039036	0.0056375	0.0035691	0.0056375	0.0051981	0.0047542	0.0056375	0.0056375	0.0029224	0.0029224	0.0029224

Notes

Notes: Values are taken from the approved guidelines unless otherwise noted.

W = working guideline; M = interim guideline, Min = Minimum concentration requirement based on life stage.

Guidelines based on toxicity modifying factors are presented based on the mean baseline values (hardness of 54 mg/L, pH of 7.8, DOC 2.2 mg/L, temperature of 7 oC, and chloride of 0.50 mg/L) in Quesnel Lake, considered representative of average conditions in the receiving environment.

Shaded values indicates concentrations exceed the most conservative guideline of each maximum and chronic WQG for ecological receptors.

a) Hardness, dissolved organic carbon, and pH dependent copper guidelines selected from the BC ENV look up table.

- = no guideline or no data; BC WQGs = British Columbia water quality guidelines; $CaCO_3$ = calcium carbonate; FDA = field duplicate available; FD = field duplicate; mg/L = milligrams per litre; QA/QC = quality assurance/quality control.

Appendix 2-5
Table 2-4C: Copper Screening at Reference Locations from 2015 to 2023
Mount Polley Mine

Location Type			BC ENV Guideline for the Protection of Aquatic Life		BC ENV Guideline for the Protection of Wildlife Life			Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake
Station								QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a
Sample Point	Unit	BC ENV Drinking Water Screening Criteria	Long-Term Chronic	Short-Term Acute	Long-Term Chronic	Short-Term Acute	Selected Screening Criteria	QUL-2a-60m - QUL Between Cariboo Island and HAC	QUL-2a-60m - QUL Between Cariboo Island and HAC	QUL-2a-60m - QUL Between Cariboo Island and HAC	QUL-2a-60m - QUL Between Cariboo Island and HAC	QUL-2a-60m - QUL Between Cariboo Island and HAC	QUL-2a-60m - QUL Between Cariboo Island and HAC	QUL-2a-60m - QUL Between Cariboo Island and HAC	QUL-2a-60m - QUL Between Cariboo Island and HAC	QUL-2a-60m - QUL Between Cariboo Island and HAC	QUL-2a-60m - QUL Between Cariboo Island and HAC	QUL-2a-60m - QUL Between Cariboo Island and HAC	QUL-2a-60m - QUL Between Cariboo Island and HAC	QUL-2a-60m - QUL Between Cariboo Island and HAC	QUL-2a-60m - QUL Between Cariboo Island and HAC
Date								2015-10-28	2015-11-09	2015-12-07	2016-01-20	2016-04-26	2016-05-19	2016-06-28	2016-07-20	2016-08-15	2016-09-12	2016-10-26	2016-11-21	2017-04-10	2017-05-09	2017-06-19
Parameter																						
Field Parameters																						
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	7.63	-	7.6	7.4	7.96	7.69	-	-	7.53	7.26	-	7.34	7.59	7.76	7.52
Conventional Parameters																						
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	7.86	7.8	7.77	7.84	7.92	7.79	7.8	7.78	7.83	7.85	7.65	7.84	7.92	7.83	7.86
Hardness, as CaCO3	mg/L	-	-	-	-	-	-	56.4	55.3	54.9	54.9	53.5	53.9	54.1	54.6	54.4	49.8	52.6	54.2	54.1	53	52
Dissolved organic carbon	mg/L	-	-	-	-	-	-	1.74	1.81	1.51	1.68	1.54	1.74	1.59	1.87	1.75	1.56	1.64	1.81	1.63	1.55	1.65

Appendix 2-5
Table 2-4C: Copper Screening at Reference Locations from 2015 to 2023
Mount Polley Mine

Location Type			BC ENV Guideline for the Protection of Aquatic Life		BC ENV Guideline for the Protection of Wildlife Life			Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake
Station								QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a
Sample Point	Unit	BC ENV Drinking Water Screening Criteria	Long-Term Chronic	Short-Term Acute	Long-Term Chronic	Short-Term Acute	Selected Screening Criteria	QUL-2a-60m - QUL Between Cariboo Island and HAC	QUL-2a-60m - QUL Between Cariboo Island and HAC	QUL-2a-60m - QUL Between Cariboo Island and HAC	QUL-2a-60m - QUL Between Cariboo Island and HAC	QUL-2a-60m - QUL Between Cariboo Island and HAC	QUL-2a-60m - QUL Between Cariboo Island and HAC	QUL-2a-60m - QUL Between Cariboo Island and HAC	QUL-2a-60m - QUL Between Cariboo Island and HAC	QUL-2a-60m - QUL Between Cariboo Island and HAC	QUL-2a-60m - QUL Between Cariboo Island and HAC	QUL-2a-60m - QUL Between Cariboo Island and HAC	QUL-2a-60m - QUL Between Cariboo Island and HAC	QUL-2a-60m - QUL Between Cariboo Island and HAC	QUL-2a-60m - QUL Between Cariboo Island and HAC
Date								2015-10-28	2015-11-09	2015-12-07	2016-01-20	2016-04-26	2016-05-19	2016-06-28	2016-07-20	2016-08-15	2016-09-12	2016-10-26	2016-11-21	2017-04-10	2017-05-09	2017-06-19
Parameter																						
Dissolved Metals																						
Copper	mg/L	-	0.00040[a]	0.0024[a]	-	-	0.0002 - 0.0062	0.00083	0.00096	0.00054	0.0007	0.00099	0.00086	0.00093	0.00074	0.00088	0.0009	0.00096	0.00112	0.0009	0.00068	0.00067
round sample-specific pH	pH units							7.6	7.8	7.6	7.4	7.9	7.6	7.8	7.7	7.5	7.2	7.6	7.3	7.5	7.7	7.5
rounded sample-specific DOC	mg/L							1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
rounded sample-specific Hardness	mg/L							50	50	50	50	50	50	50	50	50	40	50	50	50	50	50
Chronic guideline from lookup table	mg/L						0.0002 - 0.0062	0.0005	0.0006	0.0005	0.0004	0.0007	0.0005	0.0006	0.0005	0.0004	0.0003	0.0005	0.0003	0.0004	0.0005	0.0004
Acute guideline from lookup table	mg/L						0.0002 - 0.037	0.0029224	0.0035691	0.0029224	0.0023241	0.0039036	0.0029224	0.0035691	0.0032424	0.0026145	0.0016913	0.0029224	0.0020495	0.0026145	0.0032424	0.0026145

Notes

Notes: Values are taken from the approved guidelines unless otherwise noted.

W = working guideline; M = interim guideline, Min = Minimum concentration requirement based on life stage.

Guidelines based on toxicity modifying factors are presented based on the mean baseline values (hardness of 54 mg/L, pH of 7.8, DOC 2.2 mg/L, temperature of 7 oC, and chloride of 0.50 mg/L) in Quesnel Lake, considered representative of average conditions in the receiving environment.

Shaded values indicates concentrations exceed the most conservative guideline of each maximum and chronic WQG for ecological receptors.

a) Hardness, dissolved organic carbon, and pH dependent copper guidelines selected from the BC ENV look up table.

- = no guideline or no data; BC WQGs = British Columbia water quality guidelines; $CaCO_3$ = calcium carbonate; FDA = field duplicate available; FD = field duplicate; mg/L = milligrams per litre; QA/QC = quality assurance/quality control.

Appendix 2-5
Table 2-4C: Copper Screening at Reference Locations from 2015 to 2023
Mount Polley Mine

Location Type			BC ENV Guideline for the Protection of Aquatic Life		BC ENV Guideline for the Protection of Wildlife Life			Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake
Station								QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a
Sample Point	Unit	BC ENV Drinking Water Screening Criteria	Long-Term Chronic	Short-Term Acute	Long-Term Chronic	Short-Term Acute	Selected Screening Criteria	QUL-2a-60m - QUL Between Cariboo Island and HAC	QUL-2a-60m - QUL Between Cariboo Island and HAC	QUL-2a-60m - QUL Between Cariboo Island and HAC	QUL-2a-60m - QUL Between Cariboo Island and HAC	QUL-2a-60m - QUL Between Cariboo Island and HAC	QUL-2a-60m - QUL Between Cariboo Island and HAC	QUL-2a-60m - QUL Between Cariboo Island and HAC	QUL-2a-60m - QUL Between Cariboo Island and HAC	QUL-2a-60m - QUL Between Cariboo Island and HAC	QUL-2a-60m - QUL Between Cariboo Island and HAC	QUL-2a-60m - QUL Between Cariboo Island and HAC	QUL-2a-60m - QUL Between Cariboo Island and HAC	QUL-2a-60m - QUL Between Cariboo Island and HAC	QUL-2a-60m - QUL Between Cariboo Island and HAC
Date								2017-08-21	2017-09-12	2017-10-26	2017-11-20	2018-05-22	2018-06-27	2018-07-25	2018-09-04	2018-10-18	2018-12-18	2019-05-08	2019-06-18	2019-07-25	2019-08-20	2019-10-30
Parameter																					
Field Parameters																					
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	-	-	7.43	-	7.49	7.27	7.57	7.44	7.27	7.78	-	-	7.56	7.51	7.71
Conventional Parameters																					
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	7.89	7.95	7.91	7.9	7.84	7.91	7.99	8	7.9	7.82	7.99	8.01	7.88	7.99	7.87
Hardness, as CaCO3	mg/L	-	-	-	-	-	-	54	51.6	48.8	54.3	54.5	52.1	50	52.8	54.6	54.9	58.5	54.1	52.3	51.8	52.4
Dissolved organic carbon	mg/L	-	-	-	-	-	-	1.77	1.86	1.86	1.21	2.01	2.05	4.7	1.66	1.73	1.58	1.96	1.64	1.86	1.84	1.74

Appendix 2-5
Table 2-4C: Copper Screening at Reference Locations from 2015 to 2023
Mount Polley Mine

Location Type			BC ENV Guideline for the Protection of Aquatic Life		BC ENV Guideline for the Protection of Wildlife Life			Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake
Station								QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a
Sample Point	Unit	BC ENV Drinking Water Screening Criteria	Long-Term Chronic	Short-Term Acute	Long-Term Chronic	Short-Term Acute	Selected Screening Criteria	QUL-2a-60m - QUL Between Cariboo Island and HAC	QUL-2a-60m - QUL Between Cariboo Island and HAC	QUL-2a-60m - QUL Between Cariboo Island and HAC	QUL-2a-60m - QUL Between Cariboo Island and HAC	QUL-2a-60m - QUL Between Cariboo Island and HAC	QUL-2a-60m - QUL Between Cariboo Island and HAC	QUL-2a-60m - QUL Between Cariboo Island and HAC	QUL-2a-60m - QUL Between Cariboo Island and HAC	QUL-2a-60m - QUL Between Cariboo Island and HAC	QUL-2a-60m - QUL Between Cariboo Island and HAC	QUL-2a-60m - QUL Between Cariboo Island and HAC	QUL-2a-60m - QUL Between Cariboo Island and HAC	QUL-2a-60m - QUL Between Cariboo Island and HAC	QUL-2a-60m - QUL Between Cariboo Island and HAC
Date								2017-08-21	2017-09-12	2017-10-26	2017-11-20	2018-05-22	2018-06-27	2018-07-25	2018-09-04	2018-10-18	2018-12-18	2019-05-08	2019-06-18	2019-07-25	2019-08-20	2019-10-30
Parameter																						
Dissolved Metals																						
Copper	mg/L	-	0.00040[a]	0.0024[a]	-	-	0.0002 - 0.0062	0.00058	0.00059	0.00076	0.00061	0.00054	0.00065	0.00063	0.00086	0.00063	0.00052	0.00054	<0.00050	0.00064	0.00062	<0.00050
round sample-specific pH	pH units							7.8	7.9	7.4	7.9	7.4	7.2	7.5	7.4	7.2	7.7	7.9	8	7.5	7.5	7.7
rounded sample-specific DOC	mg/L							1.5	1.5	1.5	1	2	2	4.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
rounded sample-specific Hardness	mg/L							50	50	40	50	50	50	50	50	50	50	50	50	50	50	50
Chronic guideline from lookup table	mg/L						0.0002 - 0.0062	0.0006	0.0007	0.0004	0.0004	0.0005	0.0004	0.0013	0.0004	0.0003	0.0005	0.0007	0.0007	0.0004	0.0004	0.0005
Acute guideline from lookup table	mg/L						0.0002 - 0.037	0.0035691	0.0039036	0.0021948	0.0026093	0.0030978	0.0023916	0.0078381	0.0023241	0.0017939	0.0032424	0.0039036	0.0042385	0.0026145	0.0026145	0.0032424

Notes

Notes: Values are taken from the approved guidelines unless otherwise noted.

W = working guideline; M = interim guideline, Min = Minimum concentration requirement based on life stage.

Guidelines based on toxicity modifying factors are presented based on the mean baseline values (hardness of 54 mg/L, pH of 7.8, DOC 2.2 mg/L, temperature of 7 oC, and chloride of 0.50 mg/L) in Quesnel Lake, considered representative of average conditions in the receiving environment.

Shaded values indicates concentrations exceed the most conservative guideline of each maximum and chronic WQG for ecological receptors.

a) Hardness, dissolved organic carbon, and pH dependent copper guidelines selected from the BC ENV look up table.

- = no guideline or no data; BC WQGs = British Columbia water quality guidelines; $CaCO_3$ = calcium carbonate; FDA = field duplicate available; FD = field duplicate; mg/L = milligrams per litre; QA/QC = quality assurance/quality control.

Appendix 2-5
Table 2-4C: Copper Screening at Reference Locations from 2015 to 2023
Mount Polley Mine

Location Type			BC ENV Guideline for the Protection of Aquatic Life		BC ENV Guideline for the Protection of Wildlife Life			Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake
Station								QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a
Sample Point	Unit	BC ENV Drinking Water Screening Criteria	Long-Term Chronic	Short-Term Acute	Long-Term Chronic	Short-Term Acute	Selected Screening Criteria	QUL-2a-60m - QUL Between Cariboo Island and HAC	QUL-2a-60m - QUL Between Cariboo Island and HAC	QUL-2a-60m - QUL Between Cariboo Island and HAC	QUL-2a-60m - QUL Between Cariboo Island and HAC	QUL-2a-60m - QUL Between Cariboo Island and HAC	QUL-2a-60m - QUL Between Cariboo Island and HAC	QUL-2a-60m - QUL Between Cariboo Island and HAC	QUL-2a-60m - QUL Between Cariboo Island and HAC	QUL-2a-60m - QUL Between Cariboo Island and HAC	QUL-2a-60m - QUL Between Cariboo Island and HAC	QUL-2a-60m - QUL Between Cariboo Island and HAC	QUL-2a-60m - QUL Between Cariboo Island and HAC
Date								2020-06-16	2020-07-21	2020-08-11	2020-09-16	2020-11-04	2021-05-19	2021-07-21	2021-09-15	2021-10-27	2022-05-09	2022-06-27	2022-08-15	2022-10-19
Parameter																				
Field Parameters																				
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	7.69	-	7.69	7.78	7.95	8.15	7.47	8.48	7.57	7.72	7.82	7.73	7.53
Conventional Parameters																				
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	7.78	7.38	7.88	7.95	7.8	7.88	7.83	7.85	7.92	7.91	7.87	7.83	7.89
Hardness, as CaCO3	mg/L	-	-	-	-	-	-	54.7	51.6	54.1	54.3	57.4	51.1	51.8	51.5	56.6	53.5	54.6	51	56
Dissolved organic carbon	mg/L	-	-	-	-	-	-	2.04	2.1	2.33	1.88	12.9	2.1	1.96	1.77	1.88	2.05	2.38	2.06	2.02

Appendix 2-5
Table 2-4C: Copper Screening at Reference Locations from 2015 to 2023
Mount Polley Mine

Location Type			BC ENV Guideline for the Protection of Aquatic Life		BC ENV Guideline for the Protection of Wildlife Life			Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake	Quesnel Lake
Station								QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a	QUL-2a
Sample Point	Unit	BC ENV Drinking Water Screening Criteria	Long-Term Chronic	Short-Term Acute	Long-Term Chronic	Short-Term Acute	Selected Screening Criteria	QUL-2a-60m - QUL Between Cariboo Island and HAC	QUL-2a-60m - QUL Between Cariboo Island and HAC	QUL-2a-60m - QUL Between Cariboo Island and HAC	QUL-2a-60m - QUL Between Cariboo Island and HAC	QUL-2a-60m - QUL Between Cariboo Island and HAC	QUL-2a-60m - QUL Between Cariboo Island and HAC	QUL-2a-60m - QUL Between Cariboo Island and HAC	QUL-2a-60m - QUL Between Cariboo Island and HAC	QUL-2a-60m - QUL Between Cariboo Island and HAC	QUL-2a-60m - QUL Between Cariboo Island and HAC	QUL-2a-60m - QUL Between Cariboo Island and HAC	QUL-2a-60m - QUL Between Cariboo Island and HAC
Date								2020-06-16	2020-07-21	2020-08-11	2020-09-16	2020-11-04	2021-05-19	2021-07-21	2021-09-15	2021-10-27	2022-05-09	2022-06-27	2022-08-15	2022-10-19
Parameter																				
Dissolved Metals																				
Copper	mg/L	-	0.00040[a]	0.0024[a]	-	-	0.0002 - 0.0062	0.00066	0.00059	0.00061	0.00078	0.00052	0.00061	<0.00050	0.00052	0.00062	0.00053	0.00052	0.00054	0.00055
round sample-specific pH	pH units							7.6	7.3	7.6	7.7	7.9	8.1	7.4	8.4	7.5	7.7	7.8	7.7	7.5
rounded sample-specific DOC	mg/L							2	2	2	1.5	12.5	2	1.5	1.5	1.5	2	2	2	2
rounded sample-specific Hardness	mg/L							50	50	50	50	50	50	50	50	50	50	50	50	50
Chronic guideline from lookup table	mg/L						0.0002 - 0.0062	0.0007	0.0005	0.0007	0.0005	0.0054	0.0010	0.0004	0.0009	0.0004	0.0007	0.0008	0.0007	0.0006
Acute guideline from lookup table	mg/L						0.0002 - 0.037	0.0038941	0.0027323	0.0038941	0.0032424	0.0320685	0.0060750	0.0023241	0.0052635	0.0026145	0.0043192	0.0047542	0.0043192	0.0034842

Notes

Notes: Values are taken from the approved guidelines unless otherwise noted.

W = working guideline; M = interim guideline, Min = Minimum concentration requirement based on life stage.

Guidelines based on toxicity modifying factors are presented based on the mean baseline values (hardness of 54 mg/L, pH of 7.8, DOC 2.2 mg/L, temperature of 7 oC, and chloride of 0.50 mg/L) in Quesnel Lake, considered representative of average conditions in the receiving environment.

Shaded values indicates concentrations exceed the most conservative guideline of each maximum and chronic WQG for ecological receptors.

a) Hardness, dissolved organic carbon, and pH dependent copper guidelines selected from the BC ENV look up table.

- = no guideline or no data; BC WQGs = British Columbia water quality guidelines; $CaCO_3$ = calcium carbonate; FDA = field duplicate available; FD = field duplicate; mg/L = milligrams per litre; QA/QC = quality assurance/quality control.

Table 2-4D: Copper Screening at Initial Dilution Zone Locations from 2015 to 2023
Mount Polley Mine

Location Type Station Sample Point Date Parameter	Unit	BC ENV Drinking Water Screening Criteria	BC ENV Guideline for the Protection of Aquatic Life		BC ENV Guideline for the Protection of Wildlife Life		Selected Screening Criteria	Quesnel Lake QUL-57 QUL-57-AP 2020-09-16	Quesnel Lake QUL-57 QUL-57-AP 2021-09-16	Quesnel Lake QUL-57 QUL-57-AP 2022-10-19	Quesnel Lake QUL-57 QUL-57-AT 2019-05-08	Quesnel Lake QUL-57 QUL-57-AT 2019-05-15	Quesnel Lake QUL-57 QUL-57-AT 2019-05-21	Quesnel Lake QUL-57 QUL-57-AT 2019-06-18	Quesnel Lake QUL-57 QUL-57-AT 2019-08-20	Quesnel Lake QUL-57 QUL-57-AT 2020-06-24	Quesnel Lake QUL-57 QUL-57-AT 2020-08-11	Quesnel Lake QUL-57 QUL-57-AT 2022-06-27	Quesnel Lake QUL-57 QUL-57-B 2015-12-09	Quesnel Lake QUL-57 QUL-57-B 2015-12-14	Quesnel Lake QUL-57 QUL-57-B 2015-12-21	Quesnel Lake QUL-57 QUL-57-B 2016-01-25
Field Parameters																							
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	8.19	8.57	7.92	7.85	7.82	7.9	7.93	7.95	7.62	7.91	8.06	7.84	7.76	7.67	7.85
Conventional Parameters																							
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	7.87	7.92	7.87	7.88	7.95	8.04	7.99	7.94	7.79	7.95	7.9	7.8	7.87	7.87	7.87
Hardness, as CaCO3	mg/L	-	-	-	-	-	-	50.4	51.6	53.3	58.6	53.5	51.2	46.3	46.3	49.2	46.5	51.9	53.2	56.8	55.2	55.2
Dissolved organic carbon	mg/L	-	-	-	-	-	-	2.28	1.78	1.88	1.97	2.17	2.27	1.89	2.04	2.93	3.23	2.89	1.56	1.38	1.77	1.77
Dissolved Metals																							
Copper	mg/L	-	0.0022[(a)]	0.0070[(a)]	-	0.3	0.00036 - 0.0012	0.00063	<0.00050	<0.00050	0.00056	0.00063	0.00057	<0.00050	<0.00050	0.00058	0.0006	0.00067	0.00081	0.00077	0.00089	0.0007
round sample-specific pH	pH units							8.1	8.5	7.9	7.8	7.8	7.9	7.9	7.9	7.6	7.9	8	7.8	7.7	7.6	7.8
rounded sample-specific DOC	mg/L							2	1.5	1.5	1.5	2	2	1.5	2	2.5	3	2.5	1.5	1	1.5	1.5
rounded sample-specific Hardness	mg/L							50	50	50	50	50	50	40	40	40	40	50	50	50	50	50
Chronic guideline from lookup table	mg/L						0.00036 - 0.0012	0.001012161	0.000907469	0.000652109	0.000597142	0.000795564	0.000868515	0.000616333	0.000821014	0.000770781	0.001229424	0.001174076	0.000597142	0.000362339	0.000488828	0.000597142
Acute guideline from lookup table	mg/L						0.0022 - 0.007	0.006074998	0.005469086	0.003903631	0.003569061	0.004754194	0.005198063	0.003692658	0.004917189	0.00460073	0.007362122	0.00703772	0.003569061	0.002164822	0.002922449	0.003569061

Notes

Values are taken from the approved guidelines unless otherwise noted.

W = working guideline; M = interim guideline, Min = Minimum concentration requirement based on life stage.

Guidelines based on toxicity modifying factors are presented based on the mean baseline values (hardness of 54 mg/L, pH of 7.8, DOC 2.2 mg/L, temperature of 7 oC, and chloride of 0.50 mg/L) in Quesnel Lake, considered representative of average conditions in the receiving environment.

Shaded values indicates concentrations exceed the most conservative guideline of each maximum and chronic WQG for ecological receptors.

a) hardness, dissolved organic carbon, and pH dependent copper guideline selected from BC ENV copper guideline lookup table.

- = no guideline or no data; BC WQGs = British Columbia water quality guidelines; $CaCO_3$ = calcium carbonate; FDA = field duplicate available; FD = field duplicate; mg/L = milligrams per litre; QA/QC = quality assurance/quality control.

Table 2-4D: Copper Screening at Initial Dilution Zone Locations from 2015 to 2023
Mount Polley Mine

Location Type Station Sample Point Date Parameter	Unit	BC ENV Drinking Water Screening Criteria	BC ENV Guideline for the Protection of Aquatic Life		BC ENV Guideline for the Protection of Wildlife Life		Selected Screening Criteria	Quesnel Lake QUL-57 QUL-57-B 2016-03-28	Quesnel Lake QUL-57 QUL-57-B 2018-06-04	Quesnel Lake QUL-57 QUL-57-B 2019-04-25	Quesnel Lake QUL-57 QUL-57-B 2019-05-02	Quesnel Lake QUL-57 QUL-57-B 2019-05-08	Quesnel Lake QUL-57 QUL-57-B 2019-05-15	Quesnel Lake QUL-57 QUL-57-B 2019-05-21	Quesnel Lake QUL-57 QUL-57-B 2019-06-18	Quesnel Lake QUL-57 QUL-57-B 2019-08-20	Quesnel Lake QUL-57 QUL-57-B 2020-06-24	Quesnel Lake QUL-57 QUL-57-B 2020-08-11	Quesnel Lake QUL-57 QUL-57-B 2020-09-16	Quesnel Lake QUL-57 QUL-57-B 2021-05-19	Quesnel Lake QUL-57 QUL-57-B 2021-06-02	Quesnel Lake QUL-57 QUL-57-B 2021-07-21
			Long-Term Chronic	Short-Term Acute	Long-Term Chronic	Short-Term Acute																	
Field Parameters																							
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	-	7.53	7.78	7.79	7.85	7.75	7.82	7.71	7.7	7.55	7.7	7.97	8.25	7.68	7.62
Conventional Parameters																							
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	7.84	7.94	7.85	7.83	7.88	7.98	8.04	7.97	7.99	7.82	7.81	7.9	7.75	7.91	7.89
Hardness, as CaCO3	mg/L	-	-	-	-	-	-	53.5	48.1	57.1	53.4	57.9	53.5	54.9	50.9	51.3	54.6	53.1	53	55.8	52.9	50.8
Dissolved organic carbon	mg/L	-	-	-	-	-	-	1.47	2.05	2.17	2.21	1.92	2.15	2.23	1.65	1.7	2.42	2.58	1.95	2.18	2.15	1.92
Dissolved Metals																							
Copper	mg/L	-	0.0022[(a)]	0.0070[(a)]	-	0.3	0.00036 - 0.0012	0.00103	0.0008	0.00061	0.00065	0.00055	0.00065	0.0006	0.00051	<0.00050	0.00056	<0.00050	0.00071	0.00073	0.00075	<0.00050
round sample-specific pH	pH units							7.8	7.5	7.7	7.7	7.8	7.7	7.8	7.7	7.7	7.5	7.7	7.9	8.2	7.6	7.6
rounded sample-specific DOC	mg/L							1	2	2	2	1.5	2	2	1.5	1.5	2	2.5	1.5	2	2	1.5
rounded sample-specific Hardness	mg/L							50	40	50	50	50	50	50	50	50	50	50	50	50	50	50
Chronic guideline from lookup table	mg/L						0.00036 - 0.0012	0.000399037	0.000550626	0.000723058	0.000723058	0.000597142	0.000723058	0.000795564	0.000542683	0.000542683	0.00058224	0.000903751	0.000652109	0.001064586	0.000651696	0.000488828
Acute guideline from lookup table	mg/L						0.0022 - 0.007	0.002385739	0.003292954	0.004319222	0.004319222	0.003569061	0.004319222	0.004754194	0.003242435	0.003242435	0.003484227	0.005393784	0.003903631	0.006394952	0.003894099	0.002922449

Notes

Values are taken from the approved guidelines unless otherwise noted.

W = working guideline; M = interim guideline, Min = Minimum concentration requirement based on life stage.

Guidelines based on toxicity modifying factors are presented based on the mean baseline values (hardness of 54 mg/L, pH of 7.8, DOC 2.2 mg/L, temperature of 7 oC, and chloride of 0.50 mg/L) in Quesnel Lake, considered representative of average conditions in the receiving environment.

Shaded values indicates concentrations exceed the most conservative guideline of each maximum and chronic WQG for ecological receptors.

a) hardness, dissolved organic carbon, and pH dependent copper guideline selected from BC ENV copper guideline lookup table.

- = no guideline or no data; BC WQGs = British Columbia water quality guidelines; $CaCO_3$ = calcium carbonate; FDA = field duplicate available; FD = field duplicate; mg/L = milligrams per litre; QA/QC = quality assurance/quality control.

Table 2-4D: Copper Screening at Initial Dilution Zone Locations from 2015 to 2023
Mount Polley Mine

Location Type Station Sample Point Date Parameter	Unit	BC ENV Drinking Water Screening Criteria	BC ENV Guideline for the Protection of Aquatic Life		BC ENV Guideline for the Protection of Wildlife Life		Selected Screening Criteria	Quesnel Lake QUL-57 QUL-57-B 2021-09-16	Quesnel Lake QUL-57 QUL-57-B 2021-10-27	Quesnel Lake QUL-57 QUL-57-B 2022-05-10	Quesnel Lake QUL-57 QUL-57-B 2022-06-27	Quesnel Lake QUL-57 QUL-57-B 2022-08-16	Quesnel Lake QUL-57 QUL-57-B 2022-10-19	Quesnel Lake QUL-57 QUL-57-BT 2019-05-15	Quesnel Lake QUL-57 QUL-57-BT 2019-05-21	Quesnel Lake QUL-57 QUL-57-BT 2019-06-18	Quesnel Lake QUL-57 QUL-57-BT 2022-06-27	Quesnel Lake QUL-57 QUL-57-MID 2015-12-09	Quesnel Lake QUL-57 QUL-57-MID 2015-12-14	Quesnel Lake QUL-57 QUL-57-MID 2015-12-21	Quesnel Lake QUL-57 QUL-57-MID 2016-01-25	Quesnel Lake QUL-57 QUL-57-MID 2016-03-28
			Long-Term Chronic	Short-Term Acute	Long-Term Chronic	Short-Term Acute																
Field Parameters																						
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	8.61	7.85	7.7	7.87	7.89	7.81	7.79	7.83	7.79	7.96	7.83	7.77	7.73	7.89	-
Conventional Parameters																						
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	7.89	7.95	7.83	7.93	7.91	7.88	7.96	8.04	8.03	7.91	7.79	7.86	7.9	7.92	7.84
Hardness, as CaCO3	mg/L	-	-	-	-	-	-	53.2	51.6	54.9	54.6	52.6	53.5	56.7	52.2	50.6	52.7	53.1	56.2	55.4	55.4	53.8
Dissolved organic carbon	mg/L	-	-	-	-	-	-	1.89	1.75	2.28	2.46	2.04	1.89	2.17	2.3	1.71	2.66	1.57	1.26	1.7	1.65	1.5
Dissolved Metals																						
Copper	mg/L	-	0.0022[(a)]	0.0070[(a)]	-	0.3	0.00036 - 0.0012	0.00051	<0.00050	0.00073	0.00076	0.00064	0.00054	0.00069	0.00055	<0.00050	0.00063	0.00081	0.00078	0.00083	0.00076	0.00107
round sample-specific pH	pH units							8.6	7.8	7.7	7.8	7.8	7.8	7.7	7.8	7.7	7.9	7.8	7.7	7.7	7.8	7.8
rounded sample-specific DOC	mg/L							1.5	1.5	2	2	2	1.5	2	2	1.5	2.5	1.5	1	1.5	1.5	1.5
rounded sample-specific Hardness	mg/L							50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
Chronic guideline from lookup table	mg/L						0.00036 - 0.0012	0.00094261	0.000597142	0.000723058	0.000795564	0.000795564	0.000597142	0.000723058	0.000795564	0.000542683	0.001084857	0.000597142	0.000362339	0.000542683	0.000597142	0.000597142
Acute guideline from lookup table	mg/L						0.0022 - 0.007	0.005681648	0.003569061	0.004319222	0.004754194	0.004754194	0.003569061	0.004319222	0.004754194	0.003242435	0.006482645	0.003569061	0.002164822	0.003242435	0.003569061	0.003569061

Notes

Values are taken from the approved guidelines unless otherwise noted.

W = working guideline; M = interim guideline, Min = Minimum concentration requirement based on life stage.

Guidelines based on toxicity modifying factors are presented based on the mean baseline values (hardness of 54 mg/L, pH of 7.8, DOC 2.2 mg/L, temperature of 7 oC, and chloride of 0.50 mg/L) in Quesnel Lake, considered representative of average conditions in the receiving environment.

Shaded values indicates concentrations exceed the most conservative guideline of each maximum and chronic WQG for ecological receptors.

a) hardness, dissolved organic carbon, and pH dependent copper guideline selected from BC ENV copper guideline lookup table.

- = no guideline or no data; BC WQGs = British Columbia water quality guidelines; $CaCO_3$ = calcium carbonate; FDA = field duplicate available; FD = field duplicate; mg/L = milligrams per litre; QA/QC = quality assurance/quality control.

Table 2-4D: Copper Screening at Initial Dilution Zone Locations from 2015 to 2023
Mount Polley Mine

Location Type Station Sample Point Date Parameter	Unit	BC ENV Drinking Water Screening Criteria	BC ENV Guideline for the Protection of Aquatic Life		BC ENV Guideline for the Protection of Wildlife Life		Selected Screening Criteria	Quesnel Lake QUL-57 QUL-57-MID 2018-06-04	Quesnel Lake QUL-57 QUL-57-MID 2019-04-25	Quesnel Lake QUL-57 QUL-57-MID 2019-05-02	Quesnel Lake QUL-57 QUL-57-MID 2021-05-19	Quesnel Lake QUL-57 QUL-57-MID 2021-06-02	Quesnel Lake QUL-57 QUL-57-MID 2021-07-21	Quesnel Lake QUL-57 QUL-57-MID 2021-10-27	Quesnel Lake QUL-57 QUL-57-MID 2022-05-10	Quesnel Lake QUL-57 QUL-57-MID 2022-08-16	Quesnel Lake QUL-57 QUL-57-S 2015-12-09	Quesnel Lake QUL-57 QUL-57-S 2015-12-14	Quesnel Lake QUL-57 QUL-57-S 2015-12-21	Quesnel Lake QUL-57 QUL-57-S 2016-01-25	Quesnel Lake QUL-57 QUL-57-S 2016-03-28	Quesnel Lake QUL-57 QUL-57-S 2018-06-04
			Long-Term Chronic	Short-Term Acute	Long-Term Chronic	Short-Term Acute																
Field Parameters																						
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	7.58	7.79	7.81	8.29	7.74	7.8	7.86	7.65	8.24	7.82	7.8	7.78	7.92	-	7.58
Conventional Parameters																						
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	7.89	7.83	7.9	7.74	7.9	7.91	7.95	7.83	7.9	7.8	7.85	7.89	7.86	7.83	7.86
Hardness, as CaCO3	mg/L	-	-	-	-	-	-	51	56.9	51.7	53.7	53	49.2	52.9	55.7	48.9	52.9	56.6	54.6	55.2	53.2	48.7
Dissolved organic carbon	mg/L	-	-	-	-	-	-	2.14	2.6	2.12	2.3	2.71	2.56	1.74	2.05	2.24	1.49	1.3	1.65	1.59	1.46	2.42
Dissolved Metals																						
Copper	mg/L	-	0.0022[(a)]	0.0070[(a)]	-	0.3	0.00036 - 0.0012	0.00069	0.00058	0.00064	0.00072	0.00081	<0.00050	<0.00050	0.00107	<0.00050	0.00077	0.00078	0.00085	0.00076	0.00085	0.00061
round sample-specific pH	pH units							7.5	7.7	7.8	8.2	7.7	7.8	7.8	7.6	8.2	7.8	7.8	7.7	7.9	7.8	7.5
rounded sample-specific DOC	mg/L							2	2.5	2	2	2.5	2.5	1.5	2	2	1	1	1.5	1.5	1	2
rounded sample-specific Hardness	mg/L							50	50	50	50	50	40	50	50	40	50	50	50	50	50	40
Chronic guideline from lookup table	mg/L						0.00036 - 0.0012	0.00058224	0.000903751	0.000795564	0.001064586	0.000903751	0.000940576	0.000597142	0.000651696	0.000984677	0.000399037	0.000399037	0.000542683	0.000652109	0.000399037	0.000550626
Acute guideline from lookup table	mg/L						0.0022 - 0.007	0.003484227	0.005393784	0.004754194	0.006394952	0.005393784	0.005619691	0.003569061	0.003894099	0.005942504	0.002385739	0.002385739	0.003242435	0.003903631	0.002385739	0.003292954

Notes

Values are taken from the approved guidelines unless otherwise noted.

W = working guideline; M = interim guideline, Min = Minimum concentration requirement based on life stage.

Guidelines based on toxicity modifying factors are presented based on the mean baseline values (hardness of 54 mg/L, pH of 7.8, DOC 2.2 mg/L, temperature of 7 oC, and chloride of 0.50 mg/L) in Quesnel Lake, considered representative of average conditions in the receiving environment.

Shaded values indicates concentrations exceed the most conservative guideline of each maximum and chronic WQG for ecological receptors.

a) hardness, dissolved organic carbon, and pH dependent copper guideline selected from BC ENV copper guideline lookup table.

- = no guideline or no data; BC WQGs = British Columbia water quality guidelines; $CaCO_3$ = calcium carbonate; FDA = field duplicate available; FD = field duplicate; mg/L = milligrams per litre; QA/QC = quality assurance/quality control.

Table 2-4D: Copper Screening at Initial Dilution Zone Locations from 2015 to 2023
Mount Polley Mine

Location Type / Station / Sample Point / Date / Parameter	Unit	BC ENV Drinking Water Screening Criteria	BC ENV Guideline for the Protection of Aquatic Life		BC ENV Guideline for the Protection of Wildlife Life		Selected Screening Criteria	Quesnel Lake QUL-57 QUL-57-S 2019-04-25	Quesnel Lake QUL-57 QUL-57-S 2019-05-02	Quesnel Lake QUL-57 QUL-57-S 2019-05-08	Quesnel Lake QUL-57 QUL-57-S 2019-05-15	Quesnel Lake QUL-57 QUL-57-S 2019-05-21	Quesnel Lake QUL-57 QUL-57-S 2019-06-18	Quesnel Lake QUL-57 QUL-57-S 2019-08-20	Quesnel Lake QUL-57 QUL-57-S 2020-06-24	Quesnel Lake QUL-57 QUL-57-S 2020-08-11	Quesnel Lake QUL-57 QUL-57-S 2020-09-16	Quesnel Lake QUL-57 QUL-57-S 2021-05-19	Quesnel Lake QUL-57 QUL-57-S 2021-06-02	Quesnel Lake QUL-57 QUL-57-S 2021-07-21	Quesnel Lake QUL-57 QUL-57-S 2021-09-16	Quesnel Lake QUL-57 QUL-57-S 2021-10-27
			Long-Term Chronic	Short-Term Acute	Long-Term Chronic	Short-Term Acute																	
Field Parameters																							
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	7.79	7.98	8.02	-	8.13	7.94	7.96	7.66	7.95	8.14	8.15	7.77	7.9	8.51	7.9
Conventional Parameters																							
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	7.83	7.86	7.87	7.93	8.06	7.99	7.96	7.82	7.96	7.96	7.74	7.95	7.96	7.93	7.88
Hardness, as CaCO3	mg/L	-	-	-	-	-	-	57.7	53.2	57.4	53	52.4	47.9	46.1	54.7	47.1	51.3	53.1	65.5	47.1	54	51.6
Dissolved organic carbon	mg/L	-	-	-	-	-	-	2.27	1.98	2.16	7.4	2.5	1.95	2.02	4.52	3.32	2.24	2.41	6.47	2.04	1.97	1.64
Dissolved Metals																							
Copper	mg/L	-	0.0022[(a)]	0.0070[(a)]	-	0.3	0.00036 - 0.0012	0.00063	0.00063	0.00057	0.00155	0.00061	0.0005	<0.00050	0.00104	0.0006	0.00059	0.00064	0.00239	0.00052	<0.00050	<0.00050
round sample-specific pH	pH units							7.7	7.9	8	7.9	8.1	7.9	7.9	7.6	7.9	8.1	8.1	7.7	7.9	8.5	7.9
rounded sample-specific DOC	mg/L							2	1.5	2	7	2.5	1.5	2	4.5	3	2	2	6	2	1.5	1.5
rounded sample-specific Hardness	mg/L							50	50	50	50	50	40	40	50	40	50	50	60	40	50	50
Chronic guideline from lookup table	mg/L						0.00036 - 0.0012	0.000723058	0.000652109	0.000941116	0.003024663	0.001262278	0.000616333	0.000821014	0.001466292	0.001229424	0.001012161	0.001012161	0.00227339	0.000821014	0.000907469	0.000652109
Acute guideline from lookup table	mg/L						0.0022 - 0.007	0.004319222	0.003903631	0.005637483	0.018056278	0.007575319	0.003692658	0.004917189	0.008749013	0.007362122	0.006074998	0.006074998	0.013549278	0.004917189	0.005469086	0.003903631

Notes

Values are taken from the approved guidelines unless otherwise noted.

W = working guideline; M = interim guideline, Min = Minimum concentration requirement based on life stage.

Guidelines based on toxicity modifying factors are presented based on the mean baseline values (hardness of 54 mg/L, pH of 7.8, DOC 2.2 mg/L, temperature of 7 oC, and chloride of 0.50 mg/L) in Quesnel Lake, considered representative of average conditions in the receiving environment.

Shaded values indicates concentrations exceed the most conservative guideline of each maximum and chronic WQG for ecological receptors.

a) hardness, dissolved organic carbon, and pH dependent copper guideline selected from BC ENV copper guideline lookup table.

- = no guideline or no data; BC WQGs = British Columbia water quality guidelines; $CaCO_3$ = calcium carbonate; FDA = field duplicate available; FD = field duplicate; mg/L = milligrams per litre; QA/QC = quality assurance/quality control.

Table 2-4D: Copper Screening at Initial Dilution Zone Locations from 2015 to 2023
Mount Polley Mine

Location Type Station Sample Point Date Parameter	Unit	BC ENV Drinking Water Screening Criteria	BC ENV Guideline for the Protection of Aquatic Life		BC ENV Guideline for the Protection of Wildlife Life		Selected Screening Criteria	Quesnel Lake QUL-57 QUL-57-S 2022-05-10	Quesnel Lake QUL-57 QUL-57-S 2022-06-27	Quesnel Lake QUL-57 QUL-57-S 2022-08-16	Quesnel Lake QUL-57 QUL-57-S 2022-10-19	Quesnel Lake QUL-58 QUL-58-AP 2015-12-21	Quesnel Lake QUL-58 QUL-58-AP 2016-11-21	Quesnel Lake QUL-58 QUL-58-AP 2018-01-10	Quesnel Lake QUL-58 QUL-58-AP 2018-01-31	Quesnel Lake QUL-58 QUL-58-AP 2018-10-11	Quesnel Lake QUL-58 QUL-58-AP 2019-05-15	Quesnel Lake QUL-58 QUL-58-AP 2019-05-21	Quesnel Lake QUL-58 QUL-58-AP 2019-10-30	Quesnel Lake QUL-58 QUL-58-AP 2020-09-16	Quesnel Lake QUL-58 QUL-58-AP 2021-05-19	Quesnel Lake QUL-58 QUL-58-AP 2021-07-21
			Long-Term Chronic	Short-Term Acute	Long-Term Chronic	Short-Term Acute																
Field Parameters																						
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	7.69	7.93	8.04	8	7.59	7.68	-	-	7.63	7.75	7.6	7.88	8.16	8.59	7.85
Conventional Parameters																						
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	7.84	7.88	7.93	7.87	7.88	7.93	7.79	7.95	7.89	7.97	8.03	7.9	7.92	7.86	7.9
Hardness, as CaCO3	mg/L	-	-	-	-	-	-	54	50.1	47.9	52.4	54.7	53.4	54.7	53.1	48.5	54.2	55.7	50.1	51.6	53.3	49
Dissolved organic carbon	mg/L	-	-	-	-	-	-	2.12	3.68	2.29	1.91	1.54	1.91	1.71	1.69	1.06	1.89	2.11	2.02	2.11	2.38	2.07
Dissolved Metals																						
Copper	mg/L	-	0.0022[(a)]	0.0070[(a)]	-	0.3	0.00036 - 0.0012	0.00068	0.00097	<0.00050	<0.00050	0.00089	0.00141	0.00074	0.00082	0.00084	0.00062	0.00065	0.00185	0.0007	0.00067	<0.00050
round sample-specific pH	pH units							7.6	7.9	8	8	7.5	7.6	7.7	7.9	7.6	7.7	7.6	7.8	8.1	8.5	7.8
rounded sample-specific DOC	mg/L							2	3.5	2	1.5	1.5	1.5	1.5	1.5	1	1.5	2	2	2	2	2
rounded sample-specific Hardness	mg/L							50	50	40	50	50	50	50	50	40	50	50	50	50	50	40
Chronic guideline from lookup table	mg/L						0.00036 - 0.0012	0.000651696	0.001516557	0.0008885	0.000706981	0.000436942	0.000488828	0.000542683	0.000652109	0.000308548	0.000542683	0.000651696	0.000795564	0.001012161	0.001199971	0.000752607
Acute guideline from lookup table	mg/L						0.0022 - 0.007	0.003894099	0.009068332	0.005333098	0.004238518	0.002614473	0.002922449	0.003242435	0.003903631	0.001844359	0.003242435	0.003894099	0.004754194	0.006074998	0.007227087	0.00449715

Notes

Values are taken from the approved guidelines unless otherwise noted.

W = working guideline; M = interim guideline, Min = Minimum concentration requirement based on life stage.

Guidelines based on toxicity modifying factors are presented based on the mean baseline values (hardness of 54 mg/L, pH of 7.8, DOC 2.2 mg/L, temperature of 7 oC, and chloride of 0.50 mg/L) in Quesnel Lake, considered representative of average conditions in the receiving environment.

Shaded values indicates concentrations exceed the most conservative guideline of each maximum and chronic WQG for ecological receptors.

a) hardness, dissolved organic carbon, and pH dependent copper guideline selected from BC ENV copper guideline lookup table.

- = no guideline or no data; BC WQGs = British Columbia water quality guidelines; $CaCO_3$ = calcium carbonate; FDA = field duplicate available; FD = field duplicate; mg/L = milligrams per litre; QA/QC = quality assurance/quality control.

Table 2-4D: Copper Screening at Initial Dilution Zone Locations from 2015 to 2023
Mount Polley Mine

Location Type Station Sample Point Date Parameter	Unit	BC ENV Drinking Water Screening Criteria	BC ENV Guideline for the Protection of Aquatic Life		BC ENV Guideline for the Protection of Wildlife Life		Selected Screening Criteria	Quesnel Lake QUL-58 QUL-58-AP 2021-09-16	Quesnel Lake QUL-58 QUL-58-AP 2021-10-27	Quesnel Lake QUL-58 QUL-58-AP 2022-06-27	Quesnel Lake QUL-58 QUL-58-AP 2022-08-16	Quesnel Lake QUL-58 QUL-58-AP 2022-10-19	Quesnel Lake QUL-58 QUL-58-AT 2016-06-28	Quesnel Lake QUL-58 QUL-58-AT 2016-07-06	Quesnel Lake QUL-58 QUL-58-AT 2016-08-01	Quesnel Lake QUL-58 QUL-58-AT 2016-09-05	Quesnel Lake QUL-58 QUL-58-AT 2016-10-05	Quesnel Lake QUL-58 QUL-58-AT 2016-11-09	Quesnel Lake QUL-58 QUL-58-AT 2016-11-16	Quesnel Lake QUL-58 QUL-58-AT 2016-11-30	Quesnel Lake QUL-58 QUL-58-AT 2017-03-06	Quesnel Lake QUL-58 QUL-58-AT 2017-04-10
			Long-Term Chronic	Short-Term Acute	Long-Term Chronic	Short-Term Acute																
Field Parameters																						
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	8.36	7.85	7.79	7.79	7.86	7.87	7.99	8	8.11	-	-	7.68	7.72	7.82	7.35
Conventional Parameters																						
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	7.9	7.94	7.87	7.91	7.84	7.84	7.92	7.7	8	7.82	7.84	7.77	7.85	7.84	7.93
Hardness, as CaCO3	mg/L	-	-	-	-	-	-	50.1	54.5	54.4	54.2	52.4	48.1	47.5	51.1	49.6	52.8	52.5	49.1	53.1	58.2	54.8
Dissolved organic carbon	mg/L	-	-	-	-	-	-	1.76	1.64	2.22	1.88	2.31	2.27	2.22	2.64	1.86	1.8	1.83	1.88	2	1.75	1.89
Dissolved Metals																						
Copper	mg/L	-	0.0022[(a)]	0.0070[(a)]	-	0.3	0.00036 - 0.0012	0.00062	<0.00050	0.00053	0.00065	0.00051	0.00086	0.00085	0.00476	0.0016	0.00104	0.0008	0.00077	0.00083	0.00345	0.00076
round sample-specific pH	pH units							8.3	7.8	7.7	7.7	7.8	7.8	7.9	8	8.1	7.8	7.8	7.6	7.7	7.8	7.3
rounded sample-specific DOC	mg/L							1.5	1.5	2	1.5	2	2	2	2.5	1.5	1.5	1.5	1.5	2	1.5	1.5
rounded sample-specific Hardness	mg/L							50	50	50	50	50	40	40	50	40	50	50	40	50	50	50
Chronic guideline from lookup table	mg/L						0.00036 - 0.0012	0.000838204	0.000597142	0.000723058	0.000542683	0.000795564	0.000752607	0.000821014	0.001174076	0.000705774	0.000597142	0.000597142	0.000462742	0.000723058	0.000597142	0.000339113
Acute guideline from lookup table	mg/L						0.0022 - 0.007	0.00504587	0.003569061	0.004319222	0.003242435	0.004754194	0.00449715	0.004917189	0.00703772	0.004251227	0.003569061	0.003569061	0.002762917	0.004319222	0.003569061	0.002049549

Notes

Values are taken from the approved guidelines unless otherwise noted.

W = working guideline; M = interim guideline, Min = Minimum concentration requirement based on life stage.

Guidelines based on toxicity modifying factors are presented based on the mean baseline values (hardness of 54 mg/L, pH of 7.8, DOC 2.2 mg/L, temperature of 7 oC, and chloride of 0.50 mg/L) in Quesnel Lake, considered representative of average conditions in the receiving environment.

Shaded values indicates concentrations exceed the most conservative guideline of each maximum and chronic WQG for ecological receptors.

a) hardness, dissolved organic carbon, and pH dependent copper guideline selected from BC ENV copper guideline lookup table.

- = no guideline or no data; BC WQGs = British Columbia water quality guidelines; $CaCO_3$ = calcium carbonate; FDA = field duplicate available; FD = field duplicate; mg/L = milligrams per litre; QA/QC = quality assurance/quality control.

Appendix 2-5

Table 2-4D: Copper Screening at Initial Dilution Zone Locations from 2015 to 2023

Mount Polley Mine

Location Type / Station / Sample Point / Date / Parameter	Unit	BC ENV Drinking Water Screening Criteria	BC ENV Guideline for the Protection of Aquatic Life		BC ENV Guideline for the Protection of Wildlife Life		Selected Screening Criteria	Quesnel Lake QUL-58 QUL-58-AT 2017-06-05	Quesnel Lake QUL-58 QUL-58-AT 2017-06-12	Quesnel Lake QUL-58 QUL-58-AT 2017-06-19	Quesnel Lake QUL-58 QUL-58-AT 2017-06-27	Quesnel Lake QUL-58 QUL-58-AT 2017-08-22	Quesnel Lake QUL-58 QUL-58-AT 2017-10-01	Quesnel Lake QUL-58 QUL-58-AT 2017-10-26	Quesnel Lake QUL-58 QUL-58-AT 2018-06-04	Quesnel Lake QUL-58 QUL-58-AT 2018-06-13	Quesnel Lake QUL-58 QUL-58-AT 2018-06-18	Quesnel Lake QUL-58 QUL-58-AT 2018-06-27	Quesnel Lake QUL-58 QUL-58-AT 2018-07-02	Quesnel Lake QUL-58 QUL-58-AT 2018-08-23	Quesnel Lake QUL-58 QUL-58-AT 2018-09-04	Quesnel Lake QUL-58 QUL-58-AT 2018-10-18
			Long-Term Chronic	Short-Term Acute	Long-Term Chronic	Short-Term Acute																
Field Parameters																						
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	7.68	7.71	7.78	7.78	8.32	-	7.85	7.32	7.62	7.57	7.9	7.58	7.8	7.84	7.82
Conventional Parameters																						
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	7.86	7.99	7.89	7.9	7.89	7.88	7.93	7.9	7.92	7.92	7.88	7.93	7.93	8.01	7.91
Hardness, as CaCO3	mg/L	-	-	-	-	-	-	50.3	49	48.1	57.4	49.2	49.3	49.5	51.3	51.1	50.3	48.2	50.4	49	49.7	51.6
Dissolved organic carbon	mg/L	-	-	-	-	-	-	2.33	1.89	1.94	2.11	2.47	1.57	1.74	2.19	2.25	2.36	2.49	2.06	1.74	1.73	1.66
Dissolved Metals																						
Copper	mg/L	-	0.0022[(a)]	0.0070[(a)]	-	0.3	0.00036 - 0.0012	0.00089	0.0007	0.00057	0.0009	0.0006	0.00059	0.00055	0.0007	0.00062	0.00065	0.00054	0.00079	0.00088	0.00156	0.00053
round sample-specific pH	pH units							7.6	7.7	7.7	7.7	8.3	7.8	7.8	7.3	7.6	7.5	7.9	7.5	7.8	7.8	7.8
rounded sample-specific DOC	mg/L							2	1.5	1.5	2	2	1.5	1.5	2	2	2	2	2	1.5	1.5	1.5
rounded sample-specific Hardness	mg/L							50	40	40	50	40	40	40	50	50	50	40	50	40	40	50
Chronic guideline from lookup table	mg/L						0.00036 - 0.0012	0.000651696	0.000513293	0.000513293	0.000723058	0.001025887	0.00056486	0.00056486	0.00045232	0.000651696	0.00058224	0.000821014	0.00058224	0.00056486	0.00056486	0.000597142
Acute guideline from lookup table	mg/L						0.0022 - 0.007	0.003894099	0.00306638	0.00306638	0.004319222	0.006204314	0.003375881	0.003375881	0.002732256	0.003894099	0.003484227	0.004917189	0.003484227	0.003375881	0.003375881	0.003569061

Notes

Values are taken from the approved guidelines unless otherwise noted.

W = working guideline; M = interim guideline, Min = Minimum concentration requirement based on life stage.

Guidelines based on toxicity modifying factors are presented based on the mean baseline values (hardness of 54 mg/L, pH of 7.8, DOC 2.2 mg/L, temperature of 7 oC, and chloride of 0.50 mg/L) in Quesnel Lake, considered representative of average conditions in the receiving environment.

Shaded values indicates concentrations exceed the most conservative guideline of each maximum and chronic WQG for ecological receptors.

a) hardness, dissolved organic carbon, and pH dependent copper guideline selected from BC ENV copper guideline lookup table.

- = no guideline or no data; BC WQGs = British Columbia water quality guidelines; $CaCO_3$ = calcium carbonate; FDA = field duplicate available; FD = field duplicate; mg/L = milligrams per litre; QA/QC = quality assurance/quality control.

Table 2-4D: Copper Screening at Initial Dilution Zone Locations from 2015 to 2023
Mount Polley Mine

Location Type Station Sample Point Date Parameter	Unit	BC ENV Drinking Water Screening Criteria	BC ENV Guideline for the Protection of Aquatic Life		BC ENV Guideline for the Protection of Wildlife Life		Selected Screening Criteria	Quesnel Lake QUL-58 QUL-58-AT 2018-10-24	Quesnel Lake QUL-58 QUL-58-AT 2018-10-29	Quesnel Lake QUL-58 QUL-58-AT 2018-11-07	Quesnel Lake QUL-58 QUL-58-AT 2019-05-08	Quesnel Lake QUL-58 QUL-58-AT 2019-05-15	Quesnel Lake QUL-58 QUL-58-AT 2019-06-18	Quesnel Lake QUL-58 QUL-58-AT 2019-07-11	Quesnel Lake QUL-58 QUL-58-AT 2019-07-25	Quesnel Lake QUL-58 QUL-58-AT 2019-08-20	Quesnel Lake QUL-58 QUL-58-AT 2020-06-16	Quesnel Lake QUL-58 QUL-58-AT 2020-06-24	Quesnel Lake QUL-58 QUL-58-AT 2020-06-29	Quesnel Lake QUL-58 QUL-58-AT 2020-07-21	Quesnel Lake QUL-58 QUL-58-AT 2020-08-11	Quesnel Lake QUL-58 QUL-58-B 2015-11-05
			Long-Term Chronic	Short-Term Acute	Long-Term Chronic	Short-Term Acute																
Field Parameters																						
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	7.31	7.68	7.8	7.89	7.86	7.93	7.99	7.9	7.94	7.75	-	7.63	-	7.6	-
Conventional Parameters																						
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	7.98	7.87	7.95	7.84	7.97	8	7.91	7.89	7.96	7.8	7.79	7.85	7.45	7.95	7.95
Hardness, as CaCO3	mg/L	-	-	-	-	-	-	52.3	50.6	54.3	56.5	54.4	48.3	51.9	47.7	46.1	51.2	48.6	52	47	45.9	52.5
Dissolved organic carbon	mg/L	-	-	-	-	-	-	1.6	2.73	1.83	1.84	2.25	1.77	1.83	2.21	2.03	3.12	2.96	2.42	3.92	3.14	1.52
Dissolved Metals																						
Copper	mg/L	-	0.0022[(a)]	0.0070[(a)]	-	0.3	0.00036 - 0.0012	0.00056	<0.00050	0.00058	0.00056	0.00058	<0.00050	<0.00050	<0.00050	<0.00050	0.00077	0.00054	0.00052	0.00084	0.00074	0.00056
round sample-specific pH	pH units							7.3	7.6	7.8	7.8	7.8	7.9	7.9	7.9	7.9	7.7	7.7	7.6	7.4	7.6	7.9
rounded sample-specific DOC	mg/L							1.5	2.5	1.5	1.5	2	1.5	1.5	2	2	3	2.5	2	3.5	3	1.5
rounded sample-specific Hardness	mg/L							50	50	50	50	50	40	50	40	40	50	40	50	40	40	50
Chronic guideline from lookup table	mg/L						0.00036 - 0.0012	0.000339113	0.00081466	0.000597142	0.000597142	0.000795564	0.000616333	0.000652109	0.000821014	0.000821014	0.001084444	0.00085517	0.000651696	0.00085301	0.000925166	0.000652109
Acute guideline from lookup table	mg/L						0.0022 - 0.007	0.002049549	0.004866035	0.003569061	0.003569061	0.004754194	0.003692658	0.003903631	0.004917189	0.004917189	0.006473431	0.005106874	0.003894099	0.005117359	0.005521194	0.003903631

Notes

Values are taken from the approved guidelines unless otherwise noted.

W = working guideline; M = interim guideline, Min = Minimum concentration requirement based on life stage.

Guidelines based on toxicity modifying factors are presented based on the mean baseline values (hardness of 54 mg/L, pH of 7.8, DOC 2.2 mg/L, temperature of 7 oC, and chloride of 0.50 mg/L) in Quesnel Lake, considered representative of average conditions in the receiving environment.

Shaded values indicates concentrations exceed the most conservative guideline of each maximum and chronic WQG for ecological receptors.

a) hardness, dissolved organic carbon, and pH dependent copper guideline selected from BC ENV copper guideline lookup table.

- = no guideline or no data; BC WQGs = British Columbia water quality guidelines; $CaCO_3$ = calcium carbonate; FDA = field duplicate available; FD = field duplicate; mg/L = milligrams per litre; QA/QC = quality assurance/quality control.

Table 2-4D: Copper Screening at Initial Dilution Zone Locations from 2015 to 2023
Mount Polley Mine

Location Type Station Sample Point Date Parameter	Unit	BC ENV Drinking Water Screening Criteria	BC ENV Guideline for the Protection of Aquatic Life		BC ENV Guideline for the Protection of Wildlife Life		Selected Screening Criteria	Quesnel Lake QUL-58 QUL-58-B 2015-11-30	Quesnel Lake QUL-58 QUL-58-B 2015-12-02	Quesnel Lake QUL-58 QUL-58-B 2015-12-09	Quesnel Lake QUL-58 QUL-58-B 2015-12-14	Quesnel Lake QUL-58 QUL-58-B 2015-12-30	Quesnel Lake QUL-58 QUL-58-B 2016-01-25	Quesnel Lake QUL-58 QUL-58-B 2016-02-23	Quesnel Lake QUL-58 QUL-58-B 2016-03-28	Quesnel Lake QUL-58 QUL-58-B 2016-04-27	Quesnel Lake QUL-58 QUL-58-B 2016-05-05	Quesnel Lake QUL-58 QUL-58-B 2016-05-10	Quesnel Lake QUL-58 QUL-58-B 2016-05-17	Quesnel Lake QUL-58 QUL-58-B 2016-05-25	Quesnel Lake QUL-58 QUL-58-B 2016-06-07	Quesnel Lake QUL-58 QUL-58-B 2016-06-20
			Long-Term Chronic	Short-Term Acute	Long-Term Chronic	Short-Term Acute																
Field Parameters																						
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	7.78	7.74	7.74	7.45	7.62	-	7.67	7.9	7.98	7.81	7.46	7.56	7.42	-	7.68
Conventional Parameters																						
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	7.8	7.57	7.79	7.86	7.76	7.84	7.78	7.83	7.87	7.92	7.87	7.98	7.42	7.82	7.81
Hardness, as CaCO3	mg/L	-	-	-	-	-	-	52.9	53.2	54	57.6	53.2	55.1	53.5	53	54.4	55.7	56.1	55.4	55.3	58.2	56.9
Dissolved organic carbon	mg/L	-	-	-	-	-	-	1.49	1.5	1.68	1.46	1.76	1.61	1.6	1.48	1.78	1.88	1.82	1.67	1.69	1.91	1.66
Dissolved Metals																						
Copper	mg/L	-	0.0022[(a)]	0.0070[(a)]	-	0.3	0.00036 - 0.0012	0.00078	0.00078	0.00086	0.0008	0.00078	0.00087	0.00093	0.00097	0.00098	0.00104	0.00114	0.00103	0.00129	0.00095	0.00097
round sample-specific pH	pH units							7.7	7.7	7.7	7.4	7.6	7.8	7.6	7.9	7.9	7.8	7.4	7.5	7.4	7.8	7.6
rounded sample-specific DOC	mg/L							1	1.5	1.5	1	1.5	1.5	1.5	1	1.5	1.5	1.5	1.5	1.5	1.5	1.5
rounded sample-specific Hardness	mg/L							50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
Chronic guideline from lookup table	mg/L						0.00036 - 0.0012	0.000362339	0.000542683	0.000542683	0.000258009	0.000488828	0.000597142	0.000488828	0.000436116	0.000652109	0.000597142	0.000386805	0.000436942	0.000386805	0.000597142	0.000488828
Acute guideline from lookup table	mg/L						0.0022 - 0.007	0.002164822	0.003242435	0.003242435	0.001550046	0.002922449	0.003569061	0.002922449	0.002609262	0.003903631	0.003569061	0.002324068	0.002614473	0.002324068	0.003569061	0.002922449

Notes

Values are taken from the approved guidelines unless otherwise noted.

W = working guideline; M = interim guideline, Min = Minimum concentration requirement based on life stage.

Guidelines based on toxicity modifying factors are presented based on the mean baseline values (hardness of 54 mg/L, pH of 7.8, DOC 2.2 mg/L, temperature of 7 oC, and chloride of 0.50 mg/L) in Quesnel Lake, considered representative of average conditions in the receiving environment.

Shaded values indicates concentrations exceed the most conservative guideline of each maximum and chronic WQG for ecological receptors.

a) hardness, dissolved organic carbon, and pH dependent copper guideline selected from BC ENV copper guideline lookup table.

- = no guideline or no data; BC WQGs = British Columbia water quality guidelines; $CaCO_3$ = calcium carbonate; FDA = field duplicate available; FD = field duplicate; mg/L = milligrams per litre; QA/QC = quality assurance/quality control.

Table 2-4D: Copper Screening at Initial Dilution Zone Locations from 2015 to 2023
Mount Polley Mine

Location Type Station Sample Point Date Parameter	Unit	BC ENV Drinking Water Screening Criteria	BC ENV Guideline for the Protection of Aquatic Life		BC ENV Guideline for the Protection of Wildlife Life		Selected Screening Criteria	Quesnel Lake QUL-58 QUL-58-B 2016-06-28	Quesnel Lake QUL-58 QUL-58-B 2016-07-06	Quesnel Lake QUL-58 QUL-58-B 2016-08-01	Quesnel Lake QUL-58 QUL-58-B 2016-09-05	Quesnel Lake QUL-58 QUL-58-B 2016-10-05	Quesnel Lake QUL-58 QUL-58-B 2016-11-09	Quesnel Lake QUL-58 QUL-58-B 2016-11-16	Quesnel Lake QUL-58 QUL-58-B 2016-11-30	Quesnel Lake QUL-58 QUL-58-B 2017-02-02	Quesnel Lake QUL-58 QUL-58-B 2017-03-06	Quesnel Lake QUL-58 QUL-58-B 2017-04-10	Quesnel Lake QUL-58 QUL-58-B 2017-05-09	Quesnel Lake QUL-58 QUL-58-B 2017-05-15	Quesnel Lake QUL-58 QUL-58-B 2017-05-22	Quesnel Lake QUL-58 QUL-58-B 2017-05-29
			Long-Term Chronic	Short-Term Acute	Long-Term Chronic	Short-Term Acute																
Field Parameters																						
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	7.5	7.65	7.7	7.72	-	-	7.52	7.75	7.67	7.78	7.37	7.42	7.52	7.53	7.4
Conventional Parameters																						
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	7.8	7.89	7.67	7.87	7.79	7.81	7.7	7.79	7.92	7.86	7.91	7.81	7.88	7.94	7.85
Hardness, as CaCO3	mg/L	-	-	-	-	-	-	55.7	54.4	56	54.8	55.6	54.2	51.3	53.5	57.1	50.7	54.5	54.9	53.3	51.8	52.5
Dissolved organic carbon	mg/L	-	-	-	-	-	-	1.56	1.55	2.27	1.89	1.77	1.77	1.85	1.92	1.75	1.88	1.74	1.79	1.94	2.2	1.68
Dissolved Metals																						
Copper	mg/L	-	0.0022[(a)]	0.0070[(a)]	-	0.3	0.00036 - 0.0012	0.00104	0.00106	0.00325	0.00096	0.00096	0.00139	0.00075	0.00105	0.00081	0.00108	0.00092	0.00098	0.00097	0.00089	0.00075
round sample-specific pH	pH units							7.5	7.6	7.7	7.7	7.7	7.8	7.5	7.7	7.6	7.7	7.3	7.4	7.5	7.5	7.4
rounded sample-specific DOC	mg/L							1.5	1.5	2	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	2	1.5
rounded sample-specific Hardness	mg/L							50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
Chronic guideline from lookup table	mg/L						0.00036 - 0.0012	0.000436942	0.000488828	0.000723058	0.000542683	0.000542683	0.000597142	0.000436942	0.000542683	0.000488828	0.000542683	0.000339113	0.000386805	0.000436942	0.00058224	0.000386805
Acute guideline from lookup table	mg/L						0.0022 - 0.007	0.002614473	0.002922449	0.004319222	0.003242435	0.003242435	0.003569061	0.002614473	0.003242435	0.002922449	0.003242435	0.002049549	0.002324068	0.002614473	0.003484227	0.002324068

Notes

Values are taken from the approved guidelines unless otherwise noted.

W = working guideline; M = interim guideline, Min = Minimum concentration requirement based on life stage.

Guidelines based on toxicity modifying factors are presented based on the mean baseline values (hardness of 54 mg/L, pH of 7.8, DOC 2.2 mg/L, temperature of 7 oC, and chloride of 0.50 mg/L) in Quesnel Lake, considered representative of average conditions in the receiving environment.

Shaded values indicates concentrations exceed the most conservative guideline of each maximum and chronic WQG for ecological receptors.

a) hardness, dissolved organic carbon, and pH dependent copper guideline selected from BC ENV copper guideline lookup table.

- = no guideline or no data; BC WQGs = British Columbia water quality guidelines; $CaCO_3$ = calcium carbonate; FDA = field duplicate available; FD = field duplicate; mg/L = milligrams per litre; QA/QC = quality assurance/quality control.

Table 2-4D: Copper Screening at Initial Dilution Zone Locations from 2015 to 2023
Mount Polley Mine

Location Type Station Sample Point Date Parameter	Unit	BC ENV Drinking Water Screening Criteria	BC ENV Guideline for the Protection of Aquatic Life		BC ENV Guideline for the Protection of Wildlife Life		Selected Screening Criteria	Quesnel Lake QUL-58 QUL-58-B 2017-06-05	Quesnel Lake QUL-58 QUL-58-B 2017-06-12	Quesnel Lake QUL-58 QUL-58-B 2017-06-19	Quesnel Lake QUL-58 QUL-58-B 2017-06-27	Quesnel Lake QUL-58 QUL-58-B 2017-08-22	Quesnel Lake QUL-58 QUL-58-B 2017-10-01	Quesnel Lake QUL-58 QUL-58-B 2017-10-26	Quesnel Lake QUL-58 QUL-58-B 2017-11-20	Quesnel Lake QUL-58 QUL-58-B 2018-01-04	Quesnel Lake QUL-58 QUL-58-B 2018-01-18	Quesnel Lake QUL-58 QUL-58-B 2018-05-03	Quesnel Lake QUL-58 QUL-58-B 2018-05-13	Quesnel Lake QUL-58 QUL-58-B 2018-05-22	Quesnel Lake QUL-58 QUL-58-B 2018-06-04	Quesnel Lake QUL-58 QUL-58-B 2018-06-13
			Long-Term Chronic	Short-Term Acute	Long-Term Chronic	Short-Term Acute																	
Field Parameters																							
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	7.65	-	-	7.8	7.54	-	7.47	-	7.8	7.66	6.95	7.45	7.07	6.98	7.32
Conventional Parameters																							
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	7.86	7.96	7.88	7.91	7.83	7.88	7.88	7.93	7.87	7.73	7.88	7.86	7.8	7.91	7.9
Hardness, as CaCO3	mg/L	-	-	-	-	-	-	53	52.3	51.2	55.4	53.7	53.6	49.6	53.3	53.8	55.3	50.8	44.4	54.8	55.1	52.1
Dissolved organic carbon	mg/L	-	-	-	-	-	-	2.03	1.87	1.59	1.82	2	1.65	1.8	1.66	1.51	1.72	1.99	1.77	1.88	2.06	1.93
Dissolved Metals																							
Copper	mg/L	-	0.0022[(a)]	0.0070[(a)]	-	0.3	0.00036 - 0.0012	0.00092	0.00077	0.00065	0.0009	0.00078	0.00079	0.00068	0.00065	0.00069	0.00078	0.001	0.00061	0.00082	0.00076	0.00075
round sample-specific pH	pH units							7.6	7.9	7.8	7.8	7.5	7.8	7.4	7.9	7.8	7.6	7.1	7.4	7.1	6.9	7.3
rounded sample-specific DOC	mg/L							2	1.5	1.5	1.5	2	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	2	1.5
rounded sample-specific Hardness	mg/L							50	50	50	50	50	50	40	50	50	50	50	40	50	50	50
Chronic guideline from lookup table	mg/L						0.00036 - 0.0012	0.000651696	0.000652109	0.000597142	0.000597142	0.00058224	0.000597142	0.000365262	0.000652109	0.000597142	0.000488828	0.000252891	0.000365262	0.000252891	0.000240954	0.000339113
Acute guideline from lookup table	mg/L						0.0022 - 0.007	0.003894099	0.003903631	0.003569061	0.003569061	0.003484227	0.003569061	0.002194815	0.003903631	0.003569061	0.002922449	0.001558529	0.002194815	0.001558529	0.001526057	0.002049549

Notes

Values are taken from the approved guidelines unless otherwise noted.

W = working guideline; M = interim guideline, Min = Minimum concentration requirement based on life stage.

Guidelines based on toxicity modifying factors are presented based on the mean baseline values (hardness of 54 mg/L, pH of 7.8, DOC 2.2 mg/L, temperature of 7 oC, and chloride of 0.50 mg/L) in Quesnel Lake, considered representative of average conditions in the receiving environment.

Shaded values indicates concentrations exceed the most conservative guideline of each maximum and chronic WQG for ecological receptors.

a) hardness, dissolved organic carbon, and pH dependent copper guideline selected from BC ENV copper guideline lookup table.

- = no guideline or no data; BC WQGs = British Columbia water quality guidelines; $CaCO_3$ = calcium carbonate; FDA = field duplicate available; FD = field duplicate; mg/L = milligrams per litre; QA/QC = quality assurance/quality control.

Table 2-4D: Copper Screening at Initial Dilution Zone Locations from 2015 to 2023
Mount Polley Mine

Location Type / Station / Sample Point / Date / Parameter	Unit	BC ENV Drinking Water Screening Criteria	BC ENV Guideline for the Protection of Aquatic Life		BC ENV Guideline for the Protection of Wildlife Life		Selected Screening Criteria	Quesnel Lake QUL-58 QUL-58-B 2018-06-18	Quesnel Lake QUL-58 QUL-58-B 2018-06-27	Quesnel Lake QUL-58 QUL-58-B 2018-07-02	Quesnel Lake QUL-58 QUL-58-B 2018-08-23	Quesnel Lake QUL-58 QUL-58-B 2018-09-04	Quesnel Lake QUL-58 QUL-58-B 2018-10-11	Quesnel Lake QUL-58 QUL-58-B 2018-10-18	Quesnel Lake QUL-58 QUL-58-B 2018-10-24	Quesnel Lake QUL-58 QUL-58-B 2018-10-29	Quesnel Lake QUL-58 QUL-58-B 2018-11-07	Quesnel Lake QUL-58 QUL-58-B 2018-12-18	Quesnel Lake QUL-58 QUL-58-B 2019-02-26	Quesnel Lake QUL-58 QUL-58-B 2019-03-05	Quesnel Lake QUL-58 QUL-58-B 2019-04-25	Quesnel Lake QUL-58 QUL-58-B 2019-05-02
			Long-Term Chronic	Short-Term Acute	Long-Term Chronic	Short-Term Acute																
Field Parameters																						
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	7.33	7.58	7.11	7.78	7.57	7.32	7.5	6.95	7.45	7.58	7.81	7.74	7.77	7.71	7.76
Conventional Parameters																						
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	7.93	7.83	8	7.92	8	7.93	7.89	7.91	7.9	7.95	7.82	7.93	7.8	7.85	7.84
Hardness, as CaCO3	mg/L	-	-	-	-	-	-	53.2	50.5	55.6	52.5	52.9	54.4	57.7	59.4	53.3	56	53.2	53.4	54.7	57.7	54
Dissolved organic carbon	mg/L	-	-	-	-	-	-	2.01	2.2	1.89	1.78	1.66	1.15	1.81	1.78	1.78	1.81	1.7	1.68	1.64	2.76	1.98
Dissolved Metals																						
Copper	mg/L	-	0.0022[(a)]	0.0070[(a)]	-	0.3	0.00036 - 0.0012	0.00097	0.00065	0.00086	0.00074	0.00075	0.00075	0.00062	0.0007	0.00071	0.0007	0.00058	0.00056	0.00056	0.00063	0.00065
round sample-specific pH	pH units							7.3	7.5	7.1	7.7	7.5	7.3	7.5	7.1	7.4	7.5	7.8	7.7	7.7	7.7	7.7
rounded sample-specific DOC	mg/L							2	2	1.5	1.5	1.5	1	1.5	1.5	1.5	1.5	1.5	1.5	1.5	2.5	1.5
rounded sample-specific Hardness	mg/L							50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
Chronic guideline from lookup table	mg/L						0.00036 - 0.0012	0.00045232	0.00058224	0.000252891	0.000542683	0.000436942	0.000226208	0.000436942	0.000252891	0.000386805	0.000436942	0.000597142	0.000542683	0.000542683	0.000903751	0.000542683
Acute guideline from lookup table	mg/L						0.0022 - 0.007	0.002732256	0.003484227	0.001558529	0.003242435	0.002614473	0.001367383	0.002614473	0.001558529	0.002324068	0.002614473	0.003569061	0.003242435	0.003242435	0.005393784	0.003242435

Notes

Values are taken from the approved guidelines unless otherwise noted.

W = working guideline; M = interim guideline, Min = Minimum concentration requirement based on life stage.

Guidelines based on toxicity modifying factors are presented based on the mean baseline values (hardness of 54 mg/L, pH of 7.8, DOC 2.2 mg/L, temperature of 7 oC, and chloride of 0.50 mg/L) in Quesnel Lake, considered representative of average conditions in the receiving environment.

Shaded values indicates concentrations exceed the most conservative guideline of each maximum and chronic WQG for ecological receptors.

a) hardness, dissolved organic carbon, and pH dependent copper guideline selected from BC ENV copper guideline lookup table.

- = no guideline or no data; BC WQGs = British Columbia water quality guidelines; $CaCO_3$ = calcium carbonate; FDA = field duplicate available; FD = field duplicate; mg/L = milligrams per litre; QA/QC = quality assurance/quality control.

Table 2-4D: Copper Screening at Initial Dilution Zone Locations from 2015 to 2023
Mount Polley Mine

Location Type Station Sample Point Date Parameter	Unit	BC ENV Drinking Water Screening Criteria	BC ENV Guideline for the Protection of Aquatic Life		BC ENV Guideline for the Protection of Wildlife Life		Selected Screening Criteria	Quesnel Lake QUL-58 QUL-58-B 2019-05-08	Quesnel Lake QUL-58 QUL-58-B 2019-05-21	Quesnel Lake QUL-58 QUL-58-B 2019-06-18	Quesnel Lake QUL-58 QUL-58-B 2019-07-11	Quesnel Lake QUL-58 QUL-58-B 2019-07-25	Quesnel Lake QUL-58 QUL-58-B 2019-08-20	Quesnel Lake QUL-58 QUL-58-B 2019-10-30	Quesnel Lake QUL-58 QUL-58-B 2020-06-02	Quesnel Lake QUL-58 QUL-58-B 2020-06-09	Quesnel Lake QUL-58 QUL-58-B 2020-06-16	Quesnel Lake QUL-58 QUL-58-B 2020-06-24	Quesnel Lake QUL-58 QUL-58-B 2020-06-29	Quesnel Lake QUL-58 QUL-58-B 2020-07-21	Quesnel Lake QUL-58 QUL-58-B 2020-08-11	Quesnel Lake QUL-58 QUL-58-B 2020-09-16
			Long-Term Chronic	Short-Term Acute	Long-Term Chronic	Short-Term Acute																	
Field Parameters																							
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	7.8	7.6	7.71	7.8	7.61	7.47	7.72	7.69	-	7.64	7.33	7.55	-	7.33	7.77
Conventional Parameters																							
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	7.85	8.03	8.02	7.89	7.86	8.01	7.84	7.83	7.95	7.79	7.82	7.87	7.46	7.89	7.94
Hardness, as CaCO3	mg/L	-	-	-	-	-	-	54.3	59.8	60.9	57.6	54.6	53.4	52.7	56.5	55.8	55	56.7	58	55	52.3	58.3
Dissolved organic carbon	mg/L	-	-	-	-	-	-	2.37	2.33	1.7	1.96	1.99	1.71	1.73	2.12	2.73	2.12	2.32	2.22	2.16	2.42	2.34
Dissolved Metals																							
Copper	mg/L	-	0.0022[(a)]	0.0070[(a)]	-	0.3	0.00036 - 0.0012	0.00068	0.00065	0.00069	0.00056	0.00062	0.00061	0.00051	0.00074	0.00084	0.00065	0.00067	0.00067	0.00059	0.00063	0.00108
round sample-specific pH	pH units							7.8	7.6	7.7	7.8	7.6	7.4	7.7	7.6	7.9	7.6	7.3	7.5	7.4	7.3	7.7
rounded sample-specific DOC	mg/L							2	2	1.5	1.5	1.5	1.5	1.5	2	2.5	2	2	2	2	2	2
rounded sample-specific Hardness	mg/L							50	50	60	50	50	50	50	50	50	50	50	50	50	50	50
Chronic guideline from lookup table	mg/L						0.00036 - 0.0012	0.000795564	0.000651696	0.00056934	0.000597142	0.000488828	0.000386805	0.000542683	0.000651696	0.001084857	0.000651696	0.00045232	0.00058224	0.000515485	0.00045232	0.000723058
Acute guideline from lookup table	mg/L						0.0022 - 0.007	0.004754194	0.003894099	0.00339844	0.003569061	0.002922449	0.002324068	0.003242435	0.003894099	0.006482645	0.003894099	0.002732256	0.003484227	0.003097836	0.002732256	0.004319222

Notes

Values are taken from the approved guidelines unless otherwise noted.

W = working guideline; M = interim guideline, Min = Minimum concentration requirement based on life stage.

Guidelines based on toxicity modifying factors are presented based on the mean baseline values (hardness of 54 mg/L, pH of 7.8, DOC 2.2 mg/L, temperature of 7 oC, and chloride of 0.50 mg/L) in Quesnel Lake, considered representative of average conditions in the receiving environment.

Shaded values indicates concentrations exceed the most conservative guideline of each maximum and chronic WQG for ecological receptors.

a) hardness, dissolved organic carbon, and pH dependent copper guideline selected from BC ENV copper guideline lookup table.

- = no guideline or no data; BC WQGs = British Columbia water quality guidelines; $CaCO_3$ = calcium carbonate; FDA = field duplicate available; FD = field duplicate; mg/L = milligrams per litre; QA/QC = quality assurance/quality control.

Table 2-4D: Copper Screening at Initial Dilution Zone Locations from 2015 to 2023
Mount Polley Mine

Location Type Station Sample Point Date Parameter	Unit	BC ENV Drinking Water Screening Criteria	BC ENV Guideline for the Protection of Aquatic Life		BC ENV Guideline for the Protection of Wildlife Life		Selected Screening Criteria	Quesnel Lake QUL-58 QUL-58-B 2020-11-04	Quesnel Lake QUL-58 QUL-58-B 2021-05-04	Quesnel Lake QUL-58 QUL-58-B 2021-05-11	Quesnel Lake QUL-58 QUL-58-B 2021-05-19	Quesnel Lake QUL-58 QUL-58-B 2021-05-25	Quesnel Lake QUL-58 QUL-58-B 2021-06-02	Quesnel Lake QUL-58 QUL-58-B 2021-07-21	Quesnel Lake QUL-58 QUL-58-B 2021-09-16	Quesnel Lake QUL-58 QUL-58-B 2021-10-27	Quesnel Lake QUL-58 QUL-58-B 2022-05-09	Quesnel Lake QUL-58 QUL-58-B 2022-05-25	Quesnel Lake QUL-58 QUL-58-B 2022-05-31	Quesnel Lake QUL-58 QUL-58-B 2022-06-06	Quesnel Lake QUL-58 QUL-58-B 2022-06-27	Quesnel Lake QUL-58 QUL-58-B 2022-08-16
			Long-Term Chronic	Short-Term Acute	Long-Term Chronic	Short-Term Acute																	
Field Parameters																							
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	8.1	7.72	7.76	8.36	7.66	7.53	7.43	8.41	7.57	7.64	7.38	7.7	-	7.79	7.65
Conventional Parameters																							
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	7.82	7.95	7.9	7.86	7.9	7.89	7.88	7.85	7.93	7.91	7.89	7.96	7.9	7.87	7.91
Hardness, as CaCO3	mg/L	-	-	-	-	-	-	54.3	57.5	54.6	55.3	54.8	53.4	54.6	57.6	57.8	54.4	49.4	55.4	56.2	54.3	57.7
Dissolved organic carbon	mg/L	-	-	-	-	-	-	13	2.19	2.1	2.3	1.94	2.22	2.16	1.88	1.86	2.32	2.25	2.09	1.98	2.36	2.32
Dissolved Metals																							
Copper	mg/L	-	0.0022[(a)]	0.0070[(a)]	-	0.3	0.00036 - 0.0012	<0.00050	0.00067	0.00075	0.00086	0.0007	0.00076	0.00077	0.0007	0.00061	0.00071	0.00075	0.00094	0.00076	0.00056	0.00074
round sample-specific pH	pH units							8.1	7.7	7.7	8.3	7.6	7.5	7.4	8.4	7.5	7.6	7.3	7.7	7.9	7.7	7.6
rounded sample-specific DOC	mg/L							13	2	2	2	1.5	2	2	1.5	1.5	2	2	2	1.5	2	2
rounded sample-specific Hardness	mg/L							50	50	50	50	50	50	50	50	50	50	40	50	50	50	50
Chronic guideline from lookup table	mg/L						0.00036 - 0.0012	0.006465806	0.000723058	0.000723058	0.00111269	0.000488828	0.00058224	0.000515485	0.000873217	0.000436942	0.000651696	0.000426521	0.000723058	0.000652109	0.000723058	0.000651696
Acute guideline from lookup table	mg/L						0.0022 - 0.007	0.03868045	0.004319222	0.004319222	0.006687899	0.002922449	0.003484227	0.003097836	0.005263515	0.002614473	0.003894099	0.002577998	0.004319222	0.003903631	0.004319222	0.003894099

Notes

Values are taken from the approved guidelines unless otherwise noted.

W = working guideline; M = interim guideline, Min = Minimum concentration requirement based on life stage.

Guidelines based on toxicity modifying factors are presented based on the mean baseline values (hardness of 54 mg/L, pH of 7.8, DOC 2.2 mg/L, temperature of 7 oC, and chloride of 0.50 mg/L) in Quesnel Lake, considered representative of average conditions in the receiving environment.

Shaded values indicates concentrations exceed the most conservative guideline of each maximum and chronic WQG for ecological receptors.

a) hardness, dissolved organic carbon, and pH dependent copper guideline selected from BC ENV copper guideline lookup table.

- = no guideline or no data; BC WQGs = British Columbia water quality guidelines; $CaCO_3$ = calcium carbonate; FDA = field duplicate available; FD = field duplicate; mg/L = milligrams per litre; QA/QC = quality assurance/quality control.

Table 2-4D: Copper Screening at Initial Dilution Zone Locations from 2015 to 2023
Mount Polley Mine

Location Type Station Sample Point Date Parameter	Unit	BC ENV Drinking Water Screening Criteria	BC ENV Guideline for the Protection of Aquatic Life		BC ENV Guideline for the Protection of Wildlife Life		Selected Screening Criteria	Quesnel Lake QUL-58 QUL-58-B 2022-10-19	Quesnel Lake QUL-58 QUL-58-BP 2016-11-16	Quesnel Lake QUL-58 QUL-58-BP 2019-10-30	Quesnel Lake QUL-58 QUL-58-BT 2016-06-28	Quesnel Lake QUL-58 QUL-58-BT 2016-07-06	Quesnel Lake QUL-58 QUL-58-BT 2016-08-01	Quesnel Lake QUL-58 QUL-58-BT 2016-09-05	Quesnel Lake QUL-58 QUL-58-BT 2016-10-05	Quesnel Lake QUL-58 QUL-58-BT 2016-11-09	Quesnel Lake QUL-58 QUL-58-BT 2017-03-06	Quesnel Lake QUL-58 QUL-58-BT 2017-04-10	Quesnel Lake QUL-58 QUL-58-BT 2017-06-05	Quesnel Lake QUL-58 QUL-58-BT 2017-06-12	Quesnel Lake QUL-58 QUL-58-BT 2017-06-19	Quesnel Lake QUL-58 QUL-58-BT 2017-06-27
			Long-Term Chronic	Short-Term Acute	Long-Term Chronic	Short-Term Acute																
Field Parameters																						
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	7.51	7.66	7.73	7.72	7.72	7.76	7.71	-	-	7.79	7.36	7.68	7.75	7.71	7.79
Conventional Parameters																						
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	7.87	7.73	7.84	7.83	7.91	7.67	7.87	7.8	7.82	7.85	7.94	7.89	7.99	7.88	7.91
Hardness, as CaCO3	mg/L	-	-	-	-	-	-	60.7	51.5	52.5	54.7	54.3	52.9	52.9	59.2	53	56.5	53.4	52.7	50.3	55.6	59.1
Dissolved organic carbon	mg/L	-	-	-	-	-	-	2.13	2.19	1.75	1.57	1.55	2.18	1.81	1.83	1.79	1.67	2.11	2.32	1.67	1.68	1.84
Dissolved Metals																						
Copper	mg/L	-	0.0022[(a)]	0.0070[(a)]	-	0.3	0.00036 - 0.0012	0.00073	0.00079	<0.00050	0.0009	0.00083	0.0036	0.00259	0.00094	0.00113	0.00099	0.00082	0.00081	0.00066	0.00075	0.00085
round sample-specific pH	pH units							7.5	7.6	7.7	7.7	7.7	7.7	7.7	7.8	7.8	7.7	7.3	7.6	7.7	7.7	7.7
rounded sample-specific DOC	mg/L							2	2	1.5	1.5	1.5	2	1.5	1.5	1.5	1.5	2	2	1.5	1.5	1.5
rounded sample-specific Hardness	mg/L							60	50	50	50	50	50	50	50	50	50	50	50	50	50	50
Chronic guideline from lookup table	mg/L						0.00036 - 0.0012	0.000610931	0.000651696	0.000542683	0.000542683	0.000542683	0.000723058	0.000542683	0.000597142	0.000597142	0.000542683	0.00045232	0.000651696	0.000542683	0.000542683	0.000542683
Acute guideline from lookup table	mg/L						0.0022 - 0.007	0.003656437	0.003894099	0.003242435	0.003242435	0.003242435	0.004319222	0.003242435	0.003569061	0.003569061	0.003242435	0.002732256	0.003894099	0.003242435	0.003242435	0.003242435

Notes

Values are taken from the approved guidelines unless otherwise noted.

W = working guideline; M = interim guideline, Min = Minimum concentration requirement based on life stage.

Guidelines based on toxicity modifying factors are presented based on the mean baseline values (hardness of 54 mg/L, pH of 7.8, DOC 2.2 mg/L, temperature of 7 oC, and chloride of 0.50 mg/L) in Quesnel Lake, considered representative of average conditions in the receiving environment.

Shaded values indicates concentrations exceed the most conservative guideline of each maximum and chronic WQG for ecological receptors.

a) hardness, dissolved organic carbon, and pH dependent copper guideline selected from BC ENV copper guideline lookup table.

- = no guideline or no data; BC WQGs = British Columbia water quality guidelines; $CaCO_3$ = calcium carbonate; FDA = field duplicate available; FD = field duplicate; mg/L = milligrams per litre; QA/QC = quality assurance/quality control.

Table 2-4D: Copper Screening at Initial Dilution Zone Locations from 2015 to 2023
Mount Polley Mine

Location Type Station Sample Point Date Parameter	Unit	BC ENV Drinking Water Screening Criteria	BC ENV Guideline for the Protection of Aquatic Life		BC ENV Guideline for the Protection of Wildlife Life		Selected Screening Criteria	Quesnel Lake QUL-58 QUL-58-BT 2017-08-22	Quesnel Lake QUL-58 QUL-58-BT 2017-10-01	Quesnel Lake QUL-58 QUL-58-BT 2017-10-26	Quesnel Lake QUL-58 QUL-58-BT 2018-05-13	Quesnel Lake QUL-58 QUL-58-BT 2018-06-04	Quesnel Lake QUL-58 QUL-58-BT 2018-06-13	Quesnel Lake QUL-58 QUL-58-BT 2018-06-18	Quesnel Lake QUL-58 QUL-58-BT 2018-06-27	Quesnel Lake QUL-58 QUL-58-BT 2018-07-02	Quesnel Lake QUL-58 QUL-58-BT 2018-08-23	Quesnel Lake QUL-58 QUL-58-BT 2018-09-04	Quesnel Lake QUL-58 QUL-58-BT 2018-10-18	Quesnel Lake QUL-58 QUL-58-BT 2018-10-24	Quesnel Lake QUL-58 QUL-58-BT 2018-10-29	Quesnel Lake QUL-58 QUL-58-BT 2018-11-07
			Long-Term Chronic	Short-Term Acute	Long-Term Chronic	Short-Term Acute																
Field Parameters																						
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	8.21	-	7.82	7.7	7.29	7.62	7.45	7.79	7.43	7.77	7.69	7.62	7.04	7.6	7.6
Conventional Parameters																						
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	7.82	7.87	7.94	7.89	7.93	7.91	7.95	7.9	8	7.89	8	7.87	7.89	7.9	7.97
Hardness, as CaCO3	mg/L	-	-	-	-	-	-	51.6	50.7	49.8	44.9	53.2	52.2	54.2	52.3	54.8	51.1	50.7	52.4	54.2	51.7	54.6
Dissolved organic carbon	mg/L	-	-	-	-	-	-	2.2	1.94	1.7	2.27	2.36	2.12	1.31	1.99	2.03	1.7	1.74	1.72	3	1.74	2.13
Dissolved Metals																						
Copper	mg/L	-	0.0022[(a)]	0.0070[(a)]	-	0.3	0.00036 - 0.0012	0.00065	0.00062	0.00072	0.00063	0.00068	0.00059	0.00065	0.00067	0.00073	0.00098	0.00075	0.00057	0.00171	0.00058	0.00081
round sample-specific pH	pH units							8.2	7.8	7.8	7.7	7.2	7.6	7.4	7.7	7.4	7.7	7.6	7.6	7.1	7.6	7.6
rounded sample-specific DOC	mg/L							2	1.5	1.5	2	2	2	1	1.5	2	1.5	1.5	1.5	3	1.5	2
rounded sample-specific Hardness	mg/L							50	50	40	40	50	50	50	50	50	50	50	50	50	50	50
Chronic guideline from lookup table	mg/L						0.00036 - 0.0012	0.001064586	0.000597142	0.00056486	0.000684136	0.000392778	0.000651696	0.000258009	0.000542683	0.000515485	0.000542683	0.000488828	0.000488828	0.000506239	0.000488828	0.000651696
Acute guideline from lookup table	mg/L						0.0022 - 0.007	0.006394952	0.003569061	0.003375881	0.004085372	0.002391649	0.003894099	0.001550046	0.003242435	0.003097836	0.003242435	0.002922449	0.002922449	0.003115819	0.002922449	0.003894099

Notes

Values are taken from the approved guidelines unless otherwise noted.

W = working guideline; M = interim guideline, Min = Minimum concentration requirement based on life stage.

Guidelines based on toxicity modifying factors are presented based on the mean baseline values (hardness of 54 mg/L, pH of 7.8, DOC 2.2 mg/L, temperature of 7 oC, and chloride of 0.50 mg/L) in Quesnel Lake, considered representative of average conditions in the receiving environment.

Shaded values indicates concentrations exceed the most conservative guideline of each maximum and chronic WQG for ecological receptors.

a) hardness, dissolved organic carbon, and pH dependent copper guideline selected from BC ENV copper guideline lookup table.

- = no guideline or no data; BC WQGs = British Columbia water quality guidelines; $CaCO_3$ = calcium carbonate; FDA = field duplicate available; FD = field duplicate; mg/L = milligrams per litre; QA/QC = quality assurance/quality control.

Table 2-4D: Copper Screening at Initial Dilution Zone Locations from 2015 to 2023
Mount Polley Mine

Location Type Station Sample Point Date Parameter	Unit	BC ENV Drinking Water Screening Criteria	BC ENV Guideline for the Protection of Aquatic Life		BC ENV Guideline for the Protection of Wildlife Life		Selected Screening Criteria	Quesnel Lake QUL-58 QUL-58-BT 2019-05-08	Quesnel Lake QUL-58 QUL-58-BT 2019-06-18	Quesnel Lake QUL-58 QUL-58-BT 2019-07-11	Quesnel Lake QUL-58 QUL-58-BT 2019-07-25	Quesnel Lake QUL-58 QUL-58-BT 2019-08-20	Quesnel Lake QUL-58 QUL-58-BT 2020-06-16	Quesnel Lake QUL-58 QUL-58-BT 2020-06-24	Quesnel Lake QUL-58 QUL-58-BT 2020-06-29	Quesnel Lake QUL-58 QUL-58-BT 2020-07-21	Quesnel Lake QUL-58 QUL-58-BT 2020-08-11	Quesnel Lake QUL-58 QUL-58-MID 2015-11-30	Quesnel Lake QUL-58 QUL-58-MID 2015-12-02	Quesnel Lake QUL-58 QUL-58-MID 2015-12-09	Quesnel Lake QUL-58 QUL-58-MID 2015-12-14	Quesnel Lake QUL-58 QUL-58-MID 2015-12-30
			Long-Term Chronic	Short-Term Acute	Long-Term Chronic	Short-Term Acute																
Field Parameters																						
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	7.86	7.72	7.99	7.71	7.59	7.66	-	7.59	-	7.42	7.73	7.73	7.74	7.33	7.67
Conventional Parameters																						
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	7.84	8.03	7.88	7.87	8	7.83	7.8	7.86	7.38	7.89	7.79	7.54	7.8	7.87	7.77
Hardness, as CaCO3	mg/L	-	-	-	-	-	-	55.1	52.4	55.2	50.8	52.5	53.9	53.7	53	48.2	52.1	53.9	52.3	53.7	56.4	53.2
Dissolved organic carbon	mg/L	-	-	-	-	-	-	2.06	1.66	2.21	1.93	1.99	2.24	2.35	2.22	2.83	2.27	1.52	1.37	1.52	1.63	1.72
Dissolved Metals																						
Copper	mg/L	-	0.0022[(a)]	0.0070[(a)]	-	0.3	0.00036 - 0.0012	0.00062	<0.00050	<0.00050	0.00051	0.0005	0.00064	0.00056	0.00052	0.00059	0.00064	0.00066	0.00138	0.00095	0.00083	0.00084
round sample-specific pH	pH units							7.8	7.7	7.9	7.7	7.5	7.6	7.8	7.5	7.3	7.4	7.7	7.7	7.7	7.3	7.6
rounded sample-specific DOC	mg/L							2	1.5	2	1.5	1.5	2	2	2	2.5	2	1.5	1	1.5	1.5	1.5
rounded sample-specific Hardness	mg/L							50	50	50	50	50	50	50	50	40	50	50	50	50	50	50
Chronic guideline from lookup table	mg/L						0.00036 - 0.0012	0.000795564	0.000542683	0.000868515	0.000542683	0.000436942	0.000651696	0.000795564	0.00058224	0.000533246	0.000515485	0.000542683	0.000362339	0.000542683	0.000339113	0.000488828
Acute guideline from lookup table	mg/L						0.0022 - 0.007	0.004754194	0.003242435	0.005198063	0.003242435	0.002614473	0.003894099	0.004754194	0.003484227	0.003221464	0.003097836	0.003242435	0.002164822	0.003242435	0.002049549	0.002922449

Notes

Values are taken from the approved guidelines unless otherwise noted.

W = working guideline; M = interim guideline, Min = Minimum concentration requirement based on life stage.

Guidelines based on toxicity modifying factors are presented based on the mean baseline values (hardness of 54 mg/L, pH of 7.8, DOC 2.2 mg/L, temperature of 7 oC, and chloride of 0.50 mg/L) in Quesnel Lake, considered representative of average conditions in the receiving environment.

Shaded values indicates concentrations exceed the most conservative guideline of each maximum and chronic WQG for ecological receptors.

a) hardness, dissolved organic carbon, and pH dependent copper guideline selected from BC ENV copper guideline lookup table.

- = no guideline or no data; BC WQGs = British Columbia water quality guidelines; $CaCO_3$ = calcium carbonate; FDA = field duplicate available; FD = field duplicate; mg/L = milligrams per litre; QA/QC = quality assurance/quality control.

Table 2-4D: Copper Screening at Initial Dilution Zone Locations from 2015 to 2023
Mount Polley Mine

Location Type Station Sample Point Date Parameter	Unit	BC ENV Drinking Water Screening Criteria	BC ENV Guideline for the Protection of Aquatic Life		BC ENV Guideline for the Protection of Wildlife Life		Selected Screening Criteria	Quesnel Lake QUL-58 QUL-58-MID 2016-01-25	Quesnel Lake QUL-58 QUL-58-MID 2016-02-23	Quesnel Lake QUL-58 QUL-58-MID 2016-03-28	Quesnel Lake QUL-58 QUL-58-MID 2016-04-11	Quesnel Lake QUL-58 QUL-58-MID 2016-04-27	Quesnel Lake QUL-58 QUL-58-MID 2016-05-05	Quesnel Lake QUL-58 QUL-58-MID 2016-05-10	Quesnel Lake QUL-58 QUL-58-MID 2016-05-17	Quesnel Lake QUL-58 QUL-58-MID 2016-05-25	Quesnel Lake QUL-58 QUL-58-MID 2016-06-07	Quesnel Lake QUL-58 QUL-58-MID 2016-06-20	Quesnel Lake QUL-58 QUL-58-MID 2017-02-02	Quesnel Lake QUL-58 QUL-58-MID 2017-05-09	Quesnel Lake QUL-58 QUL-58-MID 2017-05-15	Quesnel Lake QUL-58 QUL-58-MID 2017-05-22
			Long-Term Chronic	Short-Term Acute	Long-Term Chronic	Short-Term Acute																
Field Parameters																						
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	7.88	7.69	7.94	7.8	8	7.88	7.5	7.64	7.46	7.66	7.84	7.63	7.42	7.54	7.54
Conventional Parameters																						
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	7.84	7.79	7.83	7.97	7.87	7.93	7.85	7.98	7.42	7.82	7.79	7.92	7.81	7.86	7.94
Hardness, as CaCO3	mg/L	-	-	-	-	-	-	55.3	53.8	52.8	53.5	54.6	54.2	54.4	53.7	54.2	55.4	54.3	57.4	54.4	53.6	54.7
Dissolved organic carbon	mg/L	-	-	-	-	-	-	1.71	1.46	1.51	1.82	1.86	1.82	1.64	1.59	1.55	1.73	1.75	1.88	1.95	1.72	2.14
Dissolved Metals																						
Copper	mg/L	-	0.0022[(a)]	0.0070[(a)]	-	0.3	0.00036 - 0.0012	0.00088	0.00086	0.00099	0.00111	0.00103	0.00125	0.00085	0.00108	0.00092	0.00092	0.00093	0.00076	0.00088	0.00092	0.00101
round sample-specific pH	pH units							7.8	7.6	7.9	7.8	8	7.8	7.5	7.6	7.4	7.6	7.8	7.6	7.4	7.5	7.5
rounded sample-specific DOC	mg/L							1.5	1	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	2
rounded sample-specific Hardness	mg/L							50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
Chronic guideline from lookup table	mg/L						0.00036 - 0.0012	0.000597142	0.000326309	0.000652109	0.000597142	0.000706981	0.000597142	0.000436942	0.000488828	0.000386805	0.000488828	0.000597142	0.000488828	0.000386805	0.000436942	0.00058224
Acute guideline from lookup table	mg/L						0.0022 - 0.007	0.003569061	0.001950036	0.003903631	0.003569061	0.004238518	0.003569061	0.002614473	0.002922449	0.002324068	0.002922449	0.003569061	0.002922449	0.002324068	0.002614473	0.003484227

Notes

Values are taken from the approved guidelines unless otherwise noted.

W = working guideline; M = interim guideline, Min = Minimum concentration requirement based on life stage.

Guidelines based on toxicity modifying factors are presented based on the mean baseline values (hardness of 54 mg/L, pH of 7.8, DOC 2.2 mg/L, temperature of 7 oC, and chloride of 0.50 mg/L) in Quesnel Lake, considered representative of average conditions in the receiving environment.

Shaded values indicates concentrations exceed the most conservative guideline of each maximum and chronic WQG for ecological receptors.

a) hardness, dissolved organic carbon, and pH dependent copper guideline selected from BC ENV copper guideline lookup table.

- = no guideline or no data; BC WQGs = British Columbia water quality guidelines; $CaCO_3$ = calcium carbonate; FDA = field duplicate available; FD = field duplicate; mg/L = milligrams per litre; QA/QC = quality assurance/quality control.

Table 2-4D: Copper Screening at Initial Dilution Zone Locations from 2015 to 2023
Mount Polley Mine

Location Type Station Sample Point Date Parameter	Unit	BC ENV Drinking Water Screening Criteria	BC ENV Guideline for the Protection of Aquatic Life		BC ENV Guideline for the Protection of Wildlife Life		Selected Screening Criteria	Quesnel Lake QUL-58 QUL-58-MID 2017-05-29	Quesnel Lake QUL-58 QUL-58-MID 2017-11-20	Quesnel Lake QUL-58 QUL-58-MID 2018-01-04	Quesnel Lake QUL-58 QUL-58-MID 2018-01-18	Quesnel Lake QUL-58 QUL-58-MID 2018-05-03	Quesnel Lake QUL-58 QUL-58-MID 2018-05-22	Quesnel Lake QUL-58 QUL-58-MID 2018-12-18	Quesnel Lake QUL-58 QUL-58-MID 2019-02-26	Quesnel Lake QUL-58 QUL-58-MID 2019-03-05	Quesnel Lake QUL-58 QUL-58-MID 2019-04-25	Quesnel Lake QUL-58 QUL-58-MID 2019-05-02	Quesnel Lake QUL-58 QUL-58-MID 2019-05-21	Quesnel Lake QUL-58 QUL-58-MID 2020-06-02	Quesnel Lake QUL-58 QUL-58-MID 2020-06-09	Quesnel Lake QUL-58 QUL-58-MID 2020-11-04
			Long-Term Chronic	Short-Term Acute	Long-Term Chronic	Short-Term Acute																
Field Parameters																						
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	7.41	-	7.8	7.64	6.95	7.06	7.84	7.81	7.79	7.72	7.77	7.64	7.76	-	8.18
Conventional Parameters																						
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	7.85	7.93	7.87	7.71	7.88	7.81	7.8	7.93	7.83	7.85	7.88	8.03	7.83	7.93	7.85
Hardness, as CaCO3	mg/L	-	-	-	-	-	-	52	53.8	52.6	56.9	52.2	55.2	56.2	53.1	53.8	57.8	53.4	55.7	55.9	54	53.5
Dissolved organic carbon	mg/L	-	-	-	-	-	-	1.58	1.61	1.63	1.59	1.96	2	1.71	1.64	1.69	2.11	1.92	2.19	2.09	2.39	12.8
Dissolved Metals																						
Copper	mg/L	-	0.0022[(a)]	0.0070[(a)]	-	0.3	0.00036 - 0.0012	0.00065	0.0006	0.00071	0.00069	0.00072	0.00087	0.00066	0.00054	0.00055	0.00063	0.00065	0.00061	0.00067	0.00074	0.00056
round sample-specific pH	pH units							7.4	7.9	7.8	7.6	7.1	7	7.8	7.8	7.7	7.7	7.7	7.6	7.7	7.9	8.1
rounded sample-specific DOC	mg/L							1.5	1.5	1.5	1.5	1.5	2	1.5	1.5	1.5	2	1.5	2	2	2	12.5
rounded sample-specific Hardness	mg/L							50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
Chronic guideline from lookup table	mg/L						0.00036 - 0.0012	0.000386805	0.000652109	0.000597142	0.000488828	0.000252891	0.000286764	0.000597142	0.000597142	0.000542683	0.000723058	0.000542683	0.000651696	0.000723058	0.000868515	0.006219882
Acute guideline from lookup table	mg/L						0.0022 - 0.007	0.002324068	0.003903631	0.003569061	0.002922449	0.001558529	0.001789106	0.003569061	0.003569061	0.003242435	0.004319222	0.003242435	0.003894099	0.004319222	0.005198063	0.037212538

Notes

Values are taken from the approved guidelines unless otherwise noted.

W = working guideline; M = interim guideline, Min = Minimum concentration requirement based on life stage.

Guidelines based on toxicity modifying factors are presented based on the mean baseline values (hardness of 54 mg/L, pH of 7.8, DOC 2.2 mg/L, temperature of 7 oC, and chloride of 0.50 mg/L) in Quesnel Lake, considered representative of average conditions in the receiving environment.

Shaded values indicates concentrations exceed the most conservative guideline of each maximum and chronic WQG for ecological receptors.

a) hardness, dissolved organic carbon, and pH dependent copper guideline selected from BC ENV copper guideline lookup table.

- = no guideline or no data; BC WQGs = British Columbia water quality guidelines; $CaCO_3$ = calcium carbonate; FDA = field duplicate available; FD = field duplicate; mg/L = milligrams per litre; QA/QC = quality assurance/quality control.

Table 2-4D: Copper Screening at Initial Dilution Zone Locations from 2015 to 2023
Mount Polley Mine

Location Type Station Sample Point Date Parameter	Unit	BC ENV Drinking Water Screening Criteria	BC ENV Guideline for the Protection of Aquatic Life		BC ENV Guideline for the Protection of Wildlife Life		Selected Screening Criteria	Quesnel Lake QUL-58 QUL-58-MID 2021-05-04	Quesnel Lake QUL-58 QUL-58-MID 2021-05-11	Quesnel Lake QUL-58 QUL-58-MID 2021-05-25	Quesnel Lake QUL-58 QUL-58-MID 2021-06-02	Quesnel Lake QUL-58 QUL-58-MID 2022-05-09	Quesnel Lake QUL-58 QUL-58-MID 2022-05-18	Quesnel Lake QUL-58 QUL-58-MID 2022-05-25	Quesnel Lake QUL-58 QUL-58-MID 2022-05-31	Quesnel Lake QUL-58 QUL-58-MID 2022-06-06	Quesnel Lake QUL-58 QUL-58-MP 2015-12-21	Quesnel Lake QUL-58 QUL-58-MP 2016-04-11	Quesnel Lake QUL-58 QUL-58-MP 2016-11-16	Quesnel Lake QUL-58 QUL-58-MP 2016-11-21	Quesnel Lake QUL-58 QUL-58-MP 2018-01-10	Quesnel Lake QUL-58 QUL-58-MP 2018-01-31
			Long-Term Chronic	Short-Term Acute	Long-Term Chronic	Short-Term Acute																
Field Parameters																						
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	7.73	7.84	7.66	7.59	7.71	7.8	7.39	7.82	-	7.65	-	7.68	7.69	-	-
Conventional Parameters																						
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	7.95	7.92	7.85	7.89	7.91	7.9	7.9	7.96	7.72	7.88	7.97	7.86	7.91	7.8	7.97
Hardness, as CaCO3	mg/L	-	-	-	-	-	-	57.2	54.6	53.8	54.4	50.4	58.7	51.1	53	48.3	55	54.7	51.2	56.2	54.5	58.4
Dissolved organic carbon	mg/L	-	-	-	-	-	-	2.14	2.2	1.98	2.2	2.24	2.14	1.88	2.14	2.11	1.65	1.83	1.74	1.95	1.6	1.61
Dissolved Metals																						
Copper	mg/L	-	0.0022[(a)]	0.0070[(a)]	-	0.3	0.00036 - 0.0012	0.00066	0.00067	0.00066	0.00073	0.00064	0.00095	0.00081	0.00068	0.00062	0.00096	0.00121	0.00067	0.00192	0.00094	0.0009
round sample-specific pH	pH units							7.7	7.8	7.6	7.5	7.7	7.8	7.3	7.8	7.7	7.6	7.9	7.6	7.6	7.8	7.9
rounded sample-specific DOC	mg/L							2	2	1.5	2	2	2	1.5	2	2	1.5	1.5	1.5	1.5	1.5	1.5
rounded sample-specific Hardness	mg/L							50	50	50	50	50	50	50	50	40	50	50	50	50	50	50
Chronic guideline from lookup table	mg/L						0.00036 - 0.0012	0.000723058	0.000795564	0.000488828	0.00058224	0.000723058	0.000795564	0.000339113	0.000795564	0.000684136	0.000488828	0.000652109	0.000488828	0.000488828	0.000597142	0.000652109
Acute guideline from lookup table	mg/L						0.0022 - 0.007	0.004319222	0.004754194	0.002922449	0.003484227	0.004319222	0.004754194	0.002049549	0.004754194	0.004085372	0.002922449	0.003903631	0.002922449	0.002922449	0.003569061	0.003903631

Notes

Values are taken from the approved guidelines unless otherwise noted.

W = working guideline; M = interim guideline, Min = Minimum concentration requirement based on life stage.

Guidelines based on toxicity modifying factors are presented based on the mean baseline values (hardness of 54 mg/L, pH of 7.8, DOC 2.2 mg/L, temperature of 7 oC, and chloride of 0.50 mg/L) in Quesnel Lake, considered representative of average conditions in the receiving environment.

Shaded values indicates concentrations exceed the most conservative guideline of each maximum and chronic WQG for ecological receptors.

a) hardness, dissolved organic carbon, and pH dependent copper guideline selected from BC ENV copper guideline lookup table.

- = no guideline or no data; BC WQGs = British Columbia water quality guidelines; $CaCO_3$ = calcium carbonate; FDA = field duplicate available; FD = field duplicate; mg/L = milligrams per litre; QA/QC = quality assurance/quality control.

Table 2-4D: Copper Screening at Initial Dilution Zone Locations from 2015 to 2023
Mount Polley Mine

Location Type Station Sample Point Date Parameter	Unit	BC ENV Drinking Water Screening Criteria	BC ENV Guideline for the Protection of Aquatic Life		BC ENV Guideline for the Protection of Wildlife Life		Selected Screening Criteria	Quesnel Lake QUL-58 QUL-58-MP 2018-10-11	Quesnel Lake QUL-58 QUL-58-MP 2019-05-15	Quesnel Lake QUL-58 QUL-58-MP 2019-10-30	Quesnel Lake QUL-58 QUL-58-MP 2020-09-16	Quesnel Lake QUL-58 QUL-58-MP 2021-05-19	Quesnel Lake QUL-58 QUL-58-MP 2021-07-21	Quesnel Lake QUL-58 QUL-58-MP 2021-09-16	Quesnel Lake QUL-58 QUL-58-MP 2021-10-27	Quesnel Lake QUL-58 QUL-58-MP 2022-06-27	Quesnel Lake QUL-58 QUL-58-MP 2022-08-16	Quesnel Lake QUL-58 QUL-58-MP 2022-10-19	Quesnel Lake QUL-58 QUL-58-S 2015-11-05	Quesnel Lake QUL-58 QUL-58-S 2015-11-30	Quesnel Lake QUL-58 QUL-58-S 2015-12-02	Quesnel Lake QUL-58 QUL-58-S 2015-12-09
			Long-Term Chronic	Short-Term Acute	Long-Term Chronic	Short-Term Acute																
Field Parameters																						
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	7.43	7.74	7.75	7.88	8.5	7.57	8.56	7.64	7.79	7.68	7.57	-	-	7.72	7.74
Conventional Parameters																						
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	7.87	7.98	7.86	7.91	7.87	7.87	7.86	7.95	7.88	7.93	7.88	8.01	7.76	7.45	7.82
Hardness, as CaCO3	mg/L	-	-	-	-	-	-	51.6	54.3	52.5	56.7	54.4	53.4	53.9	59	55.6	56.3	56.2	52.8	53.9	52.9	53.6
Dissolved organic carbon	mg/L	-	-	-	-	-	-	1.22	1.78	1.94	2.06	2.21	2.13	1.86	1.78	2.35	2.09	2.09	1.67	1.83	1.58	1.52
Dissolved Metals																						
Copper	mg/L	-	0.0022[(a)]	0.0070[(a)]	-	0.3	0.00036 - 0.0012	0.00071	0.00066	0.00051	0.00077	0.00078	0.0006	0.00063	0.00076	0.00058	0.00071	0.00062	<0.00050	0.00067	0.00073	0.00077
round sample-specific pH	pH units							7.4	7.7	7.7	7.8	8.5	7.5	8.5	7.6	7.7	7.6	7.5	8	7.7	7.7	7.7
rounded sample-specific DOC	mg/L							1	1.5	1.5	2	2	2	1.5	1.5	2	2	2	1.5	1.5	1.5	1.5
rounded sample-specific Hardness	mg/L							50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
Chronic guideline from lookup table	mg/L						0.00036 - 0.0012	0.000258009	0.000542683	0.000542683	0.000795564	0.001199971	0.00058224	0.000907469	0.000488828	0.000723058	0.000651696	0.00058224	0.000706981	0.000542683	0.000542683	0.000542683
Acute guideline from lookup table	mg/L						0.0022 - 0.007	0.001550046	0.003242435	0.003242435	0.004754194	0.007227087	0.003484227	0.005469086	0.002922449	0.004319222	0.003894099	0.003484227	0.004238518	0.003242435	0.003242435	0.003242435

Notes

Values are taken from the approved guidelines unless otherwise noted.

W = working guideline; M = interim guideline, Min = Minimum concentration requirement based on life stage.

Guidelines based on toxicity modifying factors are presented based on the mean baseline values (hardness of 54 mg/L, pH of 7.8, DOC 2.2 mg/L, temperature of 7 oC, and chloride of 0.50 mg/L) in Quesnel Lake, considered representative of average conditions in the receiving environment.

Shaded values indicates concentrations exceed the most conservative guideline of each maximum and chronic WQG for ecological receptors.

a) hardness, dissolved organic carbon, and pH dependent copper guideline selected from BC ENV copper guideline lookup table.

- = no guideline or no data; BC WQGs = British Columbia water quality guidelines; $CaCO_3$ = calcium carbonate; FDA = field duplicate available; FD = field duplicate; mg/L = milligrams per litre; QA/QC = quality assurance/quality control.

Table 2-4D: Copper Screening at Initial Dilution Zone Locations from 2015 to 2023
Mount Polley Mine

Location Type Station Sample Point Date Parameter	Unit	BC ENV Drinking Water Screening Criteria	BC ENV Guideline for the Protection of Aquatic Life		BC ENV Guideline for the Protection of Wildlife Life		Selected Screening Criteria	Quesnel Lake QUL-58 QUL-58-S 2015-12-14	Quesnel Lake QUL-58 QUL-58-S 2015-12-21	Quesnel Lake QUL-58 QUL-58-S 2015-12-30	Quesnel Lake QUL-58 QUL-58-S 2016-01-25	Quesnel Lake QUL-58 QUL-58-S 2016-02-23	Quesnel Lake QUL-58 QUL-58-S 2016-03-28	Quesnel Lake QUL-58 QUL-58-S 2016-04-11	Quesnel Lake QUL-58 QUL-58-S 2016-04-27	Quesnel Lake QUL-58 QUL-58-S 2016-05-05	Quesnel Lake QUL-58 QUL-58-S 2016-05-10	Quesnel Lake QUL-58 QUL-58-S 2016-05-17	Quesnel Lake QUL-58 QUL-58-S 2016-05-25	Quesnel Lake QUL-58 QUL-58-S 2016-06-07	Quesnel Lake QUL-58 QUL-58-S 2016-06-20	Quesnel Lake QUL-58 QUL-58-S 2016-06-28
			Long-Term Chronic	Short-Term Acute	Long-Term Chronic	Short-Term Acute															
Field Parameters																					
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	6.99	7.67	7.38	7.91	7.77	7.95	7.78	8.09	7.99	7.55	7.52	7.44	7.92	8.12	7.82
Conventional Parameters																						
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	7.86	7.86	7.77	7.85	7.81	7.83	7.95	7.89	7.95	7.84	7.94	7.35	7.82	7.88	7.85
Hardness, as CaCO3	mg/L	-	-	-	-	-	-	56.8	54.9	53.1	55.4	54	53.4	54	53.7	53.6	54.7	50.8	51.6	51.3	48.2	48
Dissolved organic carbon	mg/L	-	-	-	-	-	-	1.64	1.68	1.65	1.67	1.5	1.53	1.94	1.88	2.03	1.8	1.97	2.12	1.92	1.96	2.23
Dissolved Metals																						
Copper	mg/L	-	0.0022[(a)]	0.0070[(a)]	-	0.3	0.00036 - 0.0012	0.00079	0.00078	0.00082	0.00077	0.00076	0.0008	0.00091	0.00076	0.00076	0.00081	0.00083	0.00066	0.00066	0.00057	0.00067
round sample-specific pH	pH units							7.1	7.6	7.3	7.9	7.7	7.9	7.7	8	7.9	7.5	7.5	7.4	7.9	8.1	7.8
rounded sample-specific DOC	mg/L							1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	2	1.5	1.5	2	1.5	1.5	2
rounded sample-specific Hardness	mg/L							50	50	50	50	50	50	50	50	50	50	50	50	50	40	40
Chronic guideline from lookup table	mg/L						0.00036 - 0.0012	0.000252891	0.000488828	0.000339113	0.000652109	0.000542683	0.000652109	0.000542683	0.000706981	0.000868515	0.000436942	0.000436942	0.000515485	0.000652109	0.000705774	0.000752607
Acute guideline from lookup table	mg/L						0.0022 - 0.007	0.001558529	0.002922449	0.002049549	0.003903631	0.003242435	0.003903631	0.003242435	0.004238518	0.005198063	0.002614473	0.002614473	0.003097836	0.003903631	0.004251227	0.00449715

Notes

Values are taken from the approved guidelines unless otherwise noted.

W = working guideline; M = interim guideline, Min = Minimum concentration requirement based on life stage.

Guidelines based on toxicity modifying factors are presented based on the mean baseline values (hardness of 54 mg/L, pH of 7.8, DOC 2.2 mg/L, temperature of 7 oC, and chloride of 0.50 mg/L) in Quesnel Lake, considered representative of average conditions in the receiving environment.

Shaded values indicates concentrations exceed the most conservative guideline of each maximum and chronic WQG for ecological receptors.

a) hardness, dissolved organic carbon, and pH dependent copper guideline selected from BC ENV copper guideline lookup table.

- = no guideline or no data; BC WQGs = British Columbia water quality guidelines; $CaCO_3$ = calcium carbonate; FDA = field duplicate available; FD = field duplicate; mg/L = milligrams per litre; QA/QC = quality assurance/quality control.

Table 2-4D: Copper Screening at Initial Dilution Zone Locations from 2015 to 2023
Mount Polley Mine

Location Type Station Sample Point Date Parameter	Unit	BC ENV Drinking Water Screening Criteria	BC ENV Guideline for the Protection of Aquatic Life		BC ENV Guideline for the Protection of Wildlife Life		Selected Screening Criteria	Quesnel Lake QUL-58 QUL-58-S 2016-07-06	Quesnel Lake QUL-58 QUL-58-S 2016-08-01	Quesnel Lake QUL-58 QUL-58-S 2016-09-05	Quesnel Lake QUL-58 QUL-58-S 2016-10-05	Quesnel Lake QUL-58 QUL-58-S 2016-11-09	Quesnel Lake QUL-58 QUL-58-S 2016-11-16	Quesnel Lake QUL-58 QUL-58-S 2016-11-30	Quesnel Lake QUL-58 QUL-58-S 2017-02-02	Quesnel Lake QUL-58 QUL-58-S 2017-03-06	Quesnel Lake QUL-58 QUL-58-S 2017-04-10	Quesnel Lake QUL-58 QUL-58-S 2017-05-09	Quesnel Lake QUL-58 QUL-58-S 2017-05-15	Quesnel Lake QUL-58 QUL-58-S 2017-05-22	Quesnel Lake QUL-58 QUL-58-S 2017-05-29	Quesnel Lake QUL-58 QUL-58-S 2017-06-05
			Long-Term Chronic	Short-Term Acute	Long-Term Chronic	Short-Term Acute																
Field Parameters																						
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	8.06	7.83	7.97	-	-	7.39	7.49	7.67	7.82	7.27	7.42	7.48	7.34	7.36	7.71
Conventional Parameters																						
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	7.79	7.74	7.98	7.87	7.85	7.83	7.79	7.9	7.9	7.92	7.82	7.93	7.94	7.91	7.86
Hardness, as CaCO3	mg/L	-	-	-	-	-	-	46.7	48.9	50	51.2	51.1	47.5	52.5	58.8	70.2	54.5	53.8	53.9	51.2	51.4	48.1
Dissolved organic carbon	mg/L	-	-	-	-	-	-	2.04	2.27	1.82	1.85	1.9	1.97	2.11	1.94	2.01	2.35	2	2.26	2.02	1.9	2.56
Dissolved Metals																						
Copper	mg/L	-	0.0022[(a)]	0.0070[(a)]	-	0.3	0.00036 - 0.0012	0.00061	0.00052	<0.00050	<0.00050	0.0005	0.00051	0.00137	0.00066	0.00085	0.00092	0.00091	0.00078	0.00069	0.00067	0.00072
round sample-specific pH	pH units							8	7.8	7.9	7.8	7.8	7.3	7.4	7.6	7.8	7.2	7.4	7.4	7.3	7.3	7.7
rounded sample-specific DOC	mg/L							2	2	1.5	1.5	1.5	1.5	2	1.5	2	2	2	2	2	1.5	2.5
rounded sample-specific Hardness	mg/L							40	40	50	50	50	40	50	50	70	50	50	50	50	50	40
Chronic guideline from lookup table	mg/L						0.00036 - 0.0012	0.0008885	0.000752607	0.000652109	0.000597142	0.000597142	0.0003197	0.000515485	0.000488828	0.000871311	0.000392778	0.000515485	0.000515485	0.00045232	0.000339113	0.00085517
Acute guideline from lookup table	mg/L						0.0022 - 0.007	0.005333098	0.00449715	0.003903631	0.003569061	0.003569061	0.001933609	0.003097836	0.002922449	0.005196156	0.002391649	0.003097836	0.003097836	0.002732256	0.002049549	0.005106874

Notes

Values are taken from the approved guidelines unless otherwise noted.

W = working guideline; M = interim guideline, Min = Minimum concentration requirement based on life stage.

Guidelines based on toxicity modifying factors are presented based on the mean baseline values (hardness of 54 mg/L, pH of 7.8, DOC 2.2 mg/L, temperature of 7 oC, and chloride of 0.50 mg/L) in Quesnel Lake, considered representative of average conditions in the receiving environment.

Shaded values indicates concentrations exceed the most conservative guideline of each maximum and chronic WQG for ecological receptors.

a) hardness, dissolved organic carbon, and pH dependent copper guideline selected from BC ENV copper guideline lookup table.

- = no guideline or no data; BC WQGs = British Columbia water quality guidelines; $CaCO_3$ = calcium carbonate; FDA = field duplicate available; FD = field duplicate; mg/L = milligrams per litre; QA/QC = quality assurance/quality control.

Table 2-4D: Copper Screening at Initial Dilution Zone Locations from 2015 to 2023
Mount Polley Mine

Location Type Station Sample Point Date Parameter	Unit	BC ENV Drinking Water Screening Criteria	BC ENV Guideline for the Protection of Aquatic Life		BC ENV Guideline for the Protection of Wildlife Life		Selected Screening Criteria	Quesnel Lake QUL-58 QUL-58-S 2017-06-12	Quesnel Lake QUL-58 QUL-58-S 2017-06-19	Quesnel Lake QUL-58 QUL-58-S 2017-06-27	Quesnel Lake QUL-58 QUL-58-S 2017-08-22	Quesnel Lake QUL-58 QUL-58-S 2017-10-01	Quesnel Lake QUL-58 QUL-58-S 2017-10-26	Quesnel Lake QUL-58 QUL-58-S 2017-11-20	Quesnel Lake QUL-58 QUL-58-S 2018-01-04	Quesnel Lake QUL-58 QUL-58-S 2018-01-10	Quesnel Lake QUL-58 QUL-58-S 2018-01-18	Quesnel Lake QUL-58 QUL-58-S 2018-01-31	Quesnel Lake QUL-58 QUL-58-S 2018-05-03	Quesnel Lake QUL-58 QUL-58-S 2018-05-13	Quesnel Lake QUL-58 QUL-58-S 2018-05-22	Quesnel Lake QUL-58 QUL-58-S 2018-06-04
			Long-Term Chronic	Short-Term Acute	Long-Term Chronic	Short-Term Acute																	
Field Parameters																							
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	7.79	7.76	7.81	8.13	-	8.13	-	7.79	-	7.53	-	6.83	7.7	7.22	7.45
Conventional Parameters																							
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	8	7.84	7.88	7.94	7.93	7.94	7.94	7.87	7.78	7.63	7.96	7.86	7.92	7.86	7.87
Hardness, as CaCO3	mg/L	-	-	-	-	-	-	48.2	48.4	49.6	50	51	48.4	52	53.5	50.7	54.4	54.2	51.7	42.9	51.7	47.9
Dissolved organic carbon	mg/L	-	-	-	-	-	-	2	1.92	2.05	2.12	1.58	1.92	1.55	1.6	1.69	1.72	1.69	1.99	8.61	2.38	2.38
Dissolved Metals																							
Copper	mg/L	-	0.0022[(a)]	0.0070[(a)]	-	0.3	0.00036 - 0.0012	0.00071	0.00059	0.00069	0.00084	<0.00050	<0.00050	0.00057	0.00064	0.00067	0.00057	0.00067	0.00077	0.00175	0.00085	0.00072
round sample-specific pH	pH units							7.7	7.7	7.8	8.1	7.9	8.1	7.9	7.7	7.7	7.5	7.9	7.1	7.7	7.2	7.4
rounded sample-specific DOC	mg/L							2	1.5	2	2	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	8.5	2	2
rounded sample-specific Hardness	mg/L							40	40	40	50	50	40	50	50	50	50	50	50	40	50	40
Chronic guideline from lookup table	mg/L						0.00036 - 0.0012	0.000684136	0.000513293	0.000752607	0.001012161	0.000652109	0.000705774	0.000652109	0.000542683	0.000542683	0.000436942	0.000652109	0.000252891	0.002905768	0.000392778	0.000486699
Acute guideline from lookup table	mg/L						0.0022 - 0.007	0.004085372	0.00306638	0.00449715	0.006074998	0.003903631	0.004251227	0.003903631	0.003242435	0.003242435	0.002614473	0.003903631	0.001558529	0.017281335	0.002391649	0.00292588

Notes

Values are taken from the approved guidelines unless otherwise noted.

W = working guideline; M = interim guideline, Min = Minimum concentration requirement based on life stage.

Guidelines based on toxicity modifying factors are presented based on the mean baseline values (hardness of 54 mg/L, pH of 7.8, DOC 2.2 mg/L, temperature of 7 oC, and chloride of 0.50 mg/L) in Quesnel Lake, considered representative of average conditions in the receiving environment.

Shaded values indicates concentrations exceed the most conservative guideline of each maximum and chronic WQG for ecological receptors.

a) hardness, dissolved organic carbon, and pH dependent copper guideline selected from BC ENV copper guideline lookup table.

- = no guideline or no data; BC WQGs = British Columbia water quality guidelines; $CaCO_3$ = calcium carbonate; FDA = field duplicate available; FD = field duplicate; mg/L = milligrams per litre; QA/QC = quality assurance/quality control.

Table 2-4D: Copper Screening at Initial Dilution Zone Locations from 2015 to 2023
Mount Polley Mine

Location Type / Station / Sample Point / Date / Parameter	Unit	BC ENV Drinking Water Screening Criteria	BC ENV Guideline for the Protection of Aquatic Life		BC ENV Guideline for the Protection of Wildlife Life		Selected Screening Criteria	Quesnel Lake QUL-58 QUL-58-S 2018-06-13	Quesnel Lake QUL-58 QUL-58-S 2018-06-18	Quesnel Lake QUL-58 QUL-58-S 2018-06-27	Quesnel Lake QUL-58 QUL-58-S 2018-07-02	Quesnel Lake QUL-58 QUL-58-S 2018-08-23	Quesnel Lake QUL-58 QUL-58-S 2018-09-04	Quesnel Lake QUL-58 QUL-58-S 2018-10-11	Quesnel Lake QUL-58 QUL-58-S 2018-10-18	Quesnel Lake QUL-58 QUL-58-S 2018-10-24	Quesnel Lake QUL-58 QUL-58-S 2018-10-29	Quesnel Lake QUL-58 QUL-58-S 2018-11-07	Quesnel Lake QUL-58 QUL-58-S 2018-12-18	Quesnel Lake QUL-58 QUL-58-S 2019-02-26	Quesnel Lake QUL-58 QUL-58-S 2019-03-05	Quesnel Lake QUL-58 QUL-58-S 2019-04-25
			Long-Term Chronic	Short-Term Acute	Long-Term Chronic	Short-Term Acute																
Field Parameters																						
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	7.71	7.6	7.86	7.51	7.93	7.85	7.55	7.9	7.57	7.62	7.71	7.84	8	7.8	7.82
Conventional Parameters																						
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	7.88	7.92	7.89	7.96	7.93	8	7.95	7.86	7.97	7.83	7.95	7.94	7.96	7.87	7.82
Hardness, as CaCO3	mg/L	-	-	-	-	-	-	49.4	49.6	48.8	51	48.6	49.6	49.6	51.7	53.4	50.7	58	55.2	55.4	57.8	57.3
Dissolved organic carbon	mg/L	-	-	-	-	-	-	2.3	2.47	2.15	2.2	1.78	1.73	1.16	1.67	1.86	1.86	1.6	1.65	1.61	1.84	2.04
Dissolved Metals																						
Copper	mg/L	-	0.0022[(a)]	0.0070[(a)]	-	0.3	0.00036 - 0.0012	0.00085	0.0007	0.00056	0.00064	<0.00050	0.00051	<0.00050	<0.00050	0.00053	0.00161	0.00074	0.00066	0.00056	0.00066	0.00064
round sample-specific pH	pH units							7.7	7.6	7.8	7.5	7.9	7.8	7.5	7.9	7.5	7.6	7.7	7.8	8	7.8	7.8
rounded sample-specific DOC	mg/L							2	2	2	2	1.5	1.5	1	1.5	1.5	1.5	1.5	1.5	1.5	1.5	2
rounded sample-specific Hardness	mg/L							40	40	40	50	40	40	40	50	50	50	50	50	50	50	50
Chronic guideline from lookup table	mg/L						0.00036 - 0.0012	0.000684136	0.000616523	0.000752607	0.00058224	0.000616333	0.00056486	0.000275297	0.000652109	0.000436942	0.000488828	0.000542683	0.000597142	0.000706981	0.000597142	0.000795564
Acute guideline from lookup table	mg/L						0.0022 - 0.007	0.004085372	0.003681855	0.00449715	0.003484227	0.003692658	0.003375881	0.00164905	0.003903631	0.002614473	0.002922449	0.003242435	0.003569061	0.004238518	0.003569061	0.004754194

Notes

Values are taken from the approved guidelines unless otherwise noted.

W = working guideline; M = interim guideline, Min = Minimum concentration requirement based on life stage.

Guidelines based on toxicity modifying factors are presented based on the mean baseline values (hardness of 54 mg/L, pH of 7.8, DOC 2.2 mg/L, temperature of 7 oC, and chloride of 0.50 mg/L) in Quesnel Lake, considered representative of average conditions in the receiving environment.

Shaded values indicates concentrations exceed the most conservative guideline of each maximum and chronic WQG for ecological receptors.

a) hardness, dissolved organic carbon, and pH dependent copper guideline selected from BC ENV copper guideline lookup table.

- = no guideline or no data; BC WQGs = British Columbia water quality guidelines; $CaCO_3$ = calcium carbonate; FDA = field duplicate available; FD = field duplicate; mg/L = milligrams per litre; QA/QC = quality assurance/quality control.

Table 2-4D: Copper Screening at Initial Dilution Zone Locations from 2015 to 2023
Mount Polley Mine

Location Type Station Sample Point Date Parameter	Unit	BC ENV Drinking Water Screening Criteria	BC ENV Guideline for the Protection of Aquatic Life		BC ENV Guideline for the Protection of Wildlife Life		Selected Screening Criteria	Quesnel Lake QUL-58 QUL-58-S 2019-05-02	Quesnel Lake QUL-58 QUL-58-S 2019-05-08	Quesnel Lake QUL-58 QUL-58-S 2019-05-15	Quesnel Lake QUL-58 QUL-58-S 2019-05-21	Quesnel Lake QUL-58 QUL-58-S 2019-06-18	Quesnel Lake QUL-58 QUL-58-S 2019-06-19	Quesnel Lake QUL-58 QUL-58-S 2019-07-11	Quesnel Lake QUL-58 QUL-58-S 2019-07-25	Quesnel Lake QUL-58 QUL-58-S 2019-08-20	Quesnel Lake QUL-58 QUL-58-S 2019-10-30	Quesnel Lake QUL-58 QUL-58-S 2020-06-02	Quesnel Lake QUL-58 QUL-58-S 2020-06-09	Quesnel Lake QUL-58 QUL-58-S 2020-06-16	Quesnel Lake QUL-58 QUL-58-S 2020-06-24	Quesnel Lake QUL-58 QUL-58-S 2020-06-29
			Long-Term Chronic	Short-Term Acute	Long-Term Chronic	Short-Term Acute																	
Field Parameters																							
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	7.78	7.92	7.83	7.53	7.95	7.85	7.68	8.12	7.96	7.8	7.82	7.39	7.74	7.45	7.65
Conventional Parameters																							
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	7.89	7.86	7.93	8.03	8.01	8.01	7.9	7.89	7.96	7.91	7.87	7.83	7.8	7.74	7.83
Hardness, as CaCO3	mg/L	-	-	-	-	-	-	55	55.7	54	54.6	48.5	53.6	51.4	49.8	46.3	50.1	55.5	51.7	54.1	47.1	51.5
Dissolved organic carbon	mg/L	-	-	-	-	-	-	1.81	2.11	2.64	6.32	1.9	1.8	1.91	2.46	2.05	2.04	4.7	4.45	3.94	2.67	2.99
Dissolved Metals																							
Copper	mg/L	-	0.0022[(a)]	0.0070[(a)]	-	0.3	0.00036 - 0.0012	0.00061	0.00053	0.00056	0.00139	<0.00050	<0.00050	<0.00050	0.00055	<0.00050	<0.00050	0.00112	0.00091	0.00111	<0.00050	0.00064
round sample-specific pH	pH units							7.7	7.9	7.8	7.5	7.9	7.8	7.6	8.1	7.9	7.8	7.8	7.3	7.7	7.4	7.6
rounded sample-specific DOC	mg/L							1.5	2	2.5	6	1.5	1.5	1.5	2	2	2	4.5	4	3.5	2.5	2.5
rounded sample-specific Hardness	mg/L							50	50	50	50	40	50	50	40	40	50	50	50	50	40	50
Chronic guideline from lookup table	mg/L						0.00036 - 0.0012	0.000542683	0.000868515	0.000994082	0.001748722	0.000616333	0.000597142	0.000488828	0.000939083	0.000821014	0.000795564	0.001787072	0.000905435	0.001264152	0.000608802	0.00081466
Acute guideline from lookup table	mg/L						0.0022 - 0.007	0.003242435	0.005198063	0.005935196	0.010435842	0.003692658	0.003569061	0.002922449	0.005654005	0.004917189	0.004754194	0.010664925	0.005466862	0.0075499	0.003656755	0.004866035

Notes

Values are taken from the approved guidelines unless otherwise noted.

W = working guideline; M = interim guideline, Min = Minimum concentration requirement based on life stage.

Guidelines based on toxicity modifying factors are presented based on the mean baseline values (hardness of 54 mg/L, pH of 7.8, DOC 2.2 mg/L, temperature of 7 oC, and chloride of 0.50 mg/L) in Quesnel Lake, considered representative of average conditions in the receiving environment.

Shaded values indicates concentrations exceed the most conservative guideline of each maximum and chronic WQG for ecological receptors.

a) hardness, dissolved organic carbon, and pH dependent copper guideline selected from BC ENV copper guideline lookup table.

- = no guideline or no data; BC WQGs = British Columbia water quality guidelines; $CaCO_3$ = calcium carbonate; FDA = field duplicate available; FD = field duplicate; mg/L = milligrams per litre; QA/QC = quality assurance/quality control.

Table 2-4D: Copper Screening at Initial Dilution Zone Locations from 2015 to 2023
Mount Polley Mine

Location Type Station Sample Point Date Parameter	Unit	BC ENV Drinking Water Screening Criteria	BC ENV Guideline for the Protection of Aquatic Life		BC ENV Guideline for the Protection of Wildlife Life		Selected Screening Criteria	Quesnel Lake QUL-58 QUL-58-S 2020-07-21	Quesnel Lake QUL-58 QUL-58-S 2020-08-11	Quesnel Lake QUL-58 QUL-58-S 2020-09-16	Quesnel Lake QUL-58 QUL-58-S 2020-11-04	Quesnel Lake QUL-58 QUL-58-S 2021-05-04	Quesnel Lake QUL-58 QUL-58-S 2021-05-11	Quesnel Lake QUL-58 QUL-58-S 2021-05-25	Quesnel Lake QUL-58 QUL-58-S 2021-06-02	Quesnel Lake QUL-58 QUL-58-S 2021-07-21	Quesnel Lake QUL-58 QUL-58-S 2021-09-16	Quesnel Lake QUL-58 QUL-58-S 2021-10-27	Quesnel Lake QUL-58 QUL-58-S 2022-05-09	Quesnel Lake QUL-58 QUL-58-S 2022-05-18	Quesnel Lake QUL-58 QUL-58-S 2022-05-25	Quesnel Lake QUL-58 QUL-58-S 2022-05-31
Field Parameters																						
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	-	7.76	8.15	7.92	7.77	7.79	7.86	7.75	7.92	8.52	7.9	7.76	8.24	7.44	8.03
Conventional Parameters																						
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	7.4	7.9	7.93	7.84	7.93	7.97	7.85	7.88	7.94	7.9	7.95	7.9	7.89	7.87	7.98
Hardness, as CaCO3	mg/L	-	-	-	-	-	-	47	45.2	52.2	53.2	55.3	52	53.4	52.8	46.4	52.1	54.1	54.1	57.4	51.5	56.7
Dissolved organic carbon	mg/L	-	-	-	-	-	-	4.12	3.19	2.36	13.1	2.43	2.22	2.2	4.44	2.26	1.75	1.73	2.2	2.15	2.37	7.4
Dissolved Metals																						
Copper	mg/L	-	0.0022[(a)]	0.0070[(a)]	-	0.3	0.00036 - 0.0012	0.00084	0.0007	0.00069	0.00051	0.00058	0.00068	0.00063	0.0012	0.00057	<0.00050	<0.00050	0.00087	0.00094	0.00092	0.00163
round sample-specific pH	pH units							7.4	7.7	8.1	7.9	7.7	7.7	7.8	7.7	7.9	8.5	7.9	7.7	8.2	7.4	8
rounded sample-specific DOC	mg/L							4	3	2	13	2	2	2	4	2	1.5	1.5	2	2	2	7
rounded sample-specific Hardness	mg/L							40	40	50	50	50	50	50	50	40	50	50	50	50	50	50
Chronic guideline from lookup table	mg/L						0.00036 - 0.0012	0.000975272	0.0010263	0.001012161	0.005595543	0.000723058	0.000723058	0.000795564	0.001445004	0.000821014	0.000907469	0.000652109	0.000723058	0.001064586	0.000515485	0.003270395
Acute guideline from lookup table	mg/L						0.0022 - 0.007	0.005853858	0.006127105	0.006074998	0.033336232	0.004319222	0.004319222	0.004754194	0.008619379	0.004917189	0.005469086	0.003903631	0.004319222	0.006394952	0.003097836	0.019545796

Notes

Values are taken from the approved guidelines unless otherwise noted.

W = working guideline; M = interim guideline, Min = Minimum concentration requirement based on life stage.

Guidelines based on toxicity modifying factors are presented based on the mean baseline values (hardness of 54 mg/L, pH of 7.8, DOC 2.2 mg/L, temperature of 7 oC, and chloride of 0.50 mg/L) in Quesnel Lake, considered representative of average conditions in the receiving environment.

Shaded values indicates concentrations exceed the most conservative guideline of each maximum and chronic WQG for ecological receptors.

a) hardness, dissolved organic carbon, and pH dependent copper guideline selected from BC ENV copper guideline lookup table.

- = no guideline or no data; BC WQGs = British Columbia water quality guidelines; $CaCO_3$ = calcium carbonate; FDA = field duplicate available; FD = field duplicate; mg/L = milligrams per litre; QA/QC = quality assurance/quality control.

Table 2-4D: Copper Screening at Initial Dilution Zone Locations from 2015 to 2023
Mount Polley Mine

Location Type Station Sample Point Date Parameter	Unit	BC ENV Drinking Water Screening Criteria	BC ENV Guideline for the Protection of Aquatic Life		BC ENV Guideline for the Protection of Wildlife Life		Selected Screening Criteria	Quesnel Lake QUL-58 QUL-58-S 2022-06-06	Quesnel Lake QUL-58 QUL-58-S 2022-06-27	Quesnel Lake QUL-58 QUL-58-S 2022-08-16	Quesnel Lake QUL-58 QUL-58-S 2022-10-19	Quesnel Lake QUL-59 QUL-59-AP 2020-09-16	Quesnel Lake QUL-59 QUL-59-AP 2021-07-21	Quesnel Lake QUL-59 QUL-59-AP 2021-09-16	Quesnel Lake QUL-59 QUL-59-AP 2021-10-27	Quesnel Lake QUL-59 QUL-59-AP 2022-08-16	Quesnel Lake QUL-59 QUL-59-AP 2022-10-19	Quesnel Lake QUL-59 QUL-59-AT 2019-05-08	Quesnel Lake QUL-59 QUL-59-AT 2019-05-15	Quesnel Lake QUL-59 QUL-59-AT 2019-06-18	Quesnel Lake QUL-59 QUL-59-AT 2019-08-20	Quesnel Lake QUL-59 QUL-59-AT 2020-06-24
			Long-Term Chronic	Short-Term Acute	Long-Term Chronic	Short-Term Acute																
Field Parameters																						
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	-	7.87	8.06	8.06	8.19	7.8	8.25	7.83	7.72	7.88	7.88	7.7	7.95	7.87	7.59
Conventional Parameters																						
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	7.71	7.83	7.89	7.85	7.94	7.91	7.91	7.94	7.92	7.88	7.87	7.97	7.99	7.95	7.8
Hardness, as CaCO3	mg/L	-	-	-	-	-	-	48.8	50.5	46.8	52.4	52.3	48.5	52.9	55.2	53.7	52.5	58.1	54.2	49.9	47.3	47
Dissolved organic carbon	mg/L	-	-	-	-	-	-	2.56	3.65	2.17	2.08	2.11	1.92	1.75	1.61	2.07	2.09	2.02	1.99	1.82	2.24	2.76
Dissolved Metals																						
Copper	mg/L	-	0.0022[(a)]	0.0070[(a)]	-	0.3	0.00036 - 0.0012	0.00072	0.00095	0.00053	0.00053	0.00064	<0.00050	<0.00050	<0.00050	0.00077	<0.00050	0.00082	0.0006	0.0005	<0.00050	0.00054
round sample-specific pH	pH units							7.7	7.8	8	8	8.1	7.8	8.2	7.8	7.7	7.8	7.8	7.7	7.9	7.8	7.5
rounded sample-specific DOC	mg/L							2.5	3.5	2	2	2	1.5	1.5	1.5	2	2	2	1.5	1.5	2	2.5
rounded sample-specific Hardness	mg/L							40	50	40	50	50	40	50	50	50	50	50	50	40	40	40
Chronic guideline from lookup table	mg/L						0.00036 - 0.0012	0.00085517	0.001390164	0.0008885	0.000941116	0.001012161	0.00056486	0.000801029	0.000597142	0.000723058	0.000795564	0.000795564	0.000542683	0.000616333	0.000752607	0.000688298
Acute guideline from lookup table	mg/L						0.0022 - 0.007	0.005106874	0.008303874	0.005333098	0.005637483	0.006074998	0.003375881	0.00481488	0.003569061	0.004319222	0.004754194	0.004754194	0.003242435	0.003692658	0.00449715	0.004118099

Notes

Values are taken from the approved guidelines unless otherwise noted.

W = working guideline; M = interim guideline, Min = Minimum concentration requirement based on life stage.

Guidelines based on toxicity modifying factors are presented based on the mean baseline values (hardness of 54 mg/L, pH of 7.8, DOC 2.2 mg/L, temperature of 7 oC, and chloride of 0.50 mg/L) in Quesnel Lake, considered representative of average conditions in the receiving environment.

Shaded values indicates concentrations exceed the most conservative guideline of each maximum and chronic WQG for ecological receptors.

a) hardness, dissolved organic carbon, and pH dependent copper guideline selected from BC ENV copper guideline lookup table.

- = no guideline or no data; BC WQGs = British Columbia water quality guidelines; $CaCO_3$ = calcium carbonate; FDA = field duplicate available; FD = field duplicate; mg/L = milligrams per litre; QA/QC = quality assurance/quality control.

Table 2-4D: Copper Screening at Initial Dilution Zone Locations from 2015 to 2023
Mount Polley Mine

Location Type Station Sample Point Date Parameter	Unit	BC ENV Drinking Water Screening Criteria	BC ENV Guideline for the Protection of Aquatic Life		BC ENV Guideline for the Protection of Wildlife Life		Selected Screening Criteria	Quesnel Lake QUL-59 QUL-59-AT 2020-08-11	Quesnel Lake QUL-59 QUL-59-AT 2022-06-27	Quesnel Lake QUL-59 QUL-59-B 2015-12-09	Quesnel Lake QUL-59 QUL-59-B 2015-12-14	Quesnel Lake QUL-59 QUL-59-B 2015-12-21	Quesnel Lake QUL-59 QUL-59-B 2016-01-25	Quesnel Lake QUL-59 QUL-59-B 2016-03-28	Quesnel Lake QUL-59 QUL-59-B 2016-05-17	Quesnel Lake QUL-59 QUL-59-B 2018-06-04	Quesnel Lake QUL-59 QUL-59-B 2019-04-25	Quesnel Lake QUL-59 QUL-59-B 2019-05-02	Quesnel Lake QUL-59 QUL-59-B 2019-05-08	Quesnel Lake QUL-59 QUL-59-B 2019-05-15	Quesnel Lake QUL-59 QUL-59-B 2019-06-18	Quesnel Lake QUL-59 QUL-59-B 2019-08-20
			Long-Term Chronic	Short-Term Acute	Long-Term Chronic	Short-Term Acute																
Field Parameters																						
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	7.95	8.05	7.85	7.78	7.68	7.86	7.96	7.66	7.48	7.78	-	7.85	-	7.69	7.44
Conventional Parameters																						
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	7.81	7.87	7.8	7.85	7.89	7.86	7.86	7.98	7.94	7.95	7.9	7.88	7.97	8.02	8
Hardness, as CaCO3	mg/L	-	-	-	-	-	-	47.5	50.8	53.3	56.8	55.2	56.5	53.3	55.5	53.8	58	55.6	61.1	54.7	56.9	51.6
Dissolved organic carbon	mg/L	-	-	-	-	-	-	2.98	2.91	1.5	1.32	1.61	1.67	1.64	1.61	1.98	2.05	6.06	2	1.91	1.69	1.77
Dissolved Metals																						
Copper	mg/L	-	0.0022[(a)]	0.0070[(a)]	-	0.3	0.00036 - 0.0012	0.00059	0.00074	0.00082	0.00077	0.00088	0.00077	0.00102	0.00092	0.00073	0.00067	0.00075	0.0006	0.00063	0.00057	0.00066
round sample-specific pH	pH units							7.9	8	7.8	7.7	7.6	7.8	7.9	7.6	7.4	7.7	7.9	7.8	7.9	7.6	7.4
rounded sample-specific DOC	mg/L							2.5	2.5	1.5	1	1.5	1.5	1.5	1.5	1.5	2	6	2	1.5	1.5	1.5
rounded sample-specific Hardness	mg/L							40	50	50	50	50	50	50	50	50	50	50	60	50	50	50
Chronic guideline from lookup table	mg/L						0.00036 - 0.0012	0.001025728	0.001174076	0.000597142	0.000362339	0.000488828	0.000597142	0.000652109	0.000488828	0.000386805	0.000723058	0.002595727	0.000834963	0.000652109	0.000488828	0.000386805
Acute guideline from lookup table	mg/L						0.0022 - 0.007	0.006136637	0.00703772	0.003569061	0.002164822	0.002922449	0.003569061	0.003903631	0.002922449	0.002324068	0.004319222	0.015491244	0.004982324	0.003903631	0.002922449	0.002324068

Notes

Values are taken from the approved guidelines unless otherwise noted.

W = working guideline; M = interim guideline, Min = Minimum concentration requirement based on life stage.

Guidelines based on toxicity modifying factors are presented based on the mean baseline values (hardness of 54 mg/L, pH of 7.8, DOC 2.2 mg/L, temperature of 7 oC, and chloride of 0.50 mg/L) in Quesnel Lake, considered representative of average conditions in the receiving environment.

Shaded values indicates concentrations exceed the most conservative guideline of each maximum and chronic WQG for ecological receptors.

a) hardness, dissolved organic carbon, and pH dependent copper guideline selected from BC ENV copper guideline lookup table.

- = no guideline or no data; BC WQGs = British Columbia water quality guidelines; $CaCO_3$ = calcium carbonate; FDA = field duplicate available; FD = field duplicate; mg/L = milligrams per litre; QA/QC = quality assurance/quality control.

Table 2-4D: Copper Screening at Initial Dilution Zone Locations from 2015 to 2023
Mount Polley Mine

Location Type Station Sample Point Date Parameter	Unit	BC ENV Drinking Water Screening Criteria	BC ENV Guideline for the Protection of Aquatic Life		BC ENV Guideline for the Protection of Wildlife Life		Selected Screening Criteria	Quesnel Lake QUL-59 QUL-59-B 2020-06-24	Quesnel Lake QUL-59 QUL-59-B 2020-08-11	Quesnel Lake QUL-59 QUL-59-B 2020-09-16	Quesnel Lake QUL-59 QUL-59-B 2021-05-19	Quesnel Lake QUL-59 QUL-59-B 2021-06-02	Quesnel Lake QUL-59 QUL-59-B 2021-07-21	Quesnel Lake QUL-59 QUL-59-B 2021-09-16	Quesnel Lake QUL-59 QUL-59-B 2021-10-27	Quesnel Lake QUL-59 QUL-59-B 2022-05-10	Quesnel Lake QUL-59 QUL-59-B 2022-06-27	Quesnel Lake QUL-59 QUL-59-B 2022-08-16	Quesnel Lake QUL-59 QUL-59-B 2022-10-19	Quesnel Lake QUL-59 QUL-59-BT 2019-05-08	Quesnel Lake QUL-59 QUL-59-BT 2019-05-15	Quesnel Lake QUL-59 QUL-59-BT 2019-06-18
			Long-Term Chronic	Short-Term Acute	Long-Term Chronic	Short-Term Acute																
Field Parameters																						
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	7.49	7.72	7.81	8.14	7.66	7.52	8.35	7.65	7.73	7.79	7.65	7.57	7.86	-	7.71
Conventional Parameters																						
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	7.82	7.83	7.92	7.74	7.91	7.89	7.9	7.91	7.81	7.91	7.91	7.9	7.88	7.98	8.02
Hardness, as CaCO3	mg/L	-	-	-	-	-	-	53.3	53.5	53.7	55.5	52.2	53.8	55	55.6	54.2	55	53.4	56.1	55.7	53.9	56.9
Dissolved organic carbon	mg/L	-	-	-	-	-	-	2.35	2.34	1.91	2.52	2.2	1.98	2.01	1.63	2.15	2.35	2.07	2.05	2.04	2.08	10.1
Dissolved Metals																						
Copper	mg/L	-	0.0022[(a)]	0.0070[(a)]	-	0.3	0.00036 - 0.0012	0.00052	0.00056	0.00064	0.0008	0.00078	0.00057	0.00053	0.0007	0.00062	0.0009	0.00063	0.00059	0.00056	0.00061	<0.00050
round sample-specific pH	pH units							7.4	7.7	7.8	8.1	7.6	7.5	8.3	7.6	7.7	7.7	7.6	7.5	7.8	7.9	7.7
rounded sample-specific DOC	mg/L							2	2	1.5	2.5	2	1.5	2	1.5	2	2	2	2	2	2	10
rounded sample-specific Hardness	mg/L							50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
Chronic guideline from lookup table	mg/L						0.00036 - 0.0012	0.000515485	0.000723058	0.000597142	0.001262278	0.000651696	0.000436942	0.00111269	0.000488828	0.000723058	0.000723058	0.000651696	0.00058224	0.000795564	0.000868515	0.003609731
Acute guideline from lookup table	mg/L						0.0022 - 0.007	0.003097836	0.004319222	0.003569061	0.007575319	0.003894099	0.002614473	0.006687899	0.002922449	0.004319222	0.004319222	0.003894099	0.003484227	0.004754194	0.005198063	0.021455989

Notes

Values are taken from the approved guidelines unless otherwise noted.

W = working guideline; M = interim guideline, Min = Minimum concentration requirement based on life stage.

Guidelines based on toxicity modifying factors are presented based on the mean baseline values (hardness of 54 mg/L, pH of 7.8, DOC 2.2 mg/L, temperature of 7 oC, and chloride of 0.50 mg/L) in Quesnel Lake, considered representative of average conditions in the receiving environment.

Shaded values indicates concentrations exceed the most conservative guideline of each maximum and chronic WQG for ecological receptors.

a) hardness, dissolved organic carbon, and pH dependent copper guideline selected from BC ENV copper guideline lookup table.

- = no guideline or no data; BC WQGs = British Columbia water quality guidelines; $CaCO_3$ = calcium carbonate; FDA = field duplicate available; FD = field duplicate; mg/L = milligrams per litre; QA/QC = quality assurance/quality control.

Table 2-4D: Copper Screening at Initial Dilution Zone Locations from 2015 to 2023
Mount Polley Mine

Location Type Station Sample Point Date Parameter	Unit	BC ENV Drinking Water Screening Criteria	BC ENV Guideline for the Protection of Aquatic Life		BC ENV Guideline for the Protection of Wildlife Life		Selected Screening Criteria	Quesnel Lake QUL-59 QUL-59-BT 2019-08-20	Quesnel Lake QUL-59 QUL-59-BT 2020-06-24	Quesnel Lake QUL-59 QUL-59-BT 2020-08-11	Quesnel Lake QUL-59 QUL-59-BT 2022-06-27	Quesnel Lake QUL-59 QUL-59-MID 2015-12-02	Quesnel Lake QUL-59 QUL-59-MID 2015-12-09	Quesnel Lake QUL-59 QUL-59-MID 2015-12-14	Quesnel Lake QUL-59 QUL-59-MID 2015-12-21	Quesnel Lake QUL-59 QUL-59-MID 2016-01-25	Quesnel Lake QUL-59 QUL-59-MID 2016-03-28	Quesnel Lake QUL-59 QUL-59-MID 2016-05-17	Quesnel Lake QUL-59 QUL-59-MID 2018-06-04	Quesnel Lake QUL-59 QUL-59-MID 2019-04-25	Quesnel Lake QUL-59 QUL-59-MID 2019-05-02	Quesnel Lake QUL-59 QUL-59-MID 2021-05-19
			Long-Term Chronic	Short-Term Acute	Long-Term Chronic	Short-Term Acute																
Field Parameters																						
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	7.44	7.5	7.79	7.86	7.82	7.84	7.82	7.69	7.91	8.03	7.65	7.52	7.79	7.79	8.25
Conventional Parameters																						
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	8	7.81	7.82	7.89	7.58	7.8	7.87	7.89	7.86	7.86	7.99	7.92	7.94	7.84	7.87
Hardness, as CaCO3	mg/L	-	-	-	-	-	-	52.2	57.4	53.5	52	52.8	53.2	56.6	54.5	55.3	53.8	53.1	53	58.2	53.3	51.7
Dissolved organic carbon	mg/L	-	-	-	-	-	-	1.74	2.44	2.39	2.44	1.58	1.5	1.36	1.5	1.71	1.62	2	2.1	1.83	2.05	2.27
Dissolved Metals																						
Copper	mg/L	-	0.0022[(a)]	0.0070[(a)]	-	0.3	0.00036 - 0.0012	<0.00050	0.00058	0.00054	0.00056	0.00087	0.00085	0.00076	0.00081	0.00073	0.00097	0.00105	0.00104	0.00062	0.00062	0.00068
round sample-specific pH	pH units							7.4	7.5	7.7	7.8	7.8	7.8	7.8	7.6	7.9	8	7.6	7.5	7.7	7.7	8.2
rounded sample-specific DOC	mg/L							1.5	2	2	2	1.5	1.5	1	1.5	1.5	1.5	2	2	1.5	2	2
rounded sample-specific Hardness	mg/L							50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
Chronic guideline from lookup table	mg/L						0.00036 - 0.0012	0.000386805	0.00058224	0.000723058	0.000795564	0.000597142	0.000597142	0.000399037	0.000488828	0.000652109	0.000706981	0.000651696	0.00058224	0.000542683	0.000723058	0.001064586
Acute guideline from lookup table	mg/L						0.0022 - 0.007	0.002324068	0.003484227	0.004319222	0.004754194	0.003569061	0.003569061	0.002385739	0.002922449	0.003903631	0.004238518	0.003894099	0.003484227	0.003242435	0.004319222	0.006394952

Notes

Values are taken from the approved guidelines unless otherwise noted.

W = working guideline; M = interim guideline, Min = Minimum concentration requirement based on life stage.

Guidelines based on toxicity modifying factors are presented based on the mean baseline values (hardness of 54 mg/L, pH of 7.8, DOC 2.2 mg/L, temperature of 7 oC, and chloride of 0.50 mg/L) in Quesnel Lake, considered representative of average conditions in the receiving environment.

Shaded values indicates concentrations exceed the most conservative guideline of each maximum and chronic WQG for ecological receptors.

a) hardness, dissolved organic carbon, and pH dependent copper guideline selected from BC ENV copper guideline lookup table.

- = no guideline or no data; BC WQGs = British Columbia water quality guidelines; $CaCO_3$ = calcium carbonate; FDA = field duplicate available; FD = field duplicate; mg/L = milligrams per litre; QA/QC = quality assurance/quality control.

Table 2-4D: Copper Screening at Initial Dilution Zone Locations from 2015 to 2023
Mount Polley Mine

Location Type Station Sample Point Date Parameter	Unit	BC ENV Drinking Water Screening Criteria	BC ENV Guideline for the Protection of Aquatic Life		BC ENV Guideline for the Protection of Wildlife Life		Selected Screening Criteria	Quesnel Lake QUL-59 QUL-59-MID 2021-06-02	Quesnel Lake QUL-59 QUL-59-MID 2021-07-21	Quesnel Lake QUL-59 QUL-59-MID 2022-05-10	Quesnel Lake QUL-59 QUL-59-MP 2020-09-16	Quesnel Lake QUL-59 QUL-59-MP 2021-09-16	Quesnel Lake QUL-59 QUL-59-S 2015-12-09	Quesnel Lake QUL-59 QUL-59-S 2015-12-14	Quesnel Lake QUL-59 QUL-59-S 2015-12-21	Quesnel Lake QUL-59 QUL-59-S 2016-01-25	Quesnel Lake QUL-59 QUL-59-S 2016-03-28	Quesnel Lake QUL-59 QUL-59-S 2016-05-17	Quesnel Lake QUL-59 QUL-59-S 2018-06-04	Quesnel Lake QUL-59 QUL-59-S 2019-04-25	Quesnel Lake QUL-59 QUL-59-S 2019-05-02	Quesnel Lake QUL-59 QUL-59-S 2019-05-08
			Long-Term Chronic	Short-Term Acute	Long-Term Chronic	Short-Term Acute																
Field Parameters																						
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	7.74	7.65	7.71	7.91	8.41	7.84	7.77	7.7	7.95	8.15	7.57	7.71	7.74	7.83	7.9
Conventional Parameters																						
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	7.9	7.88	7.91	7.93	7.89	7.79	7.86	7.9	7.85	7.84	7.95	7.87	7.84	7.87	7.87
Hardness, as CaCO3	mg/L	-	-	-	-	-	-	50.2	52.4	54.5	54	53.3	53.9	56.6	54.8	55.3	53.8	51.6	48	58.2	53.4	56.6
Dissolved organic carbon	mg/L	-	-	-	-	-	-	2.16	1.89	2.03	1.96	1.88	1.53	1.34	1.63	1.64	1.61	2.07	2.5	1.86	2.03	2.05
Dissolved Metals																						
Copper	mg/L	-	0.0022[(a)]	0.0070[(a)]	-	0.3	0.00036 - 0.0012	0.00082	0.00051	0.00065	0.0009	0.00051	0.00079	0.0008	0.0008	0.00072	0.00085	0.00079	0.00072	0.00063	0.00061	<0.00050
round sample-specific pH	pH units							7.7	7.6	7.7	7.9	8.4	7.8	7.7	7.7	7.9	8.1	7.5	7.7	7.7	7.8	7.9
rounded sample-specific DOC	mg/L							2	1.5	2	1.5	1.5	1.5	1	1.5	1.5	1.5	2	2.5	1.5	2	2
rounded sample-specific Hardness	mg/L							50	50	50	50	50	50	50	50	50	50	50	40	50	50	50
Chronic guideline from lookup table	mg/L						0.00036 - 0.0012	0.000723058	0.000488828	0.000723058	0.000652109	0.000873217	0.000597142	0.000362339	0.000542683	0.000652109	0.000760868	0.00058224	0.00085517	0.000542683	0.000795564	0.000868515
Acute guideline from lookup table	mg/L						0.0022 - 0.007	0.004319222	0.002922449	0.004319222	0.003903631	0.005263515	0.003569061	0.002164822	0.003242435	0.003903631	0.004565462	0.003484227	0.005106874	0.003242435	0.004754194	0.005198063

Notes

Values are taken from the approved guidelines unless otherwise noted.

W = working guideline; M = interim guideline, Min = Minimum concentration requirement based on life stage.

Guidelines based on toxicity modifying factors are presented based on the mean baseline values (hardness of 54 mg/L, pH of 7.8, DOC 2.2 mg/L, temperature of 7 oC, and chloride of 0.50 mg/L) in Quesnel Lake, considered representative of average conditions in the receiving environment.

Shaded values indicates concentrations exceed the most conservative guideline of each maximum and chronic WQG for ecological receptors.

a) hardness, dissolved organic carbon, and pH dependent copper guideline selected from BC ENV copper guideline lookup table.

- = no guideline or no data; BC WQGs = British Columbia water quality guidelines; $CaCO_3$ = calcium carbonate; FDA = field duplicate available; FD = field duplicate; mg/L = milligrams per litre; QA/QC = quality assurance/quality control.

Appendix 2-5

Table 2-4D: Copper Screening at Initial Dilution Zone Locations from 2015 to 2023

Mount Polley Mine

Location Type Station Sample Point Date Parameter	Unit	BC ENV Drinking Water Screening Criteria	BC ENV Guideline for the Protection of Aquatic Life		BC ENV Guideline for the Protection of Wildlife Life		Selected Screening Criteria	Quesnel Lake QUL-59 QUL-59-S 2019-05-15	Quesnel Lake QUL-59 QUL-59-S 2019-06-18	Quesnel Lake QUL-59 QUL-59-S 2019-08-20	Quesnel Lake QUL-59 QUL-59-S 2020-06-24	Quesnel Lake QUL-59 QUL-59-S 2020-08-11	Quesnel Lake QUL-59 QUL-59-S 2020-09-16	Quesnel Lake QUL-59 QUL-59-S 2021-05-19	Quesnel Lake QUL-59 QUL-59-S 2021-06-02	Quesnel Lake QUL-59 QUL-59-S 2021-07-21	Quesnel Lake QUL-59 QUL-59-S 2021-09-16
			Long-Term Chronic	Short-Term Acute	Long-Term Chronic	Short-Term Acute											
Field Parameters																	
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	7.69	7.96	7.9	7.56	8.01	8.2	8.22	7.88	7.84	8.28
Conventional Parameters																	
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	7.96	8	7.96	7.84	6.88	7.96	7.86	8.02	7.94	7.93
Hardness, as CaCO3	mg/L	-	-	-	-	-	-	58.3	51.3	47.1	54.6	47.4	51.7	52.7	74.3	47.5	52
Dissolved organic carbon	mg/L	-	-	-	-	-	-	5.86	1.93	2.19	5.03	3.44	2	2.26	8.28	2.29	1.74
Dissolved Metals																	
Copper	mg/L	-	0.0022[(a)]	0.0070[(a)]	-	0.3	0.00036 - 0.0012	0.0015	0.0005	0.00053	0.0012	0.00062	0.00081	0.00065	0.00323	<0.00050	<0.00050
round sample-specific pH	pH units							7.6	7.9	7.9	7.5	8	8.2	8.2	7.8	7.8	8.2
rounded sample-specific DOC	mg/L							5.5	1.5	2	5	3	2	2	8	2	1.5
rounded sample-specific Hardness	mg/L							50	50	40	50	40	50	50	70	40	50
Chronic guideline from lookup table	mg/L						0.00036 - 0.0012	0.00179276	0.000652109	0.000821014	0.001456538	0.001329764	0.001064586	0.001064586	0.003471836	0.000752607	0.000801029
Acute guideline from lookup table	mg/L						0.0022 - 0.007	0.010694156	0.003903631	0.004917189	0.008702942	0.00797407	0.006394952	0.006394952	0.02064959	0.00449715	0.00481488

Notes

Values are taken from the approved guidelines unless otherwise noted.

W = working guideline; M = interim guideline, Min = Minimum concentration requirement based on life stage.

Guidelines based on toxicity modifying factors are presented based on the mean baseline values (hardness of 54 mg/L, pH of 7.8, DOC 2.2 mg/L, temperature of 7 oC, and chloride of 0.50 mg/L) in Quesnel Lake, considered representative of average conditions in the receiving environment.

Shaded values indicates concentrations exceed the most conservative guideline of each maximum and chronic WQG for ecological receptors.

a) hardness, dissolved organic carbon, and pH dependent copper guideline selected from BC ENV copper guideline lookup table.

- = no guideline or no data; BC WQGs = British Columbia water quality guidelines; $CaCO_3$ = calcium carbonate; FDA = field duplicate available; FD = field duplicate; mg/L = milligrams per litre; QA/QC = quality assurance/quality control.

Appendix 2-5
Table 2-4D: Copper Screening at Initial Dilution Zone Locations from 2015 to 2023
Mount Polley Mine

Location Type Station Sample Point Date Parameter	Unit	BC ENV Drinking Water Screening Criteria	BC ENV Guideline for the Protection of Aquatic Life		BC ENV Guideline for the Protection of Wildlife Life		Selected Screening Criteria	Quesnel Lake QUL-59 QUL-59-S 2021-10-27	Quesnel Lake QUL-59 QUL-59-S 2022-05-10	Quesnel Lake QUL-59 QUL-59-S 2022-06-27	Quesnel Lake QUL-59 QUL-59-S 2022-08-16	Quesnel Lake QUL-59 QUL-59-S 2022-10-19
			Long-Term Chronic	Short-Term Acute	Long-Term Chronic	Short-Term Acute						
Field Parameters												
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	7.87	7.73	7.81	8.03	8.02
Conventional Parameters												
pH	pH units	6.5 to 8.5	6.5 to 9	6.5 to 9	5 to 9.5	5 to 9.5	6.5 to 8.5	7.88	7.84	7.8	7.92	7.86
Hardness, as CaCO3	mg/L	-	-	-	-	-	-	53	54.6	50.8	47.7	52.2
Dissolved organic carbon	mg/L	-	-	-	-	-	-	1.76	2.15	3.65	2.12	1.9
Dissolved Metals												
Copper	mg/L	-	0.0022[(a)]	0.0070[(a)]	-	0.3	0.00036 - 0.0012	0.00492	0.00084	0.00091	0.00052	0.00066
round sample-specific pH	pH units							7.8	7.7	7.8	8	8
rounded sample-specific DOC	mg/L							1.5	2	3.5	2	1.5
rounded sample-specific Hardness	mg/L							50	50	50	40	50
Chronic guideline from lookup table	mg/L						0.00036 - 0.0012	0.000597142	0.000723058	0.001390164	0.0008885	0.000706981
Acute guideline from lookup table	mg/L						0.0022 - 0.007	0.003569061	0.004319222	0.008303874	0.005333098	0.004238518

Notes

Values are taken from the approved guidelines unless otherwise noted.

W = working guideline; M = interim guideline, Min = Minimum concentration requirement based on life stage.

Guidelines based on toxicity modifying factors are presented based on the mean baseline values (hardness of 54 mg/L, pH of 7.8, DOC 2.2 mg/L, temperature of 7 oC, and chloride of 0.50 mg/L) in Quesnel Lake, considered representative of average conditions in the receiving environment.

Shaded values indicates concentrations exceed the most conservative guideline of each maximum and chronic WQG for ecological receptors.

a) hardness, dissolved organic carbon, and pH dependent copper guideline selected from BC ENV copper guideline lookup table.

- = no guideline or no data; BC WQGs = British Columbia water quality guidelines; $CaCO_3$ = calcium carbonate; FDA = field duplicate available; FD = field duplicate; mg/L = milligrams per litre; QA/QC = quality assurance/quality control.

APPENDIX 2-6: Sediment and Aquatic Life Monitoring Report

Mount Polley Mine Comprehensive Environmental Monitoring Program 2022 – Sediment and Aquatic Life

Prepared for:
Mount Polley Mining Corporation
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Prepared by:
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Victoria, British Columbia

March 2023

Mount Polley Mine Comprehensive Environmental Monitoring Program 2022 – Sediment and Aquatic Life

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Periphyton and Benthic Invertebrate Tissue Quality

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Quesnel Lake Fish Community, Catchability, and Population

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Polley Lake Fish Catchability, Usage, and Population Health
Fish Tissue Quality

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Statistical Analyses

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ACRONYMS AND ABBREVIATIONS

AFDM – Ash Free Dry Mass
ANCOVA – Analysis of Covariance
ANOVA – Analysis of Variance
BC – British Columbia
BCMOE – British Columbia Ministry of Environment
BCMOECCS – British Columbia Ministry of Environment Climate Change Strategy
BCWQG – British Columbia Water Quality Guidelines
BCF – Bioconcentration Factor
BLM – Biotic Ligand Model
CA – Correspondence Analysis
CABIN – Canadian Aquatic Biomonitoring Network
CALA – Canadian Association for Laboratory Accreditation
CASQO – California Sediment Quality Objectives
CCME – Canadian Council of Ministers of the Environment
CEMP – Comprehensive Environmental Monitoring Plan
CES – Critical Effect Size
COC – Chain of Custody
CPUE – Catch-per-Unit-Effort
CRC-ICP-MS – Collision Reaction Cell Inductively Coupled Plasma – Mass Spectrometry
CRFD – Cumulative Relative Frequency Distributions
CVAAS – Cold Vapour Atomic Absorption Spectrophotometry
DFO – Department of Fisheries and Oceans Canada
DOC – Dissolved Organic Carbon
DQO – Data Quality Objectives
DQR – Data Quality Review
DW – dry weight
EMA – Environmental Management Act
ENV – BC Ministry of Environment and Climate Change Strategy
EPT – Ephemeroptera, Plecoptera, and Trichoptera
ERA – Ecological Risk Assessment
FLNRORD – BC Ministry of Forest, Lands and Natural Resource Operations and Rural Development
FOV – Field of View
GEF – Guideline Exceedance Factor

GPS – Global Positioning System
HHRA – Human Health Risk Assessment
HRWG – Habitat Remediation Working Group
ICP-MS – Inductively Coupled Plasma – Mass Spectrometry
IP – Indicator Parameter
K-M – Kaplan-Meier
K-S – Kolmogorov-Smirnov
LPL – Lowest Practicable Level
LRL – Laboratory Reporting Limit
MAD – Median Absolute Deviation
MB – Method Blank
MCE – Mixed Cellulose Ester
MCT – Measure of Central Tendency
MDMER *– Metal and Diamond Mining Effluent Regulations*
MLE – Maximum Likelihood Estimation
MOD – Magnitude of Difference
MPMC – Mount Polley Mining Corporation
PCA – Principal Component Analysis
PDF – Portable Document Format
PNAMP – Pacific Northwest Aquatic Monitoring Partnership
POI – Parameter of Interest
QA/QC – Quality Assurance / Quality Control
SAFIT – Southwest Association of Freshwater Invertebrate Taxonomists
SALM – Strong Acid Leachable Metals
SD – Standard Deviation
SCCWRP – Southern California Coastal Water Research Project
SPIN – Summer Profundal Index Netting
TOC – Total Organic Carbon
TOR – Terms of Reference
TSF – Tailings Storage Facility
TTF – Trophic Transfer Factor
USEPA – United States Environmental Protection Agency
YOY – Young-of-the-Year
WSQG – Working Sediment Quality Guidelines
WTP – Water Treatment Plant
WW – wet weight

1 INTRODUCTION

1.1 Site Description and Background

Mount Polley Mining Corporation (MPMC), a subsidiary of Imperial Metals, owns and operates the Mount Polley copper-gold mine (Mount Polley) located approximately 9 kilometers southwest of Likely, British Columbia (BC) and 56 km (100 km by road) northeast of Williams Lake, BC (Figure 1.1). Infrastructure at the Mount Polley Mine site includes open pits, an underground mine, a crusher, a mill and office spaces, a Tailings Storage Facility (TSF), a Water Treatment Plant (WTP), waste rock disposal areas, collection and settling ponds, a surface water collection system, haul roads, access roads, and storage facilities (Figure 1.2). The total lease area associated with the mine is 18,892 hectares (ha).

Mount Polley began operating in 1997 and operated from 1997 to 2001, when it entered into care and maintenance. The discovery of new ore reserves at the site and improved commodity prices prompted MPMC to reopen the mine in 2005 (MPMC 2009). Mount Polley continued operating until August 4, 2014, when a foundation failure at the perimeter embankment of the TSF resulted in a breach (Ministry of Energy and Mines 2015; Province of British Columbia 2015). The TSF perimeter embankment breach ("the breach") resulted in the release of approximately 25 million cubic meters of water, tailings slurry, and dam construction material into nearby Polley Lake, Hazeltine Creek, and Quesnel Lake (Figure 1.1).

MPMC ceased operations immediately after the breach to focus on impact assessment, cleanup, and remediation. Restricted operations were permitted to commence on August 5, 2015. During restricted operations, all tailings were placed under water in the Springer Pit (Figure 1.2). Approval for discharge of treated mine effluent to Quesnel Lake was granted under the *Environmental Management Act* (EMA*)* on November 29, 2015, and MPMC initiated discharge of treated effluent to Quesnel Lake on December 1, 2015 (Figure 1.2). Restrictions on operations were lifted on June 23, 2016, and the mine began operating at full capacity on June 27, 2016 (MPMC 2017). On January 7, 2019, MPMC announced that Mount Polley Mine operations would be suspended in May 2019 due to declining copper prices. MPMC was placed under care and maintenance on May 31, 2019 and remained so until September 2021 when MPMC initiated a transition back to active operations. Full active operations at MPMC have currently resumed, with the resumption of active pit mining operations in November 2021, and the resumption of milling and copper concentrate production in summer 2022. Discharge of treated effluent to Quesnel Lake has been ongoing since 2015 (including during care and maintenance) and is currently permitted to June 30, 2025.

585,000 590,000 595,000 600,000 605,000 610,000 615,000

5,830,000 5,825,000 5,820,000 5,815,000

Quesnel River Research Centre
Quesnel River
Likely
Morehead Lake
Frypan Lake
Frypan Creek
Morehead Creek
Trio Creek
Mount Polley Mine Perimeter
Polley Lake
Cedar Creek
Spanish Lake
Nina Lake
Bootjack Lake
Jacobie Lake
Trio Lake
Bootjack Lake Dam
Bootjack Creek
WTP
Tailings Storage Facility (TSF)
Horsefly Lake Forest Service Road
Boswell Lake
Winkley Creek Road
Hazeltine Creek
Gavin Lake Road
Edney Creek
Quesnel Lake
Gavin Lake
Edney Lake Road
Teasdale Creek Road
Edney Lake
Mitchell Bay
Fire Lake
Horsefly Bay
Horsefly River

LEGEND

- Water Treatment Plant (WTP)
- Remediation Zone for Hazeltine Creek
- Historic Watercourse
- Active Mine Operation
- Tailings Storage Facility

0 1 2 4 km

Projection: North American Datum 1983 UTM Zone 10 U

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N W E S

Location and General Layout of the Mount Polley Mine

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Figure 1.1

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590,000 592,000 594,000 596,000 598,000 600,000 602,000 604,000 606,000 608,000

5,826,000 5,824,000 5,822,000 5,820,000 5,818,000

Frypan Creek
Boundary Pit
Wight Pit
Boundary Dump
Temporary NW PAG Stockpile
North Bell Dump
Mount Polley Mine Perimeter
Polley Lake
Springer Pit
Highway to Heaven
Cariboo Pit
East RDS
NEZ Dump
Ore Stockpile #1
Mill Area
Warehouse Area
High Oxide Stockpile
SERDS Dump
SEZ Stockpile 1
Southeast Pit
Bootjack Lake
Bootjack Creek
Bootjack Lake Dam
Biosolids Stockpile
Perimeter Embankment (East) Till Borrow Pit
TSF Rock Quarry (Orica Site)
Perimeter Embankment
Tailings Storage Facility (TSF)
South Embankment
Main Embankment
Quesnel Lake
Hazeltine Creek
Diffuser 1
Diffuser 2
Edney Creek

590,000 592,000 594,000 596,000 598,000 600,000 602,000 604,000 606,000 608,000

LEGEND

- Central Collection Sump
- Effluent Mixing Tank
- Water Treatment Plant (WTP)
- Diffuser (Treated Effluent Discharge, December 2015 to present)
- Discharge to Diffusers (2015 to present)
- Discharge to Hazeltine Creek (Apr 10 2014 to Aug 14 2014 and Nov 29 2015 to Sept 30 2017)
- Effluent Discharge Pipeline (January 2018 to present)
- Mine Infrastructure
- Historic Watercourse

0 0.5 1 2 km

N W E S

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Mount Polley Mine Site Operations and Infrastructure

Date: January 2023
Project 227202.0029

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Figure 1.2

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1.2 Regulatory Environment

Mount Polley is required to comply with Permit 11678, which was first issued under the British Columbia EMA on May 30, 1997. Conditions of the permit include criteria for effluent quality and non-lethality, water quality monitoring, and biological monitoring. Permit 11678 was amended on November 7, 2012, to allow for effluent discharge from the TSF to Hazeltine Creek, which began on April 10, 2014. Discharges were halted in response to the August 4, 2014, breach.

Following extensive clean-up and remediation efforts, the British Columbia Ministry of Environment and Climate Change Strategy (BCMOECCS; i.e., ENV) issued an amendment to Permit 11678 on November 29, 2015, which allowed MPMC to discharge treated effluent into Quesnel Lake via Hazeltine Creek as part of a short-term water management strategy. Permit 11678 was amended again on April 7, 2017, allowing for the use of a pipeline to convey treated water from the WTP to diffusers in Quesnel Lake (see Figure 1.2). Permit 11678 was most recently amended on December 1, 2022, and included an update to the permitted date for the direct discharge of treated effluent to Quesnel Lake via the pipeline and diffusers, which is now allowed under Permit 11678 until June 30, 2025.

Section 3.2 of the amended Permit 11678 requires MPMC to develop and implement a Comprehensive Environmental Monitoring Plan (CEMP) for the Mount Polley Mine site and surrounding receiving environment that combines pre-existing monitoring programs into an integrated plan:

> *3.2.1 "The Permittee must continue to develop, submit, and implement an ongoing Comprehensive Environmental Monitoring Plan to evaluate the effects of mining-related activities on the physical, chemical, and biological characteristics of Hazeltine Creek, Edney Creek, Bootjack Lake, Morehead Creek, Polley Lake, Quesnel Lake, Quesnel River, and associated riparian and upland areas."*
>
> *3.2.4 "The CEMP must meet all the following requirements:*
>
> *(a) Consolidate and integrate all of the monitoring programs that are being conducted in the vicinity of the mine site and include, at minimum, surface water (quality and quantity), groundwater (characterization and interactions with surface water), sediments, soils, periphyton, phytoplankton, benthic invertebrates, zooplankton, fish, floodplain and upland vegetation, and wildlife.*
>
> *(b) At a minimum address a three-year time span.*

(c) At a minimum include all sampling sites, frequency of sampling, variables to be analyzed, method detection limits, sampling methods, sample analysis methods, and data analysis methods.

(d) The updated CEMP must be approved by the Director"

In accordance with this requirement, the CEMP (MPMC 2019) covers the 2018 to 2020 period and was developed based on an approved updated Terms of Reference (TOR) provided by ENV. The 2019 CEMP (MPMC 2019) was submitted to ENV on October 31, 2019, and was approved by ENV on February 10, 2021, subject to additional monitoring requirements (BCMOECCS 2021c). Monitoring in 2022 was completed in accordance with the approved CEMP (MPMC 2019) and the additional CEMP requirements (outlined in BCMOECCS 2021c), although the CEMP covers the 2018 to 2020 period. Based on the requirements of Permit 11678, an updated CEMP will be submitted by March 31, 2023.

The CEMP is an integrated monitoring plan that has been developed to capture in one document a number of independent and interdependent monitoring programs, including: site monitoring, water discharge monitoring, Metal and Diamond Mining Effluent Regulations (MDMER) monitoring, and breach response monitoring, and monitoring following completion of remediation efforts. The CEMP has been developed through an extensive consultative process that encompasses several permitting and other regulatory processes. This integrated monitoring plan offers the additional benefit of facilitating more efficient monitoring plan review by regulatory agencies, First Nations, and stakeholders.

1.3 Scope of this Report

This report covers a subset of the CEMP. It includes monitoring of the aquatic receiving environment adjacent to, and downstream of the Mount Polley Mine in 2022. Where relevant, data collected prior to 2022 (as far back as baseline data collected in 1995) are used in data interpretation in reference to the previous reports that provided the raw data.

This report specifically includes lakes, creeks, and rivers with the potential to have been influenced by the Mount Polley Mine through effluent discharge, the breach, or general mine operations, including Polley Lake, Bootjack Lake, Hazeltine Creek, Edney Creek, Quesnel Lake, and the Quesnel River (Figure 1.1). Additional areas were also evaluated as references for the potentially affected areas to facilitate interpretation of potential effects (as outlined in the Study Design Overview; Section 2). This report is focused on sediment quality, periphyton, plankton, benthic invertebrates, and fish. However, additional supporting data (e.g., physical habitat characteristics, water quality) are used in the interpretation of the key monitoring components.

1.4 Monitoring Objectives

The overarching objective of the monitoring undertaken under the CEMP is to support the evaluation of the potential for effects of mine-related activities on the physical, chemical, and biological characteristics of the environment surrounding the Mount Polley Mine (i.e., the receiving environment). Monitoring under the CEMP is completed to:

1. Evaluate if pollution[1] is occurring in the receiving environment as a result of the existing water discharge or mine-related activities;
2. Evaluate the environmental impacts of the August 2014 TSF embankment breach, to inform the remediation plan, as well as to evaluate the effects of mitigation measures that are implemented as part of the remediation strategy; and
3. Inform management decisions, including reclamation and closure.

General objectives of the CEMP elements reported herein (i.e., sediment quality, periphyton, plankton, benthic invertebrates, and fish) are to:

1. Evaluate the influence of mine activities on the receiving environments in comparison to baseline/pre-breach and/or reference conditions;
2. Determine potential implications to aquatic life; and
3. Provide data to support exposure assessment as part of Ecological Risk Assessment (ERA) and Human Health Risk Assessment (HHRA).

Specific questions being addressed under these objectives are:

1. Are there differences in conditions at exposed areas relative to baseline/pre-breach and/or reference conditions?
2. If yes, are the differences mine-related?
3. Does the weight-of-evidence indicate that the usefulness of the aquatic environment is impaired?

Specific objectives associated with the CEMP elements herein are provided in Table 1.1.

[1] Pollution as defined in the BC EMA (S.1(1)) means "*…the presence in the environment of substances or contaminants that substantially alter or impair the usefulness of the environment*".

Table 1.1: Objectives of Specific Mount Polley CEMP Monitoring Components Covered in this Report

Component	Objectives	Sub-Components
Sediment	1. Evaluate the influence of mine activities on depositional receiving environments (e.g., Polley Lake, Quesnel Lake, and limited locations in Hazeltine Creek) in comparison to baseline and/or reference conditions; 2. Determine potential implications to aquatic life (e.g., relative to available sediment quality guidelines); 3. Provide supporting information for benthic invertebrate community monitoring; and 4. Provide data to support exposure assessment as part of ERA and HHRA[a].	1. Sediment Quality 2. Sediment Toxicity
Periphyton[b]	1. Evaluate the influence of mine activities on erosional receiving environments (e.g., Hazeltine Creek and Edney Creek) in comparison to baseline and/or reference conditions; 2. Serve as supporting information for the determination of potential effects to aquatic life at higher trophic levels (benthic invertebrates and fish); 3. Provide supporting information for the assessment of benthic invertebrate tissue quality, benthic invertebrate community condition, and fish habitat productivity; and 4. Provide data to support exposure assessment as part of ERA and HHRA[a].	1. Productivity 2. Community Composition 3. Tissue Quality
Plankton	1. Evaluate the influence of mine activities on lake environments (Polley Lake and Quesnel Lake) in comparison to baseline and/or reference conditions; 2. Serve as supporting information for the determination of potential effects to aquatic life at higher trophic levels (fish); 3. Provide supporting information for the assessment of fish habitat productivity and fish tissue quality; and 4. Provide data to support exposure assessment as part of ERA and HHRA[a].	1. Phytoplankton Productivity 2. Phytoplankton Community Composition 3. Zooplankton Productivity 4. Zooplankton Community Composition 5. Zooplankton Tissue Quality
Benthic Invertebrates	1. Evaluate the influence of mine activities on receiving environments (e.g., Hazeltine Creek, Edney Creek, and Quesnel Lake) in comparison to baseline and/or reference conditions; 2. Determine potential implications to aquatic life (e.g., through assessment of benthic invertebrate community and productivity endpoints, and comparison of benthic tissue quality results to available guidelines); 3. Provide supporting information for the assessment of potential effects to higher trophic levels (e.g., fish); and 4. Provide data to support exposure assessment as part of ERA and HHRA[a].	1. Productivity[b] 2. Community Composition 3. Tissue Quality[b]
Fish	1. Evaluate the influence of mine activities on receiving environments (e.g., Hazeltine Creek, Edney Creek, Polley Lake, Quesnel Lake, and Quesnel River) in comparison to baseline and/or reference conditions; 2. Determine potential implications to aquatic ecosystem health and human health (e.g., relative to available fish tissue quality guidelines); 3. Document fish habitat utilization in creek and lake areas that were physically impacted by the TSF breach (most notably Hazeltine Creek and lower Edney Creek), thereby documenting the effectiveness of fish habitat rehabilitation efforts; and 4. Provide data to support exposure assessment as part of ERA and HHRA[a].	1. Fish Habitat and Usage[b] 2. Community Composition 3. Fish Health 4. Tissue Quality

[a] Ecological Risk Assessment and Human Health Risk Assessment.
[b] Denotes a component or sub-component that only applies to creeks.

1.5 Report Organization

This report is presented in eight sections, the first of which is this introduction (Section 1). Section 2 provides an overview of the approach and study design for the CEMP elements reported herein (i.e., sediment quality, periphyton, plankton, benthic invertebrates, and fish). Section 3 provides the methods used for data collection, treatment, and interpretation applicable to lake habitat. Section 4 provides the same for creek habitat. Sections 5 and 6 provide the results, assessment, and interpretation of data collected in lake habitat and creek habitat, respectively. Section 7 provides an integrated summary of key findings and recommendations. All references cited throughout the report are provided in Section 8.

2 STUDY DESIGN OVERVIEW

2.1 Conceptual Overview

The overall study design for the MPMC CEMP, including rationale for the design, is provided in the approved 2019 CEMP study design document (MPMC 2019). That document provides an overview of the mine site and its surrounding environment, an overview of environmental management on the mine site, and a detailed description of every component of the CEMP. The latter includes the monitoring objective, a summary of historic findings, a study design overview and rationale, and methodology associated with quality assurance / quality control (QA/QC), sample collection, laboratory analyses, data quality review (DQR), data handling, data interpretation, and reporting (MPMC 2019).

This report covers a subset of MPMC's CEMP – it is specifically focused on sediment and aquatic biological monitoring under the CEMP (i.e., sediment, periphyton, plankton, benthic invertebrate, and fish components of the CEMP). Briefly, sediment and aquatic biological monitoring under the CEMP was developed in consideration of:

- Pathways of potential effects (MPMC 2019);
- Accepted biological monitoring tools and measurement endpoints sensitive to mine-related influences (Table 2.1; MPMC 2019);
- The availability of baseline and/or pre-breach data (MPMC 2019);
- The findings of previous studies (MPMC 2019);
- Statistical considerations for comparisons of exposed-area data to reference, baseline, and/or over time (MPMC 2019);
- Needs of the ERA and HHRA (Golder 2017b,d); and
- Consultation (MPMC 2019).

Key pathways of potential effects to the aquatic environment include diffuse influences of the mine footprint and mining operations, the direct influence of the breach on Polley Lake, Hazeltine Creek, Edney Creek, and Quesnel Lake, and the direct discharge of treated mine water to Quesnel Lake. Sediment and aquatic biological monitoring endpoints used under the CEMP include chemical tools that address key questions and biological monitoring endpoints that are typically recognized as being the most sensitive to metals and to the potential influence of mine operations in general (Table 2.1; ESG 1999, Environment Canada 2012b; British Columbia Ministry of Environment [BCMOE] 2013, 2016; Arche et al. 2016; Simpson and Batley 2016). Baseline and/or pre-breach data are available for lakes and creeks immediately adjacent to

Table 2.1: Mount Polley CEMP Sediment and Aquatic Biological Monitoring Components and Measurement Endpoints, 2022[a]

Monitoring Component	Habitat Type	Sub-Component	Measurement Endpoints
Sediment	Lake and Creek[b]	Sediment Texture	moisture particle size distribution total organic carbon
		Sediment Quality	metals (CRC-ICP-MS scan[d]) total nitrogen total sulphur mercury
		Sediment Toxicity	14-day test of *Hyalella azteca* survival and growth (static)
Periphyton	Creek	Productivity	chlorophyll-a biomass (ash free dry mass)
		Community Composition	density (organisms/surface area) taxon richness[e] diatom taxon richness Simpson's index of diversity Simpson's index of evenness density and proportions of major taxon groups
		Tissue Quality	moisture metals (CRC-ICP-MS scan[d]) mercury
Phytoplankton	Lake	Productivity	chlorophyll-a
		Community Composition	density (organisms/volume) taxon richness[e] Simpson's index of diversity Simpson's index of evenness density and proportions of major taxon groups
Zooplankton	Lake	Productivity	biomass
		Community Composition	density (organisms/volume) taxon richness[e] Simpson's index of diversity Simpson's index of evenness density and proportions of major taxon groups
		Tissue Quality	moisture metals (CRC-ICP-MS scan[d]) mercury
Benthic Invertebrates	Lake and Creek	Productivity[c]	biomass
		Community Composition	density (organisms/surface area) taxon richness[e] Simpson's index of diversity Simpson's index of evenness density and proportions of major taxon groups Correspondence analysis[f]
		Tissue Quality	moisture metals (CRC-ICP-MS scan[d]) mercury
Fish	Lake and Creek	Habitat[g]	water depth and velocity wetted and bankfull width substrate characteristics riparian vegetation and canopy cover instream cover
		Habitat Usage[g]	repeated observation counts fish collection counts and catch-per-unit-effort[h]
		Catchability	fish collection counts and catch-per-unit-effort[h]
		Population Health	size-at-age condition size-frequency distribution
		Tissue Quality	moisture metals (CRC-ICP-MS scan[d]) mercury

[a] A number of additional supporting measures were collected to assist in the interpretation of results associated with the core measurement endpoints displayed.

[b] Due to the predominantly erosional habitat of the creek habitats assessed, measurement endpoints for sediment collected from these creek habitats were limited to the sub-components texture and chemistry.

[c] Benthic invertebrate biomass as a measure of secondary productivity was limited to creek habitats only.

[d] Metal scans by Inductively Coupled Plasma-Mass Spectrometry (ICP-MS) or Collision Reaction Cell ICP-MS (CRC-ICP-MS). "Metals" includes non-metallic parameters, such as phosphorus, which are common in CRC-ICP-MS analysis packages.

[e] Taxa reported at the lowest practicable level of taxonomy.

[f] Correspondence analysis was employed in cases where differences in community composition were not evident based on the evaluation of the density and proportions of major taxon groups.

[g] Fish habitat and fish habitat usage were monitored in creek habitats only.

[h] Fish collection and catch-per-unit-effort using a variety of techniques: minnow trapping and backpack electrofishing in creek habitats; minnow trapping, hoop netting, and gill netting in lake habitats; angling in Quesnel Lake and Quesnel River.

the mine (Polley Lake, Hazeltine Creek, Edney Creek, Bootjack Lake, and Quesnel Lake). To the extent possible, monitoring is designed to make the best use of baseline and/or pre-breach data in interpretation. Findings of previous studies (reviewed in the CEMP; MPMC 2019) also informed the study design, with the design focused on areas of greatest potential impact and on addressing key questions of effect or of recovery.

The assessment of potential mine-related effects is predicated on the detection of differences between exposed areas and baseline, pre-breach, or reference areas, or over time. Therefore, the study design was driven by considering statistical requirements (e.g., the number of reference areas and replication within each exposed and reference area) to support sufficiently powerful comparisons among areas and over time (replication level is typically n=5 to n=8). The design was also developed in consideration of data needs to support future iterations of ERA and HHRA.

2.2 Lake Habitat

Monitoring of lake habitat in the vicinity of the Mount Polley Mine in 2022 focused on two lakes: Polley Lake, which is located to the immediate east of the mine and Quesnel Lake, which is located further to the east of Polley Lake and approximately 3.7 kilometers from the mine at its nearest point (Figure 2.1). As indicated above, Polley Lake may be influenced by mining operations, and was also influenced by the breach in August 2014. Quesnel Lake was influenced by the breach in August 2014 (via Hazeltine Creek) and is currently also influenced by the direct discharge of treated mine water to Quesnel Lake (as of January 8, 2018[2]; Figure 2.1). Bootjack Lake serves as reference for Polley Lake, and unexposed/unimpacted areas within Quesnel Lake serve as references for exposed/impacted areas of the lake (Figures 1.2 and 2.1).

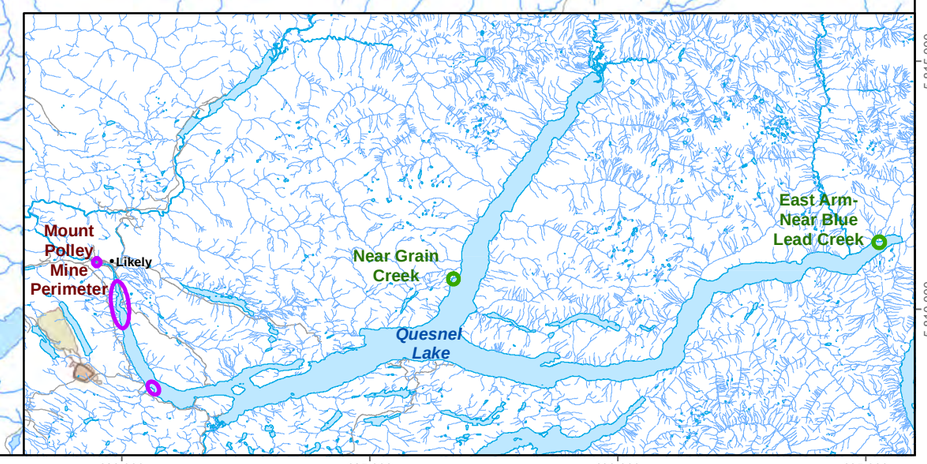
CEMP monitoring in lakes is outlined in detail in the CEMP study design document (MPMC 2019), including detailed description of each monitoring component and associated rationale for the study design and for the selected measurement endpoints. This section provides a general overview of the sediment and aquatic biological monitoring of lakes completed in 2022 (see Figure 2.1, Table 2.2). Briefly, CEMP monitoring of lakes in 2022 included the following components: sediment quality, sediment toxicity, phytoplankton productivity and community, zooplankton productivity and community, zooplankton tissue quality, benthic invertebrate community, fish community/population, and fish tissue quality. Not all monitoring components were completed at every area/station (Figure 2.1, Table 2.2). Detailed descriptions of monitoring conducted in lake habitats in 2022 are provided in Section 3.

[2] Discharge of treated mine water to Quesnel Lake via Hazeltine Creek was initiated on December 1, 2015. Direct discharge to Quesnel Lake (via a pipe) was initiated on January 8, 2018.

590,000 595,000 600,000 605,000 610,000 615,000 620,000 625,000 630,000 635,000

5,830,000 5,825,000 5,820,000 5,815,000 5,810,000

Quesnel River
Likely
Quesnel River
Near Cedar Point
Near Grain Creek
Frypan Lake
Frypan Creek
Spanish Lake
Nina Lake
Cedar Creek
Hobenly Likely Forest Service Road
Mount Polley Mine Perimeter
Polley Lake
Bootjack Lake
POL-P2
POL-S
BOL-B2
BOL-S
Bootjack Creek
Bootjack Lake Dam
Central Collection Sump
WTP
Tailings Storage Facility (TSF)
Boswell Lake
Winkley Creek Road
Quesnel Lake
QUL-ZOO-1
QUL-PNF
QUL-LNF1
Gavin Lake Road
Hazeltine Creek
Edney Creek
Near Hazeltine Creek
Quesnel Lake
QUL-ZOO-7
Edney Lake Road
Teasdale Creek Road
Edney Lake
Horsefly Bay
QUL-LREF1
Horsefly River



LEGEND

- Reference
- Exposed
- Sediment Chemistry
- Sediment Toxicity
- Zooplankton Community and Biomass
- Zooplankton Tissue Chemistry
- Phytoplankton Community
- Benthic Invertebrate Community
- Phytoplankton Productivity

Fish Colection Area

- Exposed Area
- Reference Area
- Reference Lake
- Exposed Lake

- Historic Watercourse

Note: Quesnel Lake bathymetry lines are an approximate representation only and may not precisely delineate accurate depths at larger scales.

0 1.5 3 6 km

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N W E S

Monitoring Areas on Polley, Bootjack, and Quesnel Lakes, and Quesnel River, 2022

Date: January 2023
Project 227202.0029

minnow environmental inc.

Figure 2.1

Document Path: C:\Users\CApol\Trinity Consultants, Inc\Imperial Metals - 227202.0029 - 2022 MPMC\D - GIS\Report Overview Map\22-29 Figure 2.1 Lakes.mxd

Table 2.2: General Overview of Mount Polley CEMP Monitoring in Lakes, 2022[a]

Waterbody	Sampling Area	Type	Sediment Quality	Sediment Toxicity	Phytoplankton Productivity and Community	Zooplankton Productivity and Community	Zooplankton Tissue Quality	Benthic Invertebrate Community	Fish Community / Population	Fish Tissue Quality[b]
Bootjack Lake	BOL - S (Shallow)	Reference	✓	✓	-	-	-	-	✓	✓
	BOL - B2 (Southeast Basin)	Reference	-	-	✓	✓	✓	-		
Polley Lake	POL - S (Shallow)	Exposed	✓	✓	-	-	-	-	✓	✓
	POL - P2 (Southeast Basin)	Exposed	-	-	✓	✓	✓	-		
Quesnel Lake	QUL - PNF	Exposed	✓	-	-	-	-	✓	✓	✓
	QUL - LREF1	Reference	✓	✓	-	-	-	-		
	QUL - LNF1	Exposed	✓	✓	-	-	-	-		
	QUL - ZOO - 7 (south of Cariboo Island)	Reference	-	-	✓	✓	✓	-		
	QUL - ZOO - 1 (central West Arm)	Exposed	-	-	✓	✓	✓	-		

Notes: Checkmarks indicate sampling was completed at the area indicated, dashes indicate sampling was not completed at the area indicated.

[a] Detailed descriptions of each monitoring element and associated rationale based on historical findings are provided in the CEMP (MPMC 2019); detailed methods are provided in Section 3 of this report.

[b] Fish tissue quality monitoring includes multiple species (rainbow trout and longnose sucker in Polley and Bootjack Lakes; lake trout, northern pikeminnow, and peamouth chub in Quesnel Lake; rainbow trout in Quesnel River).

2.3 Creek Habitat

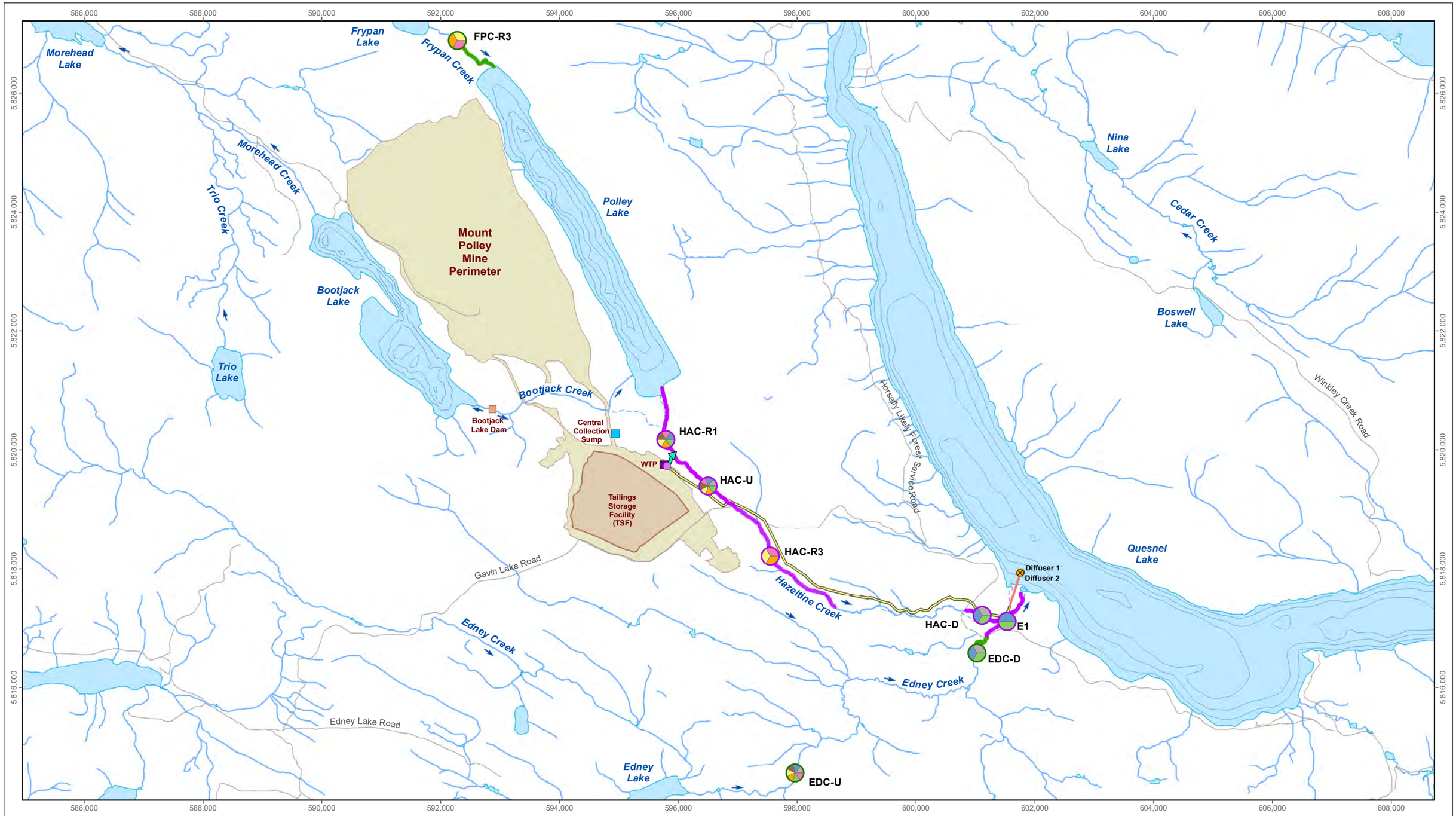
Monitoring of creek habitat in the vicinity of the Mount Polley Mine in 2022 focused on two creeks: Hazeltine Creek, which flows from Polley Lake to Quesnel Lake, and Edney Creek which conflows with Hazeltine Creek before entering Quesnel Lake (Figure 2.2). Hazeltine Creek is influenced by mining operations, was impacted by the breach in August 2014, and has conveyed Mount Polley mine water over two periods (April 11 to August 4, 2014, and November 29, 2015 to September 30, 2017). The lower 775 m of Edney Creek was also impacted by the breach. Remediation efforts of Hazeltine Creek and lower Edney Creek following the breach were initiated in 2014. Edney Creek con-flowed with Hazeltine prior to the breach, but remediation efforts separated the two creeks (Edney Creek near Quesnel Lake flowed adjacent to Hazeltine Creek) from 2014 until September 2020 when the creeks were rejoined. Two creeks (Edney Creek upstream of the impacted area and Frypan Creek) serve as references for Hazeltine Creek and the impacted area of Edney Creek (Figure 2.2).

CEMP monitoring in creeks is outlined in detail in the CEMP study design document (MPMC 2019), including detailed description of each monitoring component and associated rationale for the study design and for the selected measurement endpoints. This section provides a general overview of the sediment and aquatic biological monitoring of creeks completed in 2022 (see Figure 2.2, Table 2.3). Briefly, CEMP monitoring of creeks in 2022 included the following components: sediment quality, periphyton community and productivity, benthic invertebrate community and productivity, periphyton and benthic invertebrate tissue quality, and fish habitat usage and community. Not all components were completed at every area/station (Figure 2.2, Table 2.3). Although fish habitat characterization and fish usage monitoring (for spawning and rearing purposes) in upper and lower Hazeltine Creek and lower Edney Creek is part of the CEMP (Table 2.3), this monitoring focuses on a set of objectives identified and reviewed by the Habitat Remediation Working Group[3] (HRWG). As such, results of this monitoring in 2022, and prior years, are summarized in a separate report (Minnow 2023). Detailed descriptions of monitoring conducted in creek habits in 2022 are provided in Section 4.

2.4 Interpretive Approach

The interpretation of sediment and aquatic biological data collected under the CEMP (i.e., data reported herein) is based on a number of key interpretive tools. The approach to data

[3] The HRWG was established at the request of Fisheries and Oceans Canada (DFO; April 9, 2015), in response to regulatory requirements set out in Section 38(6) of the *Fisheries Act*. Members of the working group include: DFO, British Columbia Ministry of Environment (BCMOE), British Columbia Ministry of Forest Lands and Natural Resource Operations and Rural Development (FLNRORD), Soda Creek Indian Band, Williams Lake Indian Band, and Mount Polley Mining Company.



LEGEND

- Reference
- Exposed
- Sediment Chemistry
- Periphyton Tissue Chemistry
- Periphyton Community
- Benthic Invertebrate Community
- Benthic Invertebrate Biomass
- Benthic Invertebrate Tissue Chemistry
- Periphyton Chlorophyll-a and Ash-Free Dry Mass

Fish Collection Creek

- Exposed Creek
- Reference Creek

- Effluent Mixing Tank
- Historic Watercourse

0 1 2 4 km

N W E S

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Monitoring Areas on Hazeltine, Edney, and Frypan Creeks, 2022

Date: January 2023
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Figure 2.2

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Table 2.3: General Overview of Mount Polley CEMP Monitoring in Creeks, 2022 [a]

Waterbody	Sampling Area	Type	Sediment Quality	Periphyton			Benthic Invertebrate			Fish Habitat Assessment, Usage, and Community[b]
				Community	Productivity	Tissue Quality	Community	Productivity	Tissue Quality	
Frypan Creek	FPC-R2 (Reach 2)	Reference	-	-	-	-	-	-	-	✓
	FPC-R3 (Reach 3)	Reference	-	-	✓	-	✓	✓	-	-
Edney Creek	EDC - U (Upper)	Reference	✓	✓	✓	✓	✓	✓	✓	-
	EDC - D (Lower, unimpacted)	Reference	✓	-	-	✓	-	-	✓	✓
	E1 (Lowermost, impacted)	Exposed	-	-	-	✓	-	-	✓	
Hazeltine Creek	HAC-R1 (Upper, Reach 1)	Exposed	-	✓	✓	✓	✓	✓	✓	✓
	HAC-U (Upper, Reach 2)	Exposed	✓	✓	✓	✓	✓	✓	✓	
	HAC-R3 (Upper, Reach 3)	Exposed	-	-	✓	-	✓	✓	-	
	HAC-D (Lower, Reach 5)	Exposed	✓	-	-	✓	-	-	✓	

Notes: Checkmarks indicate sampling was completed at the area indicated, dashes indicate sampling was not completed at the area indicated.

[a] Detailed descriptions of each monitoring element and associated rationale based on historical findings are provided in the CEMP (MPMC 2019); detailed methods are provided in Section 4 of this report.

[b] Fish habitat assessment, fish habitat usage and community monitoring documented fish habitat conditions, and the usage of fish habitat by any / all fish species.

interpretation is outlined in the CEMP (MPMC 2019) and detailed methods are provided in Sections 3 and 4 of this document. Briefly, chemical data collected at potentially impacted areas are evaluated in comparison to environmental quality guidelines (as available), and based on statistical comparison to reference, to baseline and/or pre-breach, and over time (replication [n] is 5 to 8).

Presentation of chemical data incorporates results for all analytes reported by the laboratory; however, detailed analyses and discussion are focused on "primary" and "secondary" analytes (Table 2.4).[4] Primary and secondary analytes are constituents that have been identified in previous monitoring as being indicative of a mine influence on the receiving environment. Specifically, primary analytes are those that were previously identified as strongly indicative of a mine influence for most monitoring components and for which environmental quality guidelines are available. Secondary analytes are those that were previously identified as potentially indicative of a mine influence in only a subset of monitoring components. Evaluation of primary and secondary analytes was completed for all chemical data in the present report (i.e., water, sediment, and tissue quality data). To focus the interpretation of primary and secondary analyte results, discussion was limited to those analytes for which temporal differences (at the exposed areas) and/or spatial differences (between the exposed and reference or baseline/pre-breach areas) were reported. Biological data for potentially impacted areas are evaluated based on the measurement endpoints presented in Table 2.1 and are based on statistical comparison to reference, to baseline and/or pre-breach, and over time (replication [n] is typically 5).

Relationships between chemical and physical features (e.g., sediment chemistry and particle size distribution) and relationships between biological measurement endpoints and chemistry (e.g., benthic invertebrate community taxon richness and water or sediment chemistry) are evaluated using correlation or regression analysis to enhance understanding of potential cause. Although it is recognized that a significant correlation does not indicate cause, it can be useful in identifying potential cause and/or in distinguishing among different potential causes (e.g., Suter 2015). Lastly, data interpretation includes a step to bring the sediment and aquatic biological data together to identify consistencies (or inconsistencies) in the findings and to assist in the derivation of conclusions in consideration of all lines of evidence and relationships among them.

[4] Primary and secondary analytes are analytes that were classified as POIs (parameters of interest) and IPs (indicator parameters) for monitoring components in previous evaluations (see Minnow 2019a for details).

Table 2.4: Primary and Secondary Analytes used in the Evaluation of Chemical Data, 2022[a]

Category	Analyte
Primary	Arsenic
	Copper
	Iron
	Selenium
Secondary	Barium
	Cadmium
	Calcium
	Cobalt
	Manganese
	Mercury
	Molybdenum
	Nickel
	Phosphorus
	Silver
	Sodium
	Strontium
	Tin
	Titanium
	Uranium
	Vanadium
	Zinc

[a] See Section 2.4 and Minnow (2019a) for the rationale associated with selection of these analytes.

3 METHODS – LAKE HABITAT

3.1 Sediment Quality

Sediment was collected from shallow areas of Polley Lake (POL-S), Bootjack Lake (BOL-S), and Quesnel Lake (QUL-LNF1[5] and QUL-LREF1) in 2022 to support 14-day *Hyalella* Azteca toxicity testing (Figures 3.1 and 3.2, Tables 3.1 and 3.2). This sampling was completed in accordance with the requirements for shallow sediment monitoring outlined in the CEMP approval conditions dated February 10, 2021 (BCMOECCS 2021c; Section 1.2). Sediment was collected from the deep near-field area of Quesnel Lake (QUL-PNF), but not reference (QUL-PREF1)[6], to support benthic invertebrate community monitoring in this area (see Section 3.5).

Sample collection and analysis methods for 2022 are described herein and are consistent with those outlined in the CEMP (MPMC 2019). For details pertaining to prior sampling years, including equivalent historic sampling areas, refer to the references listed in Tables 3.1 and 3.2.

3.1.1 Sample Collection

Sediment samples were collected from Polley Lake (and the associated reference, Bootjack Lake) and Quesnel Lake between August 24 and August 27, 2022 (Appendix Table A.1.1). Five replicate stations were sampled to represent each monitoring area (Tables 3.1 and 3.2). Samples were collected using a stainless-steel Petite Ponar for the analysis of total organic carbon (TOC), total sulphur, total nitrogen, particle size, and metal concentrations. Sampling was conducted in accordance with technical guidance outlined in the British Columbia Field Sampling Manual (BCMOE 2013) and in federal Technical Guidance Manual for (Environment Canada 2012b) and was also consistent with previous years of monitoring (Minnow 2020a, 2022a; Table 3.1).

At each sampling station, samples were collected using a stainless-steel Petite Ponar as follows. The Petite Ponar used is a 6” x 6” (15.24 cm x 15.24 cm) grab sampler with jaws that can be held open by shear-pressure on a spring-loaded pin which is released when the sampler is lowered to the substrate and the shear-pressure on the pin is eliminated. The collection of each grab sample was initiated by carefully lowering the ponar to the sediment surface.

[5] Due to changing water levels in Quesnel Lake, the shallow near-field area (QUL-LNF1) was moved in 2019 to a deeper and continually submerged location nearby (see Minnow 2020a for details). Samples collected in 2020 to 2022 were also from this deeper monitoring location, consistent with 2019 monitoring locations.

[6] Evaluation of benthic invertebrate community recovery at the deep near-field area (QUL-PNF) in 2022 could be addressed without comparison to the deep reference area (QUL-PREF1). See Section 3.5 for details.

588,000 590,000 592,000 594,000 596,000 598,000

5,826,000

5,824,000

5,822,000

Trio Creek

Morehead Creek

Mount Polley Mine Perimeter

Polley Lake

P1

B1

Bootjack Lake

P2

B2

Trio Lake

POL-S

Hazeltine Creek

Bootjack Creek

BOL-S

Bootjack Lake Dam

LEGEND

- Exposed Area
- Reference Area
- Routine Water Monitoring Station
- Historic Watercourse

Note: Bathymetry is displayed in meters.

0 0.5 1 2 km

N W E S

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Sediment Chemistry and Toxicity Monitoring Areas, Polley Lake and Bootjack Lake, 2022

Date: January 2023
Project 227202.0029

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Figure 3.1

Document Path: C:\Users\CApol\Trinity Consultants, Inc\Imperial Metals - 227202.0029 - 2022 MPMC\D - GIS\Task 7\22-29 Figure 3.1 Sed Lakes Polley.mxd

595,000 600,000 605,000 610,000

5,820,000

5,815,000

Mount Polley Mine Perimeter

Polley Lake

Boswell Lake

Bootjack Creek

Horsefly Lake Forest Service Road

Winkley Creek Road

WTP

Tailings Storage Facility (TSF)

Lake Road

Hazeltine Creek

QUL-PNF

QUL-LNF1

Diffuser 1
Diffuser 2

Quesnel Lake

Creek

Edney Creek

Edney Lake

Horsefly Bay

QUL-LREF1

Horsefly River

595,000 600,000 605,000 610,000

LEGEND

- Exposed Area
- Reference Area
- Diffuser (Treated Effluent Discharge, December 2015 to present)
- Central Collection Sump
- Water Treatment Plant (WTP)
- Effluent Discharge Pipeline (January 2018 to present)
- Discharge to Diffusers (2015 to present)
- Historic Watercourse

[a] Not all monitoring components were completed at all areas shown. Monitoring included at least one of: sediment chemistry, sediment toxicity, and benthic invertebrate community. See Tables 3.2, 3.3, and 3.7 for details of monitoring components.

Note: Bathymetry is displayed in meters.

0 0.5 1 2 km

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N W E S

Sediment Chemistry, Sediment Toxicity, and Benthic Invertebrate Community Monitoring Areas, Quesnel Lake, 2022[a]

Date: January 2023
Project 227202.0029

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Figure 3.2

Document Path: C:\Users\CApol\Trinity Consultants, Inc\Imperial Metals - 227202.0029 - 2022 MPMC\D - GIS\Task 7\22-29 Figure 3.2 Sediment and BI Quesnel Lake.mxd

Table 3.1: Sediment Quality Monitoring in Polley Lake (Exposed) and Bootjack Lake (Reference) Shallow Areas, 2019 to 2022[a]

Program Component	Waterbody Area	Area Type	Area Codes	Analyses	Post-Breach	
					2019 (Minnow 2020a)	2022
Breach-Related	Bootjack Lake	Reference	BOL-S	Sediment Quality[b]	5	5
	Polley Lake	Exposed	POL-S	Sediment Quality[b]	5	5

[a] Numbers indicate the number of stations sampled per area. Only sampling areas that were monitored in 2022 are displayed, as well as historical data for these areas.

[b] Sediment Quality analyses included: metals and Total Organic Carbon (TOC) in < 63 µm fraction, moisture, particle size, pH, total nitrogen, and total sulphur.

Table 3.2: Overview of Sediment Quality Monitoring in Quesnel Lake, 2007 to 2022[a]

Program Component	Waterbody Area	Area Type	Area Codes	Pre-Breach	Post-Breach							
				2007 (Minnow 2009)	2014 (Minnow 2015a)	2015 (Minnow 2015b)	2016 (Minnow 2016c)	2018 (Minnow 2019a)	2019 (Minnow 2020a)	2020 (Minnow 2021a)	2021 (Minnow 2022a)	2022
Breach-Related	Deep	Exposed	QUL-PNF	-	5	5	5	5				
	Shallow	Reference	QUL-LREF1	-	5	5		-	5	5		
		Exposed	QUL-LNF1 (QUL in 2007)	5	5	3		-	5	5	5	5

Notes: "-" = not applicable. Sediment Quality analyses included: metals and Total Organic Carbon (TOC) in < 63 µm fraction, moisture, particle size, pH, total nitrogen, and total sulphur for sampling completed between 2014 and 2022.

[a] Numbers indicate the number of stations sampled per area. Only sampling areas that were monitored in 2022 are displayed, as well as historical data for these areas.

Care was taken to control the rate at which the ponar was lowered to allow appropriate sediment penetration and to minimize sediment disturbance. Once the ponar was lowered to the sediment surface, surficial sediment was collected by pulling upwards on the sampler so that the jaws of the ponar closed, capturing the surficial sediment. The ponar was then carefully retrieved to surface, the sediment grab was placed into a plastic tote, and observed for completeness and unusual characteristics. If the sample was deemed acceptable (i.e., the sampler was full to each end and was representative of surface sediment), material to a depth of 3 cm was transferred to a second tote using a stainless-steel spoon, and the remaining sediment was discarded. This procedure was repeated at each station for a minimum of five successful grabs. At that point, the composite material within the tote was homogenized using a stainless-steel spoon and transferred into two 250 mL glass sampling jars labeled with the project number, sample location, and collection date. All sampling equipment was rinsed between stations using site water. At the deep near-field area of Quesnel Lake (QUL-PNF; Figure 3.2, Table 3.2), the ponar sampler was retrieved with the assistance of a commercial line hauler (Ace Line Hauler Brutus Plus 40).

Duplicate (split) sediment samples were collected at a target frequency of 10% for QA/QC purposes. Immediately after collection, samples were stored in a cooler with ice packs until they were placed in a refrigerator at the field laboratory, where they were held until shipment (on ice) to the analytical laboratory.

Supporting measures were collected at each sampling station to support data interpretation (Appendix Tables A.1.1, A.1.2; see Section 3.8.1 for details).

3.1.2 Laboratory Analysis

Laboratory analysis of sediment quality samples from lake habitats was completed by ALS Environmental in Burnaby BC, a laboratory that is accredited by the Canadian Association for Laboratory Accreditation (CALA). Upon receipt of the sample shipment(s), ALS Environmental measured temperature in each cooler to verify the maintenance of cold samples, logged each sample, and assigned each sample a unique sample identification code. A sample receipt notification (SRN) was then sent to MPMC and Minnow for verification.

Laboratory analysis included moisture content, pH, particle size distribution, TOC, total nitrogen, total sulphur, and total metal concentrations for all samples. Analysis methods for all parameters were consistent with previous post-breach sampling years (Tables 3.1 and 3.2). Analyses except for moisture, pH, total nitrogen, total sulphur, and particle size distribution were completed on the silt/clay fraction (<63 µm diameter) in accordance with recommendations (BCMOE 2016) and consistent with previous methods (2014 to 2021; Tables 3.1 and 3.2). Analysis of pH was completed by electrode; particle size analysis was completed by sieve and pipette; TOC was completed by combustion and titration (total carbon minus total inorganic carbon); and total

nitrogen and total sulphur were completed by combustion. Analysis of metals was based on the BC Strong Acid Leachable Metals digestion (SALM; BCMOE 2016), with total metals analysis completed by Collision Reaction Cell Inductively Coupled Plasma – Mass Spectrometry (CRC-ICP-MS; United States Environmental Protection Agency [USEPA] Method 6020B; USEPA 2014]), and mercury analysis completed by Cold Vapour Atomic Absorption Spectrophotometry (CVAAS; USEPA Methods EPA 200.2/1631; USEPA 1994, 2001).

QA/QC sampling completed by the laboratory included method blanks (MBs), laboratory replicates, and laboratory accuracy measures (i.e., laboratory control samples, and/or internal reference materials). Upon completion of the analyses, a data report was provided by ALS to MPMC and Minnow in Adobe Acrobat Portable Document Format (PDF) and Microsoft Excel files (Appendix G).

3.1.3 Data Analysis

3.1.3.1 Data Screening and Analytes of Interest

Upon receipt of the initial analytical data, a DQR was completed, including an examination of data completeness, laboratory reporting limits (LRLs) achieved, laboratory precision, laboratory accuracy, and field precision (Appendix B). Following completion of the DQR, raw data were summarized by area by calculating mean, median, standard deviation (SD), minimum, and maximum. Summary statistics were calculated using the Kaplan-Meier (K-M) method as described in Section 3.8.3.1.

Data were evaluated in comparison to British Columbia Working Sediment Quality Guidelines for the protection of aquatic life (BCMOECCS 2021a) and the British Columbia Approved Water Quality Guideline for selenium in sediment (BCMOECCS 2021b), collectively termed Working Sediment Quality Guidelines (WSQG) in this report. WSQGs are numerical criteria that are protective of sediment-dwelling organisms based on long-term exposure. Most WSQGs have been adopted from the Canadian Council of Ministers of the Environment (CCME; CCME 1999) or from Ontario (OMOE 1993) and have two levels – a Lower WSQG and an Upper WSQG. The Lower WSQG is intended to represent a concentration that will protect aquatic life from adverse effects of a toxic substance in most situations. The Upper WSQG is intended to represent a concentration that, if exceeded, will likely cause severe effects on aquatic life (BCMOECCS 2021a). However, WSQGs (even the Upper WSQGs) are often naturally exceeded in mineralized areas. In addition, WSQGs were developed based on co-occurring bulk surficial sediment data and biological effect data (CCME 1995). Bulk sediment chemistry can differ substantially from the <63 µm fraction. This discrepancy between measurement

(<63 µm fraction) and exposure (to bulk sediment to which WSQGs are most applicable) should be considered in interpretation, as "caution should be used in interpreting the biological significance of chemical concentrations in sediments for different types based on these guidelines" (CCME 1995).

Sediment quality data from exposed areas were also evaluated relative to 1) "reference data" and 2) "pre-breach data". Reference data included all post-breach data (2014 to 2022) from reference areas that were sampled in 2022. Reference and pre-breach data were compiled separately and used to calculate reference and pre-breach 95th percentile screening values, respectively. Reference 95th percentile screening values were calculated from each post-breach reference dataset (i.e., separately for Bootjack Lake shallow [BOL-S] and Quesnel Lake shallow [QUL-LREF1] and deep [QUL-PREF1][7] reference areas). Pre-breach 95th percentile screening values were calculated from each available pre-breach dataset (i.e., Quesnel Lake shallow area QUL-LNF1 [2007]). Once calculated, the 95th percentile reference and pre-breach screening values were compared, and the highest value for each analyte was then used to screen the associated exposed data. If pre-breach data were not available, as is the case for the shallow areas of Polley Lake and the deep monitoring areas of Quesnel Lake, only the 95th percentile reference values were used. The reference and pre-breach data used in the calculation of the 95th percentiles and used in data screening are presented in Appendix C.

All analytes (including primary and secondary analytes) were screened against WSQG and reference/pre-breach 95th percentile values. Analytes at exposed areas with mean concentrations that exceeded all the following criteria were termed "Analytes of Interest": 1) the WSQG, 2) the associated reference 95th percentile value, and 3) the associated pre-breach 95th percentile value (if available). Analytes of Interest were determined separately for each monitoring area (i.e., separately for shallow area of Polley Lake, and deep and shallow areas of Quesnel Lake). Concentrations of the Analytes of Interest, along with TOC, were the focus of more detailed interpretation which included graphical plots, formal statistical contrasts of temporal changes, and spatial differences in concentrations, and examination of relationships to physical and chemical sediment variables.

3.1.3.2 Statistical Analyses

Statistical analyses of Analyte of Interest and TOC concentrations in lake sediments were conducted using post-breach data (i.e., 2014 to 2022) to answer the following questions:

[7] The deep reference area of Quesnel Lake (QUL-PREF1) was not sampled in 2022 (see above), therefore reference 95th percentile values for this area were calculated using post-breach data from previous years (2014 to 2021; data previously presented in Minnow 2022a).

1. Have mean analyte concentrations at the exposed area changed relative to the reference area?[8]
2. Are there differences in mean analyte concentrations between exposed and reference areas, and does the difference depend on year?
3. Have mean analyte concentrations at the exposed area changed over time since the breach?

To answer these questions, data were grouped into three categories for separate tabular and graphical presentation and statistical analyses:

1. Shallow Polley Lake (POL-S; exposed) compared to a shallow reference area (Bootjack Lake; BOL-S).
2. Deep exposed area of Quesnel Lake (QUL-PNF) compared to an un-impacted deep reference area (QUL-PREF1)[9].
3. Shallow exposed area of Quesnel Lake (QUL-LNF1) compared to an un-impacted shallow reference area (QUL-LREF1).

Questions 1 and 2 were answered by conducting a two-way Analysis of Variance (ANOVA) assessing the exposed:reference ratios of results, with *Area* and *Year* as factors and assessing the interaction between *Area* and *Year.* The two-way ANOVA included all data with paired exposed and reference results (i.e., excluded QUL-PNF data from 2020 and 2022 which did not have corresponding reference results). Except for TOC, the data used in the two-way ANOVA model were $\log_{10}$ transformed. As such, differences between the exposed and reference areas were multiplicative when testing the significance of the interaction between *Area* and *Year* (i.e., if the concentration in the reference area decreases by 50%, then the null hypothesis would be that the concentration in the exposed area also decreases by 50%). Few data points were below the LRL but were replaced with the highest LRL when present. If the *Area*×*Year* interaction term was significant ($\alpha = 0.05$), then the ratios of the concentrations from the exposed area to the reference area differed among years. In this case, pairwise contrasts among years were completed to compare the relative difference in means (in $\log_{10}$ units) between areas among years. The hypotheses tested were:

$$H_0: \left(\mu_{\text{Exposed}} - \mu_{\text{Reference}}\right)_i = \left(\mu_{\text{Exposed}} - \mu_{\text{Reference}}\right)_j \text{ for all years i, j, i} \neq \text{j}$$

[8] i.e., has the ratio of concentrations (exposed:reference) changed over time?

[9] Although the deep reference area of Quesnel Lake (QUL-PREF1) was not sampled in 2022, results from this area (2014 to 2021; Minnow 2022a) were included in tabular and graphical presentation and in statistical analyses to provide additional context for the interpretation of temporal changes at the deep near-field area (QUL-PNF) from 2014 to 2022.

The contrasts were completed for all pairwise comparisons among years, where paired exposed and reference data were available. The analysis for metals assumed data were $\log_{10}$ distributed so the hypothesis of testing differences between means is equivalent to testing the ratios of exposed to reference concentrations on the untransformed scale because of the following property of logarithms:

$$log\left(x_{\text{Exposed}}\right) - log\left(x_{\text{Exposed}}\right) = log\left(\frac{x_{\text{Exposed}}}{x_{\text{Reference}}}\right).$$

Comparisons of TOC were conducted on untransformed data and thus significant interactions tested for absolute rather than relative differences between reference and exposed areas. The results of the multiple comparisons among years were displayed by assigning letters (e.g., A, B, C) to each year. Letters were assigned such that the year with the highest ratio (or absolute difference for TOC) of exposed:reference was assigned the letter "A" and years that do not differ significantly (α = 0.05) share a letter. When the *Area*×*Year* interaction term was not significant (α = 0.05), the differences between areas were consistent among years and no exposed:reference relative contrasts were conducted.

Temporal changes in the ratio of exposed:reference (or absolute difference for TOC) were quantified by calculating a Magnitude of Difference (MOD), which is the difference between the value for the exposed area and the predicted value for the exposed area, assuming the same ratio (i.e., exposed:reference) from the baseline year (the first year the data were collected). This MOD was expressed as a percent change as:

$$MOD = \frac{10\text{^}\bar{x}_{Exposed\ Observed} - 10\text{^}\bar{x}_{\text{Exposed }Predicted}}{10\text{^}\bar{x}_{\text{Exposed }Predicted}} \times 100\%$$

where $\bar{x}_{Exposed\ Observed}$ is the mean for the exposed area (in $\log_{10}$ units) for the given year and $\bar{x}_{\text{Exposed }Predicted}$ is the predicted mean (log units), assuming the relative difference between the exposed area and reference area did not change from the baseline year (i.e., $\bar{x}_{\text{Exposed }Predicted} = \bar{x}_{\text{Reference}} + \left(\bar{x}_{\text{Exposed B}aseline} - \bar{x}_{\text{Reference B}aseline}\right)$). The MODs for TOC did not need to be back-transformed but were calculated using the same formula otherwise.

Question 3 was answered using the results of the same two-way ANOVA used to answer Question 1 but considered exposed and reference data independently (rather than assessing the exposed:reference ratio as outlined for Questions 1 and 2). These analyses included unpaired exposed and reference data that were not assessed as part of the analyses addressing in Questions 1 and 2 (i.e., QUL-PNF results from 2020 and 2022). When the interaction term of this two-way ANOVA was significant, spatial and temporal *post hoc* contrasts were conducted to test for differences among years for each area and between reference and exposed areas in

each year. The MOD between the exposed and reference areas for significant spatial comparisons was calculated in each year as:

$$MOD = \frac{10\text{^}\bar{x}_{Exposed} - 10\text{^}\bar{x}_{\text{Reference}}}{10\text{^}\bar{x}_{\text{Reference}}} \times 100\%$$

where $\bar{x}_{Exposed}$ and $\bar{x}_{Reference}$ are the exposed and reference area means (in log units), respectively. The MOD for temporal differences from the base year were similarly calculated as:

$$MOD = \frac{10\text{^}\bar{x}_{Yeari} - 10^{\bar{x}}{}_{\text{Base year}}}{10\text{^}\bar{x}_{\text{Base year}}} \times 100\%$$

where $\bar{x}_{Yeari}$ and $\bar{x}_{Baseyear}$ are the means for the selected year and base year of monitoring (in log units), respectively. For both MOD calculations, the means for TOC were not back-transformed because the model used untransformed data. When the interaction term was not significant, the differences between exposed and reference areas were consistent over time and a spatial MOD (i.e., between areas) was calculated for all years combined if the *Area* term was significant, and temporal contrasts and MODs were conducted for the pooled areas (i.e., combined reference and exposed).

Analytes of Interest and TOC concentrations were plotted to support the two-way ANOVA results. Where relevant, these plots included comparison of post-breach data (i.e., those data included in the analyses) to WSQG and reference/pre-breach 95th percentile values. Pre-breach data were also included in a sub-set of the plots for context.

Relationships between the Analytes of Interest concentrations and sediment physical (i.e., particle size) and chemical variables (TOC, total nitrogen, and total sulfur content) were evaluated using Spearman correlation analysis. Correlation analyses were conducted separately for each of the three data groupings outlined above (1: shallow Polley Lake and Bootjack Lake areas; 2: deep Quesnel Lake areas; 3: shallow Quesnel Lake areas) using all available post-breach data (i.e., 2014 to 2022) to evaluate these relationships over time. For both deep and shallow monitoring areas, differing relationships were apparent for the exposed areas relative to reference. As such, correlations were run separately for two groups of data: 1) the paired exposed and reference areas combined (i.e., POL-S and BOL-S; QUL-PNF and QUL-PREF1, and QUL-LNF1 and QUL-LREF1); 2) exposed areas only (i.e., POL-S, QUL-PNF, QUL-LNF1 independently and separate from reference). Metal concentrations were measured in the <63 µm fraction of sediment (see Section 3.1.2), therefore relationships between Analyte of Interest concentrations and particle size were completed for this fraction of sediment only, with clay content used in correlations calculated as (% clay)/(% silt and clay). Following the derivation

of correlation coefficients, a Bonferroni-type correction (i.e., α = 0.05 divided by the total number of independent variables) was applied to minimize the risk of declaring false positive correlations since at least 5% of derived correlations would be expected to occur by chance alone at an uncorrected α of 0.05. Any significant correlations found at the Bonferroni-adjusted α were further investigated using scatter plots.

Sediment quality data were analysed using Principal Component Analysis (PCA) as a means of summarizing the data for use in correlation analyses to assess potential physical and/or chemical causes of differences in benthic invertebrate community condition (see Section 3.5.3.2). PCA is a multivariate statistical ordination technique that can be used to reduce many variables (in this case 34 analytes for sediment quality) and to assist in the identification of patterns in datasets. PCA was completed using data from the deep exposed area of Quesnel Lake (QUL-PNF) collected from 2014 to 2022. Prior to running PCA, analytes for which more than 25% of the data were below the LRL, or analytes for which an incomplete dataset existed were excluded from the data matrix. All concentration data were transformed using a $\log_{10}$-transformation and principal component axes were then generated. Subsequently, the correlation between each parameter and the first two principal components (PCs) were tested using a Pearson's correlation coefficient and plotted to identify analytes that best explained similarities and differences in sediment chemistry among stations.

All sediment statistical analyses and plots were completed using R (R Core Team 2022).

3.2 Sediment Toxicity

Toxicity testing was completed in 2022 using sediments from shallow areas of Polley Lake, Bootjack Lake, and Quesnel Lake to satisfy Condition 9 of the CEMP approval issued by ENV (BCMOECCS 2021c) which specified the following:

> *"The 14-day sediment toxicity test on H. azteca must be conducted every three years (i.e., next in 2022) using sediment of shallow habitat from Polley Lake unless MPMC can clearly show that copper concentrations in all Polley Lake shallow sediment samples are below the 95th percentile of the copper concentrations in the Bootjack Lake reference area shallow sediment samples. H. azteca toxicity testing using sediment from shallow areas of Quesnel Lake must be continued as stated in the March 14, 2019 approval letter. "No effect to H. azteca" in that letter shall mean "no unacceptable response" relative to the reference area, as defined on page 37 of "Mount Polley Comprehensive Environmental Monitoring Program 2019 – Sediment and Aquatic Life".*

In accordance with this CEMP condition (BCMOECCS 2021c), 14-day toxicity testing using *H. azteca* (an epi-benthic amphipod) was completed in 2022 using shallow

breach-impacted sediments from Polley Lake (POL-S; with shallow Bootjack Lake sediments serving as reference [BOL-S]) and from Quesnel Lake (QUL-LNF1; with shallow un-impacted sediments from Quesnel Lake serving as reference [QUL-LREF1]; Figures 3.1 and 3.2, Table 3.3).

Sample collection and analysis methods for 2022 are described herein are consistent with those outlined in the CEMP (MPMC 2019). For details pertaining to prior sampling years refer to the references listed in Table 3.3.

3.2.1 Sample Collection

Sediment samples for toxicity testing using *H. azteca* in 2022 were collected from shallow areas of Polley Lake (POL-S), Bootjack Lake (BOL-S), and Quesnel Lake (QUL-LNF1, QUL-LREF1; Figures 3.1 and 3.2, Table 3.3) as described in Section 3.1.1. Sediments were collected at a total of five replicate stations per area, with the field replicates serving as replicates in the laboratory. Sediment samples for toxicity testing were shipped to Nautilus Environmental (Nautilus) in Burnaby BC following the methods used for sediment quality samples, described in Section 3.1.1.

3.2.2 Laboratory Analysis

Upon receipt, Nautilus opened the coolers, measured temperature to verify the maintenance of cold samples, removed each sample from the coolers, logged the sample, and confirmed sample receipt with MPMC and Minnow. Static water toxicity testing of *H. azteca* is outlined in detail in Nautilus (2022; Appendix G) and was conducted according to procedures described in the Biological Test Method for the 14-day survival and growth test using *H. azteca* (Environment Canada 2017). Briefly, for the 14-day test of *H. azteca*, Nautilus set up five field-replicate test vessels per area (i.e., with each replicate representing a sampling station). A laboratory control (beach sand in accordance with the biological test method) was also set up with five laboratory replicates.

In the toxicity test laboratory, several supporting measurements were collected within the toxicity test vessels as described by Nautilus (2022; Appendix G). Briefly, this included meter measurements of overlying water (temperature, dissolved oxygen, conductivity, and pH) and the collection of overlying water for analysis of ammonia and dissolved copper by ALS Environmental (Burnaby, BC). Collection of overlying water samples for analysis of dissolved copper was completed at test termination (Nautilus 2022; Appendix G).

Table 3.3: Overview of Sediment Toxicity Monitoring in Lake Habitats in the Vicinity of the Mount Polley Mine, 2014 to 2022 [a]

Waterbody		Area Type	Area Code	2014 (Minnow 2015a)		2016 (Minnow 2017d)		2019 (Minnow 2020a)	2020 (Minnow 2021a)	2021 (Minnow 2022a)	2022
				Chironomus dilutus	*Hyalella azteca*	*Chironomus dilutus*	*Hyalella azteca*	*Hyalella azteca*	*Hyalella azteca*	*Hyalella azteca*	*Hyalella azteca*
				10-day survival and growth	14-day survival and growth	10-day survival and growth	14-day survival and growth	14-day survival and growth	14-day survival and growth	14-day survival and growth	14-day survival and growth
Bootjack Lake	Shallow	Reference	BOL-S	-	-	-	-	5	-	-	5
Polley Lake		Exposed	POL-S	-	-	-	-	5	-	-	5
Quesnel Lake	Shallow	Reference	QUL-LREF1	5 (5)	5 (5)	5	5	5	5	5[b]	5
		Near-field	QUL-LNF1	5 (5)	5 (5)	5	5	5	5	5[b]	5

Notes: "-" = not applicable/ not tested.

[a] Values indicate the number of stations sampled per area. Values in brackets, e.g., (x), indicate the number of replicates per station. If no value in brackets is given, the number of replicates was one per station. Only sampling areas that were monitored between in 2022 are displayed, as well as historical data for these areas.

[b] 14-day survival and growth tests were completed using two methodologies in 2021 as part of an investigation: 1) the standard static exposure methods that have been employed in all prior years; and 2) static-renewal exposure methods that differ from methods used in prior years. See Minnow 2022a for details.

3.2.3 Data Analysis

Statistical analyses for the tests were performed by Nautilus using CETIS software (Tidepool Scientific Software 2021) and included contrasts of the exposed area against laboratory controls and the matched reference area. Statistical contrasts were completed following guidance provided by Environment Canada (2005) and involved the use of an ANOVA with Dunnett's test for quantitative data that met parametric test assumptions. When nonparametric techniques were required, the data were analyzed using the Steel Many-one rank sum test. For quantile data, the Fisher Exact/Bonferroni Holm test was performed. Significant differences were determined at a significance level $\alpha = 0.05$.

Sediment toxicity test results were interpreted based on a combination of statistical contrasts and effect size by comparing exposed area results relative to both the laboratory control and reference area results. For this evaluation, results were grouped into two categories for separate tabular and graphical presentation, statistical analyses, and interpretation:

1. Shallow Polley Lake area (POL-S; exposed) compared to a shallow reference area (Bootjack Lake; BOL-S), tested using *H. azteca*.
2. Shallow exposed area of Quesnel Lake (QUL-LNF1) compared to an un-impacted shallow reference area (QUL-LREF1), tested using *H. azteca*.

Comparisons for each test endpoint were evaluated using a stepwise procedure similar to that of the Southern California Coastal Water Research Project (SCCWRP) California Sediment Quality Objectives (CASQO; Bay et al. 2014):

1. Mean responses (percent survival and growth [dry weight per surviving organism]) were expressed as a percentage of the mean laboratory control result and the mean field reference result.
2. Results of the statistical contrasts of mean responses in tests of impacted sediment against the laboratory control and the field reference sediment were compiled (i.e., the impacted area was identified as significantly different or not significantly different from the mean laboratory control result and the mean field reference result).
3. Results were categorized as follows:
    a. No unacceptable response was identified as a mean response within 20% of the mean laboratory control result and the mean field reference result (i.e., survival or growth were ≥80% of the control and field reference);
    b. Low to moderate response was identified as a mean response of between 20% and 50% of the mean laboratory control result and the mean field reference result (i.e., survival or growth were 50% to 80% of the control and field reference);

c. High (large) response was identified as a mean response of >50% of mean laboratory control result and the mean field reference result (i.e., survival or growth were <50% of the control and field reference);

1. Results that were in the low to moderate response category were subject to a further categorization step:

   a. If the “low to moderate” response did not differ statistically from the laboratory control and the field reference, it was categorized as a low response;
   b. If the “low to moderate” response differed statistically from the laboratory control and the field reference, it was categorized as a moderate response.

2. Where comparisons to mean laboratory control result and the mean field reference result did not fall into the same response category, the result was discussed relative to both the control and the field reference.

Application of a 20% reduction in survival relative to the field reference to define acceptability is consistent with thresholds used elsewhere (e.g., Suter et al. 1995; BCMELP 1998; Government of Canada 2010; Mebane 2010; Nautilus and Zajdlik 2011; Bay et al. 2014). The 20% threshold is the same as the acceptability threshold for laboratory control survival identified in the test method (i.e., a test is considered acceptable if fewer than 20% of organisms in the laboratory control die; Environment Canada 2017).

Toxicity test results were evaluated relative to *in situ* water quality measures *(*field and laboratory) and relative to results of other components of the CEMP. Control normalized survival and growth results (i.e., presented as a percentage of the average laboratory control result) were plotted over time for each exposed and corresponding reference monitoring area. Relationships between control normalized survival and growth results and supporting chemical and physical variables (i.e., sediment TOC and copper concetrations and overlying water dissolved copper concentrations [field and laboratory]) were evaluated using a simple linear regression model. Data were explored for outliers based on studentized residuals of the linear regression; data points with values > 3 were considered outliers. When outliers were identified, correlations were run with and without outliers included in the data and results of both analyses presented.

The regression analysis included all avaliable data for each monitoring area (2014 to 2022 for shallow Quesnel Lake areas, and 2019 and 2022 for shallow Polley Lake and refererence) and relationships were plotted along with the line of best fit. Statistically significant regressions were identified using an α of 0.05. All analyses were conducted using R (R Core Team 2022).

3.3 Plankton Community and Productivity

Plankton community and productivity monitoring in 2022 was completed at an exposed area in Polley Lake (POL-P2) with Bootjack Lake (BOL-B2) serving as a reference, and exposed (QUL-ZOO-1) and reference (QUL-ZOO-7) areas of Quesnel Lake (Figure 3.3, Tables 3.4 and 3.5; Appendix Table A.1.3). Monitoring was completed in June, July, and August, with each sampling event occurring at least 30 days apart. Single (n = 1) phytoplankton and zooplankton samples were collected in June and August at each monitoring area, and five replicate (n = 5) samples were collected in July at each monitoring area (Tables 3.4 and 3.5), in accordance with the CEMP (MPMC 2019). As outlined in the CEMP (MPMC 2019), the frequency of plankton community and productivity sampling is annual, and monitoring at these areas was last completed in 2021 (Minnow 2022a). It should be noted that phytoplankton productivity has been evaluated solely based on chlorophyll-a concentrations since (including 2022; see Minnow 2021a for details).

Sample collection and analysis methods for 2022 are described herein. For details pertaining to prior sampling years, refer to the references listed in Tables 3.4 and 3.5.[10]

3.3.1 Sample Collection

3.3.1.1 Phytoplankton

Phytoplankton sampling was completed in June (n=1 per area), July (n=5 per area), and August (n=1 per area) 2022 and included the collection of community composition and productivity (chlorophyll-a) samples (Table 3.4; Appendix Table A.1.3).

Phytoplankton samples were collected using a depth-integrated tube water sampler that is weighted at the bottom. The depth-integrated sampler (length ~13 m) enables collection of water and phytoplankton throughout the photic zone (the upper layer of the water column receiving light penetration). Depth-integrated samples were collected using nearly the full length of the tube whenever station depth is greater than 12 m, or only a portion of the tube in areas < 12 m deep (Appendix Table A.1.3) to prevent collection of sediment or water from the sediment-water interface. To collect one sample, the weighted end of the plastic tubing was lowered to the required sampling depth, the hose was crimped, and the depth-integrated sampler was pulled to the surface with the hose remaining crimped the entire time.

[10] Minnow has completed interpretive reporting for plankton community and productivity monitoring data collected since 2018 (Minnow 2019a, 2020a, 2021a, 2022a) and has completed monitoring implementation since 2019 after providing monitoring program design modifications (Minnow 2019c) at the request of MPMC. A complete description of historic plankton sampling activities was included in Minnow (2019a) and the modified monitoring program design was included in the approved CEMP (MPMC 2019).

590,000 595,000 600,000 605,000 610,000 615,000 620,000

5,825,000

5,820,000

5,815,000

Frypan Lake
Cedar Creek
Spanish Lake
Nina Lake
Horsefly Lake Forest Service Road
POL-P1
Polley Lake
Mount Polley Mine Perimeter
BOL-B1
Bootjack Lake
POL-P2
BOL-B2
BOL-B2
Boswell Lake
Winkley Creek Road
Bootjack Creek
Bootjack Creek Dam
QUL-ZOO-1
WTP
QUL-18
Tailings Storage Facility (TSF)
QUL-58
Diffuser 1
Diffuser 2
Quesnel Lake
QUL-120A
Hazeltine Creek
QUL-2a
QUL-ZOO-7
Gavin Lake Road
Edney Creek
Edney Lake Road
Horsefly Bay
Horsefly River

590,000 595,000 600,000 605,000 610,000 615,000 620,000

LEGEND

- Exposure
- Reference
- Routine Water Monitoring Station
- Diffuser (Treated Effluent Discharge, December 2015 to present)
- Water Treatment Plant (WTP)
- Central Collection Sump
- Effluent Discharge Pipeline (January 2018 to present)
- Discharge to Diffusers (2015 to present)
- Historic Watercourse

[a]Monitoring at each plankton monitoring area included at least one of: phytoplankton community and productivity, zooplankton community and productivity, and zooplankton tissue chemistry. See Tables 3.4, 3.5 and 3.6 for details of monitoring components.

Note: Bathymetry is displayed in meters.

0 1 2 4 Km

Projection: North American Datum 1983 UTM Zone 10U
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N W E S

Plankton and Supporting Water Quality Monitoring Areas, Polley, Bootjack, and Quesnel Lakes, 2022[a]

Date: January 2023
Project 227202.0029

minnow environmental inc.

Figure 3.3

Document Path: C:\Users\CApol\Trinity Consultants, Inc\Imperial Metals - 227202.0029 - 2022 MPMC\D - GIS\Task 5\22-29 Figure 3.3 Plankton and WQ Monitoring.mxd

Table 3.4: Overview of Phytoplankton Community and Productivity Monitoring in Lake Habitats in the Vicinity of the Mount Polley Mine, 1995 to 2022[a]

Waterbody	Area Type	Area Code	Component	Baseline		Post-Breach														
				1995 (HKP 1996)	1996 (HKP 1997a)	2015 (Golder 2016a)	2016	2017	2018 (Minnow 2019a)	2019[b] (Minnow 2020a)			2020 (Minnow 2021a)			2021 (Minnow 2022a)			2022		
										June	July	August	June	July	August	June	July	August	June	July	August
Polley Lake	Exposed	POL-P2	community	7	5	6	2	2	2	1	5	1	1	5	1	1	5	1	1	5	1
			chlorophyll-a	9	5	4	2	2	2	1	5	1	1	5	1	1	5	1	1	5	1
	Reference	BOL-B2	community	9	6	-	-	-	-	1	5	1	1	5	1	1	5	1	1	5	1
			chlorophyll-a	4	6	-	-	-	-	1	5	1	1	5	1	1	5	1	1	5	1
Quesnel Lake	Exposed	QUL-ZOO-1	community	-	-	-	2	2	2	1	5	1	1	5	1	1	5	1	1	5	1
			chlorophyll-a	-	-	-	2	2	2	1	5	1	1	5	1	1	5	1	1	5	1
	Reference	QUL-ZOO-7	community	-	-	-	2	2	2	1	5	1	1	5	1	1	5	1	1	5	1
			chlorophyll-a	-	-	-	2	2	2	1	5	1	1	5	1	1	5	1	1	5	1

Notes: "-" = not applicable; data from 2015 to 2018 were provided in electronic form to Minnow from the Mount Polley Mine database. References are not displayed for data from 2016 and 2017 because these data were not contained in a specific report (to Minnow's knowledge) and these data were provided by MPMC to Minnow as a Microsoft Excel file.

[a] Values indicate the number of samples collected per area per year or month. Only sampling areas that were monitored in 2022 are displayed, as well as historical data for these areas.

[b] Phytoplankton sampling in 2019 was performed at all areas using two methodologies (surface grab and depth-integrated sampler) to facilitate a statistical comparison of methods

Table 3.5: Overview Zooplankton Community and Productivity Monitoring in Lake Habitats in the Vicinity of the Mount Polley Mine, 1995 to 2022[a]

Waterbody	Area Type	Area Code	Component	Baseline		Post-Breach																	
				1995 (HKP 1996)	1996 (HKP 1997a)	2014 (Golder 2017a)	2015 (Golder 2017a)	2016 (Golder 2017a)	2017 (Golder 2017a)	2018 (Minnow 2019a)	2019[b] (Minnow 2020a)			2020 (Minnow 2021a)			2021 (Minnow 2022a)			2022		
											June	July	August	June	July	August	June	July	August	June	July	August
Polley Lake	Exposed	POL-P2	community	5	5	-	5	2	2	2	1	5	1	1	5	1	1	5	1	1	5	1
			biomass	-	-	-	-	-	-	-	1	5	1	1	5	1	1	5	1	1	5	1
	Reference	BOL-B2	community	6	6	-	-	-	-	-	1	5	1	1	5	1	1	5	1	1	5	1
			biomass	-	-	-	-	-	-	-	1	5	1	1	5	1	1	5	1	1	5	1
Quesnel Lake	Exposed	QUL-ZOO-1	community	-	-	8	5	2	2	2	1	5	1	1	5	1	1	5	1	1	5	1
			biomass	-	-	8	5	2	2	2	1	5	1	1	5	1	1	5	1	1	5	1
	Reference	QUL-ZOO-7	community	-	-	5	5	2	2	2	1	5	1	1	5	1	1	5	1	1	5	1
			biomass	-	-	5	5	2	2	2	1	5	1	1	5	1	1	5	1	1	5	1

Notes: "-" = not applicable. Data from 2014 to 2018 were provided in electronic form to Minnow from the Mount Polley Mine database.

[a] Values indicate the number of samples collected per area per year or month. Only sampling areas that were monitored in 2022 are displayed, as well as historical data for these areas.

[b] Analysis of zooplankton samples from Quesnel Lake was performed using two mesh sizes (50 µm and 150 µm) to facilitate comparison to historical samples collected using 150 µm mesh size. See (Minnow 2020a) for details.

The weighted end was then placed into a clean plastic pail and the crimped end was released allowing the water to flow into the clean bucket.

Upon retrieval of the depth-integrated sample into the clean bucket, *in situ* water measurements were immediately taken with a YSI EXO™ (see Section 3.8.1). Phytoplankton and water samples were then taken by decanting water from the bucket into appropriate sample bottle(s), and samples were preserved and stored as follows. Samples for phytoplankton community composition were decanted into an opaque 250 mL plastic bottle and then preserved using Lugol's solution, which was added using an eyedropper until the sample colour was like that of weak tea, mixed thoroughly and stored in a cool dark environment prior to shipment to the laboratory for analysis. Samples for chlorophyll-a were decanted into an opaque 250 mL plastic bottle and supporting water samples were decanted into pre-cleaned routine water quality sample bottles and preserved as required. Routine water quality samples were kept on ice in the field and refrigerated until being shipped (on ice) to the analytical laboratory. Duplicate (split) routine water quality and chlorophyll-a samples were collected at a target frequency of 10% for QA/QC purposes Appendix Table A.1.3.

Water collected for phytoplankton chlorophyll-a was kept cool until same-day filtration as follows.[11] A measured volume of sample was decanted into the vacuum filter apparatus and filtered through 0.45 µm pore diameter Whatman mixed cellulose ester (MCE) filter paper. The filter paper (containing sample) was then placed into a labeled opaque centrifuge tube and frozen until shipment (on ice) to the analytical laboratory. All filter apparatus equipment was rinsed with distilled water between each sample.

Supporting *in situ* water quality depth profiles were recorded at every area (n=1) and Secchi depth was measured at every station (n=1 per area in June and August, n=5 per area in July; Appendix Table A.1.3; see Section 3.8.1 for description of supporting measures collection).

3.3.1.2 Zooplankton

Zooplankton sampling was carried out concurrently with phytoplankton sampling in June (n=1 per area), July (n=5 per area), and August (n=1 per area) 2022 and included collection of samples for assessment of community composition and productivity (Table 3.5; Appendix Table A.1.3).

Samples were collected using a using a 30 cm diameter, 90 cm long, zooplankton haul net with a 0.5 m diameter mouth opening and 50 µm Nitex mesh. Zooplankton community samples were

[11] Chlorophyll-a samples collected during the August sampling event could not be field-filtered due to a sampling supply shortage. These samples refrigerated until shipment on ice to the analytical laboratory where they were filtered prior to analysis.

collected by lowering the zooplankton haul net to ~2 m above the lake bottom, then retrieving the net vertically through the water column at a rate of ~0.5 m/sec. (a single vertical haul). Each zooplankton sample consisted of a single vertical haul.[12] Haul depths differed among lakes based on lake depth (~2 m less than bottom depth), with hauls beginning at a 33 m depth in Quesnel Lake, at ~26 m in Polley Lake, and at ~16 m in Bootjack Lake (Appendix Table A.1.3).

Upon retrieval, material on the inside of the net was rinsed into the cod end by lifting the net in and out of the water without submerging the mouth of the net. Sample material was then rinsed from the cod end of the net into a 250 mL plastic bottle using a squeeze bottle filled with filtered water. Samples were then preserved with buffered formalin solution to a nominal concentration of 4%. Preserved samples were stored in a dark, cool place prior to shipment to the laboratory for taxonomic analysis.

Supporting measures collected included those outlined above for phytoplankton sample collection (Section 3.3.1.1; Appendix Table A.1.3; see Section 3.8.1 for description of supporting measures collection).

3.3.2 Laboratory Analysis

3.3.2.1 Phytoplankton

3.3.2.1.1 Community

Phytoplankton samples were sent to Biologica Environmental Services Ltd. (Victoria, BC) for taxonomic identification and enumeration. Upon arrival, samples were examined, and additional Lugol's preservative was added (if required) to ensure adequate preservation. An inventory form was created and verified with the Chain of Custody (COC) to ensure that all

[12] The CEMP approval amendment letter from ENV (dated July 15, 2019; BCMOECCS 2019b) stipulated that zooplankton samples must be collected using a modified horizontal tow method; which is a condition that applies to all zooplankton sample collection. This was not the intent of the plankton program recommendations provided by Minnow (dated May 28, 2019; Minnow 2019c) which included the use of different plankton tow methods for the collection of: 1) zooplankton productivity and community samples, and 2) zooplankton tissue chemistry samples. Minnow maintains that zooplankton productivity and community samples should be collected using a vertical tow method only (consistent with the recommendations provided by Minnow in May 2019; Minnow 2019c). A modified horizontal tow method was not recommended for the collection of zooplankton community samples for two reasons. Firstly, zooplankton samples for community analysis have previously been collected by a single vertical tow. Changing the collection method for this sample type to a modified horizontal tow would limit comparability with previously collected data. Secondly, it is difficult to ensure that the sampling net ascends through the water column at a constant speed when conducting a horizontal tow. Since zooplankton community composition differs through the water column, variability in the amount of time that the net samples a given depth during a horizontal tow could influence the community results. Use of a vertical tow method eliminates this consideration entirely. Following consultation with MPMC regarding the above rationale and the best methodological approach to implement, Minnow collected zooplankton community and productivity samples using a vertical haul methodology between 2019 and 2022. For a comparison of zooplankton community and productivity samples collected using both vertical and modified horizontal haul methodologies, see Minnow (2020a).

samples were accounted for, and each sample had the appropriate number of jars as indicated on the COC.

For processing, plankton community samples were first thoroughly mixed by shaking the sample container and sub-samples (50 to 100 mL), then were dispensed into Utermöhl settling chambers and allowed to settle for 36 to 48 hours, depending on sub-sample volume. Sub-samples were then systematically scanned using a Zeiss Axio Vert A.1 inverted phase contrast microscope at 400x magnification. All algal cells were counted in a series of randomly located field of view (FOV) until a minimum of 300 algal units were identified and enumerated. Algal units represent single cells of all algal groups, as well as colonies or filaments of blue-green algae. Given that blue-green algal colonies and filaments may contain hundreds of cells, enumerating units (rather than individual cells) allows for a more equal representation of algal groups. The mean number of cells per unit (1 for single cells, >1 for all other algal forms) were estimated for all taxa and used to calculate total densities. Only "viable" cells (those that appeared to be alive at the time of collection) were identified and enumerated. *Chrysophyte loricas*, cellulose cups formed by some chrysophyte species, were also counted (USEPA 2010).

Phytoplankton were identified to genus, where possible, following the most up-to-date taxonomic references and collaborations with international and local algal taxonomic experts. Species-level identifications were only given to identifiable taxa for which there are reliable taxonomic references available that encompass the species-level morphological diversity in North America. This approach ensures long-term consistency of data sets and is in accordance with the trend in algal taxonomic practice to be more conservative with delineation of species. Species-level identifications for some taxa are problematic due to widespread phenotypic plasticity that can artificially inflate species richness (Wehr et al. 2015). When applicable, the terms "cf." (*confertim*, possibly for species) and "sp.1", "sp. 2", etc. (a single undetermined species) were employed to distinguish between different species in the same genus.

Taxa were grouped according to their major ecological groupings (e.g., Diatoms, Cyanobacteria, etc.). Data were reported as density (cells per liter) for each taxon, for each ecological grouping, and as total density at each station. Laboratory QA/QC included evaluation of sub-sampling accuracy on at least 10% of samples. Data were provided to MPMC and Minnow as a Microsoft Excel spreadsheet along with a methods and QA/QC report as an Adobe Acrobat PDF file (Appendix G).

3.3.2.1.2 Productivity

Phytoplankton chlorophyll-a analysis was completed by ALS Environmental (Burnaby, BC). Upon receipt, ALS Environmental measured the internal temperature of shipping coolers to verify

the integrity of samples, logged each sample, and assigned each sample a unique identification code. A sample receipt confirmation was then sent to Minnow and MPMC. Samples were laboratory filtered if required (i.e., for samples collected in August; see Section 3.3.1.1) prior to analysis of chlorophyll-a followed procedures adapted from USEPA Method 445.0 (USEPA 1997) Chlorophyll-a concentrations were determined by routine acetone extraction followed by fluorescence detection using a non-acidification procedure, a method that is not subject to interferences from chlorophyll-b.

Laboratory QA/QC included reagent blanks and laboratory accuracy measures (i.e., laboratory control samples). Upon completion of the analyses, a data report was provided by ALS to MPMC and Minnow as an Adobe Acrobat PDF file and a Microsoft Excel spreadsheet (Appendix G).

3.3.2.2 Zooplankton

3.3.2.2.1 Community

Zooplankton community samples were sent to Biologica Environmental Services Ltd. (Victoria, BC) for taxonomic analysis. The sample receipt procedure was as described above for phytoplankton (Section 3.3.2.1.1). Samples were transferred from their formalin solution into 70% ethanol and assigned a unique identification number.

The zooplankton community samples were processed through a 45 µm screen and analyzed in two fractions as follows:

1. A “coarse” fraction comprised of Cladocera, adult Copepoda, and copepodids, in which a minimum count of 200 organisms was obtained; and
2. A “fine” or “micro” fraction, in which Copepod Nauplii and Rotifera were identified and enumerated. Processing of the micro fraction was completed to either a 100-count or a minimum of three sub-samples.

The coarse fraction was analyzed in a Bogorov tray through a stereo microscope at 10-40x magnification and the micro fraction was analyzed using a 1-mL Sedgewick-Rafter counting chamber. Sub-sampling for all fractions was performed using Hensen-Stempel pipettes. Generally, subsamples were 1/10th of total sample volume for the coarse fraction and 1/100th for the micro fraction. Organisms were identified by taxonomic experts to the lowest practicable taxonomic level (LPL)[13] using a compound microscope (100–400x magnification),

[13] The term “Lowest Practical Level” is commonly used to describe the level of resolution for taxonomic identification (often relating to benthic invertebrate taxonomy; e.g., Environment Canada 2012b). However, the term “Lowest Practicable Level" (e.g. Carter and Resh 2001; Bailey et al. 2001) has been used throughout this report because it is a

appropriate dissection tools, and standard taxonomic references. Crustacean zooplankton were identified to species wherever possible, although this was not possible for immature copepods that lack differentiating features required for identification beyond order (e.g., Calanoida, Cyclopoida, or Harpacticoida). For Copepoda, the stage of development was recorded as Nauplii or copepodite stages I-V as was the sex for mature individuals (copepod stage VI). Rotifera were identified to the genus level. All identifications were performed using taxonomic references and collaborations with external experts, where necessary.

Laboratory QA/QC included evaluation of sub-sampling accuracy on at least 10% of samples. Data were provided to Minnow as a Microsoft Excel spreadsheet (Appendix G).

3.3.2.2.2 Productivity

Zooplankton productivity was evaluated as biomass values derived from biovolume estimates based on cell measurements performed by Biologica Environmental Services Ltd. Biomass calculations were performed for the seven most dominant zooplankton taxa by measuring at least five to 10 specimens of each taxon and applying length/weight regression formulae (USEPA 2003). Biomass estimates were presented as total wet weight (ww) and dry weight (dw) values derived from per-sample abundances. Data were provided to Minnow as a Microsoft Excel spreadsheet (Appendix G).

3.3.3 Data Analysis

3.3.3.1 Phytoplankton

Upon receipt of the analytical data, a DQR was performed, including an examination of data completeness, formulae checks, and evaluation of percent agreement of laboratory sub-sampling accuracy samples (see Appendix B).

3.3.3.1.1 Community Metrics

Phytoplankton community data were evaluated in terms of total density (cells/L), taxon richness (# of taxa), Simpson's Diversity and Evenness (calculated as in Smith and Wilson 1996; Environment Canada 2012b), and the relative density (%) and cell densities of major ecological groups (cells/L). These endpoints were calculated at the LPL of taxonomy. Phytoplankton community results at the LPL taxonomy level can contain a mixture of taxonomic levels (e.g., species, family, order, and phylum), which can affect the calculation of metrics such as taxon richness and Simpson's Diversity and Evenness. To address this issue, a series of decision criteria were applied to the data to reassign taxon abundance across levels of

more accurate description of the taxonomic decision (the term "practicable" implies the level of identification that is attainable).

taxa, while conserving the relative abundances within the higher taxon levels (see Appendix E.2 text for details). For the calculation of relative densities (%) of major phytoplankton groups, taxa were grouped as Diatoms, green algae (Chlorophytes), blue-green algae (Cyanobacteria), golden algae (Chrysophytes and Cryptomonads), Dinoflagellates, and Euglenophytes, and the densities and relative densities of all groups were determined for each sample. Phytoplankton productivity was evaluated using chlorophyll-a concentrations (µg/L).

Phytoplankton community and productivity metrics were calculated for each monitoring area in each year and were summarized by area and year using the following statistics: sample size, mean, median, minimum, maximum, and SD (where replicate data were available).

3.3.3.1.2 Statistical Analyses

Statistical analyses of phytoplankton community and productivity data were conducted to answer the following questions:

1. Are there differences in phytoplankton community and productivity between the exposed and reference areas in 2022?
2. Has the phytoplankton community and productivity of exposed areas changed among years (2019 to 2022) relative to changes at reference areas over this time?

To answer these questions, data were grouped into two categories for the separate calculation of community metrics, tabular and graphical presentation, and statistical analyses:

1. Polley Lake (POL-P2) compared to reference (Bootjack Lake; BOL-B2).
2. Quesnel Lake exposed area (QUL-ZOO-1) compared to an un-impacted reference (QUL-ZOO-7).

Phytoplankton data cannot be pooled across different sampling events due to high variability among seasons. As such, statistical analyses focused on replicate samples (n=5) collected in July, as per the CEMP (MPMC 2019). Results of single samples collected in June and August were interpreted without the use of formal statistical contrasts.

Statistical comparisons of data from July 2019 to 2022 were conducted as two--way ANOVAs with *Area* and *Year* as factors and assessing the interaction between *Area* and *Year*. If the *Area*×*Year* interaction term was significant, all pairwise contrasts were evaluated. If the interaction term was not significant but the *Area* term was significant, pairwise contrasts were conducted between areas pooling years; if the *Year* term was significant, pairwise contrasts were conducted between years pooling areas. Pairwise contrasts were evaluated using Sidak correction to account for multiple comparisons. Regardless of which overall ANOVA terms were significant, Magnitudes of Difference (MOD) were calculated based on Measures of

Central Tendency (MCT) of individual samples described below. The results of the multiple comparisons were displayed by assigning letters (e.g., A, B, C) to each unique combination of year and method.

Prior to analysis, the assumptions of normality and homogeneity of variances were tested on the residuals of the two-way ANOVA model using the Shapiro-Wilk test and Levene's test based on median values, respectively using α=0.05. Data were transformed as necessary to satisfy assumptions of normality and homogeneity of variance (log_{10}, $log_{10}(X+1)$ when zeros were present in the data). In instances where the residuals of the ANOVA model did not meet the assumptions of normality and homogeneity of variances, the analysis was conducted on ranks (equivalent to a non-parametric test).

MOD between the exposed area and reference area was calculated as:

$$MOD = \frac{MCT_{Exposed} - MCT_{Reference}}{SD_{Pooled}}$$

MOD between years was calculated as:

$$MOD_{Year} = \frac{MCT_{Year} - MCT_{Baseline\ Year}}{SD_{Pooled}}$$

where MCT is the Measure of Central Tendency (mean for untransformed data and geometric mean for log_{10}-transformed data) and the SD is the pooled standard deviation from the ANOVA model. The effect size calculations were conducted on the transformed scale when the data were transformed for analysis. When the analysis was done on the rank--transformed scale, the observed effect size was estimated using median values instead of means, and the Median Absolute Deviation (MAD) instead of SD:

$$MAD = median(|x_i - median(dataset)|)$$

where x_i is each observation in the dataset and $|f(x)|$ is the absolute value of $f(x)$.

All statistical comparisons were conducted using R (R Core Team 2022). Statistically significant differences in phytoplankton community between areas were identified using an α of 0.1 (as used for evaluation of all biological data in this report). Significant differences with a MOD that exceeded ±2 SD/MAD were further identified as potentially ecologically meaningful in both statistical analyses results and in data interpretation (Environment Canada 2012b[14]).

[14] Environment Canada (2012b) identifies a critical effect size (CES) of ± 2 SDs for evaluating ecologically meaningful changes in benthic invertebrate community. This criterion has been applied here to the interpretation of phytoplankton community.

Total phytoplankton density (cells/L), taxon richness, and chlorophyll-a concentrations were plotted as time-series figures comparing sampling areas over time (including all seasonal data from baseline, where applicable, to present). Proportional densities (%) and densities of major phytoplankton groups were plotted from 2019 to 2022 as stacked bar charts. Phytoplankton community metrics from July 2019 to 2022 only were also plotted to support the two-way ANOVA results. Untransformed data were plotted for ease of interpretation and plots were generated using R (R Core Team 2022). Historic phytoplankton proportional density data had low comparability with 2019 to 2022 data due to changes in taxonomist and were therefore excluded from plots (see Minnow 2019a for details regarding the previous taxonomist and data limitations that affect comparability).

3.3.3.2 Zooplankton

Upon receipt of the analytical data, a DQR was performed, including an examination of data completeness, formulae checks, and evaluation of percent agreement of laboratory sub-sampling accuracy samples (see Appendix B).

3.3.3.2.1 Community Metrics

Zooplankton community data were evaluated in terms of total density (# of organisms/L), taxon richness (# of taxa), Simpson's Diversity and Evenness (calculated as in Smith and Wilson 1996; Environment Canada 2012b), and the relative abundance (%) and organism densities (# of organisms/L) of major ecological groups. Zooplankton endpoints were calculated at the LPL of taxonomy. Zooplankton community results at the LPL taxonomy level can contain a mixture of taxonomic levels, which can affect the calculation of metrics such as taxon richness and Simpson's Diversity and Evenness. To address this issue, a series of decision criteria were applied to the data to reassign taxon abundance across levels of taxa, while conserving the relative abundances within the higher taxon levels (see Appendix E.2 text for details). Zooplankton data were converted from per-sample abundance values to volumetric density values (# of organisms/L) by dividing total densities by the volume of water through which the net passed (see Appendix E.2 text for details). For the calculation of relative abundance (%) of major zooplankton groups, taxa were grouped as Calanoida, Cyclopoida, Cladocera, and Rotifera, with Copepoda Nauplii (the earliest juvenile stage of Copepoda) left as their own grouping. Zooplankton productivity was evaluated using dry weight biomass (mg/L).

Zooplankton community and productivity metrics were calculated for each monitoring area in each year and were summarized by area and year using the following statistics: sample size, mean, median, minimum, maximum, and SD (where replicate data were available).

3.3.3.2.2 Statistical Analyses

Zooplankton community data were evaluated to answer the following questions:

1. Are there differences in zooplankton community and productivity between exposed and reference areas in 2022?
2. Has the zooplankton community and productivity of exposed areas changed among years (2019 and 2022) relative to changes at reference areas over this time?

To answer these questions, data were grouped into two categories for the separate calculation of community metrics, tabular and graphical presentation, and statistical analyses:

1. Polley Lake (POL-P2) compared to reference (Bootjack Lake; BOL-B2).
2. Quesnel Lake exposed area (QUL-ZOO-1) compared to an unimpacted reference (QUL-ZOO-7).

Methods for replicate analysis, data pooling, statistical analyses, presentation of historic data, and current limitations of data for temporal statistical analyses of zooplankton data are the same as those outlined for phytoplankton in Section 3.3.3.1.2, with the one exception that dry weight biomass served as the measure of productivity in both statistical analyses and plots.

3.4 Zooplankton Tissue Quality

Zooplankton tissue quality monitoring in 2022 was completed at an exposed area in Polley Lake (POL-P2) with Bootjack Lake (BOL-B2) serving as a reference, and an exposed (QUL-ZOO-1) and a reference (QUL-ZOO-7) area of Quesnel Lake (Figure 3.3, Table 3.6; Appendix Table A.1.3). Monitoring was completed in June, July, and August, with each sampling event occurring at least 30 days apart (Appendix Table A.1.3). Single (n=1) zooplankton tissue quality samples were collected in June and August at each monitoring area and five replicate (n = 5) samples were collected in July at each monitoring area (Table 3.6), in accordance with the CEMP (MPMC 2019). As outlined in the CEMP (MPMC 2019), the frequency of zooplankton tissue quality sampling is annual, and monitoring at these areas was last completed in 2021 (Minnow 2022a).

Sample collection and analysis methods for 2022 are described herein. For details pertaining to prior sampling years, including equivalent historic sampling areas, refer to the references listed in Table 3.6.[15]

[15] Minnow has completed interpretive reporting for plankton community and productivity monitoring data collected since 2018 (Minnow 2019a, 2020a, 2021a, 2022a) and has completed monitoring implementation since 2019 after providing monitoring program design modifications (Minnow 2019c) at the request of MPMC. A complete description of historic plankton sampling activities was included in Minnow (2019a) and the modified monitoring program design was included in the approved CEMP (MPMC 2019).

Table 3.6: Overview of Zooplankton Tissue Chemistry Monitoring in Lake Habitats in the Vicinity of the Mount Polley Mine, 2014 to 2022[a]

Waterbody		Area Type	Area Code	2014[b] (Golder 2017a)	2015[c] (Golder 2017a)	2016[c] (Golder 2017a)	2017[c] (Golder 2017a)	2018[c] (Minnow 2019a)	2019[d] (Minnow 2020a)	2020[d] (Minnow 2021a)	2021[d] (Minnow 2022a)	2022[d]
				September to December	May to September	Early and Late Season	Early and Late Season	Early and Late Season	June to August	June to August	June to August	June to August
Polley Lake	South Basin	Exposed	POL-P2	-	4	2	2	2	3	3	3	3
Bootjack Lake		Reference	BOL-B2	-	-	-	-	-	3	3	3	3
Quesnel Lake	Central West Arm	Exposed	QUL-ZOO-1 (ZP 2, 4, 6, 9, 12, 15, 18, 21)	8	5	2	2	2	3	3	3	3
	Near Cariboo Island	Reference	QUL-ZOO-7 (ZP 8, 11, 14, 17, 20)	5	5	2	2	2	3	3	3	3

Notes: "-" = not sampled, "ZP" = zooplankton. In 2014, QUL-ZOO-1 and QUL-ZOO-7 were reported as ZP stations. Data from 2014 to 2018 were provided in electronic form to Minnow from the Mount Polley Mine database.

[a] Values indicate the number of samples collected per area per year. Only sampling areas that were monitored in 2022 are displayed, as well as historical data for these areas.

[b] Values represent the number of single samples that were collected over the four month period.

[c] Values represent the number of months for which single samples were collected.

[d] Values represent the number of months for which samples were collected. Single samples were collected in June and August; five replicate samples were collected in July.

3.4.1 Sample Collection

Zooplankton tissue quality samples were collected in June (n =1 per area), July (n = 5 per area), and August (n=1 per area; Appendix Table A.1.3), 2022, using methods largely consistent with the CEMP (MPMC 2019). [16]

Zooplankton tissue samples were collected using a 30 cm diameter, 90 cm long, zooplankton haul net with a 0.5 m diameter mouth opening and 50 µm Nitex mesh. Sampling in Polley Lake (POL-P2) and Bootjack Lake (BOL-B2) was completed using the vertical haul method described in Section 3.3.1.2, with a maximum start depth of approximately 22 to 26 m in Polley Lake and 10 to 16 m in Bootjack Lake (Appendix Table A.1.3). Vertical hauls were completed until a sufficient sample weight was obtained (minimum 1.5 g wet weight).

Zooplankton tissue quality samples were collected from Quesnel Lake (QUL-ZOO-1 and QUL-ZOO-7) by completing a single modified horizontal haul at each area[17]. Each horizontal haul was completed by lowering the net to a start depth of 33 m and then towing the net through the water column for a set time (e.g., 4 to 10 minutes; Appendix Table A.1.3) while slowly retrieving the net to the surface.

Upon retrieval of each vertical or horizontal haul, the plankton net was rinsed towards the cod end to concentrate the sample. Excess water was decanted through the mesh of the cod end or the net, and the remaining sample was transferred into a pre-labelled plastic scintillation vial using a scoopula. Duplicate (split) sediment samples were collected at a target frequency of 10% for QA/QC purposes. Immediately after collection, samples were stored in a cooler with ice packs until being frozen prior to shipment (on ice) to the analytical laboratory.

Supporting measures included one vertical depth profile of *in situ* water quality measures and one supporting depth-integrated water quality sample collected from each area during each

[16] Zooplankton tissue quality samples were historically collected using multiple vertical hauls until a sufficient sample weight was obtained. Due to the low productivity in Quesnel Lake, this process was labour-intensive for Quesnel Lake. Therefore, Minnow recommended substitution of the vertical tow method for a modified horizontal tow method in Quesnel Lake to decrease the time required to collect sufficient sample material. Minnow recommended the continuation of vertical haul methods in Polley Lake (Minnow 2019c). The modified horizontal tow method for the collection of zooplankton tissue quality samples from Quesnel Lake was incorporated into the CEMP approval amendment letter from ENV (dated July 15, 2019; BCMOECCS 2019b). However, the letter stipulated that all zooplankton samples must be collected using the modified horizontal tow method. This methodology was only recommended for use in Quesnel Lake (not Polley or Bootjack Lakes) and specifically for zooplankton tissue quality sample collection for the reasons outlined above (Minnow 2019c). Minnow maintains that the use of a vertical tow method for the collection of zooplankton tissue quality samples is suitable for Polley and Bootjack lakes and has implemented this methodology in 2019 to 2022. The haul method used (vertical or horizontal) does not affect the characteristics of the resulting zooplankton tissue quality sample; only the time associated with sample collection.

[17] Modified horizontal tow methods were consistent with those approved by ENV (as part of the plankton program amendments in July 2019) and incorporated into the CEMP (MPMC 2019).

sampling event (see Section 3.3.1.1 for depth-integrated sample collection methods). See Section 3.8.1 for a description of supporting measures collection.

3.4.2 Laboratory Analysis

Laboratory analysis of zooplankton tissue quality samples was completed by ALS Environmental in Burnaby BC. Upon receipt of the sample shipment(s), ALS Environmental measured temperature in each cooler to verify the maintenance of cold samples, logged each sample, and assigned each sample a unique sample identification code. A SRN was then sent to MPMC and Minnow for verification.

Laboratory analysis of zooplankton tissue quality samples included metals by CRC-ICP-MS (USEPA Method 6020B; USEPA 2014), mercury by CVAAS (USEPA Methods EPA 200.2/1631E; USEPA 1994, 2001), and moisture content. Laboratory QA/QC included MB samples, laboratory duplicates, and laboratory accuracy measures (i.e., laboratory control samples and/or internal reference materials). Upon completion of the analyses, a data report was provided by ALS to MPMC and Minnow (Appendix G).

3.4.3 Data Analysis

Upon receipt of the initial analytical data, a DQR was completed, including an examination of data completeness, LRLs achieved, laboratory precision, laboratory accuracy, and field precision (Appendix B).

Data analysis of zooplankton tissue quality results focused on replicate samples (n=5) collected in July of each year (2019 to 2022). Results of single (n=1) samples collected from 2014 to 2019 were interpreted without the use of formal statistical contrasts. Zooplankton tissue quality data from each sampling event in 2022 (June, July, and August) were screened against the British Columbia selenium guideline for the protection of aquatic life (for invertebrate tissue) of 4 milligrams per kilogram dry weight (mg/kg dw; BCMOE 2014). Replicated zooplankton tissue quality data (i.e., collected in July) were summarized by area by calculating sample size, mean, SD, minimum, median, and maximum. Summary statistics were calculated using the K-M method as described in Section 3.8.3.1.

Statistical analyses of metal concentrations in zooplankton tissues were conducted using replicated data (i.e., data from July 2019 to 2022) to answer the following questions:

1. Have mean analyte concentrations at the exposed area changed relative to the reference area?[18]

[18] I.e., has the ratio of concentrations (exposed:reference) changed over time?

2. Are there differences in mean analyte concentrations between exposed and reference areas, and does the difference depend on year?

To answer these questions, data were grouped into two categories for separate tabular and graphical presentation and statistical analyses:

1. Polley Lake (POL-P2; exposed) compared to Bootjack Lake (BOL-B2; reference).
2. Quesnel Lake exposed area (QUL-ZOO-1) compared to an un-impacted reference (QUL-ZOO-7).

Question 1 was answered by conducting a two-way ANOVA assessing the exposed:reference ratios of results, with *Area* and *Year* as factors and assessing the interaction between *Area* and *Year.* The two-way ANOVA model was conducted assuming data were log distributed, and thus differences between the exposed and reference areas were multiplicative when testing the significance of the interaction between *Area* and *Year* (i.e., if the concentration in the reference area decreases by 50%, then the null hypothesis would be that the concentration in the exposed area also decreases by 50%). Due to the prevalence of analyte results which were below the LRL, the two-way ANOVA was completed with Maximum Likelihood Estimation (MLE) using a censored regression, assuming a lognormal distribution. If the *Area*×*Year* interaction term was significant (α = 0.05), then the ratios of the concentrations from the exposed area to the reference area differed among years. In this case, pairwise contrasts among years were completed to compare the relative difference in means (in log-units) between areas among years. To address question 1 the hypotheses tested were:

$$H_0: \left(\mu_{\text{Exposed}} - \mu_{\text{Reference}}\right)_i = \left(\mu_{\text{Exposed}} - \mu_{\text{Reference}}\right)_j \text{ for all years i, j, i} \neq \text{j}$$

The contrasts were completed for all pairwise comparisons among years. The analysis assumed data were log distributed so the hypothesis of testing differences between means is equivalent to testing the ratios of exposed to reference concentrations on the untransformed scale because of the following property of logarithms:

$$log\left(x_{\text{Exposed}}\right) - log\left(x_{\text{Exposed}}\right) = log\left(\frac{x_{\text{Exposed}}}{x_{\text{Reference}}}\right).$$

The results of the multiple comparisons among years were displayed by assigning letters (e.g., A, B, C) to each year. Letters were assigned such that the year with the highest ratio of exposed:reference was assigned the letter “A” and years that do not differ significantly (α = 0.05) share a letter. When the *Area*×*Year* interaction term was not significant (α = 0.05), the differences between areas were consistent among years and no relative contrasts were conducted.

Temporal changes in the ratio of exposed:reference were quantified by calculating a MOD, which is the difference between the value for the exposed area and the predicted value for the exposed area, assuming the same ratio (i.e., exposed:reference) from the baseline year (the first year the data were collected). This MOD was expressed as a percent change as:

$$MOD = \frac{exp\hat{}\bar{x}_{Exposed\ Observed} - exp\hat{}\bar{x}_{\text{Exposed }Predicted}}{exp\hat{}\bar{x}_{\text{Exposed }Predicted}} \times 100\%$$

where $\bar{x}_{Exposed\ Observed}$ is the mean for the exposed area (in log units) for the given year and $\bar{x}_{\text{Exposed }Predicted}$ is the predicted mean (log units), assuming the relative difference between the exposed area and reference area did not change from the baseline year (i.e., $\bar{x}_{\text{Exposed }Predicted} = \bar{x}_{\text{Reference}} + \left(\bar{x}_{\text{Exposed B}aseline} - \bar{x}_{\text{Reference B}aseline}\right)$).

Question 2 was answered using the results of the two-way ANOVA. When the *Area*×*Year* interaction term was significant (α = 0.05), contrasts were conducted for each year to compare the exposed and reference areas. When the *Area*×*Year* interaction term was not significant, (i.e., the difference between areas did not depend on year) the area comparison was assessed using the *Area* term of the two-way ANOVA. The MOD between the exposed area and reference area was calculated in each year as:

$$MOD = \frac{exp\hat{}\bar{x}_{Exposed} - exp\hat{}\bar{x}_{\text{Reference}}}{exp\hat{}\bar{x}_{\text{Reference}}} \times 100\%$$

where $\bar{x}_{Exposed}$ and $\bar{x}_{Reference}$ are the exposed and reference area means (in log units), respectively. When the interaction term was not significant the MOD between reference and exposed areas was calculated across all years combined.

Statistical comparisons were completed for all available analytes; however, data interpretation focused on primary and secondary analytes (see Table 2.4). Plots of data from July 2019 to 2022 that support the two-way ANOVA were presented for primary and secondary analytes that: 1) had a significant *Area* × *Time* interaction in the analyses; and 2) lacked a significant *Area* × *Time* interaction in the analyses but had a positive MOD (i.e., exposed concentrations were significantly higher than reference and the difference did not depend on year). Concentrations of primary and secondary analytes from all seasons from 2014 to 2022 were also plotted to allow qualitative comparison among seasons and qualitative temporal comparison of results. Years with more than 50% of the data reported below the LRL for any given year were excluded from the analysis. All statistical comparisons and plots were completed using R (R Core Team 2022).

Routine water quality monitoring data collected by MPMC staff between 2015[19] and 2022 in Polley Lake, Bootjack Lake, and Quesnel Lake were used to aid in tissue quality interpretation and to evaluate how water quality has changed following the breach. The evaluation included water quality data collected at the surface of the north and south basin of Polley Lake (POL-P1 and POL-P2, respectively), and from stations QUL-18 (exposed), QUL-2a (exposed), and QUL-120a (reference) of Quesnel Lake (Figure 3.3). Post-breach trends (2015 to 2022) of total and dissolved concentrations of primary and secondary analytes (Table 2.4) were evaluated at these routinely monitored stations using a seasonal Kendall test (as described in Section 3.8.3.4) and were also graphically compared to approved and working British Columbia Water Quality Guidelines (BCWQG; refer to Sections 3.8.3.2 and 3.8.3.3 for details). Results of depth-integrated water quality samples collected concurrently with the zooplankton tissue samples in 2022 were also compared to BCWQG (for details, refer to Section 3.8.3.2).

3.5 Benthic Invertebrate Community

Benthic invertebrate community monitoring was completed at the deep near-field area of Quesnel Lake in 2022 (QUL-PNF; approximately 100 meters depth; Figure 3.2, Table 3.7). Benthic invertebrate community monitoring of lake habitats last completed in 2021 (Minnow 2022a) to fulfill the requirements of the CEMP, and monitoring of these areas in 2022 was not a CEMP requirement (MPMC 2019). Monitoring was completed at QUL-PNF in 2022 with the objective of continuing the ongoing monitored natural recovery of the benthic invertebrate community in this area. This objective could be achieved by making temporal comparisons within the deep near-field area; therefore, a deep reference area was not sampled in 2022 (similar to the monitoring approach used in 2020; Minnow 2021a). As the benthic invertebrate community at the deep near-field area recovers to a condition more similar to the reference area (particularly in terms of organism density), the comparison reference condition will be more important for the monitoring the natural recovery of this area.

Sample collection and analysis methods for 2022 are described herein are consistent with those outlined in the CEMP (MPMC 2019). For details pertaining to prior sampling years, refer to the references listed in Table 3.7.

[19] Routine water quality data prior to 2015 are available for Polley Lake, Bootjack Lake, and Quesnel Lake but were excluded from plots and statistical analyses to distinguish between short-term effects from potential long-term effects of the breach on water quality trends analysis in these waterbodies. The exclusion of data prior to January 2015 was based on the rationale explained in Minnow (2019a). Briefly, laboratory turbidity data resulting from the suspension of fine particulate matter immediately after the breach were used to qualitatively identify a “breach” period (i.e., a period characterized by short-term effects on water quality). By late 2014, laboratory turbidity had decreased to values more similar to pre- breach. Based on these results, the 'breach” period was defined as beginning on August 4, 2014, and ending in December 2014. Therefore, use of data starting in January 2015 should be effective in excluding short-term breach effects on water quality.

Table 3.7: Overview of Benthic Invertebrate Community Monitoring in Lake Habitats in the Vicinity of the Mount Polley Mine, 2014 to 2022[a]

Program Component	Waterbody	Area Code	Post-Breach							
			2014 (Minnow 2015a)	2015 (Minnow 2016a)	2016 (Minnow 2017a)	2018 (Minnow 2019a)	2019 (Minnow 2020a)	2020 (Minnow 2021a)	2021 (Minnow 2022a)	2022
Breach-Related Monitoring	Quesnel Lake	QUL-PNF	5	5						

Notes: Displayed monitoring efforts used the following sampling methodology: petite-ponar grab sampler, 5-grab composite, 250 µm sieve, LPL (Lowest Practicable Level) taxonomy.

[a] Numbers indicate the number of stations sampled per area. Only sampling areas that were monitored in 2022 are displayed, as well as historical data for these areas.

3.5.1 Sample Collection

Benthic invertebrate community samples were collected on August 26 and 27, 2022, from five replicate stations within the deep near-field monitoring area of Quesnel Lake (QUL-PNF; Figure 3.2, Table 3.7). The level of replication (n = 5 per area) provides adequate statistical power to detect differences of ± two SDs at α and β of 0.10. One sample was collected at each replicate station. To ensure that the sample was representative of the station, each single sample was a composite of five sub-samples (grabs; 0.116 m^2 of bottom area in total; Appendix Table A.1.1).

Samples were collected using a Petite Ponar grab sampler according to methods consistent with provincial and federal guidance (i.e., BCMOE 2013; Environment Canada 2012b) and with previous monitoring (see Table 3.7). Samples were retrieved from each station using the ponar sampling methods described in Section 3.1.1 for the deep near-field area of Quesnel Lake. Upon retrieval, grab samples were closely examined to verify that only high quality, comparable samples were retained. Each grab was placed into a tub to evaluate whether the grab was complete (i.e., that the grab captured the surface material and was full to each edge), to evaluate the depth to which the grab penetrated, and to verify consistency in terms of particle size, organic matter, and the presence or absence of plants or algae. Incomplete or unusual grabs were discarded. Acceptable grab samples were rinsed from the Ponar into a plastic tub to ensure the complete removal of all material from the grab sampler. This grab sampling method was repeated until five acceptable grabs were collected at a given station.

At each replicate station, the composite sample of five grabs was placed into a 250 µm mesh sieve bag and sieved free of all material less than 250 µm in diameter. After sieving, the retained material (sample) was carefully transferred to internally and externally labelled 1 L wide mouth plastic jars using a wash bottle. The transfer was completed while working over a plastic tub to avoid any potential loss of organisms. Any organisms that fell into the tub or adhered to the sieve bag were removed and added to the sample. Each sample was then preserved with buffered formalin solution to achieve a nominal concentration of 10% and stored at room temperature until shipment to the laboratory.

Supporting measures were collected at each sampling station, including *in situ* water measures, Secchi depth, and supporting sediment measures (sediment quality; see Section 3.1). Refer to Section 3.8.1 for additional details about supporting measures.

3.5.2 Laboratory Analysis

Taxonomic identification of the benthic invertebrate community samples was completed by Cordillera Consulting (lead taxonomist Scott Finlayson), in Summerland BC, using standard

methods that incorporate QA/QC measures (e.g., Environment Canada 2012b, 2014). Taxonomists at Cordillera have achieved Level 2 certification by the Taxonomic Certification Program of the Society for Freshwater Science (formerly the North American Benthological Society), including certification for Group 1 (general Arthropods East/West), 2 (Ephemeroptera, Plecoptera and Trichoptera [EPT] East/West), 3 (Chironomidae East/West), and 4 (Oligochaeta) benthic organisms. Organisms were identified to the LPL[20] (typically genus or species) using up-to-date taxonomic keys.

Upon arrival, each benthic sample was logged into proprietary software, followed by a preservation check and the addition of Rose Bengal dye. Sample processing was initiated with sample washing, including elutriation to remove sand and gravel. The remaining organic material was then examined to estimate the total number of invertebrates and preserved in 70% ethanol. If the estimated number of invertebrates was greater than 600 individuals and the sample was fine and non-clumping, a subsample was taken using a Marchant Box (Marchant 1989) as described by Environment Canada (2014). All samples were sieved and processed in the laboratory using the same mesh size as used in during field collections (250 µm).

Samples (or sub-samples) were sorted using a gridded Petri dish under a low power stereo microscope into family/order while maintaining counts (counts excluded Porifera, Nemata, Platyhelminthes, Ostracoda, Copepoda, Cladocera, and any terrestrial drop-ins). When specimens were broken, only heads were counted towards the total, and larval and pupal exuviae were not counted. All samples were processed to a minimum 300 organism count. If the 300th organism was found part way through counting a cell, the entire cell was completed, and if 300 organisms had not been reached by the 50th cell of the Marchant Box, then the entire sample was sorted. All sorted organisms were stored in 80% ethanol by family/order in separate labeled vials and debris was preserved and labeled separately.

Insects were identified to the genus/species level and non-insects were identified to a minimum of family level (and to the genus/species level where possible). Identification was completed by experienced, certified taxonomists using standard keys. Taxonomists made comparisons to an externally verified reference collection, and to Standard Taxonomic Effort lists compiled by the Canadian Aquatic Biomonitoring Network (CABIN), Southwest Association of Freshwater Invertebrate Taxonomists (SAFIT), and Pacific Northwest Aquatic Monitoring Partnership (PNAMP) to ensure accuracy. Following identification, newly identified representative specimens of each taxon were placed in separate vials to update an ongoing reference collection.

[20] The term “Lowest Practical Level” is commonly used to describe the level of resolution for benthic invertebrate taxonomic identification (e.g., Environment Canada 2012b). However, the term “Lowest Practicable Level" (e.g., Carter and Resh 2001; Bailey et al. 2001) has been used throughout this report to more accurately described the taxonomic effort.

Laboratory QA/QC included an assessment of sub-sampling error, sorting efficiency, and taxonomic quality control on at least 10% of the samples (Environment Canada 2012b, 2014). Data were entered into proprietary software (INSTAR1), which was also used to calculate benthic invertebrate community metrics and to generate the taxonomic report. Data were provided to Minnow as a Microsoft Excel spreadsheet along with a methods and QA/QC report as an Adobe Acrobat PDF file (Appendix G).

3.5.3 Data Analysis

Upon receipt of the analytical data, a DQR was performed, including an examination of data completeness, organism sorting efficiency, subsampling precision and accuracy, and taxonomic identification error (see Appendix B). Following completion of the DQR, benthic invertebrate community results were analyzed as described below.

3.5.3.1 Metrics

Benthic invertebrate community condition was evaluated using metrics of organism density, taxon richness, Simpson's Diversity and Evenness, and the density and relative density of dominant taxa groups. These endpoints were calculated at the LPL of taxonomy. Benthic invertebrate community results at the LPL taxonomy level can contain a mixture of taxonomic levels (e.g., species, family, order, and class), which can affect the calculation of metrics such as taxon richness and Simpson's diversity. To address this issue, a decision key was applied to the benthic invertebrate data to reassign taxon abundance across levels of taxa, while conserving the relative abundances within the higher taxon levels (see Appendix E.4 text and Appendix Figure E.4.1 for details). Several taxa were excluded from total organism counts by the laboratory (see Section 3.5.2) prior to application of the decision key and endpoint calculation. Rare members of the benthic invertebrate community for which the level of identification was insufficient to determine whether the individual was a member of the aquatic or terrestrial community were also excluded.

Following taxa exclusions, application of the decision key, and the collapsing of taxonomic data to maintain consistency among years, the metrics outlined above were calculated for all years included in the evaluation (2014 to 2022; Table 3.7): organism density (organisms per m^2), taxon richness, Simpson's Diversity and Evenness (calculated as in Smith and Wilson 1996; Environment Canada 2012b). The densities and relative densities (%) of the most abundant taxa were also calculated. Dominant/indicator taxon groups were defined as those groups representing more than 5% of total organism abundance within each set of data, or any taxon groups considered to be important indicators of environmental stress. The benthic invertebrate

community metrics were calculated and summarized for each year using the following statistics: sample size, mean, median, minimum, maximum, and SD.

Correspondence Analysis (CA) was used to further examine benthic invertebrate community structure across all sampling years (2014 to 2022) at the deep near-field and reference areas of Quesnel Lake. CA is a multivariate ordination method that is used to reduce complex multivariate data into a smaller number of independent variables (Gauch 1982; Pielou 1984). The analysis extracts theoretical values (CA axis scores) that capture the variation in the abundance of benthic taxa. The CA produces axis scores for each deep station (near-field and reference[21]) in each year as the sum of a weighted average of $ln_{(x+1)}$-transformed species densities (#/m^2). Taxa scores are also produced as the sum of weighted averages of their densities across stations and years. The structure of the data can then be depicted in scatter plots of one CA axis against another, showing both taxa and station scores. Taxa that tend to co-occur plot together and those that rarely co-occur plot farther apart. Similarly, years at the deep near-field and reference areas that share many taxa plot closer to one another, while those with few in common plot further apart. Thus, CA can be used to describe which benthic invertebrate taxa best accounts for observed differences in the overall benthic invertebrate community between years and/or stations. The CA analysis was conducted at the LPL of taxonomic organization using $ln_{(x+1)}$-transformed density data. CA is sensitive to the presence of rare taxa (Legendre and Legendre 1983; Poos and Jackson 2012). Taxa occurring in fewer than 1% of samples or those that made up less than 1% of the total abundance of Quesnel Lake dataset were excluded from the analysis (Dolédec and Chessel 1991). The ordination was conducted using the cca() function in the vegan package (Oksanen et al. 2020) of R statistical software (R Core Team 2022). Results of the CA were summarized by sampling station and year. Taxa with the highest magnitude weights on the CA axes were identified and used in interpretation of the separation of stations on the CA axes.

3.5.3.2 Statistical Analyses

Statistical analyses of benthic invertebrate community data were conducted using post-breach data from the deep near-field (QUL-PNF; 2014 to 2022; Table 3.7) and un-impacted reference

[21] Although the deep reference area of Quesnel Lake (QUL-PREF1) was not sampled in 2022, results from this area (2014 to 2021; Minnow 2022a) were included in the CA to provide additional context for the interpretation of temporal changes at the deep near-field area (QUL-PNF) from 2014 to 2022.

(QUL-PREF1; 2014 to 2021; Minnow 2022a)[22] areas of Quesnel Lake to answer the following question:

> Has the benthic invertebrate community at the deep near-field area of Quesnel Lake changed among years since the TSF breach?

To answer this question, statistical analyses were completed following the two-way ANOVA methods outlined in Section 3.3.3.1.2 using post-breach results from the deep near-field and reference Quesnel Lake areas for the calculation of community metrics, tabular and graphical presentation, and statistical analyses.

Interpretation of benthic invertebrate community metrics was enhanced by inspection of raw data and taxonomic proportions to detect patterns of ecologically relevant spatial and temporal differences. Ecological and habitat requirements of benthic invertebrates, as outlined in standard references (Clarke 1981; Edmunds et al. 1976; Weiderholm 1983; Wiggins 1996; Vieira et al. 2006; Merritt et al. 2008) were also used in data interpretation. All statistical comparisons were conducted using R (R Core Team 2022). Statistically significant differences in benthic invertebrate community between areas were identified using an α of 0.1 (as used for evaluation of all biological data in this report). Significant differences with a MOD that exceeded ±2 SD/MAD were identified as potentially ecologically meaningful in statistical analyses results and in data interpretation (Environment Canada 2012b[23]). Densities and relative densities (%) of major benthic invertebrate groups were plotted as stacked bar charts. Benthic invertebrate community metrics were plotted to support the two-way ANOVA results. Untransformed data were plotted for ease of interpretation and plots were generated using R (R Core Team 2022).

Potential relationships between benthic invertebrate community metrics and physical and chemical conditions of the monitoring areas were explored using correlation analysis as part of causal assessment. Correlation analyses were completed using available data from the deep near-field (2014 to 2022) and reference (2014 to 2021) areas of Quesnel Lake. Although correlation is not causation (e.g., Suter 2015; Pearl et al. 2016), it is a fundamental tool applied for exploring data and generating evidence of causation (Suter 2015). Benthic invertebrate community metrics (including CA axis scores) were compared to environmental variables including physical measures (station depth), *in situ* water quality measures (temperature, dissolved oxygen, pH, and specific conductance),

[22] Although the deep reference area of Quesnel Lake (QUL-PREF1) was not sampled in 2022, results from this area (2014 to 2021; Minnow 2022a) were included in the statistical analyses to provide additional context for the interpretation of temporal changes at the deep near-field area (QUL-PNF) from 2014 to 2022.

[23] Environment Canada (2012b) identifies a CES of ± 2 SDs for evaluating ecologically meaningful changes in benthic invertebrate community.

physical/chemical sediment measures (% fines and TOC content), sediment Analyte of Interest concentrations (see Section 3.1.3.1 for details), and sediment chemistry Principal Component Analysis [PCA] axis scores (see Section 3.1.3.2 for details). Following derivation of correlation coefficients using Spearman's Rank correlation, a Bonferroni-type correction (i.e., α [0.05] divided by the total number of independent variables) was applied to minimize the risk of declaring false positive correlations.

Statistically significant correlations found at the Bonferroni-adjusted p-value were further investigated using scatter plots to determine if a continuous distribution of data was realized (possible causal relationships) or if these relationships were leveraged by outlying points (or groups of points). The effects of leverage were carefully considered because any differences in benthic community attributes observed at the exposed areas relative to reference, or temporal differences at the exposed area, might be correlated with breach-related differences in water or sediment quality regardless of cause. Leverage is a particularly important consideration in cases where substantially impacted areas are compared to unimpacted reference areas, because physical, chemical, and biological features may all be impacted and relationships among them may not actually indicate a cause other than "they were all impacted". Statistically significant correlations, coupled with careful examination of scatterplots, were used to identify the factors that most contribute to temporal and spatial variability in benthic invertebrate community endpoints. These factors were then considered considering known physical and chemical influences on benthic invertebrate communities (e.g., limitation due to low nutrient availability, toxicity by exposure to high metal concentrations).

3.6 Fish Catchability, Usage, and Population Health

3.6.1 Overview

Fish population monitoring in Polley Lake was completed in 2022, in accordance with the CEMP (MPMC 2019), to continue to document population structure and abundance, provide an estimate of young-of-the-year (YOY) survival in Polley Lake, and to assess the success of remediation efforts in Hazeltine Creek. As outlined in the CEMP (MPMC 2019), the frequency of fish population monitoring in Polley Lake is annual, and monitoring was last completed in 2021 (Minnow 2022a). A brief background and summary of historic findings of this monitoring is provided below.

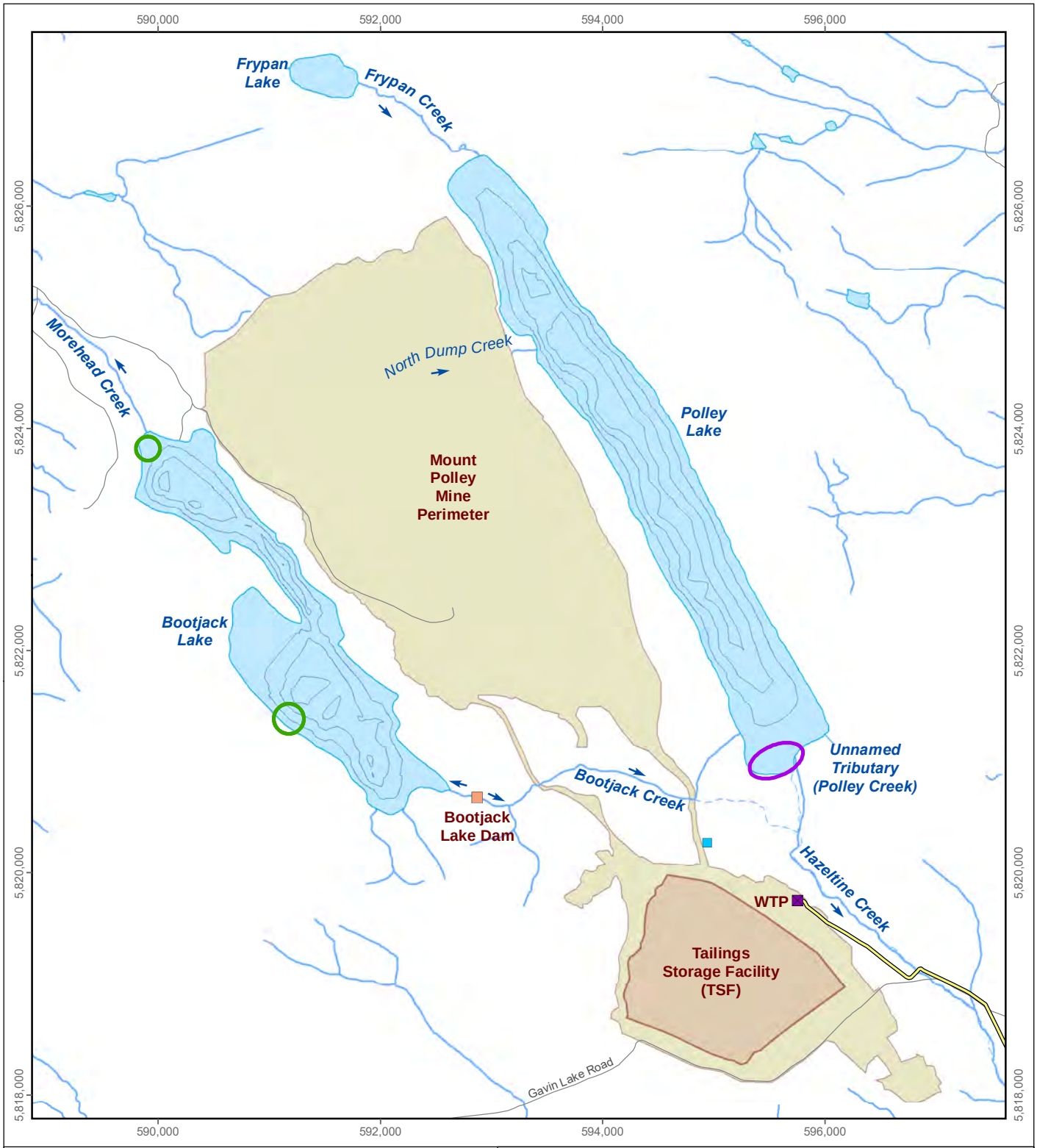
Historically, the majority of Polley Lake rainbow trout (*Oncorhynchus mykiss*) recruitment was supported by spawning and rearing in Hazeltine Creek and lower Bootjack Creek, downstream of Polley Lake (Bruce and Slaney 1991). Following the breach, both Hazeltine Creek and Bootjack Creek were inaccessible to Polley Lake fish and spawning and juvenile rearing habitat for the

Polley Lake rainbow trout population was limited to Frypan Creek and a few unnamed intermittent tributaries around the lake (Figure 3.4). However, production of rainbow trout fry from these creeks was insufficient to sustain the historic rainbow trout population within Polley Lake (Minnow 2018d).

Post-breach monitoring in Polley Lake was initiated in 2014 to assess the impact of the breach and monitor the health of fish populations (particularly rainbow trout and longnose sucker [*Catostomus catostomus*]) over time. Notably, age- and size-frequency distributions for rainbow trout caught in 2016 indicated that far fewer age-1 and age-2 individuals were captured than in 2014 (Minnow 2017d) and an absence and near absence of age-1, age-2, and age-3 fish was reported in 2017 and 2018, respectively (Minnow 2018d, Minnow 2019a). This is indicative of limited recruitment associated with Hazeltine Creek being inaccessible for spawning and rearing from 2014 to 2017.

After remediation efforts in Hazeltine Creek were completed in the fall of 2017, fish from Polley Lake were allowed access to upper Hazeltine Creek (HAC-R1 and HAC-U) on April 26, 2018, and subsequently to the entire length of Hazeltine Creek on October 7, 2020.[24] Following re-establishment of access to upper Hazeltine Creek, rainbow trout catch-per-unit-effort (CPUE) in spring of 2019 was higher than in 2018 and 2017 but substantially lower than in 2016. Rainbow trout CPUE in the spring subsequently decreased from 2019 to 2021, consistent with loss of recruitment and natural mortality of older fish since the breach. However, CPUE in the fall, when fishing is randomized in Polley Lake, was higher from 2019 to 2021 than in 2016 and 2018 with the highest CPUE documented in 2021 (Minnow 2022a). More smaller rainbow trout were caught from 2019 to 2021 than in 2016 and 2018 and based on predicted length-at-age from a linear model, many of these individuals likely represented YOY to age-2, indicating successful recruitment of rainbow trout to Polley Lake and overwintering survival. In 2021, the length frequency distribution indicated a relatively diverse range of size classes (including YOY to age-4 or 5), further suggesting successful rainbow trout survival and recruitment from 2018 to 2021 (Minnow 2022b). In particular, more age-4 rainbow trout (which are from the 2018 cohort)

[24] High water levels associated with the spring freshet in May 2020 caused flooding that enabled adult rainbow trout to bypass the fish fence located at the downstream extent of HAC-U and access the creek downstream (Minnow 2021b). In response, MPMC extended monitoring to include Reach 3 of Hazeltine Creek (HAC-R3) in the 2020 Hazeltine Creek Monitoring Program (Minnow 2021b). On July 4, 2020, the fish fence at the downstream extent of HAC-U was moved to lower Hazeltine Creek (in the vicinity of HAC-D). On October 7, 2020, the fish fence in lower Hazeltine Creek was removed (following completion of remediation works in this area), and fish were allowed access to the entire length of Hazeltine Creek. The entirety of Hazeltine Creek remained accessible to fish from October 2020 until present, except for a brief period (July to August 2021) when lower Hazeltine Creek was inaccessible during the completion of final instream remediation works in this area (Minnow 2022b).



LEGEND

- Exposed Monitoring Location
- Reference Monitoring Location
- Water Treatment Plant (WTP)
- Central Collection Sump
- Effluent Discharge Pipeline (January 2018 to present)
- Historic Watercourse

Note: Bathymetry is displayed in meters.

Spring Fish Tissue Quality Monitoring Areas, Polley Lake and Bootjack Lake, 2022

0 0.5 1 2 km

N W E S

Projection: North American Datum 1983 UTM Zone 10U

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Project 227202.0029

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Figure 3.4

Document Path: C:\Users\CApol\Trinity Consultants, Inc\Imperial Metals - 227202.0029 - 2022 MPMC\D - GIS\Task 3\22-29 Figure 3.4 Spring Fish Tissue Quality.mxd

were captured in 2021 compared to 2020 and 2019 and were anticipated to spawn for the first time in 2022. Rainbow trout older than age-5 were absent in 2021 but this was expected as all spawners that were present in 2018 will likely have reached the end of their life expectancy with little replacement by recruits from 2014 to 2017 when Hazeltine Creek was inaccessible.

Sampling methodologies for fish surveys completed in 2022 are described herein are consistent with those outlined in the CEMP (MPMC 2019). The methodologies associated with historic monitoring to assess fish population structure and abundance in Polley Lake are described elsewhere (MPMC 2019; Minnow 2019a).

Two fish surveys were completed in 2022: spring sampling was completed in May (May 26 to 30, 2022; Appendix Table C.6.1) in Polley Lake with Bootjack Lake serving as reference, and fall sampling was completed in September (September 21 to 26, 2022; Appendix Table C.6.2) in Polley Lake. The monitoring completed in spring 2022 served two purposes: 1) to provide data for the evaluation of fish population structure and abundance in Polley Lake; and 2) to provide data for the evaluation of fish tissue quality in Polley Lake compared to reference (Bootjack Lake; see Section 3.7).

Fish sampling described herein was conducted under British Columbia Ministry of Forest, Lands and Natural Resource Operations and Rural Development (FLNRORD) fish Permit WL22-714043.

3.6.2 Spring Survey

The spring survey was initiated shortly after ice-out in Polley and Bootjack lakes and when water temperatures approached 5°C (i.e., May 13, 2022) in Polley Lake (and a similar date in Bootjack Lake). Ice cover, water temperature, and fish “homing” to natal streams (e.g., Hazeltine Creek or Bootjack Creek which is currently diverted directly into the south-west end of Polley Lake; Figure 3.4) were closely monitored by mine staff to support the timing of program commencement and initial fish aggregation in Hazeltine Creek was observed on May 3, 2022.

Spring fishing was conducted using five hoop net sets in Polley Lake and four in Bootjack Lake (0.75 m diameter, 3.8 cm stretched mesh; Appendix Table C.6.1). Hoop nets were set for one to three nights; key spawning areas such as Hazeltine Creek and Bootjack Creek (for Polley Lake) and small tributary streams of Bootjack Lake were targeted to capture individuals that were ready to spawn (Figure 3.4).

For each hoop net set, the level of sampling effort was recorded (i.e., set duration), along with supporting Global Positioning System (GPS) coordinates (Appendix Table C.6.1). Supporting measures also included vertical depth profiles of *in situ* water quality measures at the

two deep basins of each lake (Polley and Bootjack Lakes; see Section 3.8.1 for details). Captured fish were identified and enumerated to characterize the fish community. Species and catch totals were recorded on field sheets.

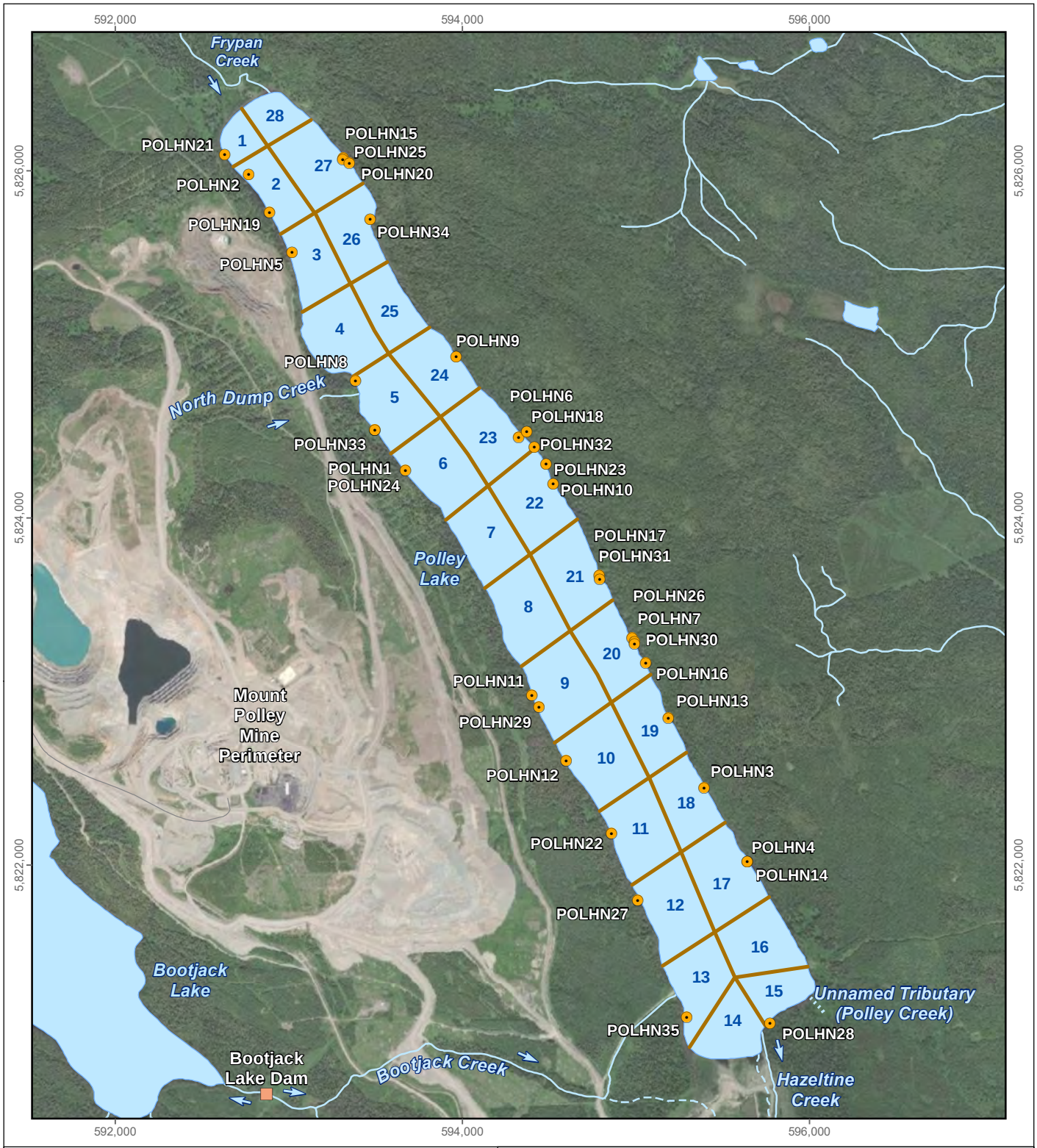
3.6.3 Fall Survey

Fall fishing was conducted in Polley Lake using seven hoop nets (four 0.6 m diameter nets [2 cm stretched mesh] and three 0.75 m diameter nets [3.8 cm stretched mesh]). The seven hoop nets were each set overnight at randomized locations in Polley Lake for five nights (Appendix Table C.6.2). The randomized net set locations were selected by separating Polley Lake into 28 fish sampling areas (Figure 3.5) and using a random number table to select the sampling area where any given net would be set in the lake on a given day. Set locations were determined *a priori*, with some adjustments made to ensure that only a single hoop net was set at a sampling area at any given time.

For each hoop net, sampling effort (i.e., set duration, configuration), and supporting GPS coordinates were recorded (Appendix Table C.6.2). Supporting measures also included vertical depth profiles of *in situ* water quality measures at the two deep basins of Polley Lake and supporting habitat data (see Section 3.8.1 for details). Captured fish were identified and enumerated to characterize the fish community. Species and catch totals were recorded on field sheets.

3.6.4 Fish Processing

Target species that were captured during the spring and fall surveys were retained for non-lethal evaluation of total length and weight. Target sample sizes for non-lethal measures were n ≥ 30 per lake (Polley and Bootjack lakes) for rainbow trout and longnose sucker in the spring (Appendix Tables C.6.3 to C.6.6). In the fall, non-lethal measurements were completed for rainbow trout, longnose sucker, and redside shiner (*Richardsonius balteatus*) from Polley Lake; target sample sizes were n ≥ 100 fish for longnose sucker and redside shiner (Appendix Tables C.6.7 and C.6.8). For rainbow trout, physical measurements were recorded for n ≥ 100 each of juvenile and adults to ensure collection of measurements from a relatively large sample size across the entire size range of rainbow trout captured (Appendix Table C.6.9). Prior to the collection of measurements in the field, rainbow trout were assigned as juvenile or adult based on the presence (juvenile) or absence (adult) of observable parr marks and/or body length (i.e., rainbow trout ≥ 25 cm in fork length were typically assigned as adults). This approximation was for field-based determination of maturity only. Incidental mortalities were disposed of in an approved manner. All other fish were released live immediately following capture.



LEGEND

- Hoop Net
- Fish Sampling Section
- Historic Watercourse
- Seasonal Watercourse

Fall Fish Population Health Monitoring Stations, Polley Lake, 2022

0 0.5 1 2 Kilometers

N W E S

Projection: North American Datum 1983 UTM Zone 10U

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Date: January 2023
Project 227202.0029

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Figure 3.5

Document Path: C:\Users\CApol\Trinity Consultants, Inc\Imperial Metals - 227202.0029 - 2022 MPMC\D - GIS\Task 9\22-29 Figure 3.5 Fall Fish Population Health Monitoring.mxd

Fish retained for non-lethal sampling were anesthetized using clove oil solution and measured for fork length, total length, and body weight (Appendix Table C.6.3 to C.6.9). A measuring board was used to measure fork and total length to the nearest millimeter. Fresh body weight was measured using a set of Pesola™ spring scales (depending on fish weight). The Pesola™ scales were demarcated at intervals of 1 to 2% of the total scale range, providing an accuracy of ± 0.3% of the fish mass. The Pesola™ spring scale for individual weight measurement was selected so that the fish weight was near the top of the scale's range to ensure that measurements achieved a resolution near 1%.

In May, a subset of eight female rainbow trout and longnose sucker from each lake (Polley Lake and Bootjack Lake) were sacrificed for the assessment of condition, tissue metal concentrations, and age distribution. See Section 3.7.1 for details of the processing methods for these fish.

3.6.5 Data Analysis

Three endpoints were used to evaluate the health of rainbow trout, longnose sucker, and redside shiner populations from Polley Lake over time (2014 to 2022). Firstly, cumulative relative frequency distributions (CRFD) of fork lengths were used as an indicator of recruitment (rainbow trout, longnose sucker, and redside shiner). Secondly, weight-at-age was used as an indicator of energy use (rainbow trout and longnose sucker). Thirdly, condition (weight-at-length) was used as an indicator of energy storage (rainbow trout and longnose sucker). CRFD included data from the randomized sampling efforts conducted in the fall only, when fish are not aggregating for spawning (which could influence the CFRD results). Condition and weight-at-age were analyzed separately for spring and fall sampling events (for years and seasons in which the necessary data were collected) and were analyzed for males and females separately (if data on sex was available) or for both sexes combined. For rainbow trout and longnose sucker, condition analyses in spring and fall were initially conducted using all fish captured; condition was then analyzed again using only fish with the greatest overlap in size (i.e., fork length) among years. Interpretation of condition analysis results was focused on the tests which included individuals with the greatest overlap in fork length (i.e., those tests that only included fish larger than a given fork length) to ensure interpretation of temporal contrasts were based on the analyses with the most robust and temporally comparable data sets.

Summary statistics (sample size, mean, SD, minimum and maximum value) were calculated separately by area and species for each measurement variable recorded in 2022 (weight, length, and age where available).

3.6.5.1 Weight-at-Age and Condition

Rainbow trout and longnose sucker condition and weight-at-age (females in spring only) were compared among years (i.e., 2016 to 2022 for spring surveys and 2014 to 2022 for fall surveys) using an Analysis of Covariance (ANCOVA) with $\log_{10}$-transformed body weight as the response, Year as a factor, and $\log_{10}$-transformed age or fork length as a covariate. Significant interactions between the covariate and year (i.e., the assumption of homogeneity of regression slopes among years) in the ANCOVA were assessed using $\alpha = 0.1$.

When the interaction term was significant, the coefficients of determination (R^2) of the interaction model and parallel slope model were compared to assess whether the slopes were practically significant. Briefly, if the R^2 was >0.8 and within 0.02 between the two models, then the conclusion was that the interaction model and parallel slope models were practically the same (Environment Canada 2012b) and the ANCOVA proceeded with the parallel slope model. Influence was also assessed using Cook's distance statistic when a significant interaction was detected. If the interaction was driven by influential points, these were removed from the analysis (Environment Canada 2012b). If the interaction could not be removed by comparison of R^2 values or removal of influential points, the conclusion was that the difference in the response variable between areas was dependent on the covariate values. When the interaction term was not significant it was removed from the model and the parallel slope ANCOVA model was fit.

Statistical comparisons were run as all pairwise contrasts over time. Statistically significant *post hoc* contrasts were identified at $\alpha = 0.1$ using Tukey's Honestly Significant Difference. The results of the pairwise comparisons among years were expressed using a compact letter system. Capital letters were assigned to years (e.g., A, B, and C) such that years that share a letter are not significantly different. The letters were assigned such that the year with the highest mean was assigned the letter "A."

Statistical outliers were defined to be observations with Studentized residuals with magnitude > 4 (Environment Canada 2012b) and statistical analyses were completed with these outliers excluded and an inventory of excluded outliers was provided with the analyses results.

A MOD was calculated for each endpoint in each year relative to the baseline year (defined as the minimum year used in the statistical comparison) as:

$$\text{MOD} = \frac{\bar{x}_{\text{i}} - \bar{x}_{\text{baseline}}}{\bar{x}_{\text{baseline}}} \times 100\% \text{ ,}$$

where $\bar{X}_i$ is the mean of a given year, and $\bar{X}_{Baseline}$ is the mean of the baseline (earliest) year (for ANOVA), or the covariate-adjusted mean (for ANCOVA, without interaction). When an interaction was observed, the MOD was estimated for small and large fish at the minimum and maximum values of the overlap in covariate values between areas using the predicted values of

the response variables from the interaction ANCOVA regression model (Environment Canada 2012b). When response variables were log_{10}-transformed, means were reported in the original data units (i.e., anti-logged), equivalent to geometric means.

Weight-at-age and condition were plotted using scatterplots with regression lines separated by year. The statistical analyses and regression model fitting for these endpoints were completed with the outliers excluded (as outlined above) and outliers were identified in plots as symbols with an "×" through them. All statistical analyses and plots were conducted using R (R Core Team 2022).

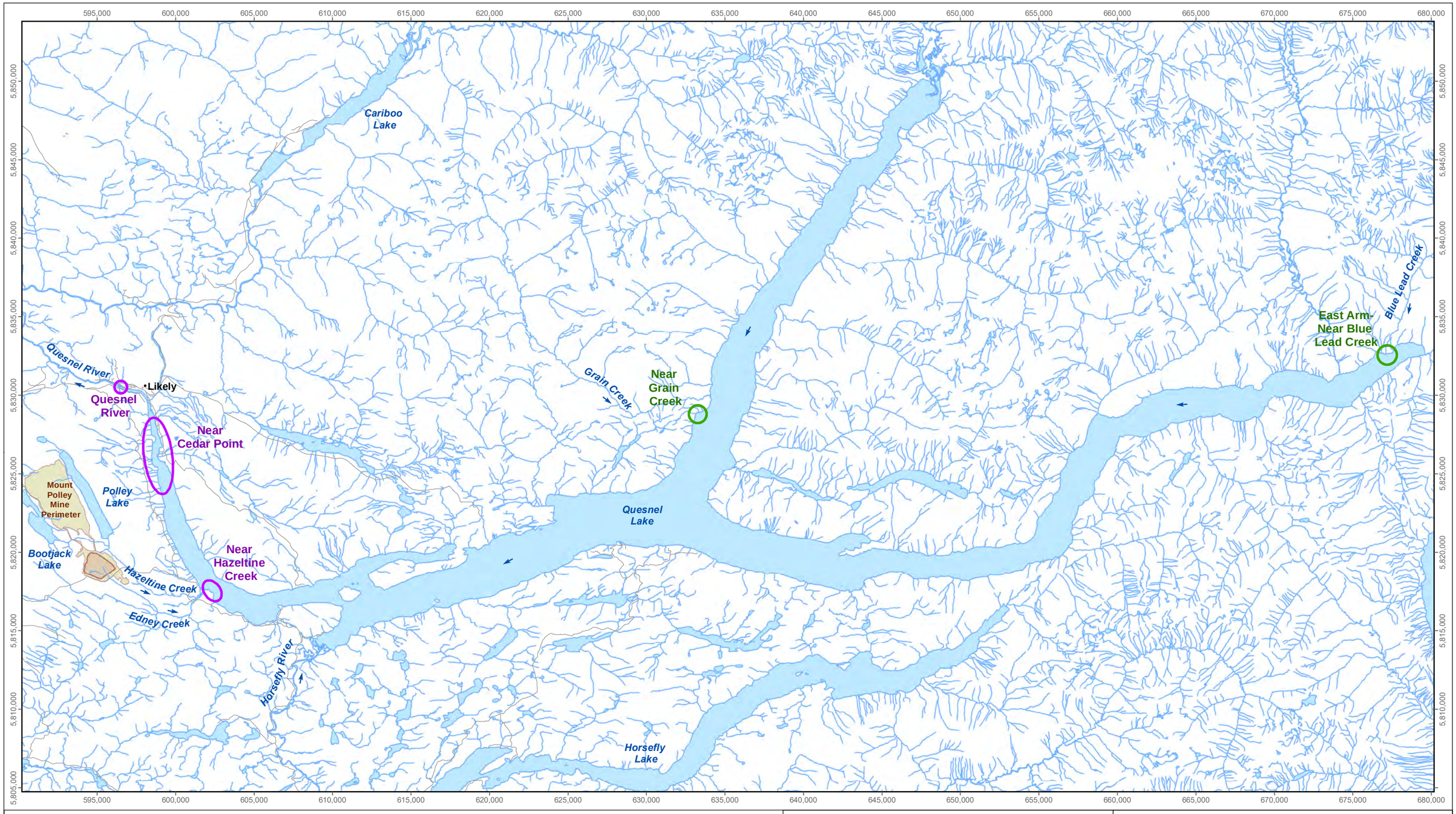
3.6.5.2 Length Frequency Distributions

Length frequency distributions of data from the randomized sampling efforts conducted in the fall were plotted using histograms and CRFD. The CRFD is a plot of the proportion of fish on the y-axis and length on the x-axis and shows the proportion of fish that have a length less than the length value on the x-axis. Statistical comparisons of length frequency distribution between years were conducted using the two-sample Kolmogorov-Smirnov (K-S) test. The two-sample K-S test compares the maximum difference in the CRFDs between areas and evaluates whether this maximum difference varies significantly among years ($p < 0.1$).

3.7 Fish Tissue Quality

Fish tissue quality monitoring in 2022 was completed in Polley Lake with Bootjack Lake serving as a reference (Figure 3.4), Quesnel Lake exposed and reference areas, and Quesnel River (Figure 3.6, Table 3.8), in accordance with the CEMP (MPMC 2019). Two fish tissue quality monitoring surveys were completed in 2022, one in spring in Polley and Bootjack lakes and one in fall in Quesnel Lake and Quesnel River. The spring (May) sampling in Polley and Bootjack lakes targeted the collection of one sport-fish species (rainbow trout) and one small home-range species (longnose sucker; Table 3.9). The fall (October) sampling targeted the collection of two small home-range species (northern pikeminnow [*Ptychocheilus oregonensis*] and peamouth chub [*Mylocheilus caurinus*]) from Quesnel Lake, and the collection of one sport fish species from each of Quesnel Lake and Quesnel River (lake trout [*Salvelinus namaycush*] and rainbow trout, respectively; Tables 3.8 and 3.9). As outlined in the CEMP (MPMC 2019), the frequency of fish tissue quality monitoring of these species in these waterbodies is annual, and monitoring following this design was last completed in 2021 (Minnow 2022a).

Sample collection and analysis methods for 2022 are described herein and are consistent with the CEMP (MPMC 2019). For details pertaining to prior sampling years, refer to the references listed in Table 3.8.



LEGEND

- Exposed Area
- Reference Area

0 3.5 7 14 km

N W E S

Projection: North American Datum 1983 UTM Zone 10U

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Fish Tissue Quality Monitoring Areas, Quesnel Lake and Quesnel River, 2022

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Figure 3.6

Document Path: C:\Users\CApol\Trinity Consultants, Inc\Imperial Metals - 227202.0029 - 2022 MPMC\D - GIS\Task 8\22-29 Figure 3.6 Fish Tissue Quality Monitoring.mxd

Table 3.8: Fish Tissue Quality Monitoring in Lake Habitats in the Vicinity of the Mount Polley Mine, 2015 to 2022

Time Period	Waterbody or Area	Fish Species (Species Code)	Target Sample Size	Target Tissue(s)[c]
Spring 2015 (Minnow 2017e)	Polley Lake Tributary (Frypan Creek)	rainbow trout (RB)	8[a]	muscle, liver, kidney, ovary
	Bootjack Lake Tributary (Reference)		8[a]	
Fall 2015 (Minnow 2017e)	Quesnel Lake West Arm near Hazeltine Creek	burbot (BB), lake trout (LT), largescale sucker (CSU), northern pikeminnow (NSC), peamouth chub (PCC), redside shiner (RSC)	8	muscle, liver, kidney, ovary, or whole body
	Quesnel Lake near Grain Creek (Reference)	largescale sucker (CSU), peamouth chub (PCC), redside shiner (RSC)	8	muscle or whole body
	Quesnel Lake East Arm near Blue Lead Creek (Reference)	burbot (BB), lake trout (LT)	8	muscle, liver, kidney, ovary
	Quesnel Lake West Arm near Poquette Creek	kokanee (KO)	8	muscle, liver, kidney
	Quesnel River	rainbow trout (RB)	8	muscle, liver, kidney
	Trio Lake (Reference)	rainbow trout (RB)	8	muscle, liver, kidney
Spring 2016	Polley Lake	longnose sucker (LSU), rainbow trout (RB), redside shiner (RSC)	8[a]	muscle, liver, ovary
	Quesnel Lake West Arm near Hazeltine Creek	largescale sucker (CSU), northern pikeminnow (NSC), peamouth chub (PCC)	8	muscle and liver, or whole body
	Quesnel Lake near Grain Creek (Reference)			
Spring 2017 (Minnow 2018e)	Polley Lake	longnose sucker (LSU), rainbow trout (RB)	8	muscle, liver, ovary
	Bootjack Lake (Reference)	longnose sucker (LSU), rainbow trout (RB)	8	muscle, liver, ovary
Fall 2017 (Minnow 2018e)	Quesnel River	rainbow trout (RB)	8	muscle, liver, kidney
	Quesnel Lake West Arm near Hazeltine Creek	northern pikeminnow (NSC)	8	whole body
Spring 2018 to 2022 (Annually) (Minnow 2019a, 2020a, 2021a, 2022a)	Polley Lake	longnose sucker (LSU), rainbow trout (RB)	8	muscle, liver, kidney, ovary
	Bootjack Lake (Reference)	longnose sucker (LSU), rainbow trout (RB)	8	muscle, liver, kidney, ovary
Fall 2018 (Minnow 2019a)	Quesnel Lake West Arm near Poquette Creek	kokanee (KO)	8	muscle, liver, kidney, ovary (if present)
	Quesnel Lake North Arm near Mitchell River (Reference)	kokanee (KO)	8	muscle, liver, kidney, ovary (if present)
Fall 2018 to 2022 (Annually) (Minnow 2019a, 2020a, 2021a, 2022a)	Quesnel Lake West Arm near Hazeltine Creek	northern pikeminnow (NSC)	8	whole body
		peamouth chub (PCC)	8	muscle, liver, kidney, ovary (n=7)
	Quesnel Lake West Arm near Cedar Point	lake trout (LT)	8[b]	muscle, liver, kidney, ovary (n=5)
	Quesnel Lake near Grain Creek (Reference)	northern pikeminnow (NSC)	8	whole body
		peamouth chub (PCC)	8	muscle, liver, kidney, ovary (n=6)
	Quesnel Lake East Arm near Blue Lead Creek (Reference)	lake trout (LT)	8	muscle, liver, kidney, ovary (n=1)
	Quesnel River	rainbow trout (RB)	8	muscle, liver, kidney, ovary (n=5)

Grey shading indicates fish tissue sampling completed in 2022.

[a] The target for these collections was n = 8 ovary samples. For the spring 2015 and 2016 data set, this resulted in more than 8 muscle and liver samples.

[b] The target for these collections was n = 8 samples of each tissue type. For the fall 2019 data set, this resulted in more than 8 muscle, liver, and kidney samples for lake trout.

[c] The target sample size indicated was achieved in 2022 for each species and target tissue unless otherwise indicated. Ovary sample sizes that differed from the target sample size in 2022 are indicated in parentheses (e.g., n=5).

Table 3.9: Life History and Habitat Preferences of Target Fish Species in the Vicinity of the Mount Polley Mine[a]

	Lake Trout (LT)	Longnose Sucker (LSU)	Northern Pikeminnow (NSC)	Peamouth Chub (PCC)	Rainbow Trout (RB)
	Salvelinus namaycush	*Catostomus catostomus*	*Ptychocheilus oregonensis*	*Mylocheilus caurinus*	*Oncorhynchus mykiss*
Home Range	move within lake to spawning sites.	move to spring spawning sites, but tagged fish have often been re-captured close to where they were originally captured.	move to spring spawning sites, but and considered to have small home range (tagged fish in the Columbia River were generally found within 3 km of the tagging location).	move to spawn in spring. Movement limited to diel inshore movement in evening and offshore in morning.	move from lake habitat to spawning creeks (generally tributaries to, or outlets of, their native lake).
Spawning	in the fall (September-November), usually at night, when water temperatures drop below 10 °C , usually in lakes over boulder or rubble bottom from depths ranging from 0.3 to 12 m, although some populations spawn in rivers.	in spring shortly after ice-out at a threshold temperature of 5 °C, although some populations in the Peace and Cariboo regions delay to a water temperature of 15 to 16 °C. Usually spawn in streams over gravel substrates in moderate currents.	in the spring at a threshold temperature of 12 °C (April to July), typically in gravel or cobble of inlet streams, generally close to the lake.	in spring/early summer (April-July) at water temperatures between 9 and 15 °C. Typically in lake inlet or outlet streams in areas of flowing water over gravel substrate. Rarely more than a few hundred metres from the lake.	in spring (April-June) at water temperatures between 8 and 15 °C. Triggered by rising water temperature above 5 °C. In fine gravel of riffle areas of tributary streams, typically at depths of 0.15 to 2.5 m and water velocity of 0.3 to 0.9 m/s. Can also spawn on gravel beaches in lakes.
Growth	growth is highly variable; in some lakes 2+ fish were in the 20 cm range.	3 to 6 cm by end of first growing season.	3.5 to 6.5 cm by end of first growing season.	3.5 to 6.0 cm by end of first growing season.	growth is highly variable depending on habitat type, productivity and food chain structure.
Maximum Age and Size	>20 years is common; oldest aged was 62 years; 75 cm.	19 years (probable under-estimate); 50 cm.	20 years; 50+ cm; females live longer and grow larger than males.	males live up to 8 years and females live up to 19 years; 25 cm.	8 years; maximum size is highly variable depending on habitat type, productivity and food chain structure.
Age at Maturity	between 5 and 13 years; males 1 to 2 years before females.	males - 5 to 6 years females - 6 to 7 years	males - 3 to 4 years females - 5 to 6 years	males - 3 years females- 4 years	3 to 5 years; as early as 1 year by males and as late as 6 years by females.
Food	young-of-year forage on plankton and aquatic insect larvae, adding larger benthic organisms as they grow. At a length of 35 to 40 cm, switch to piscivore if an appropriate prey species is available.	are benthivores as adults, but early stages forage in shallow water for a variety of prey, most commonly zooplankton. Mouth shifts from terminal to ventral with development. As adults, most common food is chironomid larvae and pupae.	mostly aquatic insects when small; diets include fish after 10 cm size. Are mostly piscivorous when larger than 30 cm (although they will eat almost any prey of suitable size).	juveniles consume a wide variety of prey (planktonic crustaceans, chironomid pupae, benthic invertebrates). Consume larger prey as they grow; adults primarily eat invertebrates, but occasionally eat fish.	in creeks, fry and juveniles forage on drifting aquatic insects. In lakes, fry forage on bottom and water column invertebrates; juveniles and adults have similar diets, but adults take larger prey and more adult insects. Large adults (> 40 cm) in large lakes often become piscivorous.
Habitat - Early Life Stages	young seek out deeper water within a month of being hatched, and prefer deeper water than adults (possibly due to cannibalism). When surface waters are cool, juveniles can also be found in shallow water about 1 to 2 m offshore.	young-of-year stay near shore near cover (vegetation or woody debris). Fry transition to deeper water.	young-of-year are typically found around lake margins in shallow water close to cover. Juveniles tend to move offshore into deeper water in the fall.	young-of-year are typically found in shallow water, and tend to move offshore at night. Juveniles also occupy shallow water, but generally deeper than young-of-year.	alevins take 1 to 4 weeks to emerge. Fry may move immediately to lakes, or reside in the stream as many as 3 years. Fry staying in the stream are territorial, and initially occupy slow, shallow areas (shallower than other species), moving to deeper and faster water as they get older.
Habitat - Adults	prefer cool water (below approximately 10 °C); during warmer summer months adults inhabit the hypolimnion (below the thermocline) and disperse throughout the lake during the winter months.	habitat generalists, found in lakes and rivers. In lakes, tend to forage inshore at night, but remain below the thermocline in the day.	often in the littoral zone about 1 m off the bottom and at the offshore side of weed beds. Move into deeper water in the fall.	habitat use changes seasonally. Generally near bottom in the winter. Move inshore in the spring and after spawning, exhibit a diel migration, moving inshore in the evening and offshore in the morning.	in lakes, prefer cool (7 to 18 °C) temperatures and high dissolved oxygen; tend to stay below the 18 °C isotherm. Spend most of the time within 3 m of surface and are often in cover in the lower littoral zone.

Notes: km = kilometres, °C = degrees Celsius, m = metres, m/s = metres per second, cm = centimetres, + = plus, > = greater than.

[a] Based on information in Scott and Crossman (1998), Roberge et al. (2001, 2002), McPhail (2007) and Barrett and Munkittrick (2010).

3.7.1 Sample Collection

Spring fishing in Polley and Bootjack lakes was completed from May 26 to 30, 2022 under FNLRORD Fish Collection Permit WL22-714043, using hoop nets to capture rainbow trout and longnose sucker (Figure 3.4), as described in Section 3.6.2. Fishing was completed in the spring to support collection of ripe ovary tissue from these two species, which is a key tissue for selenium monitoring (see Section 3.7.3.1).

Fall fishing in Quesnel Lake and Quesnel River was completed from October 1 to 6, 2022 under FLNRORD Permit WL22-714043 and Department of Fisheries and Oceans Canada (DFO) Permit XR 113 2022. Hoop nets were used specifically to target the species with small home ranges (i.e., northern pikeminnow and peamouth chub) in the exposed (West Arm-near Hazeltine Creek) and reference areas (North Arm-near Grain Creek) of Quesnel Lake (Figure 3.6, Table 3.8). Hoop netting was completed from October 3 to 6, 2022, with hoop nets set for 1 to 2 nights. Fishing to specifically target lake trout was completed in the exposed (West Arm-near Cedar Point) and reference (East Arm-near Blue Lead Creek) areas of Quesnel Lake using gill nets with mesh sizes ranging from 3 to 5 inches stretched mesh (Figure 3.6). Gill netting activities were restricted to daylight hours from October 3 to 6, 2022. The duration of gill net deployment was limited to less than 1.5 hours in accordance with the DFO permit conditions and to minimize incidental mortalities and nets were deployed using Summer Profundal Index Netting (SPIN) methods (Sandstrom and Lester 2009). Gill nets were deployed perpendicular to shore in benthic habitat at depths from 3 m (i.e., nearest to shore) to 37 m. Fish were captured from the Quesnel River (Figure 3.6, Table 3.8) by angling on October 1 and 2, 2022.

For each sampling area, the target sample size per species (e.g., rainbow trout) and tissue type (e.g., muscle, ovary, liver, and kidney, or whole-body[25]) was n = 8 to facilitate meaningful statistical comparison of fish tissue chemistry between exposed and reference areas (Table 3.8).

Supporting data recorded for the 2022 fish tissue monitoring in lake habitats included GPS coordinates of each fishing location (net set or angling effort), level of effort (net deployment and retrieval times, angling duration), *in situ* water quality measurements (i.e., depth profiles of temperature, pH, dissolved oxygen, conductivity, and specific conductance), and habitat data (see Section 3.8.1; for details).

Upon collection of fishing gear, captured fish were identified to species. Target species that were captured in the hoop nets, gill nets, or by angling and were of an appropriate size were retained for processing. Incidental mortalities were disposed of in an approved manner. All other fish were released live immediately following capture. Fish retained for lethal sampling were

[25] The tissue types collected varied by species and location; see Table 3.8.

anesthetized using a clove oil solution or euthanized with a decisive blow to the head and spinal severance and measured for fork length, total length, and body weight as described in Section 3.6.4.

Fish retained for lethal sampling were opened using dissecting scissors and any internal abnormalities were noted. All dissected fish were also examined internally to confirm sex. Internal tissues (liver, kidney, and ovary if available[26]) were then removed using dissecting tweezers and scissors, weighed to the nearest 0.001 g (±1% precision) using an analytical balance and placed in labelled Whirl-Pak™ bags. A boneless, skinless muscle sample was also collected and placed in a clean, labeled Whirl-Pak™ bag. Tissue samples were collected using clean implements (cutting boards, filet knives, and tweezers). Duplicate (split) samples were collected at a target frequency of 10% for QA/QC purposes and were evenly distributed among fish species and tissue types. Whirl-Pak™ bags containing whole carcasses (northern pikeminnow) or individual tissue samples (all other species) were stored frozen until shipment (on ice) to the analytical laboratory.

Aging structures from lethally sampled fish were then collected for age determination; specific age structures that were retained included:

- Otoliths (rainbow trout, lake trout, peamouth chub) or whole heads (northern pikeminnow);
- Pectoral fins (longnose sucker)[27]; and
- Scales as a secondary age structure.

For rainbow trout, longnose sucker, lake trout, and peamouth chub, age structures were removed, wrapped in waxed paper, placed in labelled coin envelopes, and frozen until shipment to the laboratory for aging analyses. For juvenile northern pikeminnow (that are typically smaller in size), whole heads were removed, stored, frozen, and shipped (on ice) to the aging laboratory for otolith extraction and age determination.

3.7.2 Laboratory Analysis

Laboratory analysis of fish tissue quality samples was completed by ALS Environmental (Burnaby, BC) using the same methods and QA/QC measures outlined in Section 3.4.2.

[26] Fully-developed ovaries were sampled from mature females. During fishing efforts in Quesnel Lake and Quesnel River, additional fish (i.e., more than n = 8 per area) were not targeted and sacrificed to achieve an n = 8 sample size for ovary tissue.

[27] Catostomidae spp. are known to have low-quality otoliths for aging, therefore fin rays are the preferred structure with which to derive age estimates.

Determination of fish ages using aging structures was completed by AAE Tech Services in La Salle, Manitoba. Sample shipments were accompanied by COC forms. Prior to aging, samples were thawed and otoliths were extracted from fish heads, as required. Otolith pairs for each relevant fish were examined under magnification for any issues related to structural integrity (e.g., cracks, fractures, etc.) and deformation (e.g., crystallization or misshapen lobes). Based on this evaluation, one otolith of the pair was selected for processing and embedded in Cold Cure epoxy resin, then allowed to cure for 48 hours before sectioning and polishing. Age estimation was carried out by submerging the otolith section in water under magnification with the polished surface facing up.

Pectoral fin rays from longnose sucker were processed and analyzed using a similar sectioning method to that used for the otoliths. Fin rays were embedded in Cold Cure epoxy resin to increase the structural integrity of the sample and prevent damage or degradation of the sample during processing. Samples were cured for 48 hours before sectioning. A minimum of three sections were taken to compensate for misalignment or staggering of the rays, due to shifting during the embedding process, or the inherent shape of the structure. The analysis of multiple rays enables age verification and improves the reliability of the age estimate, especially in the case of heavy checking or faint/thin annuli. The three sections were then submerged in a dish of water under magnification with the ageing surface facing up. Orientation was matched across all three sections to ensure accurate comparison.

For both otoliths and pectoral fin rays, ages were recorded with a corresponding Confidence Index value based on otolith/fin ray section condition, annuli assessment, and the confidence of the reader in the age determination. Scales that were collected as backup structures were used for age analysis only if an otolith or pectoral fin was damaged or otoliths were not collected successfully during sample processing. Data reports were provided to Minnow and MPMC as an Adobe Acrobat PDF file and Microsoft Excel spreadsheet (Appendix G).

3.7.3 Data Analysis

Fish catch data were compiled and summarized to provide a catch list for each sampling area and gear type. The catch compilations, along with data on fishing efforts completed in May and October 2022, were used to calculate CPUE for each species and sampling area. For hoop netting efforts, CPUE was expressed as number of fish per day. For gill nets, CPUE was calculated based on the number of fish captured per square meter-hour. For angling, CPUE was calculated as the number of fish per angler day. Fish length, weight, and age data were also compiled and summarized by calculating the mean, median, SD, and total range (minimum and maximum) by species and area.

Upon receipt of the chemical data from ALS, a DQR was performed. This included the assessment of field precision, laboratory precision, and laboratory accuracy against data quality objectives (DQOs) established at the outset of the project. Following the DQR, summary statistics were calculated for each analyte (% moisture, metals), species, tissue type (i.e., muscle, liver, ovary, and kidney or whole-body), and area. Summary statistics included the sample size, % of samples less than the LRL, mean, SD, minimum, median, and maximum. Summary statistics were calculated using the K-M method as described in Section 3.8.3.1.

3.7.3.1 Data Screening

Fish tissue quality data were evaluated in comparison to tissue quality guidelines for human health and/or for aquatic ecosystem health (available for mercury and selenium) and the tissue quality of fish collected from reference areas. Tissue quality guidelines included the Canadian Food Inspection Agency/Health Canada mercury guideline for the protection of human health (0.5 milligrams per kilogram wet weight [mg/kg ww]; CFIA 2015) and the BC selenium guidelines (BCMOE 2014). Selenium guidelines for BC include guidelines for the protection of human health, which are based on fish consumption levels (7.3 mg/kg dw for subsistence consumers, 14.5 mg/kg dw for the general population, and 75 mg/kg dw for the recommended two servings of fish per week). The intermediate (general population) and subsistence consumption rate was selected as most applicable for evaluation of Polley Lake, Quesnel Lake, and Quesnel River fish tissue quality (i.e., the guideline of 7.3 and 14.5 mg/kg dw, respectively). Selenium guidelines for BC also include guidelines for the protection of aquatic life, which are 4 mg/kg dw in muscle tissue and whole-body samples, and 11 mg/kg dw in egg/ovary tissues.

Scientific consensus is that the best tissues for evaluating the potential adverse effects of selenium to fish (which are considered to be the most selenium sensitive organisms) are ripe ovaries or eggs (Luoma and Presser 2009; Janz et al. 2010; Stewart et al. 2010; DeForest et al. 2012; Janz 2012). Therefore, ovary tissues were used as the primary basis for evaluating potential effects of selenium on aquatic life. The BC guideline for selenium in egg/ovary tissue (11 mg/kg dw) includes a two-fold uncertainty factor that may not be justified given a very steep dose-response curve (DeForest et al. 2012), therefore selenium concentrations in fish ovaries were also compared to the threshold (5th percentile of the distribution of 10th percentile Effect Concentrations [EC_{10}]) for reproductive effects in eggs and ovaries (20 mg/kg dw; DeForest et al. 2012).

3.7.3.2 Statistical Analyses

Statistical analyses of metal concentrations in fish tissues were conducted using post-breach data (i.e., 2015 to 2022) to answer the following questions:

1. Have mean analyte concentrations at the exposed area changed over time relative to the reference area?[28]
2. Are there differences in mean analyte concentrations between exposed and reference areas, and does the difference depend on year?

To answer these questions, data were grouped into two categories for separate tabular and graphical presentation and statistical analyses:

1. Polley Lake (exposed) compared to reference (Bootjack Lake).
2. Quesnel Lake exposed (near Hazeltine Creek or near Cedar Point) compared to reference (near Grain Creek or East Arm).[29]

Questions 1 and 2 were answered by conducting a two-way ANOVA assessing the exposed:reference ratios of results, with *Area* and *Year* as factors and assessing the interaction between *Area* and *Year.* The two-way ANOVA was competed as detailed in Section 3.4.3 (for Questions 1 and 2) to address the same questions. Similar statistical comparisons were also completed for fish ages, lengths, and weights to answer the question: is there a difference in mean fish length between exposed and reference areas, and does the difference depend on year? The comparisons of lengths, weights and age followed the two-way ANOVA methods listed above with the exception that data were fit with least-squares estimation (i.e., not MLE) because data were all uncensored (i.e., not < LRL) and data were analyzed as $\log_{10}$-transformed (length and weight) or untransformed (Age) response variables.

When reference area data were not collected concurrently with the exposed area over time (i.e., for Quesnel River), statistical comparisons of concentrations of metals in fish tissues were conducted to answer the following question:

Is there a difference in mean concentration at the exposed area over time?

The question was answered by conducting a one-way ANOVA with *Year* as the factor. Due to the prevalence of analyte results which were below the LRL (i.e., censored data), analyses of tissue metal concentration data were completed using a censored regression one-way ANOVA fit with MLE and assuming a lognormal distribution. Length, weight, and age data did not contain censored data and thus were fit with least-squares estimation (i.e., not MLE) and were analyzed as $\log_{10}$-transformed (length and weight) or untransformed (age) response variables. The MOD

[28] i.e., has the ratio of concentrations (exposed:reference) changed over time?

[29] Data from Quesnel River were considered separately since these data do not have an associated reference for comparison (i.e., statistical contrasts can be temporal only).

between the exposed area in each year relative to the first year of data collection was estimated as:

$$MOD = \frac{MCT_{Year} - MCT_{First\ Year}}{MCT_{First\ Year}} \times 100\%$$

where MCT is the measure of central tendency for the statistical test (i.e., back-transformed marginal means).

R software (R Core Team 2022) was used to conduct all statistical analyses. Censored regressions (i.e., MLE) were completed using the *survreg* function in the survival package (Therneau 2017) in R and contrasts were completed using the methods described in Oehlert (2010). Marginal means were estimated using the *emmeans*() function in R and were used to calculate MODs for the two-way ANOVA analyses. These estimates of the mean are equivalent to geometric means because the ANOVA analyses were completed on log-transformed concentrations. Consequently, the means used for the MOD calculations were not the same as the K-M mean concentrations reported in Appendix C.7 (see Section 3.8.3.1 for description of the K-M method).

Mercury concentrations were analyzed using units of mg/kg ww, in keeping with the reporting units for mercury guidelines. Mercury analyses were completed using ANCOVA with $\log_{10}$(fork length) as a covariate when the covariate was a significant predictor of mercury concentration, since mercury is known to bioaccumulate (i.e., larger fish have higher tissue concentrations; Kidd and Batchelar 2012). If fork-length was not a significant covariate ($\alpha = 0.05$) in the ANCOVA, the analysis proceeded using the ANOVA methods described above, consistent with the other analytes.

Statistical comparisons were completed for all available analytes; however, data interpretation focused on primary and secondary analytes (see Table 2.4). Plots of data that support the two-way ANOVA were presented for primary and secondary analytes that: 1) had a significant *Area* × *Time* interaction in the analyses; and 2) lacked a significant *Area* × *Time* interaction in the analyses but had a positive MOD (i.e., exposed concentrations were significantly higher than reference and the difference did not depend on year). Years with more than 50% of the data at the LRL for any given year were excluded from the analysis.

3.8 Supporting Measures

A variety of supporting physical and chemical information was used to support the interpretation of sediment and aquatic biological data collected from lakes as part of the CEMP. This information falls into two categories: 1) supporting information that was collected by Minnow during field collections of sediment, plankton, benthic invertebrates, and fish; and 2) supporting information

that was collected routinely by MPMC as part of ongoing CEMP monitoring and provided to Minnow. Unless otherwise specified, the supporting measures outlined below belong to the first category (measures collected by Minnow). Data analysis approaches for the supporting information are also detailed below.

3.8.1 Measures Collection

Supporting spot water samples were collected from specific depths using a water sampling bottle (Beta bottle or Van Dorn sampler) in support of data interpretation of the lake monitoring programs. During sediment sampling, spot water samples were collected from just above the sediment water interface (≤ 0.5 m above) at the shallow exposed (POL-S and QUL-LNF; n = 5 per area) and reference (BOL-S and QUL-LREF1; n = 5 per area) sediment sampling areas (Figures 3.1 and 3.2). The purpose of this sampling was to support the interpretation of sediment toxicity results from these shallow monitoring areas.

Water samples collected using a sampling bottle (Beta bottle or Van Dorn sampler) were obtained as follows. Prior to sampling, the sampling bottle was rinsed with site water and then lowered to the desired depth. For the collection of samples where the sampling bottle was not visible during sampling, a 5 kg steel weight was attached approximately 0.5 m below bottle to assist with collecting the sample at the appropriate depth. Once at the appropriate depth, the sampling bottle was moved side to side gently without disturbing the substrate (to ensure a representative sample was collected) prior to tripping the closure mechanism with a steel messenger. Upon retrieval, water samples were collected from a spigot fitted to the bottle. Samples collected into precleaned bottles were then preserved immediately (as required). Duplicate (split) water samples were collected at a target frequency of 10% for QA/QC purposes. Water samples were kept on ice in the field and refrigerated until being shipped (on ice) to ALS Environmental (Burnaby, BC).

One depth-integrated water sample was collected at each plankton monitoring area, during each sampling event, to support the interpretation of zooplankton tissue quality results (Appendix Table A.1.3). Samples were collected using a depth-integrated tube sampler (length ~13 m) as described in Section 3.3.1.1. Upon retrieval, the water samples were poured into a clean bucket (to collect *in situ* measures) before being decanted in pre-cleaned sample bottles, preserved (as required), stored, and shipped to the analytical laboratory as described above. Duplicate (split) depth-integrate water quality samples were collected at a target frequency of 10% for QA/QC purposes.

In addition to the spot water quality samples collected in 2022 by Minnow, water quality samples were collected routinely by MPMC staff as part of their ongoing water quality monitoring program (MPMC 2019) and were used to support data interpretation (see routine water quality monitoring station locations in Figure 3.3). These data were subjected to an internal DQR by MPMC,

including screening of laboratory QA/QC data, sample integrity issues, detection limits achieved, data accuracy, as well as potential outliers/extreme values. As such their quality were not further assessed in this report. Data were provided to Minnow by MPMC as a Microsoft Excel file.

Additional supporting information collected at each lake monitoring station in 2022 included GPS coordinates, date and time of sampling efforts, sampling depth, field meter measurements of temperature, specific conductance, dissolved oxygen, and pH at surface and bottom[30] and site and sample photographs (Appendix Tables A.1.1 to A.1.3). At one station per area per monitoring event, a minimum of one vertical depth profile of *in situ* water quality measures was recorded (Appendix Figures A.1.1 to A.1.6), as well as at least one Secchi depth measure. *In situ* water quality measures were collected using a YSI EXO™ handheld portable field meter equipped with a YSI EXO1™ or YSI EXO2™ sonde which was calibrated at least every second day. Field notes that would aid interpretation were also recorded. For sediment quality and benthic invertebrate sampling these included notes on the presence or absence of aquatic vegetation in sediment, other physical observations of sediment (sediment texture, colour, density, etc.). For fish monitoring these included notes on the habitat present (Appendix Tables A.1.4 and A.1.5).

3.8.2 Laboratory Analysis

Upon receipt of water samples, ALS opened the coolers, measured temperature to verify the maintenance of cold samples, logged each sample, and assigned each sample a unique identification code. A SRN was then sent to MPMC and Minnow for verification.

Laboratory analyses included the parameters in the CEMP routine surface water quality monitoring program (MPMC 2019): dissolved organic carbon (DOC), total metals, dissolved metals, anions (nitrate, nitrite, sulphate, chloride, and fluoride), ammonia, total nitrogen, total phosphorus, dissolved phosphorus, orthophosphate, alkalinity, hardness, turbidity, total suspended solids, total dissolved solids, pH, and conductivity. Upon completion of the analyses, a data report was provided by ALS to MPMC and Minnow as an Adobe Acrobat PDF file and Microsoft Excel spreadsheet (Appendix G)[31].

[30] Surface and bottom *in situ* water quality measures were collected at each monitoring station sediment and benthic invertebrate community sampling stations only.

[31] Data reports for spot water quality sampling are included in Appendix G. Data from routine water quality monitoring completed by MPMC were provided to Minnow in Microsoft Excel format from the MPMC database and these are not included in Appendix G.

3.8.3 Data Analysis

3.8.3.1 Summary Statistics

Summary statistics (means, percentiles, and SDs) were calculated for select chemical parameters using the K-M method (Helsel 2012). Additional information about the application of this summary statistic calculation method (i.e., which monitoring components and analytes this method was applied to) are found within the methods sections for analysis of chemical data above (Sections 3.1.3, 3.4.3, and 3.7.3).

The K-M method (Helsel 2012) involves transforming left-censored data (i.e., data prefaced with a "<" symbol) to right-censored data (i.e., values prefaced with a greater than [>] symbol), and then using the K-M estimator (used to estimate the mean survival time in survival analysis) to estimate the mean. The calculation was completed using the *survfit*() function in the survival package (Therneau 2017) in R software (R Core Team 2022) and involves calculating the area under the K-M survival curve.

The K-M method is non-parametric and can accommodate multiple LRLs. This method of estimating the mean is equivalent to using the distribution of detected values below the maximum LRL to represent values that are <LRL. For example, the mean of the data set {1, 2, <4, 5} is estimated as the mean of 1, 2, [½×1 + ½×2], and 5 which is 2.375. The value <4 is replaced by the distribution of values below 4 (i.e., 1 and 2 with equal weight of ½). Similarly, the mean of the data set {1, 1.6, 2, 2.1, <4, 5} is estimated as the mean of 1, 1.6, 2, 2.1, [¼×1 + ¼×1.6 + ¼×2 + ¼×2.1], and 5 which is 2.229. Again, the value <4 is replaced by the distribution of values below 4 (i.e., 1, 1.6, 2, and 2.1 with equal weight of ¼). If the minimum value in the data set is <LRL, it is replaced with the LRL. Therefore, if there is only one LRL and no detected values <LRL, the K-M estimate of the mean is equivalent to replacing the value <LRL with the LRL (i.e., the best guess for the values <LRL is the LRL). If a SD could not be estimated (e.g., all data <LRL), then one was not reported.

For percentiles, estimates were first calculated using K-M estimator based on survival analyses. The percentiles were calculated using the quantile() function for a survival model generated in the survival package in R software (R Core Team 2022). Estimates of percentiles cannot be generated for highly censored data using the K-M method, and so a second method was used to provide practical estimates of the percentiles. For example, for the data set: <2, <2, <2, <2, 5; the K-M method will not produce an estimate of the median. However, the median value of this data set is clearly <2. The second method of estimating percentiles was used whenever the K-M method could not generate an estimate. This method involved calculating the percentile after

substitution with the LRL, then identifying the value in the dataset equal to this value (or the next detected value in the dataset that is below this value).

Summary statistics for biological endpoints (sediment toxicity, plankton community and productivity, benthic invertebrate community, and fish community and population health; Sections 3.2.3, 3.3.3, 3.5.3, and 3.6.5) were calculated using standard methods and formulae.

3.8.3.2 Water Quality Guideline Screening

Results of spot water quality samples were screened against available approved or working BCWQG (collectively termed "BCWQG"; Appendix Table C.1.1; BCMOECCS 2021a,b). For guidelines that are dependent on other water quality parameters (e.g., hardness-based, pH, temperature), concurrent water quality parameter values were used in their calculation (BCMOECCS 2021a,b). If hardness was outside the accepted range, then the bound of that range (either upper or lower) was used to calculate the guideline (BCMOECCS 2021a,b). If concurrent data were not available, the conservative values were chosen using the historical data for that station (e.g., the minimum hardness recoded for that station was used). Surficial water quality samples collected by MPMC staff from Polley, Bootjack, and Quesnel Lake routine water quality stations (Figure 3.3) were also screened against BCWQG with the results of this screening presented in plots. Plots of routinely collected water quality samples relative to BCWQG were limited to total and dissolved concentrations of primary and secondary analytes (Table 2.4). In addition, temperature and nutrient results (total phosphorus, dissolved phosphorus, orthophosphate, total nitrogen, and nitrate) were plotted for Polley, Bootjack, and Quesnel Lake routine water quality stations (Figure 3.3) to help support the interpretation of plankton community results. Tabular and graphical screening against BCWQG was completed using R (R Core Team 2022).

3.8.3.3 Biotic Ligand Model-derived BCWQG for Copper

The BCWQG Biotic Ligand Model (BLM)-based software was used to calculate acute and chronic guidelines for dissolved copper (BCMOECCS 2019d,e). This was used to support interpretation of zooplankton tissue quality by evaluating surface waters of Polley Lake and Quesnel Lake.

The BLM integrates exposure and toxicity modifying factors other than hardness that are known to modify copper bioavailability. Using this approach, the BLM defines dissolved copper concentrations below which chronic adverse effects would not be expected under the specific water quality that co-occurs with the copper concentration. Specifically, the BCWQG BLM produces acute and chronic guidelines for dissolved copper that are based on the 12 modifying water chemistry inputs required to run the model: temperature, pH, DOC, humic acid content,

calcium, magnesium, sodium, potassium, sulphate, chloride, alkalinity, and hardness (BCMOECCS 2019d).

If required input parameters for the BCWQG BLM were missing for a data set, these data were replaced to increase the sample size, when possible. This was done using professional judgement to replace the missing data as closely as possible or by using a conservative replacement value. Data missing for the parameters chloride, pH, and DOC were replaced by substituting the mean value from sampling events conducted in close temporal proximity to the missing data or using the most conservative values (e.g., using the minimum value collected at a station). Temperature data were missing for entire years for some stations. Thus, a conservative approach was used to estimate seasonal temperatures. The maximum temperature was taken in each month for the bottom and surface monitoring stations in each lake. These temperatures were used for samples taken in their respective months for each station to ensure that changes in guideline calculations were not driven by differences in the availability of temperature data.

3.8.3.4 Water Quality Trends

Temporal trends in surface water quality data were evaluated to support interpretation of chemical monitoring components. Specifically, surface water quality data collected routinely by MPMC post-breach (i.e., 2015[32] to 2021) in Polley Lake and Quesnel Lake were evaluated to support the interpretation of zooplankton tissue quality from these areas (refer to Section 3.4.3). This evaluation was completed using the seasonal Kendall test detailed below and included evaluation of aqueous total and dissolved concentrations of primary and secondary analytes (Table 2.4), and acute and chronic Guideline Exceedance Factors (GEFs) for copper (the ratio of observed dissolved copper concentrations divided by BCWQG BLM-derived guidelines).

The non-parametric seasonal Kendall test described by Hirsch et al. (1982) was used to evaluate temporal trends in surface water quality data from the north and south basins of Polley Lake (POL-P1 and POL-P2, respectively) and from three stations in Quesnel Lake (QUL-18 and QUL-2a [exposed], and QUL-120a [reference]; Figure 3.3). The seasonal Kendall test assesses temporal trends separately for each season (or month in this case) and combines

[32] Routine water quality data prior to 2015 are available for Polley Lake, Bootjack Lake, and Quesnel Lake but were excluded from plots and statistical analyses to distinguish between short-term effects from potential long-term effects of the breach on water quality trends analysis in these waterbodies. The exclusion of data prior to January 2015 was based on the rationale explained in Minnow (2019a). Briefly, laboratory turbidity data resulting from the suspension of fine particulate matter immediately after the breach were used to qualitatively identify a “breach” period (i.e., a period characterized by short-term effects on water quality). By late 2014, laboratory turbidity had decreased to values more similar to pre- breach. Based on these results, the 'breach” period was defined as beginning on August 4, 2014, and ending in December 2014. Therefore, use of data starting in January 2015 should be effective in excluding short-term breach effects on water quality.

the results for each season into an overall test for trend. The test is non-parametric and assesses whether there is a monotonic increasing or monotonic decreasing trend over time. The test is conducted by calculating the test statistic S_i which is equal to the sum of the number of increases and decreases from a time period t to all time periods after t for each observation in season i. The overall test statistic S is computed as the sum of S_i for all seasons. The significance of the observed S is determined by comparing it to a critical value of S (at the significance level α = 0.05) determined from the exact sampling distribution of S (calculated by determining all possible permutations and combinations of S based on the increases and decreases from the number of pairwise comparisons made; Hirsch et al. 1982). If more than 45 pairwise comparisons are made (equivalent to the number of pairwise comparisons for n = 10 in a single season), then the normal approximation is used to calculate a p-value and to assess significance (Hirsch et al. 1982). The standard normal deviate Z is calculated as:

$$Z = \begin{cases} \frac{S-1}{\sqrt{\sigma_S}} if\ S > 0 \\ 0 \quad if\ S = 0 \\ \frac{S+1}{\sqrt{\sigma_S}} if\ S < 0 \end{cases}$$

where $\sigma_S = \sum_{i=1}^{k} \frac{n_i(n_i-1)(2n_i+5) - \sum_{T_i} t_i(t_i-1)(2t_i+5)}{18}$ and n_i is the number of samples in month i, t_i is the number of tied values for each tied value T_i, and k is the number of seasons (Hirsch et al. 1982).

An estimate of the trend slope over time was calculated by computing the median of all slopes between data pairs within the same month (Helsel and Hirsch 2002). The slope was reported as a change in concentration per year and as a percentage change in concentration per year. The intercept of a line through the time series was estimated as the median intercept of all lines through each point with the estimated slope (Pohlert 2016). The trend analysis was only conducted with a minimum number of 5 pairwise comparisons, the minimum number required for all consecutive increases or decreases to be significant at α = 0.05.

4 METHODS – CREEK HABITAT

4.1 Sediment Quality

Sediment quality monitoring of creek habitats in 2022 targeted one area in upper Hazeltine Creek (HAC-U) and one area in lower Hazeltine Creek (HAC-D), with areas in upper and lower Edney Creek serving as reference (EDC-U and EDC-D, respectively; Figure 4.1, Table 4.1), in accordance with the CEMP (MPMC 2019). Channel remediation works in the vicinity of HAC-U and HAC-D were completed in 2017 and 2021, respectively (Table 4.1). As outlined in the CEMP (MPMC 2019), the frequency of sediment quality monitoring in creek habitats is annual, and monitoring at these areas was last completed in 2021 (Minnow 2022a).

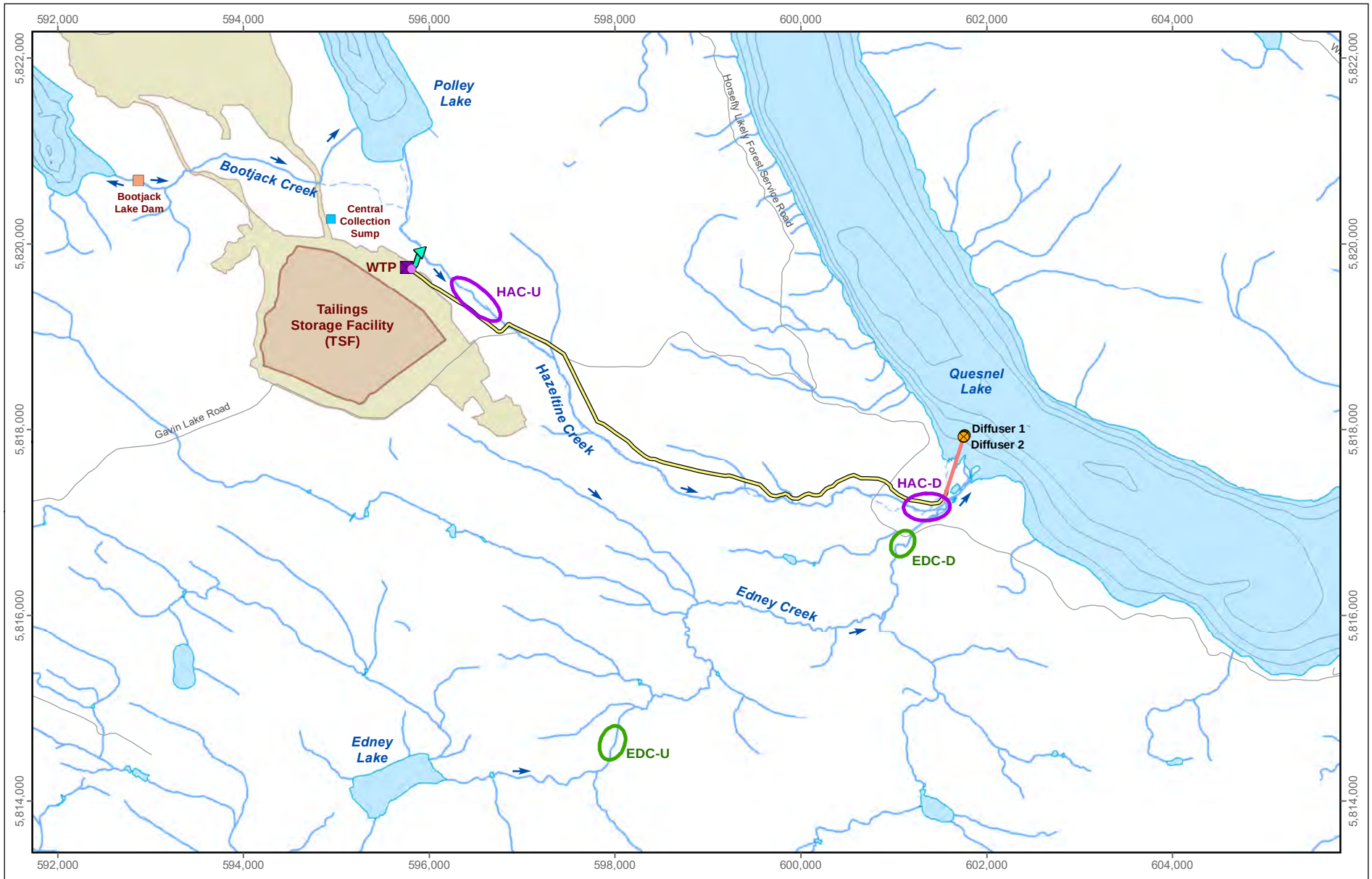
Sample collection and analysis methods for 2022 are described herein. For details pertaining to prior sampling years, including equivalent historic sampling areas, refer to the references listed in Table 4.1.

4.1.1 Sample Collection

Sediment samples were collected from Hazeltine Creek and Edney Creek between August 4th and 7th, 2022. Five replicate stations were sampled to represent each monitoring area (Figure 4.1, Table 4.1; Appendix Table A.2.1).

Hazeltine Creek and Edney Creek are predominantly erosional (HKP 1996, 1997a; Minnow 2007) and there are few locations of true sediment deposition. The limited sediment within these creeks tends to wash through during spring freshet and deposit as a thin layer of fines in quiescent areas on the lowering hydrograph. Due to the non-uniform nature of sediment deposition in these erosional areas, wetted locations that support some accumulation of fine materials (i.e., small pools, backwaters, or interstices between boulders) were selected opportunistically for sample collection. Collection of true sediment (i.e., fines in the silt and clay size category) could not be completed by conventional grab sampling due to the dominant presence of sand, gravel, and cobble in these areas. Sediment fines were therefore targeted using a clean stainless-steel- spoon.

At each sampling station selected, the location was approached by foot in a manner that did not disturb the sediment prior to sampling. Surficial sediment was then collected carefully by slowly placing the spoon on the sediment surface in a manner that minimized disturbance and inserting



LEGEND

- Exposed Area
- Reference Area
- Effluent Mixing Tank
- Historic Watercourse
- Discharge to Diffusers (2015 to present)
- Effluent Discharge Pipeline (January 2018 to present)
- Diffuser (Treated Effluent Discharge, December 2015 to present)

Note: Bathymetry is displayed in meters.

0 0.75 1.5 3 km

N W E S

Projection: North American Datum 1983 UTM Zone 10U

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Sediment Quality Monitoring Areas, Hazeltine and Edney Creeks, 2022

Date: January 2023
Project 227202.0029

minnow environmental inc.

Figure 4.1

Document Path: C:\Users\CApol\Trinity Consultants, Inc\Imperial Metals - 227202.0029 - 2022 MPMC\D - GIS\Task 6\22-29 Figure 4.1 Sediment Creeks.mxd

Table 4.1: Overview of Sediment Quality Monitoring in Creek Habitats in the Vicinity of the Mount Polley Mine, 1995 to 2022 [a]

Waterbody		Area Type	Area Code	Baseline			Pre-Breach					Post-Breach						
				1995 (HKP 1996)	1996 (HKP 1997a)	1999 (Beak 2000)	2007 (Minnow 2009)	2009 (Minnow 2011)	2010 (Minnow 2011)	2012 (Minnow 2013a)	2013 (Minnow 2013b)	2014 (Minnow 2015a)	2015 (Minnow 2015b)	2018 (Minnow 2019a)	2019 (Minnow 2020a)	2020 (Minnow 2021a)	2021 (Minnow 2022a)	2022
Hazeltine Creek	Upper	Exposed (Remediated 2017)	HAC-U (W7 2009 to 2018; ST16 in 2014; W7 Pond in 2012; UHC in 2007; W6 in 1999 W7 in 1995 and 1996)	6	6	3	3	5	5	8	8 (W7) 5 (USW7-Pond) 16[b] (W7 Pond)	5	-	5	5	5	5	5
	Lower	Exposed (Remediated 2020/2021)	HAC-D (ST02 in 2014; DSW11 in 2012 LHC in 2007; W11 in 1995, 1996, 1999 and 2010)	6	6	3	3	-	5	5[c]	-	5	-	5	5	5	5	5
Edney Creek	Upper	Reference	EDC-U (W8 in 2012; UEC in 2007; W8, W8a, and W9 in 1995, 1996; W9 and W8 in 1999)	6 (W9) 6 (W8) 6 (W8a)	6 (W9) 6 (W8) 6 (W8a)	3 (W9) 3 (W8)	3	-	-	5[c]	-	-	-	5	5	5	5	5
	Lower	Reference	EDC-D (W10 prior to 2015)	6	6	-	-	-	-	-	-	-	5[d]	5	5	5	5	5

Sediment quality samples collected in 1996 had unusually high concentrations for some parameters. Values are suspect and were not used in data analyses, display, or interpretation.

Notes: "-" = not sampled/not applicable. Sediment Quality analyses included: metals and Total Organic Carbon (TOC) in <63 µm fraction, moisture, particle size, pH, total nitrogen, and total sulphur, for sampling completed between 2014 and 2021. Prior to 2019, sediment geochemistry, porewater quality, Polycyclic Aromatic Hydrocarbon (PAH), and oil and grease analyses were also employed, but are not displayed herein. For details of these alternate analyses, see Minnow 2019a, 2020a, 2021a.

[a] Numbers indicate the number of stations sampled per area. Where multiple areas were sampled in a given year, the area is identified in parentheses after the number of stations. Only sampling areas that were monitored in 2022 are displayed, as well as historical data for these areas.

[b] Eight samples were collected in separate spring and fall sampling events.

[c] Selenium was the only parameter reported.

[d] Sediment quality data for EDC-D in 2015 were not used in the calculation of post-breach summary statistics in Minnow (2015b). See Minnow (2019a) for presentation of raw data.

the spoon into the sediment to capture sediment to a depth of no greater than 3 cm.[33] The spoon was then moved horizontally until full, and slowly retrieved to the surface to avoid sample washout.

The contents of each spoonful were inspected to ensure that it was predominantly fine sediment (i.e., silt and clay), and, if acceptable, was placed into one or more pre-labelled 250 mL glass sampling jars. This procedure was repeated approximately 20 times at each station to form a composite sample representative of the sampling station and to collect sufficient sample material for analysis (Appendix Table A.2.1). Sampling equipment was rinsed between all stations using site water. Duplicate sediment samples were collected at a target frequency of 10% for QA/QC purposes. Samples were kept on ice in the field then stored in a refrigerator until shipment (on ice) to the analytical laboratory.

Supporting information was collected at each sampling station to support data interpretation (see Section 4.5.1 for details).

4.1.2 Laboratory Analysis

Laboratory analysis of sediment quality samples from creek habitats was completed by ALS Environmental (Burnaby, BC) using the same methods and QA/QC measures described for sediment quality samples from lakes (Section 3.1.2).

4.1.3 Data Analysis

4.1.3.1 Data Screening and Analytes of Interest

Upon receipt of the analytical data, a DQR was completed, including an examination of data completeness, LRLs achieved, laboratory precision, laboratory accuracy, and field precision. Following completion of the DQR, raw data were summarized by area by calculating mean, median, SD, minimum, and maximum. Summary statistics were calculated using the K-M method as described in Section 3.8.3.1.

Sediment quality data were evaluated relative to British Columbia WSQG (BCMOECCS 2021a,b) and relative to reference and pre-breach 95th percentile concentrations (as described for lake sediment quality samples in Section 3.1.3.1). Guidelines and pre-breach/reference values were used in a two-way screening to identify analytes at exposed areas with mean concentrations that exceeded WSQG as well as reference and pre-breach 95th percentile values. Reference and pre-breach data used for screening values were compiled and calculated separately. Reference data included all available post-breach results (excluding data from 2015)

[33]Collection depth was often less than 3 cm, as fines often settle in a thin layer over coarser material, (and sampling seeks to avoid coarse material).

from Edney Creek, and pre-breach data included all results from Hazeltine Creek prior to 2014 (excluding data from 1996; Table 4.1; Appendix Tables D.2.1, D.2.2, D.2.3, D.2.4 and D.2.5).

All analytes (including primary and secondary analytes) were screened against the WSQG and reference/pre-breach 95th percentile values as described above (and as described in Section 3.1.3.1). Analytes at exposed areas with mean concentrations that exceeded all the following criteria were termed "Analytes of Interest": 1) the WSQG, 2) the associated reference 95th percentile value, and 3) the associated pre-breach 95th percentile value (if available). Analytes of Interest were determined separately for each monitoring area (i.e., separately for upper [HAC-U] and lower [HAC-D] areas of Hazeltine Creek). Concentrations of the Analytes of Interest, along with TOC, were the focus of more detailed interpretation which included graphical plots, formal statistical contrasts of temporal changes in concentrations, and examination of relationships to physical and chemical sediment variables.

4.1.3.2 Statistical Analyses

Statistical analyses of Analyte of Interest and TOC concentrations in creek sediments were conducted using post-breach data (i.e., 2018 to 2022) to answer the following questions:

1. Have mean analyte concentrations at the exposed area changed relative to the reference area?[34]
2. Are there differences in mean analyte concentrations between exposed and reference areas, and does the difference depend on year?
3. Have mean analyte concentrations at the exposed area changed over time since the breach?

To answer these questions, data were grouped into two categories for separate tabular and graphical presentation and statistical analyses:

1. Upper Hazeltine Creek (HAC-U) compared to an upper creek reference area (Upper Edney Creek; EDC-U).
2. Lower Hazeltine Creek (HAC-D) compared to a lower creek reference area (Edney Creek; EDC-U).

Questions 1 to 3 were answered by using the same statistical approach (i.e., two-way ANOVA with *Area* and *Year* as factors and assessing the interaction between *Area* and *Year)* described for lake sediments in Section 3.1.3.2. Sediment concentrations from 2014 were excluded from temporal comparisons because this sediment represented freshly deposited breach-material that was removed during remediation efforts in 2015.

[34] i.e., has the ratio of concentrations (exposed:reference) changed over time?

Analytes of Interest and TOC concentrations were plotted to support the two-way ANOVA results. Where relevant, these plots included comparison of post-breach data (i.e., those data included in the analyses) to WSQG and reference/pre-breach 95th percentile values. Pre-breach data were also included in a sub-set of the plots for context.

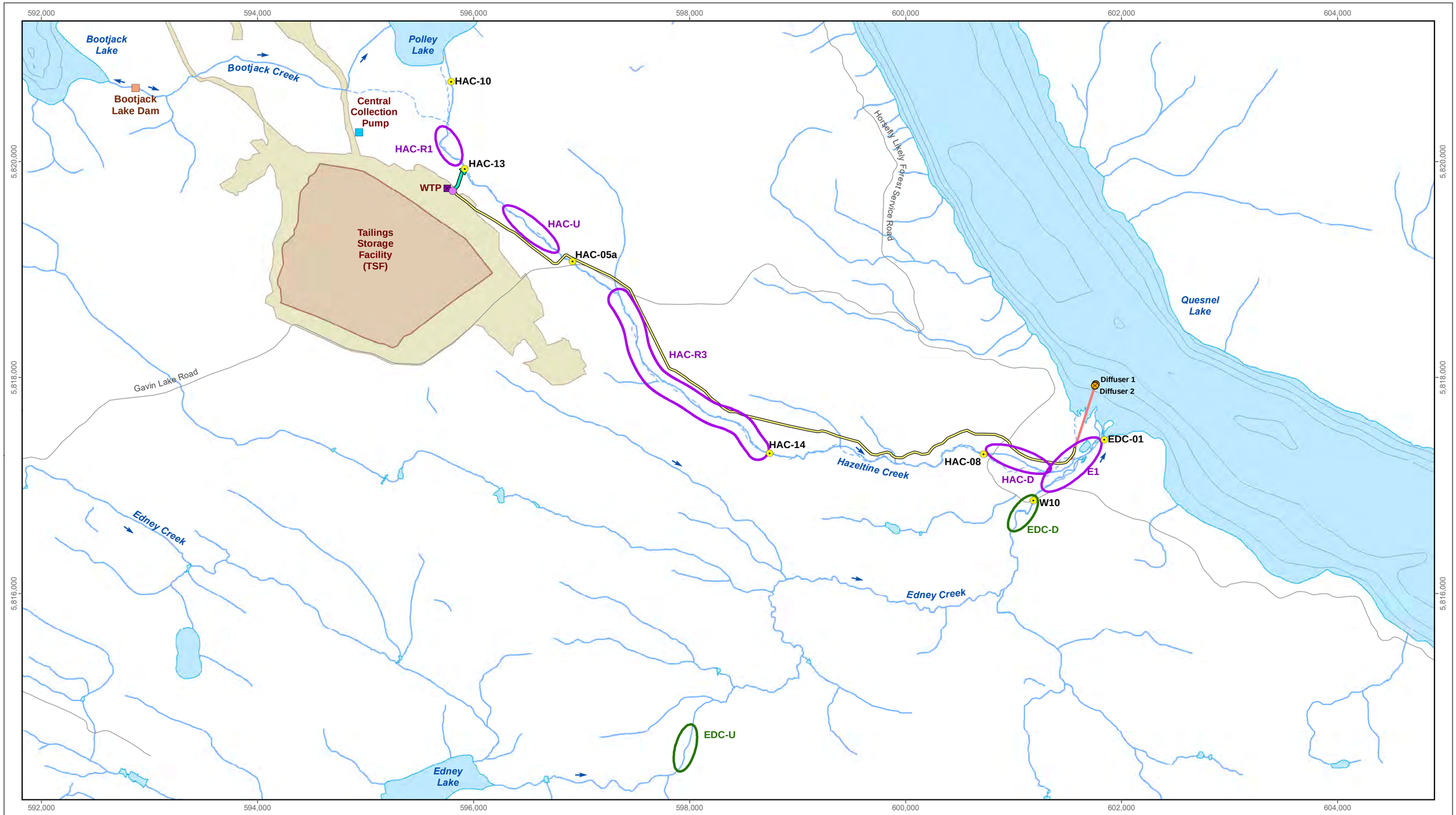
Relationships between the Analytes of Interest concentrations and physical variables (particle size) and other chemical variables (TOC, total nitrogen, and total sulphur content) were evaluated using Spearman correlation analysis described for lake sediment (Section 3.1.3.2). Correlation analysis was completed using data from 2018 to 2022 combined from upper and lower areas of Hazeltine Creek. These data were combined because the upper and lower areas of Hazeltine Creek are connected, and the objective was to evaluate these relationships over time within the entire exposed area.

All sediment statistical analyses and plots were completed using R (R Core Team 2022).

4.2 Periphyton Community and Productivity

Periphyton community and productivity monitoring of creek habitats in 2022 targeted two areas of upper Hazeltine Creek (HAC-R1, HAC-U), with one area of upper Edney Creek (EDC-U) serving as reference (Figure 4.2, Table 4.2), in accordance with the CEMP (MPMC 2019). Channel remediation works in the vicinity of HAC-R1 and HAC-U were completed in 2016 and 2017, respectively (Table 4.2). As outlined in the CEMP (MPMC 2019), the frequency of periphyton community and productivity monitoring in upper creek habitats is annual, and monitoring at these areas was last completed in 2021 (Minnow 2022a). The frequency of periphyton community and productivity monitoring in lower creek habitats is every second year, and monitoring at these areas was also last completed in 2021 (Minnow 2022a).

Periphyton productivity monitoring was also completed in 2022 in an additional area of upper Hazeltine Creek Reach 3 (HAC-R3; remediated in 2019) and an area of Frypan Creek (reference; FPC-R3) for the specific purpose of providing data to support the evaluation of fish habitat in upper Hazeltine Creek (Figures 4.2 and 4.3, Table 4.2; MPMC 2019). Frypan Creek differs from upper Hazeltine Creek in terms of habitat and flow, and the upper Edney Creek area (EDC-U) is a more suitable reference for evaluating periphyton productivity and community in upper Hazeltine Creek outside of the specific focus on evaluating fish habitat. For the above reasons, periphyton productivity data collected from Frypan Creek (FPC-R3) and upper Hazeltine Creek Reach 3 (HAC-R3) are presented in tabular form only in the present report and are excluded from data analyses and interpretation. These data will be interpreted in a separate report which focuses on the assessment of Hazeltine Creek as fish habitat (Minnow 2023).



LEGEND

- Exposed
- Reference
- Routine Water Monitoring Station
- Diffuser (Treated Effluent Discharge, December 2015 to present)
- Effluent Mixing Tank
- Discharge to Diffusers (2015 to present)
- Discharge to Hazeltine Creek (Apr 10 2014 to Aug 14 2014 and Nov 29 2015 to Sept 30 2017)
- Effluent Discharge Pipeline (January 2018 to present)
- Historic Watercourse

[a] Not all monitoring components were completed at all areas shown. Monitoring at each area included one or more of the following components: periphyton community, productivity, and tissue quality, and benthic invertebrate community, productivity, and tissue quality. See Tables 4.2, 4.3, and 4.4 for details of monitoring components.

Note: Bathymetry is displayed in meters.

0 0.5 1 2 km

N W E S

Projection: North American Datum 1983 UTM Zone 10U

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Periphyton, Benthic Invertebrate Monitoring Areas, and Water Monitoring Stations, Hazeltine and Edney Creeks, 2022[a]

Date: January 2023
Project 227202.0029

minnow environmental inc.

Figure 4.2

Document Path: C:\Users\CApol\Trinity Consultants, Inc\Imperial Metals - 227202.0029 - 2022 MPMC\D - GIS\Task 6\22-29 Figure 4.2 Periphyton and BI Creeks.mxd

Table 4.2: Overview of Periphyton Community and Productivity Monitoring in Creek Habitats in the Vicinity of the Mount Polley Mine, 1995 to 2022[a]

Waterbody		Area Type	Area Code	Component	Baseline[b]		Pre-Breach[c]	Post-Breach[d]					
					1995 (HKP 1996)	1996 (HKP 1997)	2011 (Minnow 2012)	2017 (Minnow 2018a)	2018 (Minnow 2019a)	2019 (Minnow 2020a)	2020 (Minnow 2021a)	2021 (Minnow 2022a)	2022
Hazeltine Creek	Upper	Exposed (Remediated in 2016)	HAC-R1	community	-	-	-	-	5	5	5	5	5
				chlorophyll-a	-	-	-	5	5	5	5	5	5
				AFDM	-	-	-	5	5	5	5	5	5
		Exposed (Remediated in 2017)	HAC-U (W7 prior to 2018)	community	3	3	1	-	5	5	5	5	5
				chlorophyll-a	6	3	1	-	5	5	5	5	5
				AFDM	-	-	-	-	5	5	5	5	5
		Exposed (Remediated in 2019)	HAC-R3	chlorophyll-a	-	-	-	-	-	-	5	5	5
				AFDM	-	-	-	-	-	-	5	5	5
Edney Creek	Upper	Reference	EDC-U (W9 prior to 2018)	community	3	3	-	-	5	5	5	5	5
				chlorophyll-a	6	3	-	-	5	5	5	5	5
				AFDM	-	-	-	-	5	5	5	5	5
Frypan Creek		Reference	FPC-R3	chlorophyll-a	-	-	-	3	5	5	5	5	5
				AFDM	-	-	-	3	5	5	5	5	5

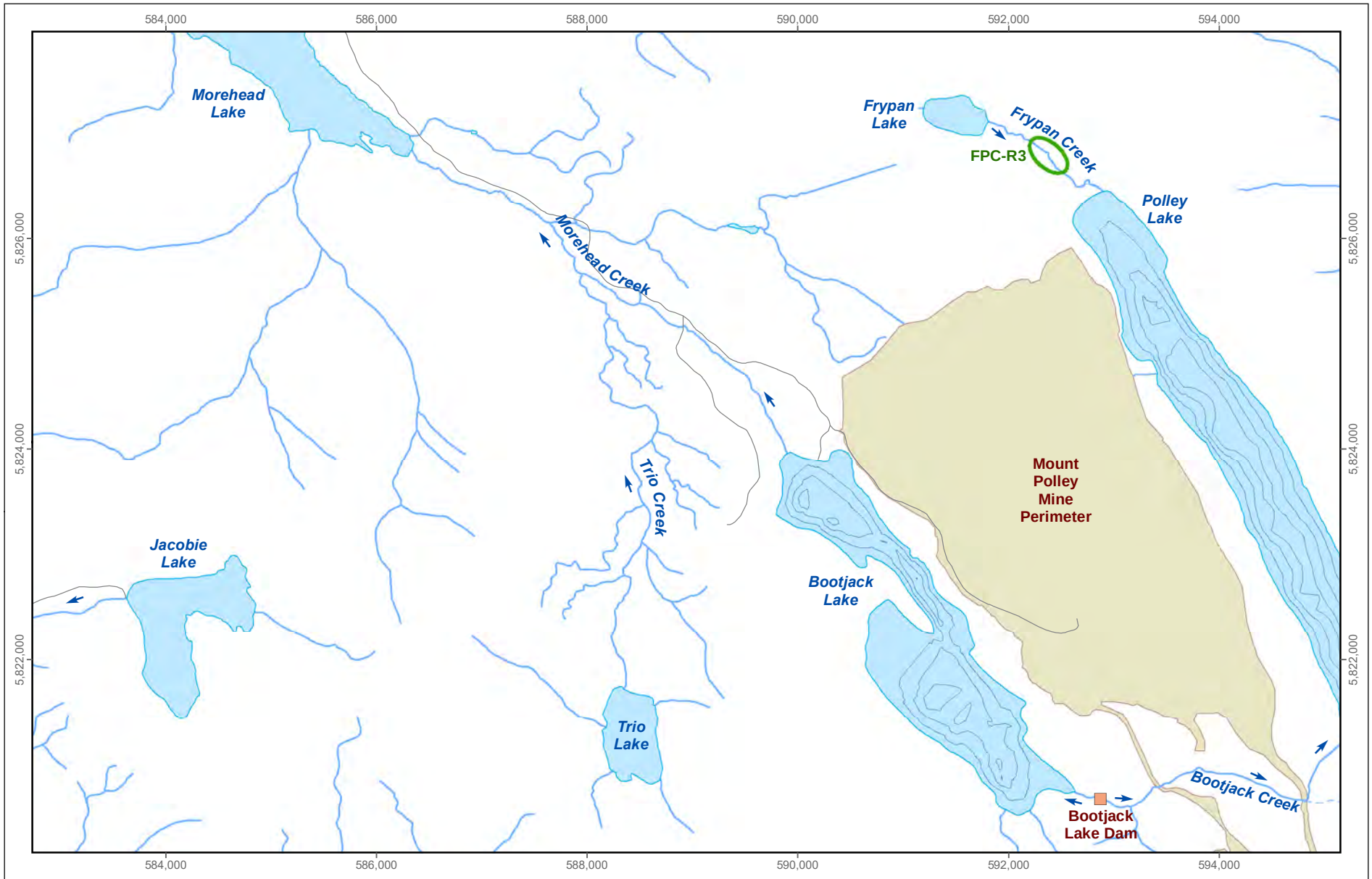
Notes: "-" = not applicable/ not sampled, "AFDM" = Ash Free Dry Mass.

[a] Numbers indicate the number of stations sampled per area. Only sampling areas that were monitored in 2022 are displayed, as well as historical data for these areas.

[b] Baseline community and chlorophyll-a samples collected by Stockner sampler from n=1 rocks per station, total scraped area = 4.91 cm^2

[c] Pre-Breach community and chlorophyll-a samples collected by scraping n=10 rocks per station, scraped area = 3.3 cm^2 per rock

[d] Post-Breach community, chlorophyll-a and AFDM samples collected by scraping from n=5 rocks per station, total scraped area = 4 cm^2 per rock



LEGEND

Reference Area

[a] Monitoring included the following components: periphyton productivity and benthic invertebrate community and productivity. See Tables 4.2 and 4.3 for details.

Note: Bathymetry is displayed in meters.

0 0.5 1 2
km

N
W E
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Projection: North American Datum 1983 UTM Zone 10U
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Periphyton and Benthic Invertebrate Monitoring Areas, Frypan Creek, 2022[a]

Date: January 2023
Project 227202.0029

minnow environmental inc.

Figure 4.3

Document Path: C:\Users\CApol\Trinity Consultants, Inc\Imperial Metals - 227202.0029 - 2022 MPMC\D - GIS\Task 6\22-29 Figure 4.3 Periphyton and BI, Frypan Creek.mxd

Sample collection and analysis methods for 2022 are described herein. For details pertaining to prior sampling years, including equivalent historic sampling areas, refer to the references listed in Table 4.2.

4.2.1 Sample Collection

Periphyton samples for the assessment of community and productivity (chlorophyll-a and ash free dry mass [AFDM]) were collected between August 5 and August 10, 2022. Five stations were sampled in each area (Figures 4.2 and 4.3, Table 4.2), and each station was established at a minimum distance of approximately three bankfull widths from adjacent stations. Periphyton sampling stations coincided with those for benthic invertebrate community monitoring. Sampling was completed at each station by selecting five representative submerged rocks (excluding those that were too small, highly angular, or uncharacteristic in surface texture). Selected rocks were taken to shore for processing as described below for productivity and community sample collection (Sections 4.2.1.1 and 4.2.1.2, respectively).

A concerted effort was made to ensure that habitat characteristics (water depth, velocity, and substrate characteristics) were comparable among sampling stations and areas to minimize natural influences on the variability of productivity and community endpoints. From 2018 to 2022, the flow of water in Hazeltine Creek in 2022 was modified by controlling the discharge of water to the creek from Polley Lake (using a weir), and by pumping water from below the thermocline in Polley Lake into the creek for the specific purpose of maintaining conditions that support the use of upper Hazeltine Creek as fish habitat. This supplemental pumping increased water depth and velocity in Hazeltine Creek relative to natural conditions. This made matching habitat conditions between the remediated (Hazeltine Creek) and reference (Edney Creek) areas particularly challenging. Despite these challenges, remediated and reference sampling locations were matched for habitat as closely as possible in 2022. The flow augmentation to Hazeltine Creek also presented challenges for matching remediated and reference area conditions in previous years of monitoring (Minnow 2019a, 2020a, 2021a, 2022a).

Supporting measures were collected at each periphyton sampling station to support data interpretation. Refer to Section 4.5.1 for additional details about supporting measures.

4.2.1.1 Productivity

Periphyton samples were collected for chlorophyll-a analysis using methods consistent with technical guidance (BCMOE 2013, 2016) and the CEMP (MPMC 2019). Briefly, samples were collected at each station by firmly placing a thin acetate template with a 2x2 cm (4 cm²) opening in the middle of each selected rock and scraping off the periphyton within this area using a stainless-steel razor blade or scalpel. This was completed for the five rocks selected at each

sampling station. Sample material scraped from each of the five rocks was then transferred from the razor blade or scalpel to a large (47 mm) 0.45 µm pore diameter MCE filter paper until a single composite sample of approximately 200 mg to 1 g wet weight was obtained per station. If material collected from the five rocks sampled was insufficient (i.e., <200 mg), additional rocks from the same location and habitat characteristics were sampled until the required sample volume was obtained. The total area scraped at each station was recorded (0.002 m²: 5 x 4 cm², or any deviations from this surface area) to allow calculation of chlorophyll-a concentration per-unit area for comparison to the BCWQG (100 mg/m²; BCMOECCS 2021b). The filter paper was then folded and placed into a labeled opaque centrifuge tube. This process was repeated for each of the five stations per monitoring area.

The same five rocks sampled for chlorophyll-a analysis (and additional rocks if they were required) were used to collect separate scrapings for analysis of AFDM. Sampling methods for AFDM followed those outlined above for chlorophyll-a (0.002 m² per station); however, material on the razor blade or scalpel from scraping of each rock was rinsed into a small pre-labelled plastic jar with additional water added to cover the tissue (as necessary). Immediately after collection, all chlorophyll-a and AFDM samples were stored in a cooler with ice packs until being frozen prior to shipment (on ice) to the analytical laboratory.

4.2.1.2 Community

Periphyton community samples were collected from the same five rocks used for productivity sampling whenever possible (and additional rocks if they were required), or from rocks of a similar size collected from the same general location and habitat (i.e., depth and velocity). Sample collection methods were similar to those outlined for AFDM (Section 4.2.1.1). Periphyton was collected from a 2x2 cm area on five rocks at each station to form a single composite sample representing 0.002 m² (5 x 4 cm²) surface area. The periphyton was removed from each rock using a scalpel and/or brush and a squirt bottle filled with site water (BCMOE 2013, 2016; Stevenson and Bahls 2006). This process was repeated for each of the five stations per monitoring area. Immediately after collection, the sample was preserved with Lugol's iodine solution until the sample was the colour of weak tea (approximately 1 mL of Lugol's per 250 mL of sample; BCMOE 2013, 2016) and was mixed gently by inverting the sampling jar. All samples were stored at room temperature prior to shipment to the laboratory for taxonomic analyses.

4.2.2 Laboratory Analysis

4.2.2.1 Productivity

Laboratory analysis of periphyton productivity (chlorophyll-a and AFDM) was completed by ALS Environmental (Burnaby, BC). Upon receipt, laboratory staff opened the coolers, measured temperature to verify the maintenance of cold samples, logged each sample, and assigned each sample a unique sample identification code. A SRN was then sent to MPMC and Minnow for verification.

Analysis of chlorophyll-a followed procedures adapted from USEPA Method 445.0 (USEPA 1997). Briefly, chlorophyll-a concentration was determined by routine acetone extraction followed by fluorescence detection using a non-acidification procedure (a method that is not subject to interferences from chlorophyll-b). Determination of total AFDM followed procedures adapted from APHA Method 10200 I (APHA 2010). Total AFDM was calculated as the difference between the dried sample weight and the ash weight, both determined gravimetrically. Dry weight was determined following drying at 105°C. The remaining sample was subsequently ignited at 500°C, rewetted to hydrate clays and minerals and brought to a constant weight at 104°C to determine ash weight. Laboratory QA/QC included reagent blanks and laboratory control samples. Upon completion of the analyses, data reports were provided by ALS Environmental to MPMC and Minnow electronically as an Adobe Acrobat PDF file and a Microsoft Excel spreadsheet (Appendix G).

4.2.2.2 Community

Taxonomic identification and enumeration of periphyton community samples was completed by Biologica Environmental Services Ltd. in Victoria, BC. Briefly, samples were homogenized by sonication, settled in Ütermohl chambers for 24 hours, and all cells within randomly selected FOV were enumerated until a minimum count of 300 algal units (1 unit = >1 cell for colonial or filamentous taxa) were enumerated or until 80 FOV were scanned. Cell units were enumerated rather than individual cells, due to colonial/filamentous algae species containing hundreds of cells per unit. Identification was performed using an inverted phase contrast microscope at 400x magnification, and algal taxa were identified to a minimum of genus-level (whenever possible) according to the most up-to-date taxonomic references (see laboratory methods description in Appendix G). Periphyton density (cells/cm^2) was determined using the number of units counted, number of cells per unit, proportion subsampled, and the total area of the selected fields of view.

Laboratory QA/QC included a re-analysis of at least 10% of samples and a calculation of percent agreement among results. Upon completion of the analyses, the data and quality control reports

were provided by Biologica to MPMC and Minnow electronically as an Adobe Acrobat PDF file and a Microsoft Excel spreadsheet (Appendix G).

4.2.3 Data Analysis

Upon receipt of the 2022 analytical data, a DQR was performed, including assessments of laboratory internal quality control checks, data completeness, calculations and unit conversions, and laboratory precision. Following completion of the DQR for the periphyton productivity endpoints, productivity results were analyzed as described below. In 2021, the DQR of periphyton community resulted in a request for an investigation of the data by the laboratory that ultimately led to the reissuing of periphyton cell density data from 2018 to 2021 (see Minnow 2022a for details). Once the quality of the 2022 periphyton community data were confirmed through the DQR process, periphyton community results were analyzed as described below, with the corrected periphyton community results from 2018 to 2021 used for all analyses (Minnow 2022a).

4.2.3.1 Metrics

The periphyton community was evaluated using the metrics of organism density, taxon richness, Simpson's Evenness and Diversity, diatom richness, and the density and relative density (%) of dominant taxa groups. These metrics were calculated using LPL taxonomy as outlined in Section 3.5.3.1. Taxonomic groups evaluated included major ecological groups (Diatoms, Chlorophytes [green algae], Chrysophytes [golden algae], Cyanobacteria [blue-green algae], Dinoflagellates, Phaeophytes [brown algae], Rhodophytes [red algae])[35].

Periphyton productivity was evaluated using chlorophyll-a and AFDM data, which were converted to standard area-based measurements (mg/m^2 and g/m^2, respectively). Chlorophyll-a concentrations were compared to water quality guidelines for eutrophic conditions (BCWQG = 100 mg/m^2; BCMOECCS 2021b) and a classification for moderately enriched streams (21 mg/m^2; Biggs 1996). Periphyton and community endpoints were summarized by area and year, including sample size, mean, median, minimum, maximum, and SD.

[35] Periphyton data were classified as "Other" taxa in laboratory results issued in 2018 and although the taxonomic groups contained in this category were unknown (i.e., unknown taxonomic identification of these organisms), they were suspected to include Phaeophytes, Chrysophytes, and Rhodophytes. Temporal statistical contrasts therefore excluded 2018 data for these taxon groups (Phaeophytes, Chrysophytes, and Rhodophytes) which were reported as absent from all samples in 2018 data. See Minnow 2019a for detailed laboratory results for 2018. Data reported in 2018 for this "Other" category was therefore excluded from data presentation and analyses in the present report. Periphyton taxonomy results have not been reported in an "Other" category by the laboratory since 2018.

Total richness, diatom richness, Simpson's Evenness, and Diversity were calculated under the assumption that each taxonomic group identified by the lab was unique. As a result, richness values reported herein differ slightly from those reported directly by the laboratory (see Appendix G), which considers only taxa that are certainly unique. For example, for the purposes of this report, the taxa Pennate Diatoms and *Diatoma sp.* were considered as two separate taxa, whereas the richness calculations completed by the laboratory were considered as one taxon. Although this approach may slightly overestimate richness, this is consistent across data sets.

Evaluation of the periphyton community and productivity included comparison to baseline and pre-breach samples collected at the same areas as post-breach samples, where possible. However, the comparability of 2018 to 2022 periphyton community data with historic (1995, 1996, 2011) datasets is limited due to differences in taxonomic practices and sampling effort across these years. Specifically, the use of multiple taxonomic laboratories since 1995 may have resulted in problems related to misidentifications and/or the use of multiple naming conventions for a single taxon (see Minnow 2019a for details). Furthermore, the taxonomic resolution of historic data was lower than 2018 to 2022 taxonomic analysis, limiting the potential for comparison. The periphyton community data from 2018 to 2022 has greater taxonomic resolution and is considerably more reliable than the historic datasets. The use of varying degrees of qualitative taxonomic analysis (categorizing the degree to which taxa were present as opposed to enumerating them) in 1995 (HKP 1996), 1996 (HKP 1997a), and 2011 (Minnow 2012), substantially limited comparisons that could be made with these data.[36] Due to these data limitations, periphyton metrics for baseline (1995, 1996) and pre-breach (2011) data excluded Simpson's Evenness and Diversity, and also excluded density based metrics for baseline results. Furthermore, statistical comparisons that included baseline and pre-breach data were limited to chlorophyll-a results only.

4.2.3.2 Statistical Analyses

Statistical comparisons of periphyton community and productivity metrics were conducted using baseline (1995, 1996) and pre-breach (2011) data (for chlorophyll-a only) and post-breach data (i.e., 2018 to 2022) to answer the following questions:

[36] Periphyton taxonomy data from 1995, 1996, and 2011 were qualitative, mostly consisting of characterization of presence/absence ("predominant", "common", "abundant," etc.) as opposed to discrete density values. In 1995 and 1996, proportions were reported for some dominant genera and groupings, however the degree to which those data represent quantitative data is unknown without density data. Even in 2011, when data were presented as density, many taxa were presented with "less than" values because the methodology employed by the taxonomist (Fraser Environmental Services) involved some qualitative elements.

1. Are there differences in periphyton community and productivity between exposed and reference areas in 2022?
2. Has the periphyton community and productivity of exposed areas changed among years relative to changes at the reference area over this time, and where pre-breach data exist, has the community recovered to pre-breach conditions?

To answer these questions, results from upper Hazeltine Creek (HAC-R1 and HAC-U) were compared to reference (EDC-U), and to pre-breach (W7; 1995, 1996, 2011, for productivity endpoints only), including calculation of community metrics, tabular and graphical presentation, and statistical analyses.

Periphyton productivity (AFDM and chlorophyll-a) data collected from upper Hazeltine Creek Reach 3 (HAC-R3; 2020 to 2022) and Frypan Creek (FPC-R3; 2017 to 2022) were excluded from data analyses and interpretation (see Section 4.2 for details and rationale) and are presented in tabular form only in the present report (Appendix Tables D.3.4 and D.3.5). These data will be interpreted in a separate report which focused on the re-opening of Hazeltine Creek as fish habitat (Minnow 2023).

Statistical comparisons of productivity and community endpoints were completed using two-way ANOVAs with *Area* and *Year* as factors and assessing the interaction between *Area* and *Year*. The analyses were completed using the two-way ANOVA methods described in Section 3.3.3.1.2 with baseline, pre-breach, and post-breach (exposed [remediated] and reference) data from the creeks.

Periphyton productivity results (chlorophyll-a) from post-breach monitoring were compared to baseline data from 1995 (HKP 1996) and 1996 (HKP 1997a), and pre-breach data from 2011 (Minnow 2012) where possible (see Table 4.2). In addition, baseline data (1995 and 1996) were compared between upper Hazeltine (W7) and upper Edney (W9) creeks to evaluate the baseline condition in these areas. Pre-breach data from upper Hazeltine Creek (W7; 2011) were treated as a separate area from HAC-R1 and HAC-U in the two-way ANOVA of chlorophyll-a because baseline and pre-breach data from W7 (2011) were used in comparison to both HAC-R1 and HAC-U. Pairwise contrasts were conducted as described in Section 3.3.3.1.2, except for those completed for upper Hazeltine Creek (HAC-R1, HAC-U). If the *Area* term was significant for the ANOVA, temporal pairwise contrasts were completed among the areas (EDC-U, W7, HAC-R1 and HAC-U; as though a significant interaction had been detected) due to the inherent temporal contrasts of the *Area* term (i.e., baseline and pre-breach data for W7 compared to post-breach data for HAC-R1 and HAC-U). Results of the contrasts of chlorophyll-a from HAC-R1 and HAC-U to data from W7 were shown on plots with an "*" for 1995, a "†" for 1996, and a "‡" for 2011.

All statistical comparisons were conducted using R (R Core Team 2022). Statistically significant differences in periphyton community and productivity between areas were identified using an α of 0.1 (as used for evaluation of all biological data in this report). Significant differences with a MOD that exceeded ±2 SD/MAD were identified as potentially ecologically meaningful in both statistical analyses results and in data interpretation (Environment Canada 2012b[37]). Densities and relative densities (%) of major periphyton taxon groups were plotted as stacked bar charts.[38] Periphyton community and productivity metrics were plotted to support the two-way ANOVA results. Untransformed data were plotted for ease of interpretation and plots were generated using R (R Core Team 2022). As outlined above, periphyton community endpoints for baseline and pre-breach were excluded from statistical contrasts due to data quality limitations but were included in plots for visualization purposes only.

4.3 Benthic Invertebrate Community and Productivity

Benthic invertebrate community and productivity monitoring of creek habitats in 2022 targeted two areas of upper Hazeltine Creek (HAC-R1, HAC-U), with one area of upper Edney Creek (EDC--U) serving as reference (Figure 4.2, Table 4.3), in accordance with the CEMP (MPMC 2019). Channel remediation works in the vicinity of HAC-R1 and HAC-U were completed in 2016 and 2017, respectively (Table 4.3). As outlined in the CEMP (MPMC 2019), the frequency of benthic invertebrate community and productivity monitoring in upper creek habitats is annual, and monitoring at these areas was last completed in 2021 (Minnow 2022a). The frequency of benthic invertebrate community and productivity monitoring in lower creek habitats is every second year, and monitoring at these areas was also last completed in 2021 (Minnow 2022a).

Benthic invertebrate community and productivity monitoring was also completed in 2022 in an additional area of upper Hazeltine Creek Reach 3 (HAC--R3; remediated in 2019) and an area of Frypan Creek (reference; FPC-R3) for the specific purpose of providing data to support the evaluation of fish habitat in upper Hazeltine Creek (Figures 4.2 and 4.3, Table 4.3; MPMC 2019). The benthic invertebrate community and productivity data collected from upper Hazeltine Creek Reach 3 (HAC-R3) and Frypan Creek (FPC-R3) are presented in tabular form only in the present report. These data will be interpreted in a separate report which focuses on the re-opening of Hazeltine Creek as fish habitat (Minnow 2023).

[37] Environment Canada (2012b) identifies a CES of ± 2 SDs for evaluating ecologically meaningful changes in benthic invertebrate community. This criterion has been applied here to the interpretation of periphyton community.

[38] In 2018 and earlier, Chrysophytes, Phaeophytes, and Rhodophytes were grouped into an 'Other' category in stacked bar charts. Periphyton data were classified as "Other" taxa in laboratory results issued in 2018 but the taxonomic groups contained in this category were unknown (i.e., unknown taxonomic identification of these organisms), but suspected to include Phaeophytes, Chrysophytes, and Rhodophytes. See Minnow 2019a for detailed laboratory results for 2018. Periphyton taxonomy results have not been reported in an "Other" category by the laboratory since 2018."

Table 4.3: Overview of Benthic Invertebrate Community and Productivity Monitoring in Creek Habitats in the Vicinity of the Mount Polley Mine, 1995 to 2022[a]

Waterbody		Area Type	Area Code	Baseline[b]			Pre-Breach		Post-Breach					
				1995 (HKP 1996)	1996 (HKP 1997a)	1999 (Beak 2000)	2002 (Morrow / Azimuth 2003)	2007 (Minnow 2009)	2017 (Minnow 2018a)	2018 (Minnow 2019a)	2019 (Minnow 2020a)	2020 (Minnow 2021a)	2021 (Minnow 2022a)	2022
Hazeltine Creek	Upper	Exposed (Remediated in 2016)	HAC-R1	-	-	-	-	-	-	5	5	5	5	5
		Exposed (Remediated in 2017)	HAC-U (W7 in 1995 to 1999, UHC in 2007)	3	3	3	-	5	-	5	5	5	5	5
		Exposed (Remediated in 2019)	HAC-R3	-	-	-	-	-	-	-	-	5	5	5
Edney Creek	Upper	Reference	EDC-U (W9 in 1995 to 2002, UER in 2007)	3	3	3	3	5	-	5	5	-[c]	5	5
Frypan Creek		Reference	FPC-R3	-	-	-	-	-	1	5	5	5	5	5

Laboratory analysis did not include determination of total wet and dry biomass.

Notes: "-" = not applicable, LPL = Lowest Practicable Level taxonomy. Only monitoring efforts that used the following methodology are displayed: Surber/ Hess sampler, 3-grab composite, 250 µm sieve, LPL. Prior to 2019, alternate sampling methodologies were employed. See Minnow 2019a for a detailed list of these alternate sampling methods.

[a] Numbers indicate the number of stations sampled per area. Only sampling areas that were monitored in 2022 are displayed, as well as historical data for these areas. Collection of benthic invertebrate biomass data was initiated in 2017.

[b] In 1995 and 1996, each sample was a single grab collected by Surber with 243 µm mesh (HKP 1996, 1997a). In 1999, each sample was a composite of 3 Surber grabs with a 250 µm mesh (Beak 2000).

[c] Monitoring was not completed at the upper Edney Creek reference area (EDC-U) in 2020 due to differences in habitat variables (water depth and velocity) relative to the remediated areas of upper Hazeltine Creek (HAC-R1 and HAC-U) for which it is a reference.

Sample collection and analysis methods for 2022 only are described herein. For details pertaining to prior sampling years, including equivalent historic sampling areas, refer to the references listed in Table 4.3.

4.3.1 Sample Collection

Benthic invertebrate community samples were collected between August 5 and 10, 2022. Five stations were sampled in each area (Figures 4.2 and 4.3, Table 4.3), and each station was established at a minimum distance of approximately three bankfull widths from adjacent stations. This level of replication provides adequate statistical power to detect differences of ± two SDs at α and β of 0.10. Sampling methods were in accordance with technical guidance (BCMOE 2013, 2016) and the CEMP (MPMC 2019). One sample was collected at each station, and each sample was a composite of three sub-samples to ensure that each sample was representative of the sampling station.

Samples were collected using a Hess sampler in Hazeltine Creek (HAC-R1, HAC-U, HAC-R3; 0.1 m^2) and a Surber sampler in Edney Creek (EDC-U) and Frypan Creek (FPC-R3; 30.5 x 30.5 cm square; 0.093 m^2). The samplers were each equipped with 250 µm mesh, which was selected to allow comparability to pre-breach data (Minnow 2009). Each sub-sample was collected from by carefully inserting the base of the sampler into undisturbed substrate. Cobble and gravel contained within the sampler was carefully washed, allowing the current to carry dislodged organisms into the collection net. Once the organisms were rinsed into the collection net, the sampler was moved to the next sub-sampling location within a station. This procedure was repeated until three sub-samples were collected from a station to complete the collection of a single sample (i.e., approximately 0.300 m^2 and 0.279 m^2 of total creek surface area for a Hess and Surber sampler, respectively). Material and organisms retained in the collection net were then carefully transferred to 1 L wide mouth plastic jars that were internally and externally labelled. This transfer was completed using a wash bottle over a plastic tub to avoid any potential loss of organisms. Any organisms that fell into the tub or adhered to the sieve bag were removed and added to the sample. Each sample was preserved with buffered formalin solution to achieve a nominal concentration of 10% and stored at room temperature until shipment to the laboratory.

A concerted effort was made to ensure that water depth, water velocity, and substrate characteristics were comparable among sub-samples, stations, and sampling areas, to minimize the influence of natural variability on benthic invertebrate community and productivity endpoints. As outlined for periphyton (see Section 4.2.1), the flow of water in Hazeltine Creek in 2022 was modified by controlling the discharge of water to the creek from Polley Lake (using a weir), and by pumping water from below the thermocline in Polley Lake into the creek for the specific purpose

of maintaining conditions that support the use of upper Hazeltine Creek as fish habitat. This supplemental flow in Hazeltine Creek presented challenges for matching habitat conditions between the exposed (Hazeltine Creek) and reference (Edney Creek) areas in 2022 similar to previous years of monitoring (Minnow 2019a, 2020a, 2021a, Minnow 2022a).

Supporting measures were collected at each sampling station to support data interpretation. Refer to Section 4.5.1 for additional details about supporting measures.

4.3.2 Laboratory Analysis

Taxonomic identification of benthic invertebrate community samples from creek habitats was completed by Cordillera Consulting using the standard methods and QA/QC measures described in Section 3.5.2 for benthic invertebrate community samples from lakes.

Following taxonomic identification, the wet and dry biomass of each sample was determined as follows[39]. For wet biomass, samples were poured out of their storage vials onto a piece of pre-weighed 212 µm Nitex mesh and were dried gently using absorbent paper. Each sample was then weighed to the nearest 0.0001 g using a Sartorius Secura Analytical balance, and the total sample wet weight was determined by subtracting the weight of the mesh from the total weight. For dry biomass, samples were placed on a piece of pre-dried and pre-weighed glass fiber filter before being dried at 160°F for 6 hours. Following a standardized short period of cooling, samples were weighed as described above, and total sample dry weight was calculated.

Laboratory QA/QC measures and the delivery of data were completed as described in Section 3.5.2 for lake benthic invertebrate community samples

4.3.3 Data Analysis

Upon receipt of the analytical data, a DQR was performed, including an examination of data completeness, organism sorting efficiency, subsampling precision and accuracy error, and taxonomic identification error (see Appendix B). Following completion of the DQR, benthic invertebrate community results were analyzed as described below.

4.3.3.1 Metrics

Benthic invertebrate community condition was evaluated using metrics of organism density, taxon richness, Simpson's Diversity and Evenness, and the density and relative density of dominant taxa groups. These endpoints were calculated at the LPL of taxonomy, following taxa exclusions, application of the decision key, and the collapsing of taxonomic data to maintain consistency among years as outlined in Section 3.5.3.1. Further analysis of benthic community structure using

[39] Total wet and dry biomass analysis was initiated in 2017 (Table 4.3).

multivariate analyses (CA) was not completed because differences in community structure between the remediated areas and pre-breach or reference conditions were easily identifiable without use of these techniques. Benthic invertebrate productivity was evaluated using total wet and dry biomass, which was converted to a standard area-based measurement (g/m^2). Benthic invertebrate community metrics were calculated for each monitoring area in each year[40] and were summarized by area and year using the following statistics: sample size, mean, median, minimum, maximum, and SD.

Evaluation of the benthic invertebrate community of upper (HAC-R1 and HAC-U) Hazeltine Creek included comparison of post-breach results to samples collected from a similar location during pre-breach monitoring in 2007 (UHC; Minnow 2009; Table 4.3). Methods employed in post-breach monitoring were consistent with those used during pre-breach sampling in 2007, enabling comparisons to pre-breach conditions (Table 4.3). Post-breach results were not compared to baseline results from HAC-U and EDC-U in 1989, 1995, and 1996 (W7 and W9, respectively; Table 4.3) because differences in sample collection methods and in taxonomic resolution precluded comparison. Adequate baseline for comparison to post-breach results is provided by the 2007 results.

Despite the consistencies between pre-breach and post-breach data, comparison of these results is still challenging due to the use of different laboratories for the taxonomic analyses, and the large time span (15 years) between data collection for the two studies (over which general improvements in laboratory protocols have occurred). A major difference between the pre-breach and post-breach data is that aquatic mites were not identified to a taxonomic level more specific than Subclass (Acari) in 2007 but were identified to genus in post-breach data, and spring-tails were identified to Class (Collembola) in 2007 but were identified to Family in post-breach data. Therefore, to keep data consistent and comparable to the pre-breach (2007) results, the aquatic mite and spring-tail data were collapsed to Class (Arachnida and Collembola, respectively). These reassignments were all completed prior to calculation of benthic community endpoints described above.

4.3.3.2 Statistical Analyses

Statistical analyses of benthic invertebrate community and productivity metrics were conducted using pre-breach (2007) and post-breach (2018 to 2022) to answer the following questions:

1. Are there differences in benthic invertebrate community and productivity between exposed and reference areas in 2022?

[40] Total biomass data are not available prior to initiation of biomass monitoring in 2017.

2. Has the benthic invertebrate community and productivity of exposed areas changed among years relative to changes at reference areas over this time, and where pre-breach data exist, has the community recovered to pre-breach conditions?

To answer these questions, results from upper Hazeltine Creek (HAC-R1 and HAC-U) were compared to reference (EDC-U), and to pre-breach (UHC; 2007), including calculation of community metrics, tabular and graphical presentation, and statistical analyses.

Benthic invertebrate community and productivity data collected from upper Hazeltine Creek Reach 3 (HAC-R3; 2020 to 2022) and Frypan Creek (FPC-R3; 2017 to 2022) were excluded from data analyses and interpretation (see Section 4.3 for details and rationale) and are presented in tabular form only in the present report (Appendix Tables D.4.1 to D.4.4). These data will be interpreted in a separate report which focused on the re-opening of Hazeltine Creek as fish habitat (Minnow 2023).

Statistical comparisons were completed using two-way ANOVAs with *Area* and *Year* as factors and assessing the interaction between *Area* and *Year*. The analyses were completed using the two-way ANOVA methods described in Section 3.3.3.1.2 with pre-breach and post-breach (exposed [remediated] and reference) data from the creeks. Comparisons between the exposed areas of upper Hazeltine Creek (HAC-R1 and HAC-U) and the associated reference (EDC-U) were completed for each year that remediated and reference data were available (i.e., 2018 to 2022; see Table 4.3). In addition, pre-breach data (2007) were compared between upper Hazeltine (UHC) and upper Edney (UER) creeks to evaluate the baseline condition in these areas. As described in Section 4.2.3.2, UHC (pre-breach data; 2007) was treated as a separate area from HAC-R1 and HAC-U in the upper Hazeltine Creek two-way ANOVA analyses because pre-breach data from UHC was used in comparison to both HAC-R1 and HAC-U. Pairwise contrasts were conducted as described in section 3.3.3.1.2, except for those completed for upper Hazeltine Creek (HAC-R1, HAC-U). If the *Area* term was significant for the ANOVA, temporal pairwise contrasts were completed among the areas (EDC-U, UHC, HAC-R1 and HAC-U; as though a significant interaction had been detected) due to the inherent temporal contrasts of the *Area* term (i.e., pre-breach data for UHC compared to post-breach data for HAC-R1 and HAC-U). Pairwise comparisons to pre-breach data in tables are shown using the standard letter display (years that share a letter were not significantly different). Results of the contrasts of HAC-R1 and HAC-U to pre-breach data from UHC (2007) are shown on figures with an asterisk "*" indicating a significant difference relative to pre-breach.

Interpretation of benthic invertebrate community metrics was enhanced by inspection of raw data and taxonomic proportions to detect patterns of ecologically relevant differences between the exposed and pre-breach areas. Ecological and habitat requirements of benthic invertebrates, as

outlined in standard references (Clarke 1981; Edmunds et al. 1976; Weiderholm 1983; Wiggins 1996; Vieira et al. 2006, Merritt et al. 2008) were used in data interpretation. All statistical comparisons were conducted using R (R Core Team 2022). Statistically significant differences in benthic invertebrate community between areas were identified using an α of 0.1 (as used for evaluation of all biological data in this report). Significant differences with a MOD that exceeded ±2 SD/MAD were identified as potentially ecologically meaningful in statistical analyses results and in data interpretation (Environment Canada 2012b[41]). Densities and relative densities (%) of major benthic invertebrate groups were plotted as stacked bar charts. Benthic invertebrate community metrics were plotted to support the two-way ANOVA results. Untransformed data were plotted for ease of interpretation and plots were generated using R (R Core Team 2022).

Correlation analyses were completed for upper Hazeltine Creek (HAC-R1, HAC-U) using data from 2018 to 2022 to investigate the relationships between benthic invertebrate community metrics and supporting measures of physical and chemical conditions in these areas that have been recovering since 2016 and 2017, respectively (following the completion of remediation works). Benthic invertebrate community metrics were compared to the environmental variables water depth, velocity, temperature, dissolved oxygen (concentration and %), pH, specific conductivity, and substrate size using Spearman's Rank correlation (as described in Section 3.5.3.2). A Bonferroni-type correction (i.e., α [0.05] divided by the total number of independent variables) was applied to minimize the risk of declaring false positive correlations. Statistically significant correlations found at the Bonferroni-adjusted p-value were further investigated using scatter plots to determine if a continuous distribution of data was realized (possible causal relationships) or if these relationships were leveraged by outlying points (or groups of points).

4.4 Periphyton and Benthic Invertebrate Tissue Quality

Periphyton and tissue quality monitoring of creek habitats in 2022 was completed in accordance with the CEMP (MPMC 2019) and targeted upper (HAC-R1, HAC-U) and lower (HAC-D) areas of Hazeltine Creek and an impacted area of lower Edney Creek (E1), with un-impacted areas of upper (EDC-U) and lower (EDC-D) Edney Creek serving as reference (Figure 4.2, Table 4.4). Channel remediation works in the vicinity of HAC-R1 and HAC-U were completed in 2016 and 2017, respectively, and in 2020/2021 in the vicinity of HAC-D and E1[42] (Table 4.4).

[41] Environment Canada (2012b) identifies a CES of ± 2 SDs for evaluating ecologically meaningful changes in benthic invertebrate community.

[42] Monitoring stations within the remediated lower creek areas (HAC-D and E1) were relocated in 2021 relative to previous years due to the recent remediation efforts in these areas (Minnow 2022a). Briefly, in the case of HAC-D, this included relocation of the monitoring stations further upstream within the lower Hazeltine Creek. In the case of E1, this

Table 4.4: Overview of Periphyton and Benthic Invertebrate Tissue Quality Monitoring in Creek Habitats in the Vicinity of the Mount Polley Mine, 2009 to 2022[a]

Waterbody		Area Type	Area Code	Tissue	Year[b]												
					Pre-Breach					Post-Breach							
					2009 (Minnow 2011)	2010 (Minnow 2011)	2011 (Minnow 2012)	2012 (Minnow 2013a)	2013 (Minnow 2013b)	2015 (Minnow 2016b)	2016 (Minnow 2017b)	2017 (Minnow 2018b)	2018 (Minnow 2019a)	2019 (Minnow 2020a)	2020 (Minnow 2021a)	2021 (Minnow 2022a)	2022
Hazeltine Creek	Upper	Exposed (Remediated in 2016)	HAC-R1	Periphyton	-	-	-	-	-	-	-	8	8	8	8	8	8
				Benthic Invertebrates	-	-	-	-	-	-	-	8	8	8	8	8	8
		Exposed (Remediated in 2017)	HAC-U (W7 prior to 2015)	Periphyton	-	5	5	8	5	-	-	-	8	8	8	8	8
				Benthic Invertebrates	5	5	-	8	8	5	3	-	8	8	8	8	8
	Lower	Exposed (Remediated in 2020/2021)	HAC-D (W11 prior to 2015)	Periphyton	-	5	5	5	5	-	-	8	8	8	8	8	8
				Benthic Invertebrates	-	5	-	5	5	8	3	12[c]	8	8	8	8	8
Edney Creek	Upper	Reference	EDC-U (Upper Edney Creek)	Periphyton	-	-	-	-	-	-	-	-	8	8	8	8	8
				Benthic Invertebrates	-	-	-	-	-	-	-	-	8	8	8	8	8
	Lower	Reference	EDC-D (Lower Edney Creek)	Periphyton	-	-	-	-	-	-	-	8	8	8	8	8	8
				Benthic Invertebrates	-	-	-	-	-	5	3	8	8	8	8	8	8
		Exposed (Remediated in 2020/2021)	E1	Periphyton	-	-	-	-	-	-	-	-	-	8	8	8	8
				Benthic Invertebrates	-	-	-	-	-	-	-	-	-	8	8	8	8

Shading indicates only selenium was monitored.
Shading indicates stations were exposed to effluent being conveyed by Hazeltine Creek to Quesnel Lake.

Notes: "-" = not applicable/not sampled.

[a] Numbers indicate the number of stations sampled per area. Only sampling areas that were monitored in 2022 are displayed, as well as historical data for these areas.

[b] Composite-taxa benthic invertebrate samples were collected from 2009 to 2015. In 2016 and 2017, stoneflies and caddisflies were sampled at reference and remediated areas, respectively. In 2018 to 2022, both composite-taxa samples and single taxon (caddisfly) samples were collected at all areas.

[c] Eight samples for stoneflies and eight samples for caddisflies were sampled at a total of 12 stations.

As outlined in the CEMP (MPMC 2019), the frequency of periphyton and benthic invertebrate tissue quality monitoring in creek habitats is annual, and monitoring at these areas was last completed in 2021 (Minnow 2022a).

Some temporal differences exist in the composition of benthic invertebrate samples, including the collection of composite-taxa and/or single taxon (caddisfly) sample types (Table 4.4). Composite-taxa samples are representative of the range of taxa present at a sampling area and are reflective of dietary exposure for fish, therefore may be used in assessment of fish habitat. Single-taxon samples represent one taxon group and were collected to decrease the potential variability in results related to differences among benthic invertebrate taxa in tissue quality. Both single taxon (caddisfly) and composite-taxa samples were collected at each sampling area from 2018 to 2022, consistent with the CEMP (MPMC 2019). Prior to 2018, either composite-taxa (2009 to 2015) or single taxon (2016 and 2017) benthic invertebrate tissue quality samples were collected (see Table 4.4 and Minnow 2018c, 2019a for details).

Sample collection and analysis methods for 2022 are described herein. For details pertaining to prior sampling years, including equivalent historic sampling areas, refer to the references listed in Table 4.4.

4.4.1 Sample Collection

Periphyton and benthic invertebrate tissue samples were collected from 8 replicate stations within each area (Figure 4.2, Table 4.4) between August 2 and 10, 2022. Periphyton tissue samples were collected at each station by scraping periphyton from the surface of at least five rocks using a scalpel until a sufficient sample weight (i.e., more than 0.5 g wet weight) was attained for analysis. Periphyton scrapings were placed in labeled scintillation vials.

Benthic invertebrate tissue samples were collected at each station using a combination of kick-and-sweep and hand picking. The kick-and-sweep method involved a field technician moving upstream and across the stream channel (in a zig-zag pattern) while holding a kick net (a net with a triangular opening and a 400 µm mesh bag) immediately downstream and disturbing the substrate with their feet to dislodge benthic organisms into the net. The net was then rinsed with water to move all debris and invertebrates to the collection cup at the bottom of the net.

included relocation of the monitoring stations in lower Edney Creek to upstream of the confluence with Hazeltine Creek which was constructed in summer 2020 (Minnow 2022a). Monitoring station locations for HAC-D in 2022 were returned to similar locations to previous monitoring years (i.e., prior to 2021) and monitoring station locations for E1 in 2022 were consistent with the relocated locations sampled in 2021 (i.e., remained upstream of the confluence with Hazeltine Creek (Figure 4.2).

The collection cup was removed and the contents (i.e., invertebrates and debris) were poured into a white tub. Benthic invertebrates were then picked free of debris and transferred to labelled scintillation vials. Hand picking entailed overturning rocks in the streambed and collecting any benthic invertebrates observed. Both kick-and-sweep and hand-picking methods were employed at each erosional sampling station to collect benthic invertebrate samples. Two types of benthic invertebrate tissue samples were collected from each station: composite-taxa and single taxon (caddisfly).

Duplicate (split) samples were collected at a target frequency of 10% for QA/QC purposes and were evenly distributed among sampling areas and tissue types. Following collection, samples were stored in a cooler with ice packs until being frozen prior to shipment (on ice) to the analytical laboratory.

4.4.2 Laboratory Analysis

Laboratory analysis of periphyton and benthic invertebrate tissue quality samples was completed by ALS Environmental (Burnaby, BC) using the same methods and QA/QC measures outlined in Section 3.4.2.

4.4.3 Data Analysis

Upon receipt of periphyton and benthic invertebrate tissue chemistry data, a DQR was completed, including an examination of data completeness, LRLs achieved, laboratory precision, laboratory accuracy, and field precision (Appendix B).

Benthic invertebrate tissue quality data collected from 2022 were screened against the British Columbia selenium guideline for the protection of aquatic life (for invertebrate tissue) of 4 mg/kg dw (BCMOE 2014). Summary statistics were calculated for each analyte by area and tissue type for 2022 and for prior years (2010 to 2021) that were used in analyses, and included mean, SD, minimum, median, and maximum values. Summary statistics were calculated using the K-M method as described in Section 3.8.3.1. Data analysis and interpretation of periphyton and benthic invertebrate tissue quality focused on primary and secondary analytes representing a mine influence (see Table 2.4).

4.4.3.1 BCF and TTF Calculation

Concentrations of the primary and secondary analytes in periphyton tissue and benthic invertebrate were evaluated relative to concentrations in water. The ratio of ([tissue sample concentration]/ [dissolved water concentration]) is referred to as a Bioconcentration Factor (BCF). These ratios are often used to describe the extent to which an analyte is taken up by an organism from the surrounding environment through exposure routes

other than diet (i.e., Arnot and Gobas 2006) and are applicable to erosional areas where sediment is generally rare. BCFs were calculated using mean tissue metal concentrations (dry weight) and mean aqueous dissolved metal concentrations from routine water quality monitoring stations near each tissue sampling area (Figure 4.2). Mean aqueous analyte concentrations were calculated as described in Section 3.8.3.1) using data from the one-year period prior to sampling (i.e., September 2021 to August 2022). Mean values at the LRL were replaced with the LRL for the calculation of the BCF ratios. For EDC-U, routine water quality data were not collected by MPMC, and so BCFs were calculated using data from the spot water samples collected during tissue collection.

Concentrations of primary and secondary analytes in benthic invertebrate tissue were also evaluated relative to concentrations in periphyton tissue. These ratios of concentrations are referred to as Trophic Transfer Factors (TTFs) and can be estimated for benthic invertebrates assuming they inhabit a single trophic level above periphyton (i.e., TTF = [benthic invertebrate sample]/[periphyton sample]). TTFs can be used to describe the extent to which analyte concentrations increase between lower and higher trophic levels (e.g., Presser and Luoma 2010). Paired observations of benthic invertebrate and periphyton tissue chemistry were used to calculate TTFs for each replicate station in 2022 (i.e., 8 replicate TTFs per area in 2022). In addition, data collected in prior years (2010 [pre-breach], and 2017 to 2021 (post-breach; in years when both periphyton and benthic invertebrate tissue samples were collected) were also used to calculate TTFs in Hazeltine Creek (refer to previous reports outlined in Table 4.4). If an analyte concentration for either the nominator (benthic invertebrate tissue metal concentration) or denominator (periphyton tissue metal concentration) in the TTF calculation was censored (i.e., < LRL), the TTF was not calculated. These calculated TTFs were then summarized by year and area calculating the mean, SD, median, minimum, and maximum.

4.4.3.2 Statistical Analyses

Statistical analyses of metal concentrations in 1) periphyton tissue, 2) composite-taxa benthic invertebrate tissue, and 3) caddisfly tissue samples of TTFs were conducted using pre-breach (2010) and post-breach (2015 to 2022) data to answer the following questions:

1. Have mean analyte concentrations or TTFs at the exposed area changed over time relative to the reference area?[43]
2. Are there differences in mean analyte concentrations TTFs between exposed and reference areas, and does the difference depend on year?

[43] i.e., has the ratio of concentrations (exposed:reference) changed over time?

3. Do mean analyte concentrations or TTFs at exposed areas differ from pre-breach conditions?

To answer these questions, data were grouped into three categories for separate tabular and graphical presentation and statistical analyses:

1. The exposed areas of upper Hazeltine Creek (HAC-R1 and HAC-U; 2018 to 2022 for periphyton and composite and single-taxon benthic invertebrates) compared to reference (EDC-U; 2018 to 2022 for periphyton and composite and single-taxon benthic invertebrates).
2. The exposed area of lower Hazeltine Creek (HAC-D; 2017 to 2022 for periphyton, 2015 and 2018 to 2022 for composite-taxa and 2018 to 2022 for single-taxon benthic invertebrates) compared to reference (EDC-D; 2017 to 2022 for periphyton, 2015 and 2018 to 2022 for composite-taxa and 2018 to 2022 for single-taxon benthic invertebrates).
3. The exposed area of lower Edney Creek (E1; 2019 to 2022 for periphyton and composite and single-taxon benthic invertebrates) compared to reference (EDC-U; 2019 to 2022 for periphyton and composite and single-taxon benthic invertebrates).

Questions 1 and 2 were answered by conducting a two-way ANOVA assessing the exposed:reference ratios of results, with *Area* and *Year* as factors and assessing the interaction between *Area* and *Year.* The two-way ANOVA was competed *as* detailed in Section 3.4.3 (for Questions 1 and 2) to address the same questions.

Post-breach results (2015 to 2022) were also statistically contrasted to pre-breach data, where possible. Pre-breach data were collected for periphyton and composite-taxa benthic invertebrate tissue quality from HAC-U and HAC-D in 2010 (Table 4.4).[44] The comparisons to pre-breach were conducted using a censored one-way ANOVA with *Year* as the factor as described in Section 3.7.3.2 and were used to contrast post-breach results for periphyton tissue quality, composite-taxa benthic invertebrate tissue quality, and TTFs to pre-breach conditions. TTF data (calculated as described in Section 4.4.3.1) did not contain censored (i.e., < LRL) values, therefore the ANOVA models for comparison of TTFs were fit with least-squares estimation (i.e., not MLE) and $\log_{10}$ transformed response variables. Data used in these comparisons included the following:

[44] Pre-breach periphyton and composite-taxa benthic invertebrate tissue quality samples were also collected in 2011 to 2013 at HAC-U and HAC-D, and from HAC-U in 2009. Reported data for these samples included selenium as the only analyte, therefore these results were not included in statistical contrasts to pre-breach data.

1. Post-breach periphyton tissue quality, composite-taxa benthic invertebrate tissue quality, and TTF results from HAC-R1 and HAC-U compared to pre-breach results from HAC-U; and
2. Post-breach periphyton tissue quality, composite-taxa benthic invertebrate tissue quality, and TTF results from HAC-D compared to pre-breach results from HAC-D.

Although statistical analyses were conducted for all metals detected in the chemical analyses, data presentation, interpretation, and discussion were focused on the identified primary and secondary analytes (see Table 2.4). Plots of data that support the two-way ANOVA were presented for primary and secondary analytes that: 1) had a significant *Area* × *Time* interaction in the analyses; and 2) lacked a significant *Area* × *Time* interaction in the analyses but had a positive MOD (i.e., exposed concentrations were significantly higher than reference and the difference did not depend on year). Results of the contrasts to pre-breach (2010) are shown on the two-way ANOVA figures with an "*" indicating a significant difference relative to pre-breach.

All statistical analyses were conducted using R software (R Core Team 2022). A significance level $\alpha = 0.05$ was used for statistical comparisons, as was used for the evaluation of all chemical data in this report.

4.5 Supporting Measures

A variety of supporting physical and chemical information was used to support the interpretation of sediment and aquatic biological data collected from creeks as part of the CEMP. This information falls into two categories: 1) supporting information that was collected by Minnow during field collections; and 2) supporting information that was collected routinely by MPMC as part of ongoing CEMP monitoring components. Unless otherwise specified, the supporting measures outlined below belong to the first category (measures collected by Minnow).

4.5.1 Measures Collection

Supporting single spot water samples were collected from creek stations concurrent with periphyton community, benthic invertebrate community, and tissue quality sampling for comparison to BCWQG. These samples were collected on August 8, 2022 (not concurrent with biological sample collection) to ensure sample arrival at the laboratory was within the recommended hold times. Water samples were collected by wading into a mid-channel area, moving from downstream to upstream, so as not to collect water downstream of disturbed substrates, and collecting the samples from approximately half of the total water depth. Water quality data collected routinely by MPMC staff at stations near to the biological monitoring areas were also used in support of data interpretation (Figure 4.2). These data were subjected to an internal DQR by MPMC and were not further assessed for data quality in this report

(for details refer to Section 3.8.1). Immediately after collection, both spot and routine water quality samples were placed into a cooler with ice packs before being stored in a refrigerator until shipment (on ice) to the analytical laboratory (as detailed in Section 3.8.1).

Supporting measures and sampling information were collected at each of the creek monitoring stations to support data interpretation (Appendix Figure A.2.1, Appendix Tables A.2.1 to A.2.5). These included those described in Section 3.8.1 (excluding vertical depth profiles and Secchi depth) as well as the following: water velocity, substrate size (20 randomly selected substrate pieces measured per station), and general habitat characteristics assessed once for each monitoring area (channel measures, canopy cover, instream cover, periphyton coverage, and substrate characteristics) using methods adapted from Environment Canada (2012a).

4.5.2 Laboratory Analysis

Laboratory analyses of supporting spot and routine water quality samples were completed as described in Section 3.8.2 and included the parameters outlined in the CEMP routine surface water quality monitoring program (MPMC 2019). Upon completion of the analyses, a data report was provided by ALS to MPMC and Minnow as an Adobe Acrobat PDF file and a Microsoft Excel spreadsheet (Appendix G)[45].

4.5.3 Data Analysis

4.5.3.1 Summary Statistics

Summary statistics were calculated for water, sediment, and tissue quality parameters following the K-M methods described in Section 3.8.3.1. Additional information on specific parameters and applications of the summary statistics for chemical data are found within the methods sections for analysis of these data above (Sections 4.1.3 and 4.4.3 above). Summary statistics for biological endpoints (periphyton and benthic invertebrate community and productivity) were calculated using standard methods and formulae.

4.5.3.2 Water Quality Guideline Screening

Results of spot water quality sampling were screened against BCWQG (Appendix Table D.1.1; BCMOECCS 2021a,b) as outlined in Sections 3.8.3.2 and 3.8.3.3. Results of creek water quality sampling completed routinely by MPMC staff in the year preceding monitoring (i.e., September 2021 to August 2022) were also screened against BCWQG (see Sections 3.8.3.2 and 3.8.3.3 for details). These routine water quality data were also summarized by calculating sample size,

[45] Data reports for spot water quality sampling are included in Appendix G. Data from routine water quality monitoring completed by MPMC were provided to Minnow in Microsoft Excel format from the MPMC database and are these not included in Appendix G.

mean, SD, minimum, maximum, and % LRL values as described in Section 3.8.3.1. Plots comparing total and dissolved concentrations of primary and secondary analytes to BCWQG were prepared for routinely collected water quality samples (Table 2.4). Tabular screening against BCWQG was completed using Microsoft Excel and plots were generated using R (R Core Team 2022).

5 RESULTS – LAKE HABITAT

5.1 Polley Lake

5.1.1 Sediment Quality

Sediment quality monitoring in 2022 was completed in a shallow exposed area of Polley Lake (POL-S) with a similar shallow area of Bootjack Lake (BOL-S) serving as reference (Figure 3.1, Table 3.1). A review of 2022 sediment data quality (Appendix B) indicated that the data met the established DQOs. Specifically, the data were characterized by appropriate LRLs, negligible analyte concentrations in MB samples, excellent laboratory precision and field sampling precision, and excellent laboratory accuracy. Overall, the 2022 sediment quality data can be used with a high level of confidence for interpretation. A review of 2022 supporting water data quality (Appendix B) indicated the data were characterized by appropriate LRLs, negligible analyte concentrations in MB samples, and excellent laboratory precision and field sampling precision. Laboratory accuracy for supporting water samples was considered acceptable since all laboratory control samples met the DQO, although some matrix spikes (MS) results could not be detected due to high background concentrations. Hold time exceedances occurred for four analytes in six separate samples. Most of these hold time exceedances occurred after receipt of the samples by the laboratory (i.e., samples were received by the laboratory in sufficient time for analysis). For two samples, the hold times were exceeded prior to laboratory receipt due to a combination of challenges associated with the logistics of expedited sample shipments from a remote area and the short hold times. Analyte results with hold time exceedances were similar to those samples without hold time exceedances 2022 and were within the range of historic results, suggesting little if any impact of the hold time exceedances on analyte results. Overall, the 2022 water quality data can be used with a good level of confidence for interpretation.

Sediments collected from the shallow monitoring area of Polley Lake (POL-S) in 2022 were composed of predominantly silt and sand (mean = 53.7% and 38.5%, respectively) while the reference area sediments had higher sand and lower silt content (station BOL-S; mean = 50.7% and 41.9%, respectively; Table 5.1; Appendix Tables C.2.1 to C.2.3). Sediments from POL-S in 2022 had a lower sand and higher silt content than in 2019 when the area was last sampled (mean = 67.0% and 29.8%, respectively). The mean TOC and total nitrogen content of POL-S sediments in 2022 (mean = 1.03% and 0.0958%, respectively) were lower than the associated reference sediments (mean = 8.80% and 0.447%, respectively), as was also observed in 2019 (Table 5.1; Appendix Tables C.2.2 and C.2.3). For TOC content, the lower content in POL-S sediments was significant in both 2019 and 2022, and the exposed TOC content of POL-S

Table 5.1: Summary of Sediment Quality Data for Polley Lake (POL-S; Exposed) and Bootjack Lake (BOL-B2; Reference) Shallow Areas, 2019 to 2022

Analyte	Units	BC Working Sediment Quality Guidelines[a]		Reference (BOL-S; 2019 and 2022)[b]	Reference				Exposed			
					Bootjack Lake				Polley Lake			
					BOL-S				POL-S			
					2019		2022		2019		2022	
		Lower	Upper		Mean	SD	Mean	SD	Mean	SD	Mean	SD
Physical Tests												
Moisture	%	-	-	89.7	77.1	11.9	67.7	11.5	39.5	7.20	42.5	4.96
pH (1:2 soil:water)	pH	-	-	5.98	6.45	0.857	7.15	0.724	7.97	0.175	7.54	0.0707
Particle Size												
% Gravel (>2 mm)	%	-	-	5.80	1.86	1.92	2.50	2.13	1.00	-	1.00	-
% Sand (2.0 mm - 0.063 mm)	%	-	-	79.3	32.7	28.0	50.7	18.2	67.0	26.3	38.5	8.11
% Silt (0.063 mm - 4 µm)	%	-	-	86.2	58.8	24.7	41.9	16.6	29.8	22.9	53.7	6.55
% Clay (<4 µm)	%	-	-	19.1	7.34	6.84	5.12	1.96	3.42	3.38	7.62	2.32
Organic / Inorganic Carbon (<63 µm)												
Total Organic Carbon	%	-	-	14.6	10.8	3.52	8.80	3.34	0.810	0.256	1.03	0.137
Nutrients (Bulk Sediment)												
Total Nitrogen by LECO	%	-	-	1.17	0.705	0.449	0.447	0.296	0.0452	0.0345	0.0958	0.0270
Metals (<63 µm)[c]												
Aluminum	mg/kg	-	-	12,900	9,420	2,799	7,878	1,906	***14,102***	4,749	***21,260***	1,394
Antimony	mg/kg	-	-	0.790	0.592	0.201	0.352	0.138	0.378	0.0476	0.454	0.0288
Arsenic	mg/kg	5.9	17	6.70	4.66	1.53	4.15	1.05	***13.5***	1.57	***14.0***	0.733
Barium	mg/kg	-	-	193	153	26.9	129	8.69	155	50.3	182	9.09
Beryllium	mg/kg	-	-	0.510	0.380	0.113	0.292	0.0904	***0.584***	0.130	***0.784***	0.0541
Bismuth	mg/kg	-	-	0.100	0.100	-	0.100	-	***0.102***	0.00447	0.100	-
Boron	mg/kg	-	-	12.0	10.4	0.894	7.92	1.86	10.0	-	10.7	0.428
Cadmium	mg/kg	0.6	3.5	0.282	0.199	0.0654	0.177	0.0329	0.159	0.0264	0.132	0.0119
Calcium	mg/kg	-	-	183,000	41,606	75,691	105,138	88,807	25,160	2,861	27,880	2,263
Chromium	mg/kg	37.3	90	29.2	22.1	5.34	16.2	3.55	24.0	8.22	13.1	0.279
Cobalt	mg/kg	-	-	7.58	5.82	1.56	4.75	1.07	***25.7***	6.05	***20.5***	0.581
Copper	mg/kg	35.7	197	215	137	64.7	90.1	41.0	***767***	194	***673***	47.5
Iron	mg/kg	21,200	43,766	15,900	12,980	2,594	12,060	1,574	***136,800***	73,054	***64,820***	7,048
Lead	mg/kg	35	91.3	5.13	3.36	1.12	2.55	0.429	5.05	0.579	4.80	0.580
Lithium	mg/kg	-	-	8.30	6.42	1.50	5.06	0.948	***14.3***	4.04	***18.4***	1.79
Magnesium	mg/kg	-	-	5,600	3,550	923.4	4,180	1,196	***8,272***	2,896	***12,580***	1,066
Manganese	mg/kg	460	1,100	1,070	666	261	689	196	712	31.0	764	56.5
Mercury	mg/kg	0.17	0.486	0.146	0.0921	0.0386	0.0697	0.0347	0.0769	0.00800	0.0693	0.00257
Molybdenum	mg/kg	25	23,000	5.57	3.27	1.66	2.58	1.02	3.72	0.449	4.87	0.321
Nickel	mg/kg	16	75	22.9	16.1	5.61	11.4	2.36	13.2	1.99	10.6	0.300
Phosphorus	mg/kg	-	-	703	639	48.4	561	78.2	***2,178***	302	***1,900***	62.0
Potassium	mg/kg	-	-	990	692	210	620	145	982	356	***1,680***	123
Selenium	mg/kg	2	-	2.74	1.66	0.703	1.98	0.579	1.53	0.272	1.44	0.133
Silver	mg/kg	0.5	-	0.181	0.131	0.0525	0.0882	0.0354	***0.425***	0.148	***0.301***	0.0245
Sodium	mg/kg	-	-	248	185	7.11	213	31.2	***637***	206	***932.6***	53.2
Strontium	mg/kg	-	-	1,060	275	439	532	428	143	59.4	213	13.9
Sulphur	mg/kg	-	-	6,600	4,700	1,666	2,210	1,590	1,080	205	1,996	332
Thallium	mg/kg	-	-	0.0810	0.0614	0.0146	0.0536	0.00805	0.0500	-	0.0500	-
Tin	mg/kg	-	-	0.430	0.292	0.0881	0.236	0.0541	***1.45***	0.109	***2.14***	0.150
Titanium	mg/kg	-	-	578	442	58.6	385	152	***1,252***	162	***1,888***	143
Uranium	mg/kg	-	-	2.15	1.39	0.386	1.54	0.553	1.32	0.606	1.34	0.0738
Vanadium	mg/kg	-	-	45.0	36.5	8.00	29.5	6.35	***547***	292	***257***	27.6
Zinc	mg/kg	123	315	50.0	37.7	9.89	29.8	5.63	***67.9***	8.03	***62.9***	4.81
Zirconium	mg/kg	-	-	4.10	-	-	2.76	1.17	-	-	***5.94***	1.33

Value is > Lower BC Working Sediment Quality Guideline.

Value is > Upper BC Working Sediment Quality Guideline.

Notes: "-" = no data, SD - Standard Deviation. ***Bold/Italics -*** Exposed value (Polley Lake) is > reference 95th percentile values (<5th percentile value for pH).

[a] British Columbia Working Sediment Guidelines (BCMOECCS 2021a) and approved BC Sediment Quality Guideline for Selenium (BCMOECCS 2021b).

[b] For calculation of reference 95th percentile values (2019 to 2022) see Appendix Table C.2.1.

[c] Total sulphur measured in bulk sediment, not the <63 µm fraction.

sediments did not change significantly between the two sampling events, relative to reference (Figure 5.1; Appendix Tables E.1.1 and E.1.2).

The mean concentration of 17 out of 34 analytes in POL-S sediments (<63 µm fraction) in 2022 exceeded the reference (BOL-S) 95th percentile concentrations. Among these analytes, arsenic, copper, and iron were the only analytes with mean concentrations in 2022 that exceeded both the WSQG and the reference 95th percentile values (Analytes of Interest; Table 5.1; Appendix Tables C.2.2 and C.2.3). Mean arsenic concentrations in POL-S sediments exceeded the lower WSQG by 2.4 times, and mean copper and iron concentrations exceeded the upper WSQG by 3.4 and 1.5 times, respectively (Table 5.1; Appendix Table C.2.3). Copper concentrations at the reference area (BOL-S) also exceeded the lower WSQG by 2.5 times, indicating sediments in the region have naturally elevated copper concentrations (Figure 5.1; Appendix Table E.1.2).

Mean concentrations of these three Analytes of Interest in POL-S sediments were significantly elevated relative to reference sediments in 2019 and 2022, and the exposed:reference ratio was temporally stable between 2019 and 2022 (i.e., exposed concentrations did not differ temporally relative to reference (Figure 5.1; Appendix Table E.1.1). Mean iron concentrations, were substantially lower in 2022 (mean = 64,820 mg/kg) than in 2019 (mean = 136,800 mg/kg), but not significantly so, due to the high variability observed in 2019 (range = 55,800 to 221,000 mg/kg; Table 5.1; Appendix Tables E.1.1, E.1.2, C.2.3).

Arsenic, copper, and iron concentrations were significantly negatively correlated with TOC and total nitrogen content when sediments from both POL-S and BOL-S were considered (Appendix Table E.1.3, Appendix Figure E.1.1). These results were highly leveraged by the highest analyte concentrations and lowest TOC content occurring in POL-S sediments and highest TOC and total nitrogen content occurring in BOL-S sediments (Appendix Figure E.1.1). These relationships are consistent with a breach-related influence defined by the input of inorganic sediments with elevated analyte concentrations to Polley Lake.

5.1.2 Sediment Toxicity

Sediment toxicity testing using *H. azteca* in 2022 (14-day standard test) was completed at a shallow exposed area of Polley Lake (POL-S), with a similar shallow area of Bootjack Lake (BOL-S) serving as reference (Figure 3.1; Section 3.3). A review of sediment toxicity test data quality indicated that tests met control acceptability criteria and all water quality parameters remained within acceptable ranges throughout the tests (Nautilus 2022; Appendix G). Reference toxicant test results fell within the acceptable range and therefore the sensitivity of organisms used in the tests was considered appropriate (see the DQR for details; Appendix B). All ammonia concentrations were at levels that are not expected to cause adverse effects to *H. azteca* (Appendix G). Examination of laboratory bench sheets indicated that temperature,

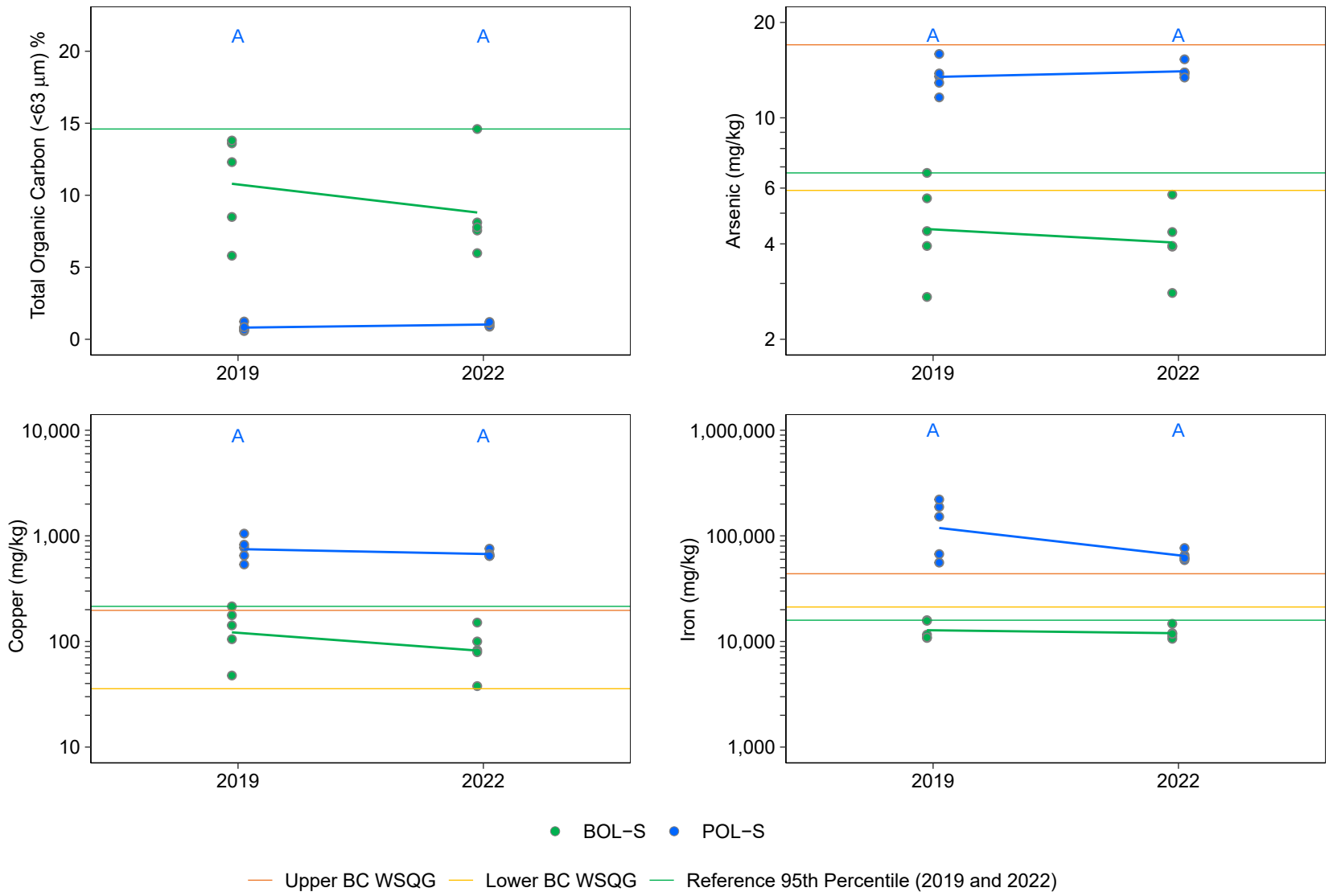


Figure 5.1: Sediment Analyte of Interest Concentrations (<63 µm Fraction) for Polley Lake (POL-S; Exposed) and Bootjack Lake (BOL-B2; Reference) Shallow Areas, 2019 to 2022

Notes: BC WSQG = British Columbia Working Sediment Quality Guideline (BCMOECCS 2021a) and approved BC Sediment Quality Guideline for Selenium (BCMOECCS 2021b). The reference 95th Percentile was calculated using data from 2019 and 2022. Green represents reference areas and blue represents exposed areas. Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Individual samples are plotted and lines join the least squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year and $\log_{10}$-transformed data for all analytes except Total Organic Carbon (TOC) (no transformation). Years that share a letter (e.g., A,B,C) have ratios (or differences - TOC) of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio (or difference) of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted.

dissolved oxygen, conductivity, and pH were all stable over the course of the toxicity tests (Appendix G).

Survival of *H. azteca* exposed to POL-S sediments in 2022 showed no unacceptable response relative to the reference sediments (BOL-S) and the laboratory control. Growth of *H. azteca* exposed to POL-S sediments also showed no unacceptable response, with growth 14% greater than reference (BOL-S) sediments and 26% greater than the laboratory control (Table 5.2). The survival and growth responses observed in 2022 were similar to those in 2019 (Figure 5.2); which indicated a low survival response relative to the lab sand control (but no unacceptable response relative to the reference sediments) and no unacceptable growth response (Minnow 2020a).

The overlying water of the bioassay test vessels in 2022 had concentrations of dissolved copper that were notably higher for POL-S sediments (mean = 0.028 mg/L measured on day 14 of the test; Appendix G) than the overlying waters for reference sediments (BOL-S; 0.0049 mg/L). Dissolved copper concentrations in the bioassay test vessels for POL-S sediments were also notably higher than those documented in field-collected water samples (mean = 0.0036 mg/L; Appendix Table C.1.2). This suggests some copper mobilization in the test set-up that has either not occurred *in situ* or has attenuated over time. Despite the elevated dissolved copper concentations in the bioassay test vessels relative to *in situ* conditions, the absence of survival or growth effects to *H. azteca* in toxicity testing indicates the shallow exposed sediments from Polley Lake are able to support benthic invertebrate organisms.

5.1.3 Plankton Community and Productivity

Plankton community and productivity monitoring in 2022 was completed three times (June, July, and August) in Polley Lake (POL-P2) and at a corresponding reference area (Bootjack Lake; BOL-B2; Figure 3.3, Tables 3.4 and 3.5). A review of the 2022 plankton data quality (Appendix B) indicated that the data met the established DQOs. Specifically, the data were characterized by good agreement between laboratory duplicates for both phytoplankton and zooplankton community results, indicating good laboratory precision and accuracy. Additionally, phytoplankton productivity measurements (chlorophyll-a) results were of acceptable detectability (above the LRL), negligible analyte concentrations in MB samples, excellent laboratory precision, and excellent laboratory accuracy. Chlorophyll-a sample hold times were exceeded by one day in one sample from August due to a combination of field sampling logistics (field filtration was not possible), challenges associated shipping from a remote area, and the short (two day) recommended hold time for unfiltered chlorophyll-a samples (see Appendix B for details). The chlorophyll-a result for the single sample that exceeded the hold time was similar to results from samples without hold time exceedances 2022 and were

Table 5.2: Summary of *Hyalella azteca* 14-day Survival and Growth Responses for Sediment Toxicity Testing of Polley Lake (POL-S; Exposed) and Bootjack Lake (BOL-S; Reference) Shallow Areas, 2022

Results and Classification	Polley Lake	
	POL-S	
	Survival	Growth[a]
	%	mg
Raw Area Result	94.0 ± 8.9	0.24 ± 0.03
Raw Laboratory Control Result	96.5 ± 5.50	0.19 ± 0.03
Raw Reference Result (BOL-S)	90.0 ± 7.10	0.21 ± 0.01
Control Normalized Response	97%	126%
Reference Normalized Response	104%	114%
Statistically Significant Reduction from Control	N	N
Statistically Significant Reduction from Reference	N	N
CLASSIFICATION	**NR**	**NR**

no unacceptable response (<20% reduction) - **NR**.
low response (20-50% reduction) and not significantly different than control and reference - **LR**.
moderate response (20-50% reduction) and significantly different than control and reference - **MR**.
high response (>50% reduction) - **HR**.

Note: Y = Yes, N = No.

[a] Growth = dry weight per surviving organism (mg).

[b] Where comparisons to mean laboratory control result and the mean field reference result did not fall into the same response classification, the result was discussed relative to both the control and the field reference.

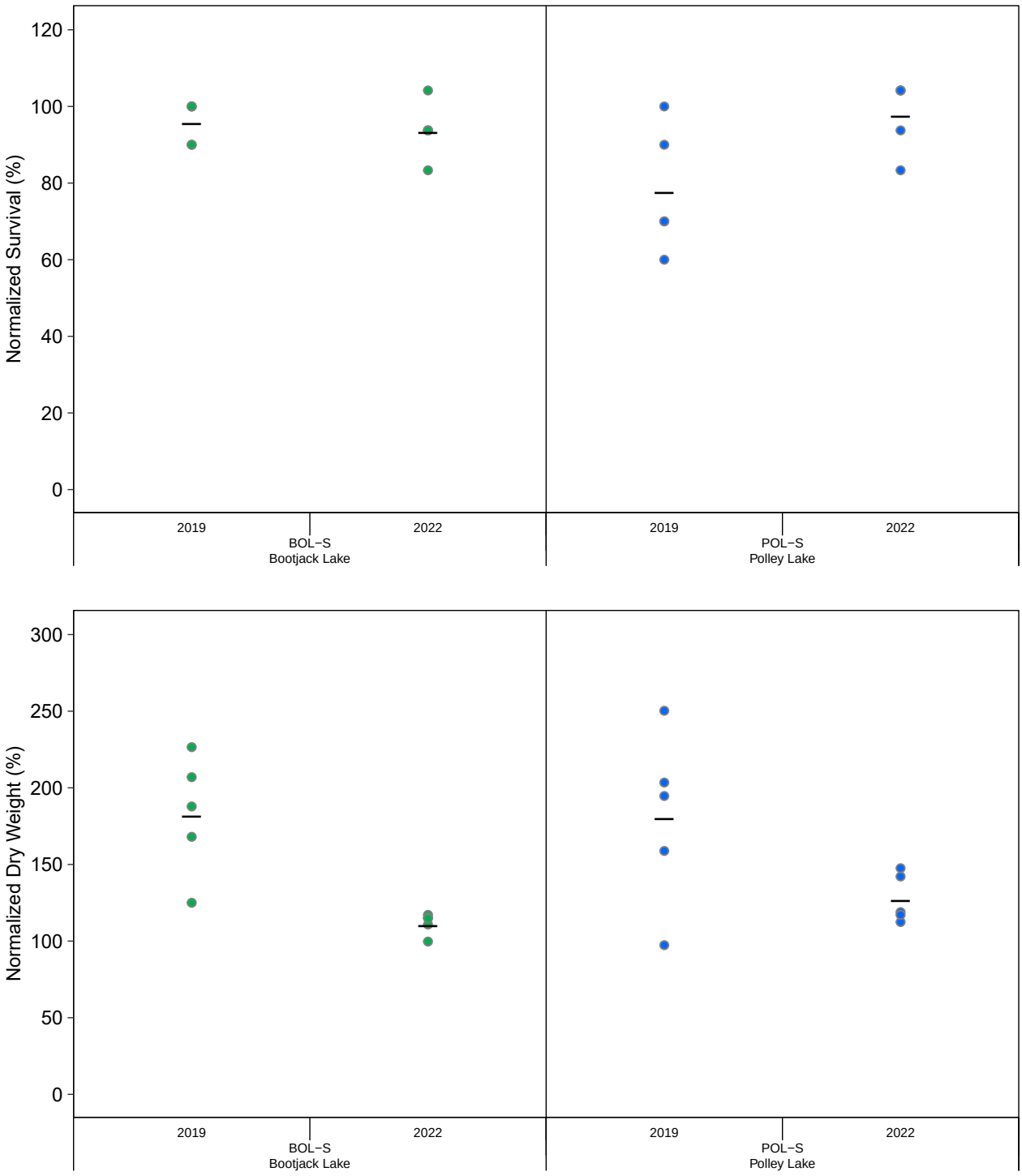


Figure 5.2: *Hyalella azteca* 14-day Survival and Growth Responses for Sediment Toxicity Testing of Polley Lake (POL-S; Exposed) and Bootjack Lake (BOL-S; Reference) Shallow Areas, 2019 to 2022

Notes: Plots are only included for primary or secondary analytes with a significant postive exposed - reference difference in 2022 or in all monitoring years. Survival data were normalized to the control acceptance criteria, and the samples were calculated as a percentage of normalized control performance. Growth data were normalized to laboratory controls run during the test with the reference site for that area.

within the range of historic results, suggesting little if any impact of the hold time exceedances on analyte results. Overall, the plankton community and productivity data for Polley Lake can be used with a high level of confidence for data interpretation. A review of 2022 supporting water data quality indicated these data can be used with a good level of confidence for interpretation (see Section 5.1.1 for details).

5.1.3.1 Phytoplankton

5.1.3.1.1 Community

Phytoplankton densities in Polley Lake (POL-P2) in 2022 were highest in August and were mid-range in July, while densities at Bootjack Lake (reference area; BOL-B2) in 2022 were highest in July. The taxon richness reported in June was within the range observed in July at both POL P2 and BOL-B2 in 2022, but richness in both lakes was highest in August (Appendix Figure E.2.1, Appendix Table C.3.1). Phytoplankton density, and Simpson's Diversity and Evenness were significantly higher at POL-P2 compared to BOL-B2 in July 2022, while taxon richness was significantly lower (Figure 5.3, Table 5.3; Appendix Tables C.3.1, C.3.2). Total phytoplankton density at POL-P2 was higher than at BOL-B2 in 2022 due to the combined effects of higher densities of Chlorophytes, Chrysophytes, and Cryptomonads (Appendix Figure E.2.2, Appendix Table E.2.1).

Temporal analyses indicated variability in density and Simpson's Diversity and Evenness at POL-P2 from 2019 to 2022, but these endpoints were largely similar to or higher than reference over that period. Taxon richness showed temporal stability from 2019 to 2022 and was similar to or lower than reference over that period. Specifically, mean phytoplankton density at POL-P2 in 2022 was significantly lower than in 2019 and 2020; however, a similar significant decrease in density was observed at BOL-B2 among these years (Figure 5.3, Table 5.3). Densities were also lower in 2021 compared to 2019 in both lakes. The significant decrease in phytoplankton densities at both POL-P2 and BOL-B2 in 2022 relative to previous years (relative to 2019 and 2020 at POL-P2 and relative to 2019 to 2020 at BOL-B2; Figure 5.3, Table 5.3) was driven by decreased densities of Cyanobacteria at both locations since 2019 (Appendix Figure E.2.2, Appendix Table E.2.1). Given that the densities of Cyanobacteria decreased in a similar manner in both waterbodies, it is likely that this decrease was related to local environmental factors (e.g., water temperature), with seasonal fluctuations in surface water temperature being very similar in both waterbodies (Appendix Figures A.1.1, C.1.1). Taxon richness at POL-P2 from 2019 to 2022 was lower than at BOL-B2 except in 2020, was temporally stable over this period, was generally within the range of post-breach (2015 to 2018) and was lower than baseline at both POL-P2 and BOL-B2 (Figure 5.3, Table 5.3; Appendix Figure E.2.1). It is possible that some of the variability in richness among the baseline (1995 and 1996), post-breach (2015 to 2018),

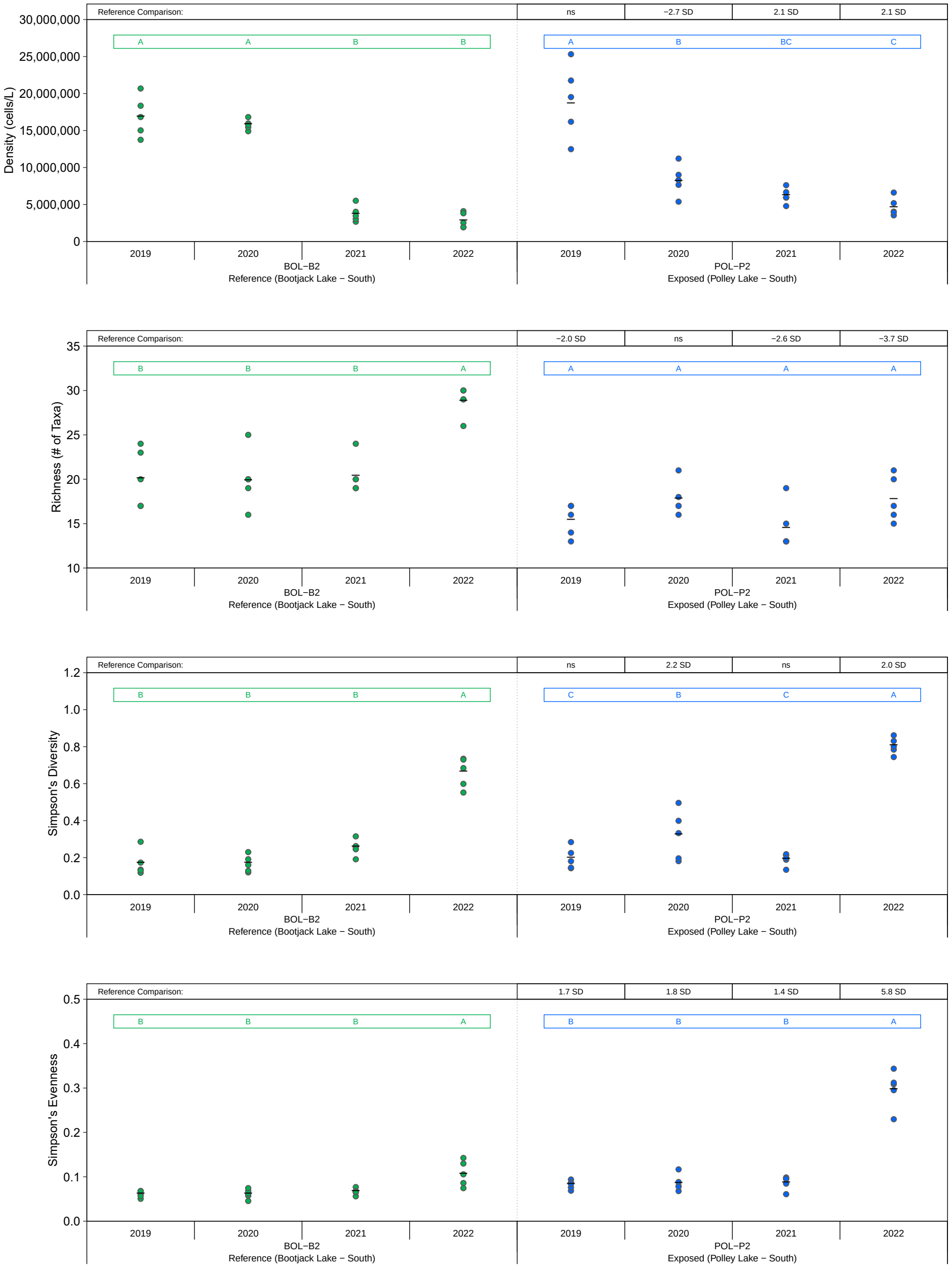


Figure 5.3: Phytoplankton Community Endpoints for Polley Lake (POL−P2; Exposed) and Bootjack Lake (BOL−B2; Reference) Areas in July, 2019 to 2022

Notes: Black bars represent measures of central tendency (mean, geometric mean, or median depending on if analysis was conducted on untransformed, $\log_{10}$−transformed or rank−transformed data). Coloured letters represent significant (p−value <0.1) post−hoc comparisons within areas over time; years that share a letter of the same colour (e.g., A, B) within a box of the same colour do not differ significantly within an area. A number above the plot indicates significant exposed vs. reference post−hoc comparisons within a given year. The magnitude of difference (MOD) for these significant post−hoc comparisons are expressed in units of standard deviation (SD) or median absolute deviations (MAD; if the data were rank−transformed prior to analysis) relative to reference. 'nc' indicates no comparisons were possible; 'ns' indicates a non−significant contrast; 'nm' indicates that the MOD could not be calculated because MAD = 0. For plots of phytoplankton results prior to 2019, see Minnow 2019a, 2020a, 2021a. For unreplicated phytoplankton results collected in June and August 2022, see Appendix Table C.3.1.

Table 5.3: Results of Statistical Comparisons of Phytoplankton Community Endpoints for Polley Lake (POL-P2; Exposed) and Bootjack Lake (BOL-B2; Reference) Areas in July, 2019 to 2022

Endpoint	Transformation	2-Way ANOVA p-values			Area Type	Area	Year	Mean	MCT[a]	Temporal Contrasts Within Sites								Spatial Comparison Within Years[b]
										Pairwise Comparisons Between Years				MOD Relative to Baseline[b]				
		Area	Year	Area x Year						2019	2020	2021	2022	2019	2020	2021	2022	POL-P2
Density (cells/L)	log10	-	-	<0.001	Reference	BOL-B2	2019	16,920,021	16,745,017	A	A	B	B	Baseline	ns	-6.3	-7.5	ns
							2020	15,769,285	15,756,799									-2.7
							2021	3,737,530	3,618,303									2.1
							2022	2,856,805	2,710,389									2.1
					Exposed	POL-P2	2019	19,050,107	18,506,530	A	B	BC	C	Baseline	-3.4	-4.5	-5.8	
							2020	8,310,083	8,083,492									
							2021	6,188,644	6,117,587									
							2022	4,657,243	4,534,837									
Richness (# of Taxa)	log10	-	-	0.025	Reference	BOL-B2	2019	20.2	20.0	B	B	B	A	Baseline	ns	ns	2.8	-2.0
							2020	20.0	20.0									ns
							2021	20.4	20.0									-2.6
							2022	28.8	29.0									-3.7
					Exposed	POL-P2	2019	15.4	15.0	A	A	A	A	Baseline	ns	ns	ns	
							2020	17.8	18.0									
							2021	14.6	14.0									
							2022	17.8	18.0									
Simpson's Diversity	none	-	-	0.004	Reference	BOL-B2	2019	0.168	0.170	B	B	B	A	Baseline	ns	ns	6.9	ns
							2020	0.166	0.170									2.2
							2021	0.254	0.250									ns
							2022	0.660	0.660									2.0
					Exposed	POL-P2	2019	0.196	0.200	C	B	C	A	Baseline	1.8	ns	8.6	
							2020	0.321	0.320									
							2021	0.190	0.190									
							2022	0.804	0.800									
Simpson's Evenness	log10	-	-	<0.001	Reference	BOL-B2	2019	0.0607	0.0600	B	B	B	A	Baseline	ns	ns	3.1	1.7
							2020	0.0615	0.0610									1.8
							2021	0.0664	0.0660									1.4
							2022	0.108	0.100									5.8
					Exposed	POL-P2	2019	0.0819	0.0810	B	B	B	A	Baseline	ns	ns	7.2	
							2020	0.0859	0.0840									
							2021	0.0869	0.0860									
							2022	0.298	0.300									
Chlorophyll-a (µg/L)	log10	-	-	<0.001	Reference	BOL-B2	2019	2.76	2.70	A	B	B	B	Baseline	-2.2	-3.5	-2.0	ns
							2020	2.05	2.00									ns
							2021	1.68	1.70									-2.2
							2022	2.08	2.10									2.0
					Exposed	POL-P2	2019	2.46	2.50	A	B	C	A	Baseline	-2.3	-4.9	ns	
							2020	1.76	1.80									
							2021	1.23	1.20									
							2022	2.82	2.80									

Magnitude of Difference (MOD) < -2.
Magnitude of Difference (MOD) > 2.

Notes: "-" = no data available, nc = no comparison, ns = no significance, nm = contrast Magnitudes of Difference (MODs) could not be calculated because the Median Absolute Deviation (MAD) = 0, cells/L = Cells per litre. µg/L = micrograms per litre.

[a] MCT = Measures of Central Tendency. Mean, geometric mean, or median depending on if analysis was conducted on untransformed, log $_{10}$-transformed, or rank-transformed data.

[b] Magnitude of difference (MOD) calculated for two-way ANOVA as (Exposed Mean - Reference Mean)/SD (or [Mean - Baseline Mean]/SD for temporal comparisons) on the transformed scale, where SD was the pooled standard deviation of the model residuals. MOD calculated for Kruskal-Wallis (i.e., rank-transformed data) as (Exposed Median - Reference Median)/MAD, where MAD was the pooled median absolute deviation.

and 2019 to 2022 sampling periods was related to changes in phytoplankton taxonomists (see Minnow 2020a for details). Simpson's Diversity was higher in 2022 compared to previous years (2019 to 2021) at POL-P2 and was either similar to (in 2019 and 2021) or significantly higher (2020 and 2022) than at BOL-B2. Similarly, Simpson's Evenness at POL-P2 was higher in 2022 compared to previous years (2019 to 2021) and was consistently higher than at BOL-B2 from 2019 to 2022 (Figure 5.3, Table 5.3; Appendix Tables C.3.1, C.3.2).

In 2022, the phytoplankton community at POL-P2 was dominated by Cyanobacteria in July and August but was dominated by Diatoms and Chlorophytes in June (Figure 5.4; Appendix Tables C.3.1 and C.3.2). At BOL-B2, the phytoplankton community was dominated by Cyanobacteria in June, July, and August, although the extent of community dominance was lowest in June (Figure 5.4; Appendix Tables C.3.1 and C.3.2). The mean relative densities (%) of the dominant phytoplankton taxa (Chlorophytes and Chrysophytes) were similar or higher at POL-P2 compared to BOL-B2 in July 2022, except Cyanobacteria which was significantly lower. Specifically, % Cyanobacteria decreased significantly at both POL-P2 and BOL-B2 in 2022 relative to previous years (2019 to 2021) and was lower at POL-P2 than reference in 2020 and 2022. The relative densities of Chrysophytes and Chlorophytes were significantly higher at both POL-P2 and BOL-B2 in 2022 compared to 2019 to 2021. The relative density of Chrysophytes was higher at POL-P2 than at BOL-B2 from 2019 to 2022 while the relative density of Chlorophytes was higher in 2020 and 2022 (Figure 5.4; Appendix Figure E.2.2, Appendix Tables C.3.1, C.3.2). Cryptomonad relative density was significantly higher from 2020 to 2022 at POL-P2 compared to 2019, and the relative density of Cryptomonads at POL-P2 has varied compared to BOL-B2 across these monitoring years but was similar to reference in 2022. The relative density of Diatoms at POL-P2 decreased significantly between 2019 and 2021, but significantly increased in 2022 compared to previous years at both POL-P2 and BOL-B2. Diatom relative density at POL-P2 was not significantly different than at BOL-B2 in 2022, despite being higher and lower than BOL-B2 in 2020 and 2021, respectively (Figure 5.4; Appendix Figures E.2.2, Appendix Tables C.3.1, C.3.2, E.2.1). The increases observed in Diatom, Chlorophyte, and Chrysophyte relative densities in 2022 relative to prior years were a direct result of lower Cyanobacteria densities and therefore relative densities. The absence of compensatory increases in the densities of Diatoms, Chlorophytes, and Chrysophytes indicates that this decline in Cyanobacteria densities did not lead to a significant increase in the densities of other types of phytoplankton within the community (Appendix Figure E.2.2, Appendix Tables C.3.1, C.3.2, E.2.1), which is reflected in the decreased total density in Polley Lake in 2022 compared to prior years (2019 and 2020; Table 5.3).

Phytoplankton density data at POL-P2 showed patterns that were generally similar to those for relative densities, with the following exceptions. The relative densities of Diatoms, Chlorophytes,

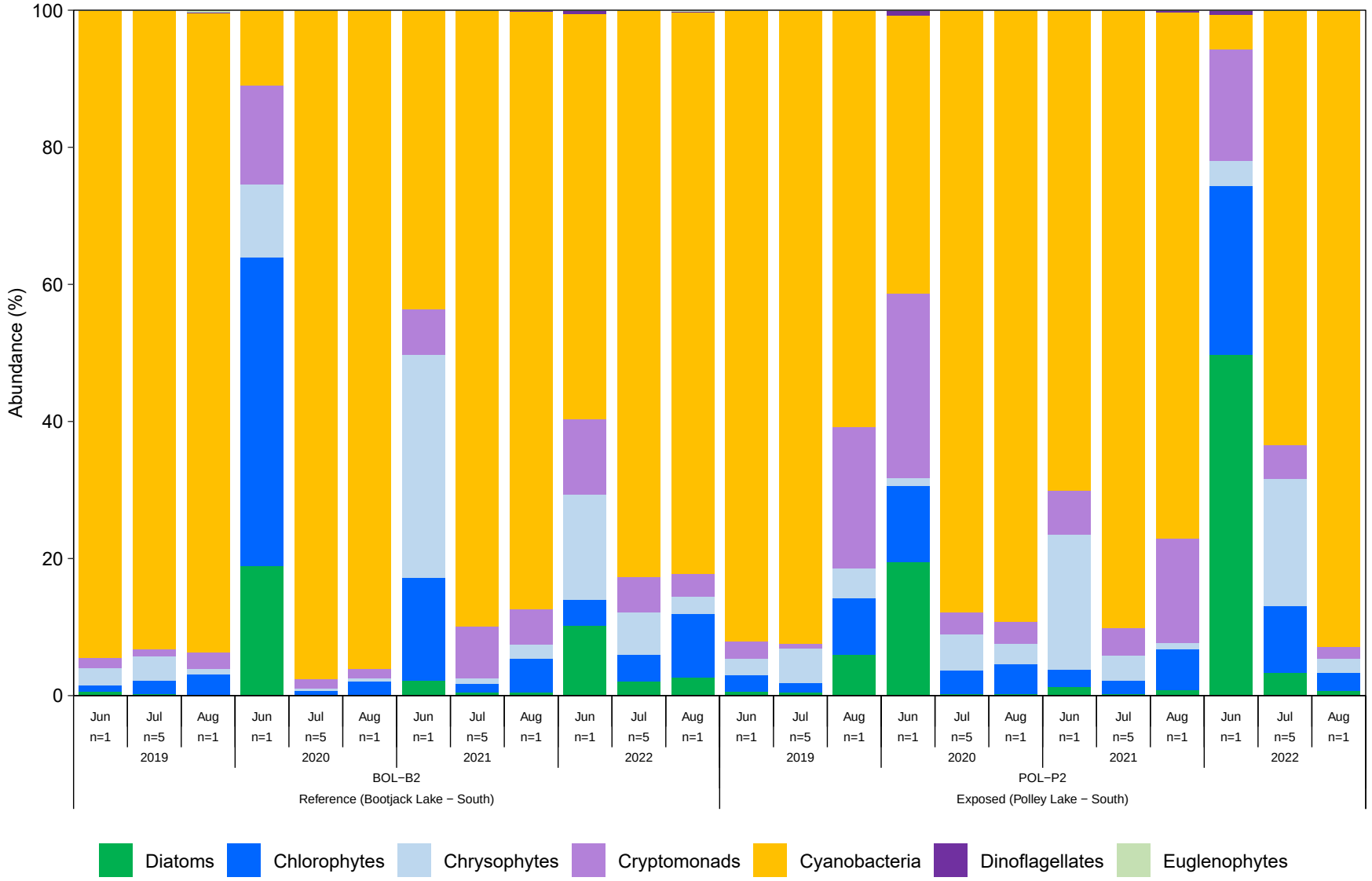


Figure 5.4: Relative Mean Densities of Major Phytoplankton Community Taxonomic Groups for Polley Lake (POL−P2; Exposed) and Bootjack Lake (BOL−B2; Reference) Areas, 2019 to 2022

and Chrysophytes at POL-P2 and BOL-B2 increased between 2019 and 2022 but cell densities of these groups in 2022 were similar to cell densities in 2019 (Appendix Figures E.2.2, E.2.3, Appendix Tables C.3.1, C.3.2, and E.2.1). The density of Cryptomonads was higher at POL-P2 than at BOL-B2 in 2022 while the relative density of Cryptomonads was similar between the two areas. The relative density of Cyanobacteria was lower at POL-P2 than at BOL-B2 in 2022 while the density of Cyanobacteria was similar between the two areas. Cyanobacteria density decreased significantly at POL-P2 in 2022 relative to 2019 to 2021, and as outlined above, this was the primary driver for the corresponding decreases in total density among the same years (Appendix Figure E.2.2, Appendix Table C.3.1, C.3.2, E.2.1). As in previous years, phytoplankton densities and relative densities at both POL-P2 and BOL-B2 show a succession towards communities being more dominated by Cyanobacteria as the summer progressed from June to August (Figure 5.4; Appendix Table C.3.1), which was likely a result of increasing water temperatures (Appendix Figures A.1.1, C.1.1; Schnurr and Allen 2015).

Overall, the phytoplankton community in Polley Lake in July 2022 was characterized by total densities, and Simpson's Diversity and Evenness that were significantly higher than Bootjack Lake (reference), but taxon richness that was significantly lower than reference. Total density in Polley Lake was lower in July 2022 than in 2019 and 2020, a decrease that was driven by decreased Cyanobacteria densities that was also observed at the reference. Both Polley and Bootjack Lake experienced succession to Cyanobacteria dominance of the phytoplankton community in July and August, likely due to higher water temperatures in the photic zone in late summer which favour Cyanobacteria. Taxon richness was lower in Polley Lake compared to the reference area from 2019 to 2022, except for 2020 when richness was similar between the two areas. Simpson's Diversity and Evenness in Polley Lake was similar to or higher than the reference area in each monitoring year (2019 to 2022). Phytoplankton community composition in Polley Lake has consistently (i.e., in each year from 2019 to 2022) been characterized by higher relative densities of Chrysophytes compared to Bootjack Lake while the differences in relative densities between Polley Lake and Bootjack Lake in other taxonomic groups (i.e., Diatoms, Chlorophytes, Cyanobacteria, and Cryptomonads) have been variable over time. The similarity or higher result for most primary endpoints in Polley Lake compared to reference (density, Simpson's Diversity and Evenness), and the temporal stability (either within Polley Lake or relative to the reference area) for those endpoints in Polley Lake that were lower than reference (e.g., taxon richness), are suggestive of a lack of mine-related influence on the phytoplankton community of Polley Lake.

5.1.3.1.2 Productivity

Chlorophyll-a concentrations were highest in July and August at POL-P2 and highest in June at BOL-B2 in 2022, with the mean of July samples similar to June at POL-P2 and similar to August at BOL-B2 (Appendix Table C.3.1, Appendix Figure E.2.1). Chlorophyll-a concentrations were significantly higher at POL-P2 than at BOL-B2 in July 2022 despite being significantly lower in 2021, and similar between the two lakes in 2019 and 2020. Although chlorophyll-a concentrations have been consistent at BOL-B2 from 2020 to 2022, they have fluctuated across these years at POL-P2, which has largely driven the variability in comparisons between the two lakes (Figure 5.5, Table 5.3; Appendix Tables C.3.1 and C.3.2). Changes in phytoplankton productivity at POL-P2 over time may be related to local natural variability in physical (e.g., light exposure and water temperatures) and chemical factors (e.g., nutrient concentrations) that has affected the two lakes differently. For instance, the peak summer temperature reported in Polley Lake exceeded that in Bootjack Lake in 2022, while nutrient (nitrogen and phosphorus) concentrations were similar (Appendix Figure C.1.1; Appendix Table C.1.3).

A lake's trophic status classification corresponds to its overall productivity in terms of algal biomass (chlorophyll-a) and nutrient concentration (Wetzel 2001). The trophic statuses of Polley Lake and Bootjack Lake in 2022, based on July chlorophyll-a concentrations (range = 2.46 to 3.78 µg/L for POL-P2, 1.82 to 2.5 µg/L for BOL-B2, were classified as mesotrophic (2.5 to 8.0 µg/L) and oligotrophic (<2.5 µg/L; Vollenweider and Kerekes 1982), respectively (Figure 5.5; Appendix Tables C.3.1 and C.3.2). Total chlorophyll-a concentrations in 2022 in Polley Lake and Bootjack Lake were within the range of baseline (1995 and 1996) and post-breach values for both lakes, except for a single anomalous result at BOL-B2 in June 2022 which was higher than most previous results (except the June 2021 result; Appendix Figure E.2.1, Appendix Tables C.3.1 and C.3.2). While the trophic state of Polley Lake increased from oligotrophic to mesotrophic between 2021 and 2022 (based on July data), this represented a return to the same mesotrophic status observed in 2019 (Figure 5.5; Appendix Tables C.3.1 and C.3.2).

5.1.3.2 Zooplankton

5.1.3.2.1 Community

Zooplankton densities in 2022 in Polley Lake (POL-P2) and Bootjack Lake (BOL-B2) were highest in July and June, respectively, while densities at both lakes were lowest in August (Appendix Figure E.2.4, Appendix Tables C.3.3, C.3.4). Zooplankton taxon richness at POL-P2 in 2022 was highest in July and lowest in both June and August, while richness at BOL-B2 was

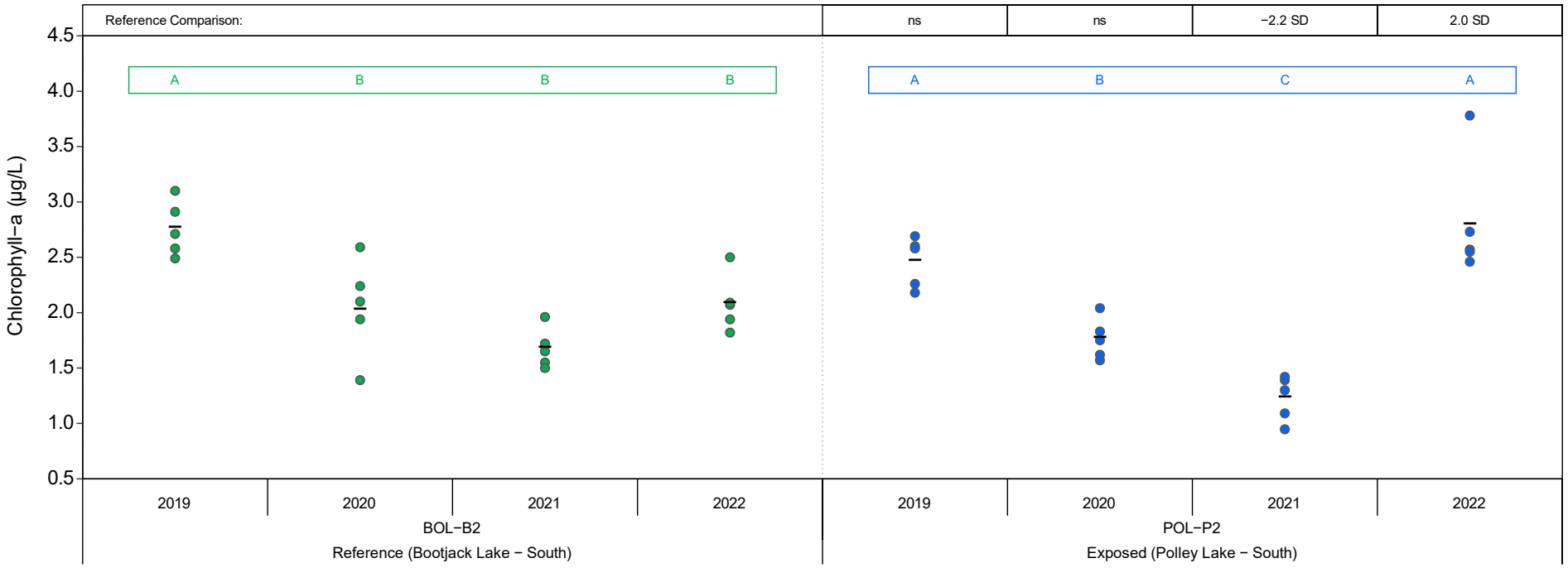


Figure 5.5: Phytoplankton Chlorophyll−a Concentrations for Polley Lake (POL−P2; Exposed) and Bootjack Lake (BOL−B2; Reference) Areas in July, 2019 to 2022

Notes: Black bars represent measures of central tendency (mean, geometric mean, or median depending on if analysis was conducted on untransformed, log10− transformed or rank−transformed data). Coloured letters represent significant (p−value <0.1) post−hoc comparisons within areas over time; years that share a letter of the same colour (e.g., A, B) within a box of the same colour do not differ significantly within an area. A number above the plot indicates significant exposed vs. reference post−hoc comparisons within a given year. The magnitude of difference (MOD) for these significant post−hoc comparisons are expressed in units of standard deviation (SD) or median absolute deviations (MAD; if the data were rank−transformed prior to analysis) relative to reference. 'nc' indicates no comparisons were possible; 'ns' indicates a non−significant contrast; 'nm' indicates that the MOD could not be calculated because MAD = 0. For plots of phytoplankton results prior to 2019, see Minnow 2019a, 2020a, 2021a. For unreplicated phytoplankton results collected in June and August 2022, see Appendix Table C.3.1.

highest in August and lowest in July. Zooplankton density, taxon richness, and Simpson's Diversity and Evenness at POL-P2 were similar to BOL-B2 in July 2022 (Figure 5.6, Table 5.4).

Temporal analyses indicated that mean zooplankton density at POL-P2 in July 2022 was significantly higher than in 2019 or 2021 but similar to 2020. Density at POL-P2 was also similar to BOL-B2 in both 2020 and 2022 despite within-lake temporal variation at POL-P2. This temporal variability was reflected in part in temporal changes of zooplankton densities at BOL-B2, where density in 2022 was also higher than in 2019 (Figure 5.6, Table 5.4; Appendix Tables C.3.3, C.3.4). Taxon richness at POL-P2 was significantly higher in 2022 compared to 2020 but was similar to richness in 2019 and 2021, while richness at BOL-B2 was higher in 2022 compared to 2019 but similar in 2020 and 2021 (Figure 5.6, Table 5.4). Simpson's Diversity and Evenness at POL-P2 in 2022 was similar to prior monitoring years (2019 to 2021; Figure 5.6, Table 5.4). While Simpson's Diversity and Evenness were lower at POL-P2 than at BOL-B2 in 2019 and 2020, the lack of change in these indices at POL-P2 over time combined with decreasing Diversity and Evenness at BOL-B2 has led to the similarity of these endpoints between the two areas in 2021 and 2022.

The zooplankton community at POL-P2 in 2022 was dominated by Rotifera in June, Copepod Nauplii and Rotifera in July, and Copepod Nauplii and Cyclopoida in August, which differed from the dominance of Rotifera observed in June, July, and August at BOL-B2 (Figure 5.7; Appendix Tables C.3.3, C.3.4). In July 2022, the relative densities (%) of Calanoida, Cladocera, and Copepod Nauplii were significantly higher at POL-P2 than at BOL-B2, while the relative densities of Cyclopoida and Rotifera were similar and significantly lower, respectively (Appendix Figure E.2.5, Appendix Tables C.3.4 and E.2.2). The relative densities of Copepod Nauplii and Rotifera have been consistently higher and lower, respectively, at POL-P2 compared to BOL-B2 in each year from 2019 to 2022, while the relative densities of Calanoida, Cladocera, Copepod Nauplii, and Cyclopoida have been more variable (Appendix Figure E.2.5, Appendix Table E.2.2). The consistently lower relative density of Rotifera at POL-P2 than at BOL-B2 could potentially be due to differing predation on crustacean zooplankton in Polley Lake versus Bootjack Lake. Planktivorous fish species, including rainbow trout and longnose sucker which occur in both Polley and Bootjack lakes, can decrease populations of the larger crustacean zooplankton by predation, freeing smaller Rotifera from competition and predation (Brooks and Dodson 1965, Fussman 1996). Relative densities of Cyclopoida and Rotifera at POL-P2 were lower and higher, respectively, in 2022 than from 2019 to 2021, while the relative densities of the remaining taxa were either stable from 2019 to 2022 or similar in 2022 to 2019 (indicating temporal stability; Appendix Figure E.2.5, Appendix Table E.2.2). The temporal increase in Rotifera relative density was also observed at Bootjack Lake from 2019 to 2022, suggesting this was related to natural environmental factors. The decrease in Cyclopoida relative density at POL-P2 in 2022 relative to

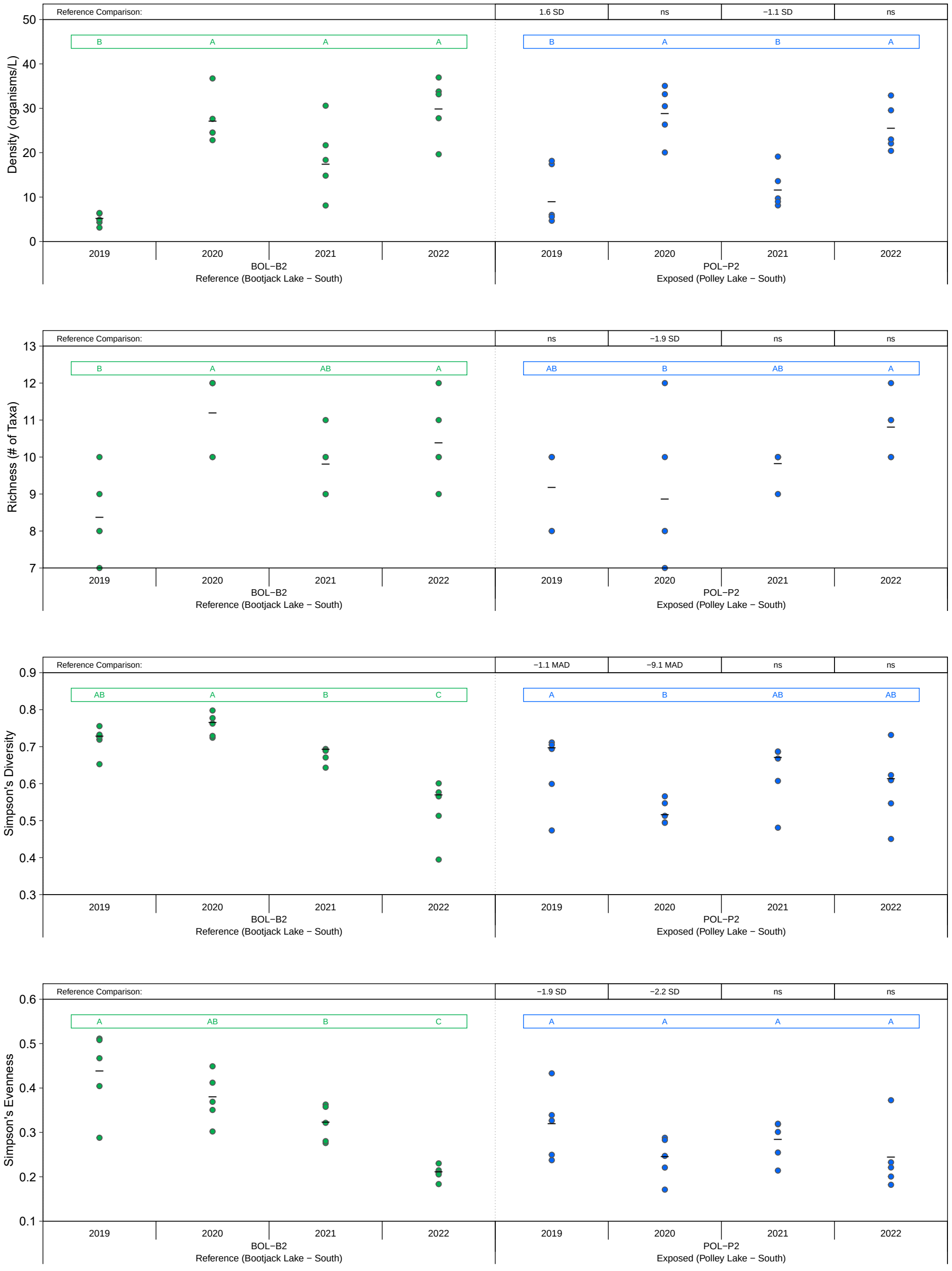


Figure 5.6: Zooplankton Community Endpoints for Polley Lake (POL−P2; Exposed) and Bootjack Lake (BOL−B2; Reference) Areas in July, 2019 to 2022

Notes: Black bars represent measures of central tendency (mean, geometric mean, or median depending on if analysis was conducted on untransformed, $\log_{10}$− transformed or rank−transformed data). Coloured letters represent significant (p−value <0.1) post−hoc comparisons within areas over time; years that share a letter of the same colour (e.g., A, B) within a box of the same colour do not differ significantly within an area. A number above the plot indicates significant exposed vs. reference post−hoc comparisons within a given year. The magnitude of difference (MOD) for these significant post−hoc comparisons are expressed in units of standard deviation (SD) or median absolute deviations (MAD; if the data were rank−transformed prior to analysis) relative to reference. 'nc' indicates no comparisons were possible; 'ns' indicates a non−significant contrast; 'nm' indicates that the MOD could not be calculated because MAD = 0. For plots of zooplankton results prior to 2019, see Minnow 2019a, 2020a, 2021a. For unreplicated zooplankton results collected in June and August 2022, see Appendix Table C.3.3.

Table 5.4: Results of Statistical Comparisons of Zooplankton Community Endpoints for Polley Lake (POL-P2; Exposed) and Bootjack Lake (BOL-B2; Reference) Areas in July, 2019 to 2022

Endpoint	Transformation	2-Way ANOVA p-values			Area Type	Area	Year	Mean	MCT[a]	Temporal Contrasts Within Sites								Spatial Comparison Within Years[b]
										Pairwise Comparisons Between Years				MOD Relative to Baseline[b]				
		Area	Year	Area x Year						2019	2020	2021	2022	2019	2020	2021	2022	POL-P2
Density (organisms/L)	log10	-	-	0.032	Reference	BOL-B2	2019	5.01	4.80	B	A	A	A	Baseline	4.7	3.4	4.9	1.6
							2020	27.2	27.0									ns
							2021	18.7	17.0									-1.1
							2022	30.3	30.0									ns
					Exposed	POL-P2	2019	10.4	8.70	B	A	B	A	Baseline	3.2	ns	2.9	
							2020	29.0	28.0									
							2021	11.9	11.0									
							2022	25.6	25.0									
Richness (# of Taxa)	log10	-	-	0.025	Reference	BOL-B2	2019	8.40	8.30	B	A	AB	A	Baseline	2.4	ns	1.8	ns
							2020	11.2	11.0									-1.9
							2021	9.80	9.80									ns
							2022	10.4	10.0									ns
					Exposed	POL-P2	2019	9.20	9.10	AB	B	AB	A	Baseline	ns	ns	ns	
							2020	9.00	8.80									
							2021	9.80	9.80									
							2022	10.8	11.0									
Simpson's Diversity	rank	-	-	<0.001	Reference	BOL-B2	2019	0.717	0.730	AB	A	B	C	Baseline	ns	ns	-5.8	-1.1
							2020	0.758	0.760									-9.1
							2021	0.677	0.690									ns
							2022	0.530	0.570									ns
					Exposed	POL-P2	2019	0.637	0.690	A	B	AB	AB	Baseline	-6.6	ns	ns	
							2020	0.523	0.510									
							2021	0.626	0.670									
							2022	0.592	0.610									
Simpson's Evenness	none	-	-	0.016	Reference	BOL-B2	2019	0.436	0.440	A	AB	B	C	Baseline	ns	-1.9	-3.7	-1.9
							2020	0.377	0.380									-2.2
							2021	0.320	0.320									ns
							2022	0.208	0.210									ns
					Exposed	POL-P2	2019	0.317	0.320	A	A	A	A	Baseline	ns	ns	ns	
							2020	0.242	0.510									
							2021	0.282	0.280									
							2022	0.242	0.240									
Dry Weight Biomass (mg/L)	log10	-	-	0.004	Reference	BOL-B2	2019	0.00544	0.00520	B	A	B	A	Baseline	3.5	ns	4.2	3.4
							2020	0.0163	0.0160									1.1
							2021	0.00631	0.00610									ns
							2022	0.0204	0.0200									ns
					Exposed	POL-P2	2019	0.0176	0.0150	A	A	B	A	Baseline	ns	-2.2	ns	
							2020	0.0229	0.0230									
							2021	0.00762	0.00760									
							2022	0.0210	0.0200									

Magnitude of Difference (MOD) < -2.

Magnitude of Difference (MOD) > 2.

Notes: "-" = no data available, nc = no comparison, ns = no significance, nm = contrast Magnitudes of Difference (MODs) could not be calculated because the Median Absolute Deviation (MAD) = 0, organisms/L = organisms per litre. mg/L = milligrams per litre.

[a] MCT = Measures of Central Tendency. Mean, geometric mean, or median depending on if analysis was conducted on untransformed, log $_{10}$-transformed, or rank-transformed data.

[b] Magnitude of difference (MOD) calculated for two-way ANOVA as (Exposed Mean - Reference Mean)/SD (or [Mean - Baseline Mean]/SD for temporal comparisons) on the transformed scale, where SD was the pooled standard deviation of the model residuals. MOD calculated for Kruskal-Wallis (i.e., rank-transformed data) as (Exposed Median - Reference Median)/MAD, where MAD was the pooled median absolute deviation.

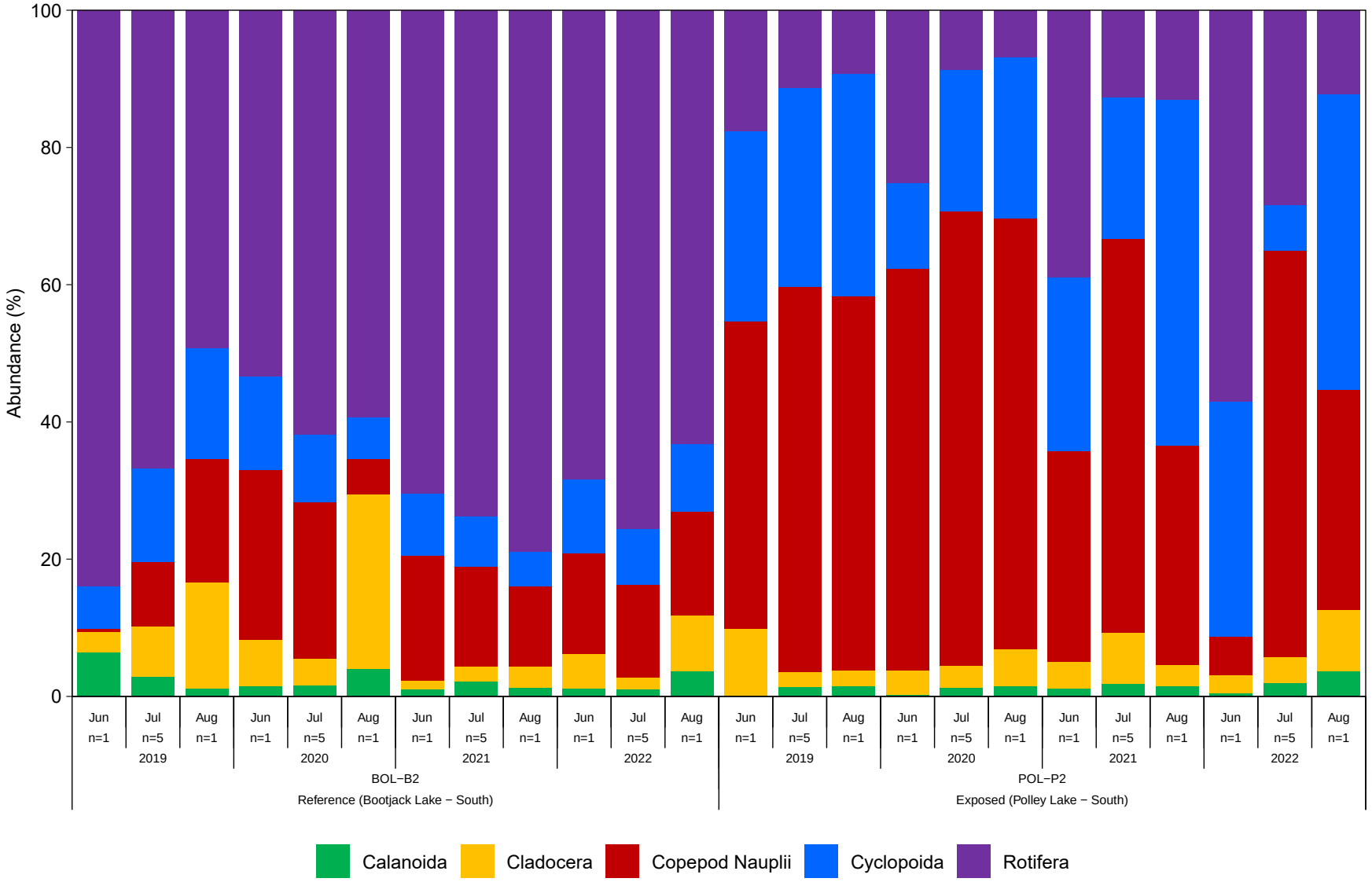


Figure 5.7: Relative Mean Densities of Major Zooplankton Community Taxonomic Groups for Polley Lake (POL−P2; Exposed) and Bootjack Lake (BOL−B2; Reference) Areas, 2019 to 2022

Notes: Results displayed for POL-P2 (August 2019) in the current figure differ from those presented in previous reports (Minnow 2020a, 2021a, 2022a) for the same sampling area and date. This discrepany is due to an incorrect calculation for these results in the prior reporting years.

previous years (2019 to 2021) reflected a change from results that were greater than reference in 2019 to 2021 to results in 2022 that were similar to reference conditions (Appendix Figure E.2.5, Appendix Table E.2.2).

Densities of major taxonomic groups generally followed the same pattern of spatial and temporal differences described above for the relative densities of major taxonomic groups, with the following exceptions. In July 2022, densities of Calanoida and Cyclopoida at POL-P2 were similar to and lower, respectively, than at BOL-B2. Densities of Calanoida have also increased from 2019 to 2022 at POL-P2, while densities of Cladocera have been stable from 2020 to 2022 and densities of Cyclopoida have been stable from 2019 to 2022, except for an increase in 2020 (Appendix Figure E.2.5, Appendix Table E.2.2).

Overall, the zooplankton community of Polley Lake was similar to the reference area in terms of total density, taxon richness, and Simpson's Diversity and Evenness in July 2022. From 2019 to 2022, the zooplankton community of Polley Lake differed from the reference area in terms of significantly higher and lower density in 2019 and 2021, respectively, lower taxon richness in 2020, and lower Simpson's Diversity and Evenness in 2019 and 2020. Zooplankton community composition in Polley Lake has consistently (i.e., in most years from 2019 to 2022) been characterized by higher relative densities of Cyclopoida and Copepod Nauplii and lower relative densities of Rotifera compared to Bootjack Lake. The consistent differences in zooplankton community composition between Polley and Bootjack Lakes suggests that these differences are likely driven by natural variability in environmental parameters (e.g., water temperature, nutrient availability, phytoplankton community, predation) in each of the two lakes.

5.1.3.2.2 Productivity

Zooplankton total biomass (dw) in 2022 in Polley Lake (POL-P2) and Bootjack Lake (BOL-B2) was highest in July and June, respectively, and lowest in August at both areas (Appendix Figure E.2.4, Appendix Table C.3.3). Mean total zooplankton biomass at POL-P2 was similar to that at BOL-B2 in July 2022 (Figure 5.8, Table 5.4; Appendix Table C.3.4). This was consistent with the similarity in zooplankton total biomass between POL-P2 and BOL-B2 in 2021 and similar changes in zooplankton biomass over time in both lakes, including a significant decrease in biomass at both POL-P2 and BOL-B2 in 2021 (relative to 2020) and a significant increase in biomass between 2021 and 2022. Zooplankton total biomass at POL-P2 was significantly higher than at BOL-B2 in 2019 and 2020 (Figure 5.8, Table 5.4; Appendix Table C.3.4). The consistently similar or significantly higher total biomass of zooplankton in Polley Lake compared to the reference area (Bootjack Lake) is indicative of a healthy lentic system, providing critical habitat for fish (Jeppesen et al. 2011).

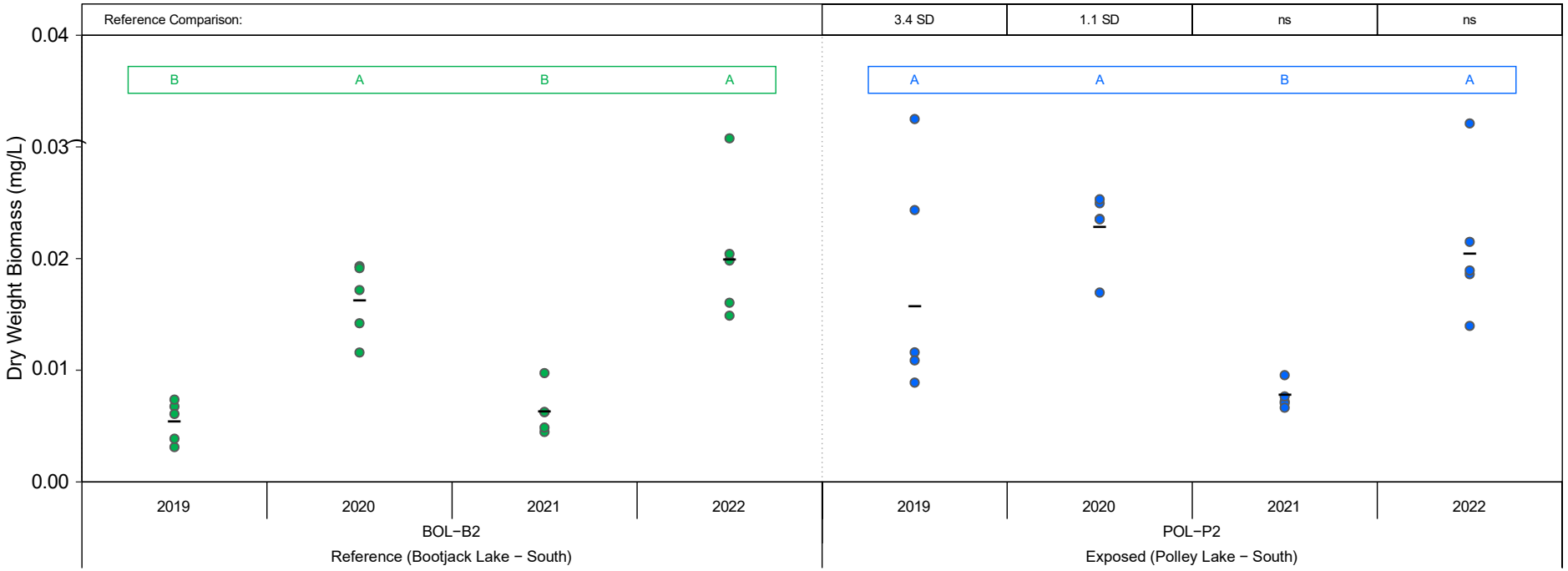


Figure 5.8: Zooplankton Biomass (Total Dry Weight) for Polley Lake (POL−P2; Exposed) and Bootjack L ake (BOL−B2; Reference) Areas in July, 2019 to 2022

Notes: Black bars represent measures of central tendency (mean, geometric mean, o r median depending o n if analysis was conducted o n untransformed, log_{10}-transformed or rank−transformed data). Coloured letters represent significant (p−value <0.1) post−hoc comparisons within areas over time; years that share a letter of the same colour (e.g., A, B) within a box o f the same colour d o not differ significantly within a n area. A number above the plot indicates significant exposed vs. reference post −hoc comparisons within a given year. The magnitude o f difference (MOD) for these significant post−hoc comparisons are expressed in units of standard deviation (SD) or median absolute deviations (MAD; if the data were rank−transformed prior to analysis) relative to reference. 'nc' indicates no comparisons were possible; 'ns' indicates a non −significant contrast; 'nm' indicates that the MOD could not be calculated because MAD = 0. For plots of zooplankton results prior to 2019, see Minnow 2019a, 2020a, 2021a. For unreplicated zooplankton results collected i n June and August 2022, see Appendix Table C.3.3.

5.1.4 Zooplankton Tissue Quality

Zooplankton tissue quality monitoring in 2022 was completed three times (June, July, and August) in Polley Lake (POL-P2) and at a corresponding reference area in Bootjack Lake (BOL-B2; Figure 3.3, Table 3.6). Replicated results from July (n=5) were used for statistical comparisons (see Section 3.4.3). A review of the 2022 zooplankton tissue data quality (Appendix B) indicated that the data largely met the established DQOs. Specifically, the data were characterized by appropriate detectability, with LRLs for selenium remaining below the BC interim guidelines (4 mg/kg dw; Appendix B). Laboratory accuracy and field sampling precision were excellent, with fewer than 20% of analytes from each duplicate set exceeding the DQO of 30% RPD. Several analytes of interest exceeded the DQO for RPD in one or more laboratory sets, but not in all of them. This variability suggests some natural heterogeneity. Laboratory precision could not be properly assessed, since data review was limited to one analyte in a single laboratory duplicate sample. A combination of insufficient sample volume, high moisture content in samples, and laboratory protocols (sample dilution, sample weight used for analysis, etc.) prevented the analysis of additional laboratory duplicate samples. The intentional collection of greater sample volume in future monitoring efforts will allow for a more thorough assessment of laboratory precision. Overall, the 2022 zooplankton tissue quality data can be used with a high level of confidence for interpretation, although the occurrence of some natural heterogeneity in analyte results were considered during data interpretation. A review of 2022 supporting water data quality indicated these data can be used with a good level of confidence for interpretation (see Section 5.1.1 for details).

As indicated in Section 3.4.3, data interpretation was focused on primary and secondary analytes (Table 2.4) with a significantly positive exposed-reference difference (i.e., analytes with exposed concentrations significantly higher than reference) in 2022 (if the analysis *Area*×*Year* interaction was significant) or in all monitoring years (if the *Area*×*Year* interaction was not significant[46]). The secondary analyte sodium was the only primary or secondary analyte with concentrations in zooplankton tissue that were higher in Polley Lake than Bootjack Lake in 2022 or in all monitoring years. Sodium concentrations did not exhibit a significant *Area*×*Year* interaction (Figure 5.9; Appendix Table E.3.1), indicating temporal stability in the ratio of exposed:reference concentrations (i.e., the geometric mean concentration at the exposed area was trending the same as at the reference area). Therefore, sodium concentrations were significantly higher in zooplankton tissue from Polley Lake than Bootjack Lake from July 2019

[46] If no significant change was detected in the exposed-reference difference among years (i.e., the *Area* x *Year* interaction was not significant), then data from 2019 to 2022 were combined for the analyses.

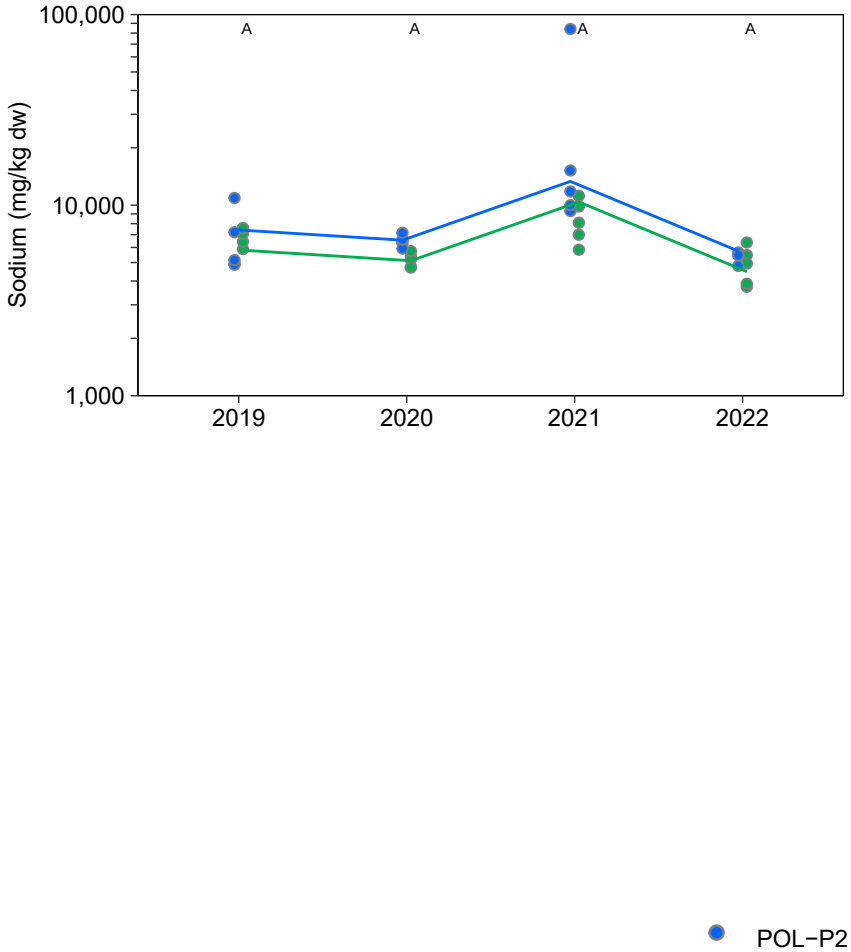


Figure 5.9: Zooplankton Tissue Primary and Secondary Analyte Concentrations with a Significant Positive Exposed - Reference Difference for Polley Lake (POL-P2; Exposed) and Bootjack Lake (BOL-B2; Reference) Areas in July, 2019 to 2022

Notes: dw = dry weight. Plots are only included for primary or secondary analytes with a significant postive exposed - reference difference in 2022 or in all monitoring years. Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed : Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed : Reference). Only years with samples from both reference and exposed areas are plotted.

to 2022 (MOD = 28%; Table 5.5; Appendix Table E.3.1) but remained within the range of tissue sodium concentrations since the initiation of monitoring in 2015 (Appendix Figure C.4.1).

The remaining primary and secondary analytes had concentrations that were either similar to or significantly lower than reference in 2022 (if the *Area×Year* interaction was significant) or in all monitoring years (if the *Area×Year* interaction was not significant; Appendix Figure E.3.1, Appendix Table E.3.1). In addition, concentrations of two primary (arsenic and copper) and three secondary analytes (manganese, mercury, molybdenum) in zooplankton tissue from Polley Lake were significantly lower in 2022 compared to the baseline year (2019), relative to reference (Appendix Table E.3.1). Selenium concentrations were lower in 2022 compared to 2020 and 2021 (but not 2019), relative to reference, and decreased to concentrations in 2022 that were similar to reference (Appendix Table E.3.1). In previous monitoring years, cadmium, selenium, tin, and zinc concentrations were significantly higher than reference in 2020 and 2021 (as well as in 2019 for selenium), while concentrations of calcium, copper, molybdenum, phosphorous, and strontium were significantly higher than reference either 2020 or 2021, but not both (Appendix Table E.3.1). The concentrations of these analytes that were significantly higher in Polley Lake zooplankton tissue than reference in previous years (2020 and/or 2021) did not continue to significantly exceed reference concentrations in 2022, except for sodium (Table 5.5; Appendix Table E.3.1). Despite these temporal fluctuations in 2020 and 2021, analyte concentrations in 2022 were similar to 2019 (baseline year) for all primary and secondary analytes, except those noted above which decreased in 2022 relative to baseline (arsenic, copper, manganese, mercury, molybdenum; Appendix Table E.3.1). Except for copper, this is supported by temporal trends in surface water quality which showed similarly stable or decreasing concentrations for all aqueous primary and secondary analytes except copper and vanadium, as outlined below.

Temporal evaluation of post-breach (2015 to 2022) surface water quality trends in Polley Lake indicated that, except for total and dissolved copper and vanadium, the surface aqueous concentrations (total and dissolved) of primary and secondary analytes in Polley Lake either decreased significantly or did not change significantly over time (Appendix Figures C.1.2 to C.1.4, C.4.1, Appendix Table E.3.2). Concentrations of both aqueous dissolved and total copper and vanadium concentrations increased significantly in the surface waters of both the north and south basins of Polley Lake (POL-P1 and POL-P2) between 2015 and 2022 (Appendix Figures C.1.2 to C.1.4, Appendix Table E.3.2). A BCWQG does not exist for vanadium (Appendix Table C.1.1), and comparison of dissolved copper to the BCWQG is discussed below. Aqueous total selenium concentrations at POL-P2 were less than half the BCWQG for total selenium from 2015 to 2022 (2 µg/L; BCMOECCS 2021b; Appendix Figure C.1.4). Aqueous total and dissolved concentrations of arsenic, manganese, molybdenum, and selenium decreased significantly in

Table 5.5: Summary of Statistical Contrasts of Exposed - Reference Relative Differences for Zooplankton Tissue Primary and Secondary Analyte Concentrations for Polley Lake (POL-P2; Exposed) and Bootjack Lake (BOL-B2; Reference) Areas in July, 2019 to 2022

Analyte	Magnitude of Difference in (Exposed – Reference) Relative to Baseline Period (%)[a]				Magnitude of Difference for Polley Mean Relative to Bootjack (%)[b]			
	Post-Breach Period				Post-Breach Period			
	2019	2020	2021	2022	2019	2020	2021	2022
Sodium	baseline	ns	ns	ns	28			

Contrast is significant (α = 0.05) and magnitude of difference is positive.

Contrast is significant (α = 0.05) and magnitude of difference is negative.

Notes: ns = not significant, baseline= first year of data included in analysis, ANOVA = two way analysis of variance. Data were analysed in units of mg/kg dry weight. Merged cells across years indicate that the Area × Time term was not significant, therefore MOD is for all years combined. Only years with samples from both reference and exposed were included in the analysis.

[a] Magnitude of difference (MOD) calculated on backtransformed least-squares means for the observed time period as $(Exp_{observed} - Exp_{predicted}) / (Exp_{predicted}) \times 100\%$ where $Exp_{predicted} = Ref_{observed} + (Exp_{baseline} - Ref_{baseline})$.

[b] Magnitude of difference (MOD) calculated on backtransformed least-squares means as (Exp-Ref)/Ref x 100%.

Polley Lake surface waters from 2015 to 2022 (Appendix Table E.3.2). This corroborates the decrease in zooplankton tissue concentrations of these analytes between 2019 and 2022 for arsenic, manganese, molybdenum, and from 2020/2021 to 2022 for selenium (Appendix Tables E.3.1, E.3.2).

To evaluate the potential impact of copper concentrations on aquatic life in Polley Lake, dissolved concentrations were compared to the relevant BLM-based BCWQG to calculate GEFs for dissolved copper (refer to Section 3.8.3.3 for details). The copper GEFs in surface water increased significantly from 2015 to 2022 at both the north and south basins of Polley Lake (Appendix Figure C.1.3, Appendix Table E.3.2). Though a significant increase has been observed since 2015, the GEFs observed for Polley Lake in 2022 were typically within the range of previous years and results largely remained within the range of copper GEFs reported for the reference (Bootjack Lake), which suggests there is little risk to aquatic life in the near term (Appendix Figure C.1.3). As outlined above, copper concentrations in zooplankton tissue from Polley Lake were lower in 2022 than in 2019 (when replicated sampling was initiated), relative to reference (Appendix Table E.3.1), indicating a decrease risk to aquatic life. A BCWQG for vanadium does not exist (BCMOECCS 2021a,b), therefore aqueous concentrations of this analyte could not be contrasted to guideline values but zooplankton tissue concentrations of vanadium in Polley Lake did not differ significantly from reference (Bootjack Lake; Appendix Table E.3.1).

Selenium concentrations in zooplankton tissue results from both Polley Lake and Bootjack Lake in 2022 were below the BC interim guideline for selenium of 4 mg/kg dw and were within the range of results reported since 2015 (BCMOECCS 2021b; Appendix Figure C.4.1, Appendix Table C.4.1). Tissue concentrations of selenium in 2022 from Polley and Bootjack lakes ranged from 2.14 to 3.34 mg/kg dw (Appendix Table C.4.1). In prior years, individual zooplankton tissue results from both exposed and reference areas have exceeded the BC guideline, though mean concentrations have remained below the guideline since 2019 (when replicated sampling was initiated), except in 2021 for Polley Lake[47] (Appendix Figure C.4.1). The variability among years in zooplankton tissue selenium concentrations may be due to environmental factors such as differences in feeding/uptake rates or species composition of the zooplankton tissue samples, which is supported by the absence of a significant temporal trend for selenium in water quality results (Appendix Table E.3.2).

[47] In 2021, one zooplankton replicate from Polley Lake had a selenium concentration of 35.2 mg/L; approximately 6 times higher than the median concentration of 5.54 mg/kg dw (see Minnow 2022a).

5.1.5 Fish Usage and Population Health

Fish usage and population health were evaluated for rainbow trout, longnose sucker, and redside shiner at Polley Lake in 2022, with Bootjack Lake serving as a reference (Figures 3.4 and 3.5), consistent with previous monitoring (see Section 3.7 for details).

5.1.5.1 Community and Catch

Spring fishing in 2022 in Polley and Bootjack lakes was undertaken after ice-out when lake water temperatures were approximately 5 °C. Similar to previous years, rainbow trout and longnose sucker were caught in both Polley and Bootjack lakes whereas redside shiner were caught in Polley Lake only (Table 5.6; Appendix Table C.6.1). Two largescale sucker (*Catostomus macrocheilus*) were also caught in Bootjack Lake in spring 2022. Largescale sucker have previously been caught in low numbers in Bootjack Lake (in 2019 and 2021) but have never been caught in Polley Lake.

The CPUE for Polley Lake rainbow trout in spring was higher in 2022 than all previous years since 2016 (2.0- to 5.0-fold) and was similar to CPUE in Bootjack Lake (Table 5.6). Spring fish collections each year have targeted rainbow trout spawners aggregating near the mouth of Hazeltine Creek and Bootjack Creek (Figure 3.4). From 2019 to 2021, temporal changes in CPUE indicated progressively fewer rainbow trout aggregated for spawning (Table 5.6) which is consistent with the observation that most spawners present in 2018 would have reached the end of their life expectancy in 2021, with low replacement by recruits from 2014 to 2017 when Hazeltine was inaccessible to spawning rainbow trout (see Section 3.6 for details). Natural mortality of older age classes and decreasing number of spawners observed in Hazeltine Creek during spawning surveys since 2018 resulted in fewer recruits being added to the population in each year (Minnow 2023). However, because rainbow trout generally begin spawning between age three and five (Scott and Crossman 1998), it was anticipated that some portion of the 2018 cohort would reach sexual maturity by 2021 and that most would be sexually mature by 2022, which is consistent with the result for spring CPUE.

Since 2016, the CPUE for longnose sucker in spring has varied in Polley Lake but declined from 2020 to 2022 to the lowest CPUE among monitoring years except 2019 (Table 5.6). As described above, spring sampling targets specific locations where fish have been known to aggregate prior to spawning, therefore differences in CPUE over time may be due in part to the non-random sampling design implemented during this period (Appendix Table C.6.1). Moreover, longnose sucker CPUE was slightly higher in Polley Lake than Bootjack Lake in spring 2022. The CPUE for redside shiner in spring has also varied over time and is likely due to non-random sampling in spring (Table 5.6; Appendix Table C.6.1).

Table 5.6: Catch-Per-Unit-Effort Results for Hoopnetting Collections in a) Spring and b) Fall for Polley Lake (POL; Exposed) and Bootjack Lake (BOL; Reference), 2016 to 2022

a)

Species		Spring												
		2016	2017		2018		2019		2020		2021		2022	
		Polley Lake	Bootjack Lake	Polley Lake	Bootjack Lake	Polley Lake	Bootjack Lake	Polley Lake	Bootjack Lake	Polley Lake	Bootjack Lake	Polley Lake	Bootjack Lake	Polley Lake
Effort (days)		33.5	4.85	0.870	3.38	5.37	7.46	3.71	14.0	8.98	10.4	23.1	11.9	11.0
Rainbow Trout	Catch	1,737	289	8	76	22	201	35	322	72	319	87	224	207
	CPUE[a]	51.9	59.6	9.22	22.5	4.10	26.9	9.45	23.1	8.02	30.7	3.76	18.8	18.8
Longnose Sucker	Catch	2,422	25	247	25	227	242	37	1,228	901	583	892	339	329
	CPUE[a]	72.4	5.15	284	7.39	42.3	32.4	10.0	88.0	100.4	56.2	38.6	28.5	29.9
Redside Shiner	Catch	1,179	0	0	0	155	0	29	0	15	0	103	0	27
	CPUE[a]	35.3	0	0	0	28.9	0	7.83	0	1.67	0	4.46	0	2.46

b)

Species		Fall					
		Polley Lake					
		2016	2018	2019	2020	2021	2022
Effort (days)		108	22.2	33.0	32.0	32.4	32.0
Rainbow Trout	Catch	497	63	329	291	383	213
	CPUE[a]	4.58	2.84	10.0	9.1	11.8	6.7
Longnose Sucker	Catch	3,288	627	623	429	451	200
	CPUE[a]	30.3	28.2	18.9	13.5	13.9	6.3
Redside Shiner	Catch	8,288	267	787	2,497	923	463
	CPUE[a]	76.3	12.0	23.9	78.3	28.5	14.5

[a] CPUE - Catch-per-unit-effort (# fish / trap / day).

Fish collections in the fall in Polley Lake followed a randomized design using a standardized level of effort (see Section 3.6.3). The randomized sampling methods used in the fall (which reflect the CPUE of the whole fish population) differ from the methods used in spring that specifically target aggregating spawners (and which largely reflect the CPUE of the spawning population).

Fall rainbow trout CPUE initially decreased from 2016 to 2018, likely reflecting the lower recruitment of YOY (as previously discussed). However, CPUE was higher in 2019 (2-fold greater than 2016); many rainbow trout captured in Polley Lake in 2019 were likely age-2 or younger based on length (Minnow 2020a) suggesting that the higher CPUE was due to successful recruitment after restoration of access to Hazeltine Creek spawning habitat in 2018. Rainbow trout CPUE in the fall was relatively consistent from 2019 to 2021 but was lower in 2022 while remaining higher in 2022 than in 2016 and 2018 (Table 5.6; Appendix Table C.6.2). Temporal comparisons of CPUE are subject to variability resulting from several factors that can affect the success of netting efforts, such as weather, water temperature, water level, and year-to-year variability in net placement and efficacy. This is true even when considering the fish collection methods employed in the fall in Polley Lake (2016 to 2022) that follow a randomized design using a standardized level of effort. Continued annual monitoring is planned in Polley Lake using the randomized design which will help to evaluate whether the lower CPUE observed in 2022 is part of a longer-term trend. Additionally, the assessment of rainbow trout size distribution results from 2016 to 2022 provides a more comparable means for temporally evaluating the population recovery in Polley Lake, with the distribution of rainbow trout in 2022 having a similar pattern to 2016 (see Section 5.1.5.2.2). Although the fall CPUE for rainbow trout was lower in 2022 than the previous three years, the number of adult rainbow trout observed during spawning surveys in Hazeltine Creek in the spring of 2022 was the highest since 2019 as most of the remaining individuals from the 2018 cohort reached maturity in 2022 (Minnow 2020b, 2021b, 2022b). Subsequently, the mean density of YOY in Hazeltine Creek from closed-station electrofishing in 2022 (62 to 119 fish/100 m^2) was also substantially higher than 2021 (2 to 12 fish /100 m^2) and 2020 (36 to 98 fish /100 m^2; Minnow 2023).

Similar to the rainbow trout CPUE, longnose sucker CPUE in Polley Lake was lower in fall 2022 than 2021 (2.1-fold) and has generally decreased over time since 2016 (approximately 5.0-fold difference in CPUE between 2016 and 2022; Table 5.6). As indicated above, temporal variability in CPUE can be the result of several factors that may influence the success of hoop netting efforts, some of which may have influenced, at least in part, the changes in longnose sucker observed from 2016 to 2022 (Table 5.6). As described above for rainbow trout, continued annual monitoring is planned in Polley Lake using the randomized design which will help to evaluate whether the lower CPUE observed in 2022 is part of a longer-term trend. The CPUE of redside shiner in fall

has varied since 2016 but decreased from 2020 to 2022. Redside shiner CPUE in 2022 was 1.7 to 5.4-fold lower than in 2019 to 2021 but was 1.2-fold higher than in 2018 (Table 5.6).

5.1.5.2 Fish Population Health

5.1.5.2.1 Spring

Spring condition (weight-at-length) of all rainbow trout in Polley Lake in 2022 was statistically similar to 2018 to 2021 but significantly lower than 2016 and 2017 although the difference relative to the baseline year (2016) was only 4.9%. When the analysis was constrained to the length range that overlapped among all seven years (greater than 23 cm fork length [FL]) condition in 2022 was signficantly lower than all years from 2016 to 2020 except 2019, but the difference relative to baseline was still less than 10% (Table 5.7; Appendix Figure E.5.1, Appendix Tables C.6.3, C.6.10, E.5.1, E.5.2). Analysis by sex showed that condition of females (constrained to individuals selected for lethal sampling; *n* = 8) in 2022 was similar to 2021 but significantly lower in 2016 to 2020, with a difference relative to the baseline year (2016) of 9.0% (Table 5.7; Appendix Figure E.5.1). Growth (weight-at-age) of lethally sampled female rainbow trout in 2022 (the only group with available age data) was similar to all prior years except 2020 (Table 5.7; Appendix Figure E.5.2, Appendix Table E.5.1). Condition of male rainbow trout was not assessed for spring of 2022 since sex was not identified for non-lethally sampled rainbow trout (and lethal sampling targeted female rainbow trout).[48]

For longnose sucker, whether assessed for all fish sampled or constrained by the subset of fish greater than 32 cm FL (i.e., greatest overlap among years), spring condition of longnose sucker from Polley Lake in 2022 was statistically similar to 2021 and significantly lower than all other years, although the MOD relative to baseline (2016) was less than 10% in both cases (Table 5.7; Appendix Figure E.5.3, Appendix Tables C.6.4, C.6.11, E.5.1). Examining only females (constrained to lethally sampled fish; *n* = 8), condition in 2022 was not significantly different from 2021, 2019, or baseline, but was significantly lower than other years; the outcome of the analysis was the same when constraining the data to fish greater than 32 cm FL (Table 5.7; Appendix Figure E.5.3). Growth (weight-at-age) of longnose sucker females in spring of 2022 was statistically similar to all years except 2018 (Table 5.7; Appendix Figure E.5.2, Appendix Table E.5.1). Examining only males (constrained to lethally sampled fish; *n* = 9), condition in 2022 was not significantly different from 2021, but was significantly lower than other years; when

[48] In previous years, the sex of male rainbow trout was confirmed during the lethal collection of tissue quality samples. Fish tissue quality sampling in Polley Lake (and reference) targets the collection of samples from females (see Section 3.7.1). Historically, some male rainbow trout were collected as incidental mortalities while targeting collection of tissue quality samples from female rainbow trout. In 2022, no males were collected as incidental mortalities during the tissue quality sampling process, therefore the sex of male rainbow trout could not be confirmed.

Table 5.7: Summary of Statistical Comparisons of Condition and Weight-at-Age of Rainbow Trout and Longnose Sucker for Polley Lake in Spring and Fall, 2014 to 2022

Season	Endpoint	Group	Rainbow Trout								Longnose Sucker							
			2014	2016	2017	2018	2019	2020	2021	2022	2014	2016	2017	2018	2019	2020	2021	2022
Spring	Energy Storage (Condition)	All	na	AB	A	BC	BC	ABC	ABC	C (-4.9)	na	B	A (+14)	AB	BC	B	CD (-4.5)	D (-9.1)
		All (FL filtered)[a]	na	A	A	A	AB	A	B (-5.5)	B (-6.8)	na	B	A (+15)	AB	B	B	BC	C (-5.8)
		Female	na	AB	A	AB	AB	A	BC	C (-9.0)	na	BC	A (+12)	AB	BC	AB	BC	C
		Female (FL filtered)[a]	na	na	na	na	na	na	na	na	na	BC	A (+14)	AB	BC	AB	BC	C
		Male	na	=	=	=	=	=	=	na	na	AB	na	na	A	AB	B	na
		Male (FL filtered)[b]	na	na	na	na	na	na	na	na	na	=	na	na	=	=	=	na
	Energy Use (Weight-at-age)	Female	na	AB	AB	AB	AB	A	AB	B	na	BC	ABC	A (+37)	AB	ABC	C	BC
Fall	Energy Storage (Condition)	All	A	CD (-11)	na	BC (-8.8)	A	B (-6.5)	B (-5.6)	D (-13)	B	BC	na	A (+8.5)	B	BC	BC	C (-5.3)
Fall	Energy Storage (Condition)	All (FL filtered)[c]	A	CD (-10)	na	BC (-8.5)	A	B (-6.6)	B (-5.6)	D (-13)	B	BC	na	A (+8.4)	B	BC	BC	C (-5.1)

Notes: Different letters signify that an endpoint is significantly different among years while the value in brackets indicates the magnitude of difference between the given year and the baseline year (baseline year is 2016 for spring and 2014 for fall data); "na" = not applicable or no sampling was conducted in the given year; "=" = no statistically significant difference in the endpoint across years; "-" = insufficient data available to conduct comparisons.

[a] Analysis conducted only on individuals with fork length greater than 23 cm for rainbow trout and 32 cm for longnose sucker.

[b] Analysis conducted only on individuals with fork length greater than 30 cm for longnose sucker.

[c] Analysis conducted only on individuals with fork length greater than 12 cm for rainbow trout and 11 cm for longnose sucker.

constraining the data to fish greater than 32 cm FL, condition was statistically similar across all years (Table 5.7; Appendix Figure E.5.3). Growth (weight-at-age) of longnose sucker males in spring of 2022 was not estimated due to data limitations (Table 5.7; Appendix Figure E.5.2, Appendix Table E.5.1).

5.1.5.2.2 Fall

The condition of rainbow trout from Polley Lake, whether including or excluding YOY fish (i.e., fork length less than 12 cm) was significantly lower in 2022 than all other monitoring years except 2016, including a 13% difference from baseline (2014), though condition was generally consistent from 2018 to 2021 (Table 5.7; Appendix Figure E.5.4, Appendix Table C.6.7, E.5.1). Interannual differences in fall condition during post-breach monitoring has frequently exceeded 7% (Table 5.7; Appendix Table E.5.1). Growth dynamics and weight-length relationships of fish species can be quite variable in the life stages that precede maturity. Given the average size (sub-mature) of rainbow trout in Polley Lake captured over the duration of post-breach monitoring efforts (for which condition is being reported), such variance is not unexpected.

Aging data was not available for rainbow trout in 2022 to assess weight-at-age. In years prior to 2019 aging was completed opportunistically via incidental mortalities that occurred during gill netting, but gill netting has not been conducted since 2018 (see Minnow 2022a for details). In the absence of recent age data, length frequency distributions and predicted length-at-age provide an indication of recruitment and survival over time. Comparison of length frequency distributions for rainbow trout caught from fall hoop netting from 2016 to 2022 show an encouraging trend for both recruitment and sustainability of the Polley Lake population, with significantly more smaller fish than in 2016 and a more even distribution of fish lengths in 2022 than in prior years (Appendix Figure E.5.5, Appendix Table E.5.3).

In 2016, the rainbow trout population in Polley Lake was dominated by age 3+ individuals (Figure 5.10), an artifact of low recruitment from 2014 to 2017 when spawning habitat in Hazeltine Creek was inaccessible. In 2018, the first year after access to Hazeltine Creek was restored, the population continued to be dominated by older fish (age-4+), however recruits from the 2018 cohort were also present. These recruits subsequently became the dominant year class in 2019 with the likely higher mortality of older fish, most of which had likely reached the end of their life expectancy (Figure 5.10). In 2020 and 2021, the population continued to shift towards a more balanced distribution among size classes with the survivorship of the 2018 and 2019 cohorts and further successful recruitment of individuals from the 2020 and 2021 cohorts. In 2022, the length frequency distribution resembled 2016 but with a lower frequency of age 3+ fish in lieu of greater strength of younger age classes. The lengt frequency distribution in 2022 had greater

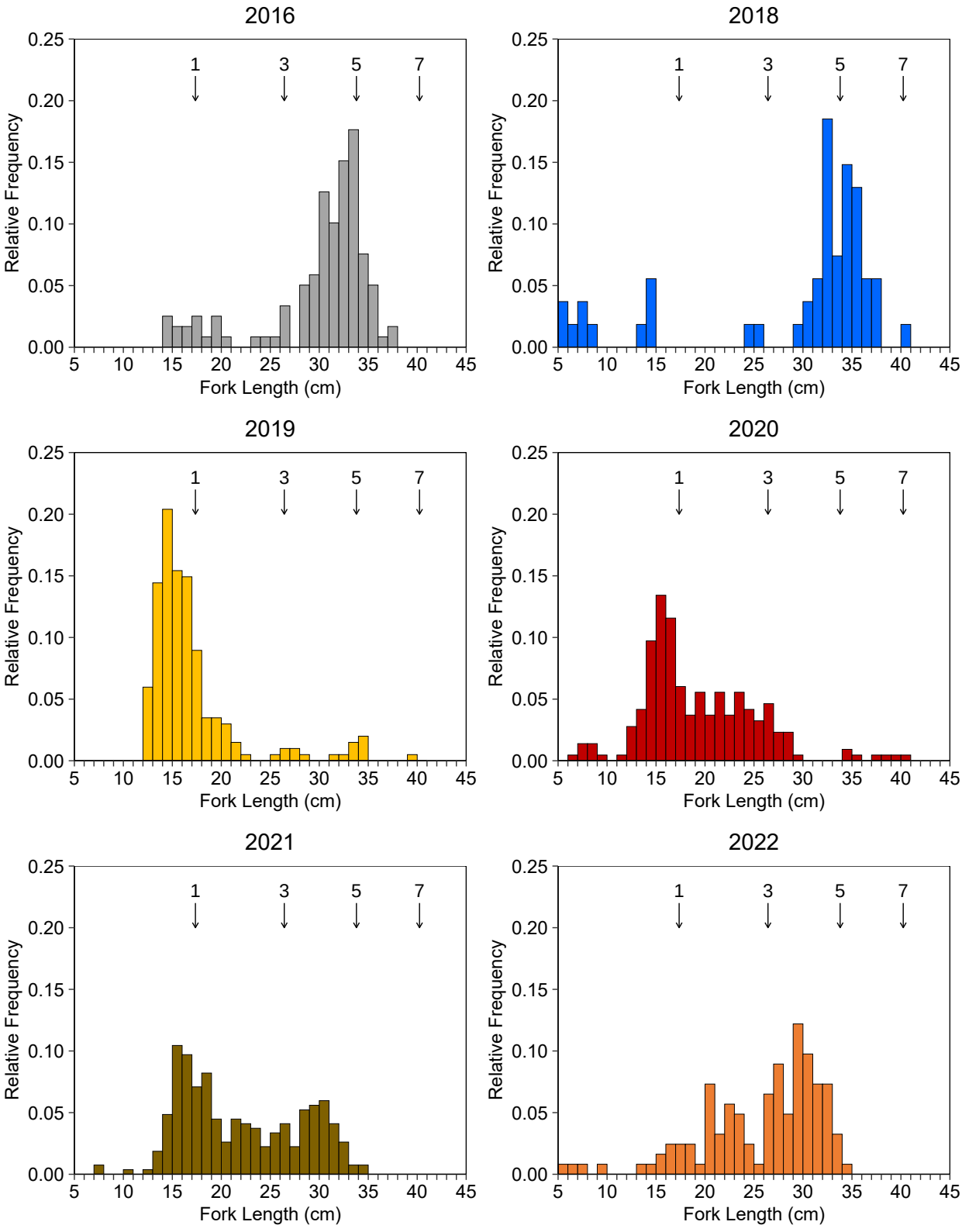


Figure 5.10: Rainbow Trout Length Frequency Distributions for Randomized Fall Hoopnetting in Polley Lake, 2016 to 2022

Notes: Numbers and arrows along the tops of figures represent predicted fork lengths at various ages from a linear model: $\log_{10}$(Fork Length) = 1.0569 + $\log_{10}$(Age+1)x0.6064, with R^2 = 0.79. The linear model to predict fork lengths at various ages uses fish collected in spring and fall, but the fork length frequency data presented for each year includes data from fall only.

resemblance to 2016 than the length frequency distributions from any of the other years (2018 to 2021; Figure 5.10), suggesting the population has returned to a pre-breach size class distribution. The relative frequency of age-1 rainbow trout decreased from 2019 to 2022 (Figure 5.10) as expected. It is likely that the mortality rate of rainbow trout spawners was higher from 2018 to 2022 (due to the cohort age) combined with low replacement of younger spawning recruits from 2014 to 2017 which resulted in progressively fewer spawners observed in Hazeltine Creek during each spawning survey since 2018 and subsequently, lower YOY densities observed in Hazeltine Creek (Minnow 2022b). However, as described above, the number of adults observed in Hazeltine Creek in spring of 2022 was the highest since 2019 as it would be expected that the individuals from the 2018 cohort would reach maturity in 2022 and subsequently, the YOY density in Hazeltine Creek was also higher than the previous two years (Minnow 2023).

Condition of longnose sucker in fall 2022, whether including or excluding YOY, was statistically similar to the previous two years of monitoring and 2016, but significantly lower than the remaining years (including baseline). However, the MOD of 2022 condition relative to 2014 (baseline) was low (less than 10%) in ecological terms, suggesting relative stability in the energy pathways supporting the longnose sucker population (Table 5.7; Appendix Figure E.5.4, Appendix Tables C.6.8, E.5.1). Similar to rainbow trout, comparison of length-frequency distributions showed that significantly more smaller fish were caught in 2022 compared to 2016, as was the case in 2018, 2020, and 2021 (Appendix Figure E.5.5, Appendix Table E.5.3). Length-frequency histograms for longnose sucker in Polley Lake from 2016 to 2022 showed that from 2016 through 2018, and to a lesser extent in 2019, catches were dominated by age-4 and age-5 fish (Figure 5.11). Moreover, 2016 and 2018 showed evidence of strong within year recruitment (high frequency of YOY and age-1; Figure 5.11). In 2020, catches shifted to a higher frequency of younger age classes (including the 2018 and 2019 cohorts, the first recruited age classes following restored access to Hazeltine Creek) and this pattern persisted in catches from 2021 and 2022 (Figure 5.11).

Redside shiner length-frequency distribution was also significantly different in 2022 compared to 2016, with more smaller fish caught in 2022 than in 2016, which was also the case each year from 2018 to 2021 (Appendix Figure E.5.5, Appendix Tables C.6.9 and E.5.3). Examination of cumulative relative frequency distributions also indicated that more smaller fish were caught in 2022 than all previous monitoring years (Appendix Figure E.5.6). The absence or near absence of small redside shiner in 2016 and 2018 and subsequent lower numbers of larger individuals in 2019 and 2020 is likely indicative of low recruitment in the years immediately following the breach. It is likely that the 2018 cohort that appears dominant in 2019 to 2021, and reached maturity in 2022, produced a strong YOY class that dominated catches in fall. Relative to 2016 and 2018

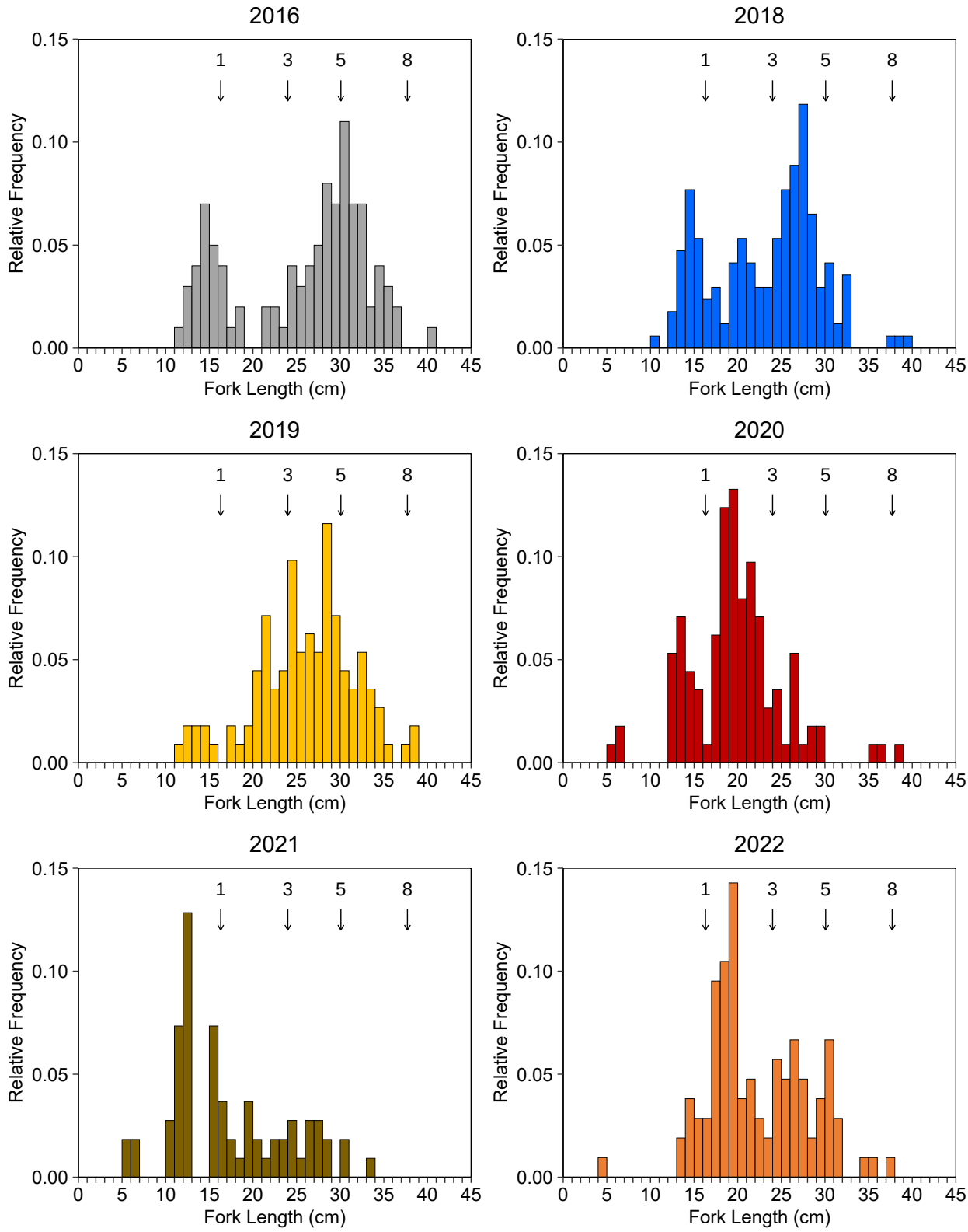


Figure 5.11: Longnose Sucker Length Frequency Distributions from Randomized Fall Hoop Netting in Polley Lake, 2016 to 2022

Notes: Numbers and arrows along the tops of figures represent predicted fork lengths at various ages from a linear model: $\log_{10}(\text{Fork Length}) = 1.0446 + \log_{10}(\text{Age}+1) \times 0.5573$, with $R^2 = 0.88$. The linear model to predict fork lengths at various ages uses fish collected in spring and fall, but the fork length frequency data presented for each year includes data from fall only.

when they were almost entirely absent from Polley Lake, over 50% of the catch in 2022 was comprised of younger fish (smaller than 7 cm; Appendix Figures E.5.5, E.5.6, Appendix Table C.6.9).

5.1.6 Fish Tissue Quality

Fish tissue quality was evaluated for rainbow trout and longnose sucker from Polley (exposed) and Bootjack (reference) lakes in 2022 (Figure 3.4, Table 3.4). A review of the 2022 fish tissue data quality (Appendix B) indicated that data collected in the spring (from Polley and Bootjack Lakes) and the fall (from Quesnel Lake and Quesnel River) had appropriate LRLs, good detectability and excellent laboratory accuracy. Field precision was moderate, with just under half of field duplicate sets having >20% of analyte comparisons above the DQO of 30%. Kidney samples had the most DQO exceedances while ovary and liver had the fewest. This suggests natural heterogeneity within the tissue samples and between tissue types (muscle, liver, kidney, and ovary); however, the level of replication employed (n = 8 per tissue type) serves to help capture this variability. Laboratory data precision was excellent, with most duplicate samples meeting DQOs. Overall, the 2022 fish tissue quality data can be used with a high level of confidence for interpretation, although the occurrence of some natural heterogeneity in analyte results were considered during data interpretation. Historic data used for comparisons are also considered high quality; however, it is considered likely that a subset of the selenium concentrations measured in fish tissues collected by MPMC in 2015 (rainbow trout ovary from exposed area Frypan Creek; included in the Polley Lake analysis) were subject to laboratory error or contamination (Minnow 2017e).

5.1.6.1 Comparison to Guidelines and Thresholds

Mean mercury concentrations in muscle from rainbow trout and longnose sucker were below the mercury guideline for human health (0.5 mg/kg ww) for both Polley and Bootjack lakes in 2022 (Table 5.8). This result was consistent with those for rainbow trout and longnose sucker captured from Polley and Bootjack lakes in 2015 to 2021 (Table 5.8). Moreover, mercury concentrations in individual samples were below the guideline for all fish captured in 2022 (Appendix Tables C.7.1 to C.7.4). In 2021, a single rainbow trout exceeded the guideline; however, individual mercury concentrations were below the guideline for all rainbow trout and longnose sucker captured from 2015 to 2020 (Table 5.8). For selenium, mean and individual tissue concentrations in muscle of rainbow trout and longnose sucker collected from both lakes were consistently below the human health guideline for moderate fish consumption (i.e., a consumption rate of 110 g per day), consistent with sampling completed between 2015 and 2021 (Table 5.8; Appendix Tables C.7.1 to C.7.4). In Polley Lake, the mean selenium concentration in rainbow trout muscle was also below the guideline for high consumption in 2022 but the guideline

Table 5.8: Fish Muscle Mercury and Selenium Concentrations from Polley Lake (Exposed) and Bootjack Lake (Reference) Relative to Human Health Consumption Guidelines, 2015 to 2022

Waterbody or Area	Species	Year/Season	Sample Size	Mercury (Hg) mg/kg ww		Selenium (Se) mg/kg dw		
				Health Canada Human Health		BCMOE Human Health		
				Guideline = 0.5 mg/kg ww		Moderate Consumption = 14.5 mg/kg dw		
						High Consumption = 7.3 mg/kg dw		
				Mean	Frequency > Guideline	Mean	Frequency > Moderate	Frequency > High
Bootjack Lake Tributary 10 (Reference)	Rainbow Trout	Spring 2015 (Minnow 2017g)	8	0.0801	0%	2.46	0%	0%
Polley Lake Tributary (Frypan Creek)	Rainbow Trout		8	0.0861	0%	4.92	0%	0%
Trio Lake (Reference)	Rainbow Trout	Fall 2015 (Minnow 2017g)	8	0.353	0%	0.709	0%	0%
Polley Lake	Rainbow Trout	Spring 2016 (Minnow 2017g)	17	0.0775	0%	5.83	0%	12%
	Longnose Sucker		16	0.0885	0%	7.44	0%	56%
Bootjack Lake (Reference)	Rainbow Trout	Spring 2017 (Minnow 2018e)	8	0.0787	0%	2.13	0%	0%
	Longnose Sucker		8	0.0817	0%	2.03	0%	0%
Polley Lake	Rainbow Trout		8	0.0798	0%	5.49	0%	0%
	Longnose Sucker		8	0.0735	0%	6.64	0%	25%
Bootjack Lake (Reference)	Rainbow Trout	Spring 2018 (Minnow 2019a)	8	0.0930	0%	2.20	0%	0%
	Longnose Sucker		8	0.0790	0%	2.40	0%	0%
Polley Lake	Rainbow Trout		8	0.0920	0%	5.60	0%	0%
	Longnose Sucker		8	0.0950	0%	7.36	0%	38%
Bootjack Lake (Reference)	Rainbow Trout	Spring 2019 (Minnow 2020a)	8	0.0873	0%	2.16	0%	0%
	Longnose Sucker		8	0.0942	0%	2.72	0%	0%
Polley Lake	Rainbow Trout		8	0.0677	0%	5.34	0%	0%
	Longnose Sucker		8	0.0599	0%	8.07	0%	100%
Bootjack Lake (Reference)	Rainbow Trout	Spring 2020 (Minnow 2021a)	8	0.0704	0%	2.42	0%	0%
	Longnose Sucker		8	0.103	0%	2.51	0%	0%
Polley Lake	Rainbow Trout		8	0.111	0%	5.41	0%	0%
	Longnose Sucker		8	0.0734	0%	8.10	0%	88%
Bootjack Lake (Reference)	Rainbow Trout	Spring 2021 (Minnow 2022a)	8	0.0916	0%	2.12	0%	0%
	Longnose Sucker		8	0.134	0%	2.10	0%	0%
Polley Lake	Rainbow Trout		8	0.274	13%	4.57	0%	0%
	Longnose Sucker		8	0.0714	0%	6.08	0%	13%
Bootjack Lake (Reference)	Rainbow Trout	Spring 2022	8	0.101	0%	2.31	0%	0%
	Longnose Sucker		8	0.122	0%	2.61	0%	0%
Polley Lake	Rainbow Trout		8	0.140	0%	4.52	0%	13%
	Longnose Sucker		8	0.0629	0%	7.84	0%	63%

Indicates mean mercury concentration greater than Health Canada's Human Health guideline for muscle tissue in fish (0.5 mg/kg dw; CFIA 2015).

Indicates mean selenium concentration greater than the BCMOE Human Health guideline for moderate fish consumption (14.5 mg/kg dw; BCMOE 2014).

Indicates mean selenium concentration greater than the BCMOE Human Health guideline for high fish consumption (7.3 mg/kg dw; BCMOE 2014).

Notes: mg/kg ww = milligrams per kilogram wet weight; mg/kg dw = milligrams per kilogram dry weight; BCMOE = British Columbia Ministry of Environment; > = greater than; % = percent.

was exceeded in a single individual (7.41 mg/kg dw; Appendix Table C.7.1). The mean selenium concentration in muscle tissue of longnose sucker from Polley Lake marginally exceeded the high consumption guideline in 2022 (mean = 7.84 mg/kg dw; Appendix Table C.7.3) with 63% of the samples exceeding the guideline, consistent with rates in Polley Lake from 2016 to 2021 (25 to 100%; Table 5.8). However, the likelihood that longnose sucker would be consumed at a high rate (i.e., subsistence consumers) is low.

Mean selenium concentrations in muscle of rainbow trout and longnose sucker from Polley Lake in 2022 were higher than the guideline for the protection of aquatic life (4 mg/kg dw; Table 5.9). The guideline was exceeded in 50% of rainbow trout and all longnose sucker muscle tissue samples, consistent with rates in Polley Lake from 2015 to 2021 (63% to 100% of fish sampled each year). Selenium concentrations remained below the guideline in all fish muscle tissue samples from Bootjack Lake (Table 5.9; Appendix Tables C.7.1 to C.7.4). The mercury guideline for fish muscle tissue is specific to human health and a mercury guideline for the protection of aquatic life does not exist.

Embryo toxicity is the primary mechanism of selenium-associated effects to egg laying vertebrates, the most selenium-sensitive organisms, and ovary tissue is recommended for assessing the potential effects of selenium on fish (e.g., Luoma and Presser 2009, Janz et al. 2010, DeForest et al. 2012, Janz 2012). The mean concentration of selenium in ovary tissue of rainbow trout collected from Polley Lake in 2022 (8.27 mg/kg dw) was lower than the 11 mg/kg dw guideline for the protection of aquatic life[49]. The mean concentration in 2022 was also lower than those reported from 2016 to 2021, representing the lowest post-breach mean concentration recorded in Polley Lake for rainbow trout ovary tissue (BCMOE 2014; Table 5.10; Appendix Table C.7.1). Of the ovaries collected from Polley Lake in 2022, one rainbow trout sample had a concentration above the guideline for the protection of aquatic life, and only marginally so (11.1 mg/kg dw; Appendix Table C.7.1). Furthermore, the mean and individual ovary selenium concentrations of rainbow trout from Polley Lake in 2022 (8.27 mg/kg dw) and in previous years were well below the 20 mg/kg dw effect threshold developed by DeForest et al. (2012; Table 5.10). Selenium concentrations in ovaries of rainbow trout from Bootjack Lake (2015 to 2022) were consistently below the tissue-specific selenium guideline for the protection of aquatic life and the threshold for reproductive effects (DeForest et al. 2012; Table 5.10; Appendix Table C.7.2). From 2016 to 2022, mean selenium concentrations in ovaries of longnose sucker captured from Polley and Bootjack lakes were lower than the tissue-specific guideline for

[49] This guideline includes a two-fold uncertainty factor (BCMOE 2014).

Table 5.9: Fish Muscle Selenium Concentrations from Polley Lake (POL; Exposed) and Bootjack Lake (BOL; Reference) Relative to the British Columbia Guideline for the Protection of Aquatic Life, 2015 to 2022

Waterbody or Area	Species	Year/ Season	Sample Size	Selenium (Se) mg/kg dw	
				BCMOE Guideline (4 mg/kg dw)	
				Mean	Frequency > Guideline
Bootjack Lake Tributary 10 (Reference)	Rainbow Trout	Spring 2015 (Minnow 2017g)	8	2.46	0%
Polley Lake Tributary (Frypan Creek)	Rainbow Trout		8	4.92	63%
Trio Lake (Reference)	Rainbow Trout	Fall 2015 (Minnow 2017g)	8	0.709	0%
Polley Lake	Rainbow Trout	Spring 2016 (Minnow 2017g)	17	5.83	88%
	Longnose Sucker		16	7.44	100%
Bootjack Lake (Reference)	Rainbow Trout	Spring 2017 (Minnow 2018e)	8	2.13	0%
	Longnose Sucker		8	2.03	0%
Polley Lake	Rainbow Trout		8	5.49	100%
	Longnose Sucker		8	6.64	100%
Bootjack Lake (Reference)	Rainbow Trout	Spring 2018 (Minnow 2019a)	8	2.20	0%
	Longnose Sucker		8	2.40	0%
Polley Lake	Rainbow Trout		8	5.60	100%
	Longnose Sucker		8	7.40	100%
Bootjack Lake (Reference)	Rainbow Trout	Spring 2019 (Minnow 2020a)	8	2.16	0%
	Longnose Sucker		8	2.72	0%
Polley Lake	Rainbow Trout		8	5.34	100%
	Longnose Sucker		8	8.07	100%
Bootjack Lake (Reference)	Rainbow Trout	Spring 2020 (Minnow 2021a)	8	2.42	0%
	Longnose Sucker		8	2.51	0%
Polley Lake	Rainbow Trout		8	5.41	100%
	Longnose Sucker		8	8.10	100%
Bootjack Lake (Reference)	Rainbow Trout	Spring 2021 (Minnow 2022a)	8	2.12	0%
	Longnose Sucker		8	2.10	0%
Polley Lake	Rainbow Trout		8	4.57	75%
	Longnose Sucker		8	6.08	100%
Bootjack Lake (Reference)	Rainbow Trout	Spring 2022	8	2.31	0%
	Longnose Sucker		8	2.61	0%
Polley Lake	Rainbow Trout		8	4.52	50%
	Longnose Sucker		8	7.84	100%

Indicates mean selenium concentration greater than the BCMOE guideline for muscle tissue or whole body in fish (4 mg/kg dw; BCMOE 2014).

Notes: mg/kg dw = milligrams per kilogram dry weight; BCMOE = British Columbia Ministry of Environment; > = greater than; % = percent.

Table 5.10: Fish Ovary Selenium Concentrations from Polley Lake (Exposed) and Bootjack Lake (Reference) Relative to Guidelines and Thresholds, 2015 to 2022

Waterbody or Area	Species	Year/Season	Sample Size	Selenium (Se) mg/kg dw		
				Mean	Frequency > Guideline or Threshold	
					BCMOE Guideline (11 mg/kg dw)	DeForest et al. (2012) Threshold (20 mg/kg dw)
Bootjack Lake Tributary 10 (Reference)	Rainbow Trout	Spring 2015 (Minnow 2017g)	8	5.87	0%	0%
Polley Lake Tributary (Frypan Creek)	Rainbow Trout		8	40.0[a]	100%	88%
Polley Lake	Rainbow Trout	Spring 2016 (Minnow 2017g)	8	10.3	38%	0%
	Longnose Sucker		8	10.4	25%	0%
Bootjack Lake (Reference)	Rainbow Trout	Spring 2017 (Minnow 2018e)	8	4.52	0%	0%
	Longnose Sucker		8	8.65	0%	0%
Polley Lake	Rainbow Trout		8	11.1	25%	0%
	Longnose Sucker		8	3.56	0%	0%
Bootjack Lake (Reference)	Rainbow Trout	Spring 2018 (Minnow 2019a)	8	4.30	0%	0%
	Longnose Sucker		8	3.70	0%	0%
Polley Lake	Rainbow Trout		8	10.1	50%	0%
	Longnose Sucker		8	9.19	0%	0%
Bootjack Lake (Reference)	Rainbow Trout	Spring 2019 (Minnow 2020a)	8	4.11	0%	0%
	Longnose Sucker		8	3.80	0%	0%
Polley Lake	Rainbow Trout		8	11.5	75%	0%
	Longnose Sucker		8	9.36	13%	0%
Bootjack Lake (Reference)	Rainbow Trout	Spring 2020 (Minnow 2021a)	8	4.67	0%	0%
	Longnose Sucker		8	3.72	0%	0%
Polley Lake	Rainbow Trout		8	9.04	13%	0%
	Longnose Sucker		8	8.41	0%	0%
Bootjack Lake (Reference)	Rainbow Trout	Spring 2021 (Minnow 2022a)	8	4.28	0%	0%
	Longnose Sucker		8	3.84	0%	0%
Polley Lake	Rainbow Trout		8	9.50	25%	0%
	Longnose Sucker		8	7.78	0%	0%
Bootjack Lake (Reference)	Rainbow Trout	Spring 2022	8	4.88	0%	0%
	Longnose Sucker		8	4.63	0%	0%
Polley Lake	Rainbow Trout		8	8.27	13%	0%
	Longnose Sucker		8	8.69	0%	0%

Indicates mean selenium concentration greater than the BCMOE guideline for ovary tissue in fish (11 mg/kg dw; BCMOE 2014).

Indicates mean selenium concentration greater than DeForest et al (2012) threshold for ovary tissue in fish (20 mg/kg dw) and the BCMOE guideline.

Notes: mg/kg dw = milligrams per kilogram dry weight, > = greater than, BCMOE = British Columbia Ministry of Environment, % = percent.

[a] Data are considered suspect and are likely influenced by laboratory error or contamination (Golder 2016b; Minnow 2017g).

the protection of aquatic life, as well as the 20 mg/kg dw threshold for reproductive effects (DeForest et al. 2012, BCMOE 2014; Table 5.10; Appendix Tables C.7.3, C.7.4).

5.1.6.2 Spatial and Temporal Comparisons

Data collected from Polley and Bootjack lakes in baseline (1995; HKP 1996), pre-breach (2009; Minnow 2011), and post-breach monitoring studies (2015 to 2021; Table 3.9)[50] were compared spatially (exposed versus reference) and temporally (annual change; see Section 3.7.3.2). These comparisons included up to 36 elements[51], two species (rainbow trout and longnose sucker), and four tissues (muscle, liver, ovary, and kidney; Appendix Figures E.6.1 to E.6.8, Appendix Tables E.6.1 to E.6.8).

Age and morphological measures (fork length and body weight) of rainbow trout and longnose sucker captured from Polley and Bootjack lakes between 2015 and 2022 are summarized in Table 5.11 (see Appendix Tables C.6.10 to C.6.11 for detailed 2022 data). Statistical comparisons of these physical measures exhibited a significant *Area*×*Year* interaction for rainbow trout fork length and body weight (based on data from 1995 to 2022; Table 5.12; Appendix Table E.6.1).[52] Rainbow trout sampled from Polley Lake were similar in size and age to those sampled those from Bootjack Lake in 2022. This was also true in prior years except 2015, 2019, 2020 when rainbow trout from Polley Lake were significantly longer (8% to 17%) and heavier (27% to 46%) than those from the reference lake (Table 5.12; Appendix Table E.6.1). The greater size and weight of rainbow trout collected from Polley Lake in 2015, 2019, and 2020 relative to Bootjack Lake may be related to limited rainbow trout recruitment associated with Hazeltine Creek being inaccessible for spawning and rearing from 2014 to 2017 (see Section 3.6.1). Conversely, longnose sucker collected from Polley Lake were significantly younger (90% in all years) and lighter (30% in 2022) than longnose sucker from Bootjack Lake (Table 5.12; Appendix Table E.6.2). In previous monitoring years, longnose sucker from Polley Lake were younger, and either not significantly different in size or were shorter and/or lighter compared to those from Bootjack Lake, consistent with trends observed during baseline data collection for size and weight (i.e., 1995; Table 5.12; Appendix Table E.6.2).

[50] The reference area (Bootjack Lake) was not sampled in 2016; therefore, statistical comparisons were not completed for 2016 (i.e., concurrent exposed and reference data are required; see Section 3.7.3.2).

[51] Silver and titanium were added to fish tissue analyses in 2020.

[52] Results of the two-way ANOVA for age, fork length, and body size may differ among tissue types for the same species in the same area due to sub-sampling (i.e., the number of females sampled for ovary tissue may be a subset of the total samples) or differences in data availability across years for the different tissue types (e.g., rainbow trout kidney data were collected from 2018 to 2022 compared to 1995 to 2022 for rainbow trout muscle tissue). For all species sampled for tissue in 2022, discussion of age and body size is focused on results of two-way ANOVA for muscle and ovary tissues.

Table 5.11: Age and Body Size Data of Fish Collected for Tissue Quality Monitoring from Polley Lake (Exposed) and Bootjack Lake (Reference), 2015 to 2022

Waterbody or Area	Fish Species	Year/Season	Sample Size	Age (Years)		Fork Length (cm)		Body Weight (Grams)	
				Mean	Range	Mean	Range	Mean	Range
Bootjack Lake Tributary 10 (Reference)	Rainbow Trout	Spring 2015 (Minnow 2017g)	8	5.3	4 - 6	28.9	25.3 - 31.3	250	188 - 325
Polley Lake Tributary (Frypan Creek)			8	4.8	4 - 6	24.7	21.8 - 28.0	187	140 - 233
Trio Lake (Reference)	Rainbow Trout	Fall 2015 (Minnow 2017g)	8	4.6	3 - 6	26.3	17.0 - 34.2	197	105 - 280
Polley Lake	Rainbow Trout	Spring 2016 (Minnow 2017g)	18	4.6	3 - 7	31.5	23.6 - 35.7	335	152 - 455
	Longnose Sucker		16	6.3	2 - 12	33.4	24.5 - 42.0	498	145 - 980
Bootjack Lake (Reference)	Rainbow Trout	Spring 2017 (Minnow 2018e)	8	5.4	4 - 6	31.6	29.2 - 33.5	327	250 - 365
	Longnose Sucker		8	8.8	7 - 12	41.6	38.8 - 44.2	1,144	890 - 1,300
Polley Lake	Rainbow Trout		8	5.0	4 - 7	32.3	28.8 - 34.5	376	260 - 430
	Longnose Sucker		8	8.4	7 - 12	38.3	34.2 - 40.8	851	660 - 1,120
Bootjack Lake (Reference)	Rainbow Trout	Spring 2018 (Minnow 2019a)	9	5.1	4 - 7	31.7	29.4 - 33.7	338	278 - 445
	Longnose Sucker		8	6.9	4 - 9	42.1	39.9 - 43.9	1,116	990 - 1,280
Polley Lake	Rainbow Trout		8	4.5	4 - 5	32.8	31.0 - 34.4	335	250 - 420
	Longnose Sucker		8	8.0	4 - 11	40.9	34.1 - 44.2	989	505 - 1,240
Bootjack Lake (Reference)	Rainbow Trout	Spring 2019 (Minnow 2020a)	8	5.1	4 - 7	31.2	27.9 - 33.0	310	225 - 360
	Longnose Sucker		8	7.4	6 - 9	40.2	37.7 - 42.8	983	820 - 1,160
Polley Lake	Rainbow Trout		8	6.3	4 - 7	33.7	32.5 - 35.4	393	350 - 435
	Longnose Sucker		8	5.9	4 - 11	36.5	30.8 - 42.9	691	405 - 1,320
Bootjack Lake (Reference)	Rainbow Trout	Spring 2020 (Minnow 2021a)	8	4.5	4 - 7	31.7	26.5 - 34.5	335	234 - 360
	Longnose Sucker		8	8.5	7 - 10	41.9	39 - 46.7	1,035	810 - 1,440
Polley Lake	Rainbow Trout		8	6.0	4 - 7	35.8	31.5 - 38.3	498	315 - 694
	Longnose Sucker		8	9.0	5 - 12	39.9	32.7 - 44.4	920	425 - 1,260
Bootjack Lake (Reference)	Rainbow Trout	Spring 2021 (Minnow 2022a)	8	4.5	4 - 5	33	30.8 - 35.4	348	302 - 445
	Longnose Sucker		8	8.9	6 - 11	43.9	41.7 - 46.8	1,143	860 - 1,380
Polley Lake	Rainbow Trout		8	4.6	3 - 6	34	25.8 - 38.6	389	176 - 590
	Longnose Sucker		8	6.0	3 - 11	34.6	24.8 - 41.6	545	196 - 960
Bootjack Lake (Reference)	Rainbow Trout	Spring 2022	8	4.1	3 - 6	29.8	24.1 - 35.0	257	156 - 360
	Longnose Sucker		8	8.9	6 - 12	40.3	32.8 - 44.6	1,017	550 - 1,360
Polley Lake	Rainbow Trout		8	3.8	3 - 4	30.8	24.8 - 34.1	278	160 - 355
	Longnose Sucker		8	7.6	5 - 13	38.4	27.7 - 44	733	262 - 960

Table 5.12: Summary of Statistical Contrasts of Exposed - Reference Relative Differences of Fish Tissue Primary and Secondary Analyte Concentrations for Polley Lake (Exposed) and Bootjack Lake (Reference), 1995 to 2022[a]

Parameter		Tissue	Rainbow Trout: Two-way ANOVA																				Longnose Sucker: Two-way ANOVA													
			Magnitude of Difference in (Exposed - Reference) Relative to Baseline Period (%)										Magnitude of Difference for Polley Lake (Exposed) Mean Relative to Bootjack Lake (Reference) (%)										Magnitude of Difference in (Exposed - Reference) Relative to Baseline Period (%)								Magnitude of Difference for Polley Lake Mean Relative to Bootjack Lake (%)							
			Before Period	Uncontrolled Release Period	Post-Release Period	Post-Breach Period							Before Period	Uncontrolled Release Period	Post-Release Period	Post-Breach Period							Before Period	Post-Release Period	Post-Breach Period						Before Period	Post-Release Period	Post-Breach Period					
			1995	2009	2012	2015	2017	2018	2019	2020	2021	2022	1995	2009	2012	2015	2017	2018	2019	2020	2021	2022	1995	2012	2017	2018	2019	2020	2021	2022	1995	2012	2017	2018	2019	2020	2021	2022
Age		muscle	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	-	baseline	ns	ns	ns	ns	ns	ns	-	-90						
Fork Length		muscle	baseline	ns	ns	17	ns	ns	ns	ns	ns	ns	ns	ns	ns	17	ns	ns	8.0	12	ns	ns	baseline	ns	ns	ns	ns	ns	ns	ns	-13	ns	ns	ns	-9.6	ns	-22	ns
Body Weight		muscle	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	30	ns	ns	27	46	ns	ns	baseline	ns	ns	ns	ns	-41	ns	-30	ns	-26	ns	-33	ns	-59	-30
Primary Analytes	Arsenic	muscle	baseline	ns	-	ns	ns	ns	ns	ns	ns	ns	66		-	66							baseline	-	ns	ns	ns	ns	ns	70	-	231	ns	ns	ns	81	ns
		ovary	-	-	-	baseline	ns	ns	ns	ns	ns	ns	-	-	-	22							-	-	baseline	ns	-63	-57	-51	-50	-	-	113	ns	ns	ns	ns	ns
	(essential)	liver[b]	baseline	-	-	ns	-52	ns	-48	-53	ns	ns	116	-	-	70	ns	39	ns	ns	99	77	baseline	-	ns	ns	ns	ns	ns	ns	57	-	119	91	ns	50	ns	88
		kidney[b]	-	-	-	-	-	baseline	ns	ns	ns	ns	-	-	-	-	-	68					-	-	-	baseline	ns	ns	ns	ns	-	-	-	36				
	Copper	muscle	-	baseline	-	ns	ns	ns	ns	ns	ns	ns	-	ns	-	ns	ns	ns	ns	ns	ns	ns	-	-	baseline	ns	ns	ns	ns	53	-	-	ns	ns	ns	ns	45	62
		ovary	-	-	-	baseline	ns	ns	ns	ns	ns	ns	-	-	-	11							-	-	baseline	ns	ns	ns	ns	ns	-	-	ns	ns	ns	ns	ns	ns
	(essential)	liver[b]	-	-	-	baseline	ns	ns	ns	ns	ns	ns	-	-	-	45							-	-	baseline	ns	ns	ns	ns	104	-	-	ns	ns	ns	ns	69	204
		kidney[b]	-	-	-	-	-	baseline	ns	ns	ns	ns	-	-	-	-	-	11					-	-	-	baseline	ns	ns	ns	ns	-	-	-	8.0				
	Iron	muscle	-	-	-	baseline	-46	ns	ns	ns	ns	ns	-	-	-	ns	-45	38	ns	ns	ns	44	-	-	baseline	ns	ns	ns	ns	ns	-	-	ns	ns	ns	ns	ns	ns
		ovary	-	-	-	baseline	ns	ns	ns	ns	ns	ns	-	-	-	ns	ns	ns	ns	ns	ns	ns	-	-	baseline	ns	ns	ns	ns	ns	-	-	-24					
	(essential)	liver[b]	-	-	-	baseline	ns	ns	ns	ns	ns	ns	-	-	-	42							-	-	baseline	ns	ns	ns	ns	ns	-	-	-19					
		kidney[b]	-	-	-	-	-	baseline	ns	ns	ns	ns	-	-	-	-	-	21					-	-	-	baseline	ns	ns	ns	91	-	-	-	ns	ns	ns	ns	53
	Selenium	muscle	baseline	268	316	173	271	267	257	224	211	174	-30	157	190	90	159	156	149	125	117	91	baseline	440	261	240	230	263	221	229	ns	389	227	208	198	229	190	198
		ovary[b]	-	-	baseline	201	ns	ns	ns	ns	ns	ns	-	-	121	564	146	133	180	93	121	70	-	baseline	-19	-16	-17	-24	-31	-37	-	197	140	148	146	126	103	88
	(essential)	liver[b]	baseline	-	-	672	148	314	690	394	306	186	ns	-	-	422	67	180	434	234	174	93	baseline	-	102	87	75	69	23	62	17	-	135	118	104	97	43	88
		kidney[b]	-	-	-	-	-	baseline	ns	ns	ns	ns	-	-	-	-	-	71					-	-	-	baseline	ns	ns	-23	ns	-	-	-	74	83	66	33	82
Secondary Analytes	Cobalt	muscle	-	<LRL	-	<LRL	baseline	129	115	<LRL	120	159	-	<LRL	-	<LRL	-39	ns	ns	<LRL	ns	57	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
		ovary	-	-	-	baseline	ns	ns	ns	ns	ns	ns	-	-	-	29							-	-	baseline	ns	ns	ns	ns	ns	-	-	17					
	(essential)	liver	-	-	-	baseline	ns	ns	ns	ns	ns	ns	-	-	-	30							-	-	baseline	ns	ns	ns	ns	ns	-	-	ns	ns	-26	-22	-24	ns
		kidney	-	-	-	-	-	baseline	ns	ns	ns	ns	-	-	-	-	-	171					-	-	-	baseline	ns	ns	ns	ns	-	-	-	ns	ns	ns	ns	ns
	Manganese	muscle	-	baseline	-	ns	-58	ns	ns	-39	ns	ns	-	ns	-	ns	-63	-24	-33	-46	ns	ns	-	-	baseline	ns	ns	82	81	ns	-	-	ns	ns	ns	39	39	ns
		ovary	-	-	-	baseline	ns	ns	-46	-66	ns	-47	-	-	-	ns	ns	ns	ns	-52	ns	ns	-	-	baseline	ns	ns	ns	ns	ns	-	-	ns	ns	ns	ns	ns	ns
	(essential)	liver	-	-	-	baseline	-28	ns	ns	ns	ns	61	-	-	-	ns	-39	ns	ns	-25	ns	36	-	-	baseline	ns	ns	ns	ns	ns	-	-	ns	ns	ns	ns	ns	ns
		kidney	-	-	-	-	-	baseline	ns	ns	ns	166	-	-	-	-	-	-42	ns	ns	ns	53	-	-	-	baseline	ns	ns	ns	ns	-	-	-	-57	-57	-57	-57	-57

Contrast is significant (α = 0.05) and magnitude of difference is positive.

Contrast is significant (α = 0.05) and magnitude of difference is negative.

Notes: "-" = no data available for analysis (i.e., either no data was collected for the given time period or the data were <LRL and could not be analysed); "<LRL" = greater than 50% LRL data for both stations so the time period was omitted from the analysis, "ns" = not significant; "ww" = wet weight; "Exp" = exposed; "Ref" = reference; "ANOVA" = Analysis of Variance; "MLE" = Maximum Likelihood Estimation. Data were analysed in units of mg/kg dry weight. Merged cells across years indicate that the Area × Time term was not significant, therefore MOD is for all years combined. Age, fork length, and body weight results are those that are associated with muscle tissue analyses.

[a] Statistical approaches included ANOVA, ANCOVA, and MLE and for each case depended on data suitability (see complete statistical results in Appendix Table E.6.1 to E.6.8). This table only presents results for primary and secondary analytes that had a significant postive exposed - reference difference in 2022 or in all monitoring years for one or more tissue types in one or both species.

[b] Organ in which the specific metal is known to accumulate (references in Appendix Table E.6.22).

[c] Magnitude of difference (MOD) calculated on back transformed least-squares means for the observed time period as $(Exp_{observed} - Exp_{predicted})/(Exp_{predicted}) \times 100\%$ where $Exp_{predicted} = Ref_{observed} + (Exp_{baseline} - Ref_{baseline})$.

[d] Magnitude of difference (MOD) calculated on back transformed least-squares means as (Exp-Ref)/Ref x 100%.

[e] MOD is inflated because data for one of the groups in the comparison were entirely < LRL, leading to an underestimate of the mean for the <LRL result and a consequent increase in MOD between the two groups.

Table 5.12: Summary of Statistical Contrasts of Exposed - Reference Relative Differences of Fish Tissue Primary and Secondary Analyte Concentrations for Polley Lake (Exposed) and Bootjack Lake (Reference), 1995 to 2022[a]

	Parameter	Tissue	Rainbow Trout: Two-way ANOVA																			Longnose Sucker: Two-way ANOVA														
			Magnitude of Difference in (Exposed - Reference) Relative to Baseline Period (%)										Magnitude of Difference for Polley Lake (Exposed) Mean Relative to Bootjack Lake (Reference) (%)										Magnitude of Difference in (Exposed - Reference) Relative to Baseline Period (%)										Magnitude of Difference for Polley Lake Mean Relative to Bootjack Lake (%)									
			Before Period	Uncontrolled Release Period	Post-Release Period	Post-Breach Period							Before Period	Uncontrolled Release Period	Post-Release Period	Post-Breach Period							Before Period	Post-Release Period	Post-Breach Period							Before Period	Post-Release Period	Post-Breach Period						
			1995	2009	2012	2015	2017	2018	2019	2020	2021	2022	1995	2009	2012	2015	2017	2018	2019	2020	2021	2022	1995	2012	2017	2018	2019	2020	2021	2022	1995	2012	2017	2018	2019	2020	2021	2022
Secondary Analytes	Molybdenum (essential)	muscle	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	-	baseline	<LRL	<LRL	ns	ns	ns	-	-	120	<LRL	<LRL	120		
		ovary	-	-	-	baseline	ns	ns	ns	-62	-45	ns	-	-	-	ns	68	ns	ns	-47	ns	ns	-	-	baseline	ns	-26	ns	ns	ns	-	-	36	50	ns	64	34	27
		liver	-	-	-	baseline	-57	ns	ns	-50	-41	-44	-	-	-	132	ns	58	59	ns	36	ns	-	-	baseline	ns	ns	ns	ns	30	-	-	ns	27	ns	21	ns	50
		kidney	-	-	-	-	-	baseline	ns	ns	ns	ns	-	-	-	-	-	ns	ns	ns	ns	ns	-	-	-	baseline	ns	ns	ns	ns	-	-	-	76				
	Nickel (essential)	muscle	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
		ovary	-	-	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	-	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
		liver	<LRL	-	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
		kidney	-	-	-	-	-	baseline	ns	ns	ns	ns	-	-	-	-	-	33					-	-	-	baseline	ns	ns	ns	92	-	-	-	-37	-62	-45	ns	ns
	Sodium (essential)	muscle	-	-	-	baseline	ns	ns	ns	-37	ns	-38	-	-	-	ns	ns	ns	ns	ns	ns	-23	-	-	baseline	ns	ns	ns	ns	ns	-	-	ns	ns	ns	ns	ns	21
		ovary	-	-	-	baseline	ns	ns	ns	ns	ns	ns	-	-	-	ns	ns	ns	ns	ns	ns	ns	-	-	baseline	ns	-27	ns	ns	ns	-	-	ns	ns	-33	ns	ns	ns
		liver	-	-	-	baseline	ns	-35	-34	-41	-48	-55	-	-	-	71	74	ns	ns	ns	ns	ns	-	-	baseline	-34	-31	-51	-41	-54	-	-	36	ns	ns	-34	-20	-38
		kidney	-	-	-	-	-	baseline	ns	ns	ns	ns	-	-	-	-	-	ns	ns	ns	ns	ns	-	-	-	baseline	ns	ns	ns	ns	-	-	-	-25				
	Tin (essential)	muscle	-	<LRL	-	<LRL	baseline	ns	<LRL	<LRL	ns	ns	-	<LRL	-	<LRL	ns	ns	<LRL	<LRL	ns	ns	-	-	baseline	-43	<LRL	-89[e]	2,392[e]	ns	-	-	ns	-47	<LRL	ns	ns	-39
		ovary	-	-	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	-	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
		liver	-	-	-	<LRL	baseline	ns	ns	ns	ns	ns	-	-	-	<LRL	ns	ns	ns	ns	ns	ns	-	-	baseline	ns	<LRL	<LRL	<LRL	ns	-	-	76		<LRL	<LRL	<LRL	76
		kidney	-	-	-	-	-	baseline	ns	ns	ns	ns	-	-	-	-	-	ns	ns	ns	ns	ns	-	-	-	baseline	ns	ns	<LRL	ns	-	-	-	ns	ns	ns	<LRL	ns
	Vanadium (essential)	muscle	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
		ovary	-	-	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	-	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
		liver	-	-	-	baseline	ns	ns	ns	ns	ns	ns	-	-	-	164							-	-	baseline	139	ns	ns	ns	ns	-	-	ns	154	76	ns	ns	79
		kidney	-	-	-	-	-	baseline	ns	ns	ns	ns	-	-	-	-	-	97					-	-	-	baseline	ns	ns	ns	ns	-	-	-	99				
	Zinc (essential)	muscle	-	baseline	-	ns	ns	ns	ns	ns	ns	ns	-	ns	-	ns	ns	ns	ns	-18	ns	ns	-	-	baseline	ns	ns	ns	ns	ns	-	-	85					
		ovary	-	-	-	baseline	ns	ns	ns	ns	ns	ns	-	-	-	ns	ns	ns	ns	ns	ns	ns	-	-	baseline	ns	ns	ns	ns	ns	-	-	9.4					
		liver	-	-	-	baseline	ns	ns	ns	ns	ns	ns	-	-	-	11							-	-	baseline	-23	-20	ns	-22	ns	-	-	27	ns	ns	ns	ns	53
		kidney	-	-	-	-	-	baseline	ns	ns	108	ns	-	-	-	-	-	ns	ns	ns	63	ns	-	-	-	baseline	ns	ns	ns	ns	-	-	-	42				

Contrast is significant (α = 0.05) and magnitude of difference is positive.

Contrast is significant (α = 0.05) and magnitude of difference is negative.

Notes: "-" = no data available for analysis (i.e., either no data was collected for the given time period or the data were <LRL and could not be analysed); "<LRL" = greater than 50% LRL data for both stations so the time period was omitted from the analysis, "ns" = not significant; "ww" = wet weight; "Exp" = exposed; "Ref" = reference; "ANOVA" = Analysis of Variance; "MLE" = Maximum Likelihood Estimation. Data were analysed in units of mg/kg dry weight. Merged cells across years indicate that the Area × Time term was not significant, therefore MOD is for all years combined. Age, fork length, and body weight results are those that are associated with muscle tissue analyses.

[a] Statistical approaches included ANOVA, ANCOVA, and MLE and for each case depended on data suitability (see complete statistical results in Appendix Table E.6.1 to E.6.8). This table only presents results for primary and secondary analytes that had a significant postive exposed - reference difference in 2022 or in all monitoring years for one or more tissue types in one or both species.

[b] Organ in which the specific metal is known to accumulate (references in Appendix Table E.6.22).

[c] Magnitude of difference (MOD) calculated on back transformed least-squares means for the observed time period as $(Exp_{observed} - Exp_{predicted})/(Exp_{predicted})\times 100\%$ where $Exp_{predicted} = Ref_{observed} + (Exp_{baseline} - Ref_{baseline})$.

[d] Magnitude of difference (MOD) calculated on back transformed least-squares means as (Exp-Ref)/Ref x 100%.

[e] MOD is inflated because data for one of the groups in the comparison were entirely < LRL, leading to an underestimate of the mean for the <LRL result and a consequent increase in MOD between the two groups.

As indicated in Section 3.7.3, data interpretation was focused on primary and secondary analytes (Table 2.4) with a significant positive exposed-reference difference (i.e., analytes with concentrations that were significantly higher in tissues from the exposed area compared to those from the reference area) in 2022 (if the analysis *Area×Year* interaction was significant) or in all monitoring years (if the *Area×Year* interaction was not significant[53]). Increasing concentrations at exposed areas relative to reference areas over time, or consistently elevated concentrations at the exposed area relative to reference, were not detected for most metals (Appendix Figures E.6.1 to E.6.8, Appendix Tables E.6.1 to E.6.8). The primary analytes arsenic, copper, iron, and selenium, and secondary analytes cobalt, manganese, molybdenum, nickel, sodium, tin, vanadium met the criteria for inclusion in data interpretation outlined above (Table 5.12). Of these primary and secondary analytes, only sodium concentrations were consistently higher in zooplankton from Polley Lake than reference (Bootjack Lake) between 2019 and 2022 (Table 5.5), while concentrations of arsenic, copper, manganese, and molybdenum in zooplankton tissue from Polley Lake decreased significantly between 2019 and 2022 (Appendix Table E.3.1). In previous years, concentrations of three of these analytes were also higher in zooplankton from Polley Lake than reference (Bootjack Lake) in one (copper and molybdenum) or two (zinc) years from 2019 to 2021 (Appendix Table E.3.1). Selenium concentrations in zooplankton tissue from Polley Lake in 2022 were similar to reference after being significantly higher than reference from 2019 to 2021 and were significantly lower in 2022 compared to 2020 and 2021 (but not 2019), relative to reference (Appendix Table E.3.1; see Section 5.1.4 for details).

Significant *Area×Year* interactions were detected for selenium concentrations in exposed rainbow trout and longnose sucker for most tissue types except for kidney in rainbow trout. The significant *Area×Year* interaction indicates that the ratio of exposed:reference concentrations differed among years (i.e., the geometric mean concentrations at the exposed area were not trending the same as the geometric mean concentrations at the reference area). The timing of the interactions indicated that selenium accumulation began between 1995 and 2009 (i.e., may be associated with the 2006 to 2009 uncontrolled surface runoff to Polley Lake; Figure 5.12, Table 5.12; Appendix Tables E.6.1 to E.6.8). In general, selenium concentrations in tissues did not continue to increase after the post-release period (2012), except for tissue selenium concentrations in rainbow trout ovary that were significantly higher, relative to reference, in 2015 compared to 2012

[53] If no significant change was detected in the exposed-reference difference among years (i.e., the *Area* x *Year* interaction was not significant), then data from all available years were combined for the analyses.

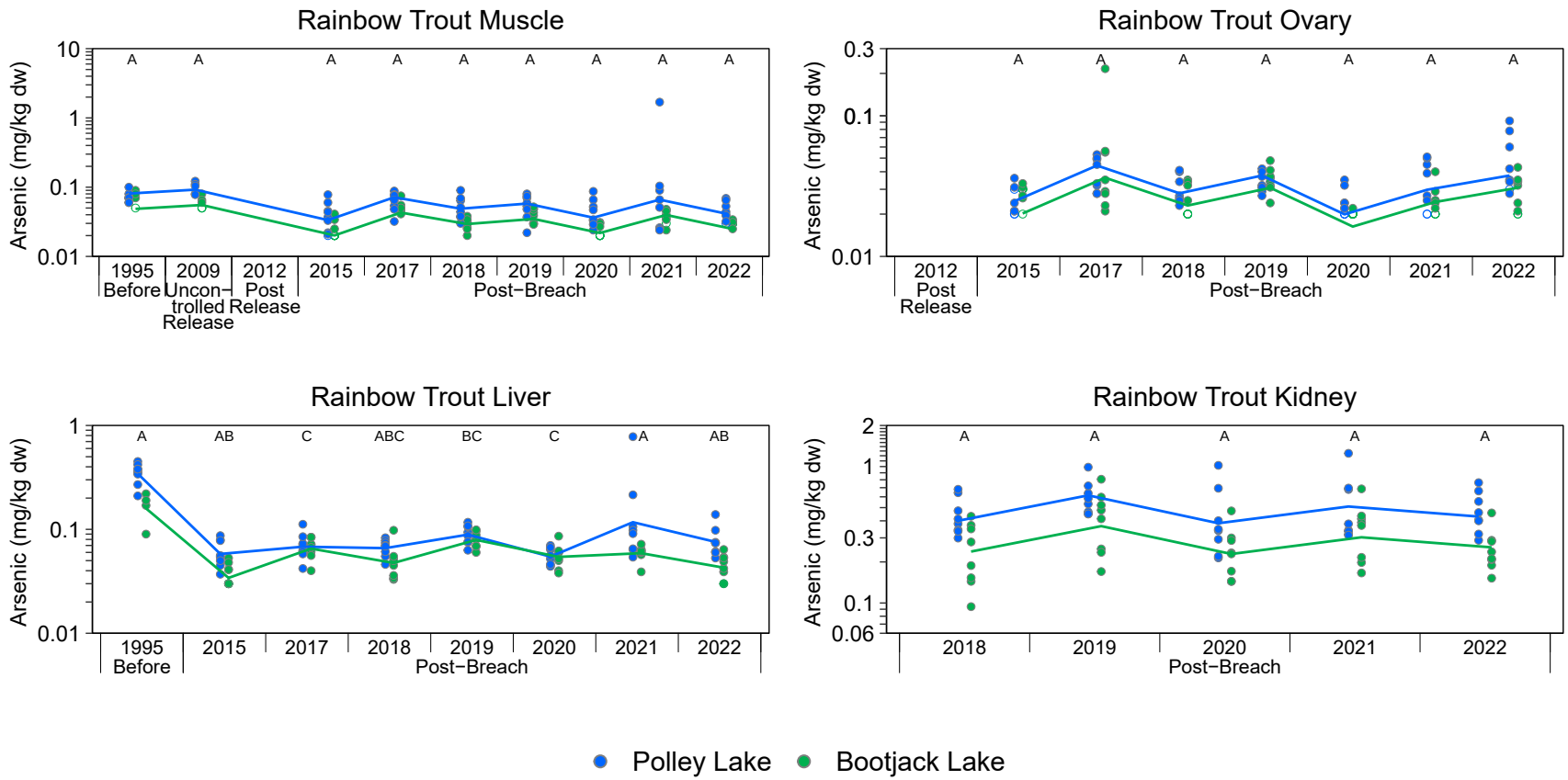
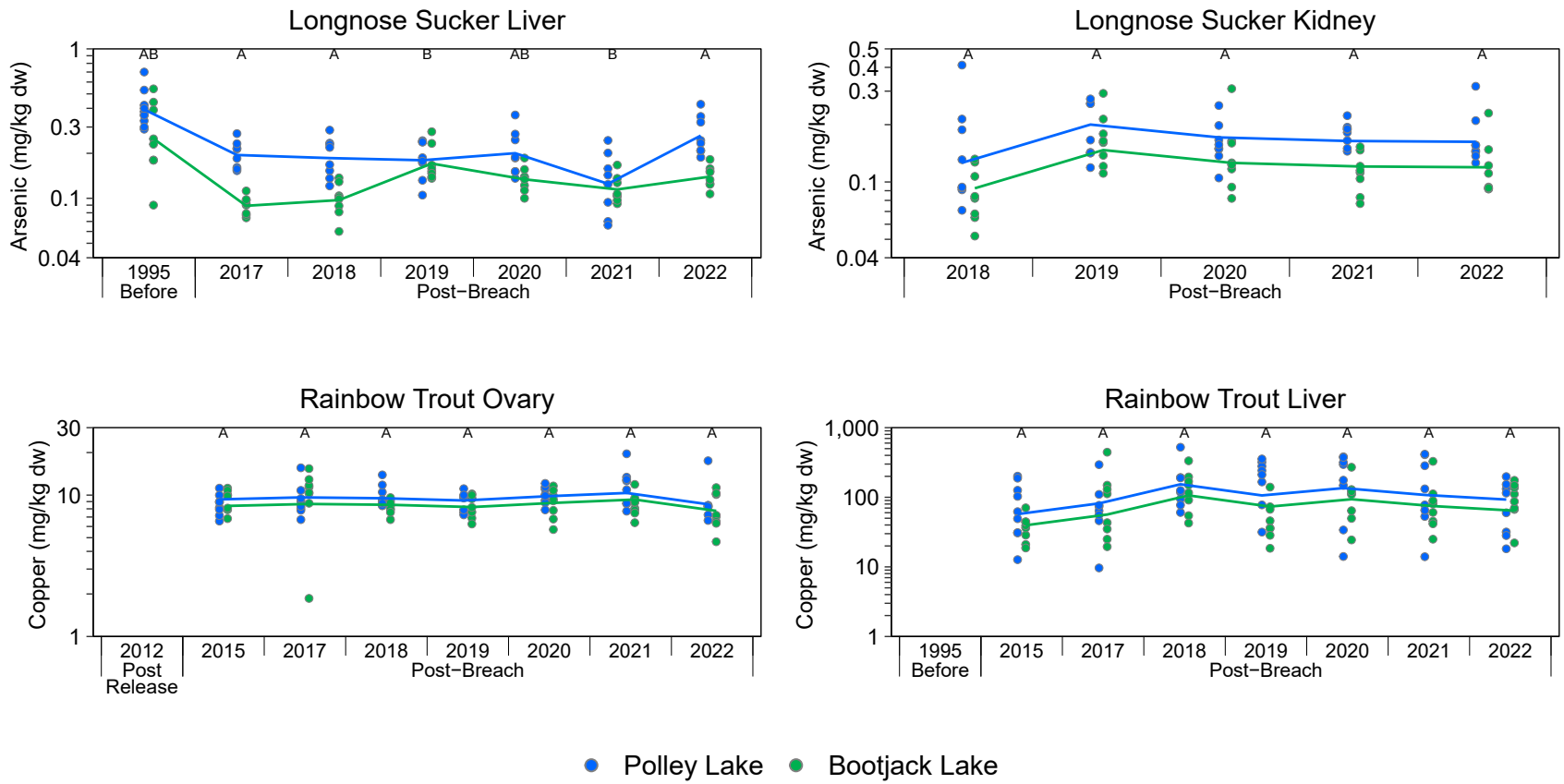


Figure 5.12: Fish Tissue Primary Analyte Concentrations with a Significant Positive Exposed - Reference Difference for Polley Lake (Exposed) and Bootjack Lake (Reference), 1995 to 2022

Notes: BCMOE = British Columbia Ministry of the Environment; GL = Guideline; dw = dry weight. Plots are only included for primary analytes that had either a significant Area × Time interaction term and were higher at exposed than reference areas in 2022, or had no significant interaction but had a higher exposed magnitude of difference across all years for a given species and tissue type. Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Individual samples are plotted and lines join the least-squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Polley Lake:Bootjack Lake) that do not differ significantly (p−value <0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Polley Lake:Bootjack Lake). Only years with samples from both reference and exposed areas are plotted.



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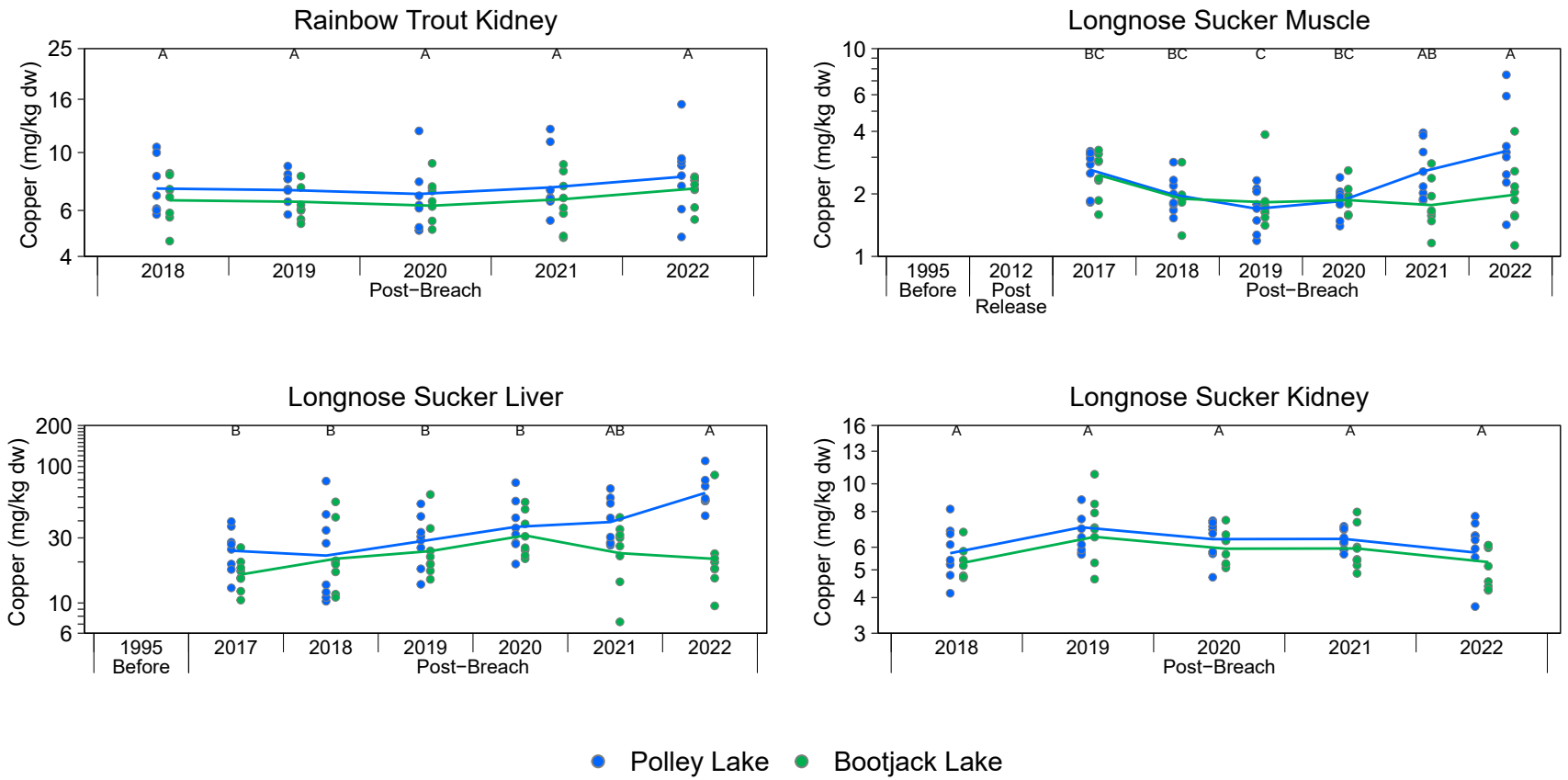
Notes: BCMOE = British Columbia Ministry of the Environment; GL = Guideline; dw = dry weight. Plots are only included for primary analytes that had either a significant Area × Time interaction term and were higher at exposed than reference areas in 2022, or had no significant interaction but had a higher exposed magnitude of difference across all years for a given species and tissue type. Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Individual samples are plotted and lines join the least-squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Polley Lake:Bootjack Lake) that do not differ significantly (p−value <0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Polley Lake:Bootjack Lake). Only years with samples from both reference and exposed areas are plotted.



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Notes: BCMOE = British Columbia Ministry of the Environment; GL = Guideline; dw = dry weight. Plots are only included for primary analytes that had either a significant Area × Time interaction term and were higher at exposed than reference areas in 2022, or had no significant interaction but had a higher exposed magnitude of difference across all years for a given species and tissue type. Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Individual samples are plotted and lines join the least-squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Polley Lake:Bootjack Lake) that do not differ significantly (p−value <0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Polley Lake:Bootjack Lake). Only years with samples from both reference and exposed areas are plotted.

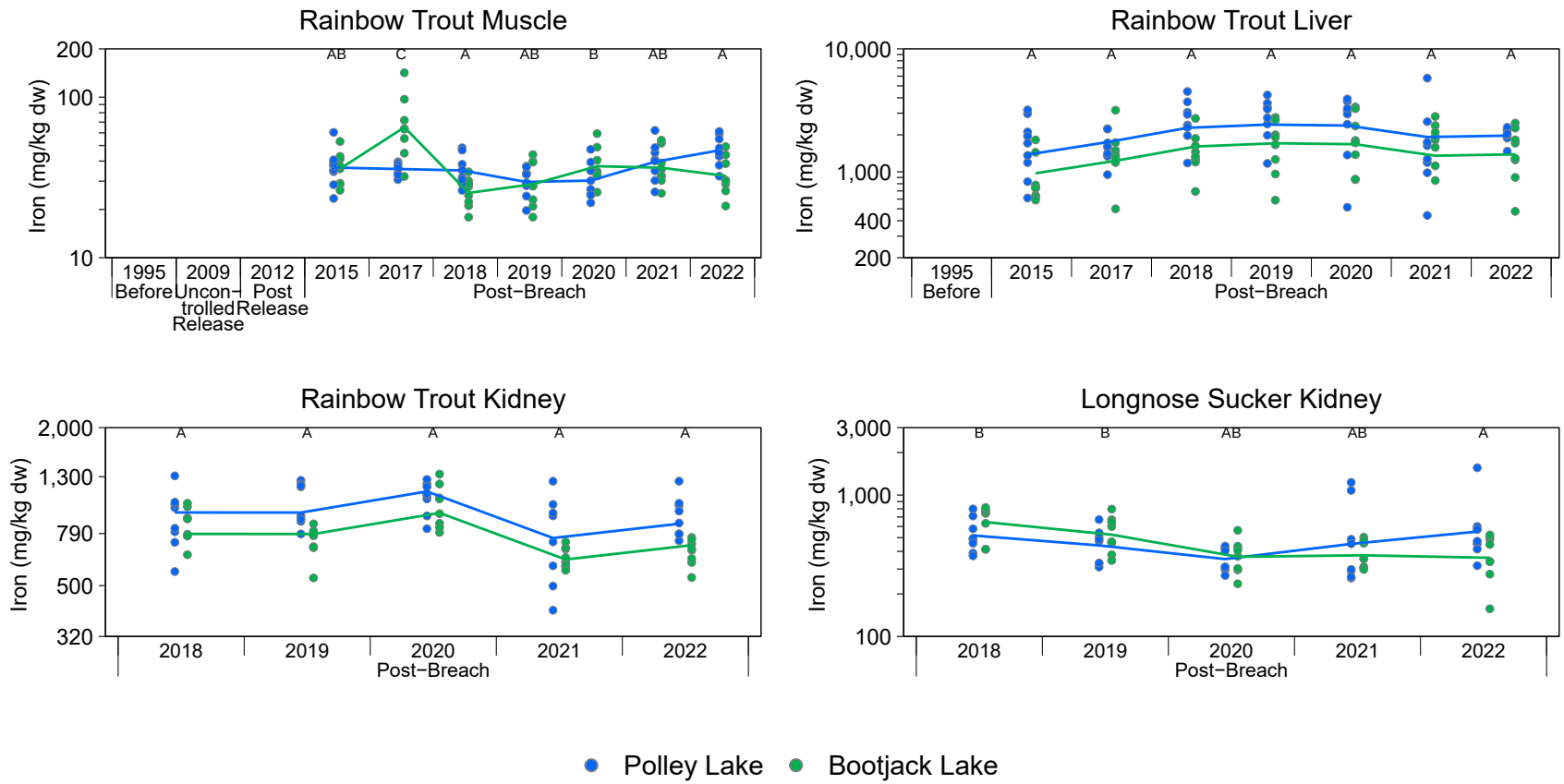


Figure 5.12: Fish Tissue Primary Analyte Concentrations with a Significant Positive Exposed - Reference Difference for Polley Lake (Exposed) and Bootjack Lake (Reference), 1995 to 2022

Notes: BCMOE = British Columbia Ministry of the Environment; GL = Guideline; dw = dry weight. Plots are only included for primary analytes that had either a significant Area × Time interaction term and were higher at exposed than reference areas in 2022, or had no significant interaction but had a higher exposed magnitude of difference across all years for a given species and tissue type. Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Individual samples are plotted and lines join the least-squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Polley Lake:Bootjack Lake) that do not differ significantly (p−value <0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Polley Lake:Bootjack Lake). Only years with samples from both reference and exposed areas are plotted.

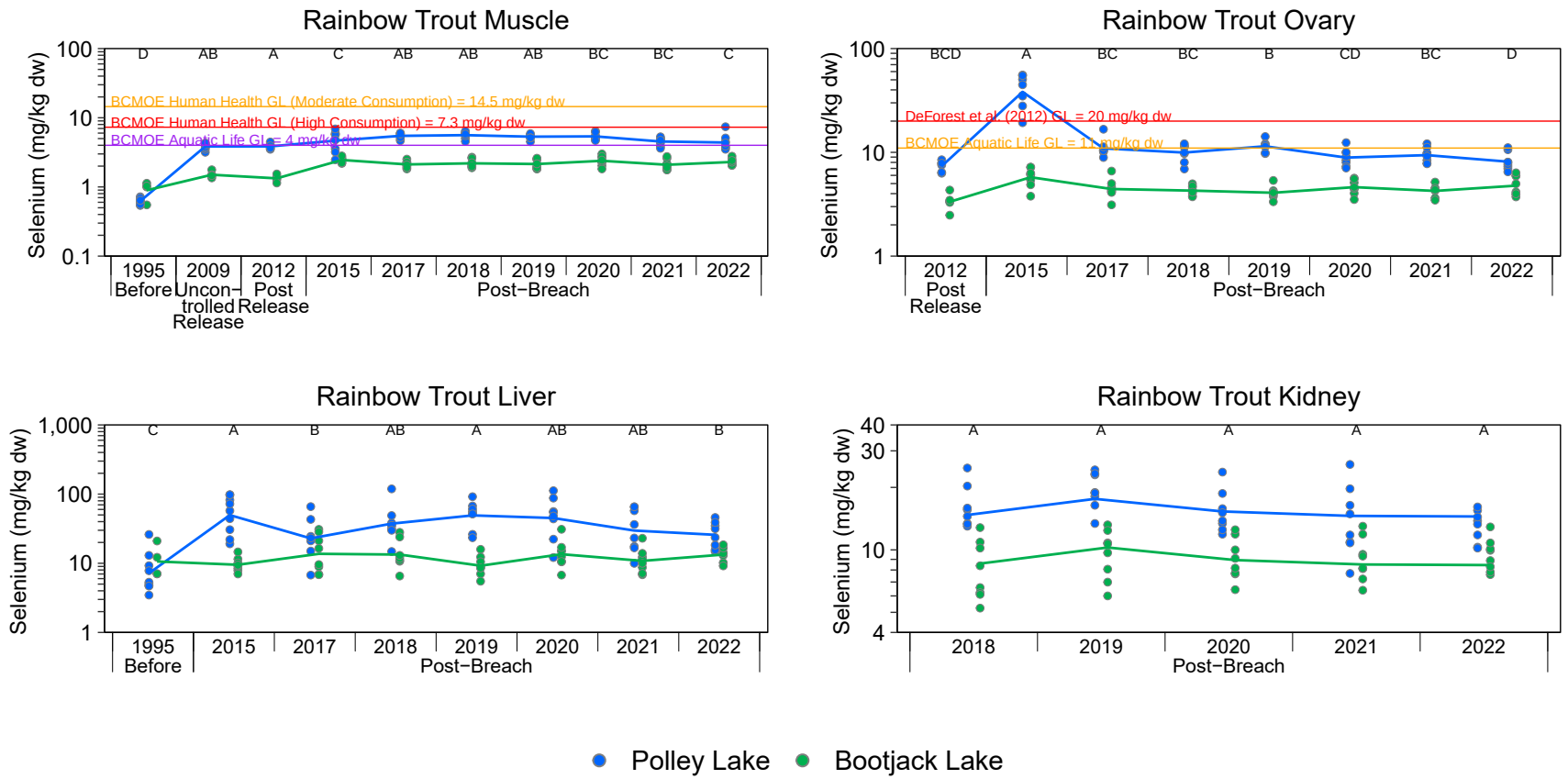
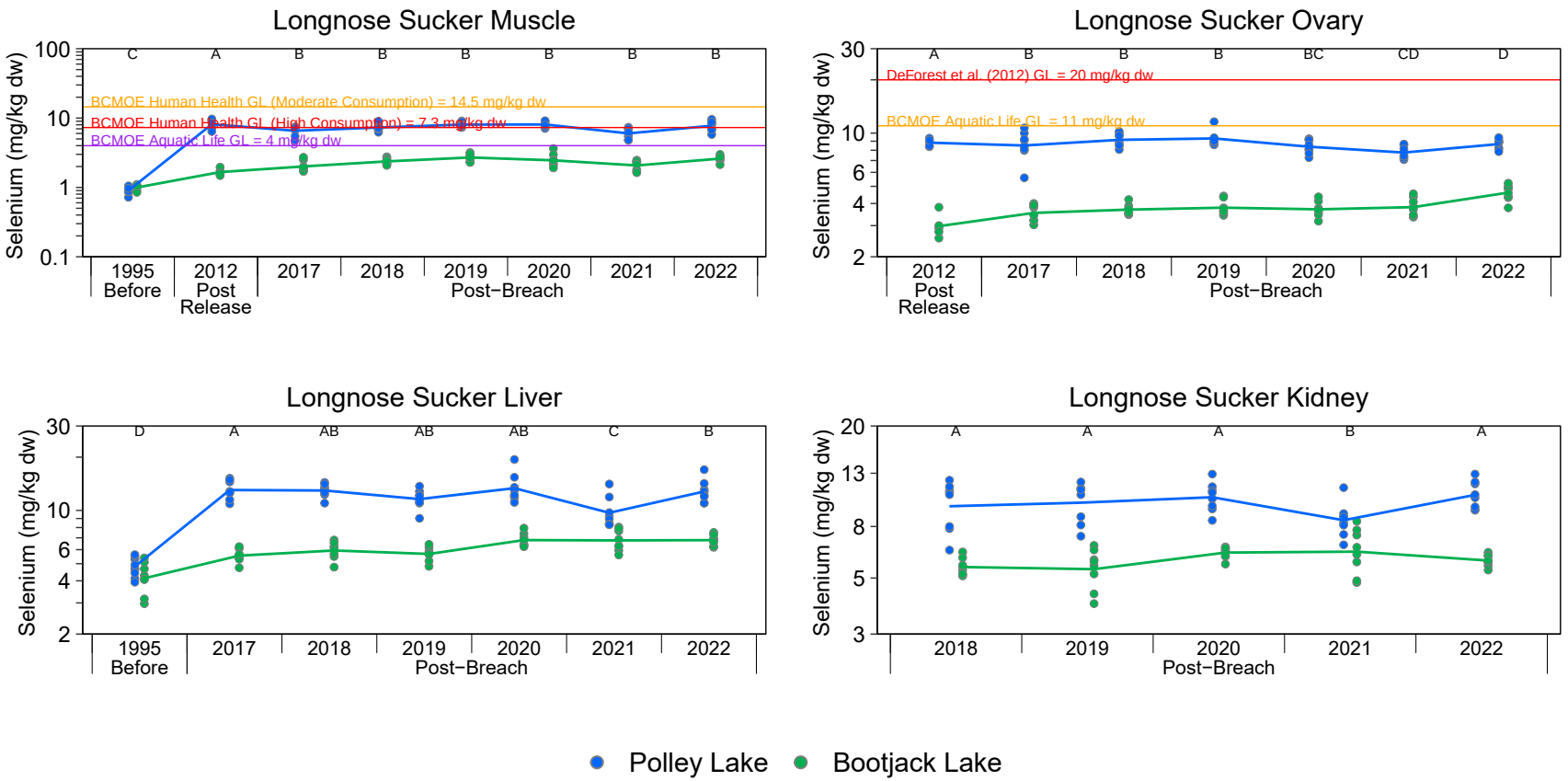


Figure 5.12: Fish Tissue Primary Analyte Concentrations with a Significant Positive Exposed - Reference Difference for Polley Lake (Exposed) and Bootjack Lake (Reference), 1995 to 2022

Notes: BCMOE = British Columbia Ministry of the Environment; GL = Guideline; dw = dry weight. Plots are only included for primary analytes that had either a significant Area × Time interaction term and were higher at exposed than reference areas in 2022, or had no significant interaction but had a higher exposed magnitude of difference across all years for a given species and tissue type. Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Individual samples are plotted and lines join the least-squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Polley Lake:Bootjack Lake) that do not differ significantly (p−value <0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Polley Lake:Bootjack Lake). Only years with samples from both reference and exposed areas are plotted.



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Notes: BCMOE = British Columbia Ministry of the Environment; GL = Guideline; dw = dry weight. Plots are only included for primary analytes that had either a significant Area × Time interaction term and were higher at exposed than reference areas in 2022, or had no significant interaction but had a higher exposed magnitude of difference across all years for a given species and tissue type. Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Individual samples are plotted and lines join the least-squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Polley Lake:Bootjack Lake) that do not differ significantly (p−value <0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Polley Lake:Bootjack Lake). Only years with samples from both reference and exposed areas are plotted.

(Figure 5.12, Table 5.12; Appendix Table E.6.3)[54]. It is possible that the 2015 peak in rainbow trout ovary selenium concentrations may reflect a short-term impact associated with the breach or possible laboratory error (previously mentioned) that cannot be separated from potential mine influence between 1995 and 2015.

Post-breach selenium concentrations in rainbow trout muscle, ovary, liver, and kidney have been consistently higher than reference (67% to 564%; Table 5.12), although there is no indication that selenium is consistently increasing in rainbow trout tissue over time. In fact, the exposed:reference ratios in muscle and liver concentrations in 2022 were at their lowest since 2017 relative to baseline, and differences between areas for ovary and kidney were not significantly different from baseline (Figure 5.12, Table 5.12; Appendix Tables E.6.1, E.6.3, E.6.4, E.6.8). In addition, selenium concentrations in rainbow trout muscle and ovary tissues were both significantly lower in 2022, relative to reference, than in 2017 to 2019 (Figure 5.12). Tissue selenium concentrations in longnose sucker have been consistently higher than reference in each year since the breach (33% to 229% across tissue types). However, selenium concentrations in longnose sucker tissues (i.e., muscle ovary, liver, and kidney) have shown temporal stability or have decreased in Polley Lake relative to Bootjack Lake since the post-release period (2012). For instance, selenium concentrations in longnose sucker ovary tissues were significantly lower in 2022, relative to reference, than reported in 2015 to 2020 (Figure 5.12, Table 5.12; Appendix Tables E.6.2, E.6.5 to E.6.7).

Concentrations of the primary analytes arsenic, copper, and iron were significantly higher in most rainbow trout tissues (muscle, ovary, liver, and kidney) from Polley Lake compared to Bootjack Lake in 2022 (or in all monitoring years if the *Area×Year* interaction was not significant), with two exceptions. These two exceptions are that copper in rainbow trout muscle and iron in rainbow trout ovary did not differ between the waterbodies in 2022 (Figure 5.12, Table 5.12; Appendix Tables E.6.1, E.6.3, E.6.4, E.6.8). Arsenic, copper, and iron concentrations in rainbow trout tissues were unchanged over time (i.e., temporally stable) in most instances, relative to reference. Where temporal changes occurred, the magnitude of the exposed:reference ratio in 2022 was either similar to or lower than baseline (Figure 5.12; Appendix Tables E.6.1, E.6.3, E.6.4, E.6.8). Therefore, there is no evidence that arsenic, copper, and iron concentrations in rainbow trout tissues from Polley Lake are increasing over time due to mine-related influence.

In longnose sucker tissues, arsenic concentrations in liver and kidney, copper concentrations in all tissues except ovary, and iron concentrations in kidney were significantly higher in samples

[54] It is considered likely that a subset of the selenium concentrations measured in exposed rainbow trout ovaries from 2015 were subject to laboratory error or contamination, resulting in reporting of increased selenium concentrations (Minnow 2017e).

from Polley Lake relative to Bootjack Lake in 2022 (or in all monitoring years; Figure 5.12, Table 5.12). However, these exposed:reference ratios in 2022 did not differ significantly from baseline, with three exceptions (Figure 5.12, Table 5.12; Appendix Tables E.6.2, E.6.5 to E.6.7). Specifically, copper concentrations in muscle and liver and iron concentrations in kidney tissues of longnose sucker had exposed:reference ratios that were significantly higher in 2022 compared to 2017 (baseline) to 2020 for copper in muscle and liver and compared to 2018 (baseline) and 2019 for iron in kidney (Figure 5.12, Table 5.12; Appendix Tables E.6.2, E.6.5 to E.6.7). The lack of consistency in the observed increases of copper and iron concentrations among longnose sucker tissue types (i.e., increases not observed in all tissues) suggests that these results are somewhat equivocal. In addition, the increases in copper and iron concentrations in longnose sucker tissues from Polley Lake in 2022 are not supported by the results of zooplankton monitoring which have indicated that copper and iron concentrations in zooplankton tissues from Polley Lake were either similar to or lower than reference in 2022 (see Section 5.1.4; Appendix Table E.3.1). Despite these inconsistencies, continued monitoring and evaluation will help to understand whether these changes were isolated or are part of a longer-term pattern.

Of the secondary analytes, cobalt, manganese, molybdenum, nickel, sodium, tin, vanadium, and zinc had significant *Area×Year* interaction terms for one or more tissue types in rainbow trout and/or longnose sucker and/or were elevated in fish caught in Polley Lake relative to Bootjack Lake in 2022 (Figure 5.13, Table 5.12; Appendix Tables E.6.1 to E.6.8). For most secondary analyte-tissue combinations, for either species, this difference was not indicative of an increase in concentrations over time due to mine influence. This is because the significant positive exposed-reference differences in 2022 were either not significantly different from prior years, or the *Area×Year* interaction and significant positive exposed-reference difference in 2022 was only reported in one tissue type in one species. For simplicity, only those secondary analyte-tissue combinations with a significant positive exposed-reference difference in 2022 or in all years (if the *Area×Year* interaction was not significant) in more than one tissue type within a species are discussed further (i.e., nickel, sodium, and tin were not discussed further).

Cobalt concentrations in rainbow trout ovary, liver, and kidney have been consistently higher in Polley Lake compared to Bootjack Lake since 2018, though cobalt concentrations in exposed tissues, relative to reference, have not changed significantly since monitoring began (Figure 5.13, Table 5.12; Appendix Tables E.6.3, E.6.4, E.6.8). For rainbow trout muscle, 2022 represents the first time since initiation of monitoring that cobalt concentrations were significantly greater in Polley Lake relative to reference. Despite this, the cobalt concentrations in rainbow trout muscle from Polley Lake, relative to reference, have been stable (i.e., did not change significantly) since 2018 (Figure 5.13, Table 5.12; Appendix Table E.6.1). Manganese concentrations in

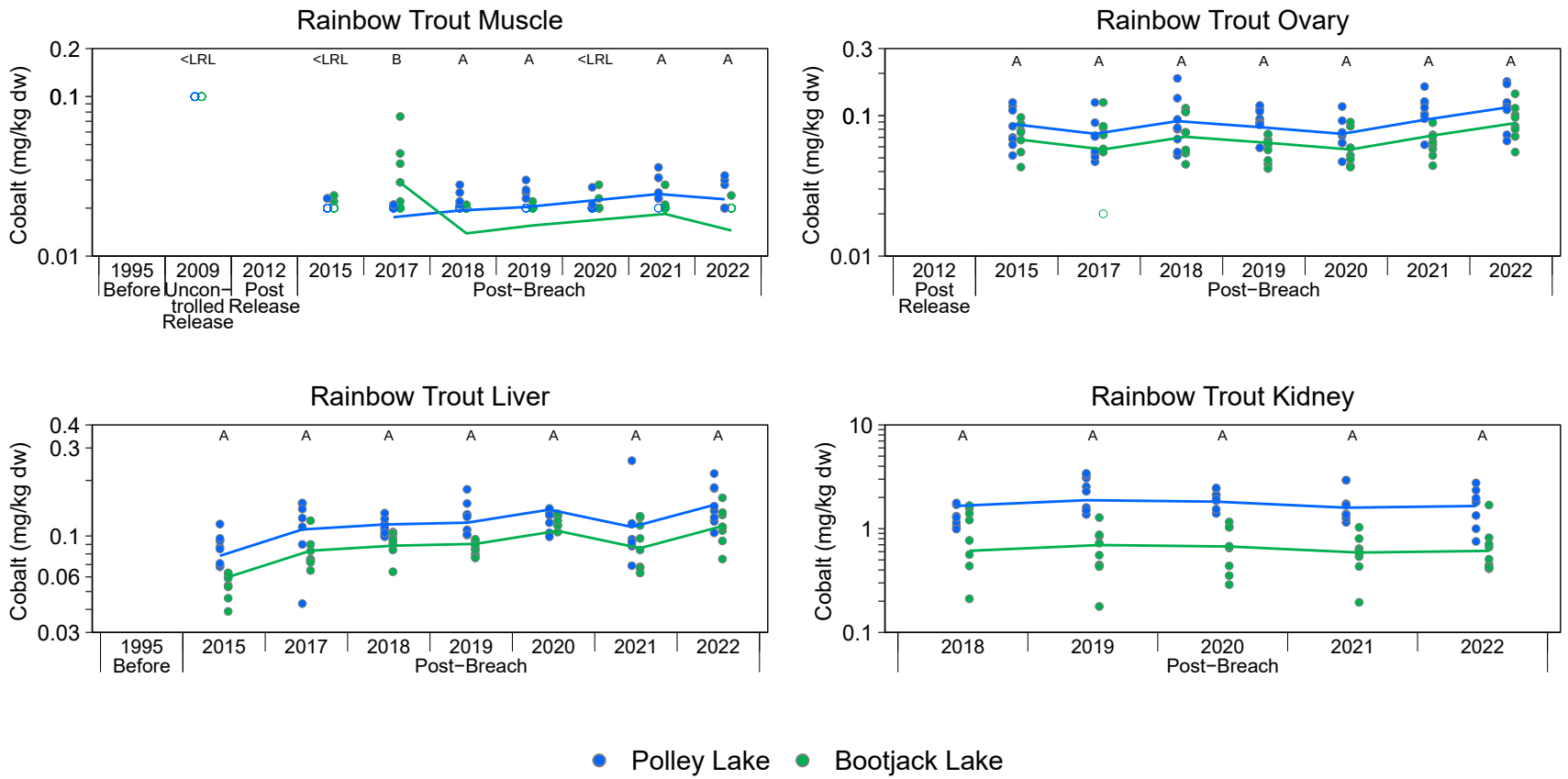

Figure 5.13: Fish Tissue Secondary Analyte Concentrations with a Significant Positive Exposed - Reference Difference for Polley Lake (Exposed) and Bootjack Lake (Reference), 1995 to 2022

Notes: dw = dry weight. Plots are only included for primary analytes that had either a significant Area × Time interaction term and were higher at exposed than reference areas in 2022, or had no significant interaction but had a higher exposed magnitude of difference across all years for a given species and tissue type. Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log-normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Polley Lake:Bootjack Lake) that do not differ significantly (p-value <0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Polley Lake:Bootjack Lake). Only years with samples from both reference and exposed areas are plotted.

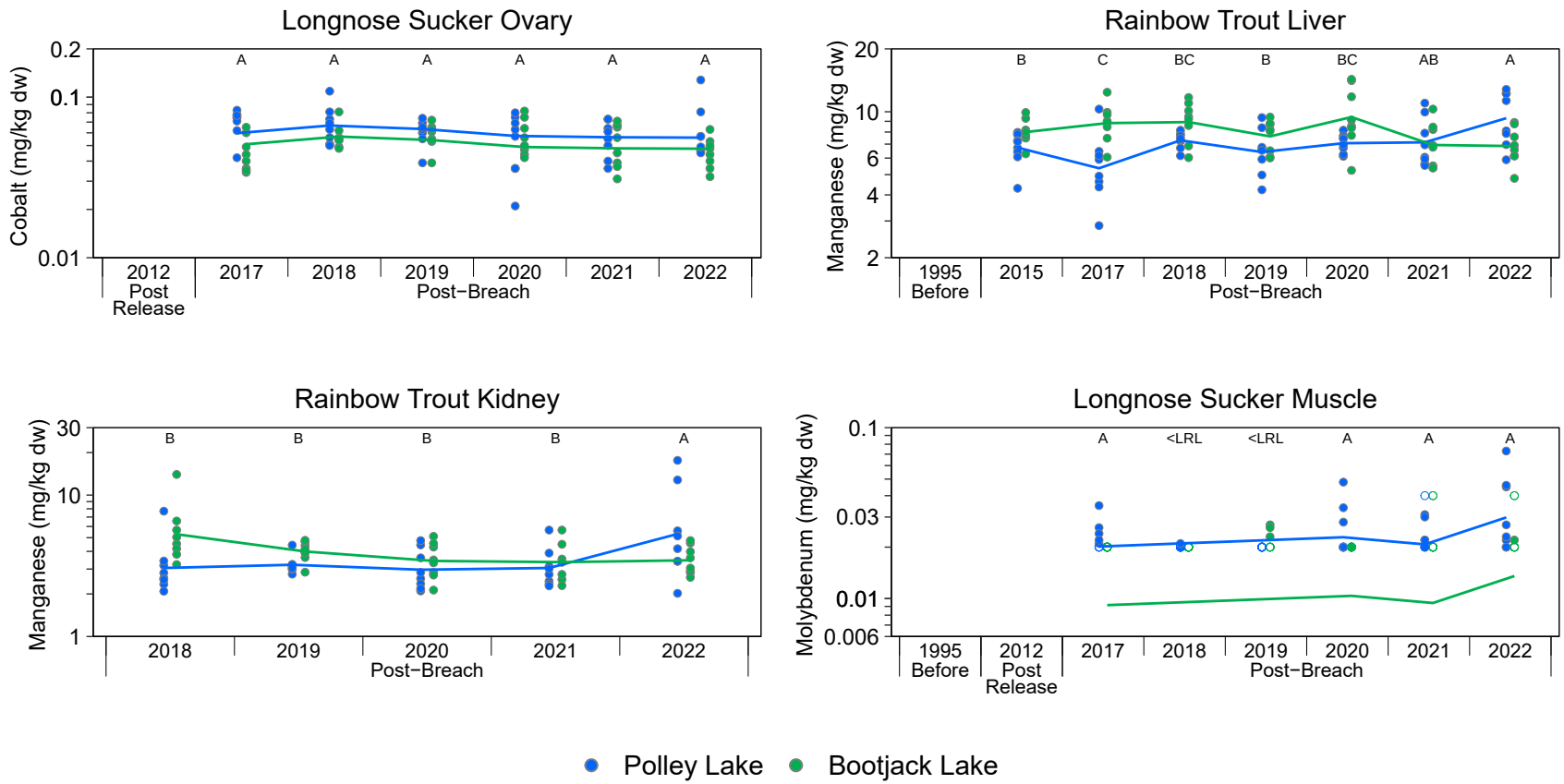

Figure 5.13: Fish Tissue Secondary Analyte Concentrations with a Significant Positive Exposed - Reference Difference for Polley Lake (Exposed) and Bootjack Lake (Reference), 1995 to 2022

Notes: dw = dry weight. Plots are only included for primary analytes that had either a significant Area × Time interaction term and were higher at exposed than reference areas in 2022, or had no significant interaction but had a higher exposed magnitude of difference across all years for a given species and tissue type. Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log-normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Polley Lake:Bootjack Lake) that do not differ significantly (p-value <0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Polley Lake:Bootjack Lake). Only years with samples from both reference and exposed areas are plotted.

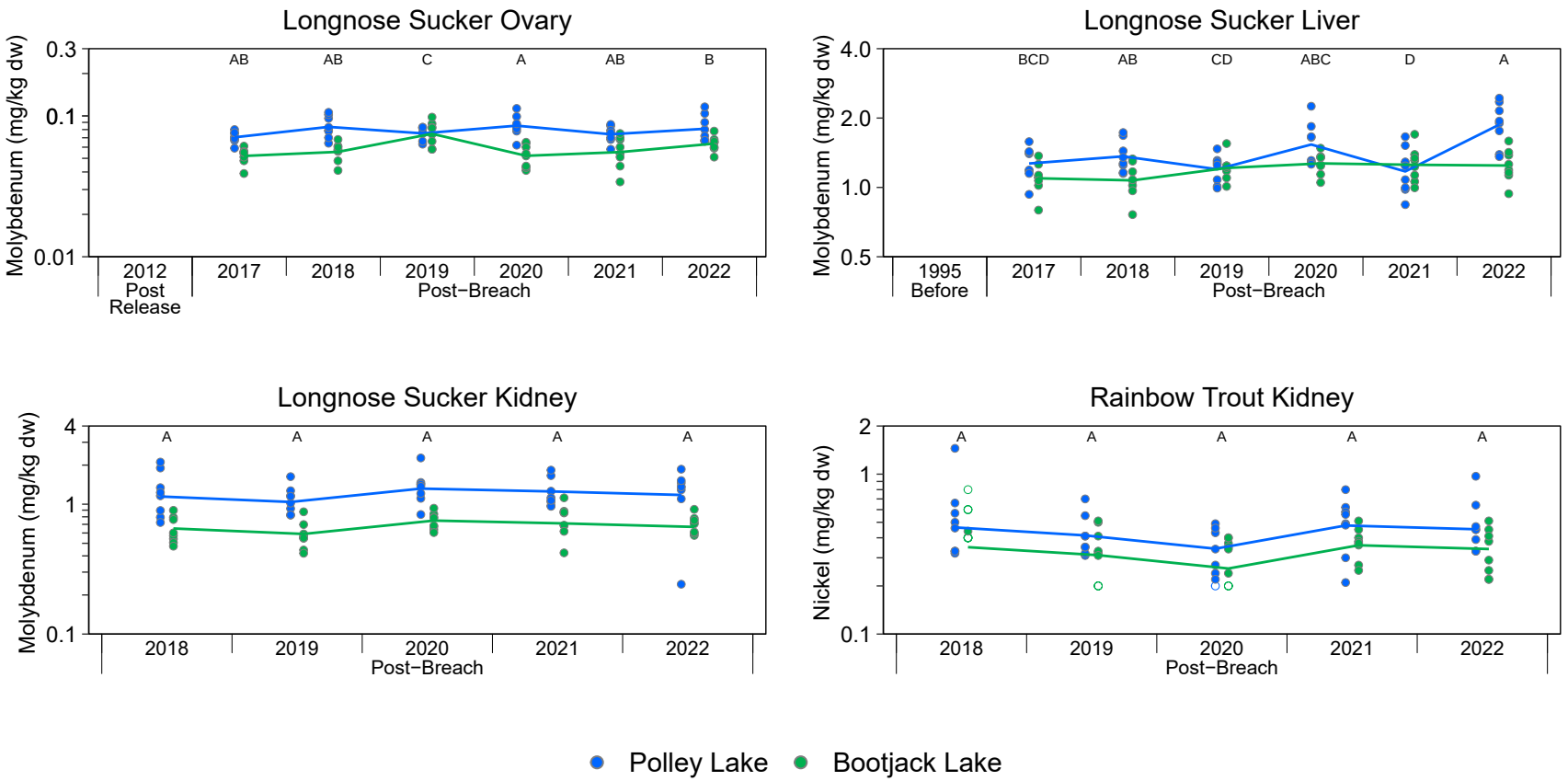

Figure 5.13: Fish Tissue Secondary Analyte Concentrations with a Significant Positive Exposed - Reference Difference for Polley Lake (Exposed) and Bootjack Lake (Reference), 1995 to 2022

Notes: dw = dry weight. Plots are only included for primary analytes that had either a significant Area × Time interaction term and were higher at exposed than reference areas in 2022, or had no significant interaction but had a higher exposed magnitude of difference across all years for a given species and tissue type. Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log-normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Polley Lake:Bootjack Lake) that do not differ significantly (p-value <0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Polley Lake:Bootjack Lake). Only years with samples from both reference and exposed areas are plotted.

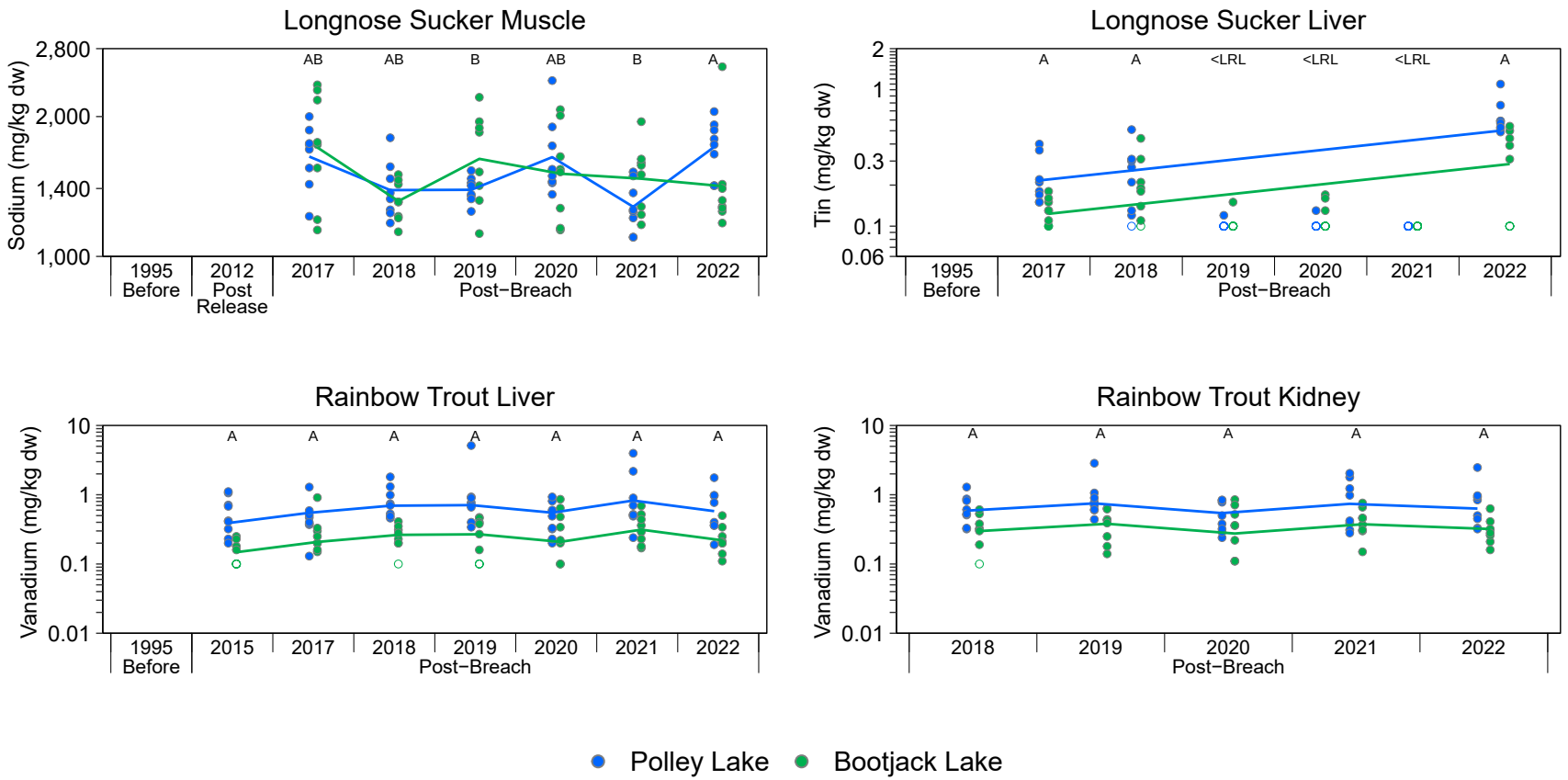

Figure 5.13: Fish Tissue Secondary Analyte Concentrations with a Significant Positive Exposed - Reference Difference for Polley Lake (Exposed) and Bootjack Lake (Reference), 1995 to 2022

Notes: dw = dry weight. Plots are only included for primary analytes that had either a significant Area × Time interaction term and were higher at exposed than reference areas in 2022, or had no significant interaction but had a higher exposed magnitude of difference across all years for a given species and tissue type. Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log-normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Polley Lake:Bootjack Lake) that do not differ significantly (p-value <0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Polley Lake:Bootjack Lake). Only years with samples from both reference and exposed areas are plotted.

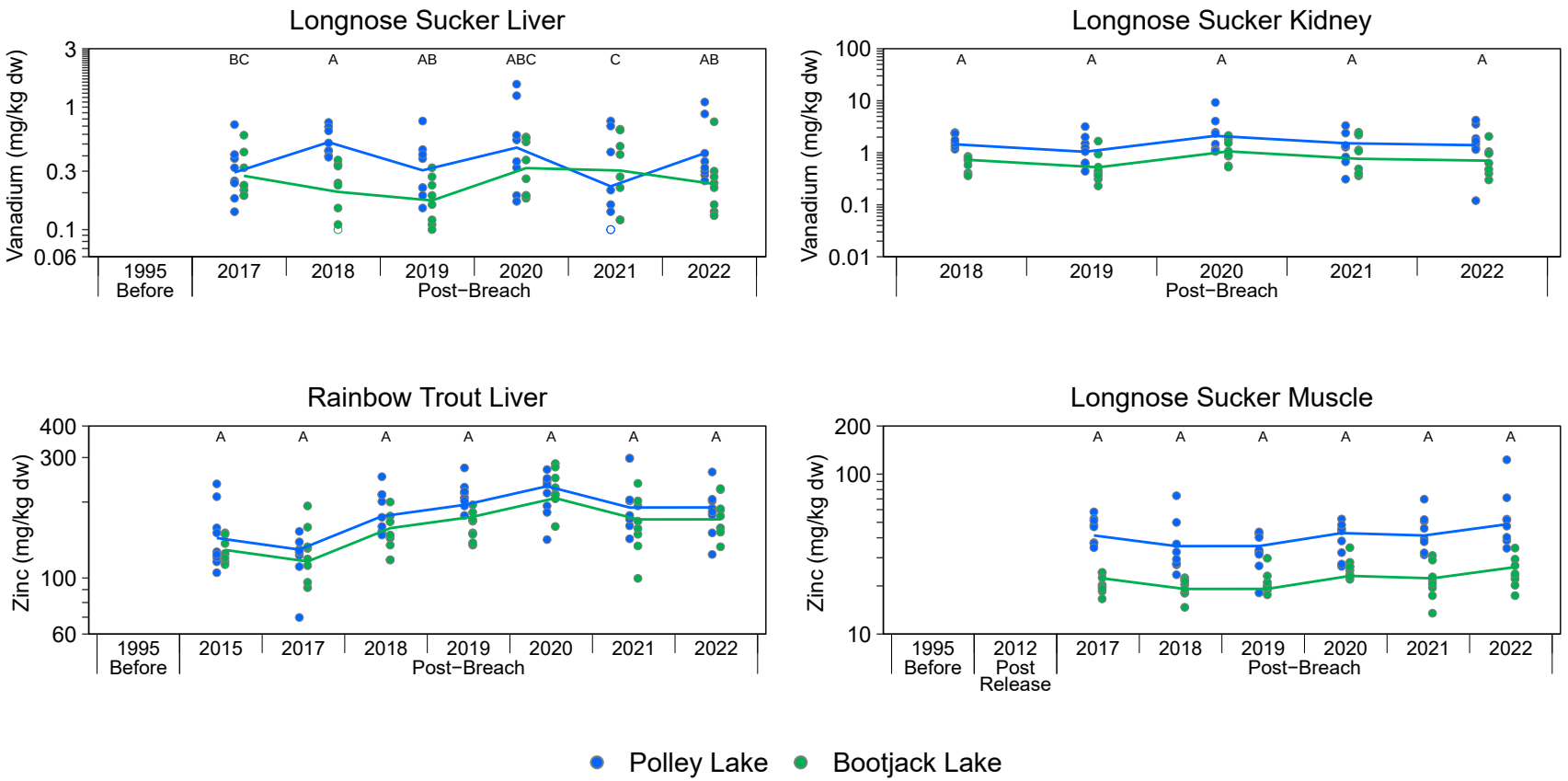

Figure 5.13: Fish Tissue Secondary Analyte Concentrations with a Significant Positive Exposed - Reference Difference for Polley Lake (Exposed) and Bootjack Lake (Reference), 1995 to 2022

Notes: dw = dry weight. Plots are only included for primary analytes that had either a significant Area × Time interaction term and were higher at exposed than reference areas in 2022, or had no significant interaction but had a higher exposed magnitude of difference across all years for a given species and tissue type. Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log-normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Polley Lake:Bootjack Lake) that do not differ significantly (p-value <0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Polley Lake:Bootjack Lake). Only years with samples from both reference and exposed areas are plotted.

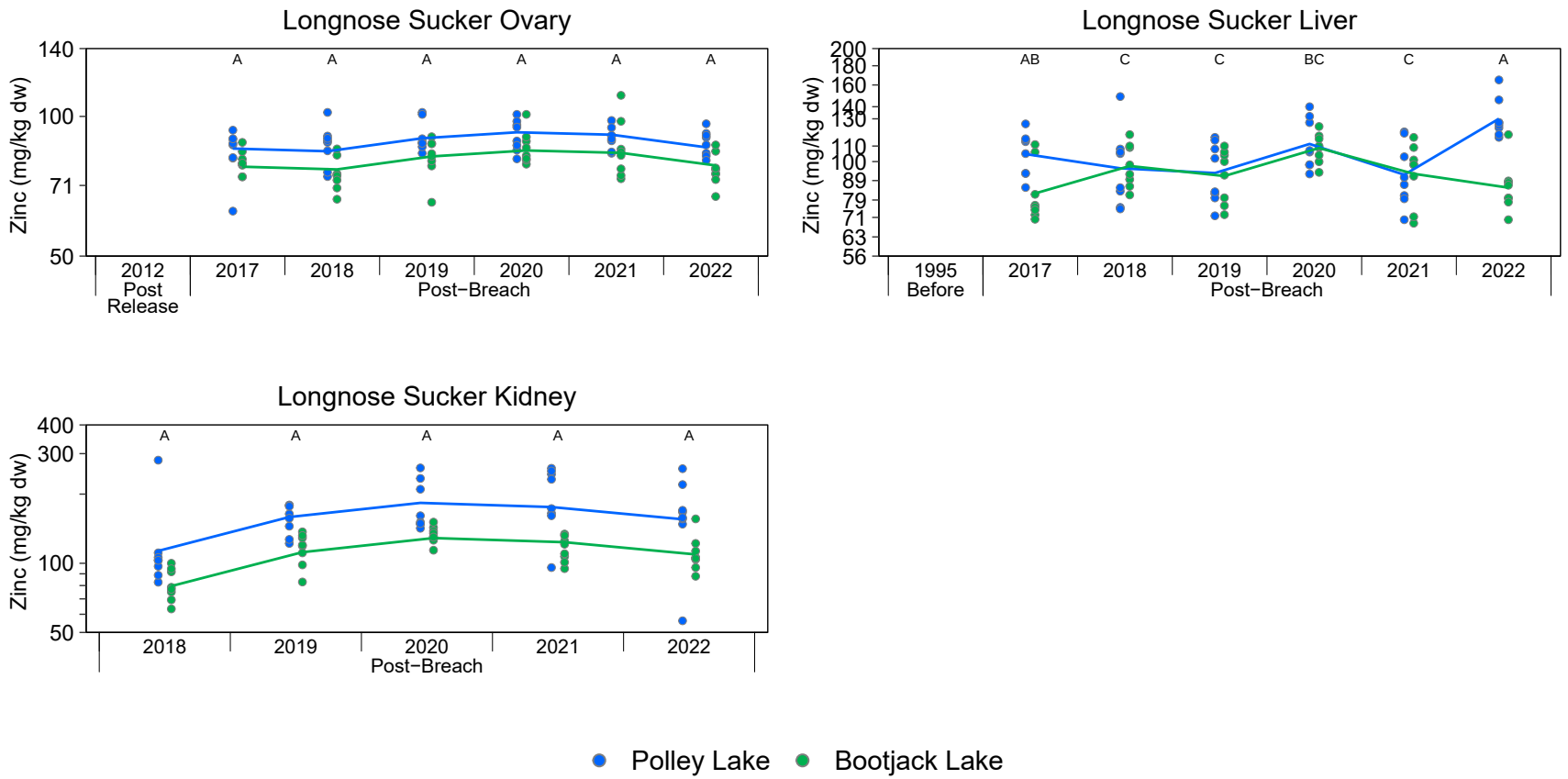

Figure 5.13: Fish Tissue Secondary Analyte Concentrations with a Significant Positive Exposed - Reference Difference for Polley Lake (Exposed) and Bootjack Lake (Reference), 1995 to 2022

Notes: dw = dry weight. Plots are only included for primary analytes that had either a significant Area × Time interaction term and were higher at exposed than reference areas in 2022, or had no significant interaction but had a higher exposed magnitude of difference across all years for a given species and tissue type. Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log-normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Polley Lake:Bootjack Lake) that do not differ significantly (p-value <0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Polley Lake:Bootjack Lake). Only years with samples from both reference and exposed areas are plotted.

rainbow trout liver and kidney were higher in Polley Lake relative to Bootjack Lake in 2022 and the exposed:reference ratios were also significantly greater in 2022 compared to 2015 to 2020 for liver and compared to 2018 to 2021 for kidney (Figure 5.13, Table 5.12; Appendix Tables E.6.4 and E.6.8). Molybdenum concentrations in all longnose sucker tissue types were significantly higher in the fish from Polley Lake relative to reference in 2022. However, molybdenum concentrations in exposed longnose sucker tissues in 2022 were similar to the baseline year, relative to reference, except for liver which had significantly higher concentrations in 2022 than baseline (compared to reference; Figure 5.13, Table 5.12; Appendix Tables E.6.2, E.6.5 to E.6.7). Vanadium concentrations were significantly greater in rainbow trout and longnose sucker liver and kidney in Polley Lake relative to reference, but the exposed:reference ratios in 2022 did not differ significantly from the baseline period. Zinc concentrations in Polley Lake were significantly greater than in Bootjack Lake across all longnose sucker tissues as well as rainbow trout liver; however, in no instance was the exposed:reference ratio in 2022 significantly different from the baseline period (Figure 5.13, Table 5.12; Appendix Tables E.6.4, E.6.8). The lack of consistency in secondary analyte results among tissues, between species, and temporally, suggests the observed changes in secondary analyte concentrations are unlikely to be the result of any persistent mine related effect and could be related to natural variability.

Overall, the results of Polley Lake rainbow trout and longnose sucker tissue quality analysis suggest that selenium concentrations in Polley Lake fish tissue increased in response to the uncontrolled surface runoff (2006 to 2009), and concentrations have remained elevated relative to reference conditions. Selenium concentrations in muscle and ovaries of rainbow trout in 2022 were significantly lower than in 2017 to 2019, relative to reference, and represent their lowest levels throughout the post-breach period. Selenium concentrations in longnose sucker tissues in 2022 were either similar to or lower than in most years since 2017. Increases in the concentrations of other analytes (i.e., arsenic, copper, iron, cobalt, manganese, molybdenum, sodium, vanadium, and zinc) in fish tissues from Polley Lake were also observed (relative to reference) but were inconsistent among tissues, species, and temporally, and are considered equivocal and inconclusive at this time. Continued post-breach monitoring will evaluate potential future changes in metal concentrations in Polley Lake rainbow trout and longnose sucker tissues.

5.1.7 Summary

Sediments were collected from the shallow area of Polley Lake (and reference) in 2022 to support the evaluation of sediment toxicity. Sediments from this area were characterized by concentrations of arsenic, copper, and iron greater than reference concentrations and WSQG. Copper was the most substantially elevated Analyte of Interest, with a mean concentration 3.4

times the upper WSQG. Copper was also the only Analyte of Interest to exceed the lower WSQG in reference sediments, which it exceeded by approximately 2.5 times. Arsenic, copper, and iron concentrations in shallow Polley Lake sediments in 2022 were similar to those reported in the previous sampling event (i.e., 2019), relative to reference, indicating temporal stability of these analyte concentrations. The TOC content of Polley Lake shallow sediments in 2022 was significantly lower than reference and did not change from 2019 to 2022, relative to reference. Overall, the 2022 sediment quality results from the shallow area of Polley Lake indicate temporal stability in the physical and chemical characteristics of these sediments since initiation of monitoring in 2019.

Sediment toxicity testing of the shallow area of Polley Lake (and reference) in 2022 indicated no unacceptable response to survival or growth of *H. azteca* relative to the reference area or the sand control. The survival and growth responses observed in 2022 were similar to those in 2019 when sampling was initiated. Conditions of the CEMP outlined that sediment toxicity testing of the shallow Polley Lake area must be continued "*unless MPMC can clearly show that copper concentrations in all Polley Lake shallow sediment samples are below the 95th percentile of the copper concentrations in the Bootjack Lake reference area shallow sediment samples.*" (BCMOECCS 2021c). This condition was not met in 2022 in Polley Lake shallow sediments, indicating that toxicity testing of these shallow sediments must be completed in three years (in 2025) in accordance with the CEMP conditions.

Phytoplankton community and productivity monitoring in Polley Lake in 2022 indicated that phytoplankton productivity (in terms of chlorophyll-a concentrations) was higher than reference, despite being significantly lower in 2021 and similar between the two lakes in 2019 and 2020. The chlorophyll-a results characterize Polley Lake as mesotrophic and reference (Bootjack Lake) as oligotrophic. While the trophic state of Polley Lake increased from oligotrophic to mesotrophic between 2021 and 2022, this represented a return to the same mesotrophic status observed in Polley Lake in 2019. The phytoplankton community in Polley Lake in 2022 was characterized by higher total density, lower taxon richness, higher Simpson's Diversity and Evenness, higher relative densities of Chlorophytes and Chrysophytes, and lower relative densities of Cyanobacteria compared to reference. Overall, result for most primary endpoints in Polley Lake were similar to or higher than reference in 2022 (density, Simpson's Diversity and Evenness), while those endpoints that were lower than reference (e.g., taxon richness) were temporally stable, suggesting there is no mine-related influence on the phytoplankton community of Polley Lake.

Zooplankton community and productivity monitoring in Polley Lake in 2022 indicated that total zooplankton biomass (dw) was similar to reference, which is consistent with prior years

(2019 to 2021) when biomass was either similar to or higher than reference. The consistently similar or significantly higher total biomass of zooplankton in Polley Lake compared to the reference is indicative of a healthy lentic system, providing critical habitat for fish. The zooplankton community of Polley Lake in 2022 was characterized by total density, taxon richness, and Simpson's Diversity and Evenness that were similar to reference. From 2019 to 2022, the zooplankton community of Polley Lake differed from the reference area in terms of significantly higher and lower density in 2019 and 2021, respectively, lower taxon richness in 2020, and lower Simpson's Diversity and Evenness in 2019 and 2020. Community composition from 2019 to 2022 has consistently been characterized by higher relative densities of Copepod Nauplii and Cyclopoida, and lower relative densities of Rotifera compared to reference. The consistent differences in zooplankton community composition between Polley Lake and the reference area suggests that temporal changes in community composition (which were similar in both areas over time) were likely driven by natural variability in environmental parameters (e.g., water temperature, nutrient availability, phytoplankton community).

Zooplankton tissue quality monitoring in Polley Lake in 2022 indicated that concentrations of primary and secondary analytes in tissues from Polley Lake were similar to or lower than reference except for sodium. Sodium concentrations were significantly greater than reference between 2019 and 2022 but demonstrated temporal stability relative to reference (i.e., did not differ between 2019 and 2022). Concentrations of two primary analytes (arsenic and copper) and three secondary analytes (manganese, mercury, molybdenum) in zooplankton tissue from Polley Lake in 2022 were significantly lower, relative to reference, than in 2019 when replicated sampling was initiated. Concentrations of selenium in zooplankton tissue from Polley Lake were below the BC interim guideline for aquatic life in 2022, which contrasts with prior years when individual zooplankton tissue selenium results have exceeded the guideline (2016, 2017, 2019, and 2021). Selenium concentrations in zooplankton tissue from Polley Lake in 2022 were similar to reference and were significantly lower than in 2020 and 2021 (but not 2019), relative to reference. The temporal stability or decreases in primary and secondary analyte concentrations in zooplankton tissue from Polley Lake in 2022 compared to 2019 was supported by trend analyses of surface water quality data which similarly showed stable or decreasing concentrations for all aqueous primary and secondary analytes except copper and vanadium.

Fish community and population health assessments undertaken from 2019 to 2022 documented the influence of the temporary loss of Hazeltine Creek due to the breach (August 2014 to April 2018), which previously supported the majority of fish recruitment to Polley Lake. Rainbow trout CPUE in spring was higher in 2022 than in all previous years since 2016. Prior to 2022, spring CPUE progressively decreased from 2019 to 2021, and was also substantially lower in all three years than in 2016, consistent with loss of recruitment and

natural mortality of older fish since the breach. As such, the spring CPUE in 2022 suggests that most of the remaining 2018 and a portion of the 2019 cohort has reached maturity which is further supported by spring spawning surveys conducted in Hazeltine Creek that documented the highest abundance of adults since 2019 (Minnow 2023). In the fall of 2022, when fishing was randomized in Polley Lake, CPUE was lower than from 2019 to 2021. However it should be noted that temporal comparisons of CPUE are subject to variability resulting from several factors that can affect the success of netting efforts, which is true even when considering the randomized and standardized fish collection methods employed. The assessment of rainbow trout size distribution provides a more comparable basis for temporally evaluating the population recovery in Polley Lake. Length frequency distributions for rainbow trout over time showed a proportional shift towards smaller and younger fish in 2019, a continued to shift towards a more balanced distribution among size classes with the survivorship of the 2018 and 2019 cohorts, and in 2022, a size class distribution more closely resembling 2016. The length frequency distribution in 2022 had greater resemblance to 2016 than the length frequency distributions from any of the other years (2018 to 2021), suggesting the population has returned to a pre-breach size class distribution. Condition of female rainbow trout in spring 2022 was similar to 2021 but lower than in all prior years (2016 to 2020) whereas growth rate in 2022 was similar to prior years but lower than in 2020. CPUE for longnose sucker in the spring has varied without evidence of a consistent directional trend over time, but CPUE in the fall has progressively decreased from 2016 to 2022. As indicated above, there are several sources of variability that can affect temporal comparisons of CPUE. Length frequency distributions for longnose sucker in Polley Lake from 2016 to 2022 showed more smaller fish were caught in 2022 compared to 2016, as was the case in 2018, 2020, and 2021, suggesting ongoing recruitment success despite the decrease in CPUE since 2016. Condition of longnose sucker females in spring has varied since 2016 but in 2022 was similar to baseline (2016) and weight-at-age also varied, although growth rate in 2022 did not significantly differ from prior years.

Fish tissue quality, evaluated in four tissues (muscle, liver, kidney, and ovary) from rainbow trout and longnose sucker, indicated that mean mercury and selenium concentrations in muscle tissue in 2022 were below guidelines for the protection of human health based on moderate consumption (i.e., indicating that fish are safe for moderate human consumption). The mean selenium concentration in muscle of longnose sucker from Polley Lake in 2022 exceeded the guideline for the protection of human health based on high consumption, which was consistent with data from 2016 (except 2017 and 2021). However, the likelihood that longnose sucker would be consumed at a high rate (i.e., subsistence consumers) is low. Selenium concentrations in ovary tissue in 2022 (the tissue most valuable in the assessment of potential selenium-associated effects on fish) for both species were lower than the BCWQG for the protection of aquatic life in

all individuals except one rainbow trout in 2022 and were below the threshold for reproductive effects in all fish. Selenium concentrations in muscle tissue of rainbow trout and longnose sucker were moderately greater than the guideline for aquatic life, which was consistent with data from 2015 to 2021. Overall, selenium concentrations in Polley Lake fish tissue have remained elevated relative to reference conditions since the uncontrolled runoff from 2006 to 2009 but the difference has not increased over the post-breach period. In fact, selenium concentrations in rainbow trout muscle and ovary tissues were significantly lower in 2022, relative to reference, than in 2017 to 2019. Additionally, selenium concentrations in longnose sucker ovary tissues were significantly lower in 2022, relative to reference, than in 2015 to 2020. This decrease in fish tissue selenium concentrations in Polley Lake corresponds with a decrease in the selenium concentrations in zooplankton tissue (i.e., dietary exposure) in 2022 compared to 2020 and 2021, and with a significant decrease in total and dissolved selenium concentrations in surface waters of Polley Lake from 2015 to 2022. Evidence of a persistent mine influence was not detected for most other analytes assessed in fish tissue in 2022. All primary analytes (arsenic, copper, iron, and selenium), and the secondary analytes cobalt, manganese, molybdenum, nickel, sodium, tin, vanadium, and zinc were elevated relative to reference in 2022 in at least one tissue type in one or both species. However, results for most these analytes (excluding selenium) were inconsistent among tissues and species, and/or were temporally stable or decreased relative to reference, indicating that the weight of evidence does not support a pattern of increasing analyte concentrations over time due to mine-exposure.

5.2 Quesnel Lake

5.2.1 Sediment Quality

Sediment quality monitoring in 2022 was completed at deep (QUL-PNF) and shallow (QUL-LNF1) exposed areas of Quesnel Lake. An unimpacted shallow (QUL-LREF1) area served as reference for the corresponding shallow exposed area (Figure 3.2, Table 3.2). An unimpacted deep reference area (QUL-PREF1) was not sampled in 2022 because monitoring of the deep impacted area (QUL-PNF) focused on evaluating temporal changes within the exposed area. Comparisons to the deep reference area results from prior years (2014 to 2021) are incorporated to support qualitative data interpretation where appropriate (see Section 3.1.3 for details of data analyses). A review of the 2022 sediment and supporting water data quality (Appendix B) indicated that these data can be used with a high or good level of confidence for interpretation, respectively (see Section 5.1.1 for details).

5.2.1.1 Deep Lake Areas

Sediments collected from the exposed deep near-field area (QUL-PNF) of Quesnel Lake in 2022 were composed primarily of silt and clay particles (mean = 46.0% and 43.8%, respectively; Table 5.13). Although QUL-PNF sediment is predominantly fine grained, and has been since 2014, sediments in 2022 had the highest sand content (mean = 10.2%) since initiation of monitoring in 2014 (Table 5.13). Sediments from the deep reference station were not collected in 2022, however, sediments from QUL-PREF1 were composed primarily of silt and sand in 2021 (mean = 68.7% and 20.1%, respectively) and had higher sand content than QUL-PNF sediments (Table 5.13; Appendix Tables C.2.4 and C.2.5). The TOC and total nitrogen content of sediments from QUL-PNF in 2022 (0.614% and 0.0786 %, respectively) were lower than those reported for the reference area in 2021 (2.10% and 0.154%, respectively). Although the TOC content of QUL-PNF has not changed significantly since 2015 (Figure 5.14), mean TOC has increased steadily (but not significantly) from 0.29% in 2015 to 0.61% in 2022 (Table 5.13; Appendix Table E.1.5).

Mean concentrations of 25 out of 34 metal analytes in QUL-PNF sediments (<63 µm fraction) collected in 2022 exceeded reference 95th percentile values (Table 5.13). Among these elements, four (arsenic, copper, iron, and manganese) had mean concentrations which also exceeded the WSQG values (Table 5.13; Appendix Table C.2.5). Specifically, mean arsenic concentrations were greater than the lower WSQG by 2.6 times and mean copper, iron, and manganese concentrations exceeded the upper WSQG by 4.2, 1.03, and 1.2 times, respectively (Figure 5.14, Table 5.13). Mean arsenic, copper, iron, and manganese concentrations in reference sediments collected in 2021 were naturally elevated above the lower BC WSQG (Table 5.13; Appendix Table C.2.4), demonstrating that these elements are somewhat naturally elevated in parts of Quesnel Lake. The mean concentrations of arsenic, copper, and iron in QUL-PNF sediments collected in 2022 were similar to those reported in 2014, and the mean manganese concentration in 2022 was similar to 2015 (Figure 5.14; Appendix Table E.1.5) indicating temporal stability of these analytes in the exposed sediments.

In the fine exposed sediments from QUL-PNF, arsenic and copper were positively correlated with % clay and total sulphur content, and manganese was positively correlated with % clay and total nitrogen and sulphur content (Appendix Figure E.1.4, Appendix Table E.1.11). The correlation of higher analyte concentrations in QUL-PNF sediments with higher clay content (% clay) is consistent with the input of fine tailings-influenced sediments with elevated analyte concentrations to the deep near-field area of Quesnel Lake.

Table 5.13: Summary of Sediment Quality Data for Quesnel Lake at QUL-PNF (Exposed) and QUL-PREF1 (Reference) Deep Areas, 2014 to 2022

Analyte	Units	BC Working Sediment Quality Guidelines [a]		Reference 95th Percentile[b]	Reference QUL-PREF1											
					2014		2015		2016		2018		2019		2021	
		Lower	Upper	QUL-PREF1 (2014 to 2021)	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Physical Tests																
Moisture	%	-	-	62.2	51.8	2.56	53.4	0.802	55	0.828	58.6	4.72	56.1	1.39	53.7	1.45
pH (1:2 soil:water)	pH	-	-	6.44	6.9	0.0744	7.02	0.335	6.52	0.0251	6.78	0.0661	6.48	0.0251	6.5	0.0917
Particle Size																
% Gravel (>2 mm)	%	-	-	1	0.1	-	0.1	-	0.1	-	1	-	1	-	1	-
% Sand (2.0 mm - 0.063 mm)	%	-	-	30.6	23.5	7.23	19.5	5.54	19.8	6.9	15.1	1.67	13.4	3.82	20.1	1.77
% Silt (0.063 mm - 4 µm)	%	-	-	79.4	67.4	7.24	69.8	4.79	69.3	6.17	75.7	1.39	77.5	3.59	68.7	1.87
% Clay (<4 µm)	%	-	-	12.1	9.08	1.17	10.7	1.11	10.9	1.44	9.14	0.434	9.06	0.297	11.2	0.647
Organic / Inorganic Carbon (<63 µm)																
Total Organic Carbon	%	-	-	2.22	1.68	0.0449	1.82	0.144	1.92	0.153	2.12	0.134	1.8	0.191	2.1	0.0546
Nutrients (Bulk sediment)																
Total Nitrogen by LECO	%	-	-	0.182	0.14	0.00829	0.17	0.012	0.158	0.011	0.177	0.0105	0.161	0.0129	0.154	0.0143
Metals (<63 µm)[c]																
Aluminum	mg/kg	-	-	17,100	14,780	760	16,567	945.2	16,060	871	14,880	687	15,900	453	16,480	722
Antimony	mg/kg	-	-	0.47	0.416	0.0182	0.437	0.0306	0.436	0.0219	0.394	0.00894	0.406	0.00894	0.446	0.0134
Arsenic	mg/kg	5.9	17	9.89	7.75	0.69	8.88	0.209	9.58	0.982	7.96	0.514	7.9	0.475	9.02	0.713
Barium	mg/kg	-	-	169	144	6.5	147	4	163	12	145	7.89	159	3.35	157	8.53
Beryllium	mg/kg	-	-	0.5	0.412	0.0228	0.49	0.0361	0.456	0.0195	0.452	0.00837	0.466	0.0114	0.456	0.0329
Bismuth	mg/kg	-	-	0.16	0.14	0.00707	0.157	0.0115	0.154	0.00548	0.142	0.00447	0.144	0.00548	0.128	0.00837
Boron	mg/kg	-	-	10	10	-	10	-	10	-	10	-	10	-	5	-
Cadmium	mg/kg	0.6	3.5	0.475	0.384	0.0289	0.42	0.0555	0.445	0.0374	0.42	0.0203	0.414	0.0253	0.402	0.0219
Calcium	mg/kg	-	-	8,780	7,742	296	8,747	114	7,900	251	7,800	176	7,370	141	8,014	342
Chromium	mg/kg	37.3	90	59.8	52	3.21	57.7	3.59	56.7	3.83	53.7	1.53	54.3	1.55	56.3	1.19
Cobalt	mg/kg	-	-	15.2	13.3	0.658	14.5	0.987	14.6	0.901	13.4	0.297	13.7	0.283	14	0.427
Copper	mg/kg	35.7	197	59.4	42.2	3.34	55.1	4.74	56.1	5.24	46.2	2.1	49	1.28	45.3	2.98
Iron	mg/kg	21,200	43,766	32,300	28,580	1,341	31,300	2,088	30,420	1,244	28,700	612	30,040	871	30,460	537
Lead	mg/kg	35	91.3	8.06	7	0.235	7.65	0.357	7.65	0.423	6.63	0.228	7.09	0.191	6.58	0.161
Lithium	mg/kg	-	-	15.2	13.1	0.518	14.4	1.59	13.5	0.598	13.4	0.268	14.4	0.329	14.3	0.783
Magnesium	mg/kg	-	-	8,510	7,666	382	8,150	678	8,082	454	7,402	205	7,972	229	8,172	234
Manganese	mg/kg	460	1,100	516	470	31.8	491	22	470	17.7	418	20.1	413	18.6	471	61.8
Mercury	mg/kg	0.17	0.486	0.0627	0.0486	0.0024	0.0579	0.00576	0.0551	0.00239	0.0546	0.00235	0.0472	0.0013	0.0578	0.0224
Molybdenum	mg/kg	25	23,000	1.11	0.91	0.0458	1.08	0.107	1.01	0.0636	0.916	0.078	0.964	0.0723	1.02	0.0522
Nickel	mg/kg	16	75	41.2	35.6	2.07	39.1	2.68	39.4	2.76	35.8	0.934	37.1	1.11	38.1	0.94
Phosphorus	mg/kg	-	-	1,400	1,094	32.9	1,180	26.5	1,314	76.7	1,236	62.7	1,274	55.9	1,356	65
Potassium	mg/kg	-	-	1,570	1,312	70.9	1,517	75.7	1,492	87	1,282	23.9	1,270	20	1,390	79.7
Selenium	mg/kg	2	-	1.28	0.86	0.0731	0.97	0.115	0.968	0.0572	0.946	0.0924	0.94	0.0381	1.25	0.132
Silver	mg/kg	0.5	-	0.238	0.188	0.0136	0.214	0.0245	0.223	0.0136	0.195	0.0095	0.214	0.00557	0.204	0.0157
Sodium	mg/kg	-	-	500	396	23	497	25.2	436	27	370	19.6	384	8.92	442	31.3
Strontium	mg/kg	-	-	88.9	74.6	3.17	85.1	3.49	79.3	2.87	74.1	0.63	76.8	2.36	84.6	3.82
Sulphur	mg/kg	-	-	1,400	-	-	1,167	321	1,180	192	1,040	152	1,280	148	866	79.6
Thallium	mg/kg	-	-	0.175	0.157	0.0086	0.174	0.0182	0.166	0.00635	0.146	0.00207	0.152	0.00444	0.148	0.00684
Tin	mg/kg	-	-	0.51	0.408	0.0536	0.453	0.0404	0.466	0.111	0.402	0.0642	0.39	0.0141	0.468	0.0259
Titanium	mg/kg	-	-	1,160	1,036	47	1,130	79.4	1,049	56.4	925.4	62.8	955.8	38	989	67.8
Uranium	mg/kg	-	-	1.51	1.3	0.051	1.46	0.0945	1.44	0.063	1.28	0.0365	1.39	0.0152	1.29	0.0483
Vanadium	mg/kg	-	-	72.3	62.2	3.56	70.1	4.49	67.9	3.74	61.5	1.59	63	1.37	65.1	2.2
Zinc	mg/kg	123	315	85.1	73.7	2.95	79.8	7.18	80.4	7.3	74.3	2.37	80.5	3.6	80.1	3.23
Zirconium	mg/kg	-	-	4.2	-	-	-	-	-	-	-	-	-	-	3.9	0.224

Value is > Lower BC Working Sediment Quality Guideline.
Value is > Upper BC Working Sediment Quality Guideline.

Notes: "-" = no data, ***Bold/Italics -*** Value is > reference 95th percentile value (<5th percentile value for pH), SD - Standard Deviation. QUL-PREF1 was not sampled in 2022, therefore displayed data include to 2021 only and the reference 95th percentile value was calculated using data from 2014 to 2021.

[a] British Columbia Working Sediment Guidelines (BCMOECCS 2021a) and approved BC Sediment Quality Guideline for Selenium (BCMOECCS 2021b).

[b] The 5th percentile is reported and screened for the pH reference data. For calculation of reference 95th percentile values see Appendix Table C.2.4

[c] Total sulphur measured in bulk sediment, not the <63 µm fraction

Table 5.13: Summary of Sediment Quality Data for Quesnel Lake at QUL-PNF (Exposed) and QUL-PREF1 (Reference) Deep Areas, 2014 to 2022

Analyte	Units	BC Working Sediment Quality Guidelines [a]		Reference 95th Percentile[b]	Exposed QUL-PNF															
					2014		2015		2016		2018		2019		2020		2021		2022	
		Lower	Upper	QUL-PREF1 (2014 to 2021)	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Physical Tests																				
Moisture	%	-	-	62.2	37.7	7.38	49.2	16.7	61	2.31	58.5	5	59.9	7.86	57.5	4.73	57.7	2.73	58.9	5.44
pH (1:2 soil:water)	pH	-	-	6.44	8.51	0.09	8.45	0.123	8.43	0.0471	8.25	0.141	8.46	0.073	8.1	0.0688	8.11	0.186	8.1	0.0913
Particle Size																				
% Gravel (>2 mm)	%	-	-	1	0.102	0.00447	0.1	-	0.1	-	1	-	1	-	1	-	1	-	1	-
% Sand (2.0 mm - 0.063 mm)	%	-	-	30.6	7.75	12.6	7	11.9	1.75	1.39	7.28	9.49	3.44	2.69	4.66	3.73	5.36	2.48	10.2	8.04
% Silt (0.063 mm - 4 µm)	%	-	-	79.4	69.6	10.8	57.5	14.6	47.1	4.02	52.5	5.09	50.9	3.65	54.8	10.3	51.8	4.31	46	3.12
% Clay (<4 µm)	%	-	-	12.1	***22.6***	11.9	***35.5***	***19.4***	***51.1***	4.89	***40.4***	***13***	***45.7***	5.6	***40.6***	10.3	***42.9***	4.95	***43.8***	6.46
Organic / Inorganic Carbon (<63 µm)																				
Total Organic Carbon	%	-	-	2.22	0.166	0.0619	0.294	0.173	0.346	0.0844	0.568	0.495	0.518	0.12	0.507	0.0836	0.567	0.186	0.614	0.111
Nutrients (Bulk sediment)																				
Total Nitrogen by LECO	%	-	-	0.182	0.0228	0.00522	0.0434	0.0163	0.0388	0.00606	0.063	0.0345	0.047	0.00927	0.0742	0.0106	0.058	0.0215	0.0786	0.0174
Metals (<63 µm)[c]																				
Aluminum	mg/kg	-	-	17,100	***20,800***	3,949	***26,520***	8,065	***35,340***	1,341	***31,060***	3,112	***32,680***	4,954	***27,020***	2,500	***28,700***	2,482	***30,560***	2,315
Antimony	mg/kg	-	-	0.47	***0.516***	0.0688	***0.554***	0.0907	***0.628***	0.0179	***0.542***	0.0402	***0.65***	0.0735	***0.56***	0.0579	***0.642***	0.0363	***0.506***	0.0134
Arsenic	mg/kg	5.9	17	9.89	***15.4***	2.01	***15.4***	1.53	***18.5***	0.652	***15.4***	1.45	***16.5***	1.17	***14.9***	0.526	***15.7***	0.887	***15.6***	0.469
Barium	mg/kg	-	-	169	***225***	35.8	***255***	58	***361***	12.9	***296***	44.3	***357***	35.5	***294***	22.8	***274***	24.7	***271***	16.8
Beryllium	mg/kg	-	-	0.5	***0.79***	0.161	***0.96***	0.253	***1.12***	0.0492	***0.99***	0.11	***1.11***	0.134	***0.936***	0.104	***0.946***	0.0594	***1***	0.0802
Bismuth	mg/kg	-	-	0.16	0.104	0.00894	0.134	0.0329	0.158	0.00837	0.15	0.0158	0.156	0.0207	***0.174***	0.0313	0.146	0.0182	0.158	0.00837
Boron	mg/kg	-	-	10	***10.6***	0.548	***11.4***	1.34	***11.8***	0.447	***11***	0.707	***11.8***	1.3	***10.4***	0.577	***10.3***	0.541	***10.3***	0.873
Cadmium	mg/kg	0.6	3.5	0.475	0.164	0.0271	0.197	0.0446	0.263	0.0141	0.238	0.0186	0.259	0.0349	0.221	0.0203	0.226	0.0274	0.246	0.00453
Calcium	mg/kg	-	-	8,780	***33,340***	4,053	***31,160***	2,792	***31,840***	1,036	***24,360***	5,178	***28,360***	2,405	***20,400***	3,310	***23,220***	3,869	***22,040***	2,318
Chromium	mg/kg	37.3	90	59.8	14.3	3.02	20.9	4.27	23.9	1.42	30.6	6.7	26.3	3.61	28	5.08	27.9	4.59	29.4	1.87
Cobalt	mg/kg	-	-	15.2	***19.4***	2.9	***25.5***	8.57	***34.6***	1.69	***26.8***	3.26	***30.1***	5.79	***22.3***	2.14	***23.8***	2.95	***25.8***	1.86
Copper	mg/kg	35.7	197	59.4	***714***	***111***	***859***	***304***	***1,210***	54.3	***846***	***185***	***1,059***	***201***	***784***	***81.9***	***806***	***113***	***835***	***80.2***
Iron	mg/kg	21,200	43,766	32,300	***37,240***	17,475	***40,620***	5,418	***38,620***	1,117	***40,860***	3,004	***41,220***	2,678	***39,260***	6,523	***38,780***	4,713	***45,100***	3,421
Lead	mg/kg	35	91.3	8.06	7.09	1.46	***9.9***	2.98	***12.6***	0.436	***11.3***	1.48	***12.1***	1.56	***12.3***	2.2	***11.1***	1.45	***12***	0.548
Lithium	mg/kg	-	-	15.2	***20.5***	4.21	***29.8***	10.9	***36.6***	2.59	***30***	3.76	***35.5***	6.7	***27.9***	2.95	***29.5***	3.96	***30.1***	2.44
Magnesium	mg/kg	-	-	8,510	***12,958***	2,560	***17,320***	6,916	***24,740***	1,488	***18,920***	2,943	***21,580***	4,593	***15,300***	1,744	***16,920***	2,756	***18,180***	1,933
Manganese	mg/kg	460	1,100	516	***797***	119	***1,033***	265	***1,348***	71.6	***1,290***	179	***1,358***	195	***1,344***	165	***1,398***	283	***1,292***	82.3
Mercury	mg/kg	0.17	0.486	0.0627	***0.0697***	0.00747	***0.0954***	0.0192	***0.101***	0.0061	-	-	***0.0983***	0.0107	***0.0896***	0.00735	***0.0909***	0.0117	***0.099***	0.00402
Molybdenum	mg/kg	25	23,000	1.11	***3.76***	0.27	***4.05***	0.718	***4.44***	0.154	***3.6***	0.681	***4.38***	0.559	***3.48***	0.216	***3.56***	0.307	***3.41***	0.214
Nickel	mg/kg	16	75	41.2	12.9	2.26	20.2	5.51	25.7	1.62	26.8	3.77	25.5	3.78	25.9	4.29	25.1	3.98	27.3	1.64
Phosphorus	mg/kg	-	-	1,400	***1,706***	125	1,352	240	1,400	105	1,198	121	1,292	137	1,224	173	1,296	219	1,260	66.7
Potassium	mg/kg	-	-	1,570	***1,942***	353	***2,640***	713	***4,140***	259	***2,922***	327	***3,198***	397	***2,450***	334	***2,500***	217	***2,736***	219
Selenium	mg/kg	2	-	1.28	1.07	0.177	1.23	0.368	***1.53***	0.087	1.21	0.0952	***1.46***	0.282	1.02	0.0847	1.18	0.161	1.13	0.0917
Silver	mg/kg	0.5	-	0.238	***0.332***	0.0399	***0.369***	0.0857	***0.446***	0.0151	***0.354***	0.0503	***0.423***	0.0645	***0.354***	0.0255	***0.349***	0.0231	***0.353***	0.0152
Sodium	mg/kg	-	-	500	***1,118***	206	***1,396***	331	***2,018***	165	***1,400***	174	***1,502***	143	***1,093***	82	***1,124***	137	***1,142***	76.9
Strontium	mg/kg	-	-	88.9	***188***	29.4	***212***	36.4	***238***	6.11	***205***	31	***239***	25.5	***223***	10.3	***229***	20.6	***213***	13.3
Sulphur	mg/kg	-	-	1,400	-	-	***1,560***	182	1,360	54.8	-	-	960	89.4	790	87.5	694	173	940	141
Thallium	mg/kg	-	-	0.175	0.05	-	0.0596	0.00879	0.0688	0.00295	0.0764	0.0203	0.0722	0.00792	0.0786	0.0155	0.075	0.0123	0.0836	0.00802
Tin	mg/kg	-	-	0.51	***2.05***	0.39	***1.99***	0.425	***2.32***	0.105	***1.83***	0.314	***2.19***	0.304	***1.66***	0.0936	***1.88***	0.123	***1.74***	0.118
Titanium	mg/kg	-	-	1,160	***1,946***	277	***1,996***	410	***2,380***	82.8	***1,984***	239	***2,192***	290	***1,758***	108	***1,832***	128	***1,786***	133
Uranium	mg/kg	-	-	1.51	1.43	0.285	1.39	0.191	***1.62***	0.0434	1.45	0.161	***1.52***	0.168	1.49	0.0999	1.37	0.08	1.48	0.104
Vanadium	mg/kg	-	-	72.3	***145***	68.1	***142***	26.3	***140***	5.1	***129***	14.5	***134***	6.83	***125***	23.1	***123***	10.3	***140***	15.9
Zinc	mg/kg	123	315	85.1	69	11.1	***96***	33.2	***129***	6.94	***101***	9.11	***119***	21.9	***87***	10.4	***95.5***	10.7	***101***	6.69
Zirconium	mg/kg	-	-	4.2	-	-	-	-	-	-	-	-	-	-	***6.52***	0.487	***6.94***	1.05	***5.18***	0.409

Value is > Lower BC Working Sediment Quality Guideline.
Value is > Upper BC Working Sediment Quality Guideline.

Notes: "-" = no data, ***Bold/Italics -*** Value is > reference 95th percentile value (<5th percentile value for pH), SD - Standard Deviation. QUL-PREF1 was not sampled in 2022, therefore displayed data include to 2021 only and the reference 95th percentile value was calculated using data from 2014 to 2021.

[a] British Columbia Working Sediment Guidelines (BCMOECCS 2021a) and approved BC Sediment Quality Guideline for Selenium (BCMOECCS 2021b).

[b] The 5th percentile is reported and screened for the pH reference data. For calculation of reference 95th percentile values see Appendix Table C.2.4

[c] Total sulphur measured in bulk sediment, not the <63 µm fraction

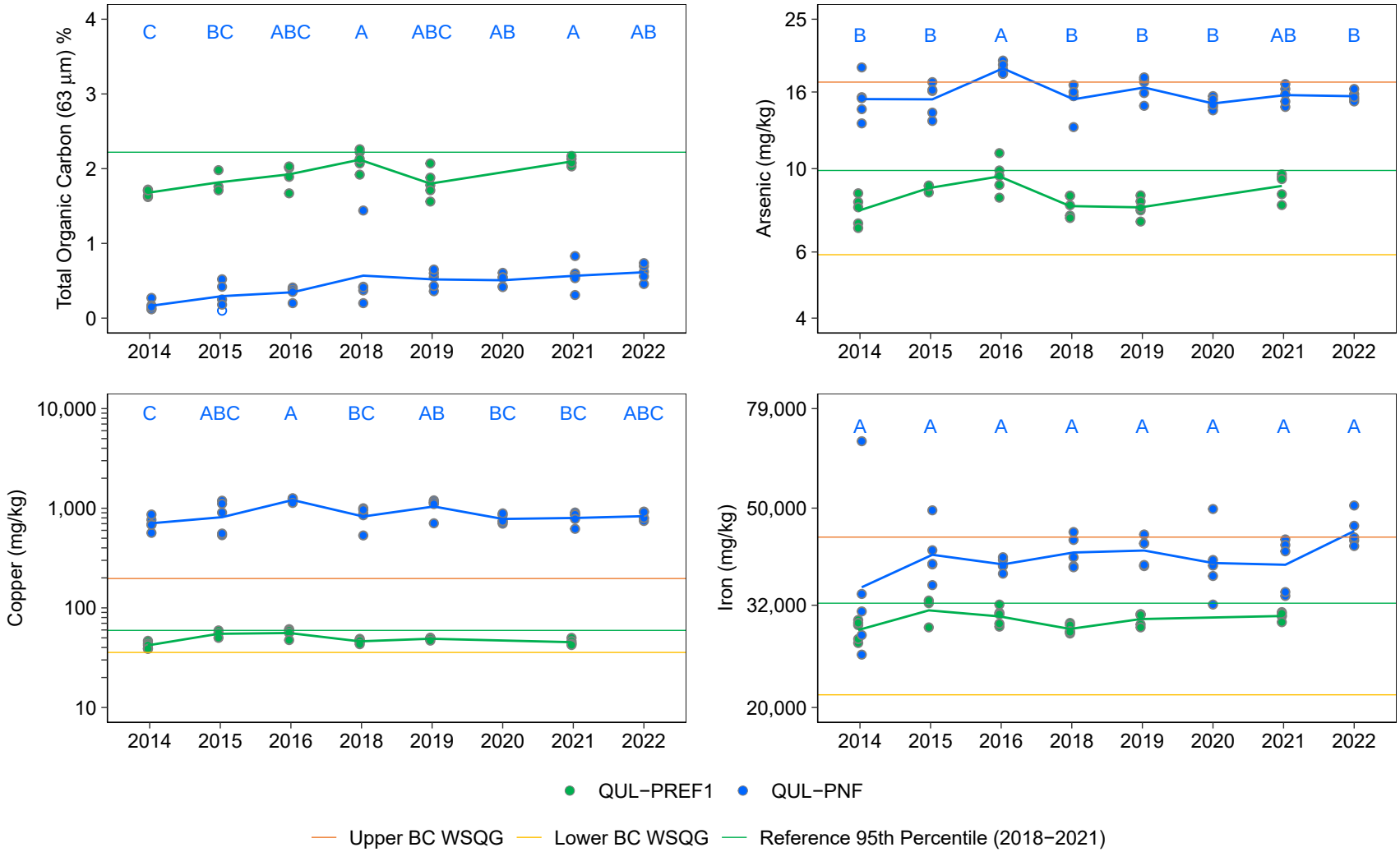

Figure 5.14: Sediment Analyte of Interest Concentrations (<63 µm Fraction) for Quesnel Lake at QUL-PNF (Exposed) and QUL-PREF1 (Reference) Deep Areas, 2014 to 2022

Notes: BC WSQG = British Columbia Working Sediment Quality Guideline (BCMOECCS 2021a) and approved BC Sediment Quality Guideline for Selenium (BCMOECCS 2021b). The reference 95th Percentile (QUL-PREF1) was calculated using data from 2014 to 2021. Green represents reference areas and other colours represent exposed areas. Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Individual samples are plotted and lines join the least squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Years that share a letter (e.g., A,B,C) have concentrations that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest concentration.

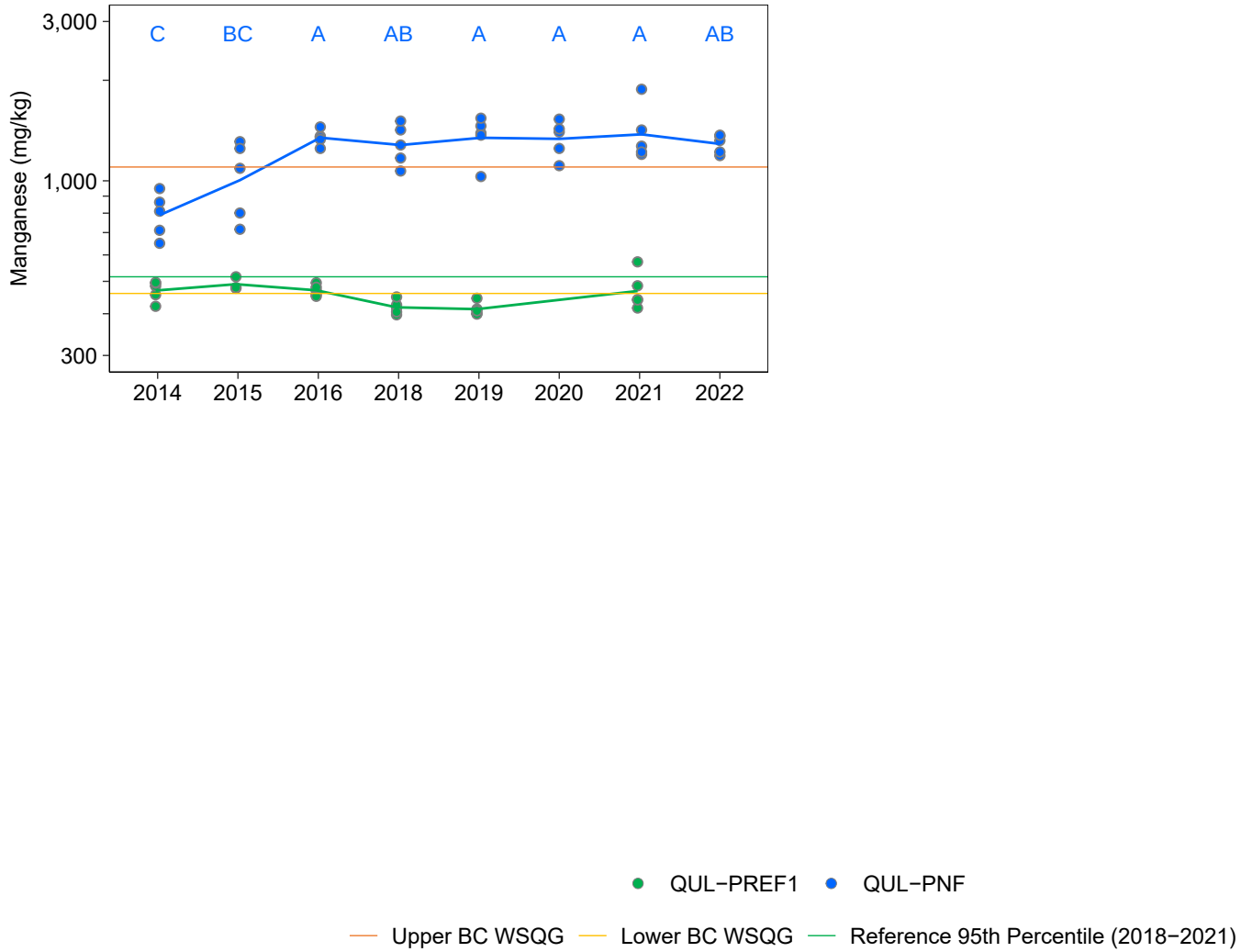

Figure 5.14: Sediment Analyte of Interest Concentrations (<63 µm Fraction) for Quesnel Lake at QUL-PNF (Exposed) and QUL-PREF1 (Reference) Deep Areas, 2014 to 2022

Notes: BC WSQG = British Columbia Working Sediment Quality Guideline (BCMOECCS 2021a) and approved BC Sediment Quality Guideline for Selenium (BCMOECCS 2021b). The reference 95th Percentile (QUL-PREF1) was calculated using data from 2014 to 2021. Green represents reference areas and other colours represent exposed areas. Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Individual samples are plotted and lines join the least squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Years that share a letter (e.g., A,B,C) have concentrations that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest concentration.

The 2022 monitoring results indicate that physical and chemical characteristics of the exposed near-field sediments appear stable, with few changes occurring since post-breach monitoring began. This is consistent with the low sediment deposition rate observed at this deep exposed area, with approximately 1 cm of fresh sediment deposition after 7 to 10 years (Minnow 2019a).

5.2.1.2 Shallow Lake Areas

Sediments collected from the shallow near-field exposed area of Quesnel Lake (QUL-LNF1) in 2022 were predominantly sand with some silt (mean = 92.8% and 6.02%, respectively) which was consistent with the sediments collected from this area in previous post-breach years (2015 to 2021; Table 5.14). The high sand content was visually evident during sample collection and was likely a result of continued washing of fine particles from these shallow sampling locations towards deeper areas of the lake. The exposed sediments in 2022 were higher in sand content and lower in silt content than the corresponding reference sediments (QUL-LREF1; mean = 61.4% sand, 32.5% silt; Table 5.14), which were also consistent with the sediments collected from prior years (2014 to 2021; Table 5.14; Appendix Tables C.2.7 to C.2.9). The TOC and total nitrogen content of the shallow near-field exposed sediment collected in 2022 (mean = 0.826% and 0.0236%, respectively) were lower than in the reference sediment (mean = 1.40% and 0.078%, respectively; Table 5.14; Appendix Tables C.2.7 and C.2.9), which was consistent with the dominance of sand at this exposed area. Mean TOC concentrations of QUL-LNF1 sediments have been stable, relative to reference, since the initiation of sampling in 2014 (Figure 5.15; Appendix Table E.1.9). Although not significant relative to reference, mean TOC concentrations at QUL-LNF1 have been slightly higher since 2019 (compared to 2014 to 2016; Appendix Table E.1.10), when the shallow near-field area was relocated[55] due to low water levels in Quesnel Lake (see Minnow 2020a for details).

The mean concentrations of 22 out of 34 analytes in the exposed sediments (<63 µm fraction) collected in 2022 at QUL-LNF1 exceeded both reference and pre-breach 95th percentile values (Table 5.14; Appendix Tables C.2.7 and C.2.8). Among these elements, five analytes (arsenic, copper, iron, manganese, and silver) also had mean concentrations that exceeded the WSQG (Figure 5.15, Table 5.14; Appendix Table C.2.9). Specifically, arsenic and silver concentrations in QUL-LNF1 sediments exceeded the lower WSQG by 2.6 and 1.04

[55] The shallow near-field area of Quesnel Lake (QUL-LNF1) was moved in 2019 from its previous location due to variable water levels in the lake. Specifically, QUL-LNF1 stations that were originally sampled in 2015 to 2016 were either dry in 2019 or only very shallow (<0.5 m depth). As such, the QUL-LNF1 monitoring locations were moved in 2019 to adjacent locations that were deeper and continually submerged. These sediment stations established in 2019 were resampled in 2020, 2021, and 2022 (see Minnow 2020 for details).

Table 5.14: Summary of Sediment Quality Data for Quesnel Lake at QUL-LNF1 (Exposed) and QUL-LREF1 (Reference) Shallow Areas, 2007 to 2022

Analyte	Units	BC Working Sediment Quality Guidelines [a]		Reference 95th Percentile [b]		Reference QUL-LREF1													
						2014		2015		2016		2019		2020		2021		2022	
		Lower	Upper	Pre-Breach (QUL-LNF1; 2007)	Reference (QUL-LREF1; 2014 to 2022)	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Physical Tests																			
Moisture	%	-	-	-	44.9	40.7	2.73	40.8	3.76	33.4	3.73	43.2	3.41	41.4	1.23	36.3	5.17	30.5	2.97
pH (1:2 soil:water)	pH	-	-	-	5.92	6.56	0.16	6.97	0.235	6.14	0.32	6.5	0.386	6.43	0.196	6.3	0.3	6.12	0.165
Particle Size																			
% Gravel (>2 mm)	%	-	-	7	5.4	1.02	0.647	1.49	0.782	1.81	1.23	2.38	2.01	5.4	9.4	2.42	1.61	2.5	1.2
% Sand (2.0 mm - 0.063 mm)	%	-	-	58	74.9	59.7	6.37	60	4.65	64	17.3	52.8	9.32	66.3	10.3	60.1	2.63	61.4	8.9
% Silt (0.063 mm - 4 µm)	%	-	-	53	58.1	35.1	6.48	33.9	3.73	30.8	16.4	42.1	10.1	26.2	6.86	34.5	4.33	32.5	8.17
% Clay (<4 µm)	%	-	-	9	5.85	4.17	0.59	4.64	1.66	3.39	1.62	3.1	1.11	2.46	0.305	3.4	0.485	3.72	0.691
Organic / Inorganic Carbon (<63 µm)																			
Total Organic Carbon	%	-	-	2.45	1.87	1.12	0.186	1.47	0.214	1.19	0.137	1.27	0.331	1.52	0.316	1.43	0.406	1.4	0.354
Nutrients (Bulk sediment)																			
Total Nitrogen by LECO	%	-	-	-	0.101	0.0658	0.00497	***0.104***	0.00945	0.0534	0.0114	0.0792	0.0128	0.0766	0.00351	0.057	0.0119	0.078	0.0134
Metals (<63 µm)[c]																			
Aluminum	mg/kg	-	-	12,500	17,100	13,260	1,383	13,133	723	11,294	1,726	12,440	1,050	14,160	1,260	13,840	2,297	15,800	1,355
Antimony	mg/kg	-	-	<10.0	0.35	0.296	0.0513	0.31	0.0173	0.256	0.0219	0.264	0.027	0.304	0.0313	0.292	0.0402	0.288	0.0356
Arsenic	mg/kg	5.9	17	7.5	5.71	4.08	0.774	4.54	0.781	3.95	0.643	3.56	0.388	4.74	0.7	4.56	1.07	4.72	0.709
Barium	mg/kg	-	-	91.4	149	124	7.76	115	7.64	109	9.48	114	23.7	129	14.4	128	10.5	126	11.1
Beryllium	mg/kg	-	-	<0.50	0.45	0.35	0.0354	0.367	0.0351	0.324	0.0336	0.324	0.0261	0.386	0.0451	0.348	0.0476	0.412	0.0286
Bismuth	mg/kg	-	-	<20.0	0.14	0.112	0.0179	0.11	0.01	0.1	-	0.1	-	0.116	0.0182	0.106	0.00894	0.108	0.013
Boron	mg/kg	-	-	-	10	10	-	10	-	10	-	10	-	5	-	5	-	5	-
Cadmium	mg/kg	0.6	3.5	<0.50	0.388	0.313	0.0341	0.33	0.0378	0.296	0.028	0.279	0.0275	0.329	0.0575	0.307	0.0488	0.326	0.049
Calcium	mg/kg	-	-	5,660	8,680	7,136	533	7,483	603	6,420	555	6,746	238	7,446	519	7,872	1,107	8,070	399
Chromium	mg/kg	37.3	90	32.3	60.3	49.5	4.11	49.7	3.66	47.8	5.91	49.1	2.26	54.7	3.99	54.3	4.53	55.8	2.69
Cobalt	mg/kg	-	-	9.6	13.3	10.3	1.41	10.8	0.927	9.6	0.972	9.85	0.814	11.2	1.42	11.1	2.09	11.5	1.17
Copper	mg/kg	35.7	197	29.6	35.8	30.3	3.69	31.6	3.2	27.8	2.68	26.6	3.52	33.3	2.39	30.2	4.8	32.1	3.8
Iron	mg/kg	21,200	43,766	23,100	28,200	23,680	2,187	23,200	1,709	22,240	1,817	22,060	611	24,720	1,711	24,400	2,913	26,040	1,762
Lead	mg/kg	35	91.3	<30.0	6.47	5.27	0.613	5.78	0.658	5.06	0.394	4.53	0.48	5.74	0.698	5.17	0.756	5.63	0.637
Lithium	mg/kg	-	-	13.2	13.7	11.5	1.43	11	0.85	11.1	1.49	10.2	1.27	12.1	1.29	10.7	1.74	11.9	1.45
Magnesium	mg/kg	-	-	5,770	8,320	6,360	501	6,420	495	5,892	640	6,122	478	7,004	473	7,384	876	7,536	560
Manganese	mg/kg	460	1,100	514	443	309	53.2	322	41.3	254	22.4	281	38.6	353	69.7	347	99.2	363	53.9
Mercury	mg/kg	0.17	0.486	0.0729	0.0471	0.0377	0.00611	0.0438	0.0066	0.0357	0.00698	0.0289	0.00269	0.0334	0.00312	0.031	0.00611	0.0354	0.00576
Molybdenum	mg/kg	25	23,000	<4.0	1.1	0.782	0.0817	0.833	0.15	0.796	0.121	0.748	0.113	0.95	0.135	0.838	0.188	0.776	0.151
Nickel	mg/kg	16	75	21.1	34.6	29.3	3.4	30.7	2.74	28.2	2.63	26.7	2.28	31.1	2.89	29.2	4.12	31.5	2.62
Phosphorus	mg/kg	-	-	-	1,240	1,136	88.5	1,143	41.6	1,055	58.9	1,130	103	1,184	56.8	1,148	89.3	1,138	47.6
Potassium	mg/kg	-	-	890	1,510	1,120	170	1,213	125	992	104	1,026	75.7	1,166	118	1,216	202	1,390	186
Selenium	mg/kg	2	-	<2.0	0.93	0.584	0.107	0.637	0.0945	0.562	0.0507	0.506	0.121	0.826	0.123	0.664	0.165	0.678	0.139
Silver	mg/kg	0.5	-	<2.0	0.174	0.144	0.0194	0.148	0.0119	0.138	0.00986	0.127	0.0221	0.152	0.0188	0.15	0.038	0.144	0.0181
Sodium	mg/kg	-	-	240	546	386	16.7	460	20	348	21.7	380	20.2	413	19.7	446	53.2	516	38.9
Strontium	mg/kg	-	-	58.5	83.7	63.3	6.58	68.9	6.3	55.7	5.97	62.5	4.66	71.8	5.47	71.2	11.3	75.5	5.29
Sulphur	mg/kg	-	-	-	720	-	-	500	-	680	192	560	89.4	594	83.5	500	-	508	13
Thallium	mg/kg	-	-	<1.0	0.147	0.123	0.0198	0.12	0.0146	0.103	0.00868	0.098	0.00957	0.116	0.0158	0.108	0.0175	0.125	0.0165
Tin	mg/kg	-	-	<5.0	0.57	0.354	0.0467	0.38	0.01	0.352	0.113	0.35	0.0265	0.384	0.0619	0.464	0.0835	0.502	0.0438
Titanium	mg/kg	-	-	607	1,180	989.8	85.9	935.7	34.9	864	114	965	54.8	1,065	76.3	1,071	116	1,076	53.7
Uranium	mg/kg	-	-	-	1.39	0.988	0.142	1.14	0.137	1.04	0.0771	0.958	0.0675	1.25	0.147	1.07	0.181	1.23	0.124
Vanadium	mg/kg	-	-	54.9	68.7	56.9	4.08	57	3.76	53.4	5.28	55.5	2.61	61.9	4.16	62.2	5.62	64.4	2.64
Zinc	mg/kg	123	315	46.7	70.4	60.8	6.45	62.3	4.42	54.3	4.8	57.3	5.41	61.4	6.1	62.6	8.37	63.8	5.36
Zirconium	mg/kg	-	-	-	4.3	-	-	-	-	-	-	-	-	3.82	0.327	4.12	0.13	3.34	0.241

Value is > Lower BC Working Sediment Quality Guideline.

Value is > Upper BC Working Sediment Quality Guideline.

Notes: "-" = no data, ***Bold/Italics*** - Exposed value is > both reference and pre-breach 95th percentile values; reference value is > reference 95th percentile value (<5th percentile value for pH); SD - Standard Deviation. Mean values reported as < the laboratory reporting limit were not screened against guidelines or reference 95th percentile. Pre-breach values that were reported as < the laboratory reporting limit were not used for screening.

[a] British Columbia Working Sediment Guidelines (BCMOECCS 2021a) and approved BC Sediment Quality Guideline for Selenium (BCMOECCS 2021b).

[b] The 5th percentile is reported and screened for the pH reference data. Pre-breach values that were reported as < the laboratory reporting limit were not used for screening. For calculation of reference 95th percentile values see Appendix Table C.2.2 and for calculation of pre-breach 95th percentile values see Appendix Table C.2.4.

[c] Total sulphur measured in bulk sediment, not the <63 µm fraction.

Table 5.14: Summary of Sediment Quality Data for Quesnel Lake at QUL-LNF1 (Exposed) and QUL-LREF1 (Reference) Shallow Areas, 2007 to 2022

Analyte	Units	BC Working Sediment Quality Guidelines [a]		Reference 95th Percentile [b]		Exposed QUL-LNF1															
						2007		2014		2015		2016		2019		2020		2021		2022	
		Lower	Upper	Pre-Breach (QUL-LNF1; 2007)	Reference (QUL-LREF1; 2014 to 2022)	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Physical Tests																					
Moisture	%	-	-	-	44.9	-	-	32.6	4.82	25.4	6.19	22.8	5.02	26.1	4.31	29.3	3.74	23.5	3.5	23.9	1.41
pH (1:2 soil:water)	pH	-	-	-	5.92	-	-	8.48	0.207	7.95	0.703	8.54	0.0554	8.68	0.136	8.31	0.722	8.51	0.224	8.35	0.218
Particle Size																					
% Gravel (>2 mm)	%	-	-	7	5.4	3.40	2.51	1.15	2.34	2.02	3	3.54	4.52	2.12	2.5	1.84	1.88	3.54	5.68	1.04	0.0894
% Sand (2.0 mm - 0.063 mm)	%	-	-	58	74.9	44.4	11.7	49.2	2.14	***82.4***	17.7	***89.2***	4.52	***95.1***	3.01	***91.2***	11.4	***90.7***	6.13	***92.8***	2.79
% Silt (0.063 mm - 4 µm)	%	-	-	53	58.1	44.6	8.08	41.7	2.01	14.8	14.7	6.67	3.55	3.34	1.65	7.46	9.26	6.26	1.64	6.02	2.93
% Clay (<4 µm)	%	-	-	9	5.85	7.20	2.05	8.07	1.82	0.786	0.405	0.628	0.129	1	-	1	-	1.12	0.268	1.12	0.164
Organic / Inorganic Carbon (<63 µm)																					
Total Organic Carbon	%	-	-	2.45	1.87	1.89	0.432	0.214	0.0706	0.35	0.198	0.122	0.0787	0.708	0.329	0.805	0.228	0.528	0.158	0.826	0.349
Nutrients (Bulk sediment)																					
Total Nitrogen by LECO	%	-	-	-	0.101	-	-	0.02	-	0.0316	0.00598	0.02	-	0.02	-	0.025	0.00959	0.02	-	0.0236	0.00568
Metals (<63 µm)[c]																					
Aluminum	mg/kg	-	-	12,500	17,100	10,700	1,380	***17,920***	887	12,314	2,265	10,632	2,246	14,960	1,780	14,860	2,321	13,564	2,787	13,980	2,848
Antimony	mg/kg	-	-	<10.0	0.35	***<10.0***	-	***0.426***	0.023	***0.43***	0.0464	***0.364***	0.055	***0.552***	0.0736	***0.544***	0.123	***0.524***	0.0764	***0.478***	0.0497
Arsenic	mg/kg	5.9	17	7.5	5.71	6.00	0.773	***13***	0.493	***15***	1.34	***14.6***	1.51	***18.7***	0.986	***15.5***	3.84	***16.4***	1.37	***15.4***	2.83
Barium	mg/kg	-	-	91.4	149	79.0	9.99	***195***	12.7	105	20.6	97.2	34.1	***156***	30.4	***155***	45.6	123	25.7	111	29.2
Beryllium	mg/kg	-	-	<0.50	0.45	***<0.500***	-	***0.676***	0.0477	***0.518***	0.0626	***0.488***	0.0698	***0.594***	0.0483	***0.53***	0.11	***0.514***	0.0669	***0.496***	0.0706
Bismuth	mg/kg	-	-	<20.0	0.14	***<20.0***	-	0.1	-	0.102	0.00447	0.11	0.0173	***0.15***	0.0212	***0.148***	0.0295	0.122	0.0179	0.13	0.02
Boron	mg/kg	-	-	-	10	-	-	10	-	10	-	10	-	10	-	7.84	1.84	7.54	1.24	7.3	1
Cadmium	mg/kg	0.6	3.5	<0.50	0.388	***<0.500***	-	0.133	0.0135	0.218	0.0464	0.168	0.0314	0.346	0.0782	0.285	0.0667	0.281	0.0465	0.343	0.128
Calcium	mg/kg	-	-	5,660	8,680	5,110	394	***28,300***	1,701	***20,300***	1,198	***20,920***	1,994	***22,740***	2,950	***19,220***	5,893	***20,860***	1,968	***16,780***	2,083
Chromium	mg/kg	37.3	90	32.3	60.3	27.7	3.63	15.5	1.58	34.7	7.84	35.9	10.3	52.5	13.8	58.9	21.6	54.5	18.4	51.4	11.8
Cobalt	mg/kg	-	-	9.6	13.3	8.02	1.12	***20.3***	0.85	***23.5***	6.05	***25.2***	6.19	***28.1***	7.21	***23.3***	6.94	***30.4***	9.31	***28***	9.49
Copper	mg/kg	35.7	197	29.6	35.8	23.0	3.99	***652***	52.6	***648***	140	***659***	212	***1,644***	433	***1,328***	676	***1,077***	208	***1,122***	510
Iron	mg/kg	21,200	43,766	23,100	28,200	19,600	2,880	***62,740***	7,313	***119,880***	54,185	***142,020***	48,744	***129,940***	64,269	***105,920***	45,297	***162,340***	83,211	***152,520***	98,091
Lead	mg/kg	35	91.3	<30.0	6.47	***<30.0***	-	5.76	0.203	6.4	0.66	5.92	1.01	***8.96***	1.03	***9.17***	2.22	***7.5***	0.831	***8.15***	1.68
Lithium	mg/kg	-	-	13.2	13.7	11.3	1.70	***18.2***	1.22	13.2	1.55	12.3	1.78	***16.4***	1.73	***15.7***	2.55	13.4	1.59	***13.9***	1.86
Magnesium	mg/kg	-	-	5,770	8,320	4,960	762	***11,320***	694	6,924	1,117	6,210	1,085	***9,400***	1,179	***8,652***	1,496	***8,774***	1,282	7,804	1,583
Manganese	mg/kg	460	1,100	514	443	359	92.4	***695***	38.4	***750***	100	***630***	96.2	***1,006***	97.3	***983.8***	250	***1,140***	184	***1,146***	266
Mercury	mg/kg	0.17	0.486	0.0729	0.0471	0.0517	0.0125	***0.0773***	0.00371	***0.101***	0.0151	***0.1***	0.0261	***0.127***	0.024	***0.103***	0.0243	***0.116***	0.0214	***0.129***	0.0375
Molybdenum	mg/kg	25	23,000	<4.0	1.1	***<4.00***	-	***3.75***	0.201	***3.38***	0.415	***3.17***	0.544	***5.44***	1.07	***5.44***	2.72	***4.02***	1.15	***2.68***	0.647
Nickel	mg/kg	16	75	21.1	34.6	17.5	2.60	12.2	0.456	18.8	2.51	17.6	3.96	27.5	3.94	31.1	7.54	24.7	3.6	25.6	2.54
Phosphorus	mg/kg	-	-	-	1,240	-	-	***1,660***	142	***1,946***	285	***2,024***	259	***1,766***	30.5	***1,572***	186	***1,758***	167	***1,542***	138
Potassium	mg/kg	-	-	890	1,510	736	131	***1,786***	87.9	920	231	736	213	992	144	1,028	132	978	214	990	245
Selenium	mg/kg	2	-	<2.0	0.93	***<2.00***	-	***1.02***	0.0324	***1.16***	0.166	***1.07***	0.264	***1.99***	0.416	***1.57***	0.556	***1.61***	0.302	***1.41***	0.416
Silver	mg/kg	0.5	-	<2.0	0.174	***<2.00***	-	***0.325***	0.0242	***0.368***	0.033	***0.414***	0.0987	***0.778***	0.179	***0.612***	0.251	***0.515***	0.101	***0.521***	0.217
Sodium	mg/kg	-	-	240	546	210	19.0	***1,160***	46.4	526	121	444	106	522	88	502	120	507	111	468	84.1
Strontium	mg/kg	-	-	58.5	83.7	53.2	4.78	***193***	11.5	***106***	21.1	***91.5***	21.2	***110***	15.7	***114***	22.1	***111***	27.5	***100***	18.2
Sulphur	mg/kg	-	-	-	720	-	-	-	-	***1,220***	259	520	44.7	***740***	207	***726***	58.6	***850***	80.3	***748***	50.2
Thallium	mg/kg	-	-	<1.0	0.147	***<1.00***	-	0.05	-	0.05	-	0.0514	0.00313	0.0562	0.00856	0.0562	0.00701	0.0522	0.00259	0.062	0.0126
Tin	mg/kg	-	-	<5.0	0.57	***<5.00***	-	***1.63***	0.0992	***1.31***	0.0918	***1.07***	0.157	***1.31***	0.272	***1.26***	0.353	***1.57***	0.22	***1.44***	0.275
Titanium	mg/kg	-	-	607	1,180	557	34.2	***1,690***	75.8	***1,326***	132	1,074	231	***1,488***	231	***1,512***	429	***1,622***	343	***1,470***	274
Uranium	mg/kg	-	-	-	1.39	-	-	1.21	0.105	1.08	0.0782	1.02	0.184	1.02	0.0979	1.14	0.158	1.02	0.0791	1.14	0.188
Vanadium	mg/kg	-	-	54.9	68.7	49.5	4.27	***235***	25.7	***461***	220	***561***	202	***501***	270	***422***	197	***673***	355	***575***	397
Zinc	mg/kg	123	315	46.7	70.4	39.2	7.10	63.1	4.35	***70.8***	9.41	67	11.2	***98.2***	18.8	***79.8***	17.4	***87.2***	15.3	***81.5***	11.2
Zirconium	mg/kg	-	-	-	4.3	-	-	-	-	-	-	-	-	-	-	***5.94***	1.49	***6.42***	1.04	***4.92***	0.589

Value is > Lower BC Working Sediment Quality Guideline.

Value is > Upper BC Working Sediment Quality Guideline.

Notes: "-" = no data, ***Bold/Italics*** - Exposed value is > both reference and pre-breach 95th percentile values; reference value is > reference 95th percentile value (<5th percentile value for pH); SD - Standard Deviation. Mean values reported as < the laboratory reporting limit were not screened against guidelines or reference 95th percentile. Pre-breach values that were reported as < the laboratory reporting limit were not used for screening.

[a] British Columbia Working Sediment Guidelines (BCMOECCS 2021a) and approved BC Sediment Quality Guideline for Selenium (BCMOECCS 2021b).

[b] The 5th percentile is reported and screened for the pH reference data. Pre-breach values that were reported as < the laboratory reporting limit were not used for screening. For calculation of reference 95th percentile values see Appendix Table C.2.2 and for calculation of pre-breach 95th percentile values see Appendix Table C.2.4.

[c] Total sulphur measured in bulk sediment, not the <63 µm fraction.

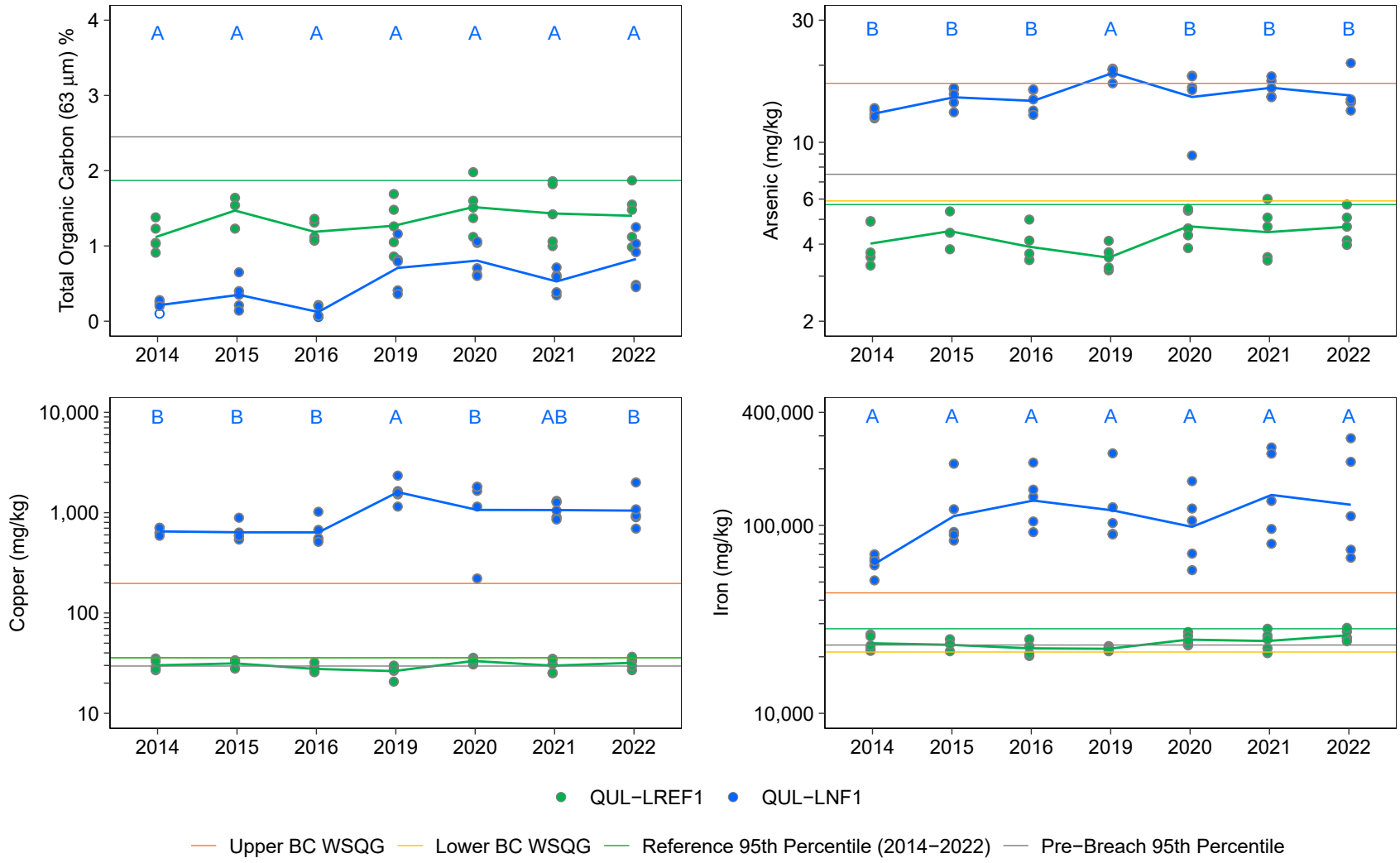

Figure 5.15: Sediment Analyte of Interest Concentrations (<63 µm Fraction) for Quesnel Lake at QUL-LNF1 (Exposed) and QUL-LREF1 (Reference) Shallow Areas, 2014 to 2022

Notes: BC WSQG = British Columbia Working Sediment Quality Guideline (BCMOECCS 2021a) and approved BC Sediment Quality Guideline for Selenium (BCMOECCS 2021b). The reference 95th Percentile was calculated using data from 2014 to 2022. Green represents reference areas and other colours represent exposed areas. Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Individual samples are plotted and lines join the least squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year and log10 transformed data for all analytes except Total Organic Carbon (TOC) (no transformation). Years that share a letter (e.g., A,B,C) have ratios (or differences – TOC) of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio (or difference) of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted.

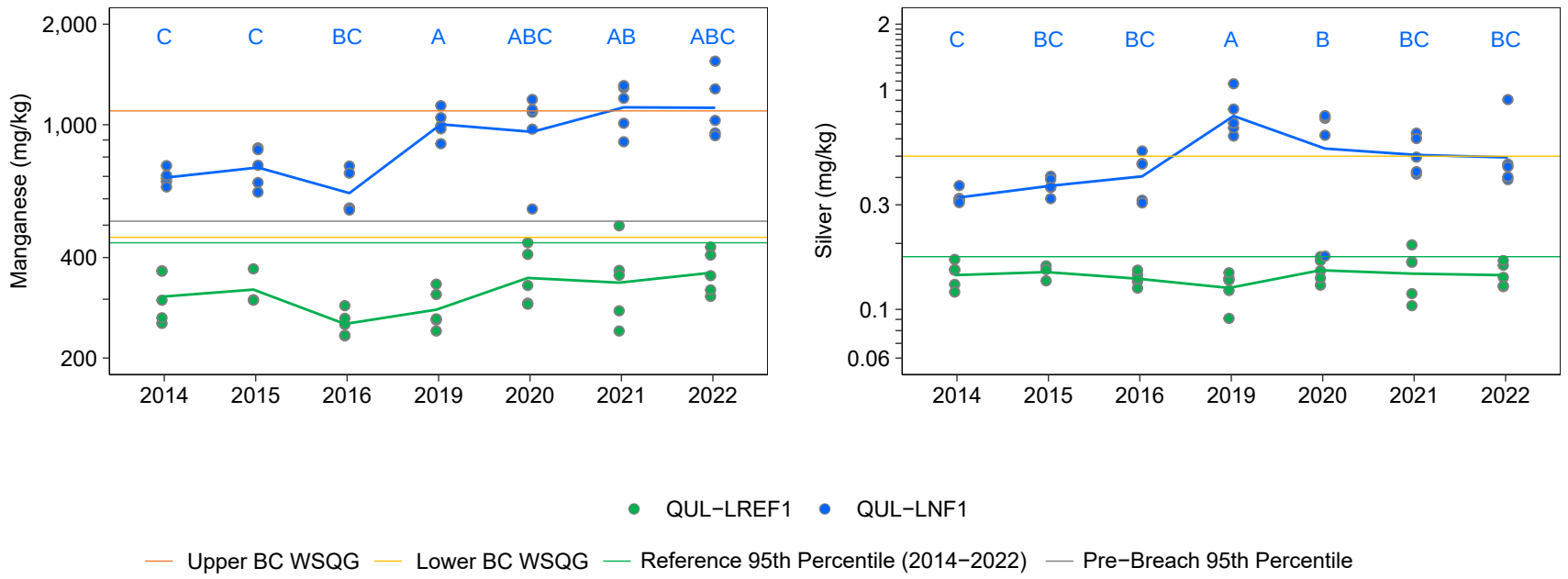

Figure 5.15: Sediment Analyte of Interest Concentrations (<63 µm Fraction) for Quesnel Lake at QUL-LNF1 (Exposed) and QUL-LREF1 (Reference) Shallow Areas, 2014 to 2022

Notes: BC WSQG = British Columbia Working Sediment Quality Guideline (BCMOECCS 2021a) and approved BC Sediment Quality Guideline for Selenium (BCMOECCS 2021b). The reference 95th Percentile was calculated using data from 2014 to 2022. Green represents reference areas and other colours represent exposed areas. Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Individual samples are plotted and lines join the least squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year and log10 transformed data for all analytes except Total Organic Carbon (TOC) (no transformation). Years that share a letter (e.g., A,B,C) have ratios (or differences – TOC) of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio (or difference) of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted.

times, respectively, and copper, iron, and manganese exceeded the upper BC WSQG by 5.7, 3.5, and 1.04 times, respectively (Table 5.14; Appendix Table C.2.9). In previous monitoring years (2019) chromium had also exceeded both reference and pre-breach 95th percentile values and been identified as an Analyte of Interest, however chromium was not identified as such in 2022 because it did not exceed the reference 95th percentile value. In 2022, the mean iron concentration in reference sediment was naturally elevated above the lower BC WSQG (Table 5.14; Appendix Table C.2.6), demonstrating that this element is naturally elevated in parts of Quesnel Lake.

The mean concentrations of arsenic, copper, iron, manganese, and silver in QUL-LNF1 sediments have been higher than reference concentrations since monitoring began in 2014. Temporal comparisons indicated that the concentrations of these five analytes in QUL-LNF1 sediments have been temporally stable from 2014 to 2022, relative to reference, except for increased arsenic, copper, and manganese concentrations in 2019 when the QUL-LNF1 sampling location was moved (Figure 5.15; Appendix Table E.1.9).

In the exposed sediments from QUL-LNF1, copper and manganese concentrations were positively correlated with TOC and % clay content, and arsenic was positively correlated with clay content (Appendix Figure E.1.4, Appendix Table E.1.11). These significant correlations infer that the tailings-influenced sediments at the shallow sampling areas of Quesnel Lake with higher clay (% clay) and TOC content tend to have higher concentrations of Analytes of Interest (e.g., arsenic, copper).

5.2.2 Sediment Toxicity

Sediment toxicity testing using *H. azteca* in 2022 (14-day standard test) was completed at a shallow exposed area of Quesnel Lake (QUL-LNF1), with an unimpacted shallow area of Quesnel Lake serving as reference (QUL-LREF1; Figure 3.1; Table 3.3). A review of sediment toxicity test data quality indicated that tests met control acceptability criteria and all water quality parameters remained within acceptable ranges throughout the tests (Nautilus 2022; Appendix G). Reference toxicant test results fell within the acceptable range and therefore the sensitivity of organisms used in the tests was considered appropriate (see the DQR for details; Appendix B). All ammonia concentrations were at levels that are not expected to cause adverse effects to *H. azteca*. Examination of laboratory bench sheets indicated that temperature, dissolved oxygen, conductivity, and pH were all stable over the course of the toxicity tests (Appendix G).

Survival of *H. azteca* exposed to QUL-LNF1 sediments in 2022 showed a moderate response (44 to 45% mortality; Table 5.15) which is similar to results in 2021 (46% mortality), slightly lower survival than 2020 (39% mortality) and much higher survival than 2019 (100% mortality) for similar 14-day standard static tests (Figure 5.16; Minnow 2020a, 2021a, 2022a). Growth of *H. azteca*

Table 5.15: Summary of *Hyalella azteca* 14-day Survival and Growth Responses for Sediment Toxicity Testing of Quesnel Lake at QUL-LNF (Exposed) and QUL-LREF1 (Reference) Shallow Areas, 2022

Results and Classification	Quesnel Lake	
	QUL-LNF	
	Survival	Growth[a]
	%	mg
Raw Area Result	54.0 ± 23.0	0.04 ± 0.01
Raw Laboratory Control Result	96.5 ± 5.50	0.19 ± 0.03
Raw Reference Result (QUL-LREF1)	98.0 ± 4.50	0.17 ± 0.03
Control Normalized Response	56%	21%
Reference Normalized Response	55%	24%
Statistically Significant Reduction from Control	Y	Y
Statistically Significant Reduction from Reference	Y	Y
CLASSIFICATION[b]	**MR**	**HR**

no unacceptable response (<20% reduction) - **NR**.
low response (20-50% reduction) and not significantly different than control and reference - **LR**.
moderate response (20-50% reduction) and significantly different than control and reference - MR.
high response (>50% reduction) - **HR**.

Note: Y = Yes, N = No.

[a] Growth = dry weight per surviving organism (mg).

[b] Where comparisons to mean laboratory control result and the mean field reference result did not fall into the same response classification, the result was discussed relative to both the control and the field reference.

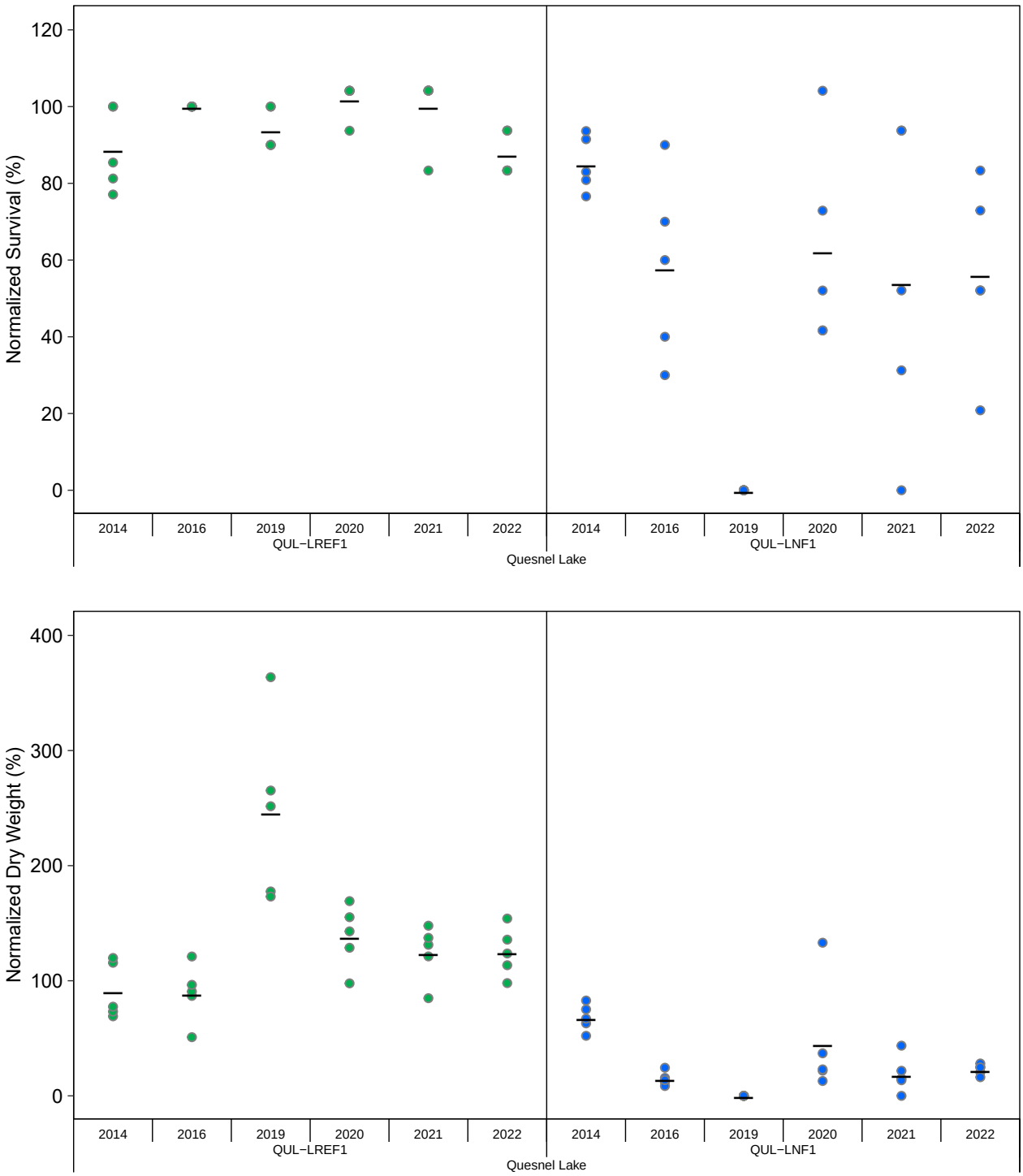

Figure 5.16: *Hyalella azteca* Survival and Growth Responses (14-day) for Sediment Toxicity Testing of Quesnel Lake at QUL-LNF (Exposed) and QUL-LREF1 (Reference) Shallow Areas, 2014 to 2022

Notes: Survival data were normalized to the control acceptance criteria, and the samples were calculated as a percentage of normalized control performance. Growth data were normalized to laboratory controls run during the test with the reference site for that area.

exposed to QUL-LNF1 sediments showed a high response (76 to 79% reduction in growth; Table 5.15), which is similar to results in 2021 (78 to 82% reduction) and a higher response (i.e., lower growth) than those in 2020 (50 to 65% reduction) for similar 14-day standard static tests (Figure 5.16; Minnow 2021a, 2022a).

Mean sediment copper concentrations at QUL-LNF1 in 2022 were 1,122 ± 510 mg/kg (Appendix C.2.9), which was similar to a laboratory determined copper 10-day LC50 of 1,078 mg/kg for *H. azteca* (Cairns et al. 1984). The corresponding dissolved aqueous copper LC50 concentration from Cairns et al. (1984) study was 39 µg/L, which was lower than the mean concentrations observed in overlying water of QUL-LNF1 toxicity testing vessels on day 14 of the test (74 µg/L ± 41 µg/L; Appendix G). Dissolved copper concentrations in the bioassay test vessels for QUL-LNF1 were higher than those in the test overlying waters for reference sediments (QUL-LREF1; 18 µg/L ± 3.3 µg/L) and were also notably higher than those documented in field-collected water samples (mean = 0.762 µg/L; Figure 5.17; Appendix Table C.1.4). This suggests copper mobilization in the test set-up that has either not occurred *in situ* or has attenuated over time *in situ*. In 2021, the 14-day *H. azteca* testing was conducted using static and static-renewal methods (i.e., renewing the testing waters during the course of the test) to better understand the evolution of dissolved copper to overlying test waters and associated implications to toxicity test results (Minnow 2022a). While static-renewal techniques reduced the overlying water concentrations of copper in bioassay vessels, and therefore provided more environmentally relevant testing conditions than static testing, the concentrations remained higher than *in situ* dissolved copper concentrations (by an average of 56-times; Minnow 2022a).

In 2022, overlying test water concentrations of dissolved copper were 97-times higher than *in situ* concentrations (Appendix C.1.4), which was relatively similar to previous toxicity test concentrations in 2020 (74-times) and 2021 (114-times), but much lower than 2019 (175-times; Figure 5.17; Minnow 2020a, 2021a, 2022a). Evaluation of regression relationships indicated that control-normalized survival and growth of *H. azteca* were positively related to sediment TOC content, and negatively related to sediment copper concentrations and to aqueous dissolved copper concentrations in the overlying water of bioassay vessels (Figure 5.18, Table 5.16). The relationships with copper concentrations (sediment and aqueous) had strong r^2 values of 0.48 to 0.65 (which are consistent with high descriptive power; Milton and Arnold 2002). These relationships infer lower *H. azteca* growth and survival at higher dissolved copper concentrations in the overlying water, which is consistent with the fact that *H. azteca* have been documented to derive little nutrition from sediment and to respond primarily to contaminants in overlying water (Wang et al. 2004).

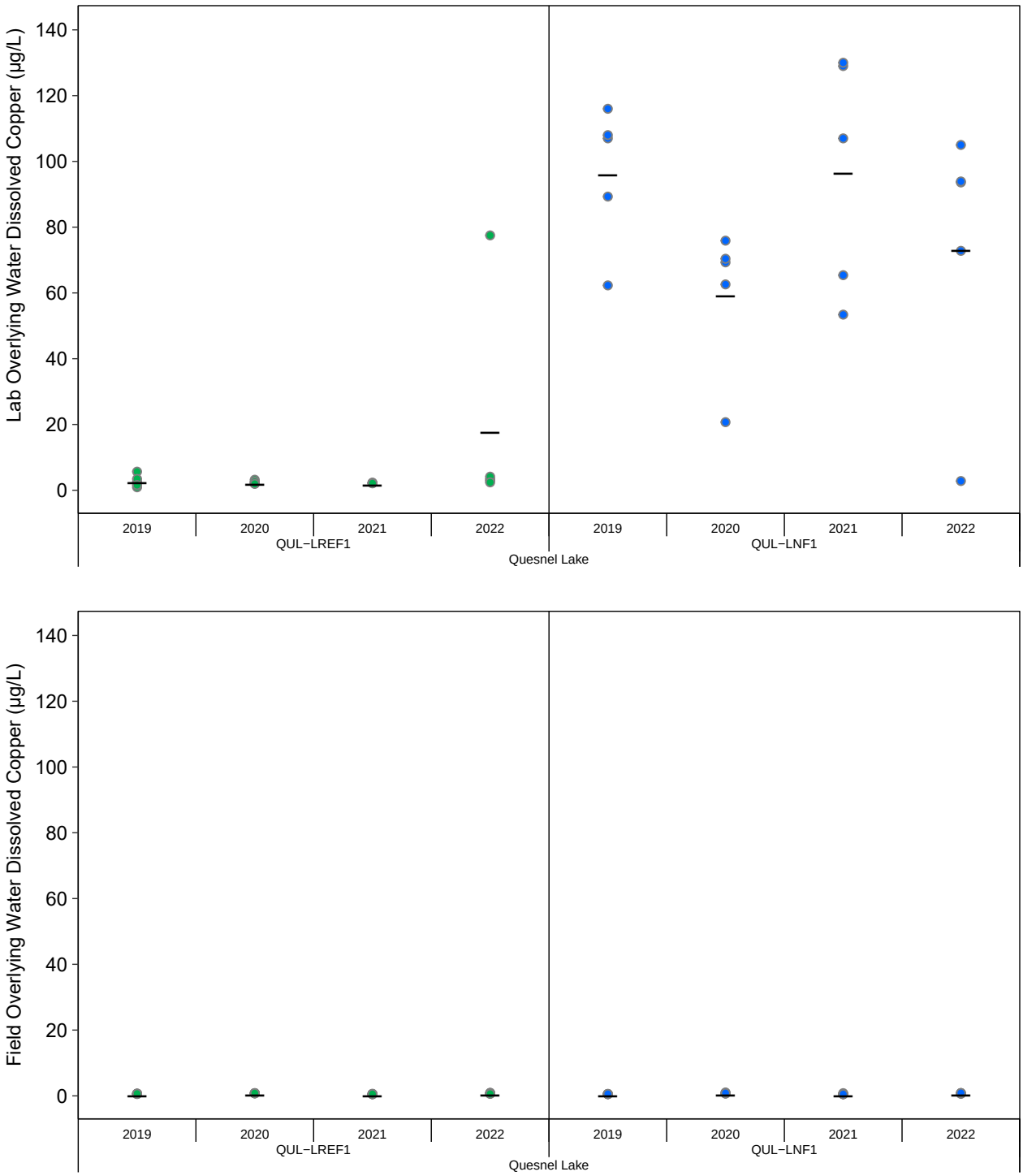

Figure 5.17: Dissolved Copper Concentrations in Laboratory and Field Overlying Water Associated with *Hyalella azteca* Survival and Growth (14-day) Sediment Toxicity Testing of Quesnel Lake at QUL-LNF (Exposed) and QUL-LREF1 (Reference) Shallow Areas, 2019 to 2022

Notes: Survival data were normalized to the control acceptance criteria, and the samples were calculated as a percentage of normalized control performance. Growth data were normalized to laboratory controls run during the test with the reference site for that area.

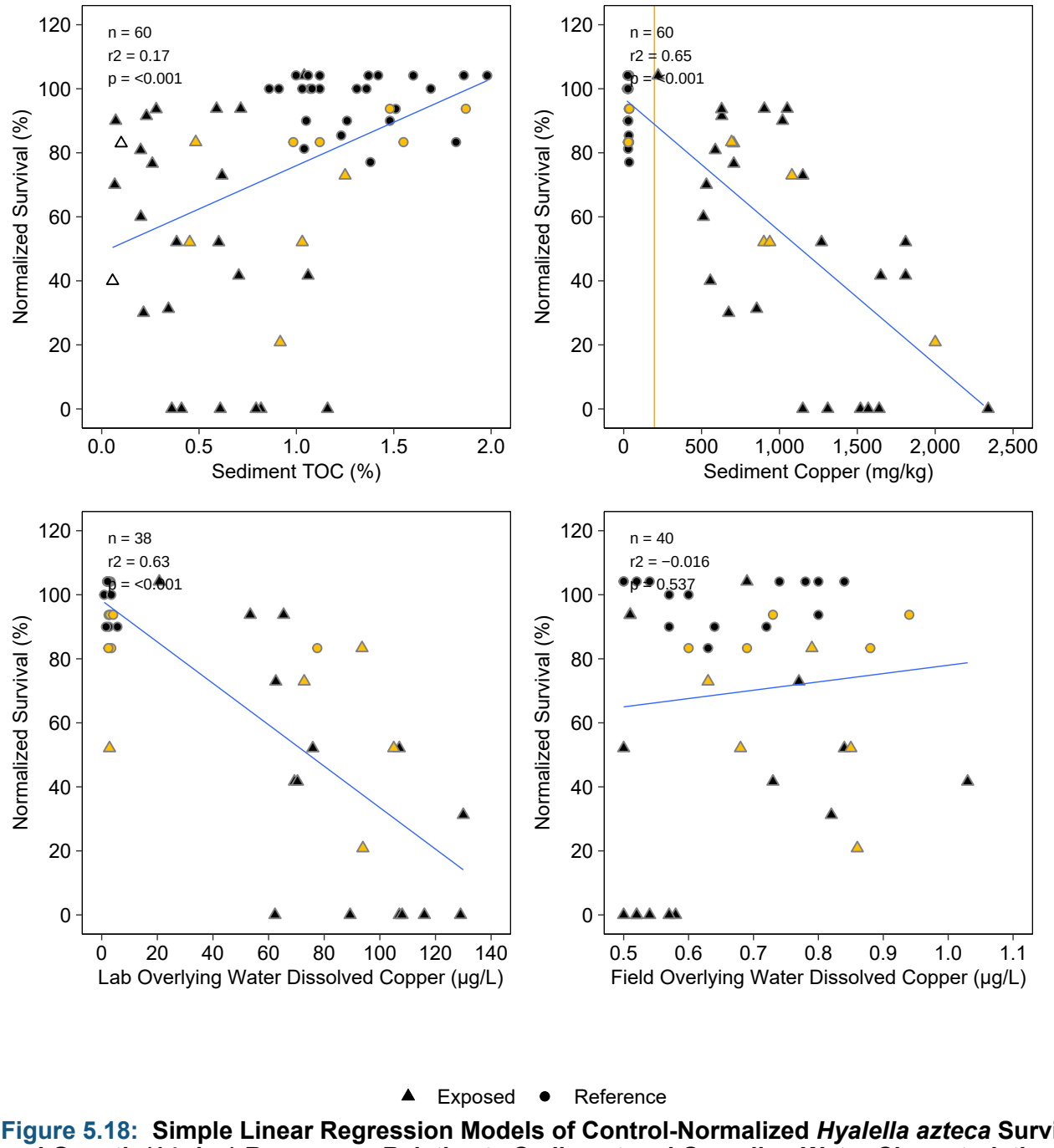

Figure 5.18: Simple Linear Regression Models of Control-Normalized *Hyalella azteca* Survival and Growth (14-day) Responses Relative to Sediment and Overyling Water Characteristics of Quesnel Lake at QUL-LNF (Exposed) and QUL-LREF1 (Reference) Shallow Areas, 2014 to 2022

Notes: Lab water and in−situ lake copper data are only available from 2019 to 2022. Outliers removed from analysis are noted with an ×. 2022 samples are plotted in orange. Censored values are shown as hollow symbols. Vertical orange lines indicate the Upper WSQG for copper (BCMOE 2017).

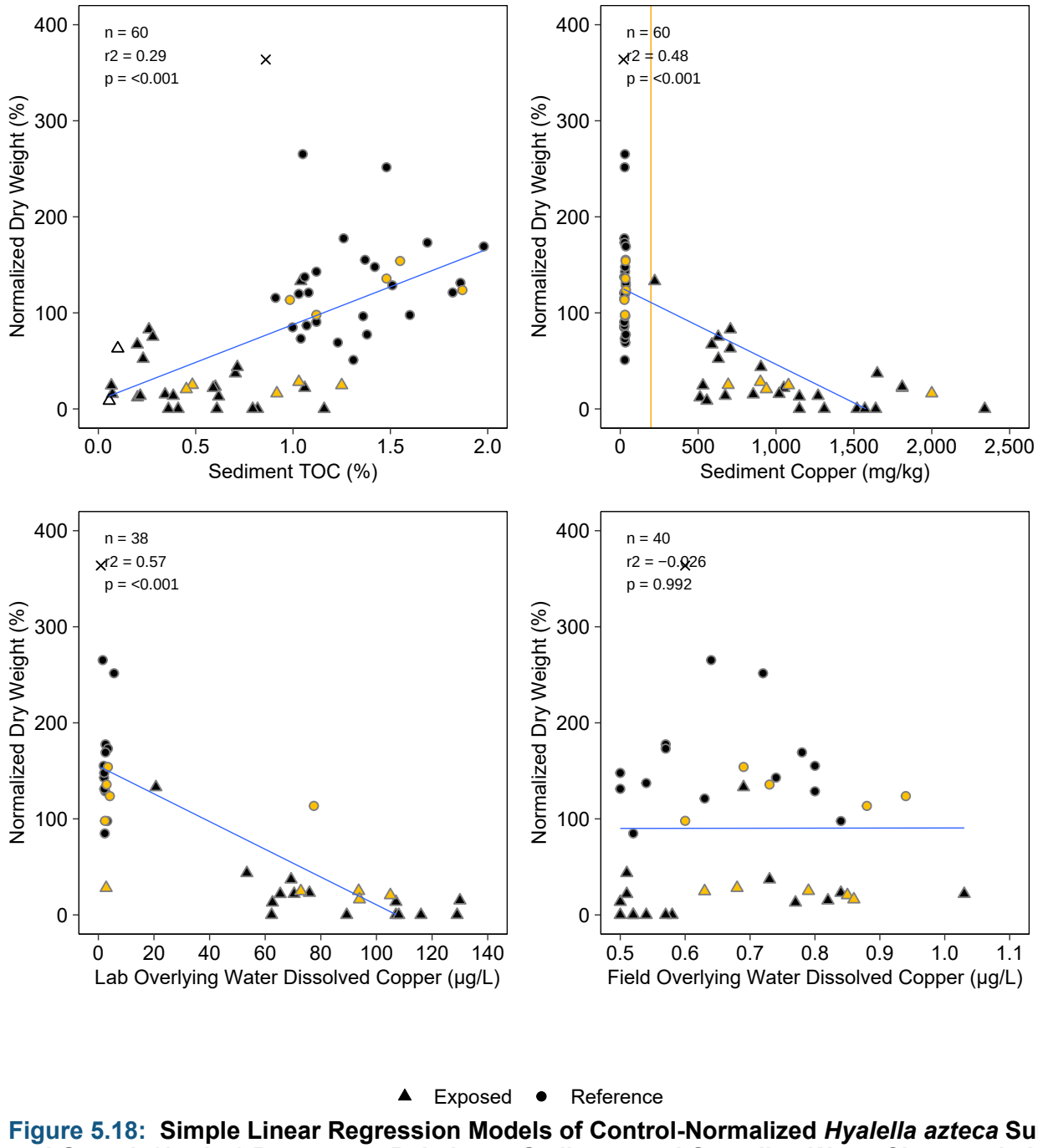

Figure 5.18: Simple Linear Regression Models of Control-Normalized *Hyalella azteca* Survival and Growth (14-day) Responses Relative to Sediment and Overyling Water Characteristics of Quesnel Lake at QUL-LNF (Exposed) and QUL-LREF1 (Reference) Shallow Areas, 2014 to 2022

Notes: Lab water and in−situ lake copper data are only available from 2019 to 2022. Outliers removed from analysis are noted with an ×. 2022 samples are plotted in orange. Censored values are shown as hollow symbols. Vertical orange lines indicate the Upper WSQG for copper (BCMOE 2017).

Table 5.16: Simple Linear Regression Models of Control-Normalized *Hyalella azteca* 14-day Survival and Growth Responses Relative to Sediment and Overlying Water Characteristics of Quesnel Lake at QUL-LNF (Exposed) and QUL-LREF1 (Reference) Shallow Areas, 2014 to 2022

Response	Predictor	Data Set	n	Slope	Intercept	P-value	r^2
Normalized Survival (%)	Sediment TOC (%)	All Data	60	27.1	48.9	<0.001	0.170
	Sediment Copper (mg/kg)	All Data	60	-0.0415	97.1	<0.001	0.650
	Lab Overlying Water Dissolved Copper (µg/L)	All Data	38	-0.647	98.2	<0.001	0.630
	Field Overlying Water Dissolved Copper (µg/L)	All Data	40	26.0	52.0	0.537	-0.016
Normalized Dry Weight (%)	Sediment TOC (%)	All Data	60	78.7	9.10	<0.001	0.290
	Sediment TOC (%)	Outliers excluded[a]	59	80.0	3.08	<0.001	0.410
	Sediment Copper (mg/kg)	All Data	60	-0.080	127	<0.001	0.480
	Sediment Copper (mg/kg)	Outliers excluded[a]	59	-0.075	119	<0.001	0.550
	Lab Overlying Water Dissolved Copper (µg/L)	All Data	38	-1.44	155	<0.001	0.570
	Lab Overlying Water Dissolved Copper (µg/L)	Outliers excluded[a]	37	-1.32	143	<0.001	0.640
	Field Overlying Water Dissolved Copper (µg/L)	All Data	40	0.922	89.6	0.992	-0.026
	Field Overlying Water Dissolved Copper (µg/L)	Outliers excluded[a]	39	27.7	64.4	0.745	-0.024

P-value < 0.05

Notes: TOC = total organic carbon, mg/kg = milligrams per kilogram, µg/L = micrograms per liter. TOC content and copper concentrations measured in the <63 µm sediment fraction.

[a] One outlier was removed from the regression based on having Studentized residuals > 3.58 (Dohoo et al. 2009).

Overall, temporal trends of *H. azteca* toxicity test results suggest a residual breach-related influence on *H. azteca* toxicity for both growth and survival within the small shallow near-field area near the mouth of Hazeltine Creek. However, the substantial difference in overlying water chemistry between laboratory and field (as noted earlier) continues to raise questions about how well the laboratory results represent *in situ* (field) exposure.

5.2.3 Plankton Community and Productivity

Plankton community and productivity monitoring in 2022 was completed three times (June, July, and August) in exposed (QUL-ZOO-1) and reference (QUL-ZOO-7) areas of Quesnel Lake (Figure 3.3, Table 3.5). A review of the 2022 plankton community and productivity data quality (Appendix B) indicated that these data can be used with a good level of confidence for interpretation (see Section 5.1.3 for details). A review of 2022 supporting water data quality indicated these data can be used with a good level of confidence for interpretation (see Section 5.1.1 for details).

5.2.3.1 Phytoplankton

5.2.3.1.1 Community

In 2022, phytoplankton densities at the exposed area (QUL-ZOO-1) and reference area (QUL-ZOO-7) of Quesnel Lake were highest in July compared to June and August (Appendix Figure E.2.7, Appendix Table C.3.5). Phytoplankton taxon richness at both QUL-ZOO-1 and QUL-ZOO-7 in 2022 was lowest in June and highest in August (Appendix Figure E.2.7, Appendix Table C.3.5). Phytoplankton density and richness were higher and lower, respectively, at QUL-ZOO-1 than at QUL-ZOO-7 in July 2022. Simpson's Diversity and Simpson's Evenness were similar between the two areas in 2022 (Figure 5.19, Table 5.17; Appendix Tables C.3.5 and C.3.6).

Temporal analyses indicated that mean phytoplankton density at QUL-ZOO-1 (exposed) was consistently higher than at QUL-ZOO-7 (reference) from 2019 to 2022, with similar temporal changes observed at each area over this period (Figure 5.19, Table 5.17). Higher densities of phytoplankton at QUL-ZOO-1 were attributed largely to greater densities of Chrysophytes and Dinoflagellates than at QUL-ZOO-7 (Appendix Figure E.2.8, Appendix Tables C.3.5 and E.2.3).

Taxon richness at QUL-ZOO-1 was stable and similar to reference from 2019 to 2021 but decreased significantly in 2022 to a mean result that was lower than the previous monitoring years (2019 to 2021) and lower than reference (Figure 5.19, Table 5.17; Appendix Tables C.3.5 and C.3.6). Although the lack of replication prior to 2019 prevented statistical comparisons of historic data, phytoplankton taxon richness at QUL-ZOO-1 in 2022 was lower than the range of results reported in previous post-breach years except August 2019 (2015 to 2021;

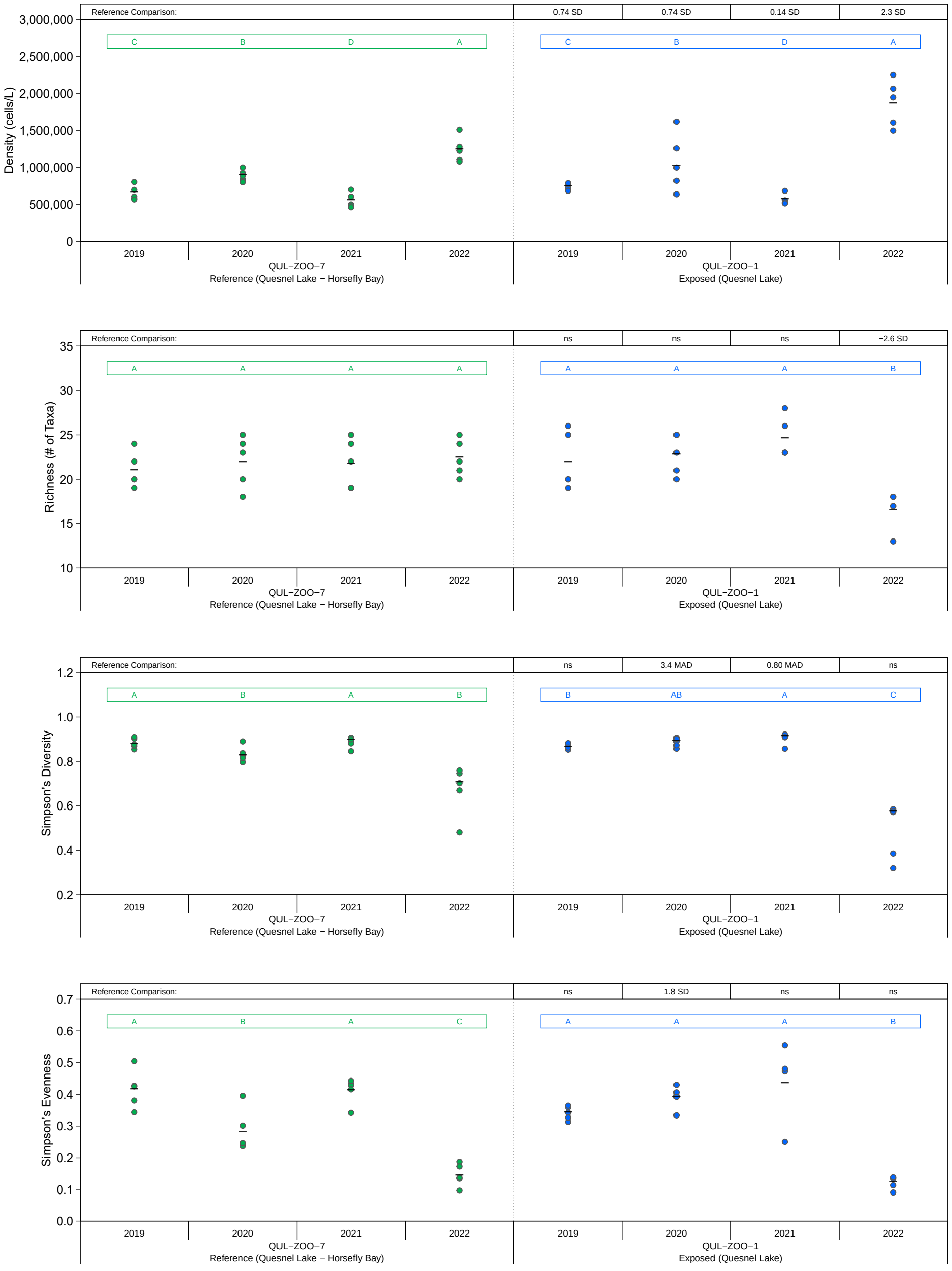

Figure 5.19: Phytoplankton Community Endpoints for Quesnel Lake at QUL−ZOO−1 (Exposed) and QUL−ZOO−7 (Reference) Areas in July, 2019 to 2022

Notes: Black bars represent measures of central tendency (mean, geometric mean, or median depending on if analysis was conducted on untransformed, log10−transformed or rank−transformed data). Coloured letters represent significant (p−value <0.1) post−hoc comparisons within areas over time; years that share a letter of the same colour (e.g., A, B) within a box of the same colour do not differ significantly within an area. A number above the plot indicates significant exposed vs. reference post−hoc comparisons within a given year. The magnitude of difference (MOD) for these significant post−hoc comparisons are expressed in units of standard deviation (SD) or median absolute deviations (MAD; if the data were rank−transformed prior to analysis) relative to reference. 'nc' indicates no comparisons were possible; 'ns' indicates a non−significant contrast; 'nm' indicates that the MOD could not be calculated because MAD = 0. For plots of phytoplankton results prior to 2019, see Minnow 2019a, 2020a, 2021a. For unreplicated phytoplankton results collected in June and August 2022, see Appendix Table C.3.5.

Table 5.17: Results of Statistical Comparisons of Phytoplankton Community Endpoints for Quesnel Lake at QUL-ZOO-1 (Exposed) and QUL-ZOO-7 (Reference) Areas in July, 2019 to 2022

Endpoint	Transformation	2-Way ANOVA P-values			Area Type	Area	Year	Mean	MCT[a]	Temporal Contrasts Within Sites								Spatial Comparison Within Years[b]
										Pairwise Comparisons Between Years				MOD Relative to Baseline[b]				
		Area	Year	Area x Year						2019	2020	2021	2022	2019	2020	2021	2022	QUL-ZOO-1
Density (cells/L)	log10	0.006	<0.001	0.119	Reference	QUL-ZOO-7	2019	651,204	645,498	C	B	D	A	Baseline	1.8	-0.96	3.6	0.74
							2020	889,702	887,084									0.74
							2021	550,375	543,568									0.14
							2022	1,240,551	1,231,482									2.3
					Exposed	QUL-ZOO-1	2019	738,035	737,054	C	B	D	A	Baseline	1.8	-1.6	5.2	
							2020	1,066,664	1,012,408									
							2021	560,459	557,226									
							2022	1,873,993	1,852,441									
Richness (# of Taxa)	log10	-	-	0.001	Reference	QUL-ZOO-7	2019	21.0	21.0	A	A	A	A	Baseline	ns	ns	ns	ns
							2020	22.0	22.0									ns
							2021	21.8	22.0									ns
							2022	22.4	22.0									-2.6
					Exposed	QUL-ZOO-1	2019	22.0	22.0	A	A	A	B	Baseline	ns	ns	-2.4	
							2020	22.8	23.0									
							2021	24.6	24.0									
							2022	16.6	16.0									
Simpson's Diversity	rank	-	-	0.007	Reference	QUL-ZOO-7	2019	0.882	0.880	A	B	A	B	Baseline	-2.7	ns	-9.0	ns
							2020	0.833	0.820									3.4
							2020	0.886	0.820									3.4
							2021	0.672	0.890									0.80
					Exposed	QUL-ZOO-1	2019	0.865	0.860	B	AB	A	C	Baseline	ns	2.4	-15	
							2020	0.886	0.890									
							2021	0.903	0.910									
							2022	0.487	0.570									
Simpson's Evenness	log10	-	-	0.015	Reference	QUL-ZOO-7	2019	0.416	0.410	A	B	A	C	Baseline	-2.0	ns	-5.6	ns
							2020	0.285	0.280									1.8
							2021	0.412	0.410									ns
							2022	0.146	0.140									ns
					Exposed	QUL-ZOO-1	2019	0.341	0.340	A	A	A	B	Baseline	ns	ns	-5.4	
							2020	0.391	0.390									
							2021	0.447	0.430									
							2022	0.123	0.120									
Chlorophyll-a (µg/L)	rank	0.389	<0.001	0.325	Reference	QUL-ZOO-7	2019	1.77	2.00	B	C	D	A	Baseline	-3.3	-6.4	8.8	ns
							2020	1.51	1.50									ns
							2021	1.12	1.10									ns
							2022	3.22	3.10									ns
					Exposed	QUL-ZOO-1	2019	2.04	2.00	B	C	D	A	Baseline	-2.6	-6.9	5.7	
							2020	1.59	1.60									
							2021	1.05	1.10									
							2022	3.29	2.80									

Magnitude of Difference (MOD) < -2.
Magnitude of Difference (MOD) > 2.

Notes: "-" = no data available. "nc" = no comparison. "ns" = no significance. "nm" = Contrast MODs could not be calculated because the Median Absolute Deviation (MAD) = 0, cells/L = cells per litre, µg/L = micrograms per litre.

[a] MCT = Measures of Central Tendency. Mean, geometric mean, or median depending on if analysis was conducted on untransformed, $\log_{10}$-transformed, or rank-transformed data.

[b] Magnitude of difference (MOD) calculated for two-way ANOVA as (Exposed Mean - Reference Mean)/SD (or [Mean - Baseline Mean]/SD for temporal comparisons) on the transformed scale, where SD was the pooled standard deviation of the model residuals. MOD calculated for Kruskal-Wallis (i.e., rank-transformed data) as (Exposed Median - Reference Median)/MAD, where MAD was the pooled median absolute deviation.

Appendix Figure E.2.7). The lower taxon richness observed at QUL-ZOO-1 compared to QUL-ZOO-7 in July 2022, and compared previous monitoring years, appears to be due to the absence of relatively rare (<1 % of total density) species in these samples (mostly Diatoms, Chlorophytes, and Chrysophytes; see laboratory data in Appendix G). The taxa that were absent from the QUL-ZOO-1 samples in July 2022 were distributed among different taxonomic groups; a fact that suggests their absence is not due to a discrete change in physical parameters at QUL-ZOO-1 in 2022 (that might preferentially affect one taxa) but rather that these relatively rare taxa were not captured by the five replicates collected during July sampling. This is supported by the consistent similarities in water temperature and nutrient concentrations between the exposed and reference areas in 2022 and at the exposed area over time (Appendix Figure C.1.5). In addition, the relative similarity of taxon richness results from August at QUL-ZOO-1 (22 taxa) and QUL-ZOO-7 (29 taxa) suggests this difference in taxon richness was temporary and possibly reflective of sampling variability (August results represent single samples that cannot be statistically compared; Appendix Table C.3.5). Three of the nine species of Diatoms, Chlorophytes, and Chrysophytes that were absent from QUL-ZOO-1 samples in July (but present in July QUL-ZOO-7 samples) were present QUL-ZOO-1 samples in August, providing further support that the absence of some these taxa from QUL-ZOO-1 samples in July 2022 was temporary. Continued monitoring will serve to confirm whether this decrease in richness at QUL-ZOO-1 is part of a longer-term trend at this exposed area or was reflective of a short-term community change. Mean Simpson's Diversity at QUL--ZOO-1 was similar to QUL-ZOO-7 from 2019 to 2022 except 2020 to 2021 when it was higher at the exposed area. Simpson's Evenness at QUL-ZOO-1 was also similar to QUL-ZOO-7 from 2019 to 2022 except 2020 when it was higher at the exposed area (Figure 5.19, Table 5.17; Appendix Table C.3.6).

The phytoplankton communities at QUL-ZOO-1 and QUL-ZOO-7 had a relatively even distribution of taxa in June 2022 and experienced succession toward more Chrysophytes in July and more Diatoms in August, with Diatoms becoming the dominant phytoplankton group at both monitoring areas by August (Figure 5.20; Appendix Table C.3.5). Seasonal succession observed at both areas was also characterized by a decrease in the relative densities of Chrysophytes and Cryptomonads from June to August. The above patterns in seasonal relative densities were also reflected in seasonal changes in cell densities (Appendix Figure E.2.9, Appendix Table C.3.5). Mean relative densities of Diatoms, Chlorophytes, and Cyanobacteria did not differ significantly between QUL-ZOO-1 and QUL-ZOO-7 in July 2022. Relative densities of Chrysophytes were significantly higher at QUL-ZOO-1 than at QUL-ZOO-7 in 2022, while the relative densities of Cryptomonads and Dinoflagellates were significantly lower (Appendix Figure E.2.8, Appendix Tables C.3.6 and E.2.3).

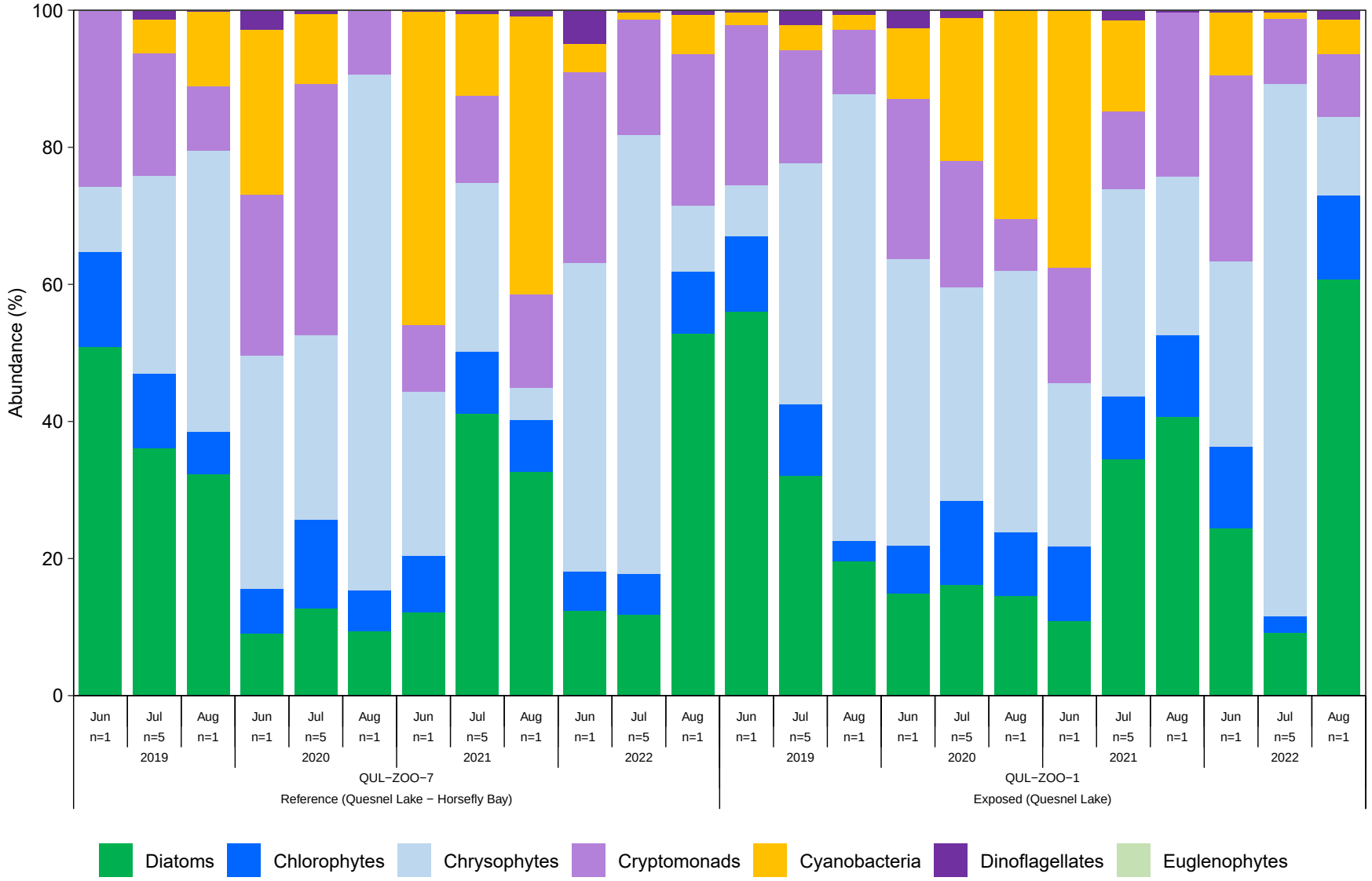

Figure 5.20: Relative Mean Densities of Major Phytoplankton Community Taxonomic Groups for Quesnel Lake at QUL−ZOO−1 (Exposed) and QUL−ZOO−7 (Reference) Areas, 2019 to 2022

The relative densities of Diatoms, Chlorophytes, and Cyanobacteria at QUL-ZOO-1 were consistently similar to those at QUL-ZOO-7 from 2019 to 2022. Mean relative densities of Chrysophytes were significantly higher at QUL-ZOO-1 compared to QUL-ZOO-7 from 2019 to 2022, suggesting that this difference may be an inherent natural difference in communities between the two areas (Appendix Figure E.2.8, Appendix Tables C.3.5, E.2.3). Relative densities of Cryptomonads at QUL-ZOO-1 were significantly lower than at QUL-ZOO-7 in 2020 and 2022 but similar in 2019 and 2021. This variability at the exposed area compared to reference for relative densities of Cryptomonads was driven by changes at the reference area (QUL-ZOO-7) given the temporal stability of QUL-ZOO-1 results from 2019 to 2022. The relative densities of Dinoflagellates at QUL-ZOO-1 were significantly higher than at QUL-ZOO-7 from 2019 to 2021 and significantly lower than in 2022 (Appendix Figure E.2.8, Appendix Tables C.3.5, E.2.3). The densities of the major phytoplankton taxonomic groups showed very similar spatial and temporal patterns as the relative density data for these groups (Appendix Figures E.2.8, E.2.9; Appendix Tables C.3.5, E.2.3). The similarities in the phytoplankton communities at the exposed and reference areas of Quesnel Lake observed from 2019 to 2022 can likely be attributed to similar water temperatures at the surface and throughout their photic zones, and nutrient concentrations (Appendix Figures A.1.5, C.1.5, Appendix Table C.1.5) which are known factors affecting phytoplankton communities (Schnurr and Allen 2015).

Overall, the phytoplankton community at the exposed area of Quesnel Lake (QUL-ZOO-1) in 2022 was characterized by total density that was higher than at reference (QUL-ZOO-7), a pattern that has persisted since 2019. Taxon richness was lower at QUL-ZOO-1 than at QUL-ZOO-7 in 2022, which reflected a significant decrease from results observed in 2019 to 2021, when richness was similar to reference. This decrease in richness was attributable to the absence of relatively rare phytoplankton taxa at QUL-ZOO-1 in July 2022, and appeared to be a temporary change based on the results of samples collected in August 2022 which included some of these relatively rare taxa. Continued monitoring will help to further understand whether the decrease in taxon richness in 2022 is part of a longer-term change or a single variable result. Simpson's Diversity and Evenness have shown some temporal variability at the exposed area but have been either similar to or higher than reference in each year since 2019. Phytoplankton community composition at both the exposed and reference areas was characterized by succession towards Diatom dominance by August in 2022, with concurrent decreases in the relative densities of Chrysophytes and Cryptomonads. The community composition at the exposed area has been similar to reference in terms of the relative densities of Diatoms, Cyanobacteria, and Chlorophytes from 2019 to 2022. The relative densities of Chrysophytes, Cryptomonads, and Dinoflagellates at the exposed area differed from reference in 2022 but showed temporal stability either within the exposed area or temporal stability in the difference relative to reference. The demonstrated

similarity of the phytoplankton community at the exposed and reference areas of Quesnel Lake for most endpoints, and the temporal stability throughout the study period for those endpoints that differed between the areas (excluding taxon richness), are suggestive of a lack of mine-related influence on the phytoplankton community of Quesnel Lake.

5.2.3.1.2 Productivity

In 2022, chlorophyll-a concentrations recorded in July at both QUL-ZOO-1 and QUL-ZOO-7 were higher than concentrations observed in June or August (Appendix Figure E.2.7, Appendix Table C.3.5). Mean chlorophyll-a concentrations at QUL-ZOO-1 were consistently similar to those at QUL-ZOO-7 from 2019 to 2022 (Figure 5.21, Table 5.17; Appendix Tables C.3.5, C.3.6). At both QUL-ZOO-1 and QUL-ZOO-7, mean chlorophyll-a concentrations successively decreased significantly each year from 2019 to 2021 but were higher in 2022 relative to previous years (2019 to 2021; Figure 5.21, Table 5.17; Appendix Tables C.3.5, C.3.6). The similarity in phytoplankton productivity between QUL-ZOO-1 and QUL-ZOO-7 can be attributed to their similar nutrient concentrations, surface water temperatures, and water temperatures throughout the photic zone (Appendix Figures A.1.5, C.1.5, Appendix Table C.1.5).

A lake's trophic status classification corresponds to its overall productivity in terms of phytoplankton biomass (chlorophyll-a) and nutrient concentration (Wetzel 2001). Based on the concentration of chlorophyll-a at QUL-ZOO-1 and QUL-ZOO-7 in 2022, Quesnel Lake can be classified as a mesotrophic system (2.5 to 8 µg/L; Vollenweider and Kerekes 1980; Figure 5.21; Appendix Figure E.2.7, Appendix Tables C.3.5 and C.3.6). The trophic status of Quesnel Lake in previous years post-breach (i.e., 2016 to 2018) was classified as ultraoligotrophic (<1 µg/L) while the status from 2019 to 2021 was classified as oligotrophic (<2.5 µg/L; Vollenweider and Kerekes 1980; Table 5.17; Appendix Figure E.2.7, Appendix Tables C.3.5). The increase in trophic status from oligotrophic in 2021 to mesotrophic in 2022 occurred at both the exposed (QUL-ZOO-1) and reference (QUL-ZOO-7) areas. The similarity in chlorophyll-a concentrations between the two areas in 2022 indicates this increase in productivity in 2022 (Figure 5.21, Table 5.17) was related to factors that influenced both areas in the same way (e.g., environmental factors such as temperature).

The higher chlorophyll-a concentrations observed in 2019 to 2022 compared to previous years may have resulted from a combination of different sampling timing in June and August/September (in 2016 to 2018) instead of July and changes in sampling methodology. Depth-integrated sampling methods were adopted in 2019 which differed from the surface grab sampling methods used in prior post-breach years (2016 to 2018). A specific investigation of these differing sampling methods in Quesnel Lake indicated either no difference or significantly higher chlorophyll-a concentrations in surface grabs compared to depth-integrated samples, but a similar investigation

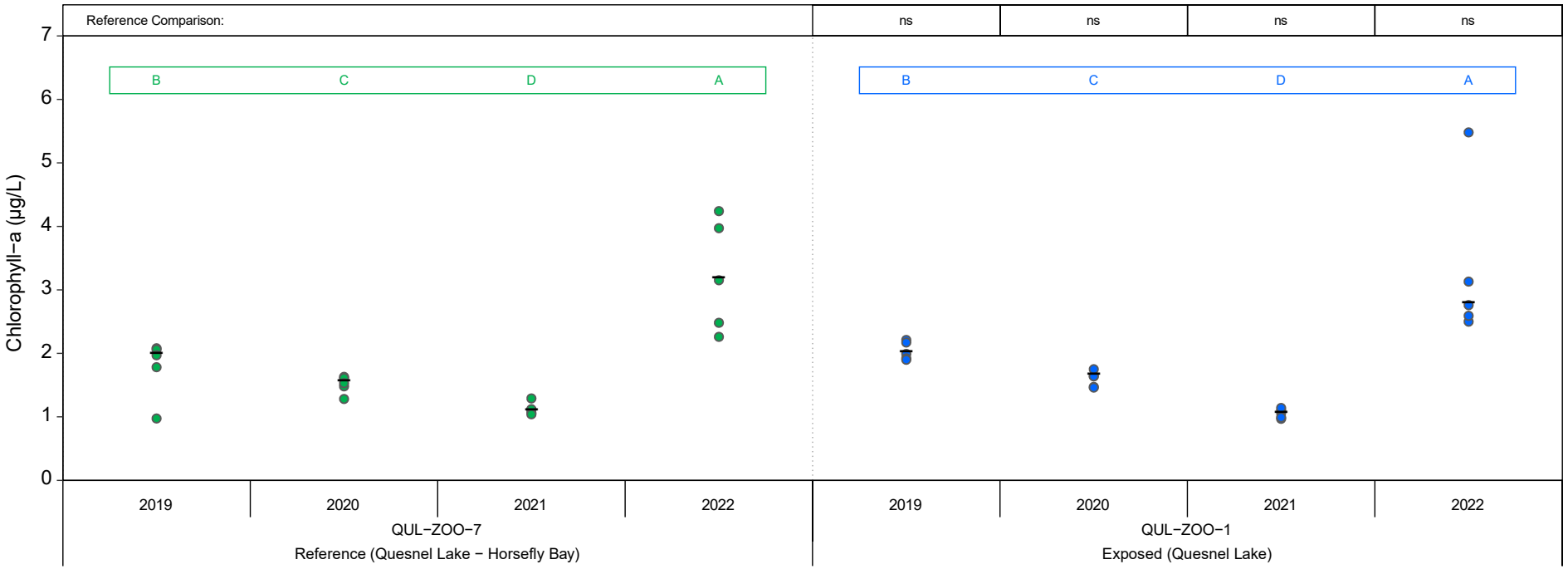

Figure 5.21: Phytoplankton Chlorophyll−a Concentrations for Quesnel Lake at QUL−ZOO−1 (Exposed) and QUL−ZOO−7 (Reference) Areas in July, 2019 to 2022

Notes: Black bars represent measures of central tendency (mean, geometric mean, or median depending on if analysis was conducted on untransformed, log_{10}− transformed or rank−transformed data). Coloured letters represent significant (p−value <0.1) post−hoc comparisons within areas over time; years that share a letter of the same colour (e.g., A, B) within a box of the same colour do not differ significantly within an area. A number above the plot indicates significant exposed vs. reference post−hoc comparisons within a given year. The magnitude of difference (MOD) for these significant post−hoc comparisons are expressed in units of standard deviation (SD) or median absolute deviations (MAD; if the data were rank−transformed prior to analysis) relative to reference.'n c' indicates no comparisons were possible; 'ns' indicates a non−significant contrast; 'nm' indicates that the MOD could not be calculated because MAD = 0. For plots of phytoplankton results prior to 2019, see Minnow 2019a, 2020a, 2021a. For unreplicated phytoplankton results collected in June and August 2022, see Appendix Table C.3.5.

in Polley and Bootjack lakes indicated significantly higher chlorophyll-a concentrations in samples collected using depth-integrated methods compared to surface sampling (Minnow 2020a). Therefore, it is plausible that the change in sampling methodology from 2019 to 2022 compared to 2016 to 2018 may have contributed to the observed increase in chlorophyll-a concentrations in 2019 to 2022.

5.2.3.2 Zooplankton

5.2.3.2.1 Community

Zooplankton densities at the exposed area (QUL-ZOO-1) and reference area (QUL-ZOO-7) of Quesnel Lake in 2022 were highest in July, while zooplankton taxon richness was highest in August at both monitoring areas (Appendix Figure E.2.10, Appendix Table C.3.7). Zooplankton density and Simpson's Evenness at QUL-ZOO-1 were both consistently similar to QUL-ZOO-7 in July from 2019 to 2022. Taxon richness was higher at QUL-ZOO-1 than at QUL-ZOO-7 in 2019, 2020, and 2022, but was lower in 2021. Simpson's Diversity at QUL-ZOO-1 was similar (2019 and 2021) or significantly higher (2020 and 2022) compared to QUL-ZOO-7 (Figure 5.22, Table 5.18; Appendix Tables C.3.7, C.3.8).

The zooplankton community at QUL-ZOO-1 (exposed) in 2022 was largely dominated by Copepod Nauplii and Rotifera in June, and by Rotifera in July and August. The June community and succession throughout summer at the exposed area was consistent with that observed at the reference area (Figure 5.23; Appendix Tables C.3.7, C.3.8). The relative density and density of dominant for zooplankton taxa groups have been similar at QUL-ZOO-1 and QUL-ZOO-7 for each of the monitoring years (2019 to 2022), with two exceptions. The relative density and density of Cyclopoida was lower at QUL-ZOO-1 than at QUL-ZOO-7 in 2019, and the relative density of Copepod Nauplii was higher at QUL-ZOO-1 than at QUL-ZOO-7 in each monitoring year and temporally stable at QUL-ZOO-1 from 2019 to 2022 (Appendix Figure E.2.11, Appendix Table E.2.4). Moreover, the relative densities of all major zooplankton taxonomic groups showed similar temporal changes from 2019 to 2022 at both QUL-ZOO-1 and QUL-ZOO-7 (Appendix Figure E.2.11, Appendix Table E.2.4). This similarity in temporal trends in community structure at the exposed and reference areas indicates these changes were likely driven by natural variability in environmental parameters that affected the two areas similarly (e.g., water temperature, nutrient availability, and phytoplankton community; Appendix Figures A.1.5, C.1.5; Appendix Table C.1.5). The densities of the major zooplankton taxonomic groups showed very similar spatial and temporal patterns to relative density data (Appendix Figure E.2.11; Appendix Tables C.3.7, C.3.8, and E.2.4).

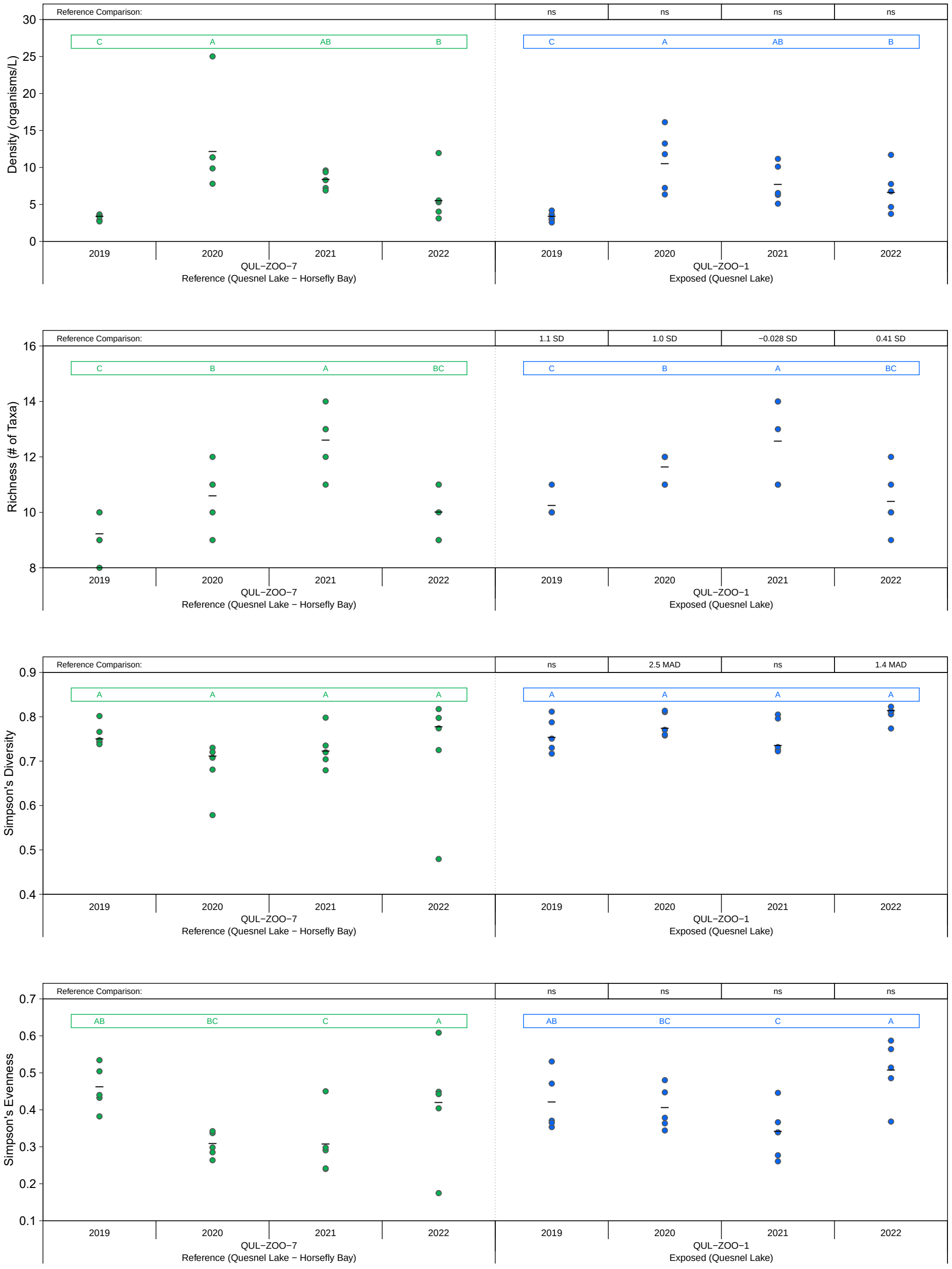

Figure 5.22: Zooplankton Community Endpoints for Quesnel Lake at QUL−ZOO−1 (Exposed) and QUL−ZOO−7 (Reference) Areas in July, 2019 to 2022

Notes: Black bars represent measures of central tendency (mean, geometric mean, or median depending on if analysis was conducted on untransformed, $\log_{10}$− transformed or rank−transformed data). Coloured letters represent significant (p−value <0.1) post−hoc comparisons within areas over time; years that share a letter of the same colour (e.g., A, B) within a box of the same colour do not differ significantly within an area. A number above the plot indicates significant exposed vs. reference post−hoc comparisons within a given year. The magnitude of difference (MOD) for these significant post−hoc comparisons are expressed in units of standard deviation (SD) or median absolute deviations (MAD; if the data were rank−transformed prior to analysis) relative to reference. 'nc' indicates no comparisons were possible; 'ns' indicates a non −significant contrast; 'nm' indicates that the MOD could not be calculated because MAD = 0. For plots of zooplankton results prior to 2019, see Minnow 2019a, 2020a, 2021a. For unreplicated zooplankton results collected in June and August 2022, see Appendix Table C.3.7.

Table 5.18: Results of Statistical Comparisons of Zooplankton Community Endpoints for Quesnel Lake at QUL-ZOO-1 (Exposed) and QUL-ZOO-7 (Reference) Areas in July, 2019 to 2022

Endpoint	Transformation	2-Way ANOVA P-values			Area Type	Area	Year	Mean	MCT[a]	Temporal Contrasts Within Sites								Spatial Comparison Within Years[b]
										Pairwise Comparisons Between Years				MOD Relative to Baseline[b]				
		Area	Year	Interaction						2019	2020	2021	2022	2019	2020	2021	2022	QUL-ZOO-1
Density (organisms/L)	log10	0.903	<0.001	0.741	Reference	QUL-ZOO-7	2019	3.21	3.20	C	A	AB	B	Baseline	3.8	2.7	1.5	ns
							2020	13.1	12.0									ns
							2021	8.27	8.20									ns
							2022	5.98	5.30									ns
					Exposed	QUL-ZOO-1	2019	3.27	3.20	C	A	AB	B	Baseline	3.3	2.4	1.9	
							2020	10.9	10.0									
							2021	7.84	7.50									
							2022	6.92	6.40									
Richness (# of Taxa)	log10	0.052	<0.001	0.544	Reference	QUL-ZOO-7	2019	9.20	9.20	C	B	A	BC	Baseline	1.5	3.4	ns	1.1
							2020	10.6	10.0									1.0
							2021	12.6	13.0									-0.028
							2022	10.0	10.0									0.41
					Exposed	QUL-ZOO-1	2019	10.2	10.0	C	B	A	BC	Baseline	1.4	2.2	ns	
							2020	11.6	12.0									
							2021	12.6	12.0									
							2022	10.4	10.0									
Simpson's Diversity	rank	-	-	0.092	Reference	QUL-ZOO-7	2019	0.759	0.750	A	A	A	A	Baseline	ns	ns	ns	ns
							2020	0.684	0.710									2.5
							2021	0.727	0.720									ns
							2022	0.719	0.770									1.4
					Exposed	QUL-ZOO-1	2019	0.759	0.750	A	A	A	A	Baseline	ns	ns	ns	
							2020	0.782	0.770									
							2021	0.756	0.730									
							2022	0.805	0.810									
Simpson's Evenness	none	0.114	0.003	0.271	Reference	QUL-ZOO-7	2019	0.459	0.460	AB	BC	C	A	Baseline	ns	-1.8	ns	ns
							2020	0.305	0.310									ns
							2021	0.304	0.300									ns
							2022	0.416	0.420									ns
					Exposed	QUL-ZOO-1	2019	0.418	0.420	AB	BC	C	A	Baseline	ns	-0.93	ns	
							2020	0.403	0.400									
							2021	0.338	0.340									
							2022	0.504	0.500									
Dry Weight Biomass (mg/L)	log10	0.534	<0.001	0.257	Reference	QUL-ZOO-7	2019	0.00474	0.00470	B	A	B	B	Baseline	1.4	ns	ns	ns
							2020	0.00703	0.00690									ns
							2021	0.00412	0.00390									ns
							2022	0.00382	0.00370									ns
					Exposed	QUL-ZOO-1	2019	0.00390	0.00380	B	A	B	B	Baseline	2.3	ns	ns	
							2020	0.00724	0.00710									
							2021	0.00327	0.00310									
							2022	0.00455	0.00450									

Magnitude of Difference (MOD) < -2.
Magnitude of Difference (MOD) > 2.

Notes: "-" = no data available. "nc" = no comparison. "ns" = no significance. "nm" = Contrast MODs could not be calculated because the MAD = 0, organisms/L = organisms per litre, mg/L = milligrams per litre.

[a] MCT = Measures of Central Tendency. Mean, geometric mean, or median depending on if analysis was conducted on untransformed, log $_{10}$-transformed, or rank-transformed data.

[b] Magnitude of difference (MOD) calculated for two-way ANOVA as (Exposed Mean - Reference Mean)/SD (or [Mean - Baseline Mean]/SD for temporal comparisons) on the transformed scale, where SD was the pooled standard deviation of the model residuals. MOD calculated for Kruskal-Wallis (i.e., rank-transformed data) as (Remediated Median - Reference Median)/MAD, where MAD was the pooled median absolute deviation.

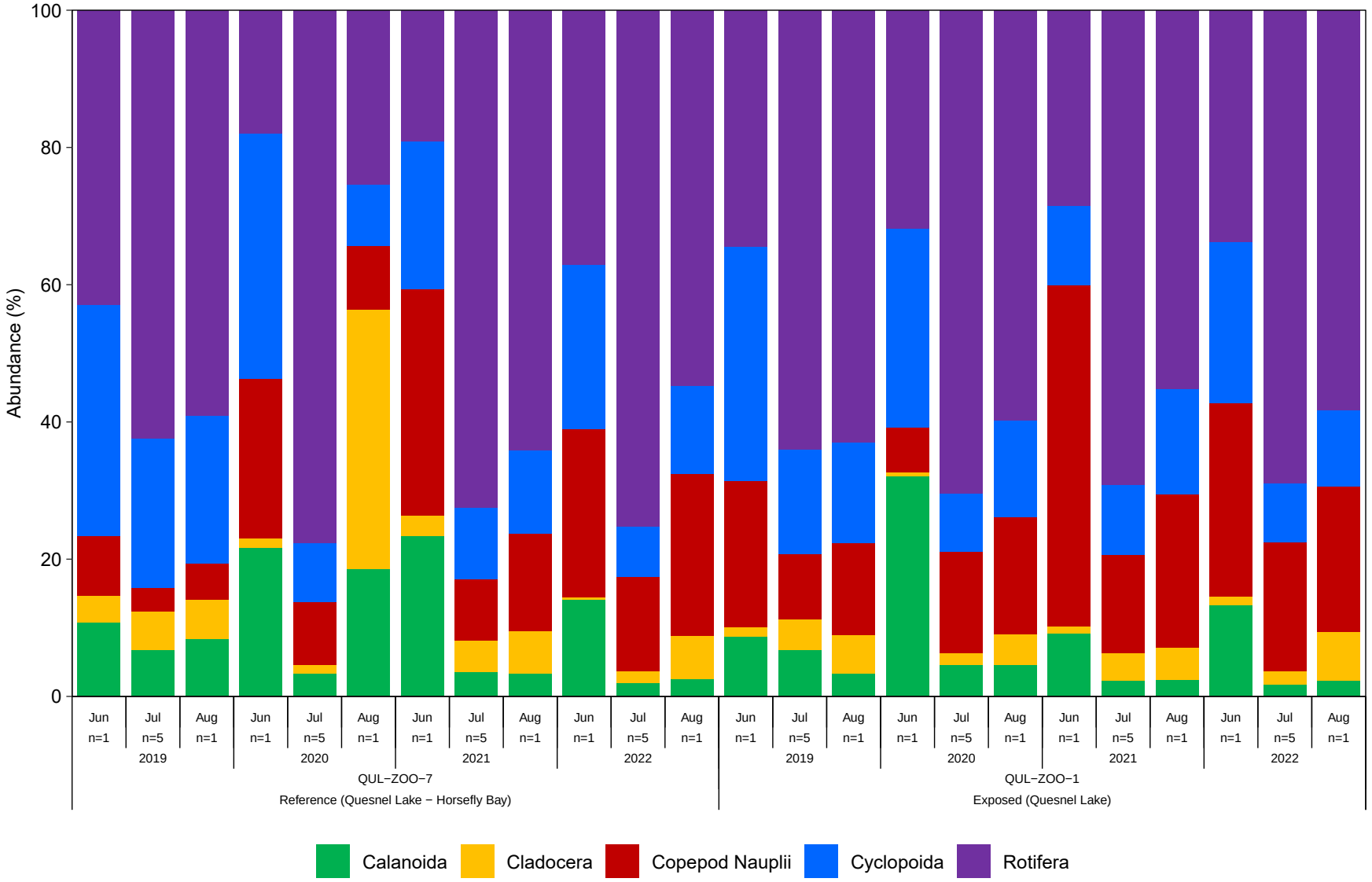

Figure 5.23: Relative Mean Densities of Major Zooplankton Community Taxonomic Groups for Quesnel Lake at QUL−ZOO−1 (Exposed) and QUL−ZOO−7 (Reference) Areas, 2019 to 2022

Overall, zooplankton communities were very similar at the exposed and reference areas of Quesnel Lake in 2022, as all community metrics were statistically similar at both areas with the exceptions of higher taxon richness, higher Simpson's Diversity, and higher relative density and density of Copepod Nauplii relative to reference. While there was variability in community metrics when comparing 2019 to 2022 data, the changes (i.e., direction and relative magnitude) were generally the same at both QUL-ZOO-1 and QUL-ZOO-7, suggesting that changes in the zooplankton community were largely driven by environmental conditions common between both areas (e.g., water temperatures and nutrient concentrations). The similarity of zooplankton communities between the exposed and reference areas for most endpoints and temporal stability of those endpoints that differed between the areas (i.e., Copepod Nauplii) from 2019 to 2022 are suggestive of a lack of mine-related influence on the zooplankton community of Quesnel Lake.

5.2.3.2.2 Productivity

Zooplankton total biomass (dw) in 2022 was highest in July and June at QUL-ZOO-1 and QUL-ZOO-7, respectively, and lowest in August at both areas (Appendix Figure E.2.10, Appendix Table C.3.7). Mean total zooplankton biomass (dw) was consistently similar between QUL-ZOO-1 and QUL-ZOO-7 from July 2019 to 2022 (Figure 5.24, Table 5.18; Appendix Tables C.3.7 and C.3.8). The similar temporal changes in zooplankton biomass at both areas (i.e., significantly higher in 2020 than in 2019, 2021, and 2022 at both areas) was likely driven by natural variability in environmental parameters similar between the two areas (e.g., water temperature, nutrient availability, and phytoplankton community; Appendix Figures A.1.5, C.1.5, Appendix Table C.1.5). The consistent similarity in zooplankton productivity between exposed and reference areas throughout this period is indicative of a healthy lentic system and sufficient food for fish (Jeppesen et al. 2011).

5.2.4 Zooplankton Tissue Quality

Zooplankton tissue quality monitoring in 2022 was completed three times (June, July, and August) in exposed and reference areas of Quesnel Lake (Figure 3.3, Table 3.6) and replicated results from July (n=5) were statistically contrasted (see Section 3.4.3). A review of the 2022 zooplankton tissue data quality (Appendix B) indicated that these data can be used with a high level of confidence for interpretation (see Section 5.1.4 for details). A review of 2022 supporting water data quality indicated these data can be used with a good level of confidence for interpretation (see Section 5.1.1 for details).

As indicated in Section 3.4.3, data interpretation was focused on primary and secondary analytes (Table 2.4) with a significantly positive expose-reference difference (i.e., analytes with exposed

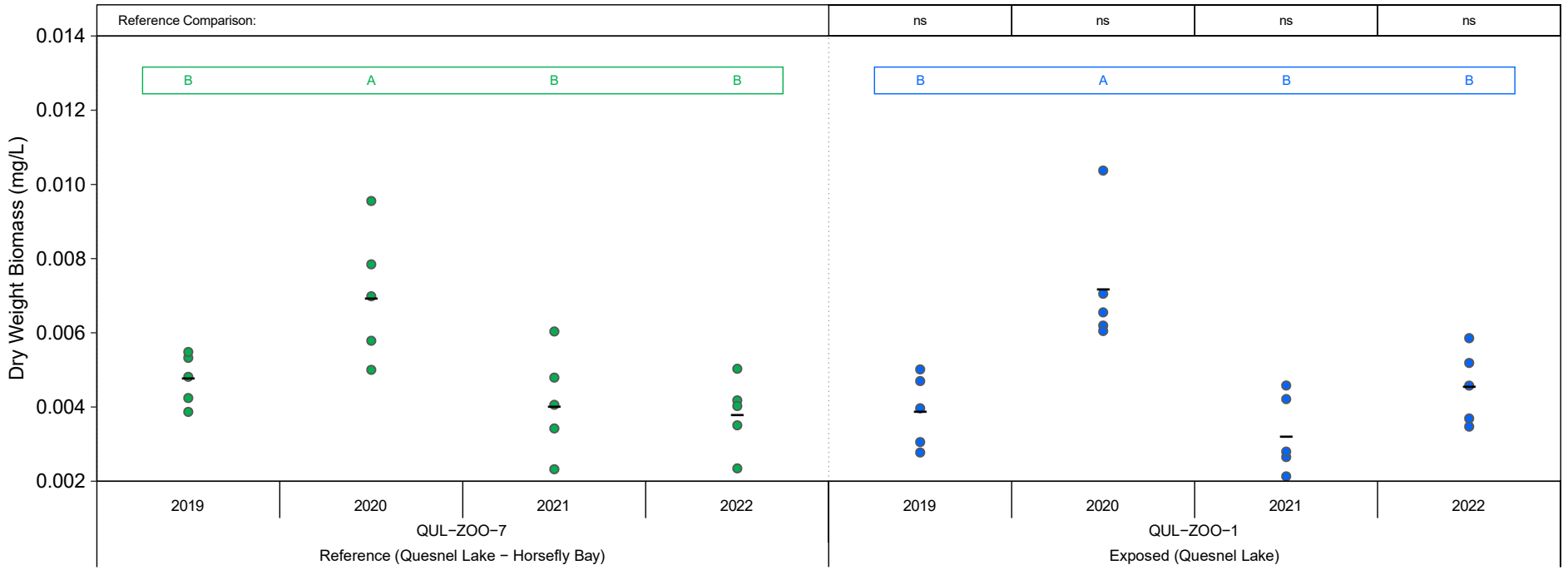

Figure 5.24: Zooplankton Biomass (Total Dry Weight) for Quesnel Lake at QUL−ZOO−1 (Exposed) and QUL−ZOO−7 (Reference) Areas in July, 2019 to 2022

Notes: Black bars represent measures of central tendency (mean, geometric mean, o r median depending o n if analysis was conducted o n untransformed, $\log_{10}$−transformed or rank−transformed data). Coloured letters represent significant (p−value <0.1) post−hoc comparisons within areas over time; years that share a letter of the same colour (e.g., A, B) within a box o f the same colour d o not differ significantly within a n area. A number above the plot indicates significant exposed vs. reference posthoc comparisons within a given year. The magnitude of difference (MOD) for these significant post−hoc comparisons are expressed in units of standard deviation (SD) or median absolute deviations (MAD; if the data were rank−transformed prior to analysis) relative to reference. 'nc' indicates no comparisons were possible; 'ns' indicates a non−significant contrast; 'nm' indicates that the MOD could not be calculated because MAD = 0. For plots of zooplankton results prior to 2019, see Minnow 2019a, 2020a, 2021a. For unreplicated zooplankton results collected in June and August 2022, see Appendix Table C.3.7.

concentrations significantly higher than reference) in 2022 (if the analysis *Area×Year* interaction was significant) or in all monitoring years (if the *Area×Year* interaction was not significant[56]). Zooplankton tissue from the exposed area of Quesnel Lake had concentrations of primary or secondary analytes that were similar to or lower than reference in 2022 or in all monitoring years. This has been true in each of the monitoring years evaluated statistically since 2019 (Appendix Table E.3.3). Thus, results indicate that zooplankton tissue quality in Quesnel Lake from 2019 to 2022 was unimpacted by the breach and potential effluent exposure.

Post-breach (2015 to 2022) surface water quality trends in exposed areas of Quesnel Lake also showed temporal stability for most analytes, with some exceptions. Specifically, total manganese, total phosphorus, and total and dissolved selenium, and dissolved barium, molybdenum and sodium were the only primary or secondary analytes that showed significant increasing trends from 2015 to 2022 in surface water from QUL-18 (near QUL-ZOO-1) and/or QUL-2a exposed water quality monitoring stations (Figure 3.3; Appendix Table E.3.4). Significant increasing trends in dissolved selenium and dissolved molybdenum were identified at both exposed stations (QUL-18 and QUL-2a), whereas an increasing trend was identified at only one of the two stations for the remaining analytes (QUL-18 [total manganese] or QUL-2a [total phosphorous and selenium, dissolved barium and sodium]; Appendix Figures C.1.5 to C.1.8, Appendix Tables C.1.5, E.3.4).

Although no BCWQG exists for dissolved selenium, total selenium concentrations at QUL-18 and QUL-2a remained approximately 10 times lower than the BCWQG for total selenium (2 µg/L; BCMOECCS 2021b) from 2015 to 2022 (Appendix Figure C.1.8). In addition, zooplankton selenium concentrations did not differ significantly between the exposed and reference areas in 2019 to 2022, as indicated above (Appendix Table E.3.2). Zooplankton selenium concentrations at both QUL-ZOO-1 (exposed) and QUL-ZOO-7 (reference) in 2022 were below the BC interim tissue guideline (4 mg/kg dw; Appendix Table C.4.2). Concentrations at QUL-ZOO-1 (exposed) were also below the guideline in 2019 to 2021, while results from 2015 to 2017 exceeded the guidelines (Appendix Figure C.4.2). Concentrations of selenium in zooplankton tissue at reference (QUL-ZOO-7 and QUL-ZOO-8) exceeded the BC interim tissue guideline in 2015 to 2017, 2019, and 2021, indicating that selenium concentrations in zooplankton tissue were naturally higher than the guideline in some areas of Quesnel Lake (Appendix Figure C.4.2, Appendix Table C.4.2). Of the remaining water quality analytes identified as increasing since 2015 at the exposed area(s), BCWQG exist only for total manganese (which remained well below the BCWQG from 2015 to 2022)

[56] If no significant change was detected in the exposed-reference difference among years (i.e., the *Area* x *Year* interaction was not significant), then data from 2019 to 2022 were combined for the analyses.

and phosphorus, but not for dissolved barium, molybdenum, or sodium (BCMOECCS 2021a,b; Figures C.1.5 to C.1.8). A measurable increase of these analytes in zooplankton tissue concentrations was not observed since 2019, indicating no sustained impact of the increased aqueous concentrations of these analytes on zooplankton tissue quality (Appendix Figure C.4.2). The evaluation of potential changes to plankton productivity associated with increased phosphorus concentrations is addressed in Sections 5.2.3.1.2 and 5.2.3.2.2.

To evaluate the potential impact of copper concentrations on aquatic life in Quesnel Lake, dissolved concentrations were compared to the relevant BLM-based BCWQG to calculate GEFs for dissolved copper (refer to Section 3.8.3.3 for details). The copper GEFs in surface water did not change significantly from 2015 to 2022 at any of the routine water quality monitoring stations (Appendix Figure C.1.7, Appendix Table E.3.4). The GEFs observed in 2022 for Quesnel Lake exposed (QUL-18 and QUL-2a) were typically within the range of previous years and results remained within the range of copper GEFs reported for the reference (QUL-12), which suggests there is likely little risk to aquatic life in the near term (Appendix Figure C.1.7)

5.2.5 Benthic Invertebrate Community

Benthic invertebrate community monitoring in 2022 was completed at the exposed deep near-field area of Quesnel Lake (QUL-PNF; Figure 3.2, Table 3.7). A comparable deep reference area located at Horsefly Bay (QUL-PREF1) was monitored from 2014 to 2021 (Minnow 2022a). Data for this area were displayed and incorporated in the interpretation to provide context for the temporal evaluation of QUL-PNF results where applicable (see Section 3.5.3 for details). A review of the 2022 benthic invertebrate community data quality (Appendix B) indicated excellent sampling sorting, efficiency, subsampling precision and accuracy, and taxonomic identification accuracy achieved the laboratory DQO, indicating the data were of excellent quality.

The mean benthic invertebrate density at QUL-PNF in 2022 (995 organisms/m^2) was unchanged since 2016 (i.e., temporally stable from 2016 to 2022; range = 590 organisms/m^2 in 2016 to 1,899 organisms/m^2 in 2019), but higher than densities reported in 2014 and 2015 (Figure 5.25, Table 5.19; Appendix Tables C.5.1, C.5.2, E.4.1). Density in 2022 at QUL-PNF remained much lower than the densities reported for the reference area (QUL-PREF1) in 2014 to 2021, but the difference relative to reference has steadily decreased (Figure 5.25, Table 5.19; Appendix Tables C.5.1 and C.5.2). Taxon richness in 2022 (mean = 6.2 taxa) was similar to all previous years (2014 to 2021; range = 2.2 to 8.2 taxa), indicating temporal stability since the initiation of monitoring in this area. Of the years when comparison to reference was possible, taxon richness was similar to reference in 2014 and 2019 but lower than reference in the remaining years (including the most recent sampling event in 2021; Figure 5.25, Table 5.16; Appendix Table E.4.1). Simpson's Evenness at QUL-PNF in 2022 was significantly lower than

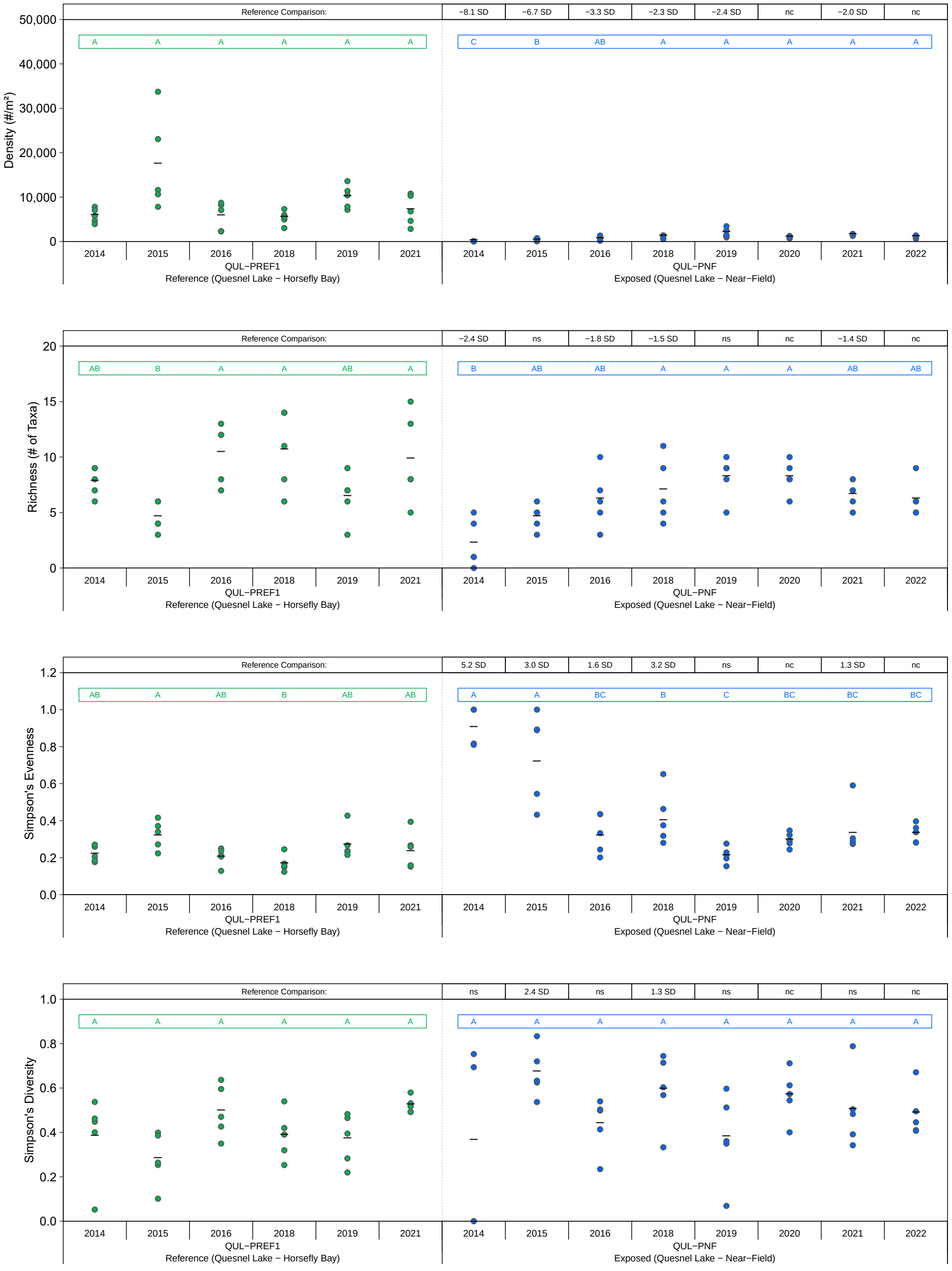

Figure 5.25: Benthic Invertebrate Community Endpoints for Quesnel Lake at QUL−PNF (Exposed) and QUL−PREF1 (Reference) Deep Areas, 2014 to 2022

Notes: Black bars represent measures of central tendency (mean, geometric mean, or median depending on if analysis was conducted on untransformed, log_{10}−transformed or rank−transformed data). Coloured letters represent significant (p−value <0.1) post−hoc comparisons within areas over time; years that share a letter of the same colour (e.g., A, B) within a box of the same colour do not differ significantly within an area. A number above the plot indicates significant exposed vs. reference post−hoc comparisons within a given year. The magnitude of difference (MOD) for these significant post−hoc comparisons is expressed in units of standard deviation (SD) or median absolute deviations (MAD; if the data were rank−transformed prior to analysis) relative to reference. 'nc' indicates no comparisons were possible; 'ns' indicates a non−significant contrast; 'nm' indicates that the MOD could not be calculated because MAD = 0.

Table 5.19: Results of Statistical Comparisons of Benthic Invertebrate Community Endpoints for Quesnel Lake at QUL-PNF (Exposed) and QUL-PREF1 (Reference) Deep Areas, 2014 to 2022

Endpoint	Transformation	2-Way ANOVA P-values			Area Type	Area	Year	Mean	MCT[a]	Temporal Contrasts Within Sites														Spatial Comparison Within Years
										Pairwise Comparisons Between Years								MOD Relative to Baseline[b]							
		Area	Year	Area x Year						2014	2015	2016	2018	2019	2020	2021	2022	2014	2015	2016	2018	2019	2020	2021	2022	QUL-PNF
Density (#/m²)	log10(x+1)	-	-	<0.001	Reference	QUL-PREF1	2014	5,843	5,659	A	A	A	A	A	nc	A	nc	Baseline	ns	ns	ns	ns	nc	ns	nc	-8.1
							2015	17,364	14,956																-6.7
							2016	5,711	4,839																-3.3
							2018	5,325	5,118																-2.3
							2019	10,065	9,787																-2.4
							2021	7,065	6,295																-2.0
					Exposed	QUL-PNF	2014	36.4	15.0	C	B	AB	A	A	A	A	A	Baseline	2.8	4.6	5.8	6.5	5.6	6.3	5.7	
							2015	216	120																
							2016	590	447																
							2018	1,061	1,009																
							2019	1,899	1,691																
							2020	915	894																
							2021	1,473	1,463																
							2022	995	957																
Richness (# of Taxa)	none	-	-	0.007	Reference	QUL-PREF1	2014	7.80	7.80	AB	B	A	A	AB	nc	A	nc	Baseline	ns	ns	ns	ns	nc	ns	nc	-2.4
							2015	4.60	4.60																ns
							2016	10.40	10.4																-1.8
							2018	10.60	10.6																-1.5
							2019	6.40	6.40																ns
							2021	9.80	9.80																-1.4
					Exposed	QUL-PNF	2014	2.20	2.20	B	AB	AB	A	A	A	AB	AB	Baseline	ns	ns	2.1	2.6	2.6	ns	ns	
							2015	4.60	4.60																
							2016	6.20	6.20																
							2018	7.00	7.00																
							2019	8.20	8.20																
							2020	8.20	8.20																
							2021	6.60	6.60																
							2022	6.20	6.20																
Simpson's Evenness	log10	-	-	<0.001	Reference	QUL-PREF1	2014	0.219	0.216	AB	A	AB	B	AB	nc	AB	nc	Baseline	ns	ns	ns	ns	nc	ns	nc	5.2
							2015	0.324	0.316																3.0
							2016	0.206	0.201																1.6
							2018	0.168	0.163																3.2
							2019	0.275	0.266																ns
							2021	0.246	0.231																1.3
					Exposed	QUL-PNF	2014	0.907	0.902	A	A	BC	B	C	BC	BC	BC	Baseline	ns	-3.8	-3.0	-5.3	-4.1	-3.7	-3.7	
							2015	0.752	0.715																
							2016	0.329	0.315																
							2018	0.417	0.399																
							2019	0.213	0.210																
							2020	0.297	0.294																
							2021	0.347	0.330																
							2022	0.332	0.329																
Simpson's Diversity	none	-	-	0.023	Reference	QUL-PREF1	2014	0.380	0.380	A	A	A	A	A	nc	A	nc	Baseline	ns	ns	ns	ns	nc	ns	nc	ns
							2015	0.281	0.281																2.4
							2016	0.496	0.496																ns
							2018	0.384	0.384																1.3
							2019	0.369	0.369																ns
							2021	0.522	0.522																ns
					Exposed	QUL-PNF	2014	0.362	0.362	A	A	A	A	A	A	A	A	Baseline	ns	ns	ns	ns	ns	ns	ns	
							2015	0.670	0.670																
							2016	0.438	0.438																
							2018	0.592	0.592																
							2019	0.378	0.378																
							2020	0.568	0.568																
							2021	0.502	0.502																
							2022	0.486	0.486																

Magnitude of Difference (MOD) < -2

Magnitude of Difference (MOD) > 2

Notes: "-" = no data available, "nc" = no comparison, "ns" = no significance, "nm" = Contrast MODs could not be calculated because the MAD=0, "MAD" = Median Absolute Deviation. No data available for QUL-PREF1 in 2020 or 2022, as area was not sampled.

[a] MCT = Measures of Central Tendency. Mean, geometric mean, or median depending on if analysis was conducted on untransformed, $\log_{10}$-transformed, or rank-transformed data.

[b] Magnitude of difference (MOD) calculated for two-way ANOVA as (Exposed Mean - Reference Mean)/SD (or [Mean - Baseline Mean]/SD for temporal comparisons) on the transformed scale, where SD was the pooled standard deviation of the model residuals. MOD calculated for Kruskal-Wallis (i.e., rank-transformed data) as (Exposed Median - Reference Median)/MAD, where MAD was the pooled Median Absolute Deviation.

2014 and 2015 and temporally stable since 2016, while Simpson's Diversity showed no change between 2014 and 2022 (Figure 5.25, Table 5.16; Appendix Table E.4.1). Simpson's Evenness at QUL-PNF has remained higher than reference except in 2019, and Diversity has been similar to reference except in 2015 and 2018 when it was higher than reference (for years when comparison to reference is possible; Figure 5.25, Table 5.16; Appendix Table E.4.1).

The benthic invertebrate community at QUL-PNF in 2022 was dominated by Chironomidae, which has been observed in this area since 2014 (mean range = 46 to 91%; Figure 5.26; Appendix Figures E.4.2 and E.4.3, Appendix Table C.5.2). The relative densities of the major taxonomic groups (including Chironomidae) have shown temporal stability since 2014, except for a temporary increase in EPT proportions in 2019 (Appendix Figure E.4.2, Appendix Table E.4.1). Densities of Chironomidae at QUL-PNF have been temporally stable since 2016 and were significantly higher in 2018 to 2022 compared to 2014 and 2015. This was consistent with the stability in total organism density observed since 2016 and the significantly higher density in these monitoring years (2018 to 2022 compared to 2014 and 2015; Table 5.16; Appendix Figure E.4.2, Appendix Table E.4.1). Compared to reference, densities and relative densities (%) of EPT (taxon known to be sensitive to habitat disturbances and water pollution; Lenat 1988, Herman and Nejadhashemi 2015) and Arachnida have been similar to reference in all years. Chironomidae (%) has been similar to reference since 2018 (and in 2014), while Oligochaeta (%) was lower than reference in 2015, 2016, and 2021 (for years when comparison to reference is possible). Since 2014, densities of EPT and Arachnida have been similar to reference, while densities of Chironomidae and Oligochaeta have been lower than reference (Appendix Figure E.4.2, Appendix Table E.4.1)

Multivariate analysis (CA) was used to further evaluate temporal changes in community composition from 2014 to 2022 at QUL-PNF. The first two axes of the CA explained a total of 41.1% of the community variation at QUL-PNF (24.4% and 16.7% for CA Axis 1 and 2, respectively; Appendix Table E.4.2, Appendix Figure E.4.4). Evaluation of temporal changes in community composition indicated that the community QUL-PNF in 2022 only differed significantly from 2014 along CA Axis 1, and 2016 along CA Axis 2 (Appendix Figure E.4.4, Appendix Table E.4.2). The similarity of the benthic community composition in most monitoring years as determined by CA (except for the difference of 2016 relative to all other years along CA Axis 1) is indicative of minimal temporal changes in community composition at this area over time. This was consistent with the temporal stability observed in the proportion of major taxonomic groups over time (Appendix Figure E.4.2). Evaluation of spatial differences indicated that the community composition at QUL-PNF differed significantly from reference along CA Axis 1 in each comparable year (i.e., each year with paired reference and exposed results since 2014; Appendix Figure E.4.4, Appendix Tables E.4.1 to E.4.3). This difference was consistent with the

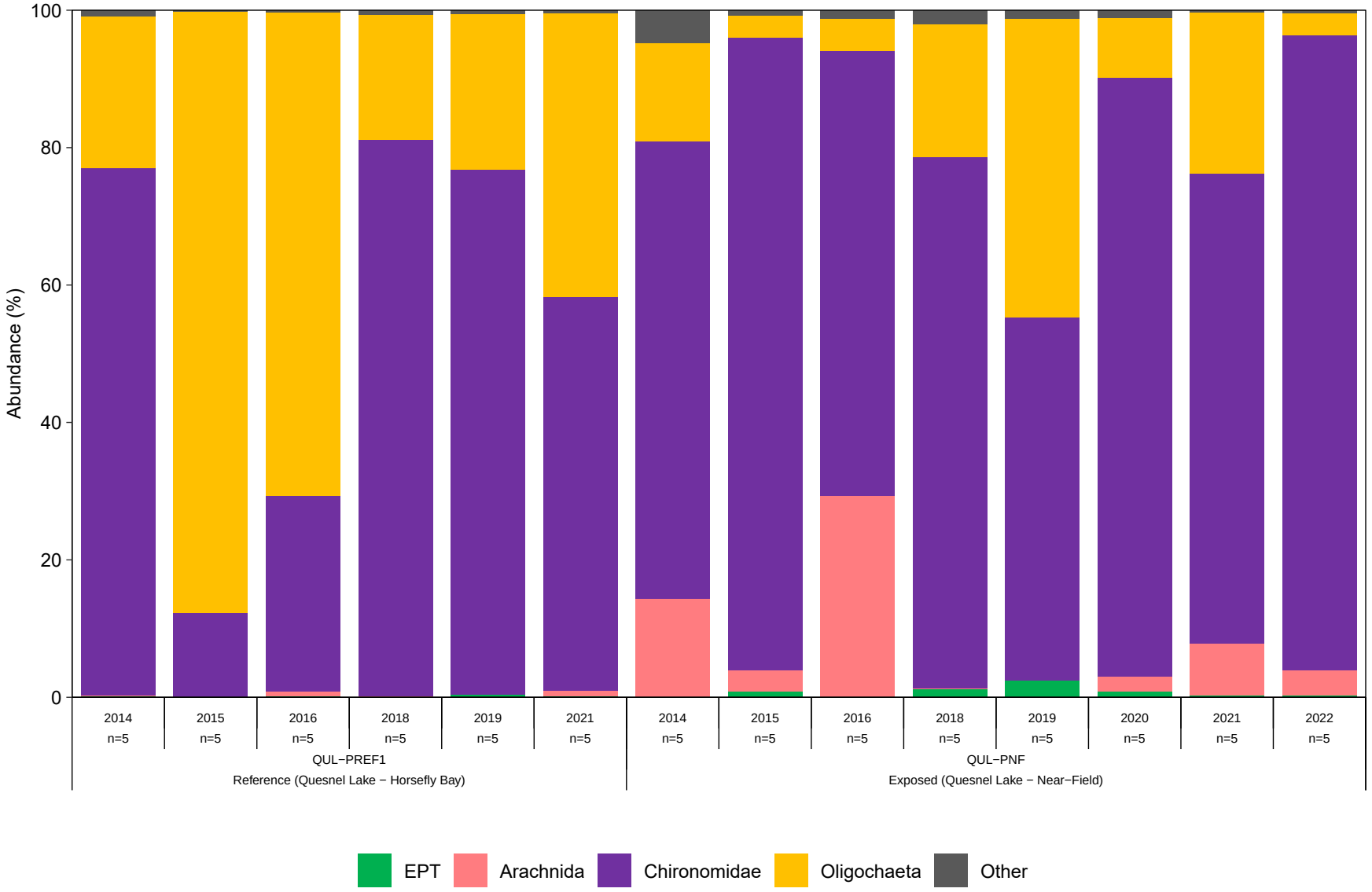

Figure 5.26: Relative Mean Densities of Major Benthic Invertebrate Community Taxonomic Groups for Quesnel Lake at QUL-PNF (Exposed) and QUL-PREF1 (Reference) Deep Areas, 2014 to 2022

continued differences in community composition at QUL-PNF relative to reference; primarily the lower relative density of Oligochaeta. Like other metrics discussed previously, these CA results suggested some recovery of the benthic invertebrate community at QUL-PNF since the initial breach event in 2014, but that no substantial change in community from 2016 to 2021.

Benthic invertebrate community endpoints of total density, Chironomidae density, Oligochaeta density and relative density (%), and CA Axis 1 were negatively correlated with percent fines and the sediment concentration of all analytes of interest (arsenic, copper, iron, and manganese), and positively correlated with TOC and with lower concentrations of several metals as reflected by PCA Axis-1 (Appendix Figure E.1.3, E.4.5, Appendix Tables E.1.7, E.1.8, E.4.4). Richness was positively correlated with TOC and negatively correlated with the concentration of copper, whereas Evenness was negatively correlated with TOC and PCA Axis-1, and positively correlated with all analytes of interest (Appendix Figure E.4.5, Appendix Table E.4.4). Tailings-impacted sediments from the breach characteristically contained a higher proportion of fines, lower TOC content, and elevated concentrations of metals such as copper, the latter of which occurred at concentrations above the upper WSQG at QUL-PNF areas following the breach (see Section 5.2.1.1). Therefore, correlation analysis indicated that the physical and chemical characteristics of sediment at QUL-PNF, including finer particle size, lower TOC content, and elevation in concentrations of metals such as copper, were related to lower total density, richness, Chironomidae density, and Oligochaeta density and relative density compared to the reference area over time. The positive correlation between Chironomidae density, total density (which is dominated by Chironomidae) and TOC content is consistent with the documented intolerance of chironomids (*Chironomus tentans*) to sediments with TOC below 1% (Suedel et al. 1993), and poor survival in sediments with TOC below 0.5% (Suedel and Rodgers 1994). Mean TOC content at QUL-PNF in 2022 was 0.614 ± 0.111% (see Section 5.2.1.1; Table 5.13). Specific conductance and water temperature were negatively correlated with total density, Chironomidae density, and Oligochaeta density and abundance but the incremental differences between the exposed and reference areas for these measures were minor (Appendix Figure E.4.5, Appendix Table E.4.4). Similarly, dissolved oxygen was positively correlated with taxon richness and temperature was also negatively correlated with richness, Oligochaeta (%), and CA Axis 1, but these measures were minor (Appendix Figure E.4.5, Appendix Table E.4.4). Therefore, no adverse effects to the benthic invertebrate community were likely associated with differences of these parameters at QUL-PNF area over time.

Overall, temporal analysis of the benthic invertebrate community at the deep near-field area of Quesnel Lake has indicated some recovery since the initial breach event in 2014, but that no substantial change in community features has occurred from 2016 to 2022. The differences in

benthic invertebrate community structure between the exposed and reference areas that were apparent in previous years appeared related to a greater proportion of fines, lower proportion of TOC, and higher metal concentrations in sediment at the exposed areas than at the reference area; sediment properties which were consistent with the presence of breach-impacted sediments at this deep exposed near-field area.

5.2.6 Fish Community, Catchability, and Population

Total fish catches and CPUE associated with fish sampling completed in Quesnel Lake and Quesnel River in fall 2022 are summarized in Appendix Tables C.6.12 to C.6.14. The supporting *in situ* water quality measurements and habitat data recorded during fish efforts are summarized in Appendix Figure A.1.6 and Appendix Table A.1.5.

Comparisons of CPUE for hoop netting efforts in exposed and reference areas in Quesnel Lake in 2022 indicated that catchability of kokanee (*Oncorhynchus nerka)* and largescale sucker (*Catostomus macrocheilus*) were 75.5-fold and 44.9-fold higher, respectively, in the exposed fishing area near Hazeltine Creek relative to the reference fishing area Grain Creek (Appendix Table C.6.12). Rainbow trout, longnose sucker, and redside shiner were caught at the reference area but not at the exposed area near Hazeltine Creek in 2022 and were also the only species that had higher CPUE at reference area compared to exposed area (Appendix Table C.6.12). Catchability of northern pikeminnow and peamouth chub were higher in the exposed fishing area relative to the reference fishing area in 2022, which agreed with the findings from 2021 (Minnow 2022a).

Comparisons of CPUE for gill net sets in Quesnel Lake in 2022 indicated that catchability of all fish species except for kokanee and rainbow trout was lower at the exposed area near Cedar Point than at the reference area in the East Arm of Quesnel Lake (Appendix Table C.6.13). Lake trout catchability in 2022 was lower at both the reference (mean CPUE = 0.00061) and exposed (mean CPUE = 0.000058) areas of Quesnel Lake compared to 2021 (Appendix Table C.6.13). Though catchability declined between 2021 and 2022, the CPUE in 2022 was within historic range (range = 0.000033 to 0.00053 in the exposed area and range = 0.00061 to 0.14 in the reference area between 2019 and 2021; Appendix Table C.6.13; Minnow 2020a, 2021a, 2022a). The CPUE for rainbow trout in 2022 at the Quesnel River sampling area was 1.5-fold lower than 2021, 1.1-fold higher than 2020, and 2.5-fold higher than 2019 (Appendix Table C.6.14; Minnow 2020a, 2021a, 2022a).

5.2.7 Fish Tissue Quality

Fish tissue quality in 2022 was evaluated at exposed and unexposed (reference) areas of Quesnel Lake and Quesnel River (Figure 3.6, Table 3.8). In Quesnel Lake, fish tissue quality was

evaluated from northern pikeminnow and peamouth chub collected near Hazeltine Creek and lake trout collected near Cedar Point, with areas in the East Arm (lake trout) and near Grain Creek (northern pikeminnow and peamouth chub) of Quesnel Lake serving as reference. In Quesnel River, fish tissue quality was evaluated from rainbow trout (Figure 3.6, Table 3.8). A review of the 2022 fish tissue data quality (Appendix B) indicated that these data can be used with a high level of confidence for interpretation (see Section 5.1.6 for details).

5.2.7.1 Comparison to Guidelines and Thresholds

Mean selenium concentrations of fish muscle samples from Quesnel Lake and Quesnel River in 2022 were consistently below consumption guidelines for the protection of human health, as was the case from 2015 to 2021 (Table 5.20; Appendix Tables C.7.5 to C.7.11; CFIA 2015; BCMOE 2014). Mean mercury concentrations in 2022 were also below the human health guideline (0.5 mg/kg ww) in fish muscle from Quesnel Lake and Quesnel River, although two lake trout individuals from each of the exposed (near Cedar Point) and reference (East Arm) areas of Quesnel Lake did exceed this threshold (Table 5.20; Appendix Table C.7.5, C.7.6, C.7.9 to C.7.11; CFIA 2015; BCMOE 2014). Given the longevity of lake trout as well as their trophic position in Quesnel Lake, it is not unexpected to see some large individuals with natural muscle tissue concentrations in exceedance of the human health guideline. In fact, it has been typical that a proportion of lake trout individuals from the reference area exceed this threshold, with results from 2021, 2020, 2019, and 2018 that exceeded the guideline by 63%, 63%, 50%, and 13% respectively (Table 5.20).

Mean selenium concentrations in fish muscle or whole-body samples from Quesnel Lake and Quesnel River were below the guideline for the protection of aquatic life in 2022 (4 mg/kg dw; BCMOE 2014), except for peamouth chub from the exposed area (Table 5.21; Appendix Tables C.7.5 to C.7.11). The mean selenium concentration in muscle of peamouth chub from the exposed area of Quesnel Lake in 2022 was higher than the guideline for the protection of aquatic life (mean = 4.3 mg/kg dw; range = 4.06 to 5.88 mg/kg dw), with 63% of samples exceeding the guideline (Table 5.21; Appendix Table C.7.9). The rate of guideline exceedances in peamouth chub muscle samples from the exposed area in 2022 (63%) has increased relative to all prior years (38% in 2021, 13% in 2018 and 2015). The rate of guideline exceedances in 2022 for rainbow trout muscle from Quesnel River (13%) and northern pikeminnow whole-body from the Quesnel Lake exposed area (25%) were greater than 2021 but were within the historic range (Table 5.21). Selenium concentrations in peamouth chub muscle and northern pikeminnow whole-body from the reference area of Quesnel Lake were below the guideline for the protection of aquatic life in all years, as were selenium concentrations in lake trout muscle from both the exposed and reference areas (Table 5.21).

Table 5.20: Fish Muscle Mercury and Selenium Concentrations from Quesnel Lake (Exposed and Reference) and Quesnel River (Exposed) Relative to Human Health Consumption Guidelines, 2015 to 2022

Waterbody or Area		Species	Year/Season	Sample Size	Mercury		Selenium		
					Health Canada Human Health		BCMOE Human Health		
					Guideline = 0.5 mg/kg ww		Moderate Consumption = 14.5 mg/kg dw		
							High Consumption = 7.3 mg/kg dw		
					Mean	Frequency > Guideline	Mean	Frequency > Moderate	Frequency > High
Quesnel Lake	East Arm (Reference)	Lake Trout	Fall 2015 (Minnow 2017g)	10	0.260	10%	1.60	0%	0%
	near Cedar Point (Exposed)	Lake Trout		10	0.220	10%	1.90	0%	0%
	near Likely (Exposed)	Kokanee		8	0.0920	0%	2.40	0%	0%
Quesnel River (Exposed)		Rainbow Trout		8	0.0646	0%	2.17	0%	0%
Quesnel Lake	near Grain Creek (Reference)	Peamouth Chub	Spring 2016 (Minnow 2017g)	8	0.150	0%	1.60	0%	0%
	near Hazeltine Creek (Exposed)	Peamouth Chub		8	0.240	0%	2.80	0%	0%
Quesnel River (Exposed)		Rainbow Trout	Fall 2017 (Minnow 2018e)	8	0.0928	0%	3.23	0%	13%
Quesnel Lake	near Grain Creek (Reference)	Peamouth Chub	Fall 2018 (Minnow 2019a)	8	0.139	0%	2.08	0%	0%
	East Arm (Reference)	Lake Trout		8	0.443	13%	2.21	0%	0%
	North Arm (Reference)	Kokanee		8	0.0944	0%	1.97	0%	0%
	near Cedar Point (Exposed)	Lake Trout		8	0.313	0%	2.18	0%	0%
	near Hazeltine Creek (Exposed)	Peamouth Chub		8	0.123	0%	3.03	0%	0%
	near Likely (Exposed)	Kokanee		8	0.0873	0%	2.11	0%	0%
Quesnel River (Exposed)		Rainbow Trout		8	0.0497	0%	2.36	0%	0%
Quesnel Lake	near Grain Creek (Reference)	Peamouth Chub	Fall 2019 (Minnow 2020a)	8	0.139	0%	2.08	0%	0%
	East Arm (Reference)	Lake Trout		8	0.481	50%	1.87	0%	0%
	near Cedar Point (Exposed)	Lake Trout		9	0.305	11%	1.76	0%	0%
	near Hazeltine Creek (Exposed)	Peamouth Chub		8	0.137	0%	2.90	0%	0%
Quesnel River (Exposed)		Rainbow Trout		8	0.0395	0%	2.35	0%	0%
Quesnel Lake	near Grain Creek (Reference)	Peamouth Chub	Fall 2020 (Minnow 2021a)	8	0.124	0%	1.72	0%	0%
	East Arm (Reference)	Lake Trout		8	0.625	63%	1.96	0%	0%
	near Cedar Point (Exposed)	Lake Trout		8	0.319	13%	1.87	0%	0%
	near Hazeltine Creek (Exposed)	Peamouth Chub		8	0.144	0%	3.26	0%	0%
Quesnel River (Exposed)		Rainbow Trout		8	0.0545	0%	1.96	0%	0%
Quesnel Lake	near Grain Creek (Reference)	Peamouth Chub	Fall 2021 (Minnow 2022a)	8	0.146	0%	1.76	0%	0%
	East Arm (Reference)	Lake Trout		8	0.632	63%	2.07	0%	0%
	near Cedar Point (Exposed)	Lake Trout		8	0.243	0%	1.77	0%	0%
	near Hazeltine Creek (Exposed)	Peamouth Chub		8	0.182	0%	3.94	0%	0%
Quesnel River (Exposed)		Rainbow Trout		8	0.0544	0%	2.48	0%	0%
Quesnel Lake	near Grain Creek (Reference)	Peamouth Chub	Fall 2022	8	0.163	0%	2.36	0%	0%
	East Arm (Reference)	Lake Trout		8	0.494	25%	1.90	0%	0%
	near Cedar Point (Exposed)	Lake Trout		8	0.316	25%	2.10	0%	0%
	near Hazeltine Creek (Exposed)	Peamouth Chub		8	0.206	0%	4.30	0%	0%
Quesnel River (Exposed)		Rainbow Trout		8	0.0605	0%	3.00	0%	0%

Indicates mean mercury concentration greater than Health Canada's Human Health guideline for muscle tissue in fish (0.5 mg/kg dw; CFIA 2015).
Indicates mean selenium concentration greater than the BCMOE Human Health guideline for moderate fish consumption (14.5 mg/kg dw; BCMOE 2014).
Indicates mean selenium concentration greater than the BCMOE Human Health guideline for high fish consumption (7.3 mg/kg dw; BCMOE 2014).

Notes: mg/kg ww = milligrams per kilogram wet weight, mg/kg dw = milligrams per kilogram dry weight, BCMOE = British Columbia Ministry of Environment, > = greater than, % = percent, guidelines for the protection of human health were applied to edible fish tissues only (i.e., muscle) not whole body tissue results (e.g., northern pikeminnow results for 2016 to 2022).

Table 5.21: Fish Muscle Selenium Concentrations from Quesnel Lake (Exposed and Reference) and Quesnel River (Exposed) Relative to the British Columbia Guideline for the Protection of Aquatic Life, 2015 to 2022

Waterbody or Area		Species	Year/Season	Tissue	Sample Size	Selenium (mg/kg dw)	
						BCMOE Guideline (4 mg/kg dw)	
						Mean	Frequency > Guideline
Quesnel Lake	near Grain Creek (Reference)	Peamouth Chub	Fall 2015 (Minnow 2017g)	Whole Body	8	2.20	0%
		Redside Shiner		Whole Body	8	2.00	0%
	East Arm (Reference)	Lake Trout		Muscle	10	1.60	0%
	near Cedar Point (Exposed)	Lake Trout		Muscle	10	1.90	0%
	near Hazeltine Creek (Exposed)	Northern Pikeminnow		Muscle	7	2.02	0%
		Peamouth Chub		Whole Body	8	3.10	13%
		Redside Shiner		Whole Body	8	2.70	0%
	near Likely (Exposed)	Kokanee		Muscle	8	2.40	0%
Quesnel River (Exposed)		Rainbow Trout		Muscle	8	2.17	0%
Quesnel Lake	near Grain Creek (Reference)	Northern Pikeminnow	Spring 2016 (Minnow 2017g)	Whole Body	8	2.10	0%
		Peamouth Chub		Muscle	8	1.60	0%
	near Hazeltine Creek (Exposed)	Northern Pikeminnow		Whole Body	8	3.08	0%
		Peamouth Chub		Muscle	8	2.80	0%
	near Hazeltine Creek (Exposed)	Northern Pikeminnow	Fall 2017 (Minnow 2018e)	Whole body	8	2.32	0%
Quesnel River (Exposed)		Rainbow Trout		Muscle	8	3.23	13%
Quesnel Lake	near Grain Creek (Reference)	Northern Pikeminnow	Fall 2018 (Minnow 2019a)	Whole Body	8	1.72	0%
		Peamouth Chub		Muscle	8	2.08	0%
	East Arm (Reference)	Lake Trout		Muscle	8	2.21	0%
	North Arm (Reference)	Kokanee		Muscle	8	1.97	0%
	near Cedar Point (Exposed)	Lake Trout		Muscle	8	2.18	0%
	near Hazeltine Creek (Exposed)	Northern Pikeminnow		Whole Body	8	2.37	0%
		Peamouth Chub		Muscle	8	3.03	13%
	near Likely (Exposed)	Kokanee		Muscle	8	2.11	0%
Quesnel River (Exposed)		Rainbow Trout		Muscle	8	2.36	0%
Quesnel Lake	near Grain Creek (Reference)	Northern Pikeminnow	Fall 2019 (Minnow 2020a)	Whole Body	8	1.60	0%
		Peamouth Chub		Muscle	8	2.08	0%
	East Arm (Reference)	Lake Trout		Muscle	8	1.87	0%
	near Cedar Point (Exposed)	Lake Trout		Muscle	8	1.76	0%
	near Hazeltine Creek (Exposed)	Northern Pikeminnow		Whole Body	8	3.36	38%
		Peamouth Chub		Muscle	8	2.90	0%
Quesnel River (Exposed)		Rainbow Trout		Muscle	8	2.35	0%
Quesnel Lake	near Grain Creek (Reference)	Northern Pikeminnow	Fall 2020 (Minnow 2021a)	Whole Body	8	1.82	0%
		Peamouth Chub		Muscle	8	1.72	0%
	East Arm (Reference)	Lake Trout		Muscle	8	1.96	0%
	near Cedar Point (Exposed)	Lake Trout		Muscle	8	1.87	0%
	near Hazeltine Creek (Exposed)	Northern Pikeminnow		Whole Body	8	3.12	25%
		Peamouth Chub		Muscle	8	3.26	0%
Quesnel River (Exposed)		Rainbow Trout		Muscle	8	1.96	0%
Quesnel Lake	near Grain Creek (Reference)	Northern Pikeminnow	Fall 2021 (Minnow 2022a)	Whole Body	8	1.81	0%
		Peamouth Chub		Muscle	8	1.76	0%
	East Arm (Reference)	Lake Trout		Muscle	8	2.07	0%
	near Cedar Point (Exposed)	Lake Trout		Muscle	8	1.77	0%
	near Hazeltine Creek (Exposed)	Northern Pikeminnow		Whole Body	8	2.95	0%
		Peamouth Chub		Muscle	8	3.94	38%
Quesnel River (Exposed)		Rainbow Trout		Muscle	8	2.48	0%
Quesnel Lake	near Grain Creek (Reference)	Northern Pikeminnow	Fall 2022	Whole Body	8	1.83	0%
		Peamouth Chub		Muscle	8	2.36	0%
	East Arm (Reference)	Lake Trout		Muscle	8	1.90	0%
	near Cedar Point (Exposed)	Lake Trout		Muscle	8	2.10	0%
	near Hazeltine Creek (Exposed)	Northern Pikeminnow		Whole Body	8	3.62	25%
		Peamouth Chub		Muscle	8	4.30	63%
Quesnel River (Exposed)		Rainbow Trout		Muscle	8	3.00	13%

Indicates mean selenium concentration greater than the BCMOE guideline for muscle tissue or whole body in fish (4 mg/kg dw; BCMOE 2014).

Notes: mg/kg dw = milligrams per kilogram dry weight; BCMOE = British Columbia Ministry of Environment; > = greater than; % = percent. The guideline for the protection of aquatic life was applied to fish muscle and whole body tissue concentrations.

As indicated previously (Section 5.1.6.1), embryo toxicity is the primary mechanism of selenium-associated effects to egg laying vertebrates, the most selenium-sensitive organisms, and analysis of ovary tissue is recommended for assessing the effects of selenium on fish (e.g., Luoma and Presser 2009; Janz et al. 2010; DeForest et al. 2012; Janz 2012). Selenium analysis was completed on 19 ovary samples from Quesnel Lake and five samples from the Quesnel River in 2022. Seven peamouth chub ovary samples were collected from the exposed area of Quesnel Lake in 2022. Of these, six (86%) had selenium concentrations that exceeded the threshold for the protection of aquatic life (11 mg/kg dw[57]; BCMOE 2014), and three (43%) also exceeded the threshold for reproductive effects (Table 5.22). The rate of the guideline/threshold exceedances in these exposed peamouth chub ovary tissues was higher in 2022 than in prior years, with only a single sample previously reaching a concentration above the threshold for reproductive effects (*n*=1 [25%] in 2018; Table 5.22). It should be noted that 50% of the peamouth chub ovary samples from the reference area in 2022 were also above the threshold for the protection of aquatic life (range = 12.7 to 14.8 mg/kg dw; Appendix Table C.7.9). This suggests natural elevation of selenium in peamouth chub ovaries but was the first year that this occurred (Table 5.22). Mean selenium concentrations 80% of ovary samples from rainbow trout in Quesnel River in 2022 exceeded the guideline for the protection of aquatic life, which was within the range of previous years (range = 50 to 100%; Table 5.22; Appendix Table C.7.11)

5.2.7.2 Spatial and Temporal Comparisons

Data from Quesnel Lake and Quesnel River collected between 2015 to 2022 (Table 3.9) were compared spatially (exposed vs. reference) and temporally (annual change; see Section 3.7.3.2). These comparisons included up to 36 elements[58], four species (lake trout, northern pikeminnow, peamouth chub, and rainbow trout), and up to four tissues per species (whole-body, muscle, liver, ovary, and kidney; Appendix Figures E.6.9 to E.6.17, Appendix Tables E.6.9 to E.6.17). For Quesnel River rainbow trout (which do not have an associated reference area), temporal comparisons within this exposed area were evaluated (Appendix Figures E.7.18 to E.7.21, Appendix Tables E.7.18 to E.7.21).

Age and morphological measures (fork length and body weight) of lake trout, northern pikeminnow, and peamouth chub from Quesnel Lake, and rainbow trout from Quesnel River between 2015 and 2022 are summarized in Table 5.23 (see Appendix Tables C.6.15 to C.6.18 for detailed 2022 data). Statistical comparisons exhibited a significant *Area*×*Year* interaction for

[57] This guideline includes a two-fold uncertainty factor (BCMOE 2014).

[58] Silver and titanium were added to fish tissue analyses in 2020.

Table 5.22: Fish Ovary Selenium Concentrations from Quesnel Lake (Exposed and Reference) and Quesnel River (Exposed) Relative to the British Columbia Guideline for the Protection of Aquatic Life, 2015 to 2022[a]

Waterbody or Area		Species	Year/Season	Sample Size	Selenium mg/kg dw		
					Mean	Frequency > Guideline or Threshold	
						BCMOE Guideline (11 mg/kg dw)	DeForest et al. (2012) Threshold (20 mg/kg dw)
Quesnel Lake	East Arm (Reference)	Lake Trout	Fall 2015 (Minnow 2017g)	2	3.30	0%	0%
	near Cedar Point (Exposed)	Lake Trout		3	5.10	0%	0%
	near Hazeltine Creek (Exposed)	Northern Pikeminnow		4	5.08	0%	0%
	near Likely (Exposed)	Kokanee		1	5.40	0%	0%
Quesnel River (Exposed)		Rainbow Trout		1	9.51	0%	0%
Quesnel Lake	near Grain Creek (Reference)	Peamouth Chub	Fall 2018 (Minnow 2019a)	4	9.43	0%	0%
	East Arm (Reference)	Lake Trout		1	10.1	0%	0%
	North Arm (Reference)	Kokanee		5	3.73	0%	0%
	near Cedar Point (Exposed)	Lake Trout		4	6.96	0%	0%
	near Hazeltine Creek (Exposed)	Peamouth Chub		4	14.3	50%	25%
	near Likely (Exposed)	Kokanee		8	4.28	0%	0%
Quesnel River (Exposed)		Rainbow Trout		2	2.76	50%	0%
Quesnel Lake	near Grain Creek (Reference)	Peamouth Chub	Fall 2019 (Minnow 2020a)	4	9.43	0%	0%
	East Arm (Reference)	Lake Trout		3	4.22	0%	0%
	near Cedar Point (Exposed)	Lake Trout		2	9.30	0%	0%
	near Hazeltine Creek (Exposed)	Peamouth Chub		4	9.74	25%	0%
Quesnel River (Exposed)		Rainbow Trout		1	14.1	100%	0%
Quesnel Lake	near Grain Creek (Reference)	Peamouth Chub	Fall 2020 (Minnow 2021a)	1	6.04	0%	0%
	East Arm (Reference)	Lake Trout		3	3.02	0%	0%
	near Cedar Point (Exposed)	Lake Trout		4	4.72	0%	0%
	near Hazeltine Creek (Exposed)	Peamouth Chub		6	8.57	33%	0%
Quesnel River (Exposed)		Rainbow Trout		1	5.39	0%	0%
Quesnel Lake	near Grain Creek (Reference)	Peamouth Chub	Fall 2021 (Minnow 2022a)	4	10.3	0%	0%
	near Cedar Point (Exposed)	Lake Trout		6	4.29	0%	0%
	near Hazeltine Creek (Exposed)	Peamouth Chub		8	9.74	25%	0%
Quesnel River (Exposed)		Rainbow Trout		1	16.2	100%	0%
Quesnel Lake	near Grain Creek (Reference)	Peamouth Chub	Fall 2022	6	11.2	50%	0%
	East Arm (Reference)	Lake Trout		1	4.16	0%	0%
	near Cedar Point (Exposed)	Lake Trout		5	6.43	0%	0%
	near Hazeltine Creek (Exposed)	Peamouth Chub		7	17.7	86%	43%
Quesnel River (Exposed)		Rainbow Trout		5	11.5	80%	0%

Indicates mean selenium concentration greater than the BCMOE guideline for ovary tissue in fish (11 mg/kg dw; BCMOE 2014).

Indicates mean selenium concentration greater than DeForest et al. (2012) threshold for ovary tissue in fish (20 mg/kg dw) and the BCMOE guideline.

Notes: mg/kg dw = milligrams per kilogram dry weight, > = greater than, BCMOE = British Columbia Ministry of Environment, % = percent.

[a] No female lake trout were collected from the Quesnel Lake East Arm (reference) in 2021, therefore results for lake trout from this area are not displayed in 2021.

Table 5.23: Age and Body Size Data of Fish Collected for Tissue Quality Monitoring from Quesnel Lake (Exposed and Reference) and Quesnel River (Exposed), 2015 to 2022

Waterbody or Area		Species	Year/ Season	Sample Size	Age (Years)		Fork Length (cm)		Body Weight (Grams)	
					Mean	Range	Mean	Range	Mean	Range
Quesnel Lake	near Grain Creek (Reference)	Peamouth Chub	Fall 2015 (Minnow 2017g)	8	-	-	20.3	18.8 - 21.2	93.4	80.9 - 113
	East Arm (Reference)	Lake Trout		10	10	4 - 19[a]	48.7	34.4 - 63.4	1,230	430 - 2,670
	near Cedar Point (Exposed)	Lake Trout		10	9	4 - 14	51.4	37.2 - 66.2	1,573	550 - 3,220
	near Hazeltine Creek (Exposed)	Northern Pikeminnow		7	7.7	3 - 10	29.2	18.2 - 35.3	375	68 - 650
		Peamouth Chub		8	-	-	20.5	18.0 - 23.0	103	65 - 145
	near Likely (Exposed)	Kokanee		8	3.0	-	25.8	25.2 - 26.6	182	140 - 215
Quesnel River (Exposed)		Rainbow Trout		8	4.0	2 - 6	28.8	21.5 - 34.0	296	143 - 443
Quesnel Lake	near Grain Creek (Reference)	Northern Pikeminnow	Spring 2016 (Minnow 2017g)	8	3.0	2 - 4	11.2	9.0 - 13.0	14.0	7.8 - 21.5
		Peamouth Chub		8	10	7 - 14	21.1	20.1 - 22.3	107	84 - 142
	near Hazeltine Creek (Exposed)	Northern Pikeminnow		8	3.0	-	11.4	9.8 - 13.0	13.6	8.4 - 20.0
		Peamouth Chub		8	9.0	6 - 15	20.5	18.6 - 22.9	103	66 - 150
Quesnel Lake	near Hazeltine Creek (Exposed)	Northern Pikeminnow	Fall 2017 (Minnow 2018e)	8	2.9	2 - 3	8.9	7.4 - 10.9	7.6	3.9 - 14.0
Quesnel River (Exposed)		Rainbow Trout		8	4.4	2 - 6	31.3	21.5 - 37.1	343	97 - 523
Quesnel Lake	near Grain Creek (Reference)	Northern Pikeminnow	Fall 2018 (Minnow 2019a)	8	4.0	3 - 5	13.2	11.7 - 15.6	25.7	14.3 - 39.5
		Peamouth Chub		8	8.0	5 - 12	19.4	15.6 - 21.6	94.7	51.5 - 134
	East Arm (Reference)	Lake Trout		8	19	12 - 35	59.6	55.0 - 66.5	2,306	1,700 - 3,100
	North Arm (Reference)	Kokanee		8	2.7	2 - 3	30.4	29.0 - 31.6	335	250 - 370
	near Cedar Point (Exposed)	Lake Trout		8	12	8 - 19	57.7	53.0 - 67.0	2,000	1,460 - 3,200
	near Hazeltine Creek (Exposed)	Northern Pikeminnow		8	2.7	2 - 3	13.4	11.4 - 15.6	24.7	15.3 - 38.0
		Peamouth Chub		8	7.0	4 - 10	18.6	15.3 - 23.3	81.8	36.5 - 156
	near Likely (Exposed)	Kokanee		8	2.4	2 - 3	30.7	29.5 - 32.6	373	330 - 425
Quesnel River (Exposed)		Rainbow Trout		8	5.0	3 - 6	32.5	27.0 - 36.8	415	245 - 640
Quesnel Lake	near Grain Creek (Reference)	Northern Pikeminnow	Fall 2019 (Minnow 2020a)	8	4.0	3 - 5	17.5	13.2 - 23.2	69.3	23.8 - 142
		Peamouth Chub		8	8.0	5 - 10	19.2	17.4 - 21.5	87.0	58.0 - 131
	East Arm (Reference)	Lake Trout		8	18	8 - 22	56.9	49.5 - 63.9	2,134	1,610 - 2,555
	near Cedar Point (Exposed)	Lake Trout		9	12	8 - 24	59.5	50.2 - 80.0	2,739	1,450 - 6,025
	near Hazeltine Creek (Exposed)	Northern Pikeminnow		8	3.0	2 - 5	15.7	12.4 - 18.9	44.2	24.6 - 74.7
		Peamouth Chub		8	7.0	4 - 10	19.2	13.8 - 24.7	90.0	30.0 - 170
Quesnel River (Exposed)		Rainbow Trout		8	4.0	3 - 5	28.1	24.6 - 34.2	254	150 - 465
Quesnel Lake	near Grain Creek (Reference)	Northern Pikeminnow	Fall 2020 (Minnow 2021a)	8	3.8	3 - 6	15.3	13.2 - 23.7	45.4	24.6 - 152.1
		Peamouth Chub		8	5.4	2 - 9	17.5	12.9 - 21.4	67.9	25.1 - 112.2
	East Arm (Reference)	Lake Trout		8	14	5 - 28	59.3	52.3 - 71.6	2,472	1,750 - 3,950
	near Cedar Point (Exposed)	Lake Trout		8	13	5 - 20	56.9	37.8 - 67.8	2,455	580 - 4,550
	near Hazeltine Creek (Exposed)	Northern Pikeminnow		8	4.4	3 - 6	18.3	13.5 - 21.7	76.4	29 - 119
		Peamouth Chub		8	8.1	5 - 10	21.5	17.2 - 24.9	134.3	61 - 221
Quesnel River (Exposed)		Rainbow Trout		8	3.4	2 - 5	30.1	23.6 - 34.2	309	140 - 500
Quesnel Lake	near Grain Creek (Reference)	Northern Pikeminnow	Fall 2021 (Minnow 2022a)	8	4.9	3 - 7	17.5	13.3 - 24	62.0	21.7 - 155
		Peamouth Chub		8	7.8	5 - 12	18.8	14.7 - 23.1	79.2	41 - 144
	East Arm (Reference)	Lake Trout		8	24	13 - 44	60.6	52.6 - 68.4	2,444	1,750 - 2,850
	near Cedar Point (Exposed)	Lake Trout		8	11	7 - 13	56.4	47.5 - 61.5	1,929	850 - 2,450
	near Hazeltine Creek (Exposed)	Northern Pikeminnow		8	4.6	3 - 6	17.4	13.4 - 20.8	57.1	23.5 - 92
		Peamouth Chub		8	8.0	5 - 12	21.6	19.2 - 23.5	118	77 - 160
Quesnel River (Exposed)		Rainbow Trout		8	2.8	2 - 4	29.0	20.5 - 37.3	316	114 - 660
Quesnel Lake	near Grain Creek (Reference)	Northern Pikeminnow	Fall 2022	8	2.6	2 - 4	14.8	13.5 - 16.6	41.0	36.0 - 57.0
		Peamouth Chub		8	6.3	3 - 14	20.2	17.1 - 22.8	101	66.0 - 135
	East Arm (Reference)	Lake Trout		8	12.4	7 - 19	59.1	50.0 - 65.0	2,350	1,440 - 3,100
	near Cedar Point (Exposed)	Lake Trout		8	6.6	2 - 15	55.4	42.5 - 64.5	1,981	760 - 3,400
	near Hazeltine Creek (Exposed)	Northern Pikeminnow		8	3.8	2 - 6	17.3	13.6 - 21.8	64.9	33.0 - 130
		Peamouth Chub		8	8.1	6 - 10	21.6	20.0 - 22.9	138	115 - 170
Quesnel River (Exposed)		Rainbow Trout		8	3.4	2 - 5	27.4	19.4 - 33.6	258	110 - 450

Note: - = no data / not calculated.

[a] Sample size is n = 9 for age estimate.

one or more of the physical measures for each species monitored in 2022[59]. Exposed peamouth chub sampled did not differ from those from the reference area in 2022 but were significantly longer and heavier than reference in 2020 and 2021 (Table 5.24; Appendix Table E.6.10). Relative to prior years, peamouth chub length at the exposed area in 2022 was not significantly different from any other year in the time series (2016 to 2021), while weight was significantly greater than in 2018 (Appendix Table E.6.10). Northern pikeminnow age and length at the exposed area were significantly greater relative to those at the reference area in 2022, but there was no significant difference in weight (Table 5.24). Relative to previous years at the exposed area, northern pikeminnow in 2022 were significantly older than 2021, 2019, and 2018, but had mean length and weight measures in 2022 that were higher than in 2018 (Table 5.24; Appendix Table E.6.11). Exposed lake trout were of similar length and weight to those from the reference area in 2022 but were consistently younger than reference lake trout from 2015 to 2022 (Table 5.24; Appendix Table E.6.16). Measures of length, weight, and age of Quesnel River rainbow trout did not differ temporally from 2015 to 2022 (Appendix Table E.6.20).

As indicated in Section 3.7.3, data interpretation was focused on primary and secondary analytes (Table 2.4) with a significant positive expose-reference difference (i.e., analytes with concentrations that were significantly higher in tissues from the exposed area compared to those from the reference area) in 2022 (if the analysis *Area*×*Year* interaction was significant) or in all monitoring years (if the *Area*×*Year* interaction was not significant[60]). For most metals, there was little to no evidence of increasing metal concentrations at exposed relative to reference areas over time in Quesnel Lake (Appendix Figures E.6.9 to E.6.17, Appendix Tables E.6.9 to E.6.17) or over time in Quesnel River (Appendix Figures E.6.18 to E.6.21, Appendix Tables E.6.18 to E.6.21). The primary analytes arsenic, copper, iron, and selenium and 14 secondary analytes (barium, cadmium, calcium, manganese, mercury, molybdenum, phosphorus, sodium, strontium, tin, titanium, uranium, vanadium, and zinc) met the criteria for inclusion in data interpretation outlined above for Quesnel Lake data (Table 5.24). None of these primary and secondary analytes showed higher concentrations in zooplankton from the exposed area relative to the reference area of Quesnel Lake (Appendix Table E.3.3; see Section 5.2.4 for details).

[59] Results of the two-way ANOVA for age, fork length, and body size may differ among tissue types for the same species in the same area due to sub-sampling (i.e., the number of females sampled for ovary tissue may be a subset of the total samples) or differences in data availability across years for the different tissue types (e.g., peamouth chub kidney and ovary data were collected from 2018 to 2022 compared to 2016 to 2022 for peamouth chub muscle and liver tissue). For all species sampled for tissue in 2022, discussion of age and body size is focused on results of two-way ANOVA for muscle tissues.

[60] If no significant change was detected in the exposed:reference ratio among years (i.e., the *Area* x *Year* interaction was not significant), then data from all available years were combined for the analyses.

Table 5.24: Summary of Statistical Contrasts of Exposed - Reference Relative Differences of Fish Tissue Primary and Secondary Analyte Concentrations for Quesnel Lake (Exposed and Reference), 2015 to 2022[a]

Parameter		Tissue	Peamouth Chub: Two-way ANOVA												Lake Trout: Two-way ANOVA												Northern Pikeminnow: Two-way ANOVA											
			Magnitude of Difference in (Exposed - Reference) Relative to Baseline Period (%)[b]						Magnitude of Difference for Exposed Mean Relative to Reference (%)[c]						Magnitude of Difference in (Exposed - Reference) Relative to Baseline Period (%)[b]						Magnitude of Difference for Exposed Mean Relative to Reference (%)[c]						Magnitude of Difference in (Exposed - Reference) Relative to Baseline Period (%)[b]						Magnitude of Difference for Exposed Mean Relative to Reference (%)[c]					
			Post-Breach Period						Post-Breach Period						Post-Breach Period						Post-Breach Period						Post-Breach Period						Post-Breach Period					
			2016	2018	2019	2020	2021	2022	2016	2018	2019	2020	2021	2022	2015	2018	2019	2020	2021	2022	2015	2018	2019	2020	2021	2022	2016	2018	2019	2020	2021	2022	2016	2018	2019	2020	2021	2022
Age		muscle	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	baseline	ns	ns	ns	ns	ns	-31						baseline	ns	ns	ns	ns	ns	ns	-27	-26	ns	ns	43
Fork Length		muscle	baseline	ns	ns	19	ns	ns	ns	ns	ns	23	15	ns	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	baseline	ns	ns	23	ns	ns	ns	ns	ns	21	ns	16
Body Weight		muscle	baseline	ns	ns	89	ns	ns	ns	ns	ns	102	56	ns	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	baseline	ns	ns	94	ns	ns	ns	ns	ns	95	ns	ns
Primary Analytes	Arsenic	muscle	baseline	ns	-56	ns	ns	ns	77	ns	ns	119	129	ns	baseline	ns	ns	ns	ns	ns	65						baseline	-71	ns	ns	ns	ns	125	ns	ns	216	81	94
	(essential)	liver[d]	baseline	ns	ns	-68	ns	-83	94	ns	ns	ns	ns	-66	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	-	-	-	-	-	-	-	-	-	-	-	-
		ovary	-	baseline	-66	-75	ns	ns	-	ns	-42	-58	ns	ns	baseline	ns	ns	ns	-	ns	ns	ns	291	ns	-	ns	-	-	-	-	-	-	-	-	-	-	-	-
		kidney	-	baseline	ns	ns	ns	ns	-	32					baseline	ns	ns	ns	ns	ns	40						-	-	-	-	-	-	-	-	-	-	-	-
	Copper	muscle	baseline	-35	ns	-32	-58	ns	48	ns	33	ns	-38	ns	baseline	ns	ns	ns	ns	ns	-12						baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
	(essential)	liver[d]	baseline	ns	ns	ns	ns	ns	ns	108	45	ns	ns	ns	baseline	ns	ns	-77	-82	-80	ns	ns	ns	-59	-68	-64	-	-	-	-	-	-	-	-	-	-	-	-
		ovary	-	baseline	ns	ns	ns	ns	-	ns	ns	ns	ns	ns	baseline	ns	373	ns	-	ns	ns	ns	621	ns	-	231	-	-	-	-	-	-	-	-	-	-	-	-
		kidney	-	baseline	ns	ns	ns	ns	-	24					baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	-	-	-	-	-	-	-	-	-	-	-	-
	Iron	muscle	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	baseline	ns	ns	ns	ns	ns	-35						baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
	(essential)	liver[d]	baseline	ns	ns	ns	ns	ns	55						baseline	ns	ns	ns	ns	ns	-57						-	-	-	-	-	-	-	-	-	-	-	-
		ovary	-	baseline	ns	ns	ns	ns	-	ns	ns	ns	ns	ns	baseline	ns	ns	ns	-	ns	ns	ns	ns	ns	-	ns	-	-	-	-	-	-	-	-	-	-	-	-
		kidney	-	baseline	ns	ns	ns	ns	-	20					baseline	ns	ns	ns	ns	ns	-36						-	-	-	-	-	-	-	-	-	-	-	-
	Selenium	muscle	baseline	ns	ns	ns	ns	ns	79						baseline	ns	ns	-19	-27	ns	17	ns	ns	ns	-15	ns	baseline	ns	ns	ns	ns	ns	70					
	(essential)	liver[d]	baseline	ns	ns	ns	ns	ns	30						baseline	ns	-37	ns	-54	ns	ns	ns	-31	-29	-49	ns	-	-	-	-	-	-	-	-	-	-	-	-
		ovary	-	baseline	ns	ns	ns	ns	-	24					baseline	ns	ns	ns	-	ns	45				-	45	-	-	-	-	-	-	-	-	-	-	-	-
		kidney	-	baseline	ns	ns	ns	ns	-	45					baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	-	-	-	-	-	-	-	-	-	-	-	-

Contrast is significant (α = 0.05) and magnitude of difference is positive

Contrast is significant (α = 0.05) and magnitude of difference is negative

Notes: "-" = no data available for analysis (i.e., no data was collected for the given time period); "LRL" = majority of data were <LRL and could not be analysed; "ns" = not significant; "ww" = wet weight; Exp = exposed; Ref = reference; ANOVA = Analysis of Variance; MLE = Maximum Likelihood Estimation. Merged cells across years indicate that the Area × Time term was not significant, therefore MOD is for all years combined. Data were analysed in units of mg/kg dry weight except mercury which was analysed in units of mg/kg wet weight. Age, fork length, and body weight results are those that are associated with muscle tissue analyses for peamouth chub and lake trout, and whole body tissue analyses for northern pikeminnow. No female lake trout were collected from the Quesnel Lake reference area in 2021, so 2021 was excluded from the analysis of lake trout ovary tissues.

[a] Statistical approaches included ANOVA, ANCOVA, and MLE and for each case depended on data suitability (see complete statistical results in Appendix Table E.6.9 to E.6.21). This table only presents results for primary and secondary analytes that had a significant positive exposed - reference difference in 2022 or in all monitoring years for one or more tissue types in one or more species.

[b] Magnitude of difference (MOD) calculated on backtransformed least-squares means for the observed time period as $(Exp_{observed} - Exp_{predicted})/(Exp_{predicted})\times 100\%$ where $Exp_{predicted} = Ref_{observed} + (Exp_{baseline} - Ref_{baseline})$.

[c] Magnitude of difference (MOD) calculated on backtransformed least-squares means as (Exp-Ref)/Ref x 100%.

[d] Organ in which the specific primary analyte is known to accumulate (references in Appendix Table E.6.22).

[e] MOD is inflated because data for one of the groups in the comparison were entirely < LRL, leading to an underestimate of the mean for the <LRL result and a consequent increase in MOD between the two groups.

Table 5.24: Summary of Statistical Contrasts of Exposed - Reference Relative Differences of Fish Tissue Primary and Secondary Analyte Concentrations for Quesnel Lake (Exposed and Reference), 2015 to 2022[a]

	Parameter	Tissue	Peamouth Chub: Two-way ANOVA												Lake Trout: Two-way ANOVA												Northern Pikeminnow: Two-way ANOVA											
			Magnitude of Difference in (Exposed - Reference) Relative to Baseline Period (%)[b]						Magnitude of Difference for Exposed Mean Relative to Reference (%)[c]						Magnitude of Difference in (Exposed - Reference) Relative to Baseline Period (%)[b]						Magnitude of Difference for Exposed Mean Relative to Reference (%)[c]						Magnitude of Difference in (Exposed - Reference) Relative to Baseline Period (%)[b]						Magnitude of Difference for Exposed Mean Relative to Reference (%)[c]					
			Post-Breach Period						Post-Breach Period						Post-Breach Period						Post-Breach Period						Post-Breach Period						Post-Breach Period					
			2016	2018	2019	2020	2021	2022	2016	2018	2019	2020	2021	2022	2015	2018	2019	2020	2021	2022	2015	2018	2019	2020	2021	2022	2016	2018	2019	2020	2021	2022	2016	2018	2019	2020	2021	2022
Secondary Analytes	Barium	muscle	baseline	ns	ns	ns	ns	ns	14						<LRL	baseline	ns	ns	2,926[e]	175	<LRL	ns	ns	ns	ns	120	baseline	ns	ns	ns	ns	ns	71	ns	93	ns	ns	96
	(essential)	liver	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	<LRL	baseline	-62	ns	4,402[e]	<LRL	<LRL	ns	-49	ns	ns	<LRL	-	-	-	-	-	-	-	-	-	-	-	-
		ovary	-	baseline	ns	ns	ns	ns	-	37					<LRL	baseline	293	1,877[e]	-	ns	<LRL	-62	ns	ns	-	ns	-	-	-	-	-	-	-	-	-	-	-	-
		kidney	-	baseline	ns	ns	ns	ns	-	92					baseline	ns	-65	-47	-46	ns	113	164	ns	ns	ns	131	-	-	-	-	-	-	-	-	-	-	-	-
	Cadmium	muscle	baseline	<LRL	<LRL	ns	ns	ns	128	<LRL	<LRL	128			<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	baseline	ns	ns	ns	ns	ns	119					
	(essential)	liver	baseline	ns	ns	ns	ns	ns	141						baseline	ns	-74	ns	ns	ns	ns	ns	-65	ns	ns	ns	-	-	-	-	-	-	-	-	-	-	-	-
		ovary	-	baseline	ns	ns	ns	ns	-	ns	ns	ns	ns	ns	baseline	ns	ns	<LRL	-	ns	ns	ns	ns	<LRL	-	ns	-	-	-	-	-	-	-	-	-	-	-	-
		kidney	-	baseline	ns	ns	ns	ns	-	173					baseline	ns	ns	ns	ns	ns	29						-	-	-	-	-	-	-	-	-	-	-	-
	Calcium	muscle	baseline	ns	ns	-48	ns	ns	ns	ns	ns	-50	ns	46	baseline	ns	ns	81	119	ns	-41	ns	ns	ns	ns	ns	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
	(essential)	liver	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	baseline	108	ns	ns	ns	ns	ns	ns	-42	ns	ns	ns	-	-	-	-	-	-	-	-	-	-	-	-
		ovary	-	baseline	ns	ns	ns	ns	-	-21					baseline	ns	ns	ns	-	ns	ns	ns	ns	ns	-	ns	-	-	-	-	-	-	-	-	-	-	-	-
		kidney	-	baseline	ns	ns	ns	ns	-	64					baseline	ns	ns	ns	ns	68	ns	ns	ns	ns	ns	43	-	-	-	-	-	-	-	-	-	-	-	-
	Manganese	muscle	baseline	ns	ns	ns	ns	57	ns	ns	ns	-29	ns	55	baseline	ns	ns	42	92	81	-18	ns	-26	ns	58	49	baseline	ns	ns	ns	ns	ns	ns	ns	128	ns	ns	ns
	(essential)	liver	baseline	ns	ns	ns	ns	ns	20						baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	-	-	-	-	-	-	-	-	-	-	-	-
		ovary	-	baseline	ns	ns	ns	ns	-	ns	ns	ns	ns	ns	baseline	ns	ns	ns	-	ns	ns	ns	ns	ns	-	ns	-	-	-	-	-	-	-	-	-	-	-	-
		kidney	-	baseline	ns	ns	ns	ns	-	45					baseline	ns	ns	ns	ns	ns	52						-	-	-	-	-	-	-	-	-	-	-	-
	Mercury (ww)	muscle	baseline	-42	ns	-45	-36	ns	62	ns	ns	ns	ns	ns	baseline	ns	ns	ns	ns	ns	-36						-	baseline	ns	ns	ns	ns	-	ns	ns	ns	ns	ns
	(essential)	liver	baseline	ns	ns	ns	ns	ns	59						baseline	ns	-56	ns	ns	ns	-41	-36	-74	ns	-67	-44	-	-	-	-	-	-	-	-	-	-	-	-
		ovary	-	baseline	ns	ns	ns	ns	-	ns	ns	ns	ns	ns	baseline	ns	ns	ns	-	ns	ns	ns	ns	ns	-	ns	-	-	-	-	-	-	-	-	-	-	-	-
		kidney	-	baseline	ns	ns	ns	ns	-	ns	41	ns	ns	82	baseline	ns	ns	ns	ns	ns	-37						-	-	-	-	-	-	-	-	-	-	-	-
	Molybdenum	muscle	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	baseline	-42	-37	-50	-36	ns	ns	ns	ns	-35	ns	ns
	(essential)	liver	baseline	ns	ns	ns	ns	ns	34						baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	-	-	-	-	-	-	-	-	-	-	-	-
		ovary	-	baseline	ns	ns	ns	ns	-	-17					<LRL	baseline	ns	<LRL	-	ns	<LRL	ns	ns	<LRL	-	ns	-	-	-	-	-	-	-	-	-	-	-	-
		kidney	-	baseline	ns	ns	ns	ns	-	56					baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	-	-	-	-	-	-	-	-	-	-	-	-
	Phosphorus	muscle	baseline	ns	ns	-21	ns	ns	11	ns	ns	-12	ns	ns	baseline	-17	-22	-25	-15	ns	19	ns	ns	-10	ns	30	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
	(essential)	liver	baseline	ns	ns	ns	ns	ns	17						baseline	ns	-37	ns	ns	ns	ns	ns	-32	ns	ns	ns	-	-	-	-	-	-	-	-	-	-	-	-
		ovary	-	baseline	ns	ns	ns	ns	-	ns	ns	ns	ns	ns	baseline	ns	ns	ns	-	ns	ns	ns	ns	ns	-	ns	-	-	-	-	-	-	-	-	-	-	-	-
		kidney	-	baseline	ns	ns	ns	ns	-	28					baseline	ns	ns	ns	24	70	ns	ns	ns	ns	19	63	-	-	-	-	-	-	-	-	-	-	-	-

Contrast is significant (α = 0.05) and magnitude of difference is positive

Contrast is significant (α = 0.05) and magnitude of difference is negative

Notes: "-" = no data available for analysis (i.e., no data was collected for the given time period); "LRL" = majority of data were <LRL and could not be analysed; "ns" = not significant; "ww" = wet weight; Exp = exposed; Ref = reference; ANOVA = Analysis of Variance; MLE = Maximum Likelihood Estimation. Merged cells across years indicate that the Area × Time term was not significant, therefore MOD is for all years combined. Data were analysed in units of mg/kg dry weight except mercury which was analysed in units of mg/kg wet weight. Age, fork length, and body weight results are those that are associated with muscle tissue analyses for peamouth chub and lake trout, and whole body tissue analyses for northern pikeminnow. No female lake trout were collected from the Quesnel Lake reference area in 2021, so 2021 was excluded from the analysis of lake trout ovary tissues.

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[c] Magnitude of difference (MOD) calculated on backtransformed least-squares means as (Exp-Ref)/Ref x 100%.

[d] Organ in which the specific primary analyte is known to accumulate (references in Appendix Table E.6.22).

[e] MOD is inflated because data for one of the groups in the comparison were entirely < LRL, leading to an underestimate of the mean for the <LRL result and a consequent increase in MOD between the two groups.

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			Magnitude of Difference in (Exposed - Reference) Relative to Baseline Period (%)[b]						Magnitude of Difference for Exposed Mean Relative to Reference (%)[c]						Magnitude of Difference in (Exposed - Reference) Relative to Baseline Period (%)[b]						Magnitude of Difference for Exposed Mean Relative to Reference (%)[c]						Magnitude of Difference in (Exposed - Reference) Relative to Baseline Period (%)[b]						Magnitude of Difference for Exposed Mean Relative to Reference (%)[c]					
			Post-Breach Period						Post-Breach Period						Post-Breach Period						Post-Breach Period						Post-Breach Period						Post-Breach Period					
			2016	2018	2019	2020	2021	2022	2016	2018	2019	2020	2021	2022	2015	2018	2019	2020	2021	2022	2015	2018	2019	2020	2021	2022	2016	2018	2019	2020	2021	2022	2016	2018	2019	2020	2021	2022
Secondary Analytes	Sodium	muscle	baseline	ns	-21	ns	ns	ns	26	43	ns	ns	27	ns	baseline	ns	ns	ns	ns	40	-30	ns	-35	-30	ns	ns	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
	(essential)	liver	baseline	ns	ns	ns	ns	ns	20						baseline	ns	-39	-51	ns	ns	ns	ns	-33	-46	ns	ns	-	-	-	-	-	-	-	-	-	-	-	-
		ovary	-	baseline	ns	ns	ns	ns	-	ns	ns	ns	ns	ns	baseline	ns	ns	ns	-	ns	ns	ns	ns	ns	-	ns	-	-	-	-	-	-	-	-	-	-	-	-
		kidney	-	baseline	-45	-51	ns	-37	-	111	ns	ns	60	ns	baseline	-34	-35	-39	-44	ns	59	ns	ns	ns	ns	37	-	-	-	-	-	-	-	-	-	-	-	-
	Strontium	muscle	baseline	ns	ns	-65	ns	ns	ns	ns	ns	-67	ns	ns	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	baseline	ns	70	ns	ns	ns	ns	-36	ns	-37	ns	ns
	(essential)	liver	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	baseline	89	ns	ns	ns	ns	ns	ns	ns	-44	ns	-41	-	-	-	-	-	-	-	-	-	-	-	-
		ovary	-	baseline	ns	ns	ns	ns	-	-22					baseline	ns	ns	ns	-	ns	ns	ns	ns	ns	-	ns	-	-	-	-	-	-	-	-	-	-	-	-
		kidney	-	baseline	ns	ns	ns	ns	-	68					baseline	ns	ns	ns	ns	ns	-18						-	-	-	-	-	-	-	-	-	-	-	-
	Tin	muscle	baseline	ns	<LRL	700	6,823[e]	ns	ns	ns	<LRL	438	ns	ns	<LRL	<LRL	<LRL	<LRL	baseline	80	<LRL	<LRL	<LRL	<LRL	ns	64	baseline	<LRL	<LRL	-74	ns	ns	ns	<LRL	<LRL	-67	ns	ns
	(essential)	liver	baseline	ns	<LRL	1,424[e]	<LRL	329	ns	235	<LRL	1,811	<LRL	438	baseline	<LRL	<LRL	<LRL	-95[e]	ns	ns	<LRL	<LRL	<LRL	ns	ns	-	-	-	-	-	-	-	-	-	-	-	-
		ovary	-	<LRL	baseline	<LRL	<LRL	17,495[e]	-	<LRL	ns	<LRL	<LRL	ns	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	-	-	-	-	-	-	-	-	-	-	-	-
		kidney	-	baseline	-100[e]	32,347[e]	<LRL	ns	-	428	ns	ns	<LRL	888	baseline	-89	<LRL	1,641[e]	ns	ns	120	-76	<LRL	ns	ns	158	-	-	-	-	-	-	-	-	-	-	-	-
	Titanium	muscle	-	-	-	baseline	<LRL	-92	-	-	-	472	<LRL	ns	-	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	-	-	-	baseline	ns	<LRL	-	-	-	ns	ns	<LRL
	(essential)	liver	-	-	-	baseline	ns	<LRL	-	-	-	ns	ns	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	-	-	-	-	-	-	-	-	-	-	-	-
		ovary	-	-	<LRL	<LRL	<LRL	<LRL	-	-	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	-	<LRL	-	<LRL	<LRL	<LRL	-	<LRL	-	-	-	-	-	-	-	-	-	-	-	-
		kidney	-	-	<LRL	<LRL	<LRL	<LRL	-	-	<LRL	<LRL	<LRL	<LRL	-	-	-	baseline	ns	ns	-	-	-	235			-	-	-	-	-	-	-	-	-	-	-	-
	Uranium	muscle	baseline	<LRL	ns	ns	<LRL	ns	ns	<LRL	ns	ns	<LRL	ns	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	baseline	-81	ns	ns	ns	ns	ns	-77	ns	-56	ns	ns
	(essential)	liver	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	-	-	-	-	-	-	-	-	-	-	-
		ovary	-	baseline	ns	ns	ns	ns	-	ns	ns	ns	ns	ns	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	-	-	-	-	-	-	-	-	-	-	-	-
		kidney	-	baseline	ns	ns	ns	ns	-	56					<LRL	baseline	ns	ns	ns	ns	<LRL	ns	ns	ns	ns	ns	-	-	-	-	-	-	-	-	-	-	-	-
	Vanadium	muscle	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
	(essential)	liver	baseline	ns	ns	ns	ns	ns	136						<LRL	baseline	-99	<LRL	-76	<LRL	<LRL	ns	ns	<LRL	-68	<LRL	-	-	-	-	-	-	-	-	-	-	-	-
		ovary	-	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	-	-	-	-	-	-	-	-	-	-	-	-
		kidney	-	baseline	ns	ns	ns	ns	-	110					<LRL	baseline	ns	ns	ns	<LRL	<LRL	ns	ns	ns	ns	<LRL	-	-	-	-	-	-	-	-	-	-	-	-
	Zinc	muscle	baseline	ns	ns	ns	-29	ns	ns	ns	ns	ns	-30	ns	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	baseline	ns	ns	ns	ns	ns	-8.3					
	(essential)	liver	baseline	ns	ns	ns	ns	ns	19						baseline	ns	-47	-44	-37	-32	ns	ns	-37	-33	-25	ns	-	-	-	-	-	-	-	-	-	-	-	-
		ovary	-	baseline	ns	ns	ns	ns	-	-17					baseline	ns	ns	ns	-	ns	ns	ns	ns	ns	-	ns	-	-	-	-	-	-	-	-	-	-	-	-
		kidney	-	baseline	ns	ns	ns	ns	-	17					baseline	-27	ns	ns	ns	ns	20	ns	ns	ns	ns	36	-	-	-	-	-	-	-	-	-	-	-	-

Contrast is significant (α = 0.05) and magnitude of difference is positive

Contrast is significant (α = 0.05) and magnitude of difference is negative

Notes: "-" = no data available for analysis (i.e., no data was collected for the given time period); "LRL" = majority of data were <LRL and could not be analysed; "ns" = not significant; "ww" = wet weight; Exp = exposed; Ref = reference; ANOVA = Analysis of Variance; MLE = Maximum Likelihood Estimation. Merged cells across years indicate that the Area × Time term was not significant, therefore MOD is for all years combined. Data were analysed in units of mg/kg dry weight except mercury which was analysed in units of mg/kg wet weight. Age, fork length, and body weight results are those that are associated with muscle tissue analyses for peamouth chub and lake trout, and whole body tissue analyses for northern pikeminnow. No female lake trout were collected from the Quesnel Lake reference area in 2021, so 2021 was excluded from the analysis of lake trout ovary tissues.

[a] Statistical approaches included ANOVA, ANCOVA, and MLE and for each case depended on data suitability (see complete statistical results in Appendix Table E.6.9 to E.6.21). This table only presents results for primary and secondary analytes that had a significant positive exposed - reference difference in 2022 or in all monitoring years for one or more tissue types in one or more species.

[b] Magnitude of difference (MOD) calculated on backtransformed least-squares means for the observed time period as $(Exp_{observed} - Exp_{predicted})/(Exp_{predicted})\times 100\%$ where $Exp_{predicted} = Ref_{observed} + (Exp_{baseline} - Ref_{baseline})$.

[c] Magnitude of difference (MOD) calculated on backtransformed least-squares means as (Exp-Ref)/Ref x 100%.

[d] Organ in which the specific primary analyte is known to accumulate (references in Appendix Table E.6.22).

[e] MOD is inflated because data for one of the groups in the comparison were entirely < LRL, leading to an underestimate of the mean for the <LRL result and a consequent increase in MOD between the two groups.

Concentrations of the primary analytes arsenic, copper, iron, and selenium in the majority fish tissues from the exposed areas of Quesnel Lake were either: 1) statistically similar to reference, 2) significantly lower than reference in 2022, or 3) lacked a significant *Area×Year* interaction in the analyses (Figure 5.27, Table 5.24; Appendix Tables E.6.9 to E.6.17). The absence of a significant *Area×Year* interaction indicates that the ratio of exposed:reference concentrations did not differ among years (i.e., the geometric mean concentrations at the exposed area were trending the same as the geometric mean concentrations at the reference area). Therefore, for most fish tissues sampled from Quesnel Lake there is no evidence that concentrations of these primary analytes are increasing over time due to mine-related influence. Arsenic concentrations in northern pikeminnow whole-body tissue and copper concentrations in lake trout ovary in 2022 were both significantly higher in tissues from the exposed area relative to the reference and had a significant *Area×Year* interaction, indicating a temporal change in the ratio of exposed:reference concentrations (Figure 5.27, Table 5.24; Appendix Tables E.6.9 and E.6.11). However, in both cases the exposed:reference ratio in 2022 was similar to the baseline year (2016 for northern pikeminnow and 2015 for lake trout) indicating that the analyte concentrations in the exposed fish have not increased over time, relative to reference (Figure 5.27, Appendix Tables E.6.9 and E.6.11). It should be noted that the temporal comparison of lake trout analyte concentrations between exposed and reference sites were often challenged by low sample sizes, which is dependent on the proportion of the total sample (n=8) that were female (Appendix Tables C.7.5, C.7.6, E.6.9).

It is important to note that for peamouth chub no significant *Area×Year* interaction was reported for selenium concentrations in each of the tissues (muscle liver, ovary, and kidney) indicating temporal stability in these concentrations, relative to reference (Figure 5.27, Table 5.24; Appendix Tables E.6.10, E.6.12, E.6.13, E.6.15). This was despite the higher rate of guideline/threshold exceedances identified in muscle and ovary in 2022 relative to prior years (see Section 5.2.7.1) and was owing to the similar temporal variability in the selenium concentrations of tissues from exposed and reference peamouth chub. The similarity of temporal variability in exposed and reference peamouth chub tissues suggests that this variability was related to natural factors influencing both the exposed and reference areas in a similar manner. Since data are not available for these tissues from before the breach, definitive conclusions as to the potential factors influencing tissue selenium concentrations cannot be made (e.g., due to mine-exposure or due to inherent differences between the areas). Despite the fact that selenium concentrations were consistently elevated in all tissues of peamouth chub since 2016, relative to reference, there is no evidence that selenium concentrations in fish tissues from Quesnel Lake are increasing over time due to mine exposure.

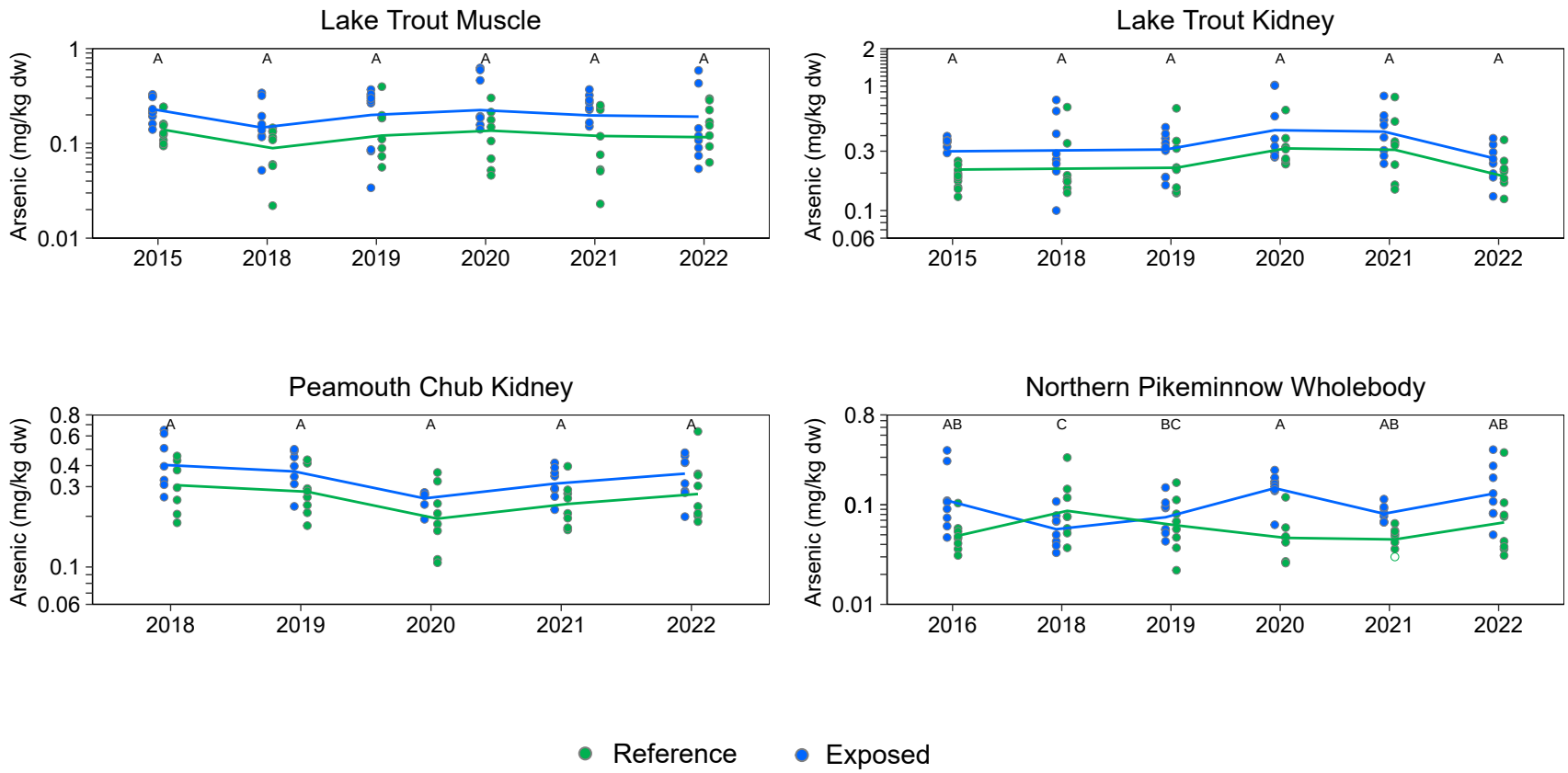

Figure 5.27: Fish Tissue Primary Analyte Concentrations with a Significant Positive Exposed - Reference Difference for Quesnel Lake (Exposed and Reference), 2015 to 2022

Notes: BCMOE = British Columbia Ministry of the Environment; GL = Guideline; dw = dry weight. Plots are only included for primary analytes that had either a significant Area × Time interaction term and were higher at exposed than reference areas in 2022 or had no significant interaction but had a higher exposed magnitude of difference across all years for a given species and tissue type. Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted. No female lake trout were collected from the Quesnel Lake reference area in 2021, so 2021 was excluded fron analyses.

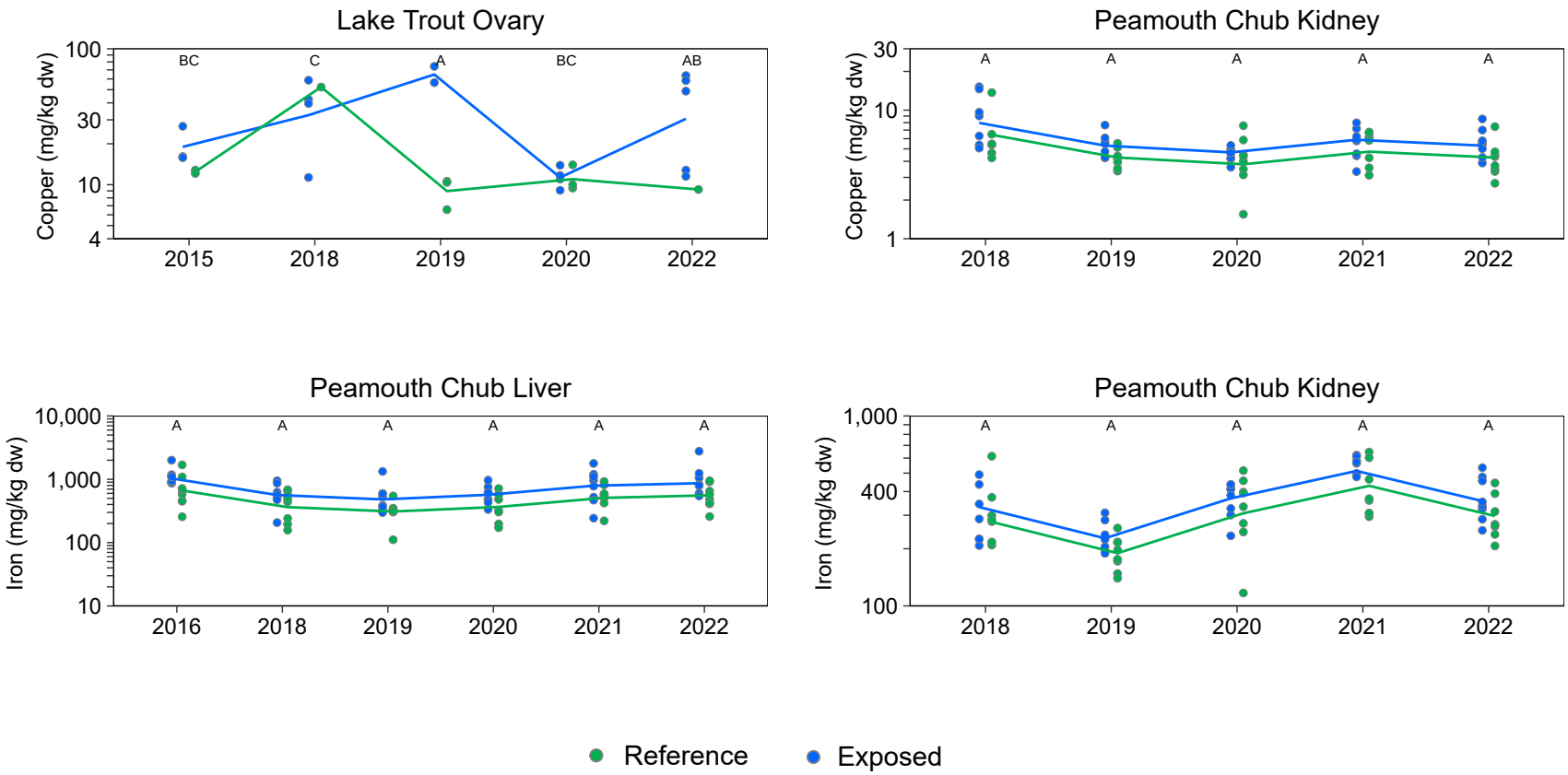

Figure 5.27: Fish Tissue Primary Analyte Concentrations with a Significant Positive Exposed - Reference Difference for Quesnel Lake (Exposed and Reference), 2015 to 2022

Notes: BCMOE = British Columbia Ministry of the Environment; GL = Guideline; dw = dry weight. Plots are only included for primary analytes that had either a significant Area × Time interaction term and were higher at exposed than reference areas in 2022 or had no significant interaction but had a higher exposed magnitude of difference across all years for a given species and tissue type. Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted. No female lake trout were collected from the Quesnel Lake reference area in 2021, so 2021 was excluded fron analyses.

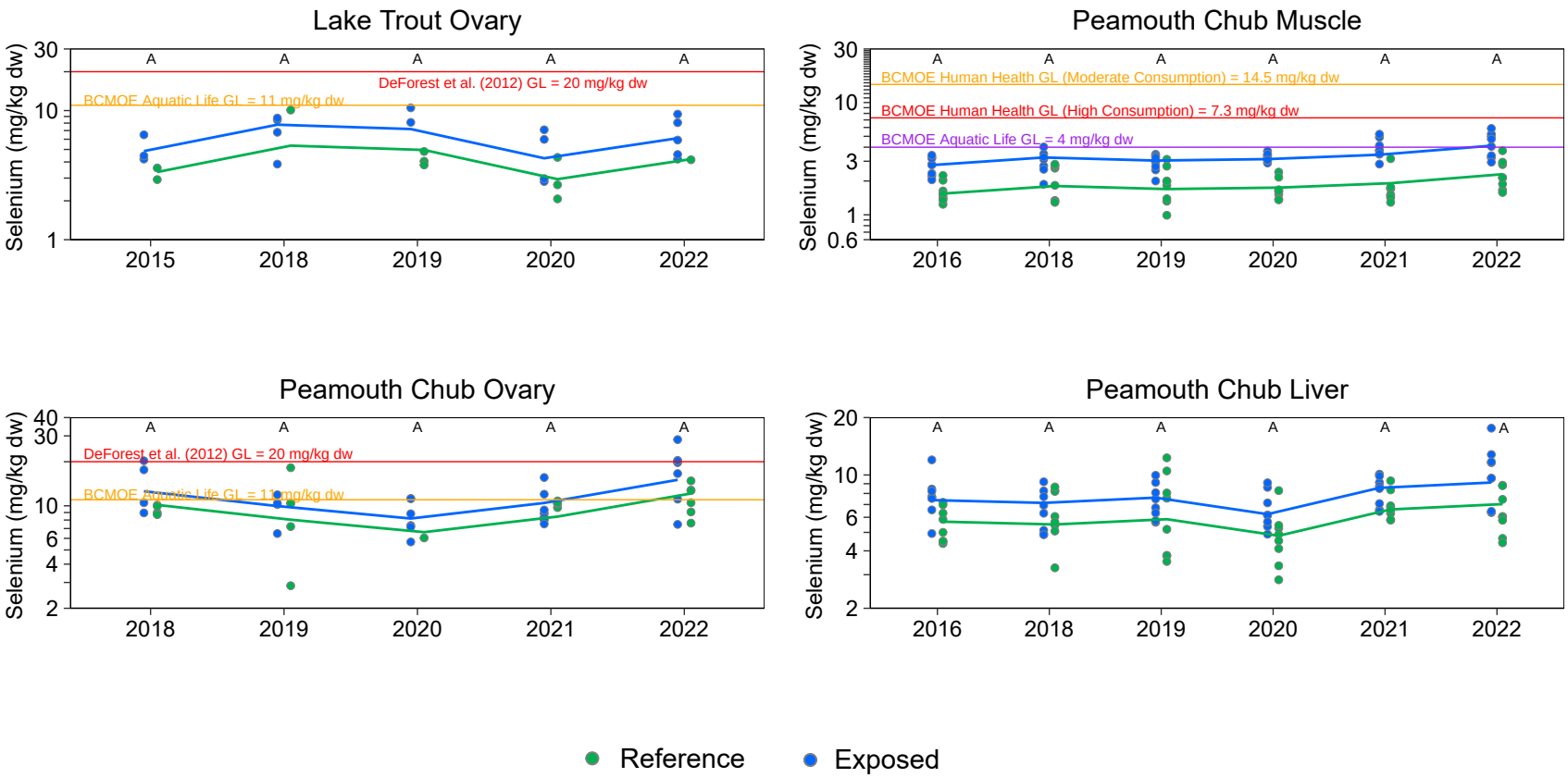

Figure 5.27: Fish Tissue Primary Analyte Concentrations with a Significant Positive Exposed - Reference Difference for Quesnel Lake (Exposed and Reference), 2015 to 2022

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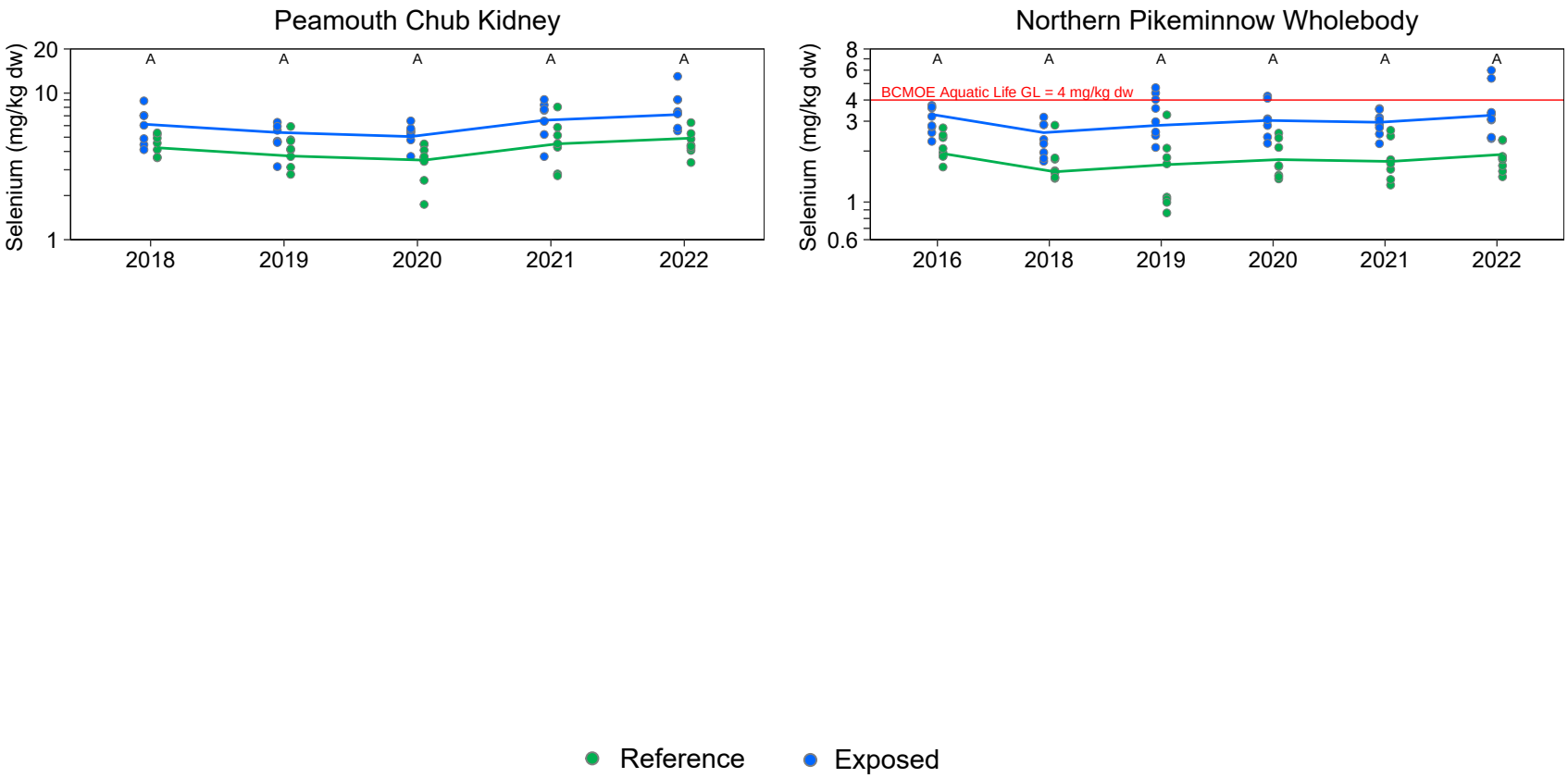


Figure 5.27: Fish Tissue Primary Analyte Concentrations with a Significant Positive Exposed - Reference Difference for Quesnel Lake (Exposed and Reference), 2015 to 2022

Notes: BCMOE = British Columbia Ministry of the Environment; GL = Guideline; dw = dry weight. Plots are only included for primary analytes that had either a significant Area × Time interaction term and were higher at exposed than reference areas in 2022 or had no significant interaction but had a higher exposed magnitude of difference across all years for a given species and tissue type. Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted. No female lake trout were collected from the Quesnel Lake reference area in 2021, so 2021 was excluded fron analyses.

The secondary analytes, barium, cadmium, calcium, manganese, mercury, molybdenum, phosphorus, sodium, strontium, tin, titanium, uranium, vanadium, and zinc had significant interaction terms for one or more tissue types in one or more of the Quesnel Lake species (peamouth chub, northern pikeminnow, and lake trout) and/or were elevated in fish caught in the exposed area relative to the reference area in 2022 (Figure 5.28, Table 5.24; Appendix Tables E.6.9 to E.6.17). For most secondary analyte-tissue combinations for each of the three species, this difference was not indicative of an increase in concentrations over time due to mine influence. This is because the significant positive exposed-reference differences in 2022 were either not significantly different from prior years, or the *Area×Year* interaction and significant positive exposed-reference difference in 2022 was only reported in one tissue type in one species. For simplicity, only those secondary analyte-tissue combinations with a significant positive exposed-reference difference in 2022 or in all years (if the *Area×Year* interaction was not significant) in more than one tissue type within a species are discussed further (i.e., sodium, strontium, titanium, and uranium were not discussed further).

For most of the secondary analytes identified for further discussion (barium, cadmium, calcium, manganese, mercury, molybdenum, phosphorus, tin, vanadium, and zinc), there was no evidence of concentrations of these analytes increasing over time. This based on secondary analyte concentrations in the majority fish tissues from the exposed areas of Quesnel Lake were either: 1) statistically similar to reference, 2) significantly lower than reference in 2022 (if the *Area×Year* interaction in the analyses was significant), or 3) lacked a significant *Area×Year* interaction in the analyses (Figure 5.28, Table 5.24; Appendix Tables E.6.9 to E.6.17). As outlined above, the absence of a significant *Area×Year* interaction indicates that the ratio of exposed:reference concentrations did not differ among years. For instance, cadmium, molybdenum, and vanadium concentrations that were significantly higher in exposed tissues compared to reference were also temporally stable (i.e., lacked a significant *Area×Year* interaction; Table 5.24). For several secondary analytes (barium, calcium, manganese, mercury, phosphorus, tin, and zinc), some tissue types exhibited both a significant *Area×Year* interaction (i.e., a significant change in the ratio of exposed:reference concentrations over time) and higher exposed concentrations relative to reference in 2022. However, for most of these secondary analyte-tissue combinations, the analyte concentrations in exposed tissues in 2022 were similar to the baseline year, relative to reference, indicating no evidence of a mine-related temporal increase in analyte concentrations (Figure 5.28, Table 5.24; Appendix Tables E.6.9 to E.6.17). Some of these secondary analyte-tissue combinations showed increases in the exposed:reference ratio in 2022 compared to the baseline year. However, each occurred in a single tissue type within each species, and some were influenced by a high prevalence of data with results reported below the detection limit. This suggests that the observed increases may not be indicative of a persistent mine-related

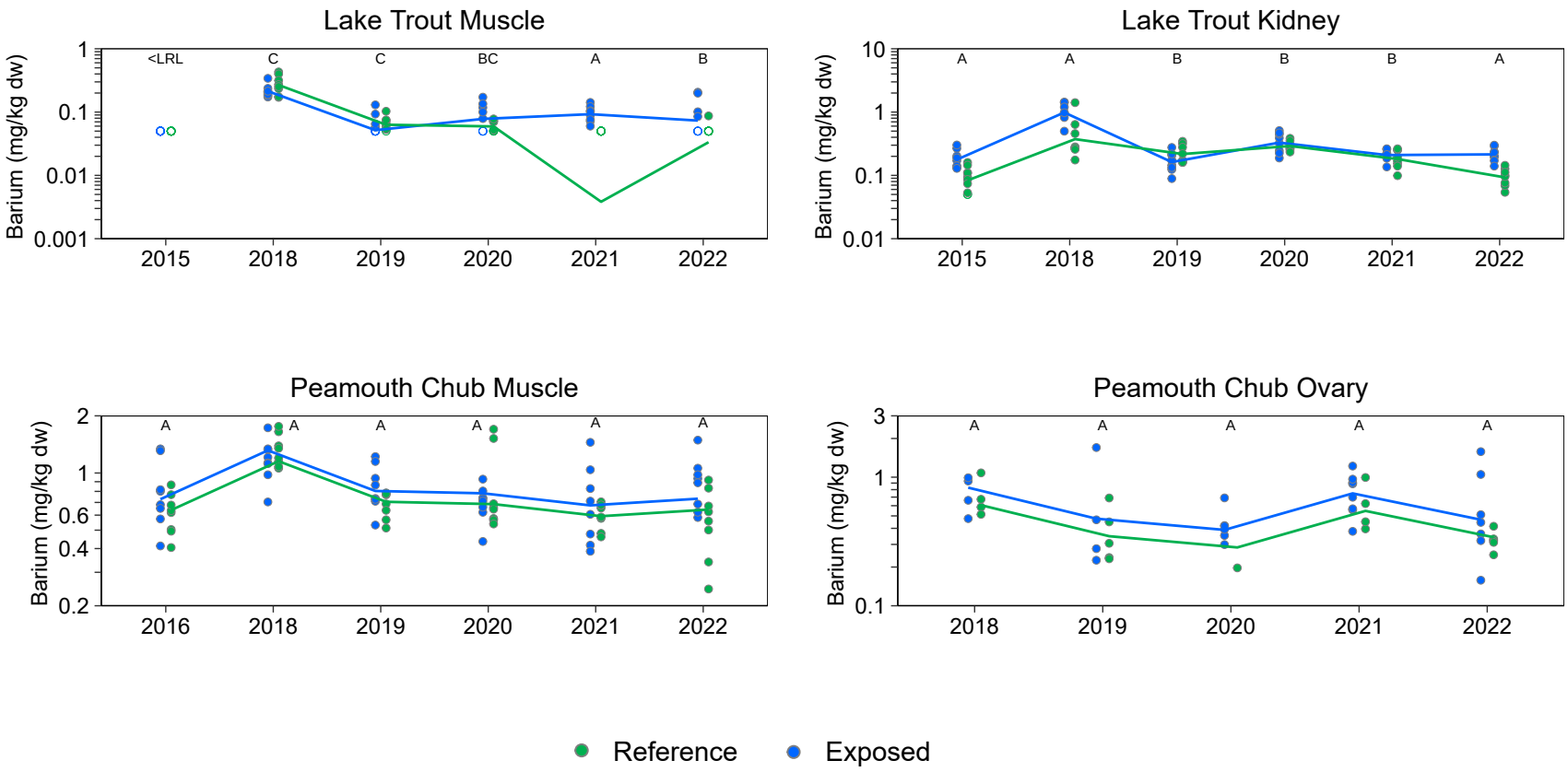
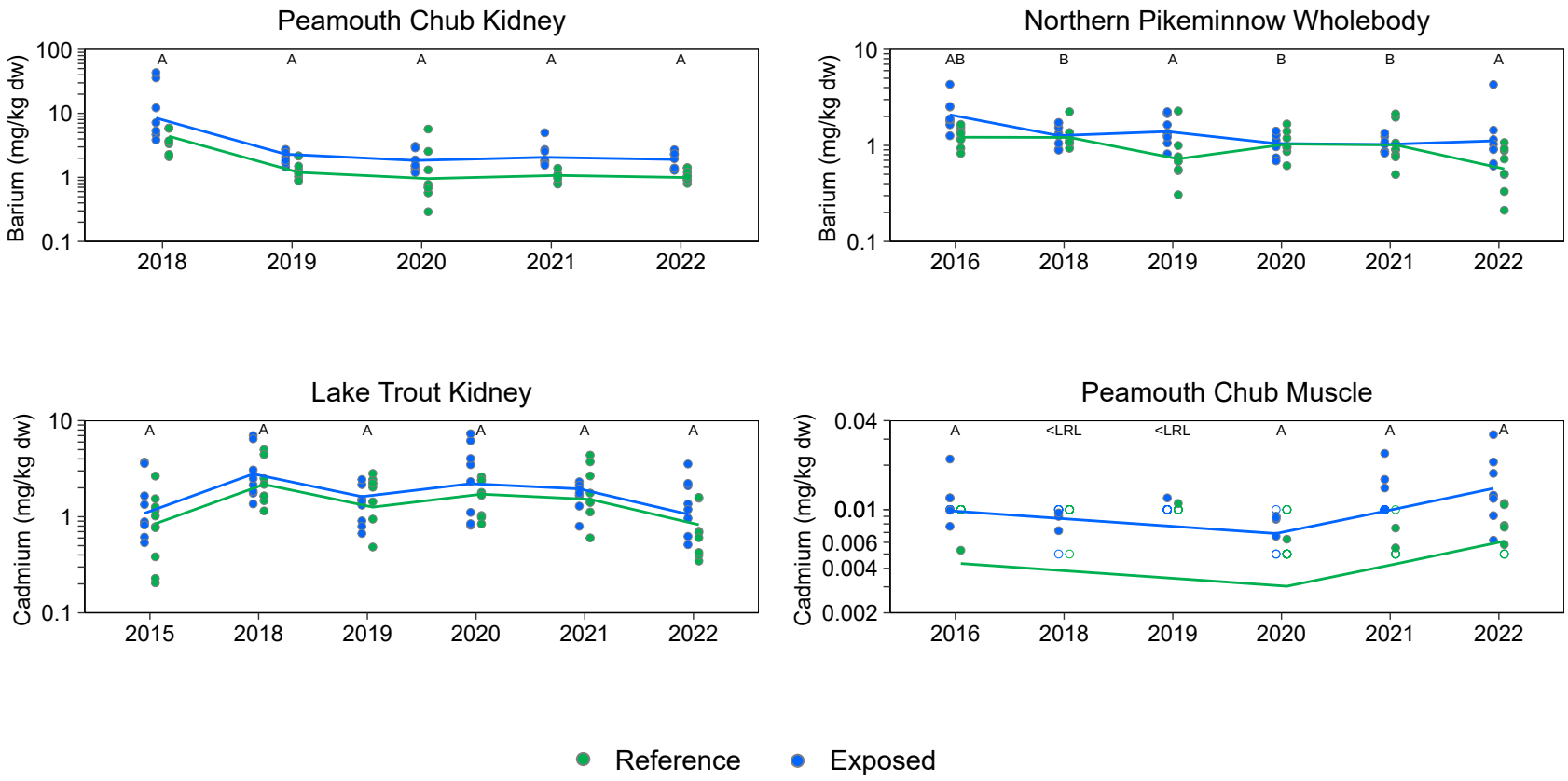


Figure 5.28: Fish Tissue Secondary Analyte Concentrations with a Significant Positive Exposed - Reference Difference for Quesnel Lake (Exposed and Reference), 2015 to 2022

Notes: BCMOE = British Columbia Ministry of the Environment; GL = Guideline; dw = dry weight. Plots are only included for secondary analytes that had either a significant Area × Time interaction term and were higher at exposed than reference areas in 2022 or had no significant interaction but had a higher exposed magnitude of difference across all years for a given species and tissue type. Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted. No female lake trout were collected from the Quesnel Lake reference area in 2021, so 2021 was excluded fron analyses.



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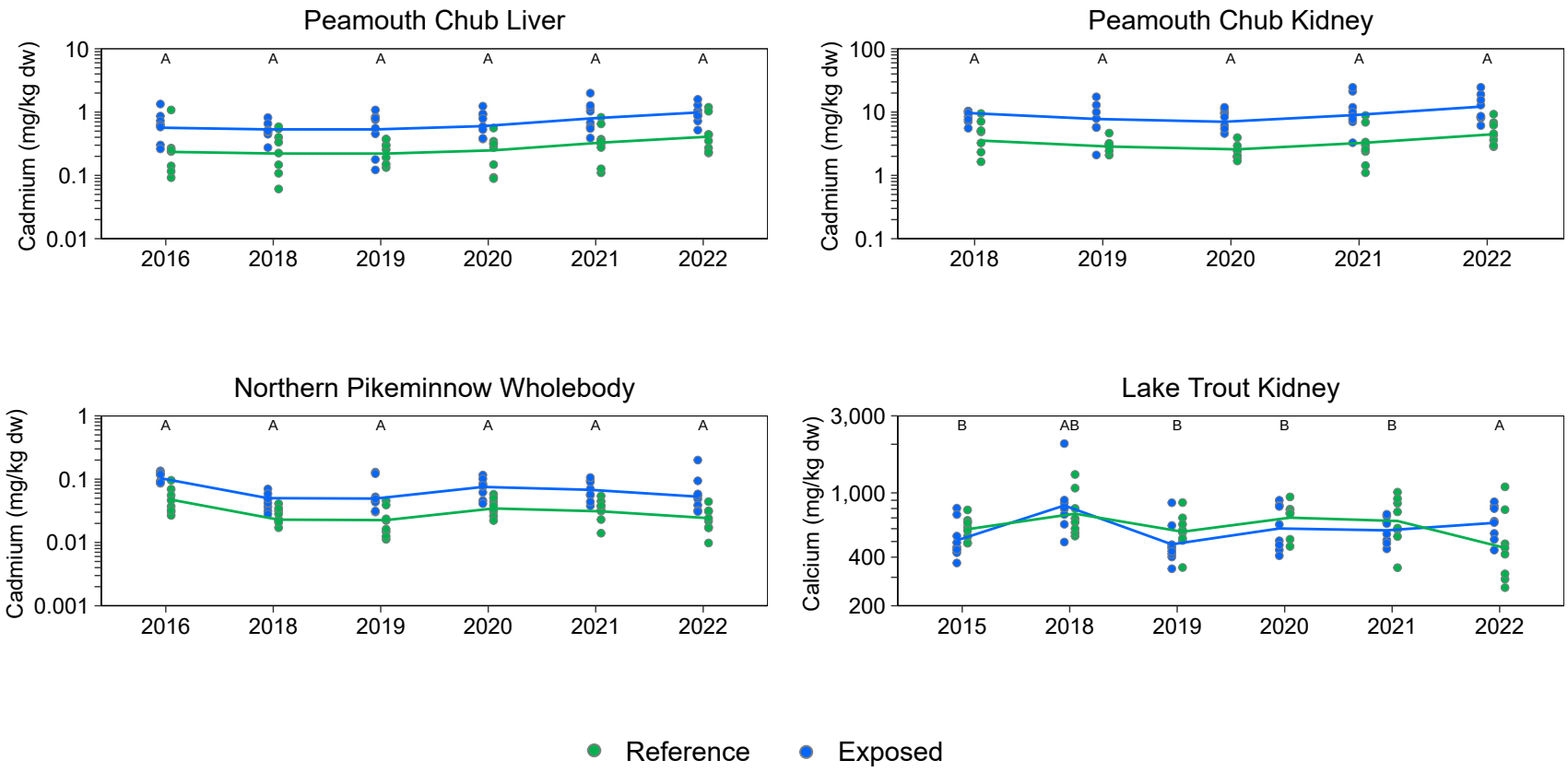

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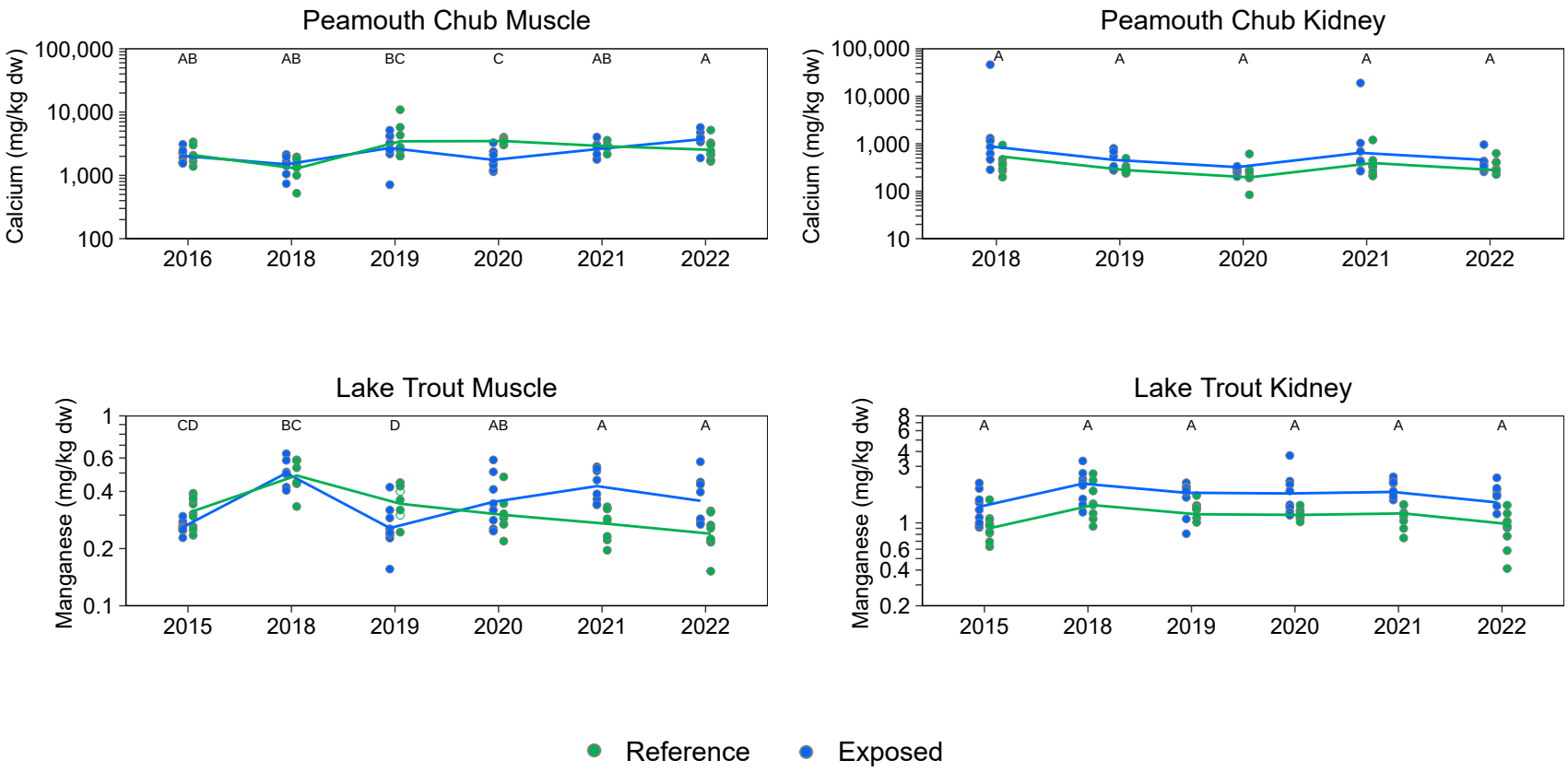

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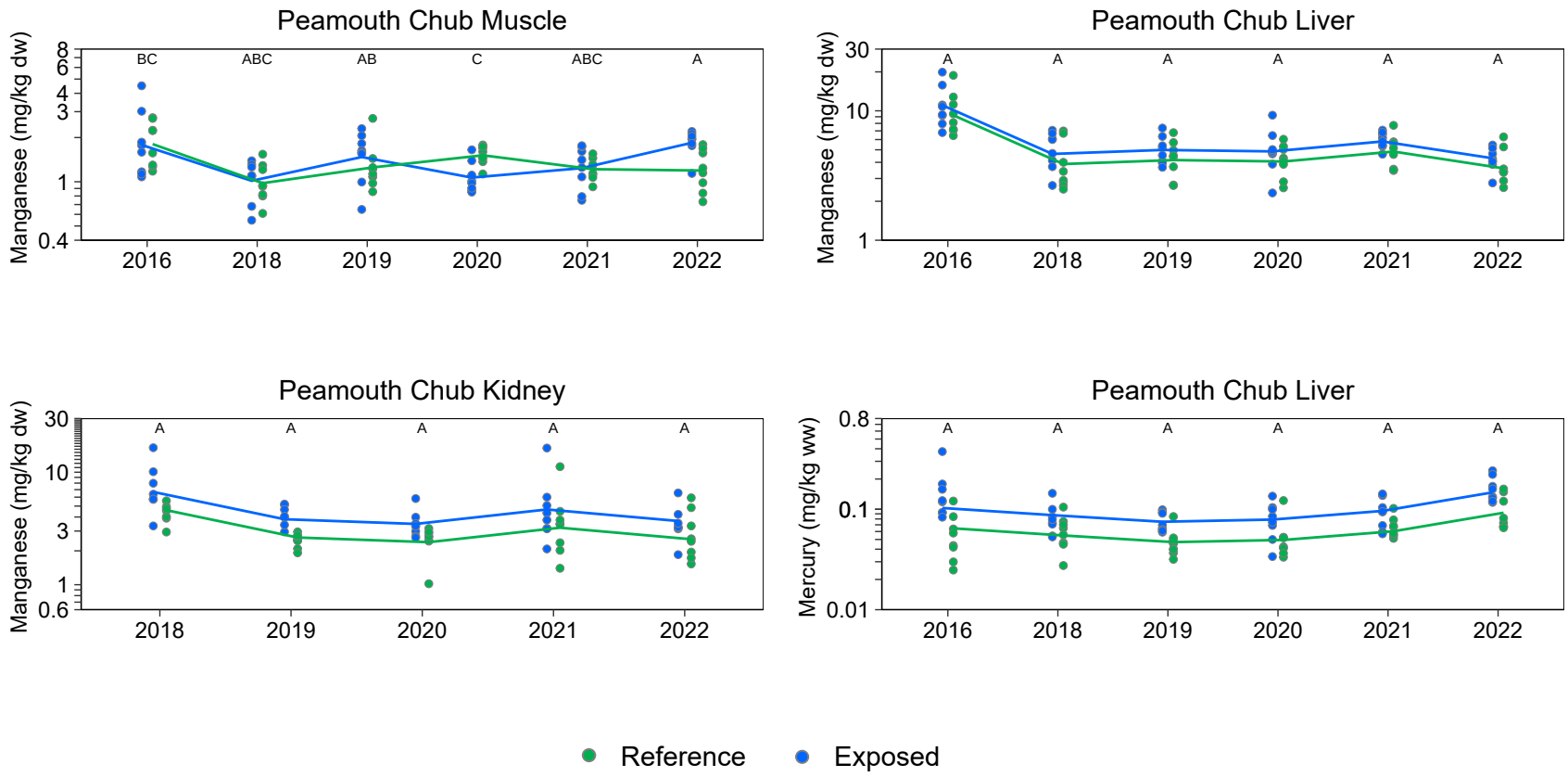

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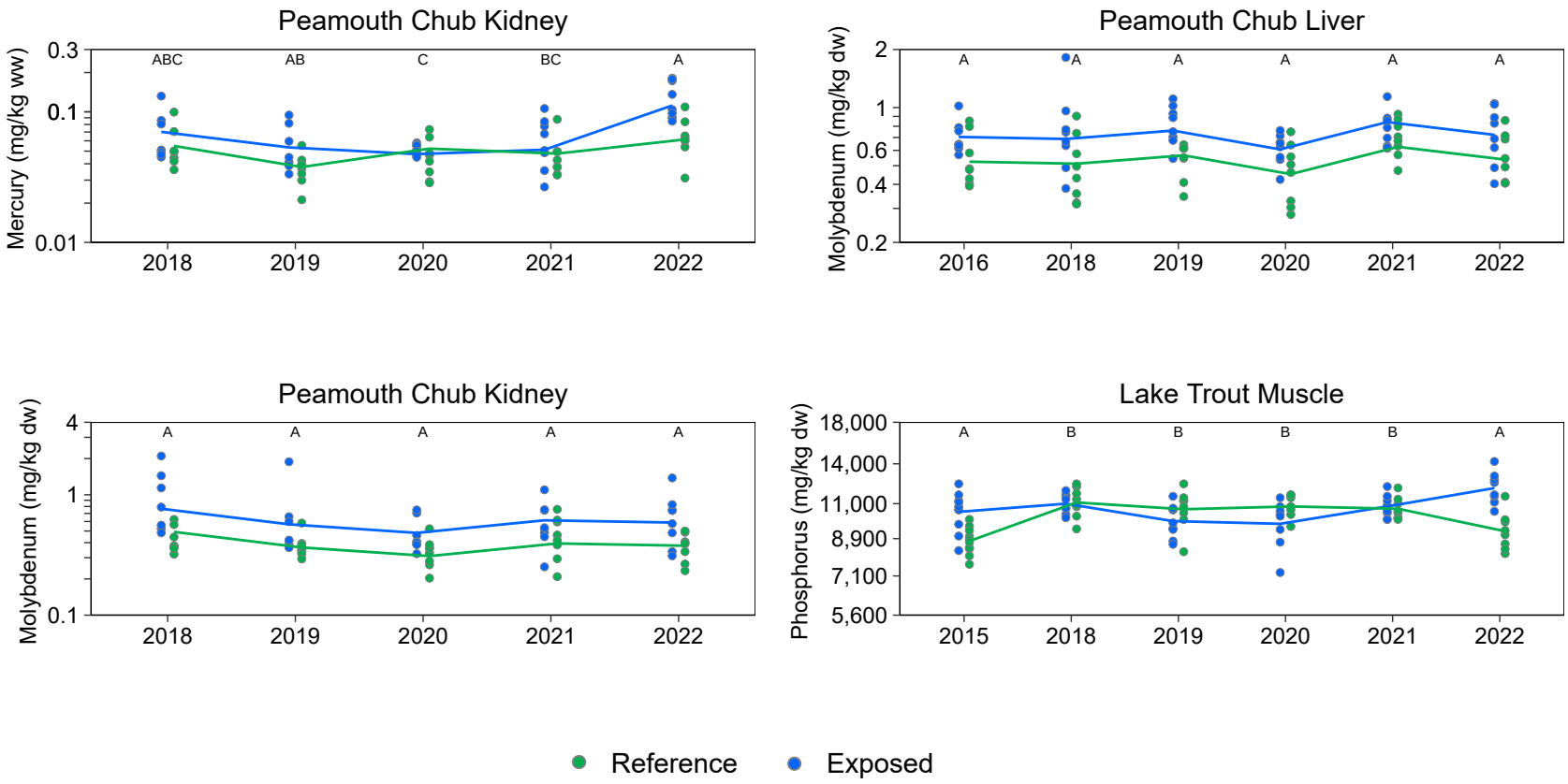

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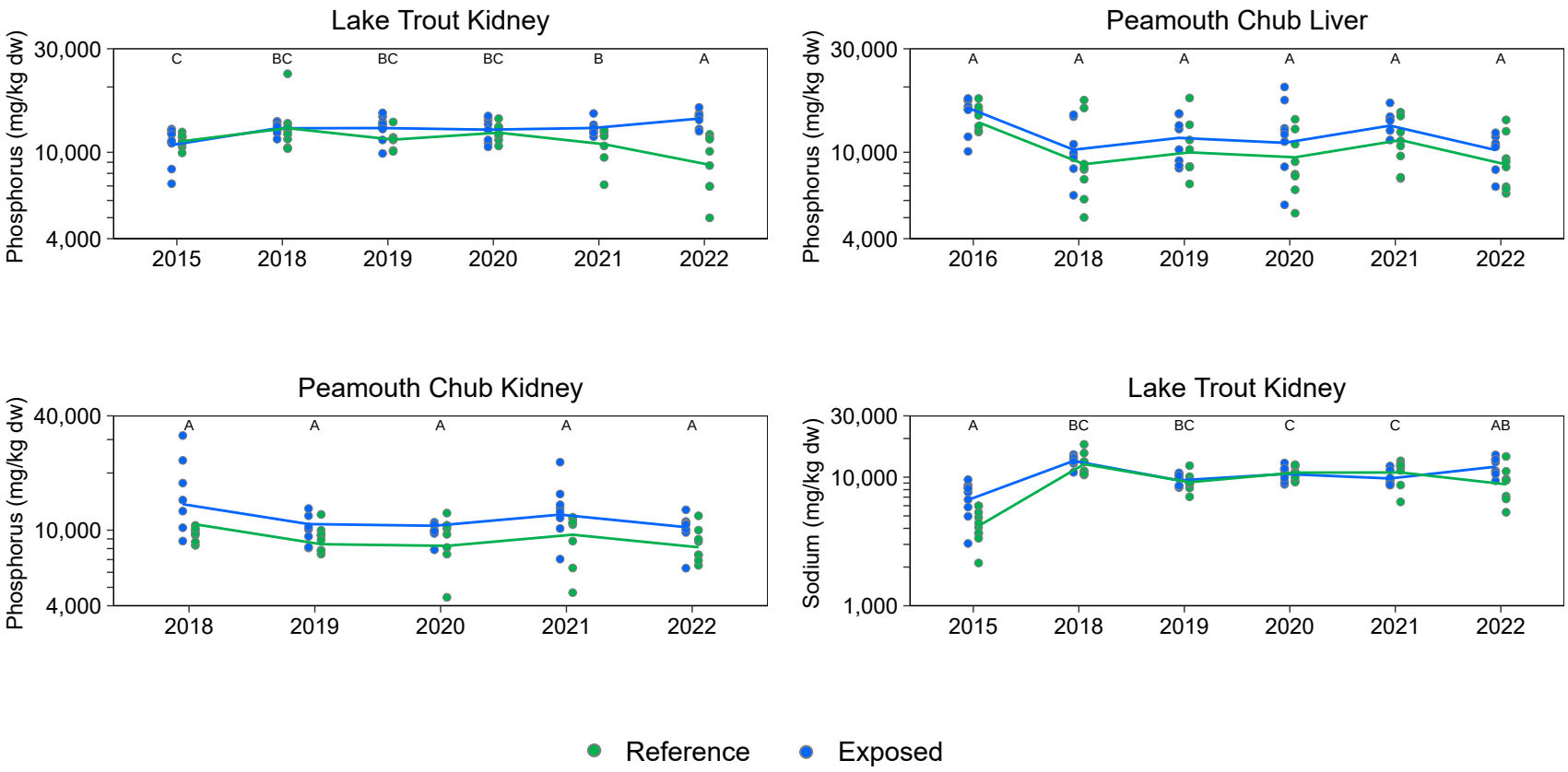

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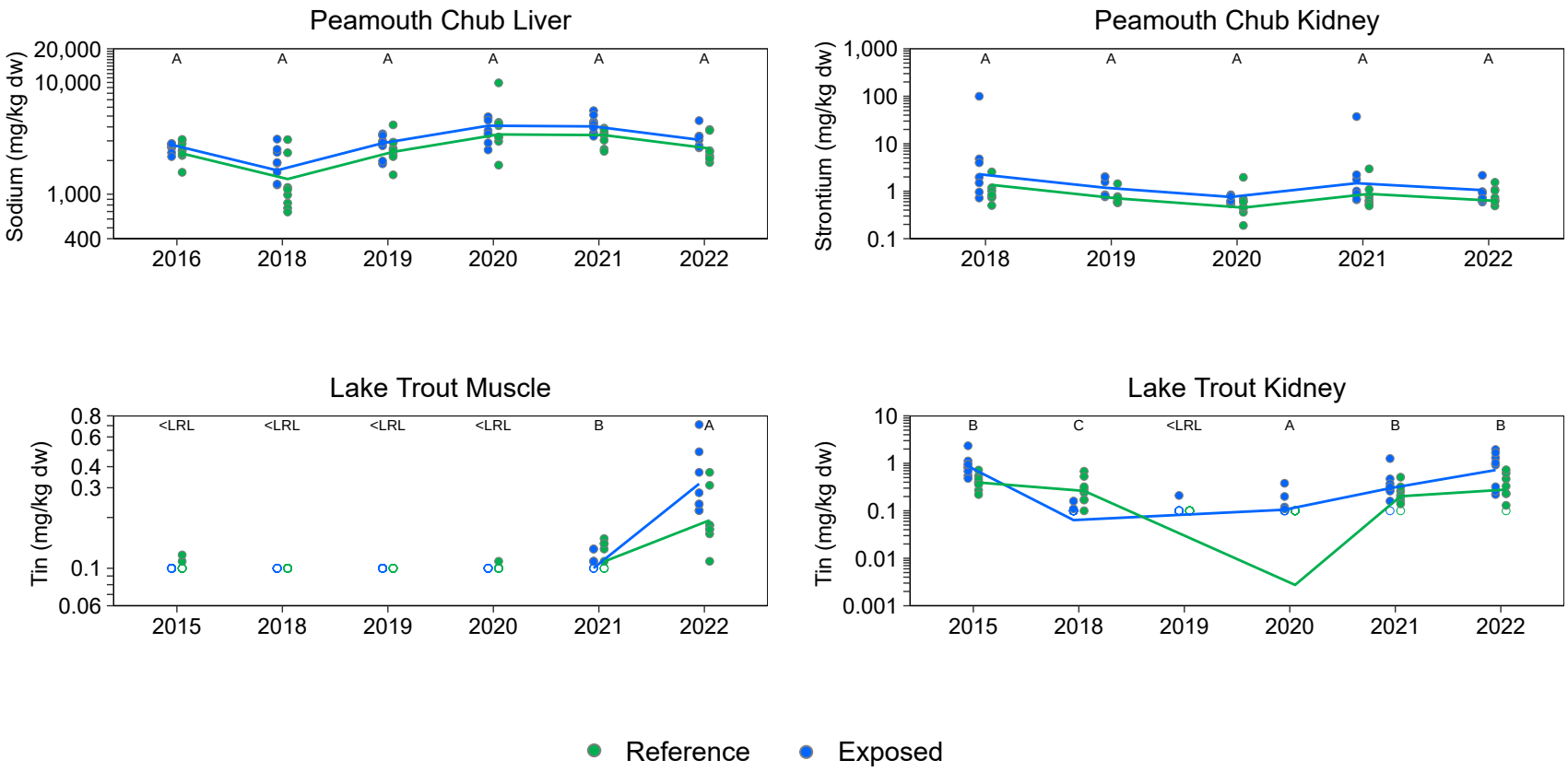

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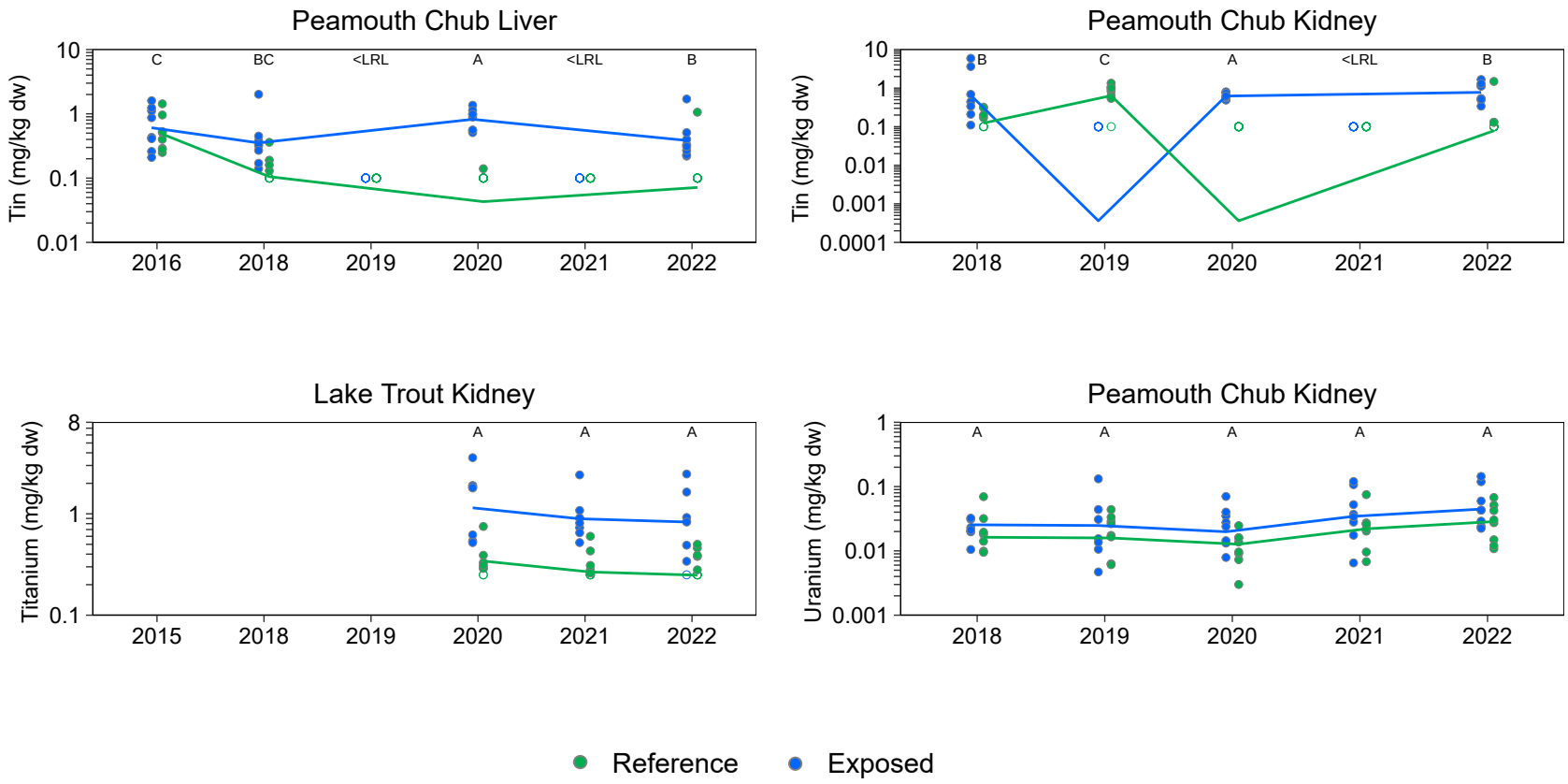

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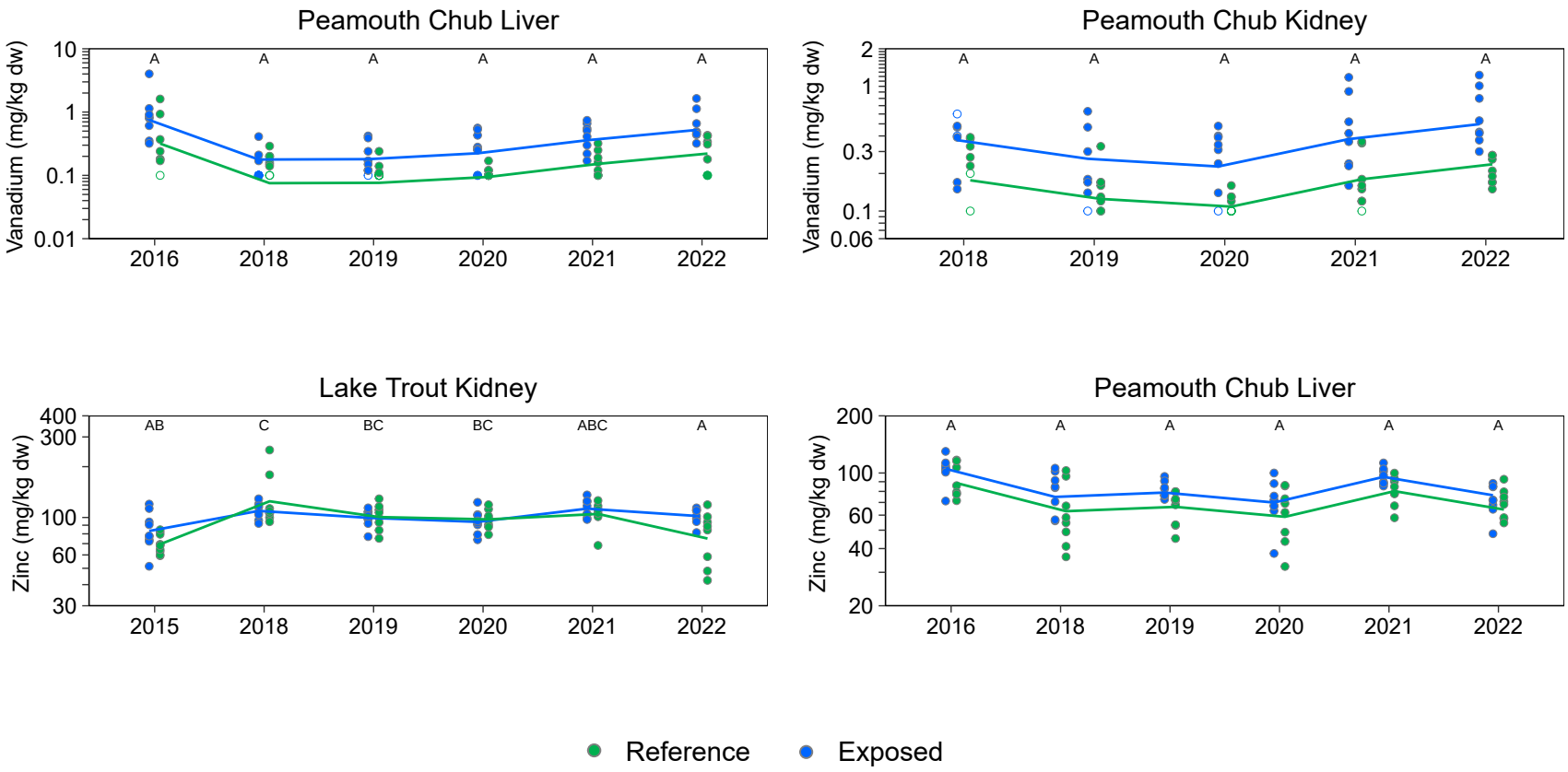

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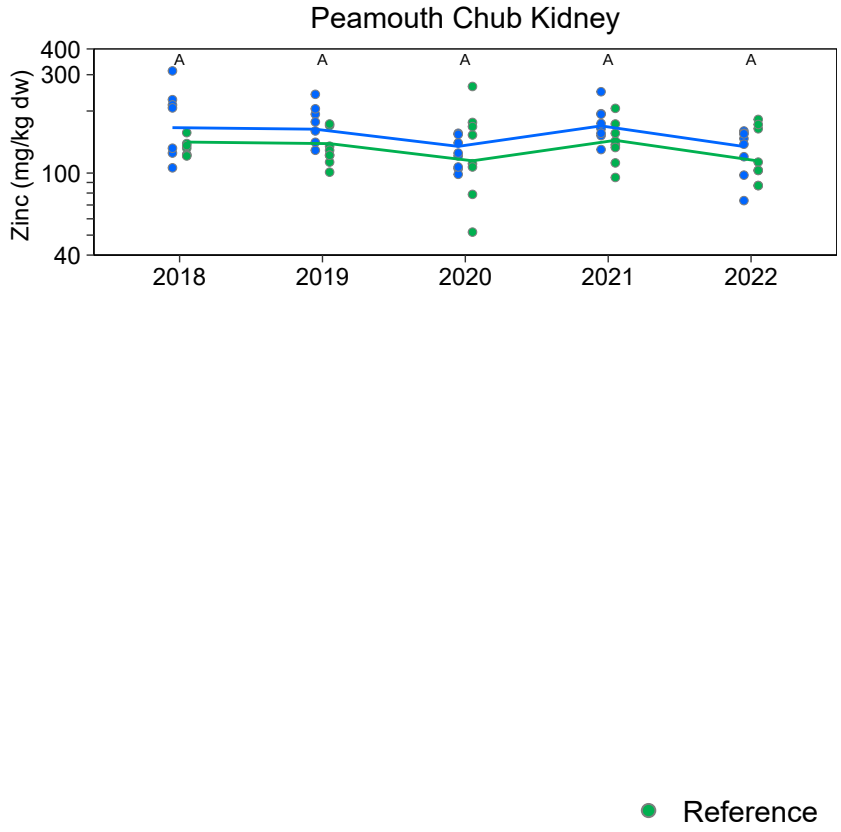

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influence which might affect all tissues within a given species. The secondary analyte-tissue combinations that showed increases in the exposed:reference ratio in 2022 compared to the baseline year are detailed below.

Barium concentrations in lake trout muscle from the exposed area were significantly higher in 2022 than in 2018 and 2019, relative to reference (Figure 5.28, Table 5.24; Appendix Table E.6.16). However, the results of temporal comparisons for barium were influenced by a relatively high frequency of results below the LRL, particularly at the reference area in 2021 and 2022. Calcium concentrations in lake trout kidney from the exposed area in 2022 were similar to 2018 but significantly higher than all other prior years (including baseline), relative to reference (Figure 5.28, Table 5.24; Appendix Table E.6.14).

Manganese concentrations in the muscle of peamouth chub and lake trout from the exposed area were significantly higher in 2022, relative to reference, than in the baseline year (Figure 5.28; Appendix Tables E.6.10, E.6.16). Specifically, manganese concentrations in peamouth chub muscle from the exposed area in 2022 was significantly higher than in 2016 and 2022, relative to reference, and 2022 was the first year where exposed area concentrations were significantly greater than reference (Figure 5.28, Table 5.24; Appendix Table E.6.10). Manganese concentrations in lake trout muscle from the exposed area in 2022 were significantly higher than in 2015 to 2019 but were similar to 2020 to 2021, relative to reference. The higher manganese concentrations in exposed lake trout muscle from 2020 to 2022 compared to 2015 to 2019, relative to reference, appears to be related (at least in part) to a steady decline in manganese concentrations at the reference site since 2018 (Figure 5.28, Table 5.24; Appendix Table E.6.16).

Phosphorus concentrations in lake trout kidney from the exposed area of Quesnel Lake were significantly higher in 2022 compared to all prior years (2015 to 2021), relative to reference. This appears to be related to both a slight increase in the phosphorus concentrations in lake trout muscle from the exposed area combined with a slight decrease in the reference results from 2020 to 2022 (Figure 5.28, Table 5.24; Appendix Table E.6.14).

Tin concentrations in peamouth chub liver and lake trout muscle from the exposed area were higher in 2022, relative to reference, than in the baseline year. For peamouth chub liver specifically, tin concentrations in the exposed tissues in 2022 were higher than in baseline (2016) but similar to or lower than the following years (2018 and 2020; when sufficient detectable data were available for analyses), relative to reference (Figure 5.28, Table 5.24; Appendix Table E.6.12). Tin concentrations in exposed lake trout muscle were higher in 2022 than in 2021,

relative to reference, which was the first year where there were sufficient detectable data for statistical comparisons (Figure 5.28, Table 5.24; Appendix Table E.6.16). Similar to barium, the results of temporal comparisons for tin were often influenced by results below the LRL, particularly for lake trout muscle results prior to and including 2021 (Figure 5.28, Table 5.24). In some of the comparisons for tin, the magnitude of the exposed-reference difference was inflated because data for one of the groups in the comparison were entirely less than the LRL, which was the case for one or more years of data for both peamouth chub liver and lake trout muscle (Table 5.24; Appendix Tables E.6.12, E.6.16).

Although there is no corresponding reference area for Quesnel River to assess *Area×Year* interaction, concentrations of three secondary analytes in rainbow trout tissues were significantly higher in 2022 compared to the baseline year (2015). Specifically, concentrations of phosphorus in muscle, sodium in kidney, and barium in liver were significantly higher than the baseline in more than one year (including 2022), sodium in kidney has been consistently elevated each year since baseline (including 2022), and sodium in ovary and barium in muscle were higher in 2022 only compared to baseline (Appendix Figures E.6.18 to E.6.21, Appendix Tables E.6.18 to E.6.21). Phosphorus concentrations in rainbow trout muscle were 18% and 34% higher in 2021 and 2022, respectively, relative to baseline (Appendix Table E.6.20). Sodium concentrations in rainbow trout kidney in 2022 were 93% greater than baseline, and sodium has shown consistently higher concentrations in lake trout kidney since 2017 relative to baseline (range = 82 to 189% higher than baseline; Appendix Table E.6.19). However, sodium concentrations in rainbow trout muscle were the lowest concentration reported post-baseline except for 2018 (Appendix Table E.6.19). Sodium concentrations in ovary in 2022 were also higher than baseline (by 163%; Appendix Table E.6.21). Barium was significantly elevated in both muscle (410% greater than baseline) and liver (503% greater than baseline) tissue of rainbow trout in 2022, relative to baseline. Barium concentrations in muscle were the highest observed since baseline, while those in liver were similar to those in 2018 to 2020 (Appendix Tables E.6.18 and E.6.20). Considering these analytes, the consistency among tissue types reflected in the increased concentrations of barium (in muscle and liver) and sodium (in ovary and kidney) infers a potential consistent influence on analyte concentrations in these exposed tissues. However, throughout the monitoring period (2015 to 2022) only kidney concentrations of sodium have consistently been significantly higher than the baseline year (2015) results. The increases in barium and sodium were not reflected in other rainbow trout tissues nor in the tissues of other fish species in Quesnel Lake, therefore may be reflective of natural variability of these analytes within the area.

5.2.8 Summary

Sediment monitoring in 2022 continued to indicate a breach influence on sediment chemistry at both the deep and shallow areas of Quesnel Lake. Sediment collected from the deep near-field area of Quesnel Lake was characterized by concentrations of several analytes (arsenic, copper, iron, and manganese) that were greater than reference concentrations and WSQG, and TOC content lower than reference, consistent with previous post-breach results. Copper was the most substantially elevated analyte, with mean concentrations 4.2 times the upper WSQG in 2022. Mean iron and manganese concentrations were also greater than reference and upper WSQG, although to a lesser degree, and mean concentrations of arsenic were greater than reference and the lower WSQG. Temporal stability of these analytes in the deep near-field area sediments was demonstrated by arsenic, copper, and iron concentrations in 2022 that were similar to those reported in 2014, and manganese concentrations and TOC content in 2022 similar to 2015. Sediments from the shallow near-field area in 2022 had a very high sand content (92.8%), and were characterized by concentrations of arsenic, copper, iron, manganese, and silver that were greater than reference concentrations and WSQG. Copper was the most substantially elevated analyte, with mean concentrations 5.7 times the upper WSQG. Mean iron and manganese concentrations were also greater than reference and the upper WSQG (to a lesser extent than copper), while mean concentrations of arsenic and silver were greater than reference and lower WSQG. Concentrations, arsenic, copper, iron, manganese, and silver and TOC content were temporally stable, relative to reference, with concentrations in 2022 remaining similar to 2014 values for each of these analytes (compared to reference).

Sediment toxicity testing of *H. azteca* using sediments from the shallow near-field area of Quesnel Lake (QUL-LNF1) in 2022 resulted in a moderate survival response (44 to 45% mortality) and a high growth response (76 to 79% reduction). However, concentrations of dissolved copper in overlying waters of the toxicity test vessels were highly dissimilar from those documented in field-collected water from these sites, which is consistent with previous years of monitoring. Dissolved copper concentrations in the toxicity test vessels in 2022 were an average of 97-times greater than in field-collected water, which is similar to 2020 and 2021 (74- and 114-times greater, respectively) and lower than 2019 (174-times). This strongly suggests copper mobilization in the test setup that has either not occurred *in situ* or has attenuated over time *in situ*. Under these conditions, the observed mortality and growth response are consistent with dissolved copper concentrations in overlying water, particularly given that *H. azteca* have been documented to derive little nutrition from sediment and to respond primarily to contaminants in overlying water. Significant regression relationships evaluating results from 2014 to 2022 inferred lower *H. azteca* growth and survival at higher overlying water dissolved copper concentrations and higher sediment copper concentrations. This further corroborates the observation that

toxicity responses of *H. azteca* are consistent with dissolved copper concentrations in the overlying test waters of these shallow sediments. Overall, the toxicity test results from the shallow near-field area cannot be reliably extrapolated to the field but suggest potential copper mobilization in this area with disturbance.

Phytoplankton community and productivity monitoring in Quesnel Lake in 2022 indicated that phytoplankton productivity (in terms of chlorophyll-a concentrations) was similar at the exposed and reference monitoring areas, as was also observed in previous years (2019 to 2021). These results characterize both the exposed and reference areas of Quesnel Lake as mesotrophic in 2022, which is a change from the classification of ultraoligotrophic in 2016 to 2018 and as oligotrophic in 2019 to 2021; a change likely owing in part to a switch from surface grab (2018 and earlier) to depth-integrated sampling methods (2019 onwards). The plankton community of the exposed area of Quesnel Lake in July 2022 was characterized by density higher than reference, taxon richness lower than reference, and Simpson's Evenness and Diversity indices similar to reference. Total density has consistently been higher at the exposed area compared to the reference area since 2019. Simpson's Diversity and Evenness at the exposed area have shown some temporal variability but have been either similar to or higher than reference in each year since 2019. Taxon richness at the exposed area in 2022 was lower than in previous years (2019 to 2021) reflecting a decrease from conditions that were similar to reference from 2019 to 2021, to lower than reference in 2022. This decrease in taxon richness was attributable to the absence of relatively rare phytoplankton taxa at QUL-ZOO-1 in July 2022, and appeared to be a temporary change based on the results of samples collected in August 2022 which included some of these relatively rare taxa. Continued monitoring will help to further understand whether the decrease in taxon richness in 2022 is part of a longer-term change or was a single variable result. The community composition at the exposed area has been similar to reference in terms of the relative densities of Diatoms, Cyanobacteria, and Chlorophytes from 2019 to 2022. The relative densities of Chrysophytes, Cryptomonads, and Dinoflagellates at the exposed area differed from reference in 2022 but showed temporal stability either within the exposed area or temporal stability in the difference relative to reference from 2019 to 2022. The similarity of the phytoplankton community at the exposed and reference areas of Quesnel Lake for most endpoints, and the temporal stability throughout the study period for most endpoints that differed between the areas (excluding taxon richness), are suggestive of a lack of mine-related influence on the phytoplankton community of Quesnel Lake.

Zooplankton community and productivity monitoring in Quesnel Lake in 2022 indicated that total biomass of zooplankton (dw) at the exposed area was similar to reference, which is consistent with prior years. The zooplankton community at the exposed area of Quesnel Lake in 2022 was characterized by total density and Simpson's Evenness that were similar to reference, and taxon

richness and Simpson's Diversity that were higher than reference. While there was temporal variability in these metrics at the exposed area from 2019 to 2022, the changes (i.e., direction and relative magnitude) were generally the same as those observed at the reference area, and metrics at the exposed area were largely similar to or greater than reference over this period. The community composition at the exposed area has been similar to reference in terms of the densities and relative densities of most zooplankton taxa (Calanoida, Cladocera, and Rotifera) from 2019 to 2022, with two exceptions, indicating that the communities at the exposed and reference areas were largely similar. The two exceptions were lower density and relative density of Cyclopoida in 2019, and consistently higher density and relative density of Copepod Nauplii in 2019 to 2022 at the exposed area compared to reference. The similarity of zooplankton communities between the exposed and reference areas for most endpoints and temporal stability of those endpoints that differed between the areas (i.e., Copepod Nauplii) from 2019 to 2022 are suggestive of a lack of mine-related influence on the zooplankton community of Quesnel Lake.

Zooplankton tissue quality monitoring in Quesnel Lake in 2022 indicated that concentrations of primary and secondary analytes in tissues from the exposed area were similar to or lower than reference, and also temporally stable from 2019 to 2022. The lack of temporal and spatial differences in zooplankton tissue quality results in 2022 was supported by trend analyses of surface water quality data which indicated temporal stability (from 2015 to 2022) for most analytes, except for increasing trends at one or both exposed monitoring stations for total manganese, total phosphorus, total and dissolved selenium, and dissolved barium, molybdenum, and sodium. A measurable increase in concentrations of these analytes in zooplankton tissue was not observed since 2019, indicating no sustained impact of the increased aqueous concentrations of these analytes on zooplankton tissue quality. In addition, aqueous total selenium and manganese concentrations remained well below the BCWQG from 2015 to 2022. Despite the identified increasing trend in aqueous selenium concentrations, zooplankton tissue selenium concentrations were below the BC interim guideline for aquatic life at the exposed area in 2022 (similar to 2019 to 2021), and tissue selenium concentrations at the exposed area were similar to reference from 2019 to 2022. As such, monitoring results indicate that zooplankton tissue quality in 2019 to 2022 was unimpacted by the breach and potential effluent exposure.

Benthic invertebrate community monitoring in the deep-near field area of Quesnel Lake in 2022 documented a community with total density and Simpson's Evenness that were unchanged since 2016, taxon richness that was similar to all years since 2014, and Simpson's Diversity that was unchanged since 2014. Total density at the deep near-field area in 2022 remained much lower than the densities reported for the reference area in previous years (2014 to 2021), but the difference relative to reference has steadily decreased. These results indicate some recovery of the benthic invertebrate community at the exposed areas from the initial breach event in 2014,

but no substantial change in community structure since 2016 at the deep near-field exposed area of Quesnel Lake. This lack of significant recovery is consistent with the stability of sediment TOC content and concentrations of arsenic, copper, iron, and manganese in these sediments since at least 2016. Chironomidae, which are the dominant taxa at the deep near-field area, are intolerant to sediments with organic content (TOC) of less than 1% (Suedel et al. 1993) and the TOC content of near-field area sediments (mean = 0.614%) remains well below this level. The community composition has shown temporal stability since 2014, and in 2022 continued to be characterized by Chironomidae dominance. Several characteristics of the benthic invertebrate community at the deep near-field area were related to sediment characteristics, including lower total density, richness, Chironomidae density, and Oligochaeta density and relative density associated with greater proportion of fines, lower proportion of TOC, and higher metal concentrations in sediment. These sediment properties are consistent with the presence of breach-impacted sediments at the deep near-field area.

The catchability of lake trout at the exposed area of Quesnel Lake in 2022 was lower than at the reference area, while catchability of peamouth chub and northern pikeminnow in 2022 were both higher at the exposed area relative to reference. The catchability of rainbow trout from the Quesnel River in 2022 was higher than in previous years. Fish tissue quality in 2022 was evaluated in up to four tissues (muscle, liver, kidney, and ovary) in four species (lake trout, northern pikeminnow, peamouth chub, and rainbow trout). Mean mercury and selenium concentrations in fish muscle tissue from Quesnel Lake and Quesnel River in 2022 were below the guidelines for the protection of human health (i.e., indicating that fish are safe for moderate human consumption). This was consistent with prior monitoring years except 2020 and 2021 when the mean mercury concentrations in muscle of reference lake trout exceeded the consumption guideline. Mean selenium concentrations in fish muscle or whole-body samples from Quesnel Lake and Quesnel River in 2022 were below the guideline for the protection of aquatic life except for peamouth chub from the exposed area which exceeded the guideline at a higher rate in 2022 (63%) than in previous years (2015 to 2021). Mean selenium concentrations in ovary tissue (the tissue most valuable in the assessment of potential selenium-associated effects on fish) from lake trout in 2022 were below the tissue specific guideline for the protection of aquatic life but exceeded the guideline in rainbow trout and peamouth chub. In rainbow trout ovary tissue, selenium concentrations in 2022 exceeded the guideline in 50% of samples which was within the range of previous years. In peamouth chub ovary tissue, selenium concentrations in the majority of exposed (86%) and reference (50%) samples in 2022 exceeded the tissue specific guideline for the protection of aquatic life, with 43% of exposed samples also exceeding the threshold for reproductive effects. The rate of the guideline/threshold exceedances in exposed peamouth chub ovary tissue was higher in 2022 than in prior years. Despite this,

selenium concentrations in peamouth chub tissues (muscle liver, ovary, and kidney) and in northern pikeminnow whole-body samples (also a small home-range species) have been temporally stable from 2016 to 2022, relative to reference. The absence of pre-breach data precludes drawing definitive conclusions about the potential factors influencing tissue selenium concentrations (e.g., due to mine-exposure or due to inherent differences between the areas). However, results from 2016 to 2022 indicated there is no evidence that selenium concentrations in fish tissues from Quesnel Lake are increasing over time due to mine exposure. Evidence of a persistent mine influence was not detected for most analytes assessed in fish tissue from Quesnel Lake and Quesnel River in 2022. All primary analytes (arsenic, copper, iron, and selenium), and the secondary analytes barium, cadmium, calcium, manganese, mercury, molybdenum, phosphorus, sodium, strontium, tin, titanium, uranium, vanadium, and zinc were elevated relative to reference in 2022 in at least one tissue type in at least one species. However, the results for most these analytes were inconsistent among tissues and species, and/or were temporally stable, and/or the results were not supported by zooplankton tissue quality results, indicating that the weight of evidence does not support a pattern of increasing analyte concentrations over time due to mine-exposure.

6 RESULTS – CREEK HABITAT

6.1 Hazeltine Creek

6.1.1 Sediment Quality

Creek sediment quality monitoring in 2022 targeted one area in upper (HAC-U) and one in lower (HAC-D) Hazeltine Creek, with areas in upper (EDC-U) and lower (EDC-D) Edney Creek serving as reference sites, respectively (Figure 4.1, Table 4.1). A review of the 2022 sediment data quality (Appendix B) indicated that the data met the established DQOs and can be used with a high level of confidence for interpretation (see Section 5.1.1 for details).

6.1.1.1 Upper Hazeltine Creek

Sediments collected from upper Hazeltine Creek (HAC-U) in 2022 were composed primarily of silt and clay particles (mean = 71.1% and 16.1%, respectively) and were higher in silt content than the reference sediments from EDC-U, which were composed predominantly of sand and silt (mean = 55.1% and 35.7%, respectively; Table 6.1; Appendix Tables D.2.1 to D.2.7). Sediments collected at HAC-U in 2022 (mean = 71.1% silt) had the highest silt content observed since 2018 (following the completion of remediation; Table 6.1). Silt content of sediments from HAC-U has been fairly consistent from 2019 to 2022 (53.2 to 71.1%) but higher than previous years (30.0 to 30.5% in 2014 and 2018), while sand (11.2 to 32.0%) and clay content (13.4 to 21.0%) have been more variable from 2019 to 2022 (Table 6.1; Appendix Tables D.2.6 to D.2.7). The presence of fine sediments in these erosional sampling areas has been limited in some years, and this limited availability of fine sediments has necessitated opportunistic sampling (as described in Section 4.1.1; Minnow 2019a, 2020a, 2021a, 2022a). Therefore, variability in particle size is likely related to variability among years in the presence of similarly fine sediments in these erosional habitats.

Total nitrogen content in HAC-U sediment (mean = 0.765%) was higher than the corresponding reference site (mean = 0.283%) in 2022 and was also higher than prior monitoring years (mean range = <0.020 to 0.656% in 2014 to 2021; Table 6.1). The mean TOC of sediments from HAC-U (mean = 6.74%) was similar to reference (EDC-U mean = 6.01%) in 2022 and was significantly higher at HAC-U in 2022 than in 2018 and 2020 at this area, relative to reference (Appendix Figure F.1.1, Appendix Tables F.1.1 and F.1.2). The mean TOC content of sediments from HAC-U has been similar to reference in each year except 2018 and 2020, when TOC content of HAC-U sediments was significantly lower than reference (Appendix Table F.1.2). The observed variability in both TOC and total nitrogen among years is likely primarily associated with differences in sediment texture. For instance, the significantly lower TOC content of HAC-U

Table 6.1: Summary of Sediment Quality Results for Upper Hazeltine Creek (HAC-U; Exposed) and Upper Edney Creek (EDC-U; Reference), 2014 to 2022

Parameter	Units	BC Working Sediment Quality Guidelines[a]		Reference/Pre-Breach 95th Percentile[b]		Reference (Upper Edney Creek)									
						2018 (EDC-U)		2019 (EDC-U)		2020 (EDC-U)		2021 (EDC-U)		2022 (EDC-U)	
		Lower	Upper	Reference (EDC-U; 2018 to 2022)	Pre-Breach (Upper Hazeltine Creek)	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
Physical Tests															
Moisture	%	-	-	79.7	-	70.6	14.8	64.6	11.2	58.1	6.76	55.2	4.59	61.9	9.59
pH (1:2 soil:water)	pH	-	-	6.01	-	6.76	0.337	6.30	0.187	6.36	0.372	6.81	0.357	6.75	0.246
Particle Size															
% Gravel (>2 mm)	%	-	-	11.3	33.1	7.88	9.50	<1.0	-	1.06	-	4.52	3.98	1.20	0.566
% Sand (2.0 mm - 0.063 mm)	%	-	-	76.2	64.7	35.4	4.88	45.1	11.0	64.6	9.83	56.9	12.6	55.1	14.9
% Silt (0.063 mm - 4 µm)	%	-	-	56.4	76.2	48.3	7.12	43.4	8.33	28.8	8.02	31.4	10.6	35.7	11.8
% Clay (<4 µm)	%	-	-	16.4	13.9	8.80	4.41	11.4	4.21	6.24	2.49	7.20	3.84	8.42	3.52
Organic / Inorganic Carbon (<63 µm)															
Total Organic Carbon (TOC)	%	-	-	8.48	12.8	7.03	3.16	5.86	2.04	5.49	1.03	5.97	1.20	6.01	1.42
Nutrients (Bulk sediment)															
Total Nitrogen by LECO	%	-	-	0.485	-	0.355	0.127	0.386	0.143	0.303	0.0708	0.266	0.0943	0.283	0.0937
Metals (<63 µm)[c]															
Aluminum	mg/kg	-	-	22,800	17,960	18,800	2,550	19,800	1,720	15,860	1,529	21,300	3,152	14,740	1,571
Antimony	mg/kg	-	-	0.420	0.370	0.312	0.0327	0.348	0.0130	0.318	0.0239	0.352	0.0829	0.300	0.0367
Arsenic	mg/kg	5.90	17.0	12.0	8.23	***12.8***	5.47	10.8	0.537	8.90	0.836	10.4	0.441	8.07	1.40
Barium	mg/kg	-	-	200	136	159	26.6	146	4.04	130	12.5	189	13.4	108	18.3
Beryllium	mg/kg	-	-	0.620	0.460	0.484	0.0871	0.518	0.0466	0.438	0.0455	0.498	0.0763	0.372	0.0487
Bismuth	mg/kg	-	-	0.140	<0.20	0.116	0.0135	0.120	0.0122	0.102	0.00566	0.112	0.00924	0.100	-
Boron	mg/kg	-	-	5.40	5.40	***<10.0***	-	***<10.0***	-	<5.0	-	5.16	-	5.06	-
Cadmium	mg/kg	0.600	3.50	0.579	0.354	0.450	0.138	0.432	0.0978	0.381	0.0589	0.532	0.018	0.329	0.100
Calcium	mg/kg	-	-	11,000	13,395	9,610	1,080	9,900	1,190	8,404	509	9,796	232	7,846	1,022
Chromium	mg/kg	37.3	90.0	75.8	40.1	55.0	5.24	65.1	6.28	52.2	2.59	66.9	7.78	46.9	5.94
Cobalt	mg/kg	-	-	16.9	10.4	14.6	1.62	15.7	0.404	13.1	1.24	15.9	1.33	11.6	1.93
Copper	mg/kg	35.7	197	47.0	94.6	41.6	5.12	41.1	2.37	32.3	2.66	45.6	13.8	26.7	4.39
Iron	mg/kg	21,200	43,766	34,000	29,900	32,900	5,600	31,500	1,070	27,920	2,087	30,660	1,429	24,700	3,648
Lead	mg/kg	35.0	91.3	8.14	6.70	6.72	0.952	7.02	0.447	5.85	0.339	6.87	0.809	6.59	0.976
Lithium	mg/kg	-	-	17.8	14.8	14.6	2.33	15.7	1.25	14.1	0.976	14.2	1.47	12.0	0.990
Magnesium	mg/kg	-	-	7,930	6,430	7,240	527	7,400	269	6,526	318	7,842	600	6,108	536
Manganese	mg/kg	460	1,100	2,710	1,345	1,310	456	1,300	274	905	200	1,960	858	809	250
Mercury	mg/kg	0.170	0.486	0.125	0.145	0.118	0.0239	0.101	0.00416	0.101	0.0014	0.103	0.018	0.0751	0.0131
Molybdenum	mg/kg	25	23,000	2.39	1.50	0.818	0.200	1.91	0.562	0.620	0.0863	1.43	0.346	0.578	0.0746
Nickel	mg/kg	16.0	75.0	43.2	24.4	33.4	2.71	40.1	3.59	30.4	1.98	39.6	3.67	25.2	3.63
Phosphorus	mg/kg	-	-	1,370	1,375	1,260	83.4	1,310	83.8	1,132	82.0	1,204	63.5	1,025	48.8
Potassium	mg/kg	-	-	1,470	1,445	1,230	194	1,240	119	1,066	139	1,406	190	1,018	191
Selenium	mg/kg	2.00	-	0.880	3.32	0.668	0.131	0.622	0.0303	0.488	0.089	0.664	0.157	0.394	0.0961
Silver	mg/kg	0.500	-	0.205	0.160	0.187	0.0176	0.181	0.0148	0.139	0.0151	0.171	0.0246	0.131	0.0216
Sodium	mg/kg	-	-	340	350	251	20.2	245	20.2	266	14.0	293	53.2	255	33.3
Strontium	mg/kg	-	-	85.5	118	75.3	7.06	75.8	6.94	64.9	4.28	85.1	1.84	69.6	8.50
Sulphur	mg/kg	-	-	2,300	-	1,640	602	1,980	597	1,342	327	602	153	654	67.6
Thallium	mg/kg	-	-	0.166	0.0941	0.132	0.0254	0.141	0.0143	0.115	0.0108	0.138	0.0174	0.107	0.0161
Tin	mg/kg	-	-	0.620	<2.0	0.394	0.0391	0.506	0.0378	0.556	0.0607	0.5	0.282	0.362	0.0841
Titanium	mg/kg	-	-	736	776	600	102	617	57.3	634	70.0	637	110	593	61.3
Uranium	mg/kg	-	-	2.15	1.26	1.59	0.340	1.63	0.252	1.28	0.145	1.58	0.472	1.28	0.132
Vanadium	mg/kg	-	-	85.7	65.3	77.5	7.57	79.1	3.55	72.7	4.39	80.8	6.85	62.4	8.04
Zinc	mg/kg	123	315	89.7	67.6	75.7	4.83	79.8	6.22	67.5	5.42	87.6	5.20	63.3	10.8
Zirconium	mg/kg	-	-	1.90	-	-	-	-	-	1.10	0.103	1.30	0.354	1.02	0.0566

Value is > Lower BC Working Sediment Quality Guideline.
Value is > Upper BC Working Sediment Quality Guideline.

Notes: "-" = no data, ***Bold/ Italics*** - Exposed value is > both reference and pre-breach 95th percentile values; reference value is > reference 95th percentile value (< 5th percentile value for pH). Pre-breach values that were reported as < the laboratory reporting limit were not used for screening.

[a] British Columbia Working Sediment Guidelines (BCMOECCS 2021a) and approved BC Sediment Quality Guideline for Selenium (BCMOECCS 2021b).

[b] For calculation of pre-breach 95th percentile values see Appendix Table D.2.2, for calculation of reference 95th percentile values see Appendix Table D.2.3. The 5th percentile is reported for pH.

[c] Total sulphur measured in bulk sediment, not the <63 µm fraction.

Table 6.1: Summary of Sediment Quality Results for Upper Hazeltine Creek (HAC-U; Exposed) and Upper Edney Creek (EDC-U; Reference), 2014 to 2022

Parameter	Units	BC Working Sediment Quality Guidelines[a]		Reference/Pre-Breach 95th Percentile[b]		Exposed (Upper Hazeltine Creek)											
						2014 (ST16)		2018 (HAC-U)		2019 (HAC-U)		2020 (HAC-U)		2021 (HAC-U)		2022 (HAC-U)	
		Lower	Upper	Reference (EDC-U; 2018 to 2022)	Pre-Breach (Upper Hazeltine Creek)	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
Physical Tests																	
Moisture	%	-	-	79.7	-	25.4	3.80	36.6	4.48	***84.8***	8.89	***76.6***	5.60	***83.1***	3.3	***87.3***	2.11
pH (1:2 soil:water)	pH	-	-	6.01	-	8.87	0.172	8.32	0.179	7.41	0.106	7.50	0.124	7.31	0.0986	7.18	0.0898
Particle Size																	
% Gravel (>2 mm)	%	-	-	11.3	33.1	<0.10	-	12.7	4.07	1.06	-	1.78	-	2.3	0.85	<1	-
% Sand (2.0 mm - 0.063 mm)	%	-	-	76.2	64.7	69.6	6.13	38.5	2.28	11.2	12.0	32.0	11.3	12.7	3.03	12.7	2.29
% Silt (0.063 mm - 4 µm)	%	-	-	56.4	76.2	30.0	6.07	30.5	2.03	67.5	11.8	53.2	11.3	66.5	2.91	71.1	1.76
% Clay (<4 µm)	%	-	-	16.4	13.9	0.470	0.0742	***18.3***	0.989	***21.0***	0.945	13.4	0.653	***19.0***	1.36	16.1	1.21
Organic / Inorganic Carbon (<63 µm)																	
Total Organic Carbon (TOC)	%	-	-	8.48	12.8	<0.10	-	0.347	0.0634	4.44	1.12	2.28	0.550	4.47	0.725	6.74	0.682
Nutrients (Bulk sediment)																	
Total Nitrogen by LECO	%	-	-	0.485	-	<0.020	-	0.0244	0.0102	***0.656***	0.246	0.246	0.0780	***0.558***	0.116	***0.765***	0.114
Metals (<63 µm)[c]																	
Aluminum	mg/kg	-	-	22,800	17,960	10,600	286	***23,500***	1,790	15,700	1,760	17,520	1,096	18,580	1,399	16,120	536
Antimony	mg/kg	-	-	0.420	0.370	0.308	0.0268	***0.572***	0.0396	0.406	0.0688	***0.556***	0.0929	***0.426***	0.0658	0.328	0.0396
Arsenic	mg/kg	5.90	17.0	12.0	8.23	***14.7***	0.522	***12.7***	1.63	8.72	0.807	10.6	2.42	8.01	0.678	7.28	0.151
Barium	mg/kg	-	-	200	136	109	7.60	***229***	18.9	***226***	16.5	***274***	87.6	***276***	14.7	***260***	5.52
Beryllium	mg/kg	-	-	0.620	0.460	0.476	0.0230	0.618	0.0712	0.510	0.0292	0.558	0.0356	0.52	0.0245	0.534	0.0182
Bismuth	mg/kg	-	-	0.140	<0.20	<0.10	-	***0.158***	0.0110	0.104	-	0.102	0.00566	0.100	-	<0.10	-
Boron	mg/kg	-	-	5.40	5.40	***<10.0***	-	***10.2***	-	***14.2***	2.17	***13.2***	1.85	***16.5***	3.67	***19.8***	3.69
Cadmium	mg/kg	0.600	3.50	0.579	0.354	0.160	0.00857	0.257	0.0476	0.319	0.0338	0.299	0.0622	0.351	0.0236	0.354	0.0293
Calcium	mg/kg	-	-	11,000	13,395	***27,600***	702	***25,600***	8,070	***61,400***	5,990	***23,340***	5,625	***20,200***	3,973	***21,640***	1,701
Chromium	mg/kg	37.3	90.0	75.8	40.1	22.8	1.86	52.5	2.49	58.8	11.1	34.6	2.53	29.7	4	26.7	2.04
Cobalt	mg/kg	-	-	16.9	10.4	***24.0***	1.53	***17.1***	0.673	14.6	1.08	16.8	3.89	14.7	0.817	13.3	0.335
Copper	mg/kg	35.7	197	47.0	94.6	***687***	34.3	***151***	50.4	***360***	73.9	***331***	42.6	***417***	43.1	***392***	8.85
Iron	mg/kg	21,200	43,766	34,000	29,900	***139,000***	10,600	***41,400***	3,740	30,000	4,320	***44,640***	13,592	33,900	1,559	32,000	800
Lead	mg/kg	35.0	91.3	8.14	6.70	6.33	0.260	***8.77***	0.236	6.59	0.629	6.56	0.254	6.11	0.73	5.77	0.187
Lithium	mg/kg	-	-	17.8	14.8	11.8	0.713	***21.6***	0.653	14.5	1.75	17.1	0.762	13.9	1.5	13.1	0.642
Magnesium	mg/kg	-	-	7,930	6,430	6,570	185	***11,300***	669	***9,070***	850	***9,940***	1,037	***9,502***	595	***8,508***	80.7
Manganese	mg/kg	460	1,100	2,710	1,345	626	15.9	861	18.7	***2,880***	1,360	***2,737***	3,444	1,485	734	1,840	292
Mercury	mg/kg	0.170	0.486	0.125	0.145	0.0770	0.00198	0.108	0.0261	0.101	0.0153	0.111	0.00594	0.106	0.00568	0.107	0.00339
Molybdenum	mg/kg	25	23,000	2.39	1.50	***4.66***	0.356	1.35	0.277	***6.27***	1.43	***3.07***	0.64	***3.64***	1.24	***3.84***	0.308
Nickel	mg/kg	16.0	75.0	43.2	24.4	11.1	0.719	42.0	1.67	***46.4***	6.43	31.2	6.89	26.4	2.63	23.4	1.88
Phosphorus	mg/kg	-	-	1,370	1,375	***2,440***	133	1,050	56.3	***1,440***	202	1,352	79.8	***1,416***	79.6	***1,512***	128
Potassium	mg/kg	-	-	1,470	1,445	794	33.6	***2,730***	185	***1,680***	158	***1,624***	167	1,444	199	1,434	107
Selenium	mg/kg	2.00	-	0.880	3.32	1.38	0.121	0.562	0.197	2.27	0.656	1.67	0.230	3.09	0.483	***4.05***	0.622
Silver	mg/kg	0.500	-	0.205	0.160	***0.446***	0.0509	0.144	0.0158	0.164	0.0110	0.163	0.0164	0.173	0.00688	0.187	0.00834
Sodium	mg/kg	-	-	340	350	***552***	23.9	***446***	39.8	***472***	64.2	***468***	53.6	***441***	11.8	***473***	14.6
Strontium	mg/kg	-	-	85.5	118	85.7	2.76	***150***	22.0	***226***	11.3	***145***	19.8	***130***	8.14	***144***	6.31
Sulphur	mg/kg	-	-	2,300	-	-	-	660	-	***2,320***	335	1,632	629	***2,460***	397	***2,718***	485
Thallium	mg/kg	-	-	0.166	0.0941	<0.050	-	0.129	0.00802	0.0624	0.0149	0.073	0.00675	0.0662	0.0128	0.0540	0.00480
Tin	mg/kg	-	-	0.620	<2.0	***1.13***	0.0737	0.568	0.120	***0.666***	0.122	***0.816***	0.131	***0.788***	0.0497	***0.704***	0.0577
Titanium	mg/kg	-	-	736	776	***1,060***	34.2	***1,100***	155	714	181	***1,100***	103	***932.6***	108	744	74.5
Uranium	mg/kg	-	-	2.15	1.26	1.04	0.0489	0.893	0.0549	0.732	0.0975	0.754	0.0523	0.821	0.076	0.807	0.0391
Vanadium	mg/kg	-	-	85.7	65.3	***542***	53.0	***99.9***	16.7	79.9	14.5	***123***	13.6	***102***	6.57	***98.7***	3.91
Zinc	mg/kg	123	315	89.7	67.6	70.1	2.42	79.9	2.75	76.6	6.20	70.5	4.86	78.1	2.98	69.5	1.43
Zirconium	mg/kg	-	-	1.90	-	-	-	-	-	-	-	***2.68***	0.370	***2.00***	0.505	***2.02***	0.130

Value is > Lower BC Working Sediment Quality Guideline.
Value is > Upper BC Working Sediment Quality Guideline.

Notes: "-" = no data, ***Bold/ Italics*** - Exposed value is > both reference and pre-breach 95th percentile values; reference value is > reference 95th percentile value (< 5th percentile value for pH). Pre-breach values that were reported as < the laboratory reporting limit were not used for screening.

[a] British Columbia Working Sediment Guidelines (BCMOECCS 2021a) and approved BC Sediment Quality Guideline for Selenium (BCMOECCS 2021b).

[b] For calculation of pre-breach 95th percentile values see Appendix Table D.2.2, for calculation of reference 95th percentile values see Appendix Table D.2.3. The 5th percentile is reported for pH.

[c] Total sulphur measured in bulk sediment, not the <63 µm fraction.

sediments observed in 2018 and 2020, compared to reference, was associated with the highest sand content of these sediments (excluding 2014; mean = 32.0 to 38.5% sand; Table 6.1; Appendix Table F.1.2). As indicated above, the observed variability in sediment texture is likely associated with the variable availability of similarly fine sediments among years in these erosional habitats; variability which may stabilize as sediment accumulation continues to occur in this remediated system.

Mean concentrations of 14 out of 34 elements in the HAC-U sediment (<63 µm fraction) collected in 2022 exceeded both pre-breach[61] and reference upper 95th percentile values. Among these elements, copper and selenium were the only Analytes of Interest with mean sediment concentrations that also exceeded WSQG in 2022 (Figure 6.1, Table 6.1; Appendix Table D.2.7). Specifically, the mean copper concentration of HAC-U sediments in 2022 exceeded the upper WSQG by 2.0 times (Table 6.1; Appendix Table D.2.7). Mean copper concentrations in reference (EDC-U) sediments were naturally elevated above the lower WSQG in previous years (2018, 2019, 2021; Table 6.1; Appendix Table D.2.3), demonstrating that copper is naturally elevated in stream habitats in the vicinity of the Mount Polley Mine. The mean selenium concentration in HAC-U sediments in 2022 exceeded the lower WSQG by 2.0 times (Figure 6.1, Table 6.1; Appendix Table D.2.7). Although the mean selenium concentration in HAC-U sediments previously exceeded the reference 95th percentile and the lower WSQG (in 2019 and 2021), 2022 represented the first year that the mean concentration also exceeded the pre-breach 95th percentile value (for HAC-U; Table 6.1; Appendix Figure F.1.1, Appendix Table D.2.7).

Mean copper concentrations in HAC-U sediments have been significantly higher than reference sediments from 2018 to 2022, and mean selenium concentrations have been significantly higher than reference sediments from 2019 to 2022 (Figure 6.1; Appendix Table F.1.2). The mean copper and selenium concentrations in HAC-U sediments were significantly higher in 2022 than previously observed (2018 to 2021), relative to reference (Figure 6.1; Appendix Table F.1.1). However, this change for both analytes was driven by a decrease in copper and selenium concentrations at the reference area (EDC-U), which were significantly lower in 2022 compared to all prior years except 2020 (which was similar to 2022; Appendix Table F.1.2). Evaluation of temporal changes within HAC-U only (i.e., not relative to reference) indicated that copper

[61] TOC and metal concentrations reported for pre-breach sediments were based predominantly on bulk sediment, but were reported for the <63 µm fraction of sediments collected post-breach. This difference in the fraction of sediment evaluated (i.e., bulk sediments for pre-breach and <63 µm fraction for post-breach) should be considered when making comparisons of TOC and metals concentrations between the two time periods. Formal statistical temporal comparisons were conducted using data from between 2018 to 2022 which reported TOC and metal concentrations in the <63 µm fraction of sediments (see Sections 4.1.2 and 4.1.3.2).

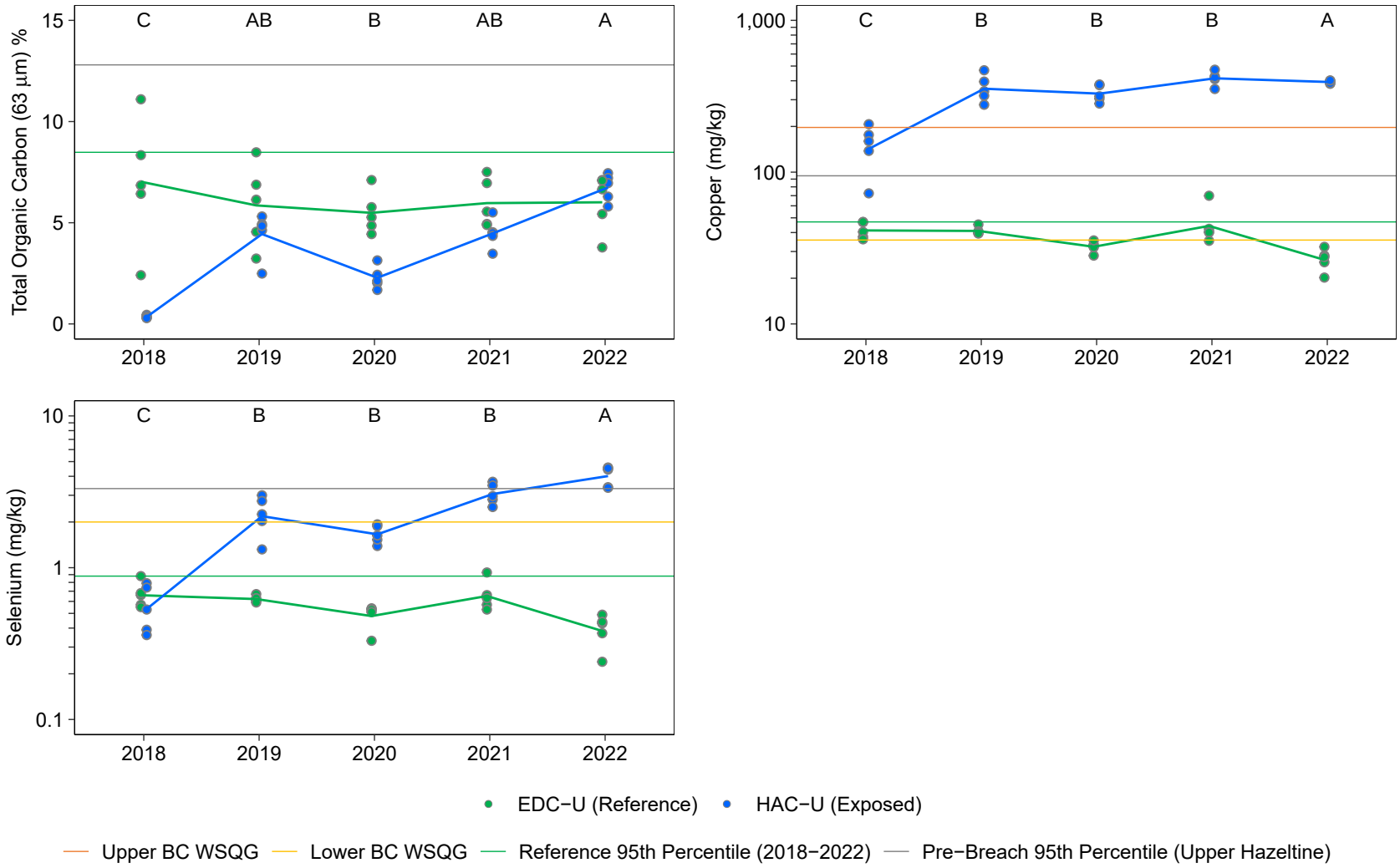


Figure 6.1: Sediment Analyte of Interest Concentrations (<63 µm Fraction) for Upper Hazeltine Creek (HAC-U; Exposed) and Upper Edney Creek (EDC-U; Reference), 2018 to 2022

Notes: Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Individual samples are plotted and lines join the least −squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have differences in concentrations (Exposed − Reference) that do not differ significantly (p−value < 0.05) among years.

concentrations in HAC-U sediments have been temporally stable since 2019 (Appendix Table F.1.2). Selenium concentrations evaluated within HAC-U sediments only (not relative to reference) were similar in 2022 and 2021 and significantly higher in 2022 than the preceding years (2018 to 2020), with the greatest differences occurring relative to 2020 and 2018 (Appendix Table F.1.2). The significantly higher selenium concentrations in HAC-U sediments observed in 2022 (compared to 2018 and 2020) coincided with significantly lower TOC content of sediments in those years (2018 and 2020) compared to 2022 (Appendix Table F.1.2) and higher sand content (mean = 38.5 and 32.0% in 2018 and 2020, respectively; mean = 12.7% in 2022; Table 6.1). This suggests that the increase in selenium concentrations at HAC-U in 2022 was associated with temporal changes in the physical characteristics (i.e., TOC and sand content) that are driven by the necessity for opportunistic sampling due to limited availability of fine sediments in some monitoring years.

Copper and selenium concentrations in Hazeltine Creek sediment have demonstrated significant positive correlations with TOC, sulphur, and total nitrogen (Appendix Figure F.1.3; Appendix Table F.1.5). These relationships further support the observation that the slight (but not significant) changes in copper concentrations and the significant increase in selenium concentrations over time in upper Hazeltine Creek sediments are associated with temporal variability in the physical and chemical characteristics of the sampled sediment (i.e., significantly higher TOC content in 2022 compared to 2018 and 2020; Appendix Table F.1.2).

6.1.1.2 Lower Hazeltine Creek

Sediments collected from lower Hazeltine Creek (HAC-D) in 2022 were composed primarily of silt and sand particles (mean = 48.6% and 42.4%, respectively). Sediments from HAC-D in 2022 were higher in silt and lower in sand content than the reference sediments from EDC-D, which were composed predominantly of sand and silt (mean = 58.3% and 34.2%, respectively; Table 6.2; Appendix Tables D.2.8 and D.2.9). The particle size of sediments collected at HAC-D has shown some temporal variability, with sediments collected in 2022 having similar silt content to those from 2019 and 2021, but higher than in 2018 and 2020 (Table 6.2). The presence of fine sediment in the erosional areas has been limited in some years and was therefore sampled opportunistically (as described in Section 4.1.1; Minnow 2019a, 2020, 2021a, 2022a). As such, some of the variability in particle size is likely related to the ability to locate similarly fine sediment among areas and years. The TOC and total nitrogen content of HAC-D sediments in 2022 (mean = 1.68% and 0.152%, respectively) were the highest observed since 2018 (following initial remediation), though they remained lower than values observed at the reference area (EDC-D) in 2022 (mean = 3.63% and 0.170%, respectively; Table 6.2; Appendix

Table 6.2: Summary of Sediment Quality Results for Lower Hazeltine Creek (HAC-D; Exposed) and Lower Edney Creek (EDC-D; Reference), 2014 to 2022

Parameter	Units	BC Working Sediment Quality Guidelines[a]		Reference/Pre-Breach 95th Percentile [b]		Reference (Lower Edney Creek)											
						2015 (EDC-D)		2018 (EDC-D)		2019 (EDC-D)		2020 (EDC-D)		2021 (EDC-D)		2022 (EDC-D)	
		Lower	Upper	Reference (EDC-D; 2018 to 2022)	Pre-Breach (Lower Hazeltine Creek)	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
Physical Tests																	
Moisture	%	-	-	70.6	-	***78.1***	7.58	40.3	12.0	59.6	15.6	34.2	3.34	48.4	10.4	53.4	7.02
pH (1:2 soil:water)	pH	-	-	6.74	-	7.70	0.246	7.93	0.241	7.18	0.330	7.67	0.154	7.50	0.203	7.41	0.556
Particle Size																	
% Gravel (>2 mm)	%	-	-	6.80	53.4	0.274	0.0283	5.48	3.58	<1.0	-	2.46	1.47	1.34	-	1.06	0.0566
% Sand (2.0 mm - 0.063 mm)	%	-	-	83.9	79.9	48.3	11.1	68.8	16.1	50.0	12.4	74.5	4.84	58.1	5.37	58.3	7.42
% Silt (0.063 mm - 4 µm)	%	-	-	43.8	31.2	***44.9***	10.4	21.6	11.8	41.5	11.1	19.7	3.65	35.4	5.83	34.2	6.47
% Clay (<4 µm)	%	-	-	9.70	9.80	6.59	1.18	4.12	1.26	8.20	1.67	3.64	0.336	5.60	0.66	6.72	0.593
Organic / Inorganic Carbon (<63 µm)																	
Total Organic Carbon (TOC)	%	-	-	3.82	9.03	3.73	1.70	2.85	0.806	3.14	0.642	2.29	0.398	2.42	0.884	3.63	0.970
Nutrients (Bulk sediment)																	
Total Nitrogen by LECO	%	-	-	0.237	-	0.206	0.0850	0.0854	0.0501	0.189	0.0769	0.104	0.0201	0.142	0.0372	0.170	0.0507
Metals (<63 µm)[c]																	
Aluminum	mg/kg	-	-	19,000	12,550	15,900	2,000	14,200	940	15,200	358	12,120	672	16,900	2,845	13,860	573
Antimony	mg/kg	-	-	0.460	1.33	0.366	0.0321	0.430	0.0806	0.390	0.0224	0.360	0.0122	0.346	0.0385	0.340	0.0158
Arsenic	mg/kg	5.90	17.0	19.5	12.1	18.2	6.94	13.8	6.39	13.0	1.45	11.7	1.30	12.6	2.83	9.80	1.13
Barium	mg/kg	-	-	184	104	175	35.5	145	39.9	125	10.9	118	6.80	152	34.9	117	6.91
Beryllium	mg/kg	-	-	0.480	0.300	0.400	0.0292	0.424	0.0654	0.406	0.0152	0.350	0.0122	0.388	0.0716	0.366	0.0207
Bismuth	mg/kg	-	-	0.140	<0.20	***0.148***	0.00447	0.122	0.00837	0.134	0.00894	0.106	0.00894	0.118	0.0146	0.114	0.00548
Boron	mg/kg	-	-	6.50	2.97	***<10.0***	-	***<10.0***	-	***<10.0***	-	<5.0	-	5.68	0.571	5.00	-
Cadmium	mg/kg	0.600	3.50	0.329	0.235	***0.373***	0.0458	0.274	0.0606	0.303	0.0176	0.238	0.00832	0.296	0.0647	0.262	0.0289
Calcium	mg/kg	-	-	11,000	7,026	10,300	1,240	9,240	1,220	10,000	1,060	8,580	567	9,276	1,223	8,594	241
Chromium	mg/kg	37.3	90.0	60.4	33.1	45.8	4.17	42.1	2.56	48.4	3.50	44.5	1.34	55.4	8.21	43.4	1.68
Cobalt	mg/kg	-	-	15.5	11.0	14.9	1.96	11.6	1.12	14.0	0.744	11.9	0.370	13.6	2.41	11.7	0.462
Copper	mg/kg	35.7	197	38.1	42.0	35.9	4.40	34.1	5.34	35.0	1.39	26.1	1.01	32.3	4.91	28.3	2.17
Iron	mg/kg	21,200	43,766	33,600	35,400	31,900	2,640	27,600	4,290	31,300	1,380	29,060	1,119	31,980	4,157	27,720	1,339
Lead	mg/kg	35.0	91.3	8.37	5.61	7.74	0.591	7.51	0.663	7.85	0.476	6.30	0.228	7.20	1.08	6.81	0.296
Lithium	mg/kg	-	-	16.8	12.9	16.3	0.822	15.7	1.39	16.1	0.680	13.2	0.305	14.1	2.63	13.9	0.676
Magnesium	mg/kg	-	-	8,140	6,159	7,600	970	6,640	300	7,200	260	6,166	219	7,418	1,091	6,762	248
Manganese	mg/kg	460	1,100	1,410	1,116	***1,830***	1,910	600	280	959	313	806	58.4	878	445	705	229
Mercury	mg/kg	0.170	0.486	0.0876	0.140	0.0846	0.0161	0.0743	0.0138	0.0591	0.00383	0.0592	0.00660	0.0617	0.0101	0.0598	0.00733
Molybdenum	mg/kg	25	23,000	1.51	0.752	0.902	0.238	0.890	0.405	0.974	0.179	0.622	0.0661	1.14	0.326	0.584	0.0439
Nickel	mg/kg	16.0	75.0	39.9	24.0	33.6	3.86	30.1	2.21	34.9	2.29	28.1	0.719	34.6	6.29	27.9	0.658
Phosphorus	mg/kg	-	-	1,190	729	1,090	109	1,040	84.4	1,130	65.7	1,033	77.9	1,108	84.1	972	45.7
Potassium	mg/kg	-	-	1,480	909	1,390	243	1,100	158	1,210	133	978	43.8	1,260	259	1,138	61.0
Selenium	mg/kg	2.00	-	1.06	1.30	0.898	0.246	0.812	0.240	0.610	0.119	0.422	0.0701	***1.24***	1.59	0.446	0.0680
Silver	mg/kg	0.500	-	0.174	0.0300	0.122	0.0139	0.158	0.0761	0.130	0.00831	0.0930	0.00725	0.114	0.0231	0.105	0.00796
Sodium	mg/kg	-	-	331	253	330	56.1	253	35.0	242	13.1	269	21.5	303	50.4	264	24.7
Strontium	mg/kg	-	-	105	67.1	90.5	10.6	86.0	12.5	76.4	4.70	72.0	2.39	83.1	14.8	81.3	4.83
Sulphur	mg/kg	-	-	1,200	-	***1,280***	110	500	-	820	259	732	543	508	-	548	44.7
Thallium	mg/kg	-	-	0.125	0.0508	0.110	0.00568	0.113	0.0149	0.111	0.00336	0.0850	0.0043	0.102	0.0237	0.0956	0.00635
Tin	mg/kg	-	-	0.540	1.10	0.370	0.0620	0.356	0.0503	0.540	0.172	0.376	0.0611	0.34	0.0596	0.364	0.0279
Titanium	mg/kg	-	-	796	701	644	63.7	583	68.4	679	18.4	683	40.6	766	86.7	677	83.0
Uranium	mg/kg	-	-	1.20	0.730	0.815	0.0994	0.977	0.331	0.971	0.0574	0.821	0.0242	1.02	0.137	1.00	0.0717
Vanadium	mg/kg	-	-	75.9	74.5	68.6	7.44	65.0	8.89	65.6	6.13	70.2	3.60	72.7	7.27	64.1	3.78
Zinc	mg/kg	123	315	80.9	60.2	70.6	8.13	59.5	5.10	69.6	2.24	57.0	1.51	71.8	10.4	63.5	2.53
Zirconium	mg/kg	-	-	1.90	-	-	-	-	-	-	-	1.48	0.0447	1.48	0.11	1.64	0.167

Value is > Lower BC Working Sediment Quality Guideline.

Value is > Upper BC Working Sediment Quality Guideline.

Notes: "-" = no data, ***Bold/ Italics*** - Exposed value is > both reference and pre-breach 95th percentile values; reference value is > reference 95th percentile value (< 5th percentile value for pH). Pre-breach values that were reported as < the laboratory reporting limit were not used for screening.

[a] British Columbia Working Sediment Guidelines (BCMOECCS 2021a) and approved BC Sediment Quality Guideline for Selenium (BCMOECCS 2021b).

[b] For calculation of pre-breach 95th percentile values see Appendix Table D.2.4, for calculation of reference 95th percentile values see Appendix Table D.2.5. The 5th percentile is reported for pH.

[c] Total sulphur measured in bulk sediment, not the <63 µm fraction.

Table 6.2: Summary of Sediment Quality Results for Lower Hazeltine Creek (HAC-D; Exposed) and Lower Edney Creek (EDC-D; Reference), 2014 to 2022

Parameter	Units	BC Working Sediment Quality Guidelines[a]		Reference/Pre-Breach 95th Percentile [b]		Exposed (Lower Hazeltine Creek)											
						2014 (ST02)		2018 (HAC-D)		2019 (HAC-D)		2020 (HAC-D)		2021 (HAC-D)		2022 (HAC-D)	
		Lower	Upper	Reference (EDC-D; 2018 to 2022)	Pre-Breach (Lower Hazeltine Creek)	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
Physical Tests																	
Moisture	%	-	-	70.6	-	28.8	4.23	38.1	11.9	32.6	3.37	27.7	2.70	47.0	17.2	56.7	8.91
pH (1:2 soil:water)	pH	-	-	6.74	-	8.51	0.172	8.13	0.311	8.29	0.199	8.54	0.141	8.10	0.412	7.48	0.182
Particle Size																	
% Gravel (>2 mm)	%	-	-	6.80	53.4	0.128	-	1.14	-	<1.0	-	<1.0	-	1.18	-	<1.0	-
% Sand (2.0 mm - 0.063 mm)	%	-	-	83.9	79.9	30.4	15.2	65.0	13.7	49.0	10.1	73.9	4.92	38.3	13.4	42.4	13.4
% Silt (0.063 mm - 4 µm)	%	-	-	43.8	31.2	***60.6***	12.6	26.6	12.2	41.1	8.43	21.2	4.36	***44.9***	10.3	***48.6***	11.6
% Clay (<4 µm)	%	-	-	9.70	9.80	8.91	3.66	8.02	1.92	9.74	1.71	4.52	0.993	***16.3***	6.02	8.67	2.04
Organic / Inorganic Carbon (<63 µm)																	
Total Organic Carbon (TOC)	%	-	-	3.82	9.03	0.116	0.0269	1.14	0.422	0.442	0.0792	0.354	0.0313	1.06	1.29	1.68	0.197
Nutrients (Bulk sediment)																	
Total Nitrogen by LECO	%	-	-	0.237	-	<0.020	-	0.0686	0.0525	0.0350	0.0108	0.0218	0.000566	0.0922	0.14	0.152	0.0434
Metals (<63 µm)[c]																	
Aluminum	mg/kg	-	-	19,000	12,550	16,700	2,820	15,500	1,020	15,400	614	11,960	555	***23,040***	6,385	15,150	797
Antimony	mg/kg	-	-	0.460	1.33	0.402	0.0589	0.546	0.0378	0.600	0.0292	0.546	0.0207	0.632	0.105	0.552	0.133
Arsenic	mg/kg	5.90	17.0	19.5	12.1	11.7	2.38	***25.0***	3.59	16.8	1.55	16.6	1.33	***20.3***	7.28	15.6	1.43
Barium	mg/kg	-	-	184	104	166	58.7	***212***	9.13	175	12.5	157	6.54	***515***	256	***238***	17.1
Beryllium	mg/kg	-	-	0.480	0.300	***0.492***	0.139	***0.538***	0.0303	***0.512***	0.0110	0.434	0.0297	***0.736***	0.134	***0.558***	0.0256
Bismuth	mg/kg	-	-	0.140	<0.20	0.112	0.00924	***0.144***	0.00548	***0.152***	0.00447	0.140	0.0122	***0.15***	0.04	0.127	0.00816
Boron	mg/kg	-	-	6.50	2.97	***10.2***	-	***10.0***	-	***10.0***	-	6.20	0.485	***18.9***	4.78	***11.6***	1.01
Cadmium	mg/kg	0.600	3.50	0.329	0.235	0.191	0.0335	0.313	0.0254	0.282	0.0199	0.243	0.0133	***0.361***	0.0394	0.302	0.0440
Calcium	mg/kg	-	-	11,000	7,026	***27,900***	2,770	***22,800***	1,740	***31,900***	1,180	***19,760***	680	***26,900***	2,481	***23,100***	938
Chromium	mg/kg	37.3	90.0	60.4	33.1	28.4	8.23	35.6	2.85	39.6	2.57	45.5	3.34	35.9	6.48	33.9	1.65
Cobalt	mg/kg	-	-	15.5	11.0	***18.4***	3.14	***17.0***	0.344	15.3	0.559	15.0	0.568	***19.1***	4.11	14.7	0.622
Copper	mg/kg	35.7	197	38.1	42.0	***449***	256	***361***	22.4	***208***	30.2	***149***	9.93	***655***	387	***336***	21.8
Iron	mg/kg	21,200	43,766	33,600	35,400	***66,000***	16,000	***57,400***	7,470	***35,600***	1,560	***49,920***	6,834	***48,160***	10,960	***43,533***	1,767
Lead	mg/kg	35.0	91.3	8.37	5.61	7.53	0.522	***9.13***	0.544	***9.46***	0.415	***8.49***	0.454	***10.3***	1.38	***10.3***	4.22
Lithium	mg/kg	-	-	16.8	12.9	16.3	2.98	13.1	1.44	16.3	0.773	12.3	0.896	15.4	3.86	14.4	0.451
Magnesium	mg/kg	-	-	8,140	6,159	***10,400***	2,100	8,080	578	***8,680***	291	6,790	405	***12,160***	4,165	***8,155***	375
Manganese	mg/kg	460	1,100	1,410	1,116	676	111	1,060	263	728	64.0	654	95.4	1,234	340	1,161	188
Mercury	mg/kg	0.170	0.486	0.0876	0.140	0.0653	0.0141	0.0883	0.0105	0.0611	0.00565	0.0688	0.00242	0.102	0.0172	0.103	0.00831
Molybdenum	mg/kg	25	23,000	1.51	0.752	***2.44***	1.09	***1.82***	0.220	***1.66***	0.124	1.00	0.0594	***2.68***	1.25	***1.70***	0.126
Nickel	mg/kg	16.0	75.0	39.9	24.0	22.5	7.60	28.7	1.19	34.4	1.49	29.8	1.90	33.7	4.59	25.2	0.836
Phosphorus	mg/kg	-	-	1,190	729	***1,530***	256	***1,410***	95.3	1,160	50.5	***1,196***	95.6	***1,534***	353	***1,292***	158
Potassium	mg/kg	-	-	1,480	909	***1,530***	368	1,370	102	1,370	57.7	1,200	108	***1,670***	131	1,362	87.7
Selenium	mg/kg	2.00	-	1.06	1.30	0.886	0.252	0.994	0.151	0.556	0.0945	0.522	0.0835	1.13	0.0994	1.11	0.0712
Silver	mg/kg	0.500	-	0.174	0.0300	***0.244***	0.0958	***0.233***	0.0168	***0.252***	0.139	0.149	0.0182	***0.234***	0.0476	***0.222***	0.0640
Sodium	mg/kg	-	-	331	253	***718***	386	***380***	27.4	***345***	10.8	294	12.7	***394***	74.4	***376***	31.4
Strontium	mg/kg	-	-	105	67.1	***145***	13.8	***143***	9.54	***184***	10.3	***123***	6.27	***200***	20.5	***172***	13.8
Sulphur	mg/kg	-	-	1,200	-	-	-	700	141	<500	-	508	-	784	400	813	156
Thallium	mg/kg	-	-	0.125	0.0508	0.0602	0.0135	***0.167***	0.0256	***0.152***	0.0165	0.122	0.0148	***0.127***	0.0692	0.112	0.00628
Tin	mg/kg	-	-	0.540	1.10	1.09	0.486	0.744	0.0586	0.686	0.0780	0.570	0.064	0.866	0.104	0.663	0.0427
Titanium	mg/kg	-	-	796	701	***1,310***	325	***1,010***	54.8	***961***	46.2	***1,019***	52.7	***1,209***	574	***950.8***	88.9
Uranium	mg/kg	-	-	1.20	0.730	1.05	0.163	1.05	0.0627	0.885	0.0622	0.866	0.053	1.07	0.303	0.990	0.0261
Vanadium	mg/kg	-	-	75.9	74.5	***229***	77.5	***204***	34.2	***94.1***	6.75	***160***	26.9	***152***	48.3	***135***	9.79
Zinc	mg/kg	123	315	80.9	60.2	68.2	4.29	79.8	3.69	69.1	4.34	63.8	2.75	***89.4***	7.91	76.8	5.12
Zirconium	mg/kg	-	-	1.90	-	-	-	-	-	-	-	***5.58***	0.192	***6.24***	4.16	***2.77***	0.350

Value is > Lower BC Working Sediment Quality Guideline.

Value is > Upper BC Working Sediment Quality Guideline.

Notes: "-" = no data, ***Bold/ Italics*** - Exposed value is > both reference and pre-breach 95th percentile values; reference value is > reference 95th percentile value (< 5th percentile value for pH). Pre-breach values that were reported as < the laboratory reporting limit were not used for screening.

[a] British Columbia Working Sediment Guidelines (BCMOECCS 2021a) and approved BC Sediment Quality Guideline for Selenium (BCMOECCS 2021b).

[b] For calculation of pre-breach 95th percentile values see Appendix Table D.2.4, for calculation of reference 95th percentile values see Appendix Table D.2.5. The 5th percentile is reported for pH.

[c] Total sulphur measured in bulk sediment, not the <63 µm fraction.

Tables D.2.8 and D.2.9). Sediments from HAC-D had significantly lower TOC content than reference sediments from 2018 to 2022 and TOC content was also temporally stable over this period, relative to reference (Figure 6.2; Appendix Tables F.1.3 and F.1.4).

The mean concentration of 16 out of 34 elements in the sediments (<63 µm fraction) collected in 2022 at HAC-D exceeded both pre-breach and reference upper 95th percentile values (Table 6.2). Among these elements, copper and iron were the only Analytes of Interest with mean sediment concentrations that also exceeded the WSQG in 2022 (Figure 6.2, Table 6.2; Appendix Table D.2.9). Specifically, the mean iron concentration of HAC-D sediments in 2022 exceeded the lower WSQG by 2.1 times, while the mean copper concentration exceeded the upper WSQG by 1.7 times (Table 6.2). However, mean sediment iron concentrations were naturally elevated above the lower WSQG in reference sediments (EDC-D) in each monitoring year (2018 to 2022; Figure 6.2, Table 6.2) indicating that iron is somewhat naturally elevated in stream habitats in the vicinity of the Mount Polley Mine.

Mean copper and iron concentrations in HAC-D sediments have been significantly higher than reference sediments from 2018 to 2022, except iron concentrations in 2019 that were similar to reference (Appendix Table F.1.4). The mean copper concentrations in HAC-D sediments in 2022 were similar to 2018 and 2021, but higher than 2019 and 2020, relative to reference (Figure 6.2; Appendix Table F.1.3). Mean iron concentrations in HAC-D sediments in 2022 were similar to the previous two years (2020 and 2021), higher than in 2019, and lower than in 2018, relative to reference (Figure 6.2; Appendix Table F.1.3). The similar (copper) or lower (iron) Analyte of Interest concentrations in HAC-D sediments in 2022 compared to 2018 indicates these analyte concentrations do not appear to be increasing over time, relative to reference (Figure 6.2).

Copper and iron concentrations in Hazeltine Creek sediment have demonstrated significant correlations with TOC, sulphur, and total nitrogen (Appendix Figure F.1.3, Appendix Table F.1.5). For copper, these relationships were positive and for iron these relationships were negative. These relationships suggest that the changes in copper and iron concentrations over time in lower Hazeltine Creek sediments are associated with temporal variability in the physical and chemical characteristics of the sampled sediment (Appendix Figure F.1.3, Appendix Table F.1.5).

6.1.2 Periphyton Community and Productivity

Periphyton community and productivity monitoring in 2022 was completed in remediated (exposed) areas of upper Hazeltine Creek (HAC-R1, HAC-U) with upper Edney Creek (EDC-U) serving as reference (Figure 4.2, Table 4.2). Post-breach periphyton productivity (chlorophyll-a) results from upper Hazeltine Creek were compared to those collected during baseline (1995, 1996) and pre-breach (2011; Table 4.2). Periphyton productivity monitoring

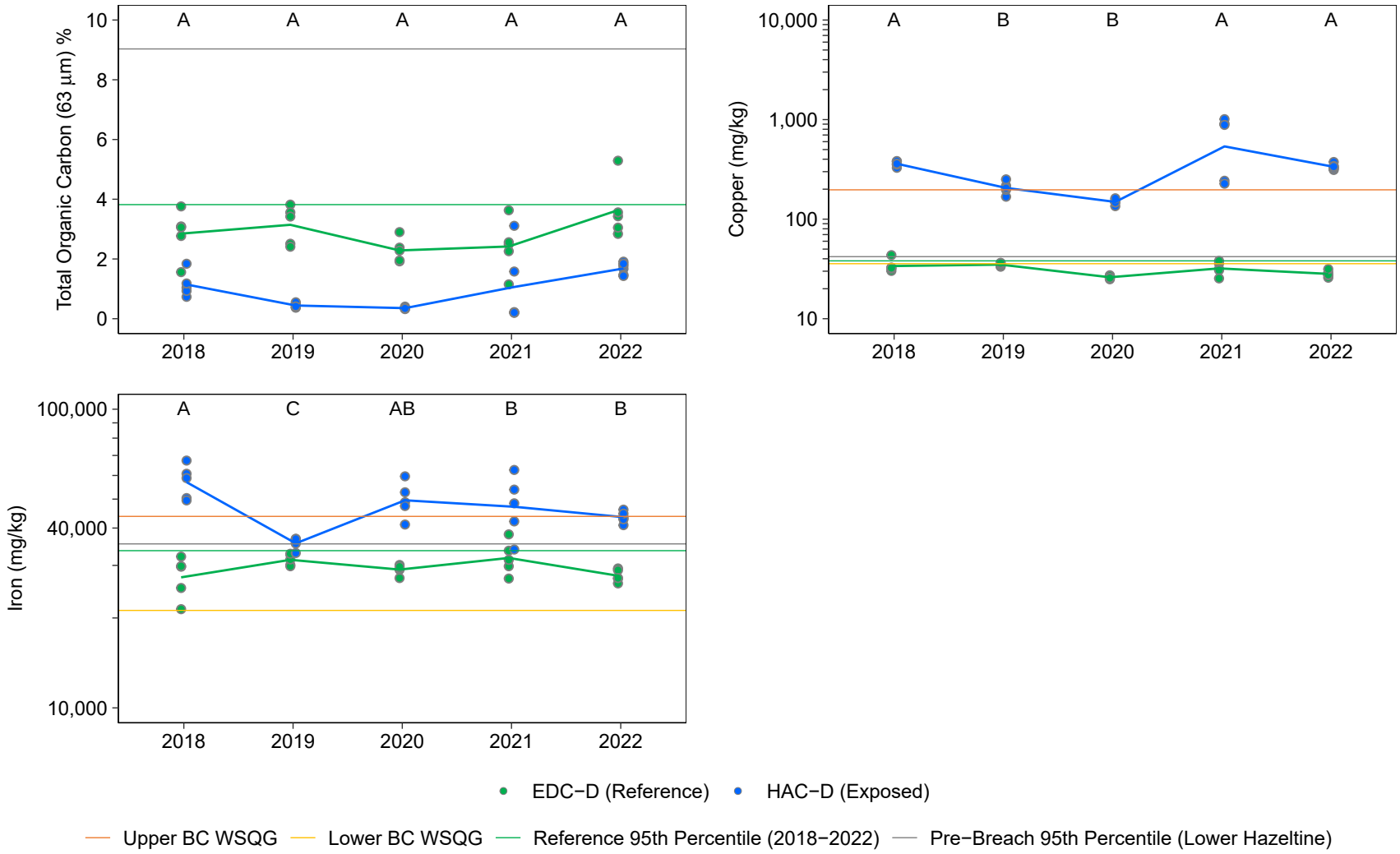


Figure 6.2: Sediment Analyte of Interest Concentrations (<63 µm Fraction) for Lower Hazeltine Creek (HAC-D; Exposed) and Lower Edney Creek (EDC-D; Reference), 2018 to 2022

Notes: Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Individual samples are plotted and lines join the least −squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have differences in concentrations (Exposed − Reference) that do not differ significantly (p−value < 0.05) among years.

(excluding community monitoring) was also completed in upper Hazeltine Creek (HAC-R3) with an area of Frypan Creek (FPC-R3) serving as reference (Figures 4.2 and 4.3, Table 4.2). Periphyton productivity monitoring at HAC-R3 and FPC-R3 was completed for the purpose of assessing fish habitat and data from this monitoring in 2022 were tabulated in the current report to meet CEMP requirements but were interpreted in a separate report (Minnow 2023). A review of the 2022 periphyton productivity and community data (Appendix B) indicated that the data met the established DQOs. Specifically, the community data were characterized by high subsampling agreement and data precision and accuracy checks, and the productivity data were characterized by appropriate LRLs, and negligible analyte concentrations in MB samples (Appendix B). Overall, the 2022 periphyton community and productivity data can be used with a high level of confidence in the derivation of conclusions. A review of 2022 supporting water data quality indicated these data can be used with a good level of confidence for interpretation (see Section 5.1.1 for details).

6.1.2.1 Area Characteristics

During sampling in upper Hazeltine Creek and upper Edney Creek (i.e., reference), careful attention was paid to matching sampling habitats both year-to-year, and between the paired exposed and reference sampling areas. However, matching habitats characteristics of sampling areas was difficult in 2022 and in prior years (2018 to 2021; Minnow 2019a, 2020a, 2021a, 2022a) due a combination of factors. In 2022, matching habitat variables in upper Hazeltine Creek to those in upper Edney Creek was challenging due to supplemental pumping of water from Polley Lake to Hazeltine Creek that increased water depth and velocity in Hazeltine Creek (see Section 4.2.1 for details). This was consistent with challenges encountered in previous monitoring years due to the supplemental pumping (2018 to 2021) which were exacerbated in some years by extreme climate events in the area (i.e., drought conditions in summer 2021; Minnow 2022a). As such, the variability in water depth and velocity among years and between the exposed and reference areas were considered when interpreting temporal changes, and these physical habitat variables are summarized below.

Examination of the physical habitat characteristics of the upper Hazeltine Creek areas (HAC-R1 and HAC-U) indicated that mean water depth and velocity was similar between the two exposed areas within a year (controllable by sample station selection) but was variable among years (Table 6.3). Water depth and velocity differed between the upper Hazeltine Creek areas and reference area in most years (Table 6.3). In 2022, mean water depth at HAC-R1 and HAC-U was approximately three times greater than the mean water depth measured at EDC-U, and mean water velocity at HAC-U was approximately two times greater than the mean water velocity measured at EDC-U and HAC-R1 (Table 6.3; Appendix Table A.2.3). Substrate size,

Table 6.3: Physical and Chemical Characteristics for Upper Hazeltine Creek (HAC-R1, HAC-U; Exposed) and Upper Edney Creek (EDC-U; Reference), 2018 to 2022

Habitat Variables	Units	Reference									
		Upper Edney Creek (EDC-U)									
		2018		2019		2020		2021		2022	
Mean Water Depth	cm	19.3		19.4		11.4		13.6		11.0	
Mean Water Velocity	m/s	0.002		0.472		0.127		0		0.212	
Median Substrate Size[a]	cm	4.7		4.2		-		5.5		5.7	
Dominant Substrate Type	-	Gravel		Cobble		Cobble		Cobble		Gravel	
Canopy Cover[b]	%	60		70		70		85		80	
Water Quality		**15-Aug-18[c]**	**Seasonal Range[d]**	**12-Aug-19[c]**	**Seasonal Range[d]**	**10-Aug-20[c]**	**Seasonal Range[d]**	**2-Aug-21[c]**	**Seasonal Range[d]**	**8-Aug-22[c]**	**Seasonal Range[d]**
Dissolved Oxygen	%	81.5	-	72.0	-	86.6	-	59.9	-	77.3	-
Temperature	°C	11.5	-	20.0	-	14.6	-	15.7	-	13.0	-
Specific Conductivity	µS/cm	119	-	116	-	138	-	141	-	125.4	-
Total Phosphorus	mg/L	0.0107	-	0.0270	-	0.0160	-	0.0227	-	0.0107	-
Total Nitrogen	mg/L	0.460	-	0.720	-	0.627	-	0.540	-	0.509	-
Dissolved Orthophosphate	mg/L	0.00300	-	<0.0010	-	0.00380	-	0.00530	-	0.0017	-
Periphyton Productivity											
Mean AFDM	g/m^2	6.66		9.60		8.05		4.89		10.6	
Mean Chlorophyll-a	mg/m^2	11.5		25.0		8.46		5.44		39.5	

Notes: AFDM = Ash Free Dry Mass. mg/m^2 = milligrams per square metre. Physical and chemical characteristic data are compiled for years when periphyton community monitoring was completed (2018 to 2022). *In situ* measures of dissolved oxygen, temperature, and specific conductivity are presented.

[a] The displayed median substrate size represents the median (50 th percentile) of 100 pebble measures recorded for each sampling area. See Appendix Table A.2.5 for pebble count data.

[b] Canopy cover includes dense and partially open cover.

[c] Water quality results are from a single grab water sample collected within a week of biological sampling at a given area. The date of sample collection is shown.

[d] Seasonal range indicates the range of water quality parameters reported from routine water quality sampling. This included data from approximately 3 months preceding/concurrent with periphyton sampling (2018 to 2022: late April to late July [n = 4 for HAC-U from 2018 to 2020, n = 11 for HAC-R1 in 2018, n=4 for HAC-R1 in 2019 and 2020]; 2021 and 2022: late April to early August [n = 4 for HAC-R1 and HAC-U]). Routine water quality data from station HAC-13 was used for HAC-R1, and data from station HAC-05a was used for HAC-U (see Figure 4.2). Water quality is not monitored routinely near EDC-U or HAC-R3. See Appendix Tables D.1.3 and D.1.4 for 2022 results, and Minnow (2019a, 2020a, 2021a, 2022a) for 2018, 2019, 2020, and 2021 results, respectively.

Table 6.3: Physical and Chemical Characteristics for Upper Hazeltine Creek (HAC-R1, HAC-U; Exposed) and Upper Edney Creek (EDC-U; Reference), 2018 to 2022

Habitat Variables	Units	Exposed									
		Upper Hazeltine Creek - Reach 1 (HAC-R1)									
		2018		2019		2020		2021		2022	
Mean Water Depth	cm	22.3		20.9		34.5		24.2		37.8	
Mean Water Velocity	m/s	0.159		0.411		0.133		0.088		0.216	
Median Substrate Size[a]	cm	4.9		5.0		4.5		5.4		5.2	
Dominant Substrate Type	-	Gravel		Cobble		Cobble		Cobble		Cobble	
Canopy Cover[b]	%	0		0		0		0		0	
Water Quality		**19-Aug-18[c]**	**Seasonal Range[d]**	**12-Aug-19[c]**	**Seasonal Range[d]**	**11-Aug-20[c]**	**Seasonal Range[d]**	**3-Aug-21[c]**	**Seasonal Range[d]**	**8-Aug-22[c]**	**Seasonal Range[d]**
Dissolved Oxygen	%	85.1	75.1 - 105.6	92.0	83.2 - 105.2	96.7	90.1 - 99.6	81.5	93.1 - 99.0	78.4	8 - 11
Temperature	°C	14.6	12.3 - 22.9	18.0	12.5 - 18.2	16.6	4.0 - 22.0	19.5	6.16 - 21.9	17.9	4.86 - 19.8
Specific Conductivity	µS/cm	288	261 - 293	278	275 - 288	240	146 - 271	243	194 - 260	247.9	246 - 288
Total Phosphorus	mg/L	0.0120	0.0110 - 0.0284	0.0140	0.0122 - 0.0264	0.0141	0.0132 - 0.0290	0.0134	0.0108 - 0.0165	0.0127	0.0119 - 0.0157
Total Nitrogen	mg/L	0.280	0.267 - 0.381	0.350	0.291 - 0.406	0.311	0.292 - 0.431	0.284	0.283 - 0.305	0.294	0.268 - 0.362
Dissolved Orthophosphate	mg/L	0.00410	<0.0010 - 0.0074	0.00180	0.0015 - 0.0085	0.00460	0.0012 - 0.0046	0.00640	0.0027 - 0.0079	0.0010	0.0014 - 0.0046
Periphyton Productivity											
Mean AFDM	g/m^2	15.5		58.1		126		15.9		96.7	
Mean Chlorophyll-a	mg/m^2	17.7		47.2		56.7		34.0		87.4	

Notes: AFDM = Ash Free Dry Mass. mg/m^2 = milligrams per square metre. Physical and chemical characteristic data are compiled for years when periphyton community monitoring was completed (2018 to 2022). *In situ* measures of dissolved oxygen, temperature, and specific conductivity are presented.

[a] The displayed median substrate size represents the median (50 th percentile) of 100 pebble measures recorded for each sampling area. See Appendix Table A.2.5 for pebble count data.

[b] Canopy cover includes dense and partially open cover.

[c] Water quality results are from a single grab water sample collected within a week of biological sampling at a given area. The date of sample collection is shown.

[d] Seasonal range indicates the range of water quality parameters reported from routine water quality sampling. This included data from approximately 3 months preceding/concurrent with periphyton sampling (2018 to 2022: late April to late July [n = 4 for HAC-U from 2018 to 2020, n = 11 for HAC-R1 in 2018, n=4 for HAC-R1 in 2019 and 2020]; 2021 and 2022: late April to early August [n = 4 for HAC-R1 and HAC-U]). Routine water quality data from station HAC-13 was used for HAC-R1, and data from station HAC-05a was used for HAC-U (see Figure 4.2). Water quality is not monitored routinely near EDC-U or HAC-R3. See Appendix Tables D.1.3 and D.1.4 for 2022 results, and Minnow (2019a, 2020a, 2021a, 2022a) for 2018, 2019, 2020, and 2021 results, respectively.

Table 6.3: Physical and Chemical Characteristics for Upper Hazeltine Creek (HAC-R1, HAC-U; Exposed) and Upper Edney Creek (EDC-U; Reference), 2018 to 2022

Habitat Variables	Units	Exposed									
		Upper Hazeltine Creek - Reach 2 (HAC-U)									
		2018		2019		2020		2021		2022	
Mean Water Depth	cm	19.7		19.6		29.8		26.3		32.8	
Mean Water Velocity	m/s	0.222		0.454		0.240		0.160		0.460	
Median Substrate Size[a]	cm	5.5		4.8		4.2		4.6		5.5	
Dominant Substrate Type	-	Gravel		Cobble		Cobble		Cobble		Cobble	
Canopy Cover[b]	%	0		0		0		0		0	
Water Quality		**19-Aug-18[b]**	**Seasonal Range[c]**	**12-Aug-19[b]**	**Seasonal Range[c]**	**11-Aug-20[c]**	**Seasonal Range[d]**	**3-Aug-21[c]**	**Seasonal Range[d]**	**8-Aug-22[c]**	**Seasonal Range[d]**
Dissolved Oxygen	%	113	85.6 - 116.3	102	95.0 - 115.4	84.1	93.9 - 114.6	82.1	95.9 - 114	90.8	8.6 - 12
Temperature	°C	16.7	11.6 - 16.9	20.0	11.9 - 16.7	17.2	4.98 - 21.5	17.4	6.84 - 21.3	18.3	4.64 - 17.9
Specific Conductivity	µS/cm	308	231 - 333	307	315 - 341	313	172 - 288	314	216 - 314	273.3	257 - 342
Total Phosphorus	mg/L	0.0110	0.011 - 0.0229	0.0130	0.0106 - 0.0277	0.0140	0.0142 - 0.0264	0.0104	0.0098 - 0.0187	0.0138	0.0142 - 0.0156
Total Nitrogen	mg/L	0.370	0.305 - 0.458	0.350	0.372 - 0.530	0.349	0.317 - 0.426	0.321	0.295 - 0.357	0.318	0.294 - 0.384
Dissolved Orthophosphate	mg/L	0.00270	0.0012 - 0.0074	<0.00100	<0.0010 - 0.0084	0.00410	0.0016 - 0.0050	0.00420	0.0014 - 0.0087	0.0034	0.0012 - 0.0067
Periphyton Productivity											
Mean AFDM	g/m^2	10.2		30.0		59.4		37.3		37.8	
Mean Chlorophyll-a	mg/m^2	12.6		35.7		14.9		22.9		26.8	

Notes: AFDM = Ash Free Dry Mass. mg/m^2 = milligrams per square metre. Physical and chemical characteristic data are compiled for years when periphyton community monitoring was completed (2018 to 2022). *In situ* measures of dissolved oxygen, temperature, and specific conductivity are presented.

[a] The displayed median substrate size represents the median (50 th percentile) of 100 pebble measures recorded for each sampling area. See Appendix Table A.2.5 for pebble count data.

[b] Canopy cover includes dense and partially open cover.

[c] Water quality results are from a single grab water sample collected within a week of biological sampling at a given area. The date of sample collection is shown.

[d] Seasonal range indicates the range of water quality parameters reported from routine water quality sampling. This included data from approximately 3 months preceding/concurrent with periphyton sampling (2018 to 2022: late April to late July [n = 4 for HAC-U from 2018 to 2020, n = 11 for HAC-R1 in 2018, n=4 for HAC-R1 in 2019 and 2020]; 2021 and 2022: late April to early August [n = 4 for HAC-R1 and HAC-U]). Routine water quality data from station HAC-13 was used for HAC-R1, and data from station HAC-05a was used for HAC-U (see Figure 4.2). Water quality is not monitored routinely near EDC-U or HAC-R3. See Appendix Tables D.1.3 and D.1.4 for 2022 results, and Minnow (2019a, 2020a, 2021a, 2022a) for 2018, 2019, 2020, and 2021 results, respectively.

which is controlled for during sampling, was similar between areas and among years (Table 6.3; Appendix Table A.2.5).

Remediation work following the breach was completed at HAC-R1 and HAC-U in 2016 and 2017, respectively (Table 4.2; see Section 4.2), and the regeneration of riparian vegetation at these remediated areas is a long-term process. Although the riparian vegetation in these upper Hazeltine Creek areas has shown substantial growth since the completion of remediation works, canopy cover over the creek channel remained absent in 2022, which was consistent with all previous sampling years (2018 to 2021; Table 6.3). Canopy coverage in 2022 remained a key difference between the remediated areas of Hazeltine Creek and the Edney Creek reference area (0% canopy coverage at HAC-R1 and HAC-U versus 80% canopy coverage at EDC-U; Table 6.3; Appendix A.2.2).

6.1.2.2 Community

In 2022, the periphyton community at HAC-R1 was similar to the reference area (EDC-U) in terms of mean density, total taxon richness, and Simpson's Evenness and Diversity. The periphyton community at HAC-U in 2022 had lower mean density and higher total richness at HAC-U compared to reference, and Simpson's Evenness and Diversity that were similar to reference (Figure 6.3, Table 6.4). Diatom richness at both HAC-R1 and HAC-U in 2022 was significantly higher than reference (Figure 6.3, Table 6.4).

The periphyton communities of the two upper Hazeltine Creek areas (HAC-R1 and HAC-U) in 2022 were similar to each other in terms of all primary metrics (density, total taxon richness, Simpson's Evenness and Diversity, and Diatom richness; Table 6.4). Temporally, the periphyton communities of HAC-R1 and HAC-U have also been consistently similar to each other from 2018 to 2022 in terms of the primary metrics, with a few exceptions. These exceptions included significantly higher density in 2019, lower total richness in 2018, and higher Simpson's Evenness and Diversity in 2021 at HAC-U compared to HAC-R1 (Figure 6.3; Table 6.4). The similarity in periphyton communities at the two upper Hazeltine Creek areas (HAC-R1 and HAC-U) in 2022, and for most metrics in prior years, indicates that recovery of the periphyton community in these two areas has been similar.

Mean periphyton densities at the upper Hazeltine Creek areas (HAC-R1 and HAC-U) have been similar to the reference area (EDC-U) from 2018 to 2022, except in 2022 when density at HAC-U was significantly lower than reference (Figure 6.3, Table 6.4; Appendix Tables D.3.1 and D.3.2). The lower mean periphyton density at HAC-U than reference in 2022 was due to a significant temporal increase in periphyton density at the reference area (significantly higher in 2022 than in 2019 to 2021), rather than a decrease in density at HAC-U (Figure 6.3, Table 6.4). Periphyton densities at HAC-U have remained temporally stable from 2018 to 2022 (Figure 6.3,

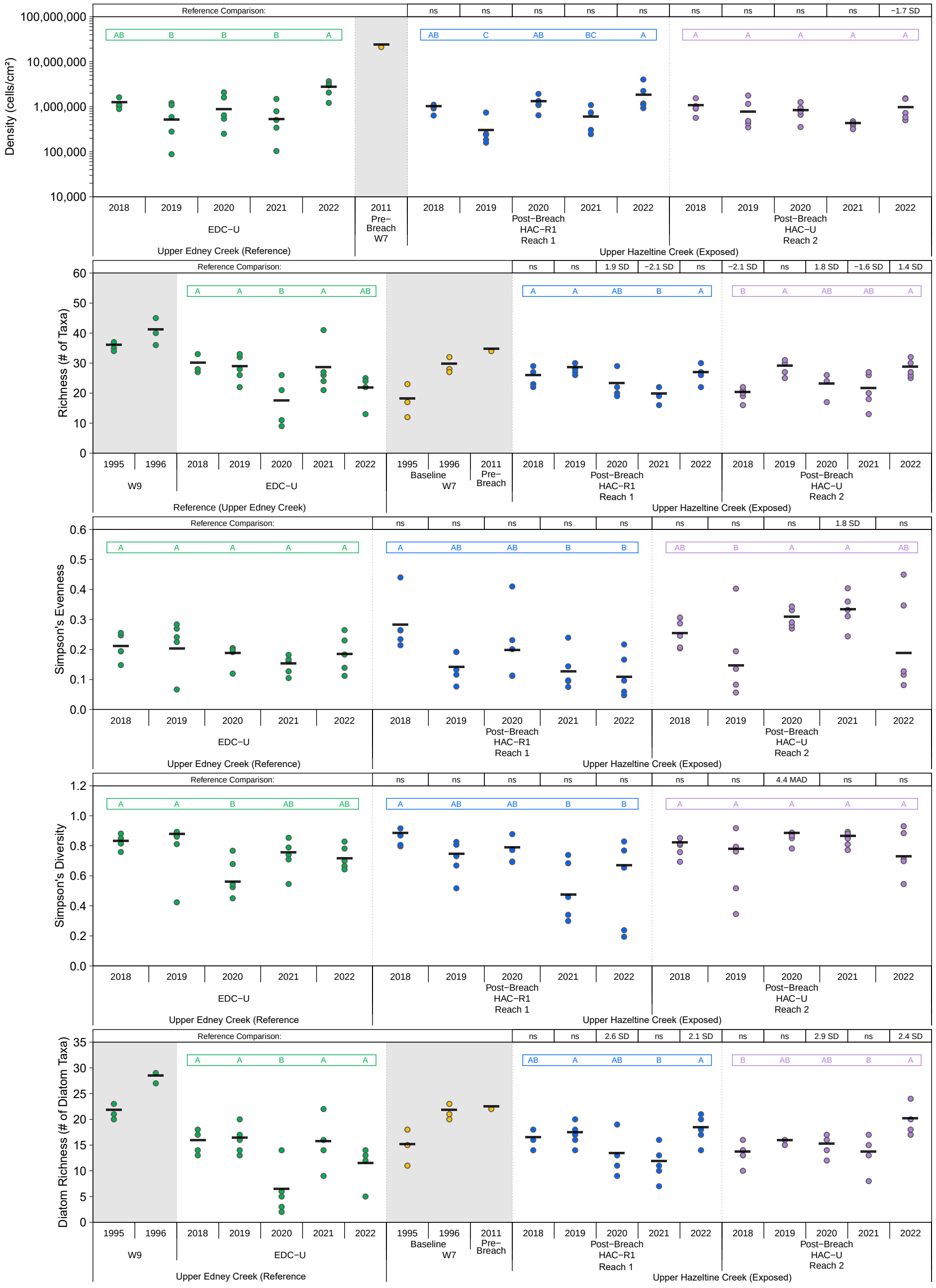


Figure 6.3: Periphyton Community Endpoints for Upper Hazeltine Creek (HAC−R1, HAC−U; Exposed) and Upper Edney Creek (EDC−U; Reference), 1995 to 2022

Notes: Black bars represent measures of central tendency (mean, geometric mean, or median depending on if analysis was conducted on untransformed, log10−transformed or rank−transformed data). Coloured letters represent significant (p−value <0.1) post−hoc comparisons within areas over time; years that share a letter of the same colour (e.g., A, B) within a box of the same colour do not differ significantly within an area. A number above the plot indicates significant exposed vs. reference post−hoc comparisons within a given year. The magnitude of difference (MOD) for these significant post−hoc comparisons is expressed in units of standard deviation (SD) or median absolute deviations (MAD; if the data were rank−transformed prior to analysis) relative to reference. 'nc' indicates no comparisons were possible; 'ns' indicates a non−significant contrast; 'nm' indicates that the MOD could not be calculated because MAD = 0. Grey shading indicates semi− quantitative data that were not included in statistical comparisons but are shown for visual comparison only.

Table 6.4: Results of Statistical Comparisons of Periphyton Community Endpoints for Upper Hazeltine Creek (HAC-R1, HAC-U; Exposed) and Upper Edney Creek (EDC-U; Reference), 2018 to 2022

Endpoint	Transformation	2-Way ANOVA P-values			Area Type	Area	Year[a]	Mean	Measures of Central Tendency[a]	Temporal Contrasts Within Sites										Spatial Comparison Within Years	
										Pairwise Comparisons Between Years					MOD Relative to Baseline[b]						
		Area	Year	Interaction						2018	2019	2020	2021	2022	2018	2019	2020	2021	2022	HAC-R1	HAC-U
Density (cells/cm²)	log10	-	-	0.096	Reference	EDC-U	2018	1,138,405	1,114,480	AB	B	B	B	A	Baseline	ns	ns	ns	ns	ns	ns
							2019	650,148	453,327											ns	ns
							2020	1,025,442	782,145											ns	ns
							2021	646,922	463,190											ns	ns
							2022	2,629,813	2,450,576											ns	-1.7
					Exposed	HAC-R1	2018	928,580	913,229	AB	C	AB	BC	A	Baseline	-2.0	ns	ns	ns		ns
							2019	315,025	264,869												1.5
							2020	1,226,087	1,154,247												ns
							2021	622,251	535,936												ns
							2022	1,896,058	1,614,583												ns
					Exposed	HAC-U	2018	995,413	946,120	A	A	A	A	A	Baseline	ns	ns	ns	ns		
							2019	837,310	681,485												
							2020	801,041	737,791												
							2021	387,310	382,691												
							2022	969,187	866,272												
Total Richness (# of Taxa)	none	-	-	<0.001	Reference	EDC-U	2018	28.8	29.0	A	A	B	A	AB	Baseline	ns	-3.0	ns	ns	ns	-2.1
							2019	28.2	28.0											ns	ns
							2020	15.6	16.0											1.9	1.8
							2021	27.8	28.0											-2.1	-1.6
							2022	21.8	22.0											ns	1.4
					Exposed	HAC-R1	2018	26.0	26	A	A	AB	B	A	Baseline	ns	ns	-1.7	ns		-1.5
							2019	27.6	28												ns
							2020	23.8	24												ns
							2021	18.4	18												ns
							2022	26.2	26												ns
					Exposed	HAC-U	2018	19.6	20	B	A	AB	AB	A	Baseline	1.8	ns	ns	1.9		
							2019	27.6	28												
							2020	23.4	23												
							2021	20.8	21												
							2022	28.0	28												
Simpson's Evenness	log10	-	-	0.045	Reference	EDC-U	2018	0.208	0.200	A	A	A	A	A	Baseline	ns	ns	ns	ns	ns	ns
							2019	0.217	0.190											ns	ns
							2020	0.183	0.180											ns	ns
							2021	0.148	0.150											ns	1.8
							2022	0.186	0.180											ns	ns
					Exposed	HAC-R1	2018	0.283	0.270	A	AB	AB	B	B	Baseline	ns	ns	-1.9	-2.3		ns
							2019	0.142	0.130												ns
							2020	0.213	0.190												ns
							2021	0.130	0.120												2.3
							2022	0.117	0.100												ns
					Exposed	HAC-U	2018	0.250	0.250	AB	B	A	A	AB	Baseline	ns	ns	ns	ns		
							2019	0.174	0.140												
							2020	0.303	0.300												
							2021	0.330	0.330												
							2022	0.224	0.180												

P-value < 0.1.
Magnitude of Difference (MOD) < -2.
Magnitude of Difference (MOD) > 2.

Notes: "-" = no data available. "nc" = no comparison. "ns" = no significance.

[a] Mean, geometric mean, or median depending on if analysis was conducted on untransformed, log_{10}-transformed, or rank-transformed data.

[b] Magnitude of difference (MOD) calculated for two-way ANOVA as (Remediated Mean - Reference Mean)/SD (or [Mean - Baseline Mean]/SD for temporal comparisons) on the transformed scale, where SD was the pooled standard deviation of the model residuals. MOD calculated for Kruskal-Wallis (i.e., rank-transformed data) as (Remediated Median - Reference Median)/MAD, where MAD was the pooled median absolute deviation.

Table 6.4: Results of Statistical Comparisons of Periphyton Community Endpoints for Upper Hazeltine Creek (HAC-R1, HAC-U; Exposed) and Upper Edney Creek (EDC-U; Reference), 2018 to 2022

Endpoint	Transformation	2-Way ANOVA P-values			Area Type	Area	Year[a]	Mean	Measures of Central Tendency[a]	Temporal Contrasts Within Sites										Spatial Comparison Within Years	
										Pairwise Comparisons Between Years					MOD Relative to Baseline[b]						
		Area	Year	Interaction						2018	2019	2020	2021	2022	2018	2019	2020	2021	2022	HAC-R1	HAC-U
Simpson's Diversity	rank	-	-	0.003	Reference	EDC-U	2018	0.824	0.820	A	A	B	AB	AB	Baseline	ns	-3.7	ns	ns	ns	ns
							2019	0.771	0.860											ns	ns
							2020	0.593	0.540											ns	4.4
							2021	0.727	0.740											ns	ns
							2022	0.724	0.700											ns	ns
					Exposed	HAC-R1	2018	0.852	0.870	A	AB	AB	B	B	Baseline	ns	ns	-5.6	-2.9		ns
							2019	0.710	0.730												ns
							2020	0.762	0.770												ns
							2021	0.504	0.460												5.3
							2022	0.537	0.650												ns
					Exposed	HAC-U	2018	0.785	0.810	A	A	A	A	A	Baseline	ns	ns	ns	ns		
							2019	0.667	0.760												
							2020	0.853	0.870												
							2021	0.841	0.850												
							2022	0.754	0.710												
Diatom Richness (# of Taxa)	none	-	-	<0.001	Reference	EDC-U	2018	15.2	15	A	A	B	A	A	Baseline	ns	-2.9	ns	ns	ns	ns
							2019	16.0	16											ns	ns
							2020	6.0	6											2.6	2.9
							2021	15.4	15											ns	ns
							2022	11.4	11											2.1	2.4
					Exposed	HAC-R1	2018	15.6	16	AB	A	AB	B	A	Baseline	ns	ns	ns	ns		ns
							2019	17.0	17												ns
							2020	14.2	14												ns
							2021	11.4	11												ns
							2022	18.0	18												ns
					Exposed	HAC-U	2018	13.2	13	B	AB	AB	B	A	Baseline	ns	ns	ns	1.9		
							2019	15.4	15												
							2020	15.2	15												
							2021	12.2	12												
							2022	19.2	19												

P-value < 0.1.
Magnitude of Difference (MOD) < -2.
Magnitude of Difference (MOD) > 2.

Notes: "-" = no data available. "nc" = no comparison. "ns" = no significance.

[a] Mean, geometric mean, or median depending on if analysis was conducted on untransformed, $\log_{10}$-transformed, or rank-transformed data.

[b] Magnitude of difference (MOD) calculated for two-way ANOVA as (Remediated Mean - Reference Mean)/SD (or [Mean - Baseline Mean]/SD for temporal comparisons) on the transformed scale, where SD was the pooled standard deviation of the model residuals. MOD calculated for Kruskal-Wallis (i.e., rank-transformed data) as (Remediated Median - Reference Median)/MAD, where MAD was the pooled median absolute deviation.

Table 6.4). Temporal changes in periphyton density at HAC-R1 from 2018 to 2022 were similar to those observed at the reference area, resulting in consistently similar densities at HAC-R1 and the reference area over this period (Figure 6.3, Table 6.4). The similarity in the temporal changes at HAC-R1 relative to the reference area indicates that the changes were likely related to natural variability in physical and chemical factors (e.g., light exposure, water temperature, nutrient availability).

Temporal comparisons of total taxon richness from 2018 to 2022 demonstrated variability at HAC-R1 and HAC-U when compared to the reference area. Total richness at both exposed areas was similar to or higher than reference in most years, except at HAC-U in 2018 and at both areas in 2021, when total richness was significantly lower than reference (Figure 6.3, Table 6.4). Despite this variability relative to reference, total richness within each of the exposed areas has been largely temporally stable, with total richness in 2022 similar to or higher than in prior years (2018 to 2021; Figure 6.3, Table 6.4; Appendix Tables D.3.1 and D.3.2). Total taxon richness of the periphyton community is generally used as a relative measure for assessment of stream health in that differences in number of taxa are interpreted as improvement (increasing taxon richness) or degradation (decreasing taxon richness; Amblard 1990). Despite the temporal variability in total richness at the exposed areas relative to reference, the similar (at HAC-R1) or significantly higher (at HAC-U) mean total richness in 2022, relative to reference, is a positive indicator of good periphyton community health in upper Hazeltine Creek. Similar to total taxon richness, Diatom taxon richness is used as a metric for determining relative stream health (Barbour et al. 1999). Diatom richness at both exposed areas (HAC-R1 and HAC-U) has been similar to or significantly higher than reference (EDC-U) from 2018 to 2022 (Figure 6.3, Table 6.4; Appendix Tables D.3.1 and D.3.2). This is a further positive indicator of good periphyton community health in the areas of upper Hazeltine Creek.

Temporal comparisons indicated that Simpson's Evenness and Diversity at the exposed areas were not significantly different from the reference area from 2018 to 2022 except for higher Simpson's Evenness (2021) and Diversity (2020), which were significantly higher at HAC-U (Figure 6.3, Table 6.4). There have been no significant differences in Simpson's Evenness or Diversity among monitoring years (2018 to 2022) at HAC-U indicating temporal stability within this area. In the past two years (2021 and 2022) at HAC-R1, Simpson's Evenness and Diversity were significantly lower compared to 2018 (Figure 6.3, Table 6.4), but did not differ relative to reference over time. The consistent similarity between both exposed (HAC-R1 and HAC-U) and reference (EDC-U) areas further indicates good periphyton community health within upper Hazeltine Creek.

In 2022, periphyton communities of upper Hazeltine Creek and the reference area were dominated by Cyanobacteria (blue-green algae; Figure 6.4). The remainder of the periphyton community at HAC-R1 and HAC-U in 2022 was primarily composed of Diatoms, Phaeophytes, and Chlorophytes (Figure 6.4). The periphyton community at HAC-R1 in 2022 had relative densities (%) of most taxa that were similar relative to reference area, except for significantly higher relative densities of Phaeophytes (brown algae) that were absent from the reference area in 2022 (Appendix Figure F.2.1, Appendix Tables D.3.1, D.3.2, and F.2.1). The periphyton community at HAC-U in 2022 had significantly higher relative densities of Phaeophytes and Diatoms than the reference area, and significantly lower relative densities of Cyanobacteria. In addition, Rhodophytes (red algae) were not observed at either exposed area in 2022 despite being present at the reference area (EDC-U). The periphyton communities of HAC-R1 and HAC-U in 2022 were similar to each other in terms of the relative densities of the most dominant taxa except for a significantly higher mean relative density of Chlorophytes at HAC-U compared to HAC-R1 (Figure 6.4; Appendix Figure F.2.1, Appendix Table F.2.1). Evaluations of the dominant taxa in 2022 (i.e., Cyanobacteria, Diatoms, and Chlorophytes) based on density were largely similar to those based on relative densities, except that the density of Diatoms at HAC-U was not significantly different than the reference area (but relative density was significantly higher; Appendix Figures F.2.1, F.2.2, Appendix Table F.2.1).

Temporal evaluation of periphyton community composition has demonstrated relative densities of Diatoms and Chlorophytes at HAC-R1 and HAC-U that were similar to or significantly higher than reference from 2018 to 2022, except significantly lower relative densities of Chlorophytes at HAC-R1 in 2021 compared to reference. In contrast, the relative densities of Cyanobacteria at HAC-R1 and HAC-U from 2018 to 2022 were similar to or lower than reference (Appendix Figure F.2.1, Appendix Table F.2.1). The significantly lower relative densities of Cyanobacteria, and higher relative densities of Diatoms at HAC-R1 and HAC-U, relative to reference, are indicative of healthy periphyton communities (Pandey et al. 2018; Xue et al. 2019). Within HAC-R1 and HAC-U, the relative densities of Cyanobacteria have been similar from 2019 to 2022, as have the relative densities of Diatoms at HAC-U. The relative densities of Diatoms and Chlorophytes at HAC-R1 in 2022 were similar to both 2019 and 2020, while relative densities of Chlorophytes at HAC-U in 2022 were similar to all prior years (2018 to 2021; Appendix Figure F.2.1, Appendix Table F.2.1). The relative densities of less prevalent taxa have been similar to reference since 2018 for Chrysophytes and Dinoflagellates, while the relative densities of Phaeophytes were consistently higher than reference (due to a near absence at the reference area in all years). Rhodophytes were consistently absent from the upper Hazeltine Creek areas but present at the reference area (Appendix Figure F.2.1, Appendix Tables D.3.1, D.3.2

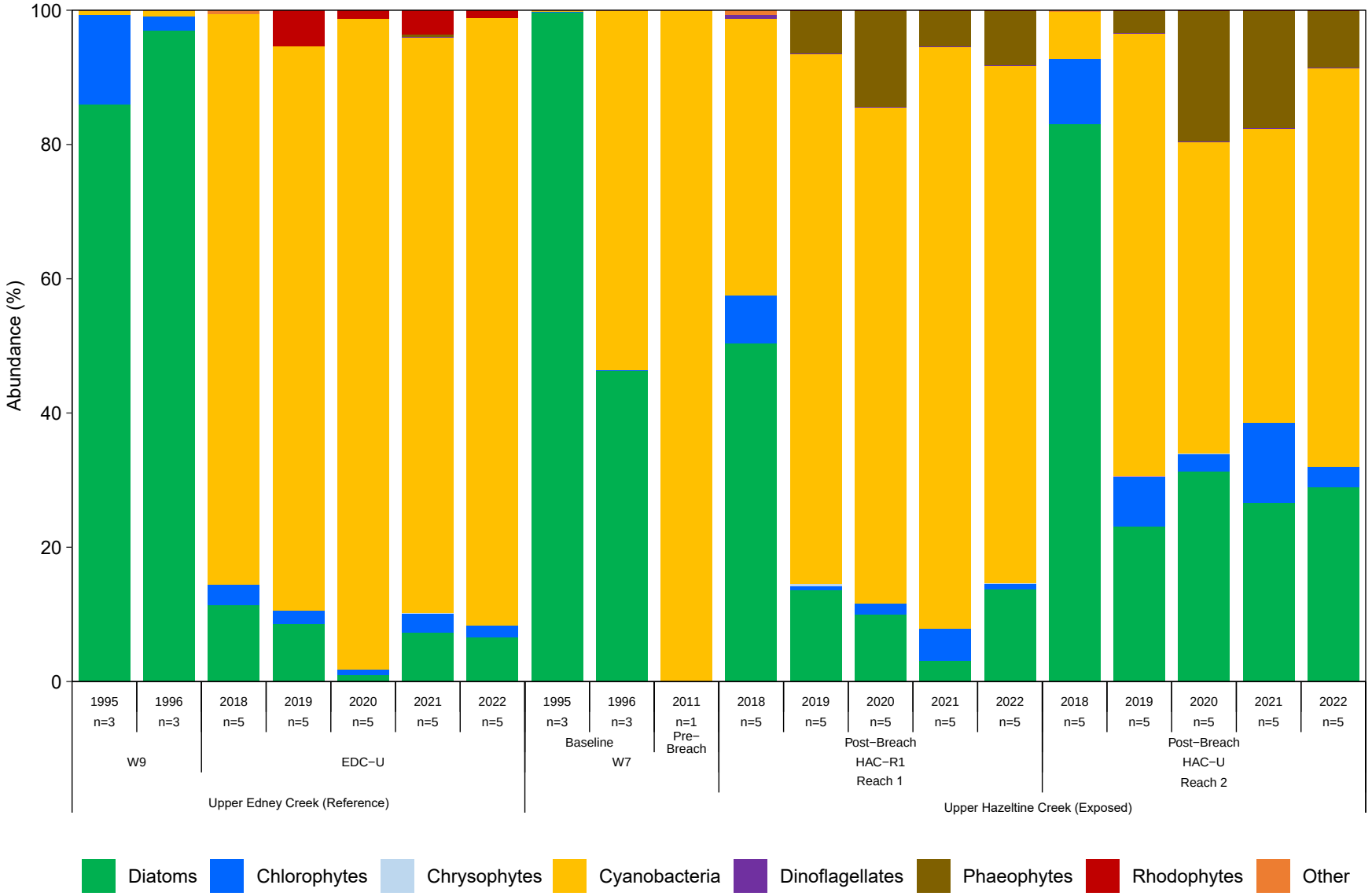


Figure 6.4: Relative Mean Densities of Major Periphyton Community Taxonomic Groups for Upper Hazeltine Creek (HAC-R1, HAC-U; Exposed) and Upper Edney Creek (EDC-U; Reference), 1995 to 2022

Notes: The sampling area W7 (2011) is the pre-breach equivalent of the post-breach sampling areas HAC-R1 and HAC-U (2018 to 2022). In 2018 and earlier, Chrysophytes, Phaeophytes, and Rhodophytes are grouped into the 'Other' category. Periphyton data were classified as "Other" taxa in laboratory results issued in 2018 but the taxonomic groups contained in this category were unknown (i.e., unknown taxonomic idenification of these organisms), but suspected to include Phaeophytes, Chrysophytes, and Rhodophytes. See Minnow 2019a for detailed laboratory results for 2018. Periphyton taxonomy results have not been reported in an "Other" category by the laboratory since 2018. See report Section 4.2.3.1 for details.

and F.2.1). The relative temporal stability of the dominant taxa within the exposed areas and/or relative to reference, and the similar or lower relative densities of Cyanobacteria and the similar or higher relative densities of Diatoms compared to reference are indicative of relatively stable periphyton communities at the upper Hazeltine Creek areas.

Overall, the periphyton community of upper Hazeltine Creek (HAC-R1 and HAC-U) in 2022 had total taxon richness and Simpson's Evenness and Diversity that were similar or higher than the reference area, and higher Diatom richness than reference. Periphyton density at HAC-R1 was similar to reference in 2022 and all prior years. At HAC-U, periphyton density in 2022 was lower than reference but has been temporally stable from 2018 to 2022 within HAC-U. The periphyton communities at the two upper Hazeltine Creek areas (HAC-R1 and HAC-U) were similar in 2022 in terms of density, total richness, Simpson's Evenness and Diversity, and Diatom richness, indicating similar recovery of the periphyton community in these two areas. The community composition at HAC-R1 (as measured by relative densities of dominant taxa) was similar to the reference area in 2022 for most groups (except Phaeophytes [brown algae] that were absent from the reference area). At HAC-U, the community composition in 2022 differed from the reference area in terms of higher relative densities of Diatoms and Phaeophytes, and lower relative densities of Cyanobacteria than the reference area. The higher and lower proportions of Diatoms and Cyanobacteria, respectively, relative to reference, are indicative of healthy periphyton communities. The similarity (or exceedance) of the periphyton community metrics (density, total richness, Simpson's Evenness and Diversity, Diatom richness) in upper Hazeltine Creek compared to the reference area in most years and/or temporal stability of these metrics are indicative of relatively stable periphyton communities at the upper Hazeltine Creek areas. Combined with the relative temporal stability of the dominant taxa within the exposed areas and/or relative to reference, and the similarity in community endpoints between the two areas (HAC-R1 and HAC-U), these are indicative of the health and robustness of the periphyton community in both areas of upper Hazeltine Creek.

6.1.2.3 Productivity

Mean periphyton chlorophyll-a (mass per unit area; mg/m²) in upper Hazeltine Creek (HAC-R1 and HAC-U) in 2022 was below the BCWQG of 100 mg/m² (BCMOECCS 2021b) but means at both areas were above a threshold indicative of moderately enriched streams (21 mg/m²; Biggs 1996; Figure 6.5; Appendix Tables D.3.2 and D.3.3). Two of the replicate samples from HAC-R1 in 2022 had chlorophyll-a (mg/m²) that exceeded the BCWQG, but samples from this area in 2022 showed a high degree of variability (mean = 87.4 ± 37.1 mg/m²; Figure 6.5; Appendix Table D.3.2). Periphyton chlorophyll-a (mg/m²) in 2022 at HAC-U was similar to the reference area (EDC-U), while the mean at HAC-R1 was significantly higher

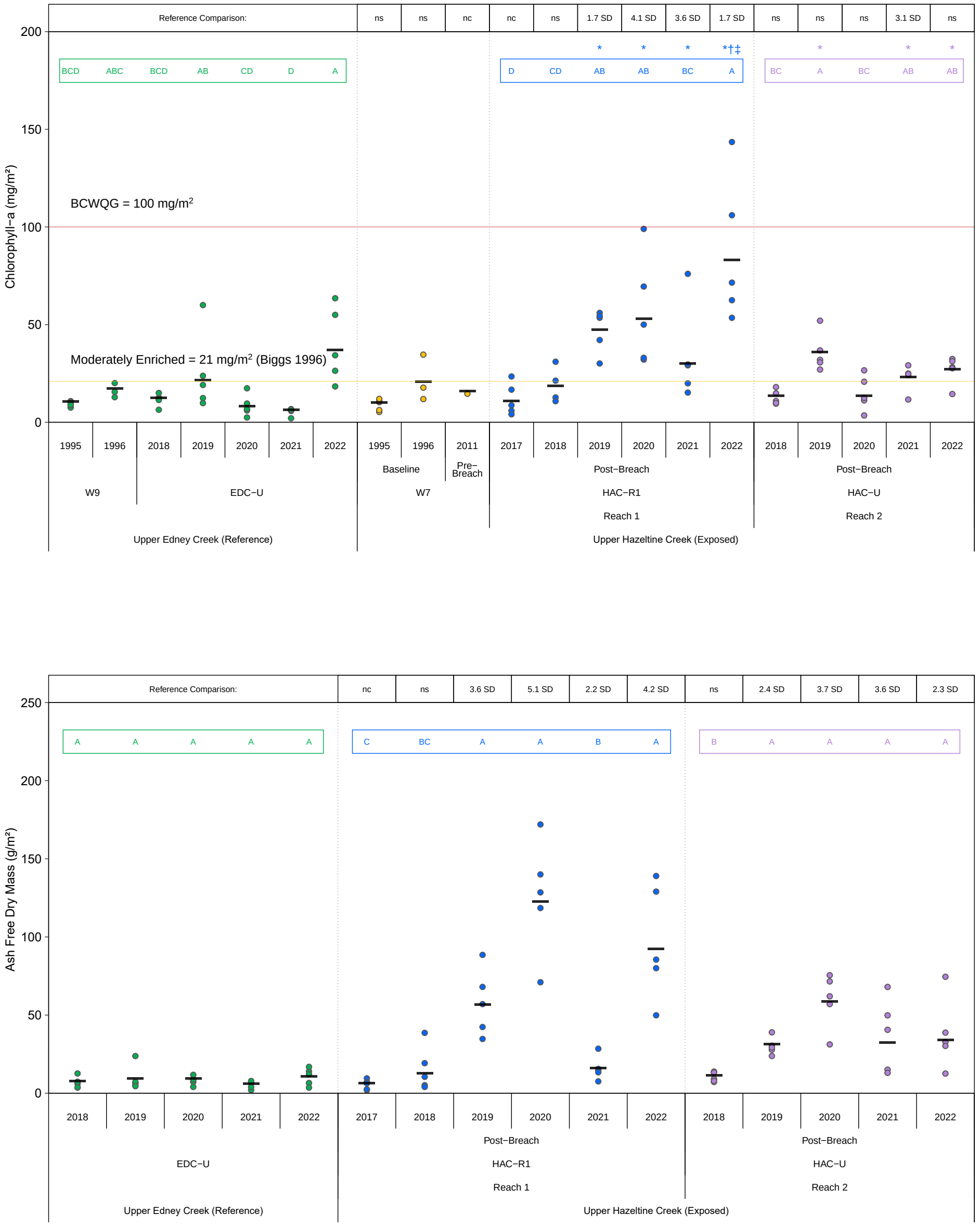


Figure 6.5: Periphyton Productivity Endpoints for Upper Hazeltine Creek (HAC−R1, HAC−U; Exposed) and Upper Edney Creek (EDC−U; Reference), 1995 to 2022

Notes: Black bars represent measures of central tendency (mean, geometric mean, or median depending on if analysis was conducted on untransformed, log10−transformed or rank−transformed data). Coloured letters represent significant (p−value <0.1) post−hoc comparisons within areas over time; years that share a letter of the same colour (e.g., A, B) within a box of the same colour do not differ significantly within an area. For statistical contrasts of Chlorophyll−a data, the analyses compared post−breach (2017 to 2022) to baseline (1995 and 1996) to pre−breach conditions (2011) at W7. The sampling area W7 (2011) is the pre−breach equivalent of the post−breach sampling areas HAC−R1 and HAC−U (2017 to 2022). Significant differences between HAC−R1 or HAC−U post−breach (2017 to 2022) results compared to baseline (1995 and 1996) or pre−breach (2011) results for W7 are indicated as follows: an * indicates significant differences to W7 in 1995, a † indicates significant differences to W7 in 1996, and a ‡ indicates significant differences to W7 in 2011. A number above the plot indicates significant exposed vs. reference post−hoc comparisons within a given year. The magnitude of difference (MOD) for these significant post−hoc comparisons is expressed in units of standard deviation (SD) or median absolute deviations (MAD; if the data were rank−transformed prior to analysis) relative to reference. 'nc' indicates no comparisons were possible; 'ns' indicates a non−significant contrast; 'nm' indicates that the MOD could not be calculated because MAD = 0.

than reference (Figure 6.5; Appendix Table F.2.2). The higher chlorophyll-a (mg/m²) at HAC-R1 in 2022 compared to reference (EDC-U) may be related, at least in part, to elevated water temperatures and increased exposure to sunlight from lack of canopy cover at the upper Hazeltine Creek areas (Table 6.3; Schnurr and Allen 2015).

From 2019 to 2022, chlorophyll-a (mg/m²) at HAC-R1 was significantly higher than reference. The magnitude of this difference was the same in 2019 and 2022 (1.7 SD) indicating that productivity at HAC-R1 has not increased progressively over time, relative to reference (Figure 6.5; Appendix Table F.2.2). Conversely, mean chlorophyll-a at HAC-U was similar to reference from 2018 to 2022, except for 2021, when chlorophyll-a was higher at HAC-U compared to reference (Figure 6.5; Appendix Table F.2.2). This was likely a result of chlorophyll-a (mg/m²) at the reference area in 2021 that was lower than other monitoring years (2019 and 2022; Figure 6.5; Appendix Tables D.3.2, D.3.3 and F.2.2). Except for 2021, chlorophyll-a in upper Hazeltine Creek generally followed similar temporal patterns as the reference area (EDC-U; Figure 6.5), suggesting that temporal changes may be related to natural variability in physical and chemical factors (e.g., temperature and nutrient availability). Chlorophyll-a (mg/m²) at HAC-U in 2022 was significantly higher than 1995 but similar to the 1996 baseline, pre-breach (2011), and prior post-breach years (2018 to 2021; Figure 6.5; Appendix Table F.2.2). Conversely, chlorophyll-a at HAC-R1 in 2022 was significantly higher than baseline (1995, 1996), pre-breach (2011), and most post-breach years (2017, 2018 and 2021; Appendix Table F.2.2). Chlorophyll-a at HAC-R1 was significantly higher than at HAC-U in 2020 and 2022 (Appendix Table F.2.2). *In situ* measures of dissolved oxygen recorded in upper Hazeltine Creek indicate that dissolved oxygen concentrations measured during periphyton sampling, and in the year preceding sampling, were consistently higher than the short-term BCWQG but occasionally lower than the long-term BCWQG by a maximum of 7% in August (Appendix Tables D.1.2 to D.1.4). These results indicate that dissolved oxygen concentrations largely remain above the long-term BCWQG despite increased periphyton growth in upper Hazeltine Creek.

Productivity measured as AFDM at HAC-R1 and HAC-U in 2022 was significantly higher than the reference area (EDC-U), which was consistent with the chlorophyll-a results for HAC-R1 but not the chlorophyll-a results for HAC-U in 2022 (Figure 6.5; Appendix Tables D.3.2, D.3.3 and F.2.2). Mean AFDM at HAC-R1 and HAC-U increased significantly between 2018 and 2019, and has remained stable since 2019, except at HAC-R1 in 2021 when drought conditions occurred in the area (Figure 6.5). Mean AFDM in upper Hazeltine Creek (HAC-R1 and HAC-U) has been significantly higher than reference (EDC-U) since 2019, suggesting recovery to stable periphyton biomass conditions. The significantly higher periphyton AFDM in areas of upper Hazeltine Creek compared to reference may be related, at least in part, to the elevated water temperature and increased exposure to sunlight from lack of canopy cover (Table 6.3; Schnurr and Allen 2015).

Like chlorophyll-a (mg/m²), AFDM at HAC-R1 was significantly higher than at HAC-U in 2020 and 2022 (Appendix Table F.2.2).

Overall, the chlorophyll-a and AFDM results indicated that productivity was significantly higher in upper Hazeltine Creek than in the reference area in 2022 but mean chlorophyll-a (mg/m²) at all areas remained below the BCWQG. Greater periphyton productivity at the remediated (exposed) areas relative to reference was likely related, at least in part, to greater exposure to direct sunlight due to the absence of canopy cover at these areas. The lack of cover in the remediated areas also drives higher water temperatures in upper Hazeltine Creek, which although mitigated to some extent by supplemental pumping from below the thermocline in Polley Lake (see Section 6.1.2), could also contribute to higher productivity. Both chlorophyll-a and AFDM at HAC-R1 in 2022 were significantly higher than at HAC-U, indicating this area had greater periphyton productivity. Periphyton productivity in upper Hazeltine Creek increased following remediation efforts and has remained temporally stable since 2019 except at HAC-R1 where AFDM decreased in 2021, potentially due to the drought conditions during this year. Despite the increased productivity following remediation efforts, water quality monitoring indicates that dissolved oxygen concentrations largely remain above the long-term BCWQG in upper Hazeltine Creek. The recovery of periphyton productivity in upper Hazeltine Creek since completion of remediation indicates there are appropriate environmental conditions (e.g., nutrients, sunlight, lack of turbidity, adequate water quality) to support periphyton growth in this area.

6.1.3 Benthic Invertebrate Community and Productivity

Benthic invertebrate community and productivity monitoring in 2022 was completed in exposed (remediated) areas of upper Hazeltine Creek (HAC-R1, HAC-U) with an area of upper Edney Creek (EDC-U) [62] serving as reference (Figure 4.2, Table 4.3). Post-breach benthic invertebrate community results from upper Hazeltine Creek were compared to those collected in 2007 (from UHC) to evaluate changes relative to pre-breach conditions (Table 4.3). Benthic invertebrate community and productivity monitoring was also completed in upper Hazeltine Creek (HAC-R3) with an area of Frypan Creek (FPC-R3) serving as reference (Figures 4.2 and 4.3, Table 4.3). The monitoring at HAC-R3 and FPC-R3 in 2022 was completed for the purpose of assessing fish habitat, and these data were tabulated in the current report to meet CEMP requirements (Appendix Tables D.4.1 to D.4.4) but were interpreted in a separate report (Minnow 2023). A review of the 2022 benthic invertebrate community data quality (Appendix B) indicated these data were of excellent quality (see Section 5.2.5 for details).

[62] Upper Edney Creek (EDC-U; reference) was not sampled in 2020 due to habitat differences relative to upper Hazeltine Creek (Minnow 2021a). As such, temporal data interpretation for reference does not refer to 2020.

A review of 2022 supporting water data quality indicated these data can be used with a good level of confidence for interpretation (see Section 5.1.1 for details).

6.1.3.1 Area Characteristics

The challenges associated with matching sampling habitats between the paired exposed and reference sampling areas outlined for periphyton monitoring (see Section 6.1.2.1) also applied to benthic invertebrate community and productivity monitoring in 2022 (Table 6.5; Appendix Table A.2.3). Briefly, supplemental pumping of water from Polley Lake to Hazeltine Creek in 2022 increased water depth and velocity in Hazeltine Creek (see Section 4.2.1 for details), which presented challenges for matching habitat variables in the upper Edney Creek reference area to those in upper Hazeltine Creek. This was consistent with challenges encountered in previous monitoring years due to the supplemental pumping (2018 to 2021; Minnow 2019a, 2020a, 2021a, 2022a) which were exacerbated in some years by extreme climate events in the area (i.e., drought conditions in summer 2021; Minnow 2022a). For instance, mean water velocity at the reference area was highly dissimilar to upper Hazeltine Creek in 2018 and 2021 due to local drought conditions (0 to 0.002 m/s), and the reference area was not sampled in 2020 due to obvious habitat differences relative to the upper Hazeltine Creek areas (Table 6.5; Minnow 2021a). In 2022, water velocity at the exposed areas (mean = 0.371 to 0.448 m/s) was similar to the reference area (mean = 0.339 m/s) but water depth at the exposed areas (mean = 28.8 to 28.9 cm) was approximately 2.4 times that in the reference area (mean = 12.0 cm; Table 6.5). In consideration of the temporal variability in water depth and velocity, data interpretation focused on the following comparisons for the upper Hazeltine Creek areas in the post-breach period: 1) comparisons to reference conditions at upper Edney Creek (EDC-U) in post-breach years (2018 to 2022), 2) comparisons to pre-breach conditions (UHC in 2007), and 3) temporal changes within the exposed areas (HAC-R1, HAC-U) from 2018 to 2022.

Evaluation of water quality collected routinely in upper Hazeltine Creek (at HAC-13 and HAC-05a; Figure 4.2) indicated that concentrations of total and dissolved metals exceeded the long-term BCWQG in samples collected during the year preceding sampling (i.e., September 2021 to August 2022). Specifically, at HAC-13 (which is located closest to the HAC-R1 sampling area), dissolved aluminum and copper exceeded the long-term BCWQG in 17 % and 75% of samples, respectively (Appendix Figures D.1.1 and D.1.2, Appendix Table D.1.3). At HAC-05a (which is located closest to the HAC-U sampling area), the long-term BCWQG was exceeded by total chromium (8% of samples) and total selenium (42% of samples), and dissolved aluminum (17% of samples) and dissolved copper (75% of samples; Appendix Figures D.1.1 and D.1.2, Appendix Table D.1.3). No analyte concentrations exceeded the short-term BCWQG in samples

Table 6.5: **Physical and Chemical Characteristics for Upper Hazeltine Creek (HAC-R1, HAC-U; Exposed) and Upper Edney Creek (EDC-U; Reference), 2018 to 2022**

Habitat Variables	Units	Reference									
		Upper Edney Creek (EDC-U)									
		2018		2019		2020		2021		2022	
Mean Water Depth	cm	19.3		19.4		-		10.3		12.0	
Mean Water Velocity	m/s	0.002		0.472		-		0		0.339	
Median Substrate Size[a]	cm	4.7		4.2		-		5.5		5.7	
Dominant Substrate Type	-	Gravel		Cobble		Cobble		Cobble		Gravel	
Canopy Cover[b]	%	60		70		70		85		80	
Water Quality		**15-Aug-18[c]**	**Seasonal Range[d]**	**12-Aug-19[c]**	**Seasonal Range[d]**	**10-Aug-20[c]**	**Seasonal Range[d]**	**2-Aug-21[c]**	**Seasonal Range[d]**	**3-Aug-22[c]**	**Seasonal Range[d]**
Dissolved Oxygen	%	81.5	-	72.0	-	86.6	-	59.9	-	77.3	-
Temperature	°C	11.5	-	20.0	-	14.6	-	15.7	-	13.0	-
Specific Conductivity	µS/cm	119	-	116	-	138	-	141	-	125.4	-
Total Phosphorus	mg/L	0.0107	-	0.0270	-	0.0160	-	0.0227	-	0.0107	-
Total Nitrogen	mg/L	0.460	-	0.720	-	0.627	-	0.540	-	0.509	-
Dissolved Orthophosphate	mg/L	0.00300	-	<0.0010	-	0.00380	-	0.00530	-	0.0017	-
Benthic Invertebrate Productivity											
Benthic Organism Density	#/m^2	6,458		15,432		-		4,529		22,389	
Mean Biomass	g/m^2 DW	1.39		1.09		-		0.537		5.09	

Notes: DW = dry weight. mg/m^2 = milligrams per square metre. Physical and chemical characteristic data are compiled for years when benthic invertebrate community monitoring was completed (2018 to 2022). *In situ* measures of dissolved oxygen, temperature, and specific conductivity are presented.

[a] The displayed median substrate size represents the median (50th percentile) of 100 pebble measures recorded for each sampling area. See Appendix Table A.2.5 for pebble count data.

[b] Canopy cover includes dense and partially open cover.

[c] Water quality results are from a single grab water sample collected within a week of biological sampling at a given area. The date of sample collection is shown.

[d] Seasonal range indicates the range of water quality parameters reported from routine water quality sampling. This included data from approximately 3 months preceding/concurrent with benthic invertebrate community sampling (2018 to 2022: late April to late July [n = 4 for HAC-U from 2018 to 2022, n = 11 for HAC-R1 in 2018, n=4 for HAC-R1 in 2019 and 2022]; 2021 and 2022: late April to early August [n = 4 for HAC-R1 and HAC-U]) . Routine water quality data from station HAC-13 was used for HAC-R1, and data from station HAC-05a was used for HAC-U (see Figure 4.2). Water quality is not monitored routinely near EDC-U or HAC-R3. See Appendix Tables D.1.3 and D.1.4 for 2022 results, and Minnow (2019a, 2020a, 2021a, 2022a) for 2018, 2019, 2020, and 2021 results, respectively.

Table 6.5: **Physical and Chemical Characteristics for Upper Hazeltine Creek (HAC-R1, HAC-U; Exposed) and Upper Edney Creek (EDC-U; Reference), 2018 to 2022**

Habitat Variables	Units	Exposed									
		Upper Hazeltine Creek - Reach 1 (HAC-R1)									
		2018		2019		2020		2021		2022	
Mean Water Depth	cm	22.3		20.9		23.7		20.0		28.8	
Mean Water Velocity	m/s	0.159		0.411		0.242		0.183		0.371	
Median Substrate Size[a]	cm	4.9		5.0		4.5		5.4		5.2	
Dominant Substrate Type	-	Gravel		Cobble		Cobble		Cobble		Cobble	
Canopy Cover[b]	%	0		0		0		0		0	
Water Quality		**19-Aug-18[c]**	**Seasonal Range[d]**	**12-Aug-19[c]**	**Seasonal Range[d]**	**11-Aug-20[c]**	**Seasonal Range[d]**	**3-Aug-21[c]**	**Seasonal Range[d]**	**8-Aug-22[c]**	**Seasonal Range[d]**
Dissolved Oxygen	%	85.1	75.1 - 105.6	92.0	83.2 - 105.2	96.7	90.1 - 99.6	81.5	93.1 - 99.0	78.4	7.98 - 11.27
Temperature	°C	14.6	12.3 - 22.9	18.0	12.5 - 18.2	16.6	4.0 - 22.0	19.5	6.16 - 21.9	17.9	4.86 - 19.76
Specific Conductivity	µS/cm	288	261 - 293	278	275 - 288	240	146 - 271	243	194 - 260	247.9	246 - 288
Total Phosphorus	mg/L	0.0120	0.0110 - 0.0284	0.0140	0.0122 - 0.0264	0.0141	0.0132 - 0.0290	0.0134	0.0108 - 0.0165	0.0127	0.0119 - 0.0157
Total Nitrogen	mg/L	0.280	0.267 - 0.381	0.350	0.291 - 0.406	0.311	0.292 - 0.431	0.284	0.283 - 0.305	0.294	0.268 - 0.362
Dissolved Orthophosphate	mg/L	0.00410	<0.0010 - 0.0074	0.00180	0.0015 - 0.0085	0.00460	0.0012 - 0.0046	0.00640	0.0027 - 0.0079	0.0010	0.0014 - 0.0046
Benthic Invertebrate Productivity											
Benthic Organism Density	#/m^2	19,750		35,493		36,987		10,097		44,467	
Mean Biomass	g/m^2 DW	0.804		3.59		3.97		2.86		2.13	

Notes: DW = dry weight. mg/m^2 = milligrams per square metre. Physical and chemical characteristic data are compiled for years when benthic invertebrate community monitoring was completed (2018 to 2022). *In situ* measures of dissolved oxygen, temperature, and specific conductivity are presented.

[a] The displayed median substrate size represents the median (50th percentile) of 100 pebble measures recorded for each sampling area. See Appendix Table A.2.5 for pebble count data.

[b] Canopy cover includes dense and partially open cover.

[c] Water quality results are from a single grab water sample collected within a week of biological sampling at a given area. The date of sample collection is shown.

[d] Seasonal range indicates the range of water quality parameters reported from routine water quality sampling. This included data from approximately 3 months preceding/concurrent with benthic invertebrate community sampling (2018 to 2022: late April to late July [n = 4 for HAC-U from 2018 to 2022, n = 11 for HAC-R1 in 2018, n=4 for HAC-R1 in 2019 and 2022]; 2021 and 2022: late April to early August [n = 4 for HAC-R1 and HAC-U]) . Routine water quality data from station HAC-13 was used for HAC-R1, and data from station HAC-05a was used for HAC-U (see Figure 4.2). Water quality is not monitored routinely near EDC-U or HAC-R3. See Appendix Tables D.1.3 and D.1.4 for 2022 results, and Minnow (2019a, 2020a, 2021a, 2022a) for 2018, 2019, 2020, and 2021 results, respectively.

Table 6.5: **Physical and Chemical Characteristics for Upper Hazeltine Creek (HAC-R1, HAC-U; Exposed) and Upper Edney Creek (EDC-U; Reference), 2018 to 2022**

Habitat Variables	Units	Exposed									
		Upper Hazeltine Creek - Reach 2 (HAC-U)									
		2018		2019		2020		2021		2022	
Mean Water Depth	cm	19.7		19.6		22.3		19.1		28.9	
Mean Water Velocity	m/s	0.222		0.454		0.459		0.363		0.448	
Median Substrate Size[a]	cm	5.5		4.8		4.2		4.6		5.5	
Dominant Substrate Type	-	Gravel		Cobble		Cobble		Cobble		Cobble	
Canopy Cover[b]	%	0		0		0		0		0	
Water Quality		**19-Aug-18[b]**	**Seasonal Range[c]**	**12-Aug-19[b]**	**Seasonal Range[c]**	**11-Aug-20[c]**	**Seasonal Range[d]**	**3-Aug-21[c]**	**Seasonal Range[d]**	**8-Aug-22[c]**	**Seasonal Range[d]**
Dissolved Oxygen	%	113	85.6 - 116.3	102	95.0 - 115.4	84.1	93.9 - 114.6	82.1	95.9 - 114	90.8	8.61 - 11.99
Temperature	°C	16.7	11.6 - 16.9	20.0	11.9 - 16.7	17.2	4.98 - 21.5	17.4	6.84 - 21.3	18.3	4.64 - 17.9
Specific Conductivity	µS/cm	308	231 - 333	307	315 - 341	313	172 - 288	314	216 - 314	273.3	257 - 342
Total Phosphorus	mg/L	0.0110	0.011 - 0.0229	0.0130	0.0106 - 0.0277	0.0140	0.0142 - 0.0264	0.0104	0.0098 - 0.0187	0.0138	0.0142 - 0.0156
Total Nitrogen	mg/L	0.370	0.305 - 0.458	0.350	0.372 - 0.530	0.349	0.317 - 0.426	0.321	0.295 - 0.357	0.318	0.294 - 0.384
Dissolved Orthophosphate	mg/L	0.00270	0.0012 - 0.0074	<0.00100	<0.0010 - 0.0084	0.00410	0.0016 - 0.0050	0.00420	0.0014 - 0.0087	0.0034	0.0012 - 0.0067
Benthic Invertebrate Productivity											
Benthic Organism Density	#/m^2	39,326		47,280		45,996		15,597		33,747	
Mean Biomass	g/m2 DW	1.24		5.31		5.33		2.73		4.57	

Notes: DW = dry weight. mg/m^2 = milligrams per square metre. Physical and chemical characteristic data are compiled for years when benthic invertebrate community monitoring was completed (2018 to 2022). *In situ* measures of dissolved oxygen, temperature, and specific conductivity are presented.

[a] The displayed median substrate size represents the median (50th percentile) of 100 pebble measures recorded for each sampling area. See Appendix Table A.2.5 for pebble count data.

[b] Canopy cover includes dense and partially open cover.

[c] Water quality results are from a single grab water sample collected within a week of biological sampling at a given area. The date of sample collection is shown.

[d] Seasonal range indicates the range of water quality parameters reported from routine water quality sampling. This included data from approximately 3 months preceding/concurrent with benthic invertebrate community sampling (2018 to 2022: late April to late July [n = 4 for HAC-U from 2018 to 2022, n = 11 for HAC-R1 in 2018, n=4 for HAC-R1 in 2019 and 2022]; 2021 and 2022: late April to early August [n = 4 for HAC-R1 and HAC-U]) . Routine water quality data from station HAC-13 was used for HAC-R1, and data from station HAC-05a was used for HAC-U (see Figure 4.2). Water quality is not monitored routinely near EDC-U or HAC-R3. See Appendix Tables D.1.3 and D.1.4 for 2022 results, and Minnow (2019a, 2020a, 2021a, 2022a) for 2018, 2019, 2020, and 2021 results, respectively.

collected from these exposed areas (Appendix Tables D.1.3 and D.1.4). Water quality is not routinely monitored at the upper Edney Creek reference area (EDC-U), but the single sample collected concurrently with biological monitoring (in August 2022) demonstrated analyte concentrations that were all below the BCWQG (Appendix Table D.1.2).

6.1.3.2 Community

The benthic invertebrate communities at HAC-U and HAC-R1 in 2022 were similar to reference (EDC-U) in terms of mean density, taxon richness, and Simpson's Evenness and Diversity except for significantly higher density at HAC-R1 (44,467 organisms/m^2) compared to reference (22,389 organisms/m^2; Figure 6.6, Table 6.6; Appendix Tables D.4.5 and D.4.6). Densities at HAC-R1 and HAC-U (33,747 organisms/m^2) in 2022 were also similar to pre-breach conditions (39,228 organisms/m^2), as were Simpson's Evenness and Diversity (Figure 6.6, Table 6.6). Mean taxon richness at HAC-R1 in 2022 (29 taxa) was significantly lower than pre-breach (44 taxa) while taxon richness at HAC-U in 2022 (32 taxa) was similar to pre-breach (Figure 6.6, Table 6.6). Overall, the benthic invertebrate community at HAC-R1 and HAC-U in 2022 was similar to both reference and pre-breach in terms of most primary metrics (density, richness, Simpson's Evenness and Diversity), except higher density than reference (but similar to pre-breach) at HAC-R1 and lower taxon richness than pre-breach (but similar to reference) at HAC-R1. These results indicate the benthic invertebrate community of Upper Hazeltine Creek has largely recovered to reference and/or pre-breach conditions when primary metrics (density, richness, Simpson's Evenness and Diversity) are considered.

The benthic invertebrate communities of the two upper Hazeltine Creek areas (HAC-R1 and HAC-U) in 2022 were similar to each other in terms of all primary metrics (density, taxon richness, and Simpson's Evenness and Diversity; Table 6.6). Temporally, the benthic invertebrate communities of these two areas have also been consistently similar to each other from 2018 to 2022 in terms of the primary metrics with few exceptions. These exceptions included significantly lower taxon richness in 2021, and significantly higher Simpson's Diversity in 2020 at HAC-U compared to HAC-R1 (Figure 6.6; Table 6.4). The similarity in benthic invertebrate communities at the two upper Hazeltine Creek areas (HAC-R1 and HAC-U) in 2022 and most prior years indicates that recovery of the benthic invertebrate community in these two areas has been largely similar when primary metrics are considered.

Mean benthic invertebrate densities at HAC-U and HAC-R1 have been significantly higher than the reference area (EDC-U) from 2018 to 2022 with one exception: density at HAC-U in 2022 was similar to reference (Figure 6.6, Table 6.6; Appendix Tables D.4.5 and D.4.6). The benthic invertebrate densities at HAC-R1 and HAC-U from 2018 to 2022 were similar to pre-breach densities with the exception of HAC-R1 in 2021, when density was significantly lower

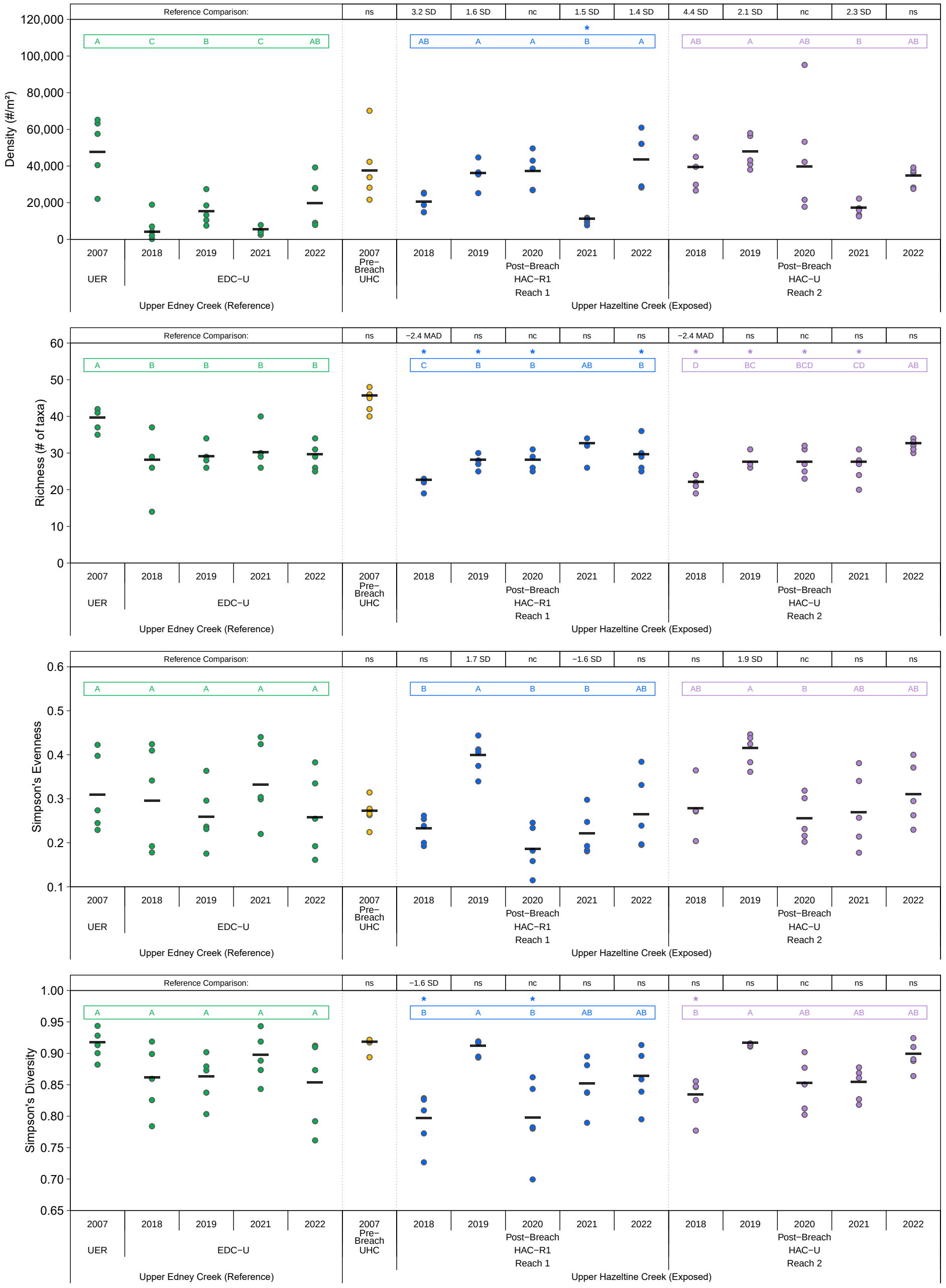


Figure 6.6: Benthic Invertebrate Community Endpoints for Upper Hazeltine Creek (HAC−R1, HAC−U; Exposed) and Upper Edney Creek (EDC−U; Reference), 2007 to 2022

Notes: Reference area EDC−U was not sampled in 2020 due to habitat differences (in water depth and flow) relative to the remediated areas HAC−R1 and HAC−U. See Section 4.3 for details. Black bars represent measures of central tendency (mean, geometric mean, or median depending on if analysis was conducted on untransformed, log10− transformed or rank−transformed data). Coloured letters represent significant (p−value <0.1) post−hoc comparisons within areas over time; years that share a letter of the same colour (e.g., A, B) within a box of the same colour do not differ significantly within an area. Data from 2007 were used in the analyses to compare post−breach (2018 to 2022) to pre−breach conditions (2007). Post−breach data from HAC−R1 and HAC−U were compared to pre−breach data from UHC, and post−breach data from EDC−U was compared to pre−breach data from UER. An * indicates a significant difference between HAC−R1 or HAC−U and UHC in 2007. A number above the plot indicates significant exposed vs. reference post−hoc comparisons within a given year. The magnitude of difference (MOD) for these significant post −hoc comparisons is expressed in units of standard deviation (SD) or median absolute deviations (MAD; if the data were rank−transformed prior to analysis) relative to reference. 'nc' indicates no comparisons were possible; 'ns' indicates a non−significant contrast; 'nm' indicates that the MOD could not be calculated because MAD = 0.

Table 6.6: **Results of Statistical Comparisons of Benthic Invertebrate Community Endpoints for Upper Hazeltine Creek (HAC-R1, HAC-U; Exposed) and Upper Edney Creek (EDC-U; Reference), 2007 to 2022**

Endpoint	Transformation	2-Way ANOVA P-values			Area Type	Area	Year[a]	Mean	Measures of Central Tendency[b]	Temporal Contrasts Within Sites: Pairwise Comparisons Between Years						Temporal Contrasts Within Sites: MOD Relative to Baseline[c]						Spatial Comparison Within Years[c,e]	
		Area	Year	Area x Year						2007 (pre-breach)[d]	2018	2019	2020	2021	2022	2007 (pre-breach)	2018	2019	2020	2021	2022	HAC-R1	HAC-U
Density (#/m²)	log10	-	-	0.032	Reference	EDC-U	2007	49,703	46,264	A	C	B	nc	C	AB	Baseline	-4.7	-2.1	nc	-4.1	ns	ns	
							2018	6,458	2,889													3.2	4.4
							2019	15,432	13,953													1.6	2.1
							2020	-	-													nc	nc
							2021	4,529	4,220													1.5	2.3
							2022	22,389	18,505													1.4	ns
					Exposed	HAC-R1	2007	-	36,099	A	AB	A	A	B	A	Baseline	ns	ns	ns	-2.2	ns		nc
							2018	19,750	19,199														ns
							2019	35,493	34,919														ns
							2020	36,987	35,882														ns
							2021	10,097	9,982														ns
							2022	44,467	42,290														ns
					Exposed	HAC-U	2007	39,228	36,099	AB	AB	A	AB	B	AB	Baseline	ns	ns	ns	ns	ns		
							2018	39,326	37,938														
							2019	47,280	46,578														
							2020	45,996	38,275														
							2021	15,597	15,864														
							2022	33,747	33,383														
Richness (# of taxa)	rank	-	-	0.010	Reference	EDC-U	2007	39.4	41.0	A	B	B	nc	B	B	Baseline	-4.0	-4.4	nc	-4.0	-4.0	ns	
							2018	27.0	29.0													-2.4	-2.4
							2019	29.0	28.0													ns	ns
							2020	-	-													nc	nc
							2021	30.8	29.0													ns	ns
							2022	29.0	29.0													ns	ns
					Exposed	HAC-R1	2007	-	45.0	A	C	B	B	AB	B	Baseline	-7.8	-5.7	-5.4	ns	-5.4		nc
							2018	21.6	22.0														ns
							2019	28.0	28.0														ns
							2020	28.0	29.0														ns
							2021	31.6	32.0														-1.7
							2022	29.2	29.0														ns
					Exposed	HAC-U	2007	44.2	45.0	A	D	BC	BCD	CD	AB	Baseline	-7.8	-6.1	-6.1	-6.1	ns		
							2018	22.0	22.0														
							2019	28.2	27.0														
							2020	27.6	27.0														
							2021	26.3	27.0														
							2022	32.0	32.0														

P-value < 0.1.
Magnitude of Difference (MOD) < -2.
Magnitude of Difference (MOD) > 2.

Notes: "-" = no data available, nc = no comparison, ns = no significance, nm = Contrast MODs could not be calculated because the Median Absolute Deviation (MAD) = 0. Reference area EDC-U was not sampled in 2020 due to habitat differences (in water depth and flow) relative to the remediated areas HAC-R1 and HAC-U. See Section 4.3 for details.

[a] Data from 2007 were used in the analyses to compare post-breach (2018 to 2022) to pre-breach conditions (2007). Post-breach data from HAC-R1 and HAC-U was compared to pre-breach data from UHC, and post-breach data from EDC-U was compared to pre-breach data from UER.

[b] Mean, geometric mean, or median depending on if analysis was conducted on untransformed, log_{10}-transformed, or rank-transformed data.

[c] Magnitude of difference (MOD) calculated for two-way ANOVA as (Exposed Mean - Reference Mean)/SD (or [Mean - Baseline Mean]/SD for temporal comparisons) on the transformed scale, where SD was the pooled standard deviation of the model residuals. MOD calculated for Kruskal-Wallis (i.e., rank-transformed data) as (Exposed Median - Reference Median)/MAD, where MAD was the pooled median absolute deviation.

[d] Pairwise contrasts against of post-breach (2018 to 2022) data from HAC-R1 and HAC-U against pre-breach (2007) data from UHC are indicated with in Figure 6.9.

[e] Spatial pairwise contrasts between HAC-R1 and HAC-U in 2007 not calculated because UHC in 2007 represents baseline for both HAC-R1 and HAC-U.

Table 6.6: Results of Statistical Comparisons of Benthic Invertebrate Community Endpoints for Upper Hazeltine Creek (HAC-R1, HAC-U; Exposed) and Upper Edney Creek (EDC-U; Reference), 2007 to 2022

Endpoint	Transformation	2-Way ANOVA P-values			Area Type	Area	Year[a]	Mean	Measures of Central Tendency[b]	Temporal Contrasts Within Sites: Pairwise Comparisons Between Years						Temporal Contrasts Within Sites: MOD Relative to Baseline[c]						Spatial Comparison Within Years[c,e]	
		Area	Year	Area x Year						2007 (pre-breach)[d]	2018	2019	2020	2021	2022	2007 (pre-breach)	2018	2019	2020	2021	2022	HAC-R1	HAC-U
Simpson's Evenness	log10	-	-	0.017	Reference	EDC-U	2007	0.314	0.300	A	A	A	nc	A	A	Baseline	ns	ns	nc	ns	ns	ns	
							2018	0.309	0.290													ns	ns
							2019	0.260	0.250													1.7	1.9
							2020	-	-													nc	nc
							2021	0.337	0.330													-1.6	ns
							2022	0.265	0.250													ns	ns
					Exposed	HAC-R1	2007	-	0.270	AB	B	A	B	B	AB	Baseline	ns	ns	ns	ns	ns		nc
							2018	0.229	0.230														ns
							2019	0.395	0.390														ns
							2020	0.187	0.180														ns
							2021	0.220	0.220														ns
							2022	0.269	0.260														ns
					Exposed	HAC-U	2007	0.269	0.270	AB	AB	A	B	AB	AB	Baseline	ns	ns	ns	ns	ns		
							2018	0.277	0.270														
							2019	0.411	0.410														
							2020	0.254	0.250														
							2021	0.271	0.260														
							2022	0.312	0.300														
Simpson's Diversity	none	-	-	0.016	Reference	EDC-U	2007	0.913	0.910	A	A	A	nc	A	A	Baseline	ns	ns	nc	ns	ns	ns	
							2018	0.857	0.860													-1.6	ns
							2019	0.859	0.860													ns	ns
							2020	-	-													nc	nc
							2021	0.893	0.890													ns	ns
							2022	0.850	0.850													ns	ns
					Exposed	HAC-R1	2007	-	0.910	A	B	A	B	AB	AB	Baseline	-3.1	ns	-3.0	ns	ns		nc
							2018	0.793	0.790														ns
							2019	0.908	0.910														ns
							2020	0.793	0.790														1.4
							2021	0.848	0.850														ns
							2022	0.860	0.860														ns
					Exposed	HAC-U	2007	0.915	0.910	A	B	A	AB	AB	AB	Baseline	-2.1	ns	ns	ns	ns		
							2018	0.830	0.830														
							2019	0.913	0.910														
							2020	0.849	0.850														
							2021	0.852	0.850														
							2022	0.895	0.900														

P-value < 0.1.
Magnitude of Difference (MOD) < -2.
Magnitude of Difference (MOD) > 2.

Notes: "-" = no data available, nc = no comparison, ns = no significance, nm = Contrast MODs could not be calculated because the Median Absolute Deviation (MAD) = 0. Reference area EDC-U was not sampled in 2020 due to habitat differences (in water depth and flow) relative to the remediated areas HAC-R1 and HAC-U. See Section 4.3 for details.

[a] Data from 2007 were used in the analyses to compare post-breach (2018 to 2022) to pre-breach conditions (2007). Post-breach data from HAC-R1 and HAC-U was compared to pre-breach data from UHC, and post-breach data from EDC-U was compared to pre-breach data from UER.

[b] Mean, geometric mean, or median depending on if analysis was conducted on untransformed, log_{10}-transformed, or rank-transformed data.

[c] Magnitude of difference (MOD) calculated for two-way ANOVA as (Exposed Mean - Reference Mean)/SD (or [Mean - Baseline Mean]/SD for temporal comparisons) on the transformed scale, where SD was the pooled standard deviation of the model residuals. MOD calculated for Kruskal-Wallis (i.e., rank-transformed data) as (Exposed Median - Reference Median)/MAD, where MAD was the pooled median absolute deviation.

[d] Pairwise contrasts against of post-breach (2018 to 2022) data from HAC-R1 and HAC-U against pre-breach (2007) data from UHC are indicated with in Figure 6.9.

[e] Spatial pairwise contrasts between HAC-R1 and HAC-U in 2007 not calculated because UHC in 2007 represents baseline for both HAC-R1 and HAC-U.

than pre-breach (Figure 6.6, Table 6.6). The significantly lower total density at HAC-R1 in 2021 was driven by significantly lower Chironomidae densities that occurred at both HAC-R1 and HAC-U in 2021 compared to all other post-breach monitoring years (Appendix Figure F.3.1, Appendix Table F.3.1). Within both HAC-R1 and the reference area (EDC-U), benthic invertebrate densities at each area in 2021 were similar to 2018, but significantly lower than all remaining monitoring years within each area (Figure 6.6, Table 6.6). These similar year-over-year changes at HAC-R1 and the reference area suggest that the decreased benthic invertebrate densities at HAC-R1 in 2021 compared to pre-breach were likely related to environmental conditions that similarly affected HAC-R1 and the reference area (EDC-U); namely the drought-like conditions that occurred in 2018 and 2021 (Minnow 2022a). Density at HAC-U has been temporally stable from 2018 to 2022 except that density in 2021 was significantly lower than in 2019 (Figure 6.6, Table 6.6). The temporal evaluation indicates that recovery of benthic invertebrate densities at HAC-R1 and HAC-U to pre-breach and/or reference conditions has been consistently observed since 2018.

Taxon richness at HAC-R1 and HAC-U was similar to reference from 2019 to 2022, but significantly lower than pre-breach from 2018 to 2022, except in 2021 at HAC-R1 and in 2022 at HAC-U when richness was similar to pre-breach values (Figure 6.6, Table 6.6). Simpson's Diversity at HAC-R1 and HAC-U was similar to reference and to pre-breach from 2019 to 2022 except in 2020 at HAC-R1 when Simpson's Diversity was lower than pre-breach (Figure 6.6, Table 6.6). Simpson's Evenness showed more temporal variability relative to reference but was similar to pre-breach from 2018 to 2022 in both exposed areas (HAC-R1 and HAC-U; Figure 6.6, Table 6.6). Simpson's Evenness and Diversity indices at both HAC-R1 and HAC-U in 2022 were temporally similar to prior post-breach monitoring years (i.e., 2018 to 2021; Figure 6.6, Table 6.6). The similarities of taxon richness and Simpson's Evenness and Diversity at HAC-R1 and HAC-U in 2022 to pre-breach and/or reference (EDC-U) conditions indicate that both upper Hazeltine Creek areas support a diverse benthic invertebrate community similar to that of reference and pre-breach conditions. The continued lower taxon richness at HAC-R1 in 2022 relative to pre-breach, but not reference, indicates that some recovery in community structure at this area is ongoing relative to pre-breach conditions.

Chironomidae was the most abundant taxon present at the upper Hazeltine Creek areas in 2022 (Figure 6.7). The mean relative densities of Chironomidae at HAC-R1 (62%) and HAC-U (36%) in 2022 were significantly higher than pre-breach (22%) and the reference area (EDC-U; 19%; Figure 6.7; Appendix Figure F.3.1, Appendix Table F.3.1). This contrasted with 2021 when the relative densities of Chironomidae at both HAC-R1 and HAC-U were similar to pre-breach and significantly lower than reference; a change that was owing to a significant increase in both relative density and density of Chironomidae at both areas between 2021

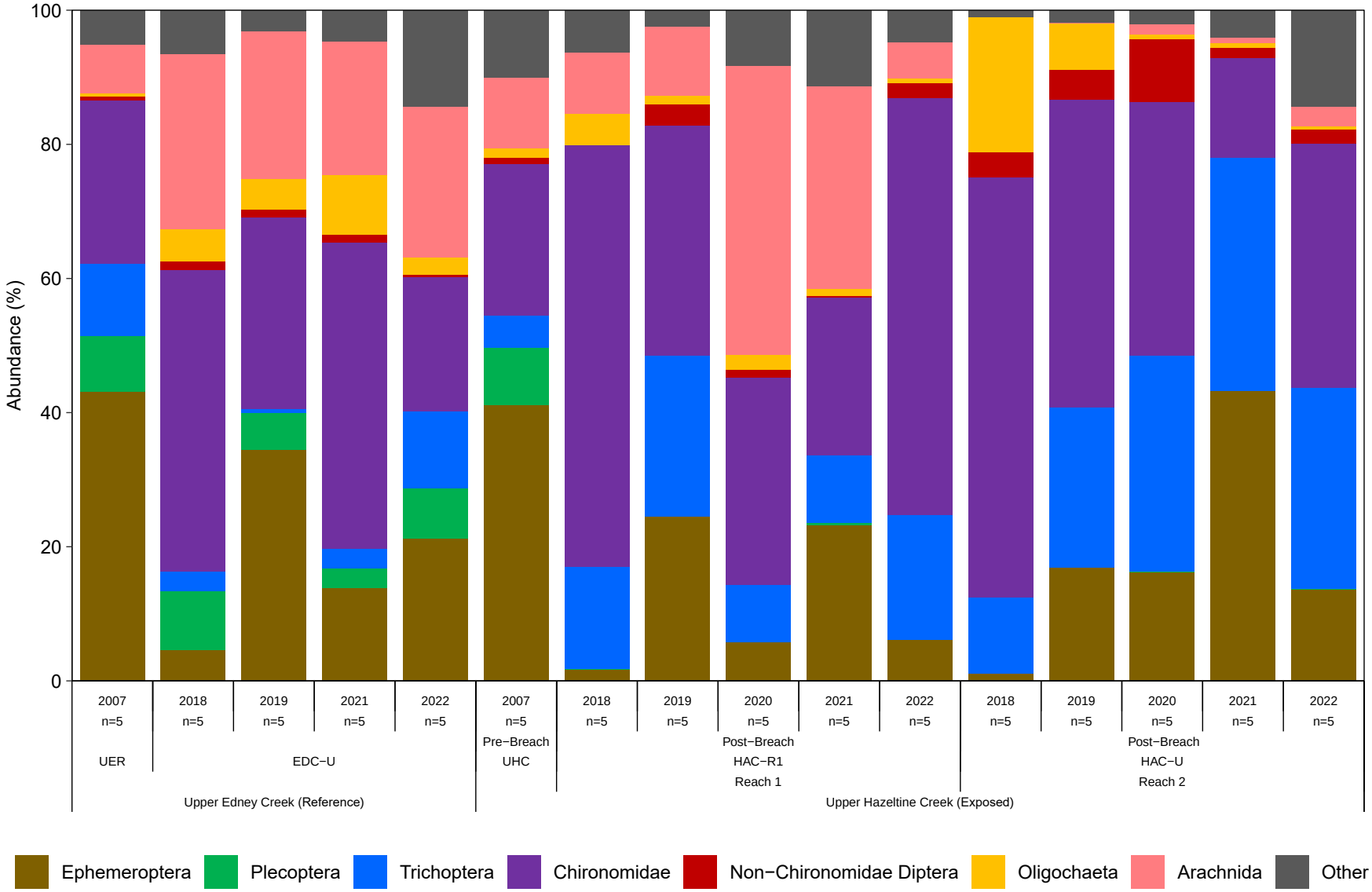


Figure 6.7: Relative Mean Densities of Major Benthic Invertebrate Community Taxonomic Groups for Upper Hazeltine Creek (HAC-R1, HAC-U; Exposed) and Upper Edney Creek (EDC-U; Reference), 2007 to 2022

and 2022 (Appendix Figures F.3.1 and F.3.2, Appendix Tables F.3.1). For both HAC-R1 and HAC-U, the increase in Chironomidae density between 2021 and 2022 reflected a return to densities that were similar to prior years (2018 to 2020) and was the primary driver of the temporal changes in total density observed between 2021 and 2022 at HAC-R1 (Appendix Figure F.3.1, Appendix Table F.3.1). For relative densities of Chironomidae, the significant increase between 2021 and 2022 reflected a return to 2018 conditions at HAC-R1 (i.e., significantly higher than 2019 to 2021) and a return to conditions similar to 2019 and 2020 at HAC-U (i.e., significantly higher than 2021; Appendix Figure F.3.1, Appendix Tables D.4.5, D.4.6, F.3.1). The relative density of Chironomidae in 2022 at HAC-R1 was significantly higher compared to HAC-U and showed a higher magnitude of difference to both reference and pre-breach. Chironomidae are tolerant of environmental stress (Mandaville 2002) and are generally expected to be present in greater proportion with increasing environmental disturbance (Barbour 1999). The significantly higher relative densities of Chironomidae in 2022 at HAC-R1 and HAC-U compared to reference and pre-breach indicate that the community in these areas have not yet fully recovered to pre-breach and reference conditions. In addition, the higher relative density and the greater magnitude of difference compared to reference for Chironomidae at HAC-R1 in 2022 compared to HAC-U suggest that the recovery of the benthic invertebrate community at HAC-R1 may be less advanced than at HAC-U.

The relative density of EPT at HAC-R1 in 2022 (25%) was significantly lower than pre-breach (55%) and the reference area (EDC-U; 43%), while the mean relative density of EPT at HAC-U (43%) was similar to pre-breach and the reference area in 2022 (Appendix Figures F.3.1, Appendix Table F.3.1). The lower relative density of EPT at HAC-R1 in 2022 contrasts with 2021 when EPT relative density at HAC-R1 was higher than reference. This temporal change in the relative density of EPT at HAC-R1 (from higher to lower than reference between 2021 and 2022) was driven by the significant increase in density of Chironomidae between 2021 and 2022, as evidenced by densities of EPT at HAC-R1 and HAC-U in 2022 that were similar to all prior years (i.e., a decrease in EPT density did not occur in 2022; Appendix Figures F.3.1 and F.3.2, Appendix Table F.3.1). Furthermore, the densities of EPT at HAC-R1 and HAC-U in 2022 were similar to both pre-breach and reference conditions, which suggests recovery of these taxa that are sensitive indicators of environmental disturbances (Lenat 1988, Herman and Nejadhashemi 2015). At HAC-R1 however, the relative density of EPT has remained significantly lower than pre-breach in all years except 2019, indicating that the proportion of the community that these sensitive taxa occupy has not yet recovered to pre-breach conditions (owing to a higher relative contribution of Chironomidae and/or Arachnida; Appendix Figures F.3.1 and F.3.2, Appendix Table F.3.1).

Within the EPT group, there were significant differences between areas and among years in the densities and relative densities of the individual Ephemeroptera, Plecoptera, and Trichoptera taxa. Most notably, the taxa Plecoptera (stoneflies), which were present pre-breach (8%) and at the reference area (EDC-U; 10%) in 2022, were not present at the upper Hazeltine Creek areas for all post-breach monitoring years including 2022 (Figure 6.7; Appendix Figure F.3.1, Appendix Table F.3.1). Plecoptera have narrow ecological requirements and are vulnerable to water pollution, habitat fragmentation, and alteration of water courses and their banks (Mandaville 2002). The lack of Plecoptera at the upper Hazeltine Creek areas since initiation of monitoring in 2018, suggest habitat conditions in these remediated areas are currently better suited for the colonization of Ephemeroptera and Trichoptera than Plecoptera for the EPT taxa.

The relative densities of Ephemeroptera (mayflies) at HAC-R1 (6%) and HAC-U (14%) in 2022 were significantly lower (-7.3 SD and -3.4 SD, respectively) than the reference area (EDC-U; 21%), and lower than pre-breach (41%; Figure 6.7; Appendix Table F.3.1). The lower relative density of Ephemeroptera at HAC-R1 and HAC-U in 2022 (compared to reference and pre-breach) contrasts with 2021 when relative densities at both areas were higher than reference and at HAC-U were similar to pre-breach (Appendix Figure F.3.1, Appendix Table F. 3.1). This temporal change in Ephemeroptera relative density was driven by the significant increase in Chironomidae density between 2021 and 2022 (similar to the temporal change observed for EPT), as evidenced by Ephemeroptera densities at HAC-R1 and HAC-U in 2022 that were similar to those in 2019 to 2021 (i.e., a decrease in Ephemeroptera density did not occur in 2022; Appendix Figures F.3.1 and F.3.2, Appendix Table F.3.1). Similar to most previous post-breach monitoring years (2018, 2020 2021), the mean density of Ephemeroptera at HAC-R1 in 2022 was still significantly lower (-2.2 SD) than pre-breach but significantly higher than in 2018. The mean density of Ephemeroptera at HAC-U has been consistently similar to pre-breach since 2019 (Appendix Tables D.4.6 and F.3.1). In comparison, the relative densities of Ephemeroptera at both HAC-R1 and HAC-U have been consistently lower than pre-breach since 2018 at both areas, except in 2021 at HAC-U when the relative density was similar to pre-breach (Figure 6.7; Appendix Figures F.3.1 and F.3.2, Appendix Table F.3.1). Further investigation of Ephemeroptera showed that the most abundant families (Leptophlebiidae and Baetidae) at HAC-R1 and HAC-U in 2022 are relatively intolerant to water pollution, whereas the most abundant family at the reference area (EDC-U; Heptageniidae) have a higher tolerance to water pollution (Mandaville 2002; Appendix G). The occurrence of Ephemeroptera families at the exposed areas that are less pollutant tolerant than those at the reference area suggests the significantly lower proportion of Ephemeroptera at the exposed areas

(compared to reference and pre-breach) is likely related to physical habitat conditions rather than chemical conditions (i.e., water chemistry).

The other notable change within EPT was the significantly higher relative density of Trichoptera (caddisflies) at both areas of upper Hazeltine Creek compared to pre-breach (in 2018, 2019, and 2022 at HAC-R1; in 2018 to 2022 at HAC-R1) and compared to the reference area in each year (2018 to 2022; Appendix Figure F.3.1, Appendix Table F.3.1). Examination of the relative density of EPT at both areas of upper Hazeltine Creek showed that Trichoptera was the dominant taxa in 2022 (i.e., greatest contributor to EPT relative density), while Ephemeroptera was the dominant taxa in 2021 (Figure 6.7; Appendix Table F.3.1, Appendix Figures F.3.1 and F.3.2). The density and relative density of Trichoptera in 2022 were similar to prior years (2019 to 2021) at both HAC-R1 and HAC-U, indicating temporal stability within each area (Appendix Figure F.3.1, Appendix Table F.3.1). The relative density of Trichoptera at HAC-U (29%) was significantly higher compared to HAC-R1 (18%) in 2022 and showed a higher magnitude of difference in 2022 to both reference and pre-breach. This higher relative density of Trichoptera at HAC-U (29%) in 2022 positively contributed to the higher relative density of EPT observed at HAC-U compared to HAC-R1 in 2022, discussed above (Appendix Figures F.3.1 and F.3.2, Appendix Table F.3.1). The significantly higher mean relative density of Trichoptera at both areas of upper Hazeltine Creek, compared to pre-breach and reference conditions, suggests that the remediated habitat is well suited to specific families within this group. Specifically, net-spinning caddisflies of the family Hydropsychidae composed greater than 74% and 83% of the mean relative density of Trichoptera at HAC-R1 and HAC-U, respectively in 2022. This is similar to results observed since 2018 and much higher than those observed during pre-breach conditions (46%; Appendix G; Minnow 2019a, 2020a, 2021a). A higher relative density of Hydropsychidae has been correlated with habitat disturbance in small streams (Houghton 2004), therefore the significantly higher mean relative density of this group at both areas of upper Hazeltine Creek in 2022 (since 2018 at HAC-R1 and 2019 at HAC-U) was consistent with early recovery of the benthic invertebrate community at this area.

For the remaining taxon evaluated (Arachnida, non-Chironomidae Diptera, and Oligochaeta), only Arachnida had relative densities in 2022 that differed from pre-breach. Specifically, Arachnida relative densities at HAC-U in 2022 were significantly lower than pre-breach, which is consistent with all prior years (2018 to 2022) while the relative densities of Arachnida at HAC-R1 have been similar to or significantly higher than pre-breach from 2018 to 2022 (Figure 6.7; Appendix Figure F.3.1, Appendix Table F.3.1). Reach 1 of Hazeltine Creek (where HAC-R1 is located) was characterized as having more pool habitat and lower water velocities than Reach 2 (where HAC-U is located; Minnow 2021a) and in 2022 periphyton productivity was greater at HAC-R1 compared to HAC-U (See Section 6.1.2.3). Arachnida mainly

inhabit aquatic vegetation (Schatz and Behan-Pelletier 2008), therefore the similar or higher relative densities of Arachnida at HAC-R1 compared to pre-breach was likely reflective of the recovery of aquatic vegetation in this remediated area.

Comparison of the community composition of HAC-R1 and HAC-U in 2022 based on the dominant taxa indicated that the densities and relative densities of most taxa were similar in 2022 between the two exposed areas with three exceptions. These exceptions are noted and discussed above and included significantly higher relative densities of Chironomidae and lower relative densities of EPT and Trichoptera at HAC-R1 compared to HAC-U in 2022 (Appendix Figure F.3.1, Appendix Table F.3.1). As indicated above, these differences in community composition suggest that benthic invertebrate community recovery is more advanced at HAC-U than at HAC-R1.

Correlation analysis indicated that some of differences in benthic invertebrate community metrics at the upper Hazeltine Creek areas (from 2018 to 2022) were related to water velocity, which is modified by the augmentation of water flows in Hazeltine Creek for the purposes of maintaining fish habitat (as outlined in Section 6.1.3.1; Minnow 2023). For instance, Simpson's Evenness and Diversity, the mean density and mean relative density of Ephemeroptera, Trichoptera, EPT and non-Chironomidae Diptera were positively correlated with mean water velocity, whereas the mean relative density of Arachnida was negatively correlated with mean water velocity. Specific conductance, which is reflective of water quality constituent concentrations, was positively correlated with Simpson's Evenness, and density and relative density of Chironomidae and Oligochaeta and negatively correlated with richness and density and density of Arachnida (Appendix Figure F.3.3, Appendix Table F.3.2). The correlations with specific conductance were driven by the highest values that were observed in 2018 and 2019 (immediately after remediation), with lower specific conductance results observed in 2020 onwards (Appendix Figure F.3.3). Of the benthic invertebrate endpoints correlated with specific conductance, taxon richness, Chironomidae density and relative, and Arachnida relative density were the only endpoints in 2022 that differed significantly from pre-breach. Taxon richness was also positively correlated with temperature (with a stronger relationship than observed with specific conductance) suggesting the influence of multiple factors on taxon richness. The significant positive correlation between density and relative density of Chironomidae and specific conductance is consistent with the tolerance of this taxon (Mandaville 2002). However, as indicated above, the occurrence of Ephemeroptera families at the exposed areas that are less pollutant tolerant than those at the reference area suggests the chemical conditions (i.e., water chemistry) of the exposed areas are not limiting for benthic invertebrate community recovery. This is further supported by the absence of significant correlations between Ephemeroptera or EPT and specific conductance. Density of Ephemeroptera and relative density of EPT were negatively, and mean relative density of

Chironomidae was positively correlated, respectively, with substrate size (Appendix Figure F.3.3, Appendix Table F.3.2)

Overall, benthic invertebrate community at both areas of Upper Hazeltine Creek in 2022 was characterized by density, richness, and Simpson's Evenness and Diversity that were similar between the two areas (HAC-R1 and HAC-U) and that were similar to reference and/or pre-breach conditions. Compared specifically to pre-breach, taxon richness at HAC-R1 in 2022 remained significantly decreased but was similar to reference conditions. These results indicate the benthic invertebrate community at these upper Hazeltine Creek areas have largely recovered to reference and/or pre-breach conditions when primary metrics (density, richness, Simpson's Evenness and Diversity) are considered. Chironomidae was the most abundant taxon at both upper Hazeltine Creek areas and was present in proportions at both areas in 2022 that were significantly higher than reference and pre-breach conditions. However, Chironomidae densities at HAC-R1 or HAC-U were only slightly higher than, or similar, respectively, to pre-breach conditions. Although lower relative density of EPT was shown at HAC-R1, but not HAC-U, compared to pre-breach and reference conditions, mean densities of EPT at both areas were similar to each other, pre-breach, and reference conditions. Notable differences in EPT at both upper Hazeltine Creek areas, compared to reference and pre-breach, were the lack of Plecoptera and the higher relative density of Trichoptera, which were dominated by a family of net-spinning caddisflies (Hydropsychidae). The occurrence of Ephemeroptera families at the exposed areas that are less pollutant tolerant than those at the reference area suggests the chemical conditions (i.e., water chemistry) of the exposed areas are not limiting for benthic invertebrate community recovery. Comparison of community composition between the two upper Hazeltine Creek areas suggested that benthic invertebrate community recovery is more advanced in Reach 2 (at HAC-U) than in Reach 1 (at HAC-R1). In summary, these results indicate both areas of upper Hazeltine Creek have recovered substantially since remediation to a condition that is similar to reference and/or pre-breach conditions based on primary metrics, but with some remaining differences in community composition compared to reference and pre-breach.

6.1.3.3 Productivity

Mean total dry biomass of benthic invertebrates at HAC-R1 and HAC-U was similar between the two upper Hazeltine Creek areas in 2022 and was also similar to prior years within each area (2019 to 2021; Figure 6.8; Appendix Table F.3.1). Similar to previous monitoring years, HAC-R1 and HAC-U had significantly higher (2.0 and 3.6 SD, respectively) dry biomass of benthic invertebrates in 2022 than the reference area (EDC-U; Figure 6.8), which at HAC-R1 was corroborated by significantly higher benthic invertebrate density than reference

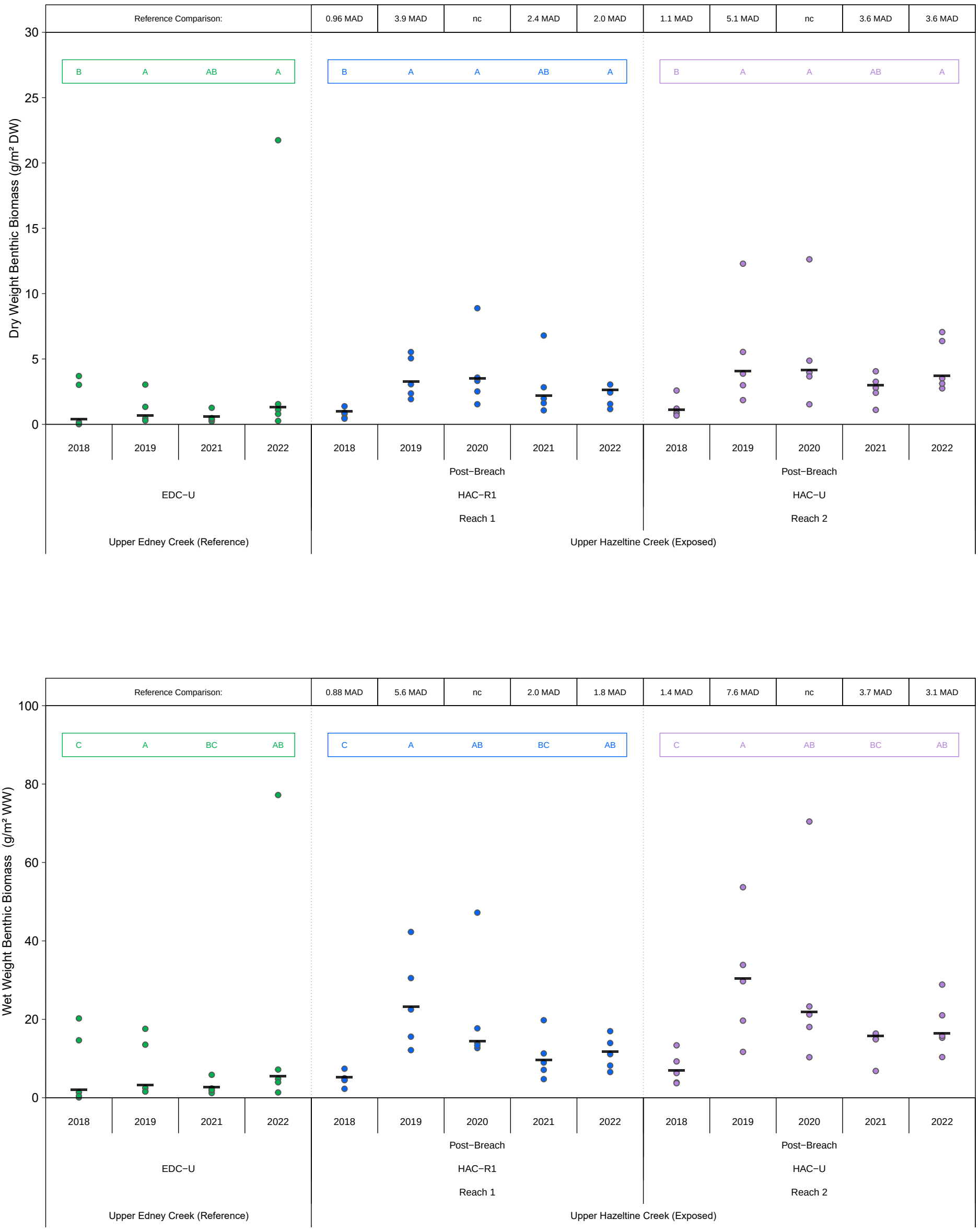


Figure 6.8: Benthic Invertebrate Biomass for Upper Hazeltine Creek (HAC−R1, HAC−U; Exposed) and Upper Edney Creek (EDC−U; Reference), 2018 to 2022

Notes: Reference area EDC−U was not sampled in 2020 due to habitat differences (in water depth and flow) relative to the remediated areas HAC−R1 and HAC−U. See Section 4.3 for details. Black bars represent measures of central tendency (mean, geometric mean, or median depending on if analysis was conducted on untransformed, log_{10}−transformed or rank−transformed data). Coloured letters represent significant (p−value <0.1) post−hoc comparisons within areas over time; years that share a letter of the same colour (e.g., A, B) within a box of the same colour do not differ significantly within an area. A number above the plot indicates significant exposed vs. reference post−hoc comparisons within a given year. The magnitude of difference (MOD) for these significant post−hoc comparisons is expressed in units of standard deviation (SD) or median absolute deviations (MAD; if the data were rank−transformed prior to analysis) relative to reference. 'nc' indicates no comparisons were possible; 'ns' indicates a non−significant contrast; 'nm' indicates that the MOD could not be calculated because MAD = 0.

(Figure 6.6; Appendix Table F.3.1). Benthic invertebrate dry weight biomass was positively correlated with mean water velocity (Appendix Figure F.3.3, Appendix Table F.3.2). The consistently higher benthic invertebrate dry biomass at the remediated areas relative to reference indicates benthic invertebrate productivity that has recovered to (and exceeded) reference conditions.

6.1.4 Periphyton and Benthic Invertebrate Tissue Quality

6.1.4.1 Overview

Periphyton and benthic invertebrate tissue samples were collected from remediated (exposed) areas of upper Hazeltine Creek (HAC-R1 and HAC-U) with upper Edney Creek (EDC-U) serving as reference, and at lower Hazeltine Creek (HAC-D) with an unimpacted area of lower Edney Creek (EDC-D) serving as reference (Figure 4.2; Table 4.4). A review of the 2022 periphyton and benthic invertebrate tissue quality data (Appendix B) indicated that the data largely met the established DQOs. Specifically, the data were characterized by appropriate detectability, negligible analyte concentrations in MB samples, low laboratory and field sampling precision, and excellent laboratory accuracy. The low laboratory and field precision were a result of sample heterogeneity (e.g., taxonomic variability in composite-taxa samples or natural variability within a single taxon); however, the collection of replicated samples (n = 8 per area in accordance with the CEMP; MPMC 2019) helped to characterize this variability. Overall, the tissue quality data can be used with a high level of confidence for interpretation, although the occurrence of some natural heterogeneity in analyte results were considered during data interpretation. A review of 2022 supporting water data quality indicated these data can be used with a good level of confidence for interpretation (see Section 5.1.1 for details).

As indicated in Section 4.4.3.2, data interpretation was focused on primary and secondary analytes (Table 2.4) with a significant positive exposed-reference difference (i.e., analytes with concentrations that were significantly higher in tissues from the remediated [exposed] area compared to those from the reference area) in 2022 (if the analysis *Area*×*Year* interaction was significant) or in all monitoring years (if the *Area*×*Year* interaction was not significant[63]) for at least one tissue type (periphyton, caddisfly, or composite-taxa benthic invertebrate) in at least one area. Data interpretations were further focused by integrating the results of water quality monitoring (i.e., bioconcentration) and trophic transfer factors (TTFs) of benthic invertebrate tissue analyte concentrations. Specifically, water quality data (and BCFs) for the analytes selected for data interpretation were examined to determine whether the

[63] If no significant change was detected in the exposed:reference ratio among years (i.e., the *Area* x *Year* interaction was not significant), then data from all available years were combined for the analyses.

significantly higher analyte concentrations in exposed tissues (relative to reference) were related to water chemistry. The TTFs for the analytes selected for data interpretation were also evaluated to determine if these analytes were bioaccumulating in the aquatic biota in Hazeltine Creek. Combined, these approaches were used to identify analytes for which concentrations in biota and TTFs at the exposed areas have increased at a rate that differs from reference and that may represent a potential risk to aquatic biota. This interpretive approach was completed separately for upper and lower Hazeltine Creek areas because the results for these areas differed slightly. Results for composite-taxa benthic invertebrate tissue samples are referred to as composite-taxa for the remainder of this section.

6.1.4.2 Upper Hazeltine Creek

For most metals evaluated, there was no evidence of increasing concentrations in periphyton and/or benthic invertebrate tissues at the exposed areas relative to the reference area over time (Appendix Figures F.4.1 to F.4.6, Appendix Tables D.5.1 to D.5.6, F.4.1 to F.4.10). The primary analytes arsenic, copper, iron, and selenium, and nine secondary analytes (barium, calcium, nickel, phosphorus, sodium, strontium, titanium, uranium, and vanadium) met the criteria for inclusion in data interpretation outlined above (i.e., were significantly higher for at least one exposed area of upper Hazeltine Creek relative to reference in 2022 or in all years; Table 6.7). Of these analytes, only titanium did not show a significant *Area×Year* interaction for at least one tissue type for at least one upper Hazeltine Creek area (Table 6.7).

MPMC implements routine water quality monitoring in upper Hazeltine Creek at HAC-13 (a station within the sampling area of HAC-R1) and at HAC-05a (a station downstream of HAC-U; Figure 4.2). Results from these routine water quality monitoring stations indicated that aqueous concentrations of two primary or secondary analytes (copper and selenium) exceeded the BCWQG during the year preceding sampling (i.e., September 2021 to August 2022). Specifically, the chronic BCWQG for dissolved copper, which is based on the BLM (BCMOECCS 2019b,c, 2021b) was exceeded in 75% of the samples collected from both station HAC-13 (HAC-R1) and station HAC-05a (HAC-U; Appendix Tables D.1.3 and D.1.4). The chronic BCWQG for total selenium (0.002 mg/L; BCMOECCS 2021b) was exceeded in 42% of the samples collected from station HAC-05a (HAC-U); selenium did not exceed the BCWQG at station HAC-13 (HAC-R1; Appendix Tables D.1.3 and D.1.4).

Of the four primary and nine secondary analytes identified for inclusion in data interpretation, mean dissolved aqueous concentrations of copper and selenium were elevated at HAC-R1 and

Table 6.7: Summary of Statistical Contrasts of Exposed - Reference Relative Differences of Primary and Secondary Analyte Concentrations in Periphyton, Caddisfly, and Composite-Taxa Benthic Invertebrate Tissue for Upper Hazeltine Creek (HAC-R1, HAC-U; Exposed), Upper Edney Creek (EDC-U; Reference), Lower Hazeltine Creek (HAC-D; Exposed), and Lower Edney Creek (EDC-D; Reference), 2015 to 2022 [a]

Analytes		Upper Hazeltine Creek Reach 1 (HAC-R1; Exposed) — Upper Edney Creek (EDC-U; Reference)															Upper Hazeltine Creek Reach 2 (HAC-U; Exposed) — Upper Edney Creek (EDC-U; Reference)														
		Periphyton					Caddisfly					Composite-Taxa Benthic Invertebrate					Periphyton					Caddisfly					Composite-Taxa Benthic Invertebrate				
		2018	2019	2020	2021	2022	2018	2019	2020	2021	2022	2018	2019	2020	2021	2022	2018	2019	2020	2021	2022	2018	2019	2020	2021	2022	2018	2019	2020	2021	2022
Primary Analyte	Arsenic	A (↓)	A (↓)	C (↓)	BC (↓)	B (↓)	AB	A	BC	C	C	A (ns)	B (ns)	B (ns)	B (ns)	A (ns)	A (↓)	A (↓)	C (↓)	AB (↓)	BC (↓)	AB	A	CD	D	BC	B (ns)	B (ns)	C (↓)	BC (ns)	A (ns)
	Copper	A (ns)	AB (ns)	AB (ns)	B (↓)	A (ns)	A	A	BC	B	C	A (↑)	BC (↑)	C (ns)	AB (↑)	BC (↑)	A (ns)	A (ns)	A (ns)	A (ns)	A (ns)	B	A	D	CD	C	B (ns)	B (↑)	C (ns)	B (↑)	A (↑)
	Iron	A (↓)	A (↓)	A (↓)	B (↓)	A (↓)	A	A	B	B	B	B (-)	B (-)	B (-)	AB (-)	A (-)	A (↓)	A (↓)	AB (↓)	B (↓)	A (↓)	A	A	B	B	A	A (-)	A (-)	B (-)	A (-)	A (-)
	Selenium	B (↓)	AB (↓)	A (↓)	A (↓)	A (↓)	C	C	BC	A	AB	D (↓)	CD (↓)	AB (↓)	A (↓)	BC (↓)	C (↓)	BC (↓)	AB (↓)	AB (↓)	A (ns)	D	C	B	B	A	B (↓)	B (↓)	A (↓)	A (↓)	A (↓)
Secondary Analyte	Barium	A (ns)	AB (ns)	C (ns)	AB (ns)	BC (ns)	AB	A	CD	D	BC	BC (ns)	AB (ns)	C (ns)	C (ns)	A (ns)	A (ns)	A (ns)	B (ns)	A (ns)	A (ns)	B	A	C	C	AB	B (↓)	A (ns)	C (↓)	B (ns)	A (ns)
	Cadmium	A (ns)	A (ns)	B (↓)	B (↓)	B (↓)	B	A	C	C	BC	A (↑)	A (↑)	B (ns)	AB (↑)	A (ns)	AB (ns)	A (ns)	C (ns)	B (↓)	C (↓)	BC	A	D	C	B	A (↑)	AB (ns)	C (ns)	BC (ns)	A (ns)
	Calcium	B (↑)	A (↑)	A (↑)	A (↑)	A (↑)	A	A	B	B	B	A (↑)	BC (ns)	C (ns)	BC (ns)	B (ns)	BC (↑)	A (↑)	BC (↑)	AB (↑)	C (↑)	A	A	D	C	B	C (ns)	B (↑)	D (ns)	C (↑)	A (↑)
	Manganese	AB (↓)	A (↓)	C (↓)	AB (↓)	BC (↓)	B	A	C	C	B	B (↓)	A (ns)	B (↓)	A (ns)	A (↓)	B (↓)	A (↓)	B (↓)	A (↓)	B (↓)	C	A	D	C	B	C (↓)	A (ns)	D (↓)	BC (ns)	B (↓)
	Molybdenum	A (ns)	A (ns)	B (ns)	B (ns)	B (ns)	A	B	A	A	B	B (ns)	B (ns)	A (ns)	AB (ns)	C (ns)	A (↓)	A (ns)	A (ns)	A (ns)	A (ns)	B	C	A	B	C	B (ns)	AB (ns)	A (↑)	B (ns)	C (↓)
	Nickel	A (↓)	A (↓)	A (↓)	A (↓)	A (↓)	AB	A	C	C	BC	AB (↓)	BC (↓)	C (↓)	BC (ns)	A (↓)	AB (↓)	A (↓)	C (↓)	BC (↓)	BC (↓)	B	A	D	C	AB	B (↓)	AB (↓)	C (↓)	B (↓)	A (↓)
	Phosphorus	A (↓)	A (↓)	A (↓)	A (↓)	A (↓)	A	A	B	A	A	C (-)	BC (-)	AB (-)	A (-)	AB (-)	AB (↓)	B (↓)	AB (↓)	A (↓)	A (ns)	AB	A	B	AB	A	B (-)	C (-)	C (-)	BC (-)	A (-)
	Sodium	AB (ns)	D (ns)	BC (ns)	CD (↓)	A (↓)	AB	A	C	B	AB	ABC (-)	C (-)	BC (-)	AB (-)	A (-)	A (ns)	B (ns)	AB (ns)	A (ns)	A (ns)	B	A	C	C	B	AB (-)	C (-)	BC (-)	BC (-)	A (-)
	Strontium	AB (↑)	A (↑)	BC (↑)	A (↑)	C (↑)	A	A	C	BC	B	A (↑)	BC (ns)	C (ns)	BC (ns)	B (ns)	A (↑)	A (↑)	B (↑)	A (↑)	B (↑)	AB	A	D	C	B	C (ns)	B (↑)	D (ns)	C (ns)	A (↑)
	Titanium	-	A (↓)	A (↓)	B (↓)	A (↓)	-	A	B	B	B	-	A (-)	A (-)	A (-)	A (-)	-	A (↓)	A (↓)	B (↓)	A (↓)	-	A	B	B	A	-	A (-)	A (-)	A (-)	A (-)
	Uranium	A (↓)	B (↓)	B (↓)	C (↓)	AB (↓)	AB	A	D	CD	BC	B (ns)	B (ns)	B (↓)	B (ns)	A (ns)	A (↓)	A (↓)	A (↓)	A (↓)	A (↓)	B	A	D	C	A	B (↓)	B (ns)	C (↓)	B (ns)	A (ns)
	Vanadium	A (↓)	AB (↓)	B (↓)	C (↓)	A (↓)	A	A	B	B	B	B (ns)	B (ns)	B (ns)	B (↑)	A (ns)	A (↓)	A (↓)	AB (↓)	B (↓)	A (↓)	A	A	B	B	A	A (ns)	A (ns)	B (ns)	A (ns)	A (ns)

Indicates significantly higher tissue concentration at exposed compared to reference area, and the interaction (Area x Year) term of the two-way ANOVA was not significant (α = 0.05; i.e., the difference between exposed and reference did not change significantly among years).

Indicates significantly lower tissue concentration at exposed compared to reference area (α = 0.05), and the interaction (Area x Year) term of the two-way ANOVA was not significant (α = 0.05; i.e., the difference between exposed and reference did not change significantly among years).

Indicates significantly higher tissue concentration at exposed compared to reference area (α = 0.05), and the interaction (Area x Year) term of the two-way ANOVA was significant (α = 0.05; i.e., the difference between exposed and reference changed significantly among years).

Indicates significantly lower tissue concentration at exposed compared to reference area (α = 0.05), and the interaction (Area x Year) term of the two-way ANOVA was significant (α = 0.05; i.e., the difference between exposed and reference changed significantly among years).

(↑) = Indicates significantly higher tissue concentration relative to pre-breach in 2010 (α = 0.05).
(↓) = Indicates significantly lower tissue concentration relative to pre-breach in 2010 (α = 0.05).
(ns) = no significant different in analyte concentration relative to pre-breach in 2010 (α = 0.05).
Notes: "-" = no statistical comparison could be made because data were not available or all results below Laboratory Reporting Limit (LRL), refer to Appendix Tables F.4.1 to F.4.10 and F.4.17 to F.4.21 for statistical analyses results and magnitude of difference calculations. Data were analysed in units of mg/kg dry weight.

[a] Results are shown for primary and secondary analytes that had a significant positive exposed - reference difference in 2022 or in all monitoring years for one or more tissue types (periphyton, caddisfly, or composite benthic invertebrate) in at least one area. Years that share a letter (e.g., A,B,C) had ratios of analyte concentrations (Exposed:Reference) that did not differ significantly among years. Letters are assigned such that A is assigned to the year with the highest ratio of concentrations (Exposed:Reference).

Table 6.7: Summary of Statistical Contrasts of Exposed - Reference Relative Differences of Primary and Secondary Analyte Concentrations in Periphyton, Caddisfly, and Composite-Taxa Benthic Invertebrate Tissue for Upper Hazeltine Creek (HAC-R1, HAC-U; Exposed), Upper Edney Creek (EDC-U; Reference), Lower Hazeltine Creek (HAC-D; Exposed), and Lower Edney Creek (EDC-D; Reference), 2015 to 2022 [a]

Analytes		Lower Hazeltine Creek Reach 5 (HAC-D; Exposed) / Lower Edney Creek (EDC-D; Reference)																	
		Periphyton						Caddisfly					Composite-Taxa Benthic Invertebrate						
		2017	2018	2019	2020	2021	2022	2018	2019	2020	2021	2022	2015	2018	2019	2020	2021	2022	
Primary Analyte	Arsenic	A (ns)	A (ns)	A (ns)	A (ns)	A (ns)	A (ns)	C	A	AB	AB	B	A (ns)	C (↓)	AB (ns)	AB (ns)	B (ns)	AB (ns)	
	Copper	A (↑)	AB (↑)	C (↑)	C (↑)	A (↑)	BC (↑)	D	BC	B	A	CD	A (↑)	C (ns)	C (↑)	C (↑)	B (↑)	C (↑)	
	Iron	A (ns)	A (ns)	BC (ns)	BC (ns)	AB (ns)	C (ns)	B	A	B	A	B	A (-)	C (-)	B (-)	BC (-)	B (-)	BC (-)	
	Selenium	BC (ns)	D (ns)	CD (↓)	AB (ns)	C (ns)	A (ns)	D	CD	BC	A	AB	ABC (↓)	C (ns)	BC (↓)	AB (ns)	ABC (↑)	A (↑)	
Secondary Analyte	Barium	B (ns)	A (ns)	B (ns)	AB (ns)	A (ns)	AB (ns)	C	AB	B	A	B	A (ns)	C (↓)	B (ns)	B (ns)	B (ns)	B (ns)	
	Cadmium	A (ns)	A (ns)	A (ns)	A (↑)	A (ns)	A (ns)	C	B	B	A	B	A (ns)	B (ns)	B (ns)	B (↑)	B (ns)	B (↑)	
	Calcium	E (ns)	C (↑)	B (↑)	AB (↑)	D (ns)	A (↑)	C	B	B	A	B	A (ns)	C (ns)	C (ns)	BC (ns)	A (ns)	AB (ns)	
	Manganese	AB (ns)	AB (ns)	BC (ns)	AB (ns)	C (↓)	A (ns)	C	AB	B	A	AB	AB (↓)	D (↓)	BC (↓)	AB (ns)	C (↓)	A (ns)	
	Molybdenum	A (↑)	B (ns)	B (ns)	B (ns)	B (ns)	B (ns)	A	B	C	D	BC	C (↓)	B (ns)	A (ns)	B (ns)	B (↓)	B (↓)	
	Nickel	A (ns)	AB (ns)	BC (ns)	BC (ns)	B (ns)	C (ns)	D	AB	BC	A	CD	A (↓)	B (↓)	B (↓)	B (↓)	B (↓)	B (↓)	
	Phosphorus	CD (ns)	D (ns)	CD (ns)	BC (ns)	AB (ns)	A (↑)	A	B	A	A	AB	C (-)	A (-)	B (-)	A (-)	A (-)	A (-)	
	Sodium	AB (ns)	B (ns)	B (ns)	AB (ns)	A (ns)	A (ns)	B	B	A	B	B	C (-)	A (-)	BC (-)	AB (-)	BC (-)	AB (-)	
	Strontium	D (ns)	C (↑)	B (↑)	AB (↑)	C (ns)	A (↑)	C	AB	B	A	B	A (ns)	B (ns)	B (ns)	B (ns)	A (ns)	A (ns)	
	Titanium	-	-	A (ns)	A (ns)	A (ns)	A (ns)	-	A	B	A	B	A (-)	-	BC (-)	C (-)	AB (-)	C (-)	
	Uranium	A (ns)	AB (ns)	C (ns)	BC (ns)	AB (ns)	BC (ns)	C	B	B	A	B	A (ns)	C (↓)	B (ns)	B (ns)	B (ns)	B (ns)	
	Vanadium	A (ns)	A (ns)	BC (ns)	BC (ns)	AB (ns)	C (ns)	B	A	B	A	B	A (↑)	C (ns)	BC (ns)	BC (ns)	B (ns)	BC (ns)	

Indicates significantly higher tissue concentration at exposed compared to reference area, and the interaction (Area x Year) term of the two-way ANOVA was not significant (α = 0.05; i.e., the difference between exposed and reference did not change significantly among years).

Indicates significantly lower tissue concentration at exposed compared to reference area (α = 0.05), and the interaction (Area x Year) term of the two-way ANOVA was not significant (α = 0.05; i.e., the difference between exposed and reference did not change significantly among years).

Indicates significantly higher tissue concentration at exposed compared to reference area (α = 0.05), and the interaction (Area x Year) term of the two-way ANOVA was significant (α = 0.05; i.e., the difference between exposed and reference changed significantly among years).

Indicates significantly lower tissue concentration at exposed compared to reference area (α = 0.05), and the interaction (Area x Year) term of the two-way ANOVA was significant (α = 0.05; i.e., the difference between exposed and reference changed significantly among years).

(↑) = Indicates significantly higher tissue concentration relative to pre-breach in 2010 (α = 0.05).
(↓) = Indicates significantly lower tissue concentration relative to pre-breach in 2010 (α = 0.05).
(ns) = no significant different in analyte concentration relative to pre-breach in 2010 (α = 0.05).
Notes: "-" = no statistical comparison could be made because data were not available or all results below Laboratory Reporting Limit (LRL), refer to Appendix Tables F.4.1 to F.4.10 and F.4.17 to F.4.21 for statistical analyses results and magnitude of difference calculations. Data were analysed in units of mg/kg dry weight.

[a] Results are shown for primary and secondary analytes that had a significant positive exposed - reference difference in 2022 or in all monitoring years for one or more tissue types (periphyton, caddisfly, or composite benthic invertebrate) in at least one area. Years that share a letter (e.g., A,B,C) had ratios of analyte concentrations (Exposed:Reference) that did not differ significantly among years. Letters are assigned such that A is assigned to the year with the highest ratio of concentrations (Exposed:Reference).

HAC-U relative to reference, as were the secondary analytes calcium, sodium, strontium, and uranium (Table 6.8)[64]. Despite elevated dissolved aqueous concentrations of copper and selenium relative to reference, periphyton BCFs for these primary analytes in upper Hazeltine Creek were generally lower than reference in 2022, as expected[65], and similar to results from 2021 (Minnow 2022a). The BCF for copper was 4.4 times greater than reference at HAC-U and 1.2 times greater than reference at HAC-R1 for composite-taxa tissues, and not elevated for caddisfly tissues. The BCF for selenium was slightly (< 2 times) greater than reference for caddisfly at both HAC-R1 and HAC-U and not elevated in composite-taxa tissues (Table 6.8; Appendix Tables D.5.1 to D.5.6). The BCFs were at least 2.0 times greater than reference for arsenic, iron, barium, calcium, nickel, phosphorus, strontium, titanium, and vanadium in at least one tissue type for at least one area of upper Hazeltine Creek (Table 6.8).

Concentrations of copper in most tissue types from upper Hazeltine Creek were consistently elevated relative to the reference area (EDC-U) from 2018 to 2022, with the exception of caddisfly tissues at HAC-R1 (in 2022) and HAC-U (in 2020 and 2021), and periphyton tissues from HAC-R1 (in 2019 to 2021; Figures 6.9 and 6.10, Table 6.7; Appendix Figures F.4.1 to F.4.6, Appendix Tables F.4.1 to F.4.10). Specifically, copper concentrations in periphyton tissues from HAC-R1 were significantly higher than reference in 2018 and 2022 but similar to reference in the interim years (2019 to 2021), and at HAC-U have been consistently elevated relative to reference from 2018 to 2022 (Figures 6.9 and 6.10, Table 6.7). Copper concentrations in periphyton tissues from both areas (HAC-R1 and HAC-U) in 2022 were similar to those in 2018, relative to reference, indicating no temporal increase has occurred (Figures 6.9 and 6.10, Table 6.7). Concentrations of copper in caddisfly tissue samples in 2022 at HAC-R1 were similar to reference but at HAC-U were significantly higher than reference. However, the magnitude of these differences relative to reference in 2022 were significantly lower than in 2018, 2019 and 2021 at HAC-R1, and lower than in 2018 and 2019 (but not different from 2021 and higher than 2020) at HAC-U (Table 6.7). Most notable, concentrations of copper in composite-taxa tissues from HAC-U have steadily increased since 2020 and were significantly higher in 2022 compared to all previous monitoring years, relative to reference (Figure 6.10, Table 6.7). In contrast, the concentrations of copper in composite-taxa tissues from HAC-R1 have varied among previous monitoring years and in 2022 exposed:reference ratios were significantly lower than 2018 (Figure 6.9, Table 6.7). Copper concentrations in composite-taxa tissue for both areas of upper Hazeltine Creek in 2022

[64] Elevated analytes were identified as those with mean concentrations at the exposed station that were at least twice the mean concentration at the reference station.

[65] Both BCFs and trophic TTFs are generally expected to decrease with increasing concentration. Increased BCFs and TTFs with increasing concentrations can be suggestive of enhanced bioavailability or reduced ability of organisms to regulate metals.

Table 6.8: Summary of Primary and Secondary Analytes Concentrations in Water, Periphyton, Composite-Taxa, and Caddisfly Tissues, BCFs and TTFs for Upper Hazeltine Creek (HAC-R1, HAC-U; Exposed), Upper Edney Creek (EDC-U; Reference), Lower Hazeltine Creek (HAC-D; Exposed), and Lower Edney Creek (EDC-D; Reference), 2022

Analytes		Component	Metric	Units	n	Area				
						Reference		Breach-exposed	Breach-exposed Previously Effluent Exposed	
						Upper Edney Creek	Lower Edney Creek	Upper Hazeltine Creek		Lower Hazeltine Creek
						EDC-U	EDC-D	HAC-R1	HAC-U	HAC-D
Primary Analytes	Arsenic (As)	Dissolved[a,b,c]	Mean[d]	mg/L	-	0.000410	0.00102	0.000474	0.000536	0.000629
		Periphyton	Tissue Mean	mg/kg	8	22.8	15.5	2.48	3.15	13.3
			BCF[e]	unitless	-	55,610	15,196	5,232	5,877	21,145
		Caddisfly	Tissue Mean	mg/kg	8	0.746	3.46	0.304	0.432	0.925
			BCF[e]	unitless	-	1,820	3,392	641	806	1,471
			TTF[f]	unitless	-	0.0382	0.270	0.131	0.154	0.140
		Composite	Tissue Mean	mg/kg	8	1.02	1.96	2.04	3.06	2.35
			BCF[e]	unitless	-	2,488	1,922	4,304	5,709	3,736
			TTF[f]	unitless	-	0.0682	0.139	0.875	1.08	0.253
	Copper (Cu)	Dissolved[a,b,c]	Mean[d]	mg/L	-	0.00181	***0.00195***	***0.00784***	***0.00871***	***0.0102***
		Periphyton	Tissue Mean	mg/kg	8	37.1	25.8	69.5	116	230
			BCF[e]	unitless	-	20,497	13,231	8,865	13,318	22,549
		Caddisfly	Tissue Mean	mg/kg	8	15.8	19.8	15.6	20.2	32.5
			BCF[e]	unitless	-	8,729	10,154	1,990	2,319	3,186
			TTF[f]	unitless	-	0.442	0.787	0.282	0.391	0.335
		Composite	Tissue Mean	mg/kg	8	23.5	33.6	119	500	73
			BCF[e]	unitless	-	12,983	17,231	15,179	57,405	7,157
			TTF[f]	unitless	-	0.658	1.34	2.18	10.3	0.682
	Iron (Fe)	Dissolved[a,b,c]	Mean[d]	mg/L	-	0.106	0.118	0.0450	0.0458	0.0586
		Periphyton	Tissue Mean	mg/kg	8	23,658	22,250	3,195	3,481	19,100
			BCF[e]	unitless	-	223,189	188,559	71,000	76,004	325,939
		Caddisfly	Tissue Mean	mg/kg	8	601	3,708	164	247	722
			BCF[e]	unitless	-	5,670	31,424	3,644	5,393	12,321
			TTF[f]	unitless	-	0.0312	0.204	0.0666	0.0905	0.136
		Composite	Tissue Mean	mg/kg	8	1,262	1,368	3,299	1,835	1,996
			BCF[e]	unitless	-	11,906	11,593	73,311	40,066	34,061
			TTF[f]	unitless	-	0.0745	0.0627	1.46	0.746	0.261
	Selenium (Se)	Dissolved[a,b,c]	Mean[d]	mg/L	-	0.000130	0.000128	0.000793	0.00152	0.00112
		Periphyton	Tissue Mean	mg/kg	8	0.770	1.10	1.98	4.11	2.82
			BCF[e]	unitless	-	5,923	8,594	2,497	2,704	2,518
		Caddisfly	Tissue Mean	mg/kg	8	0.689	1.46	**6.69**	**13.1**	**4.58**
			BCF[e]	unitless	-	5,300	11,406	8,436	8,618	4,089
			TTF[f]	unitless	-	0.988	1.36	3.55	4.52	2.16
		Composite	Tissue Mean	mg/kg	8	0.978	1.82	**4.97**	**6.77**	**4.94**
			BCF[e]	unitless	-	7,523	14,219	6,267	4,454	4,411
			TTF[f]	unitless	-	1.43	1.77	2.56	2.55	2.28
Secondary Analytes	Barium (Ba)	Dissolved[a,b,c]	Mean[d]	mg/L	-	0.00842	0.0142	0.0119	0.0142	0.0167
		Periphyton	Tissue Mean	mg/kg	8	461	148	124	235	293
			BCF[e]	unitless	-	54,751	10,423	10,420	16,549	17,545
		Caddisfly	Tissue Mean	mg/kg	8	18.1	46	3.28	5.22	17.9
			BCF[e]	unitless	-	2,150	3,239	276	368	1,072
			TTF[f]	unitless	-	0.0289	0.329	0.0327	0.0394	0.104
		Composite	Tissue Mean	mg/kg	8	10.7	17.8	42.4	41.9	32.7
			BCF[e]	unitless	-	1,271	1,254	3,563	2,951	1,958
			TTF[f]	unitless	-	0.0361	0.119	0.372	0.313	0.153
	Cadmium (Cd)	Dissolved[a,b,c]	Mean[d]	mg/L	-	0.00000920	0.00000633	0.00000556	0.00000594	0.00000565
		Periphyton	Tissue Mean	mg/kg	8	1.81	0.547	0.176	0.195	0.583
			BCF[e]	unitless	-	196,739	86,414	31,655	32,828	103,186
		Caddisfly	Tissue Mean	mg/kg	8	0.193	0.310	0.0366	0.0648	0.350
			BCF[e]	unitless	-	20,978	48,973	6,583	10,909	61,947
			TTF[f]	unitless	-	0.110	0.867	0.282	0.340	1.00
		Composite	Tissue Mean	mg/kg	8	1.09	1.07	0.628	0.581	1.15
			BCF[e]	unitless	-	118,478	169,036	112,950	97,811	203,540
			TTF[f]	unitless	-	0.861	3.18	3.30	3.19	2.69
	Calcium (Ca)	Dissolved[a,b,c]	Mean[d]	mg/L	-	16.2	26.2	40.6	46.0	42.0
		Periphyton	Tissue Mean	mg/kg	8	10,382	10,804	239,500	192,875	312,000
			BCF[e]	unitless	-	641	412	5,899	4,193	7,429
		Caddisfly	Tissue Mean	mg/kg	8	702	1,839	624	1,173	1,418
			BCF[e]	unitless	-	43	70.2	15	26	33.8
			TTF[f]	unitless	-	0.0696	0.203	0.00263	0.00620	0.00572
		Composite	Tissue Mean	mg/kg	8	1,475	1,968	7,826	25,699	3,388
			BCF[e]	unitless	-	91	75	193	559	80.7
			TTF[f]	unitless	-	0.148	0.208	0.0330	0.138	0.0112
	Manganese (Mn)	Dissolved[a,b,c]	Mean[d]	mg/L	-	0.0118	0.00572	0.0178	0.0268	0.0104
		Periphyton	Tissue Mean	mg/kg	8	16,114	2,678	1,354	2,868	4,324
			BCF[e]	unitless	-	1,365,593	468,182	76,067	107,015	415,769
		Caddisfly	Tissue Mean	mg/kg	8	716	511	172	324	561
			BCF[e]	unitless	-	60,678	89,336	9,663	12,090	53,942
			TTF[f]	unitless	-	0.0362	0.211	0.136	0.120	0.305
		Composite	Tissue Mean	mg/kg	8	731	307	923	987	889
			BCF[e]	unitless	-	61,949	53,671	51,854	36,828	85,481
			TTF[f]	unitless	-	0.0659	0.128	0.761	0.373	0.333

Dissolved concentration at exposed area exceeded reference area by less than 2-times.
Dissolved concentration at exposed area exceeded reference area by at least 2-times.
Dissolved concentration at exposed area exceeded reference area by at least than 5-times.
Indicates significantly higher tissue concentration at exposed compared to reference area (α = 0.05).
Indicates significantly lower tissue concentration at exposed compared to reference area (α = 0.05).
BCF for exposed area exceeded reference area by less than 2-times.
BCF for exposed area exceeded reference area by at least 2-times.
BCF for exposed area exceeded reference area by at least 10-times.
Mean TTF exceeds 1.
Mean TTF at exposed area exceeds 1 and the corresponding reference area TTF for a given year.
Mean TTF at exposed area exceeds 1, the corresponding reference area TTF for a given year, and mean TTFs for all previous years (pre-breach and 2017 when applicable).

BOLD = mean tissue selenium value exceeds long-term benthic invertebrate tissue guideline for selenium (4 mg/kg dw; BCMOE 2014).

BOLD/ITALICS = Indicates dissolved water value greater than the long-term average British Columbia Water Quality Guideline (BCMOECCS 2021a,b).

Notes: Results are shown for primary and secondary analytes that are presented in Table 6.7 (i.e., those with a significant positive exposed - reference difference in 2022 or in all monitoring years for one or more tissue types [periphyton, caddisfly, or composite benthic invertebrate] in at least one area). "-" = no data for dissolved water concentration/ BCF was not calculated for analytes due to no data for dissolved water concentration. "na" = not applicable. Summary statistics reported to 3 significant figures for display purposes.

[a] Monitoring stations included W10, HAC-13, HAC-05a, and HAC-08 for corresponding tissue sampling stations EDC-D, HAC-R1, HAC-U, and HAC-D, respectively (refer to Appendix Tables D.1.3, D.1.4, D.1.6, and D.1.7). For EDC-U routine water quality data were not available, so BCFs were calculated using spot water quality samples taken during tissue collection.

[b] Sample sizes for water quality monitoring are 1, 3, 8, 8, and 8 for EDC-U (EDC-U spot water quality monitoring), EDC-D (W10), HAC-R1 (HAC-13), HAC-U (HAC-05a), and HAC-D (HAC-08).

[c] Guidelines were derived from the British Columbia Water Quality Guidelines for the protection of aquatic life (BCMOECCS 2021a,b) outlined in Table D.1.1.

[d] Means were calculated for routine water quality stations using data collected between January 1, 2022 and the time of sampling in August 2022 in order to be consistent with means calculated during previous years (Minnow 2016d, 2017c, 2018c, 2019, 2020a, 2021a, 2022a).

[e] Bioconcentration Factor (BCF) = Mean Tissue Concentration (mg/kg dw) / Mean Dissolved Water Concentration (mg/L), if the dissolved water concentration was reported as below the Laboratory Reporting Limit (LRL), then the LRL was substituted for the BCF calculation.

[f] Trophic Transfer Function (TTF) = Benthic Invertebrate Tissue Concentration / Periphyton Tissue Concentration. If the reported analyte concentrations for either periphyton or benthic invertebrate tissue were below the LRL, the TTF was not calculated.

Table 6.8: Summary of Primary and Secondary Analytes Concentrations in Water, Periphyton, Composite-Taxa, and Caddisfly Tissues, BCFs and TTFs for Upper Hazeltine Creek (HAC-R1, HAC-U; Exposed), Upper Edney Creek (EDC-U; Reference), Lower Hazeltine Creek (HAC-D; Exposed), and Lower Edney Creek (EDC-D; Reference), 2022

Analytes		Component	Metric	Units	n	Area				
						Reference		Breach-exposed	Breach-exposed Previously Effluent Exposed	
						Upper Edney Creek	Lower Edney Creek	Upper Hazeltine Creek		Lower Hazeltine Creek
						EDC-U	EDC-D	HAC-R1	HAC-U	HAC-D
Secondary Analytes	Molybdenum (Mo)	Dissolved[a,b,c]	Mean[d]	mg/L	-	0.000331	0.000722	0.00690	0.00662	0.00558
		Periphyton	Tissue Mean	mg/kg	8	2.88	1.51	1.45	1.32	2.08
			BCF[e]	unitless	-	8,701	2,091	210	199	373
		Caddisfly	Tissue Mean	mg/kg	8	11.1	3.46	6.52	10.1	3.74
			BCF[e]	unitless	-	33,535	4,792	945	1,526	670
			TTF[f]	unitless	-	4.32	2.72	4.88	8.01	4.44
		Composite	Tissue Mean	mg/kg	8	5.83	0.762	3.66	2.75	2.08
			BCF[e]	unitless	-	17,613	1,055	530	415	373
			TTF[f]	unitless	-	2.29	0.557	2.73	2.36	2.70
	Nickel (Ni)	Dissolved[a,b,c]	Mean[d]	mg/L	-	0.00100	0.000887	0.000514	<0.0005	0.000558
		Periphyton	Tissue Mean	mg/kg	8	54.1	31.5	4.52	3.60	18.6
			BCF[e]	unitless	-	54,100	35,513	8,794	7,200	33,333
		Caddisfly	Tissue Mean	mg/kg	8	1.64	8.20	0.301	0.355	1.06
			BCF[e]	unitless	-	1,640	9,245	586	710	1,900
			TTF[f]	unitless	-	0.0345	0.302	0.105	0.113	0.176
		Composite	Tissue Mean	mg/kg	8	1.94	3.86	3.58	2.82	13.7
			BCF[e]	unitless	-	1,940	4,352	6,965	5,640	24,552
			TTF[f]	unitless	-	0.0420	0.127	0.947	0.882	2.81
	Phosphorus (P)	Dissolved[a,b,c]	Mean[d]	mg/L	-	0.0112	0.0100	0.00901	0.00976	0.00965
		Periphyton	Tissue Mean	mg/kg	8	3,064	1,728	869	1,656	3,336
			BCF[e]	unitless	-	273,571	172,800	96,448	169,672	345,699
		Caddisfly	Tissue Mean	mg/kg	8	8,006	7,932	6,986	7,431	7,186
			BCF[e]	unitless	-	714,821	793,200	775,361	761,373	744,663
			TTF[f]	unitless	-	2.66	4.83	8.34	5.74	3.35
		Composite	Tissue Mean	mg/kg	8	8,265	8,422	8,179	9,916	7,829
			BCF[e]	unitless	-	737,946	842,200	907,769	1,015,984	811,295
			TTF[f]	unitless	-	2.76	5.24	9.58	7.30	3.78
	Sodium (Na)	Dissolved[a,b,c]	Mean[d]	mg/L	-	2.08	4.58	7.32	7.64	7.25
		Periphyton	Tissue Mean	mg/kg	8	221	334	306	323	625
			BCF[e]	unitless	-	106	73	41.8	42.3	86.2
		Caddisfly	Tissue Mean	mg/kg	8	2,844	3,121	2,390	2,494	2,378
			BCF[e]	unitless	-	1,367	681	327	326	328
			TTF[f]	unitless	-	13.8	9.60	7.96	7.90	6.59
		Composite	Tissue Mean	mg/kg	8	3,269	3,689	4,009	3,146	3,901
			BCF[e]	unitless	-	1,572	805	548	412	538
			TTF[f]	unitless	-	15.6	11.5	13.4	9.82	11.2
	Strontium (Sr)	Dissolved[a,b,c]	Mean[d]	mg/L	-	0.110	0.172	0.281	0.305	0.296
		Periphyton	Tissue Mean	mg/kg	8	101	93	521	495	832
			BCF[e]	unitless	-	918	541	1,854	1,623	2,811
		Caddisfly	Tissue Mean	mg/kg	8	5.21	13.8	4.05	7.88	8.22
			BCF[e]	unitless	-	47	80.2	14	26	27.8
			TTF[f]	unitless	-	0.0522	0.175	0.00786	0.0163	0.0129
		Composite	Tissue Mean	mg/kg	8	9.28	11.0	30.8	75.3	19.2
			BCF[e]	unitless	-	84	64	110	247	64.9
			TTF[f]	unitless	-	0.0983	0.131	0.0590	0.157	0.0245
	Titanium (Ti)	Dissolved[a,b,c]	Mean[d]	mg/L	-	0.0100	<0.01	<0.01	<0.01	<0.01
		Periphyton	Tissue Mean	mg/kg	8	338	521	148	183	521
			BCF[e]	unitless	-	33,800	52,100	14,800	18,300	52,100
		Caddisfly	Tissue Mean	mg/kg	8	11.2	79.3	3.63	7.99	29.0
			BCF[e]	unitless	-	1,120	7,930	363	799	2,900
			TTF[f]	unitless	-	0.0545	0.187	0.0341	0.0531	0.169
		Composite	Tissue Mean	mg/kg	8	28.9	24.5	111	47.8	46.4
			BCF[e]	unitless	-	2,890	2,450	11,100	4,780	4,640
			TTF[f]	unitless	-	0.102	0.0521	1.11	0.457	0.237
	Uranium (U)	Dissolved[a,b,c]	Mean[d]	mg/L	-	0.0000610	0.000147	0.000297	0.000363	0.000387
		Periphyton	Tissue Mean	mg/kg	8	0.710	0.542	0.149	0.159	0.658
			BCF[e]	unitless	-	11,639	3,687	502	438	1,700
		Caddisfly	Tissue Mean	mg/kg	8	0.0317	0.103	0.00680	0.0181	0.0406
			BCF[e]	unitless	-	520	701	23	50	104.9
			TTF[f]	unitless	-	0.0516	0.225	0.0591	0.116	0.166
		Composite	Tissue Mean	mg/kg	8	0.0778	0.0576	0.142	0.142	0.0868
			BCF[e]	unitless	-	1,275	392	478	391	224
			TTF[f]	unitless	-	0.117	0.109	1.05	0.903	0.286
	Vanadium (V)	Dissolved[a,b,c]	Mean[d]	mg/L	-	0.000570	0.000587	0.00112	0.00107	0.000948
		Periphyton	Tissue Mean	mg/kg	8	53.4	46.2	12.0	14.0	61.5
			BCF[e]	unitless	-	93,684	78,705	10,714	13,084	64,873
		Caddisfly	Tissue Mean	mg/kg	8	1.25	9.47	0.370	0.742	2.55
			BCF[e]	unitless	-	2,193	16,133	330	693	2,690
			TTF[f]	unitless	-	0.0260	0.252	0.0402	0.0649	0.151
		Composite	Tissue Mean	mg/kg	8	2.79	3.00	11.1	6.20	5.79
			BCF[e]	unitless	-	4,895	5,111	9,911	5,794	6,108
			TTF[f]	unitless	-	0.0650	0.0620	1.31	0.623	0.239

Dissolved concentration at exposed area exceeded reference area by less than 2-times.

Dissolved concentration at exposed area exceeded reference area by at least 2-times.

Dissolved concentration at exposed area exceeded reference area by at least than 5-times.

Indicates significantly higher tissue concentration at exposed compared to reference area (α = 0.05).

Indicates significantly lower tissue concentration at exposed compared to reference area (α = 0.05).

BCF for exposed area exceeded reference area by less than 2-times.

BCF for exposed area exceeded reference area by at least 2-times.

BCF for exposed area exceeded reference area by at least 10-times.

Mean TTF exceeds 1.

Mean TTF at exposed area exceeds 1 and the corresponding reference area TTF for a given year.

Mean TTF at exposed area exceeds 1, the corresponding reference area TTF for a given year, and mean TTFs for all previous years (pre-breach and 2017 when applicable).

BOLD = mean tissue selenium value exceeds long-term benthic invertebrate tissue guideline for selenium (4 mg/kg dw; BCMOE 2014).

BOLD/ITALICS = Indicates dissolved water value greater than the long-term average British Columbia Water Quality Guideline (BCMOECCS 2021a,b).

Notes: Results are shown for primary and secondary analytes that are presented in Table 6.7 (i.e., those with a significant positive exposed - reference difference in 2022 or in all monitoring years for one or more tissue types [periphyton, caddisfly, or composite benthic invertebrate] in at least one area). "-" = no data for dissolved water concentration/ BCF was not calculated for analytes due to no data for dissolved water concentration. "na" = not applicable. Summary statistics reported to 3 significant figures for display purposes.

[a] Monitoring stations included W10, HAC-13, HAC-05a, and HAC-08 for corresponding tissue sampling stations EDC-D, HAC-R1, HAC-U, and HAC-D, respectively (refer to Appendix Tables D.1.3, D.1.4, D.1.6, and D.1.7). For EDC-U routine water quality data were not available, so BCFs were calculated using spot water quality samples taken during tissue collection.

[b] Sample sizes for water quality monitoring are 1, 3, 8, 8, and 8 for EDC-U (EDC-U spot water quality monitoring), EDC-D (W10), HAC-R1 (HAC-13), HAC-U (HAC-05a), and HAC-D (HAC-08).

[c] Guidelines were derived from the British Columbia Water Quality Guidelines for the protection of aquatic life (BCMOECCS 2021a,b) outlined in Table D.1.1.

[d] Means were calculated for routine water quality stations using data collected between January 1, 2022 and the time of sampling in August 2022 in order to be consistent with means calculated during previous years (Minnow 2016d, 2017c, 2018c, 2019, 2020a, 2021a, 2022a).

[e] Bioconcentration Factor (BCF) = Mean Tissue Concentration (mg/kg dw) / Mean Dissolved Water Concentration (mg/L), if the dissolved water concentration was reported as below the Laboratory Reporting Limit (LRL), then the LRL was substituted for the BCF calculation.

[f] Trophic Transfer Function (TTF) = Benthic Invertebrate Tissue Concentration / Periphyton Tissue Concentration. If the reported analyte concentrations for either periphyton or benthic invertebrate tissue were below the LRL, the TTF was not calculated.

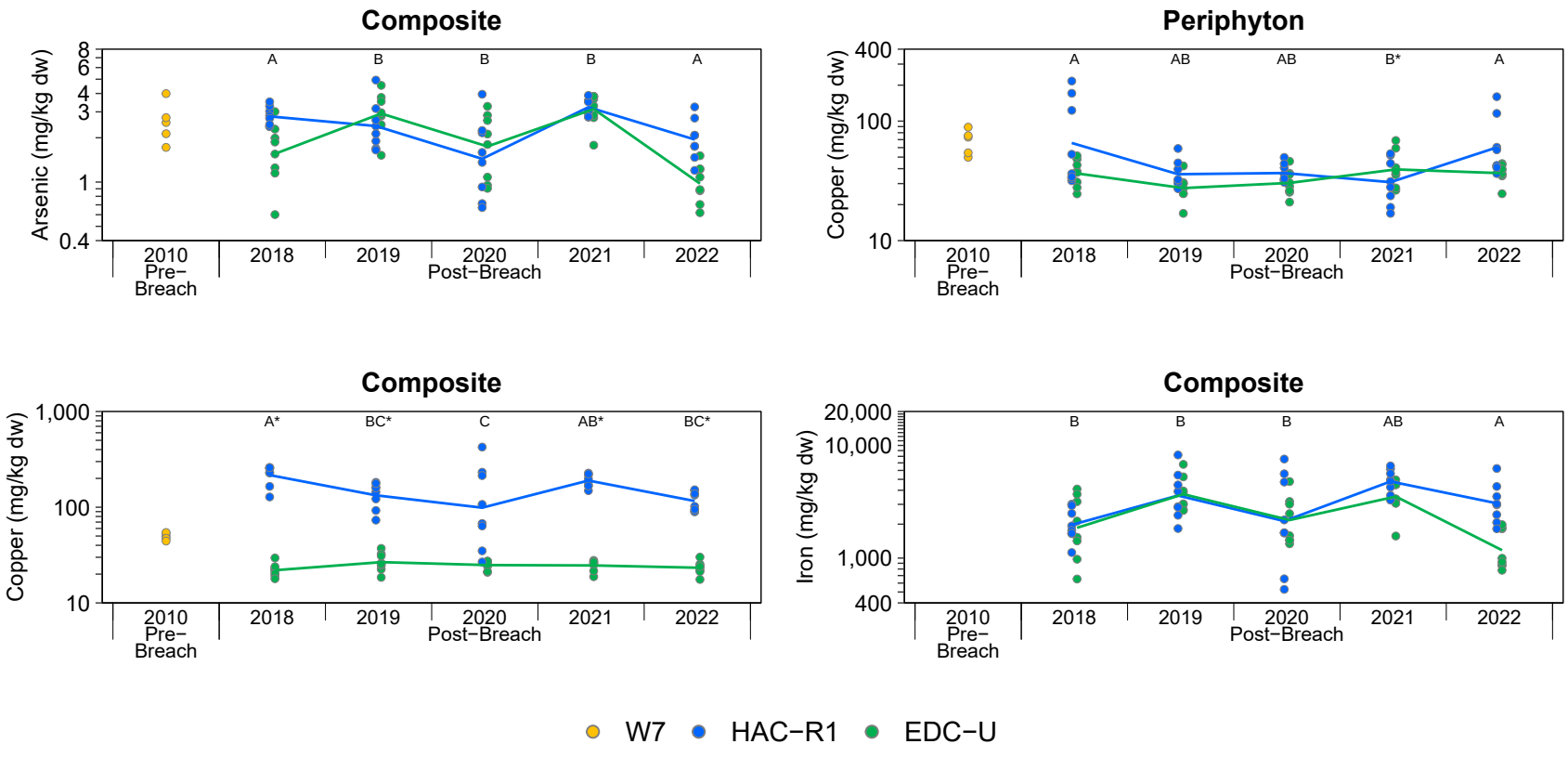


Figure 6.9: Periphyton, Caddisfly, and Composite-Taxa Benthic Invertebrate Tissue Primary and Secondary Analyte Concentrations with a Significant Positive Exposed - Reference Difference for Upper Hazeltine Creek (HAC-R1; Exposed) and Upper Edney Creek (EDC-U; Reference), 2010 to 2022

Notes: BCMOE = British Columbia Ministry of the Environment; GL = Guideline; dw = dry weight. W7 (2010) is the pre-breach equivalent of HAC-R1. Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Plots are only included for primary and secondary analytes that had either a significant Area × Time interaction term and were higher at exposed than reference areas in 2022 or had no significant interaction but had a higher exposed magnitude of difference across all years for a given tissue type. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted. Letters with a * designate years where the exposed site is different than pre-breach conditions, as determined using a one-way temporal ANOVA.

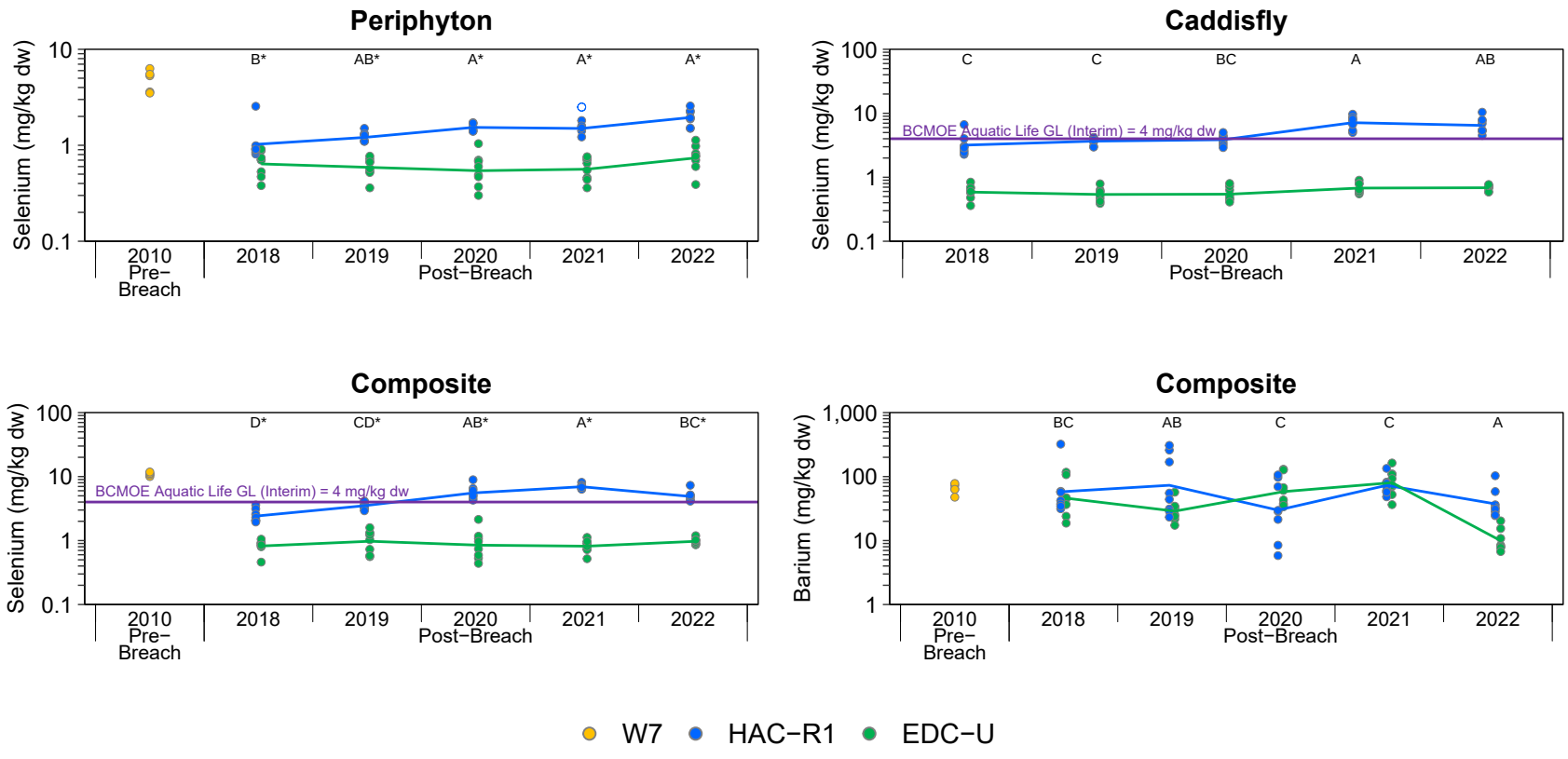


Figure 6.9: Periphyton, Caddisfly, and Composite-Taxa Benthic Invertebrate Tissue Primary and Secondary Analyte Concentrations with a Significant Positive Exposed - Reference Difference for Upper Hazeltine Creek (HAC-R1; Exposed) and Upper Edney Creek (EDC-U; Reference), 2010 to 2022

Notes: BCMOE = British Columbia Ministry of the Environment; GL = Guideline; dw = dry weight. W7 (2010) is the pre-breach equivalent of HAC-R1. Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Plots are only included for primary and secondary analytes that had either a significant Area × Time interaction term and were higher at exposed than reference areas in 2022 or had no significant interaction but had a higher exposed magnitude of difference across all years for a given tissue type. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted. Letters with a * designate years where the exposed site is different than pre-breach conditions, as determined using a one-way temporal ANOVA.

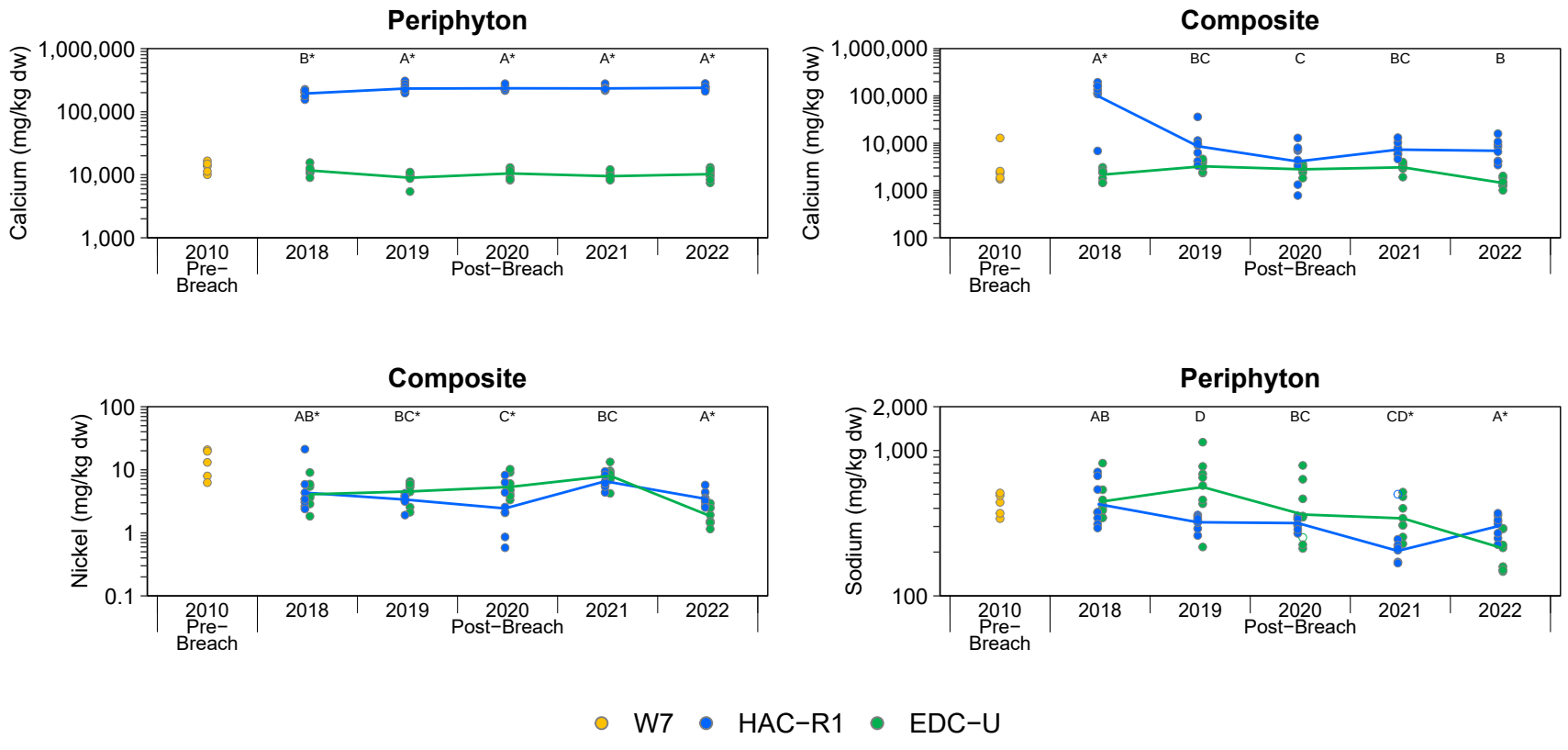


Figure 6.9: Periphyton, Caddisfly, and Composite-Taxa Benthic Invertebrate Tissue Primary and Secondary Analyte Concentrations with a Significant Positive Exposed - Reference Difference for Upper Hazeltine Creek (HAC-R1; Exposed) and Upper Edney Creek (EDC-U; Reference), 2010 to 2022

Notes: BCMOE = British Columbia Ministry of the Environment; GL = Guideline; dw = dry weight. W7 (2010) is the pre-breach equivalent of HAC-R1. Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Plots are only included for primary and secondary analytes that had either a significant Area × Time interaction term and were higher at exposed than reference areas in 2022 or had no significant interaction but had a higher exposed magnitude of difference across all years for a given tissue type. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted. Letters with a * designate years where the exposed site is different than pre-breach conditions, as determined using a one-way temporal ANOVA.

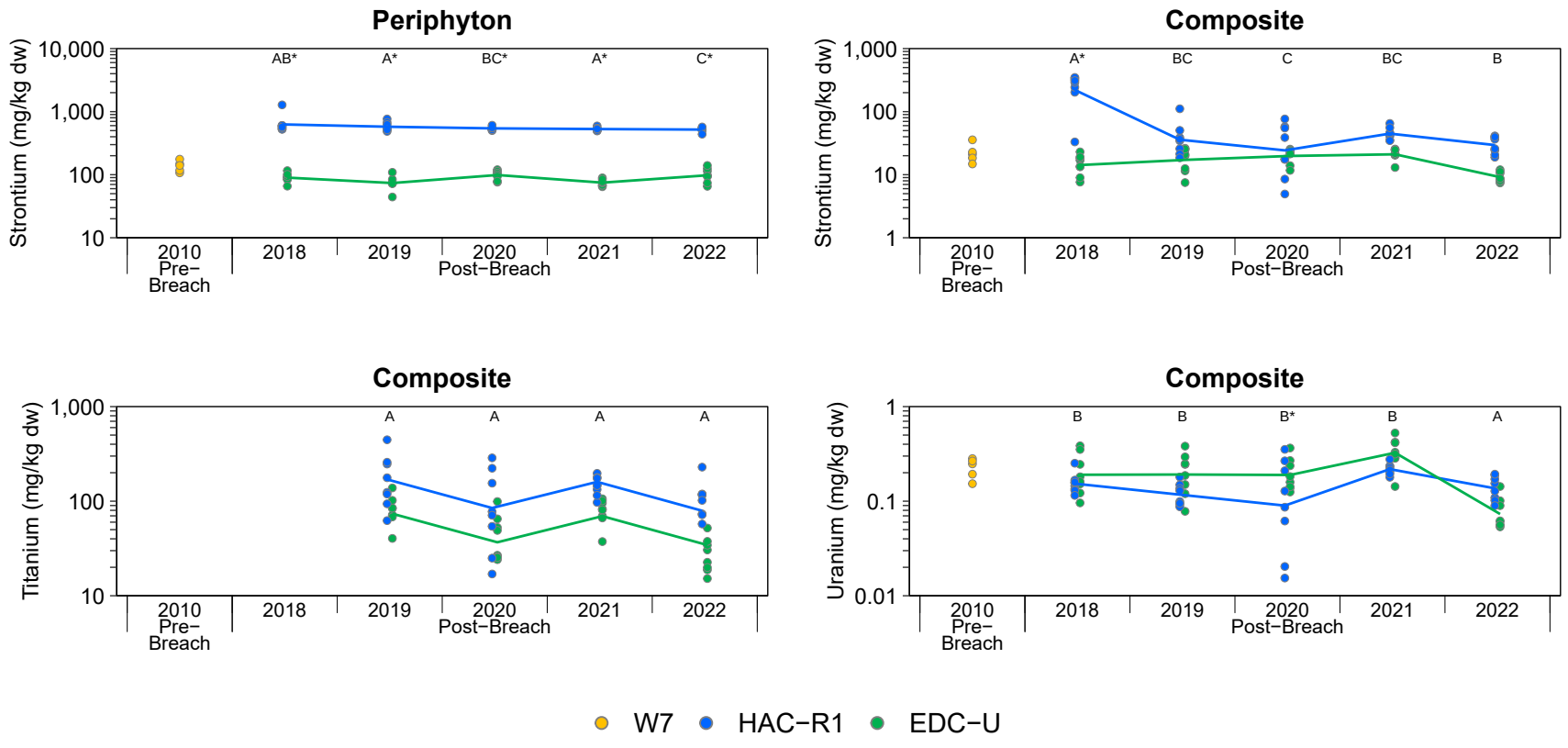


Figure 6.9: Periphyton, Caddisfly, and Composite-Taxa Benthic Invertebrate Tissue Primary and Secondary Analyte Concentrations with a Significant Positive Exposed - Reference Difference for Upper Hazeltine Creek (HAC-R1; Exposed) and Upper Edney Creek (EDC-U; Reference), 2010 to 2022

Notes: BCMOE = British Columbia Ministry of the Environment; GL = Guideline; dw = dry weight. W7 (2010) is the pre-breach equivalent of HAC-R1. Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Plots are only included for primary and secondary analytes that had either a significant Area × Time interaction term and were higher at exposed than reference areas in 2022 or had no significant interaction but had a higher exposed magnitude of difference across all years for a given tissue type. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted. Letters with a * designate years where the exposed site is different than pre-breach conditions, as determined using a one-way temporal ANOVA.

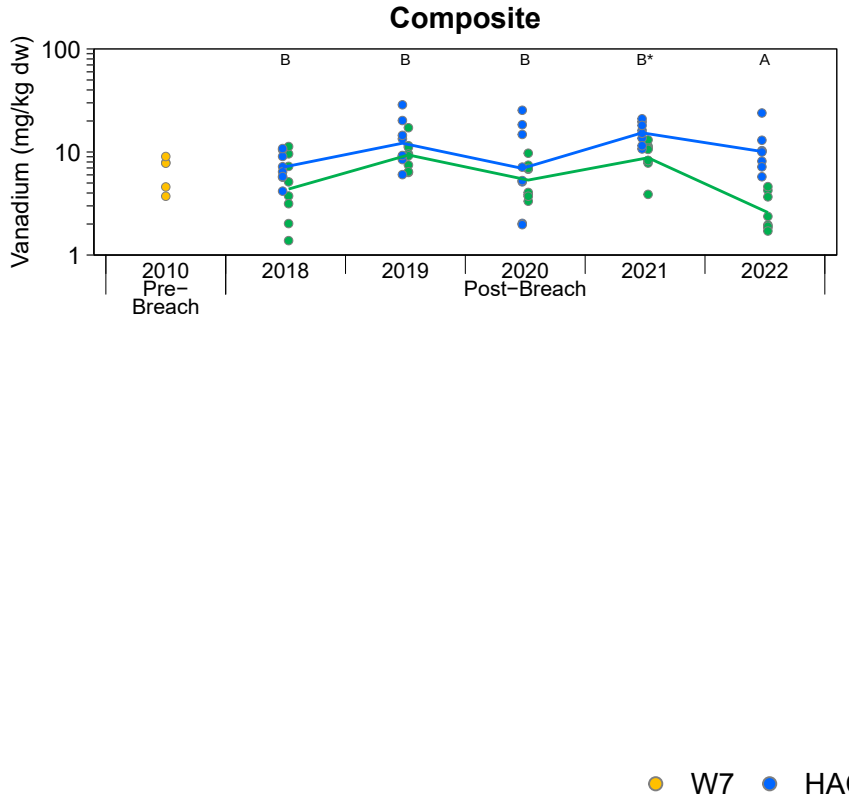


Figure 6.9: Periphyton, Caddisfly, and Composite-Taxa Benthic Invertebrate Tissue Primary and Secondary Analyte Concentrations with a Significant Positive Exposed - Reference Difference for Upper Hazeltine Creek (HAC-R1; Exposed) and Upper Edney Creek (EDC-U; Reference), 2010 to 2022

Notes: BCMOE = British Columbia Ministry of the Environment; GL = Guideline; dw = dry weight. W7 (2010) is the pre-breach equivalent of HAC-R1. Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Plots are only included for primary and secondary analytes that had either a significant Area × Time interaction term and were higher at exposed than reference areas in 2022 or had no significant interaction but had a higher exposed magnitude of difference across all years for a given tissue type. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted. Letters with a * designate years where the exposed site is different than pre-breach conditions, as determined using a one-way temporal ANOVA.

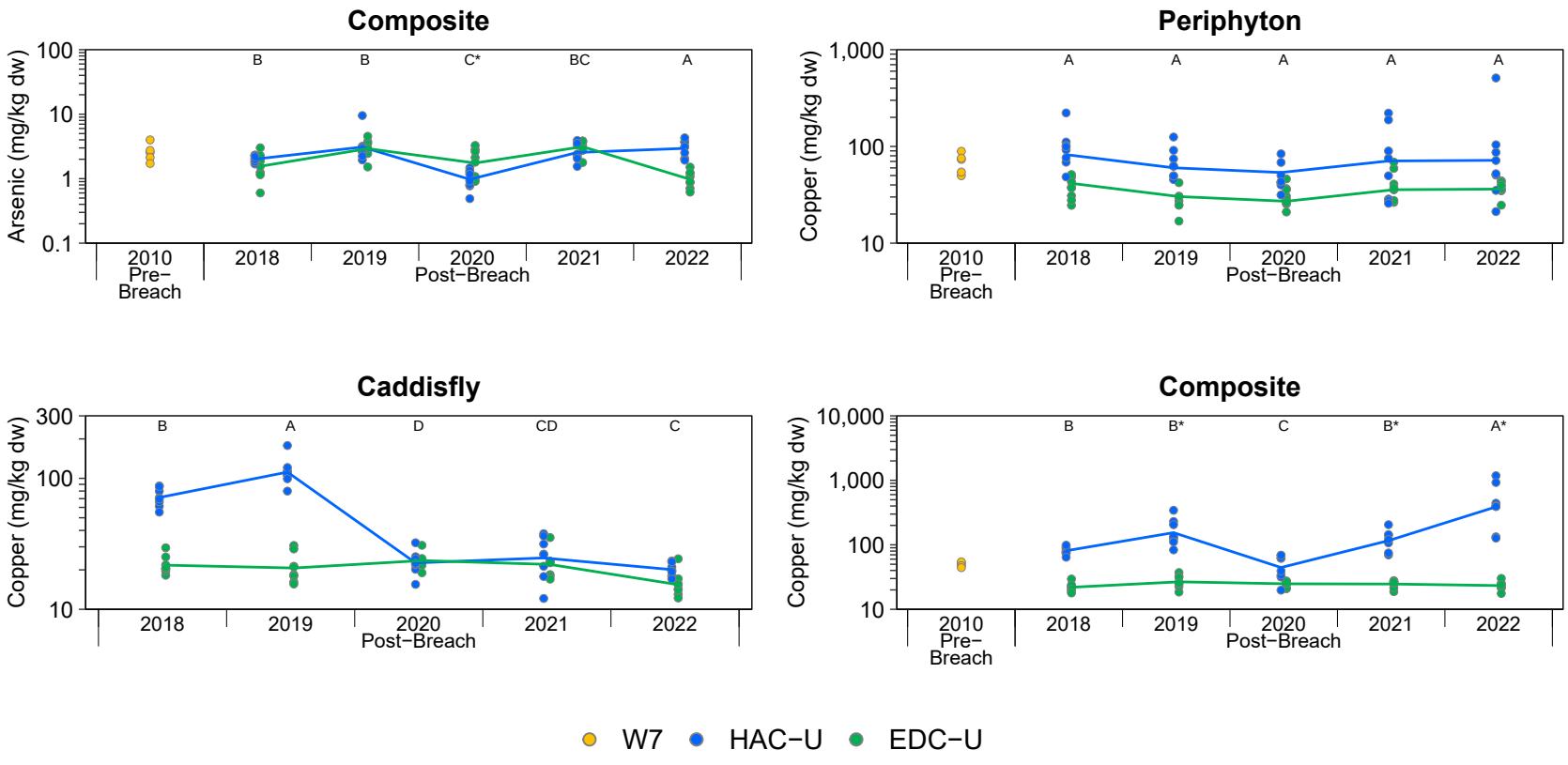


Figure 6.10: Periphyton, Caddisfly, and Composite-Taxa Benthic Invertebrate Tissue Primary and Secondary Analyte Concentrations with a Significant Positive Exposed - Reference Difference for Upper Hazeltine Creek (HAC-U; Exposed) and Upper Edney Creek (EDC-U; Reference), 2010 to 2022

Notes: BCMOE = British Columbia Ministry of the Environment; GL = Guideline; dw = dry weight. W7 (2010) is the pre-breach equivalent of HAC-U. Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Plots are only included for primary and secondary analytes that had either a significant Area × Time interaction term and were higher at exposed than reference areas in 2022 or had no significant interaction but had a higher exposed magnitude of difference across all years for a given tissue type. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two −way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted. Letters with a * designate years where the exposed site is different than pre-breach conditions, as determined using a one-way temporal ANOVA.

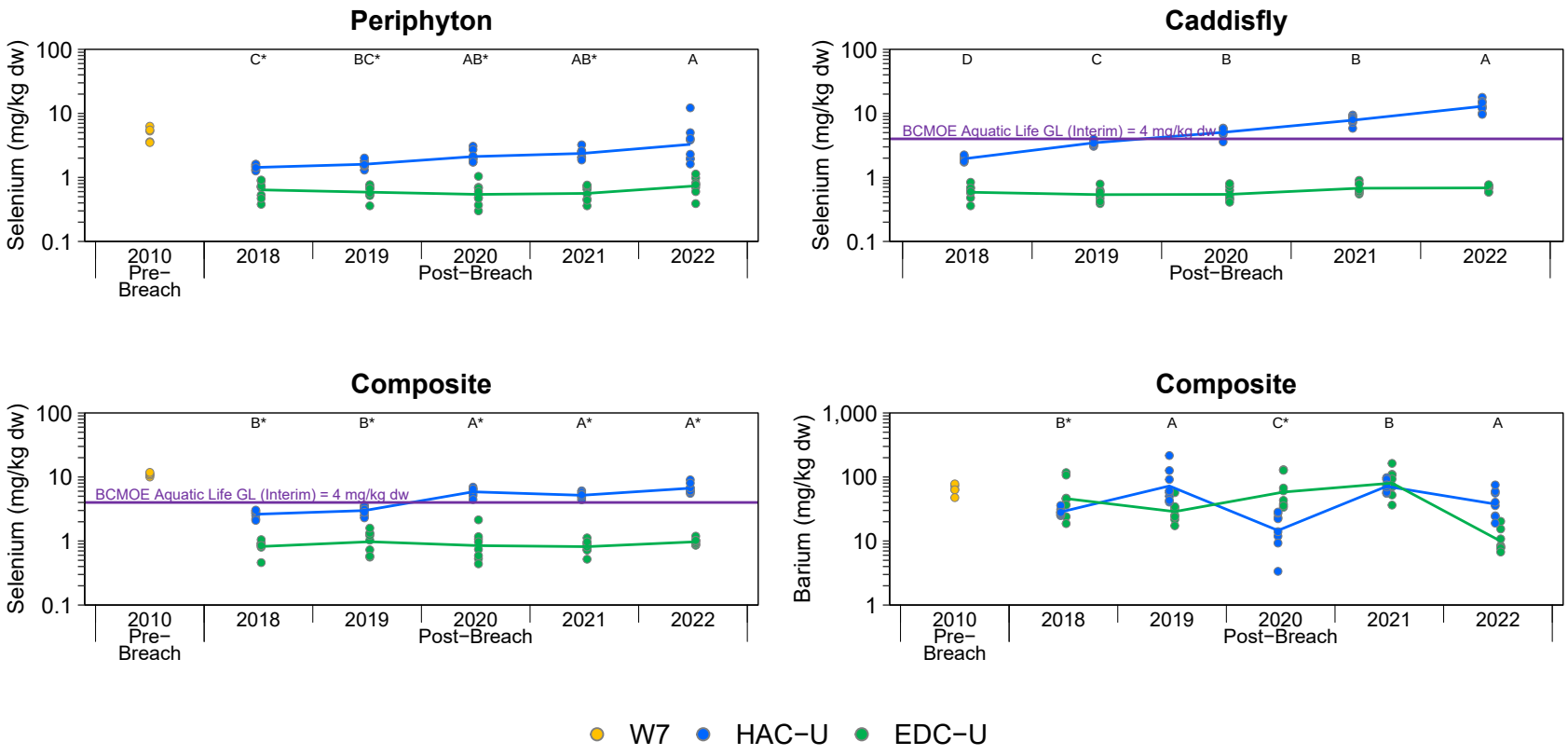


Figure 6.10: Periphyton, Caddisfly, and Composite-Taxa Benthic Invertebrate Tissue Primary and Secondary Analyte Concentrations with a Significant Positive Exposed - Reference Difference for Upper Hazeltine Creek (HAC-U; Exposed) and Upper Edney Creek (EDC-U; Reference), 2010 to 2022

Notes: BCMOE = British Columbia Ministry of the Environment; GL = Guideline; dw = dry weight. W7 (2010) is the pre-breach equivalent of HAC-U. Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Plots are only included for primary and secondary analytes that had either a significant Area × Time interaction term and were higher at exposed than reference areas in 2022 or had no significant interaction but had a higher exposed magnitude of difference across all years for a given tissue type. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two −way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted. Letters with a * designate years where the exposed site is different than pre-breach conditions, as determined using a one-way temporal ANOVA.

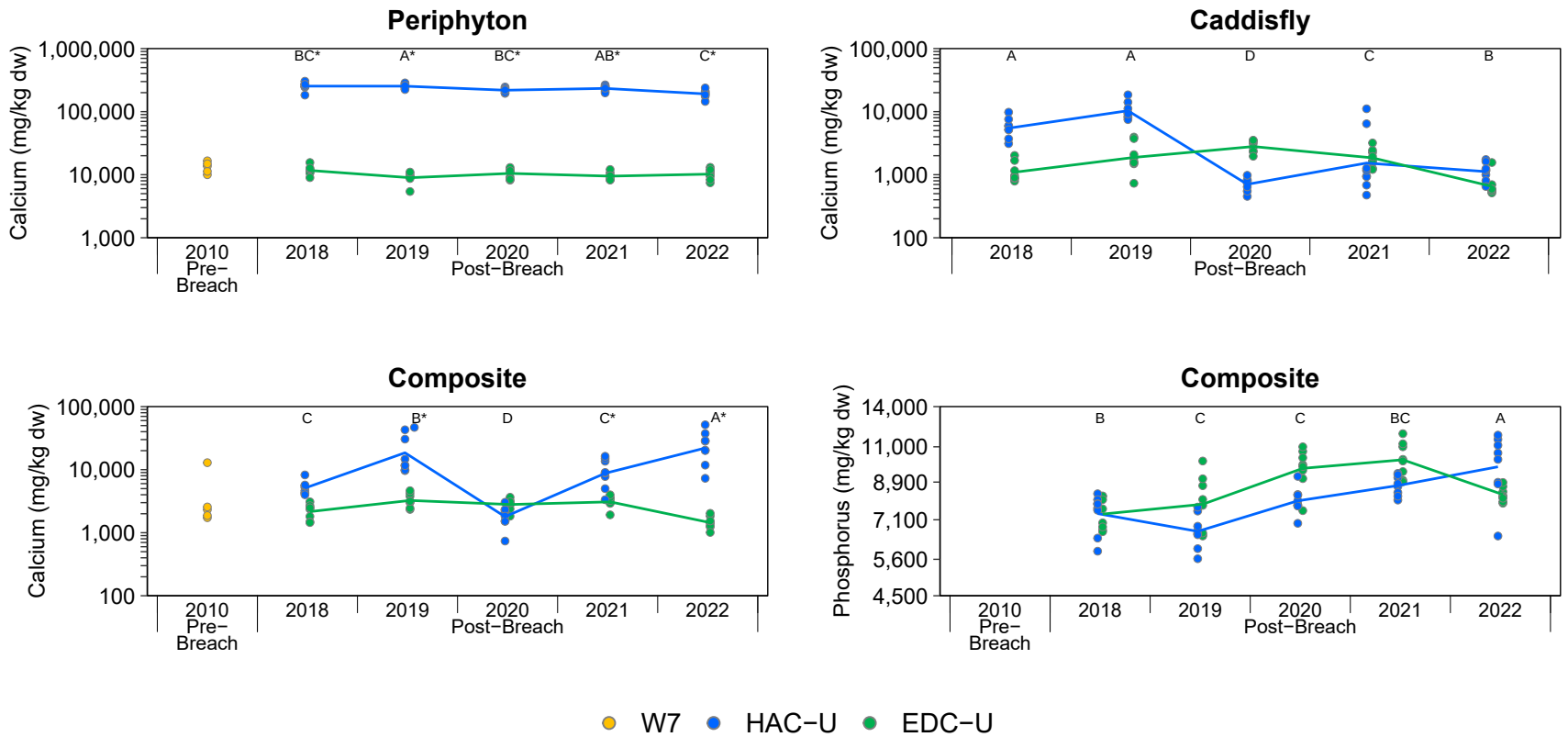


Figure 6.10: Periphyton, Caddisfly, and Composite-Taxa Benthic Invertebrate Tissue Primary and Secondary Analyte Concentrations with a Significant Positive Exposed - Reference Difference for Upper Hazeltine Creek (HAC-U; Exposed) and Upper Edney Creek (EDC-U; Reference), 2010 to 2022

Notes: BCMOE = British Columbia Ministry of the Environment; GL = Guideline; dw = dry weight. W7 (2010) is the pre-breach equivalent of HAC-U. Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Plots are only included for primary and secondary analytes that had either a significant Area × Time interaction term and were higher at exposed than reference areas in 2022 or had no significant interaction but had a higher exposed magnitude of difference across all years for a given tissue type. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two −way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted. Letters with a * designate years where the exposed site is different than pre-breach conditions, as determined using a one-way temporal ANOVA.

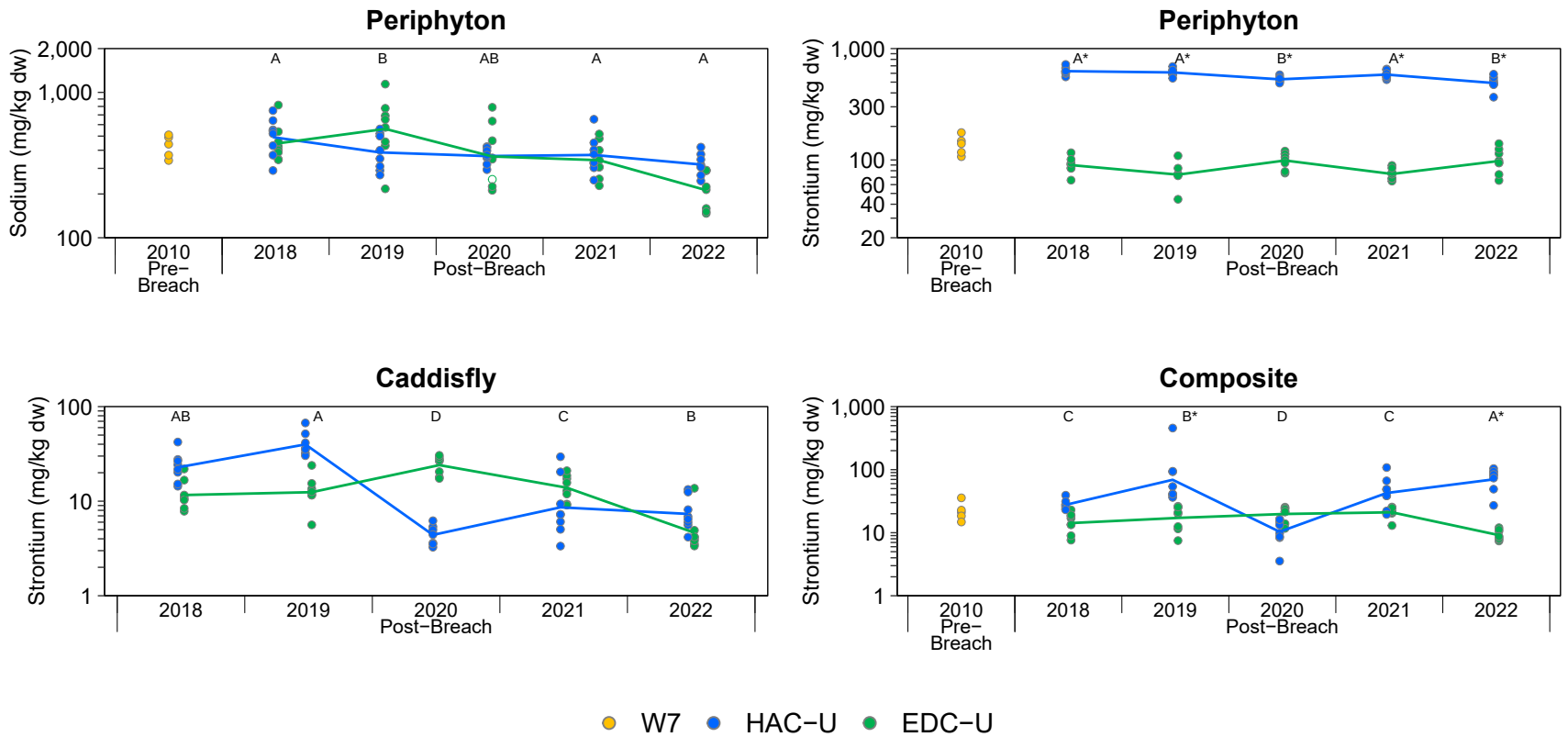
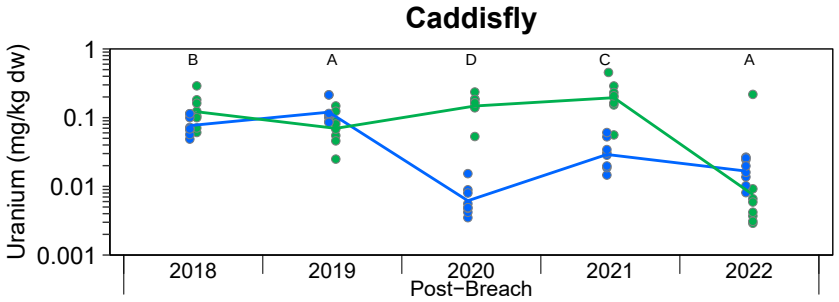


Figure 6.10: Periphyton, Caddisfly, and Composite-Taxa Benthic Invertebrate Tissue Primary and Secondary Analyte Concentrations with a Significant Positive Exposed - Reference Difference for Upper Hazeltine Creek (HAC-U; Exposed) and Upper Edney Creek (EDC-U; Reference), 2010 to 2022

Notes: BCMOE = British Columbia Ministry of the Environment; GL = Guideline; dw = dry weight. W7 (2010) is the pre-breach equivalent of HAC-U. Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Plots are only included for primary and secondary analytes that had either a significant Area × Time interaction term and were higher at exposed than reference areas in 2022 or had no significant interaction but had a higher exposed magnitude of difference across all years for a given tissue type. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two −way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted. Letters with a * designate years where the exposed site is different than pre-breach conditions, as determined using a one-way temporal ANOVA.



W7 HAC−U EDC−U

Figure 6.10: Periphyton, Caddisfly, and Composite-Taxa Benthic Invertebrate Tissue Primary and Secondary Analyte Concentrations with a Significant Positive Exposed - Reference Difference for Upper Hazeltine Creek (HAC-U; Exposed) and Upper Edney Creek (EDC-U; Reference), 2010 to 2022

Notes: BCMOE = British Columbia Ministry of the Environment; GL = Guideline; dw = dry weight. W7 (2010) is the pre-breach equivalent of HAC-U. Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Plots are only included for primary and secondary analytes that had either a significant Area × Time interaction term and were higher at exposed than reference areas in 2022 or had no significant interaction but had a higher exposed magnitude of difference across all years for a given tissue type. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two −way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted. Letters with a * designate years where the exposed site is different than pre-breach conditions, as determined using a one-way temporal ANOVA.

were significantly higher than pre-breach, which was consistent with all previous monitoring years (Figures 6.9 and 6.10, Table 6.7; Appendix Figures F.4.1 to F.4.6, Appendix Tables F.4.1 to F.4.10). Copper TTFs in caddisfly tissues in 2022 for both exposed areas were lower than reference, and significantly lower than 2018, 2019 and 2021 at HAC-R1, and only lower than 2019 at HAC-U (Table 6.9; Appendix Figures F.4.7 to F.4.10, Appendix Tables D.5.7 and D.5.8, F.4.11 to F.4.16). Composite-taxa TTFs for copper at HAC-R1 were consistently higher than reference from 2018 to 2022 but in 2022 were significantly lower than in 2021, relative to reference, which represented a decrease from higher than pre-breach in prior years (2018 to 2021) to similar to pre-breach in 2022 (Table 6.9; Appendix Figures F.4.7 to F.4.10). In contrast, composite-taxa TTFs for copper at HAC-U in 2022 were significantly higher than reference and pre-breach, and were significantly higher than all previous monitoring years, relative to reference (Table 6.9). In summary, copper concentrations in 2022 were elevated relative to reference in most tissue types, were higher than pre-breach in composite-taxa samples but not periphyton for both exposed areas, were similar or lower over time at HAC-R1 for all tissue types, and similar (periphyton and caddisfly tissues) or increased (composite-taxa tissues) over time at HAC-U. Results from 2021 showed little evidence of bioaccumulation of copper in benthic invertebrate tissues (Minnow 2022a). In contrast, results from 2022 for copper in composite-taxa tissues showed evidence of BCFs that were higher than reference and a significant temporal increase in TTFs at HAC-U between 2021 and 2022 (to TTFs that were higher than pre-breach), relative to reference. There is therefore some evidence of copper bioaccumulation in benthic invertebrate biota in 2022 in Reach 2 of upper Hazeltine Creek. However, this was limited to composite-taxa benthic invertebrate tissues from Reach 2 (HAC-U) and was not observed in caddisfly tissues from HAC-U nor in benthic invertebrate tissues (caddisfly or composite-taxa) from Reach 1 (HAC-R1), indicating a potentially localized increase.

Concentrations of selenium in all tissue types from upper Hazeltine Creek were consistently elevated relative to the reference area (EDC-U) from 2018 to 2022 (Figures 6.9 and 6.10, Table 6.7; Appendix Figures F.4.1 to F.4.6, Appendix Tables D.5.1 to D.5.6, F.4.1 to F.4.10). Selenium concentrations in periphyton tissues in 2022 were significantly higher at both exposed areas compared to 2018 but have been temporally stable since 2019 at HAC-R1, and temporally stable since 2020 at HAC-U, relative to reference (Figures 6.9 and 6.10, Table 6.7). In caddisfly tissue, concentrations of selenium in 2022 were similar to 2020 and 2021 but significantly higher than 2018 and 2019 at HAC-R1, and were significantly higher in 2022 than all prior years (2018 to 2021) at HAC-U. For composite-taxa tissue, concentrations of selenium in 2022 were lower than 2021, and similar to 2019 and 2020 but higher than 2018 at HAC-R1, and stable from 2020 to 2022 but higher than 2018 and 2019 at HAC-U (Figures 6.9 and 6.10, Table 6.7). Mean concentrations of selenium in caddisfly (6.69 mg/kg dw at HAC-R1 and 13.1 mg/kg dw

Table 6.9: Summary of Statistical Contrasts of Exposed - Reference Relative Differences in Trophic Transfer Factors of Primary and Secondary Analytes in Caddisfly and Composite-Taxa Benthic Invertebrate Tissue for Upper Hazeltine Creek (HAC-R1, HAC-U; Exposed), Upper Edney Creek (EDC-U; Reference), Lower Hazeltine Creek (HAC-D; Exposed), and Lower Edney Creek (EDC-D; Reference), 2018 to 2022 [a]

Analytes		Upper Hazeltine Creek Reach 1 (HAC-R1; Exposed) / Upper Edney Creek (EDC-U; Reference)										Upper Hazeltine Creek Reach 2 (HAC-U; Exposed) / Upper Edney Creek (EDC-U; Reference)										Lower Hazeltine Creek (HAC-D; Exposed) / Lower Edney Creek (EDC-D; Reference)									
		Caddisfly					Composite-Taxa Benthic Invertebrate					Caddisfly					Composite-Taxa Benthic Invertebrate					Caddisfly					Composite-Taxa Benthic Invertebrate				
		2018	2019	2020	2021	2022	2018	2019	2020	2021	2022	2018	2019	2020	2021	2022	2018	2019	2020	2021	2022	2018	2019	2020	2021	2022	2018	2019	2020	2021	2022
Primary Analyte	Arsenic	A	A	A	A	A	B (↑)	C (↑)	AB (↑)	AB (↑)	A (↑)	AB	A	A	B	A	B (ns)	B (↑)	B (ns)	B (↑)	A (↑)	C	A	AB	AB	B	C (ns)	A (ns)	AB (ns)	B (ns)	AB (ns)
	Copper	A	A	BC	AB	C	AB (↑)	B (↑)	B (↑)	A (↑)	B (ns)	AB	A	B	B	B	B (ns)	B (ns)	B (ns)	B (ns)	A (↑)	B	A	A	AB	A	A (↓)	A (ns)	A (ns)	A (ns)	A (ns)
	Iron	A	A	A	A	A	B (-)	B (-)	B (-)	A (-)	B (-)	AB	A	C	BC	AB	A (-)	A (-)	A (-)	A (-)	A (-)	B	A	A	A	A	B (-)	A (-)	A (-)	A (-)	A (-)
	Selenium	A	A	A	A	A	A (ns)	A (ns)	A (↑)	A (↑)	A (ns)	C	BC	BC	AB	A	A (ns)	A (ns)	A (ns)	A (ns)	A (ns)	A	AB	BC	A	C	A (ns)	A (ns)	A (ns)	A (ns)	A (ns)
Secondary Analyte	Barium	AB	A	B	C	AB	B (ns)	AB (ns)	B (ns)	B (ns)	A (ns)	B	A	BC	C	A	C (ns)	AB (ns)	C (ns)	BC (ns)	A (↑)	C	A	AB	AB	B	B (↓)	A (ns)	A (ns)	A (ns)	A (ns)
	Cadmium	ABC	A	BC	C	AB	B (↑)	B (↑)	AB (ns)	AB (↑)	A (ns)	B	A	C	BC	A	B (↑)	B (ns)	B (ns)	B (↑)	A (ns)	C	B	B	A	B	A (ns)	A (ns)	A (ns)	A (ns)	A (ns)
	Calcium	A	A	B	B	B	A (ns)	BC (↓)	C (↓)	BC (↓)	B (↓)	A	A	D	C	B	B (↓)	B (↓)	C (↓)	B (↓)	A (ns)	B	B	BC	A	C	B (↓)	BC (↓)	C (↓)	A (ns)	BC (↓)
	Manganese	B	A	BC	C	B	C (ns)	AB (↑)	BC (ns)	AB (↑)	A (ns)	B	A	C	C	AB	B (ns)	A (↑)	B (ns)	B (↑)	A (ns)	C	B	B	A	B	B (ns)	A (ns)	A (ns)	A (ns)	A (ns)
	Molybdenum	A	B	A	A	B	B (ns)	B (ns)	A (ns)	A (↑)	B (ns)	B	C	A	B	B	B (ns)	B (ns)	A (ns)	B (ns)	C (ns)	A	A	A	B	A	A (ns)	A (ns)	A (ns)	A (↓)	A (ns)
	Nickel	AB	A	C	BC	ABC	A (ns)	A (ns)	A (ns)	A (↑)	A (ns)	AB	A	BC	C	A	BC (ns)	BC (ns)	C (ns)	B (↑)	A (ns)	C	AB	AB	A	B	A (ns)	A (ns)	A (ns)	A (ns)	A (ns)
	Phosphorus	A	A	A	A	A	B (-)	AB (-)	AB (-)	A (-)	A (-)	AB	A	B	B	AB	A (-)	A (-)	AB (-)	B (-)	A (-)	A	A	A	B	B	A (-)	AB (-)	AB (-)	BC (-)	C (-)
	Sodium	BC	A	CD	AB	D	A (-)	A (-)	A (-)	A (-)	A (-)	B	A	B	B	B	A (-)	A (-)	A (-)	A (-)	A (-)	AB	AB	A	C	BC	A (-)	AB (-)	AB (-)	B (-)	B (-)
	Strontium	A	A	C	BC	B	A (ns)	C (ns)	C (↓)	BC (ns)	B (ns)	A	A	C	B	A	B (↓)	B (ns)	C (↓)	B (ns)	A (ns)	BC	B	BC	A	C	B (↓)	B (↓)	B (↓)	A (ns)	B (↓)
	Titanium	-	A	AB	A	B	-	B (-)	B (-)	A (-)	B (-)	-	A	C	BC	AB	-	AB (-)	B (-)	A (-)	B (-)	-	A	A	A	A	-	A (-)	A (-)	A (-)	A (-)
	Uranium	AB	A	C	BC	AB	C (ns)	BC (↑)	C (↑)	A (↑)	AB (↑)	B	AB	D	C	A	BC (ns)	AB (↑)	C (ns)	B (↑)	A (ns)	B	A	A	A	A	B (↓)	A (ns)	A (ns)	A (ns)	A (ns)
	Vanadium	A	A	B	AB	B	B (↑)	B (↑)	B (↑)	A (↑)	AB (↑)	AB	A	C	BC	AB	A (ns)	A (↑)	A (ns)	A (↑)	A (ns)	B	A	A	A	A	B (ns)	A (ns)	A (ns)	A (ns)	A (ns)

Indicates significantly higher tissue concentration at exposed compared to reference area, and the interaction (Area x Year) term of the two-way ANOVA was not significant (α = 0.05; i.e., the difference between exposed and reference did not change significantly among years).

Indicates significantly lower tissue concentration at exposed compared to reference area (α = 0.05), and the interaction (Area x Year) term of the two-way ANOVA was not significant (α = 0.05; i.e., the difference between exposed and reference did not change significantly among years).

Indicates significantly higher tissue concentration at exposed compared to reference area (α = 0.05), and the interaction (Area x Year) term of the two-way ANOVA was significant (α = 0.05; i.e., the difference between exposed and reference changed significantly among years).

Indicates significantly lower tissue concentration at exposed compared to reference area (α = 0.05), and the interaction (Area x Year) term of the two-way ANOVA was significant (α = 0.05; i.e., the difference between exposed and reference changed significantly among years).

(↑) = Indicates significantly higher tissue concentration relative to pre-breach in 2010 (α = 0.05).
(↓) = Indicates significantly lower tissue concentration relative to pre-breach in 2010 (α = 0.05).
(ns) = no significant different in analyte concentration relative to pre-breach in 2010 (α = 0.05).

Notes: "-" = no statistical comparison could be made since data were not available or all results were below Laboratory Reporting Limit (LRL). Trophic Transfer Function (TTF) = Benthic Invertebrate Tissue Concentration / Periphyton Tissue Concentration. If the reported analyte concentrations for either periphyton or benthic invertebrate tissue were below the LRL, the TTF was not calculated. Refer to Appendix Tables F.4.11 to F.4.16 and F.4.22 to F.4.24 for statistical analyses results and magnitude of difference calculations.

[a] Results are shown for primary and secondary analytes that are presented in Table 6.7 (i.e., those with a significant positive exposed - reference difference in 2022 or in all monitoring years for one or more tissue types [periphyton, caddisfly, or composite benthic invertebrate] in at least one area). Years that share a letter (e.g., A,B,C) had ratios of TTFs (Exposed:Reference) that did not differ significantly among years. Letters are assigned such that A is assigned to the year with the highest ratio of concentrations (Exposed:Reference).

at HAC-U) and composite-taxa (4.97 mg/kg dw at HAC-R1 and 6.67 mg/kg dw at HAC-U) tissue samples in 2022 were above the BC interim guideline (4 mg/kg dw; BCMOE 2014) in upper Hazeltine Creek. This is consistent with results from 2020 and 2021 (Figures 6.9 and 6.10) and suggests potential selenium-associated risks to aquatic life. Similar to previous monitoring years, selenium concentrations in periphyton and composite-taxa tissues[66] remained significantly lower than or similar to pre-breach tissue concentrations for both areas of upper Hazeltine Creek (Figures 6.9 and 6.10, Table 6.7; Appendix Figures F.4.1 to F.4.6, Appendix Tables D.5.1 to D.5.6, F.4.1 to F.4.10).

Evaluation of temporal changes in TTFs for selenium showed no significant change in the exposed:reference ratio over time and compared to pre-breach for most tissue types and areas, with one exception. The exception is TTFs for selenium in caddisfly tissue from HAC-U, which were significantly higher in 2022 compared to 2018 to 2020, relative to reference (Table 6.9; Appendix Figures F.4.7 to F.4.10, Appendix Tables D.5.7 and D.5.8, F.4.11 to F.4.16). The increased selenium TTFs for caddisfly tissue at HAC-U in 2022 corresponded with higher dissolved aqueous concentrations and BCFs than reference in 2022, and caddisfly tissue concentrations that were significantly higher than reference and higher than in prior years (2018 to 2021; Tables 6.8 and 6.9). Overall, the significantly higher concentrations of selenium in all tissue types from upper Hazeltine Creek relative to reference, higher TTFs relative to reference, and an increase in the exposed:reference ratio for most tissues since 2018 (except composite-taxa tissues at HAC-R1), suggests a mine-related influence on selenium concentrations in aquatic biota. Since 2021, a significant increase in selenium concentrations and associated TTFs occurred, relative to reference, for caddisfly tissue from Reach 2 (HAC-U) only. The presence of mean selenium concentrations above the guideline for protection of aquatic life indicates potential risks to aquatic biota; however, it is important to note that tissue selenium concentrations in 2022 remained similar to or significantly lower than pre-breach. For periphyton and composite-taxa benthic invertebrate tissue, the occurrence of BCFs for selenium below reference and TTFs results which show no temporal change indicate that the bioavailability and bioaccumulation of selenium in these tissues has not increased due to mine-exposure. However, there is some evidence of increased bioaccumulation of selenium in caddisfly tissues from Reach 2 (HAC-U) of upper Hazeltine Creek, based on increasing TTFs for this tissue over time.

The two other primary analytes (arsenic and iron) only had elevated tissue concentrations relative to reference for composite-taxa tissues (Table 6.7; Appendix Figures F.4.1 to F.4.6, Appendix Tables F.4.1 to F.4.10). Although the exposed:reference ratios for arsenic and iron in

[66] Caddisfly tissue results cannot be compared to pre-breach values because monitoring of this tissue type was initiated in 2018.

composite-taxa tissues from HAC-R1 and arsenic in composite-taxa tissues from HAC-U were significantly higher than previous monitoring years, these differences were due to a temporal decrease in analyte concentrations at the reference area (EDC-U) rather than an increased analyte concentrations at the exposed areas (Figures 6.9 and 6.10, Table 6.7). Composite-taxa tissue concentrations of arsenic in 2022 were similar to pre-breach concentrations at both areas of upper Hazeltine Creek (no pre-breach data exists for iron; Table 6.7; Appendix Tables F.4.7 and F.4.10). The TTFs for arsenic and iron in composite-taxa have been significantly higher than reference for all monitoring years, and for arsenic in composite-taxa tissue the TTFs for both HAC-R1 and HAC-U in 2022 were higher than pre-breach and similar to or higher than previous monitoring years (Table 6.9; Appendix Figures F.4.7 to F.4.10, Appendix Tables F.4.11 to F.4.16). Although composite-taxa tissues BCFs and TTFs were elevated relative to reference in 2022 (Tables 6.8 and 6.9), the absence of increased concentrations of arsenic and iron in composite-taxa tissue (outside of reference contrasts) indicate there is little evidence that either analyte is bioaccumulating in these tissues over time.

Concentrations and TTFs for the nine secondary analytes identified for data interpretation (barium, calcium, nickel, phosphorus, sodium, strontium, titanium, uranium, and vanadium) varied among tissue types (Figures 6.9 and 6.10, Table 6.7; Appendix Figures F.4.1 to F.4.6, Appendix Tables D.5.1 to D.5.8, F.4.1 to F.4.10). Most notable in 2022 was that concentrations of all secondary analytes in caddisfly tissues from HAC-R1 were similar to or lower than reference (Table 6.7). Furthermore, in contrast to 2021 when concentrations of molybdenum and mercury were elevated relative to reference in most caddisfly and all composite tissues (Minnow 2022a), neither analyte was elevated relative to reference in 2022 in benthic invertebrate tissues. Benthic invertebrate tissue concentrations of both molybdenum and mercury were similar to or lower than previous monitoring years (Table 6.7; Appendix Tables F.4.5 to F.4.10), therefore TTFs for these analytes were not included in data interpretation. Periphyton tissues from both upper Hazeltine Creek areas had concentrations of calcium and strontium that were consistently higher than reference and higher than pre-breach in all years (2018 to 2022). Although the concentrations of calcium and strontium in periphyton tissues changed significantly over time, concentrations in 2022 for both analytes were either similar to or lower than previous monitoring years (relative to reference) for both exposed areas (Figures 6.9 and 6.10, Table 6.7; Appendix Figures F.4.1, F.4.2, Appendix Tables F.4.1 to F.4.4). Calcium and strontium in exposed composite-taxa tissues from HAC-R1 and caddisfly and composite-taxa tissues from HAC-U were higher than reference in 2022 (Figures 6.9 and 6.10; Appendix Figures F.4.4 and F.4.6). Composite-taxa tissue concentrations of calcium and strontium in 2022 at both exposed areas were significantly higher than reference. At HAC-R1, concentrations of both analytes were similar to pre-breach and lower than most previous monitoring years (except 2020),

relative to reference, whereas at HAC-U composite-taxa tissue concentrations of these analytes were higher than pre-breach and the concentration (relative to reference) was higher than all previous monitoring years (Figures 6.9 and 6.10, Table 6.7; Appendix Tables F.4.6, F.4.7, F.4.9, F.4.10). Caddisfly tissue concentrations of calcium and strontium in 2022 at HAC-U were also significantly higher than reference but were lower than those observed in 2018 and/or 2019 (Figure 6.10, Table 6.7; Appendix Table F.4.8). Periphyton (but not caddisfly or composite-taxa) tissue concentrations of sodium were significantly higher than reference in 2022 but similar to or lower than pre-breach concentrations for both areas (Figures 6.9 and 6.10, Table 6.7). Evaluation TTFs indicated that calcium, sodium and strontium were similar to or lower than reference in caddisfly or composite-taxa tissues from both exposed areas of upper Hazeltine Creek (Tables 6.9 and 6.10; Appendix Tables F.4.11 to F.4.16).

Composite-taxa tissues from HAC-R1 had concentrations of barium, nickel, titanium, uranium, and vanadium that were significantly higher than reference, but concentrations in 2022 were similar to or lower than pre-breach (where pre-breach data exist) or were temporally stable (Figure 6.9, Table 6.7). Tissues collected from HAC-U in 2022 had analyte concentrations that were higher than reference for uranium in caddisfly, and barium and phosphorous in composite-taxa tissues. However, composite-taxa tissue concentrations of barium were similar to pre-breach (no pre-breach data for phosphorus) and caddisfly tissue uranium concentrations in 2022 were similar to 2019, indicating no temporal increase (Figures 6.9 and 6.10, Table 6.7; Appendix Tables F.4.5 to F.4.10). The similarity (or lower) concentrations of these analytes in 2022 compared to pre-breach, lack of temporal increase relative to 2018/2019, and inconsistencies among tissue types and sampling areas, indicates there is no equivocal evidence that concentrations of these analytes are increased due to a mine-related influence.

6.1.4.3 Lower Hazeltine Creek

For most metals evaluated, there was no evidence of increasing concentrations in periphyton and/or benthic invertebrate tissues at the lower Hazeltine Creek area relative to the reference area over time (Appendix Figures F.4.11 to F.4.13, Appendix Tables D.5.2, D.5.4, D.5.6, D.5.9 to D.5.11, F.4.17 to F.4.21). The primary analytes copper and selenium and seven secondary analytes barium, cadmium, calcium, manganese, molybdenum, phosphorus, and strontium met the criteria for inclusion in data interpretation (i.e., were significantly higher for at the lower Hazeltine Creek exposed area relative to reference in 2022 or in all years; Table 6.7). Of these analytes, only cadmium did not show a significant (*Area×Year*) interaction for at least one tissue type in lower Hazeltine Creek.

MPMC routinely monitors water quality in lower Hazeltine Creek at Station HAC-08 (a station upstream of HAC-D; Figure 4.2). Results from this routine water quality monitoring station

indicated that aqueous concentrations of two primary or secondary analytes (copper and selenium) exceeded the BCWQG during the year preceding sampling (i.e., September 2021 to August 2022). Specifically, concentrations of dissolved copper consistently (100% of samples) exceeded the BLM-based chronic guideline and total selenium concentrations exceeded the chronic BCWQG in one sample (Appendix Table D.1.6). Of the two primary and seven secondary analytes identified for further investigation (above), only dissolved aqueous concentrations of copper, selenium and molybdenum were elevated at HAC-D relative to reference (Table 6.8)[67]. BCFs were slightly elevated (< 2 times higher than reference) for copper in periphyton tissues and not elevated in any tissues for selenium (Table 6.8). The BCFs for barium, cadmium, and manganese were also slightly elevated relative to reference (< 2 times), while BCFs for phosphorus and strontium were 2.0 and 5.2 times higher than reference, and the BCF for calcium in periphyton tissue was the most elevated (18 times higher than reference; Table 6.8). For the most part, BCFs were lower than those observed for upper Hazeltine Creek for the secondary analytes evaluated in 2022, except for calcium and phosphorus (Table 6.8).

Concentrations of copper in periphyton, caddisfly, and composite-taxa tissues from lower Hazeltine Creek were consistently elevated relative to the lower Edney creek reference area (EDC-D) in most sampling years, except for caddisfly tissue in 2018. In addition, copper concentrations in periphyton and caddisfly tissues were consistently higher than pre-breach in most sampling years, except 2018 for composite-taxa tissues (pre-breach data do not exist for caddisflies; Figure 6.11, Table 6.7; Appendix Figures F.4.11 to F.4.13, Appendix Tables D.5.2, D.5.4, D.5.6, D.5.9 to D.5.11, F.4.17 to F.4.21). However, the mean copper concentrations in each tissue type in 2022 were significantly lower than in 2021 and were similar to or lower than previous monitoring years, relative to reference (Figure 6.11, Table 6.7). Evaluation of temporal changes in TTFs for copper showed results different to those from upper Hazeltine Creek. The copper TTFs for caddisfly and composite taxa-tissues were similar to or lower than reference in all years, and for composite-taxa tissues were temporally stable and similar to or lower than pre-breach (Table 6.9; Appendix Tables D.5.7 and D.5.8, F.4.22 to F.4.24). Overall, although copper concentrations in periphyton and benthic invertebrate tissues were significantly higher than reference and pre-breach (where pre-breach data exist), the BCFs were only slightly higher (periphyton, by 1.7 times) or lower than reference (caddisfly and composite-taxa; Table 6.8), and the TTFs were similar to or lower than reference and pre-breach.

[67] Elevated analytes were identified as those with mean concentrations at the exposed station that were at least twice the mean concentration at the reference station.

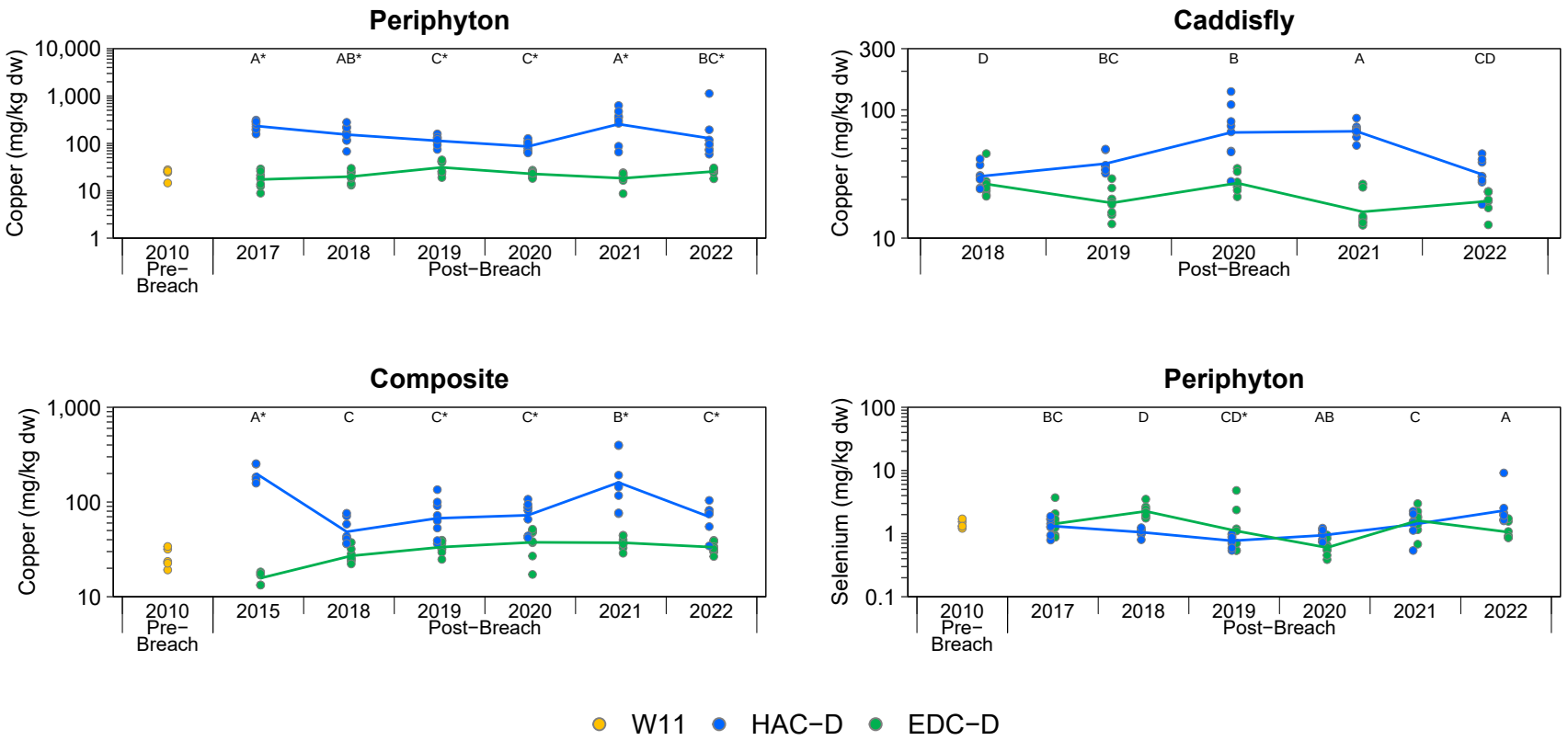


Figure 6.11: Periphyton, Caddisfly, and Composite-Taxa Benthic Invertebrate Tissue Primary and Secondary Analyte Concentrations with a Significant Positive Exposed - Reference Difference for Lower Hazeltine Creek (HAC-D; Exposed) and Lower Edney Creek (EDC-D; Reference), 2010 to 2022

Notes: BCMOE = British Columbia Ministry of the Environment; GL = Guideline; dw = dry weight. W11 (2010) is the pre-breach equivalent of HAC-D. Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Plots are only included for primary and secondary analytes that had either a significant Area × Time interaction term and were higher at exposed than reference areas in 2022 or had no significant interaction but had a higher exposed magnitude of difference across all years for a given tissue type. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted. Letters with a * designate years where the exposed site is different than pre-breach conditions, as determined using a one-way temporal ANOVA.

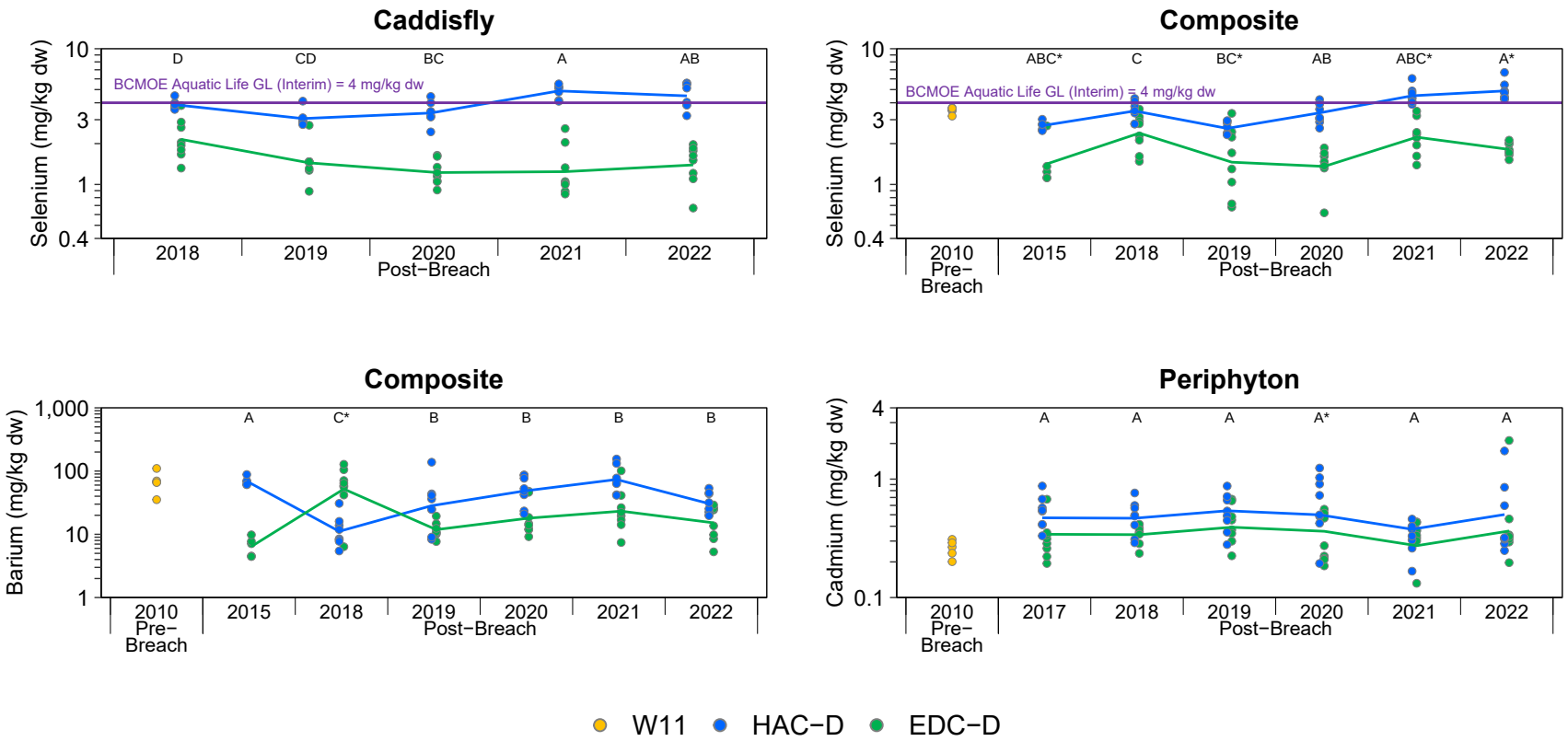


Figure 6.11: Periphyton, Caddisfly, and Composite-Taxa Benthic Invertebrate Tissue Primary and Secondary Analyte Concentrations with a Significant Positive Exposed - Reference Difference for Lower Hazeltine Creek (HAC-D; Exposed) and Lower Edney Creek (EDC-D; Reference), 2010 to 2022

Notes: BCMOE = British Columbia Ministry of the Environment; GL = Guideline; dw = dry weight. W11 (2010) is the pre-breach equivalent of HAC-D. Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Plots are only included for primary and secondary analytes that had either a significant Area × Time interaction term and were higher at exposed than reference areas in 2022 or had no significant interaction but had a higher exposed magnitude of difference across all years for a given tissue type. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted. Letters with a * designate years where the exposed site is different than pre-breach conditions, as determined using a one-way temporal ANOVA.

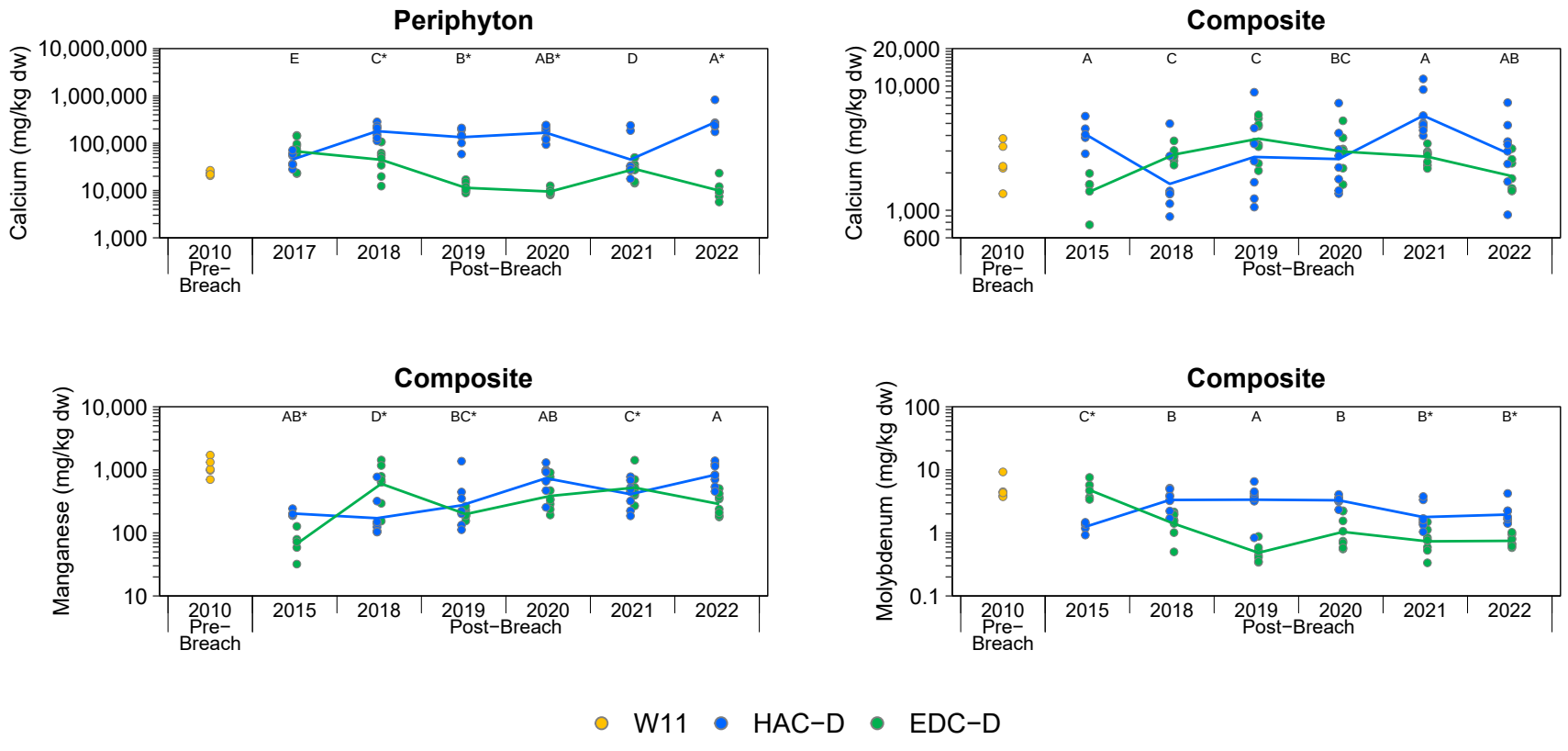


Figure 6.11: Periphyton, Caddisfly, and Composite-Taxa Benthic Invertebrate Tissue Primary and Secondary Analyte Concentrations with a Significant Positive Exposed - Reference Difference for Lower Hazeltine Creek (HAC-D; Exposed) and Lower Edney Creek (EDC-D; Reference), 2010 to 2022

Notes: BCMOE = British Columbia Ministry of the Environment; GL = Guideline; dw = dry weight. W11 (2010) is the pre-breach equivalent of HAC-D. Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Plots are only included for primary and secondary analytes that had either a significant Area × Time interaction term and were higher at exposed than reference areas in 2022 or had no significant interaction but had a higher exposed magnitude of difference across all years for a given tissue type. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted. Letters with a * designate years where the exposed site is different than pre-breach conditions, as determined using a one-way temporal ANOVA.

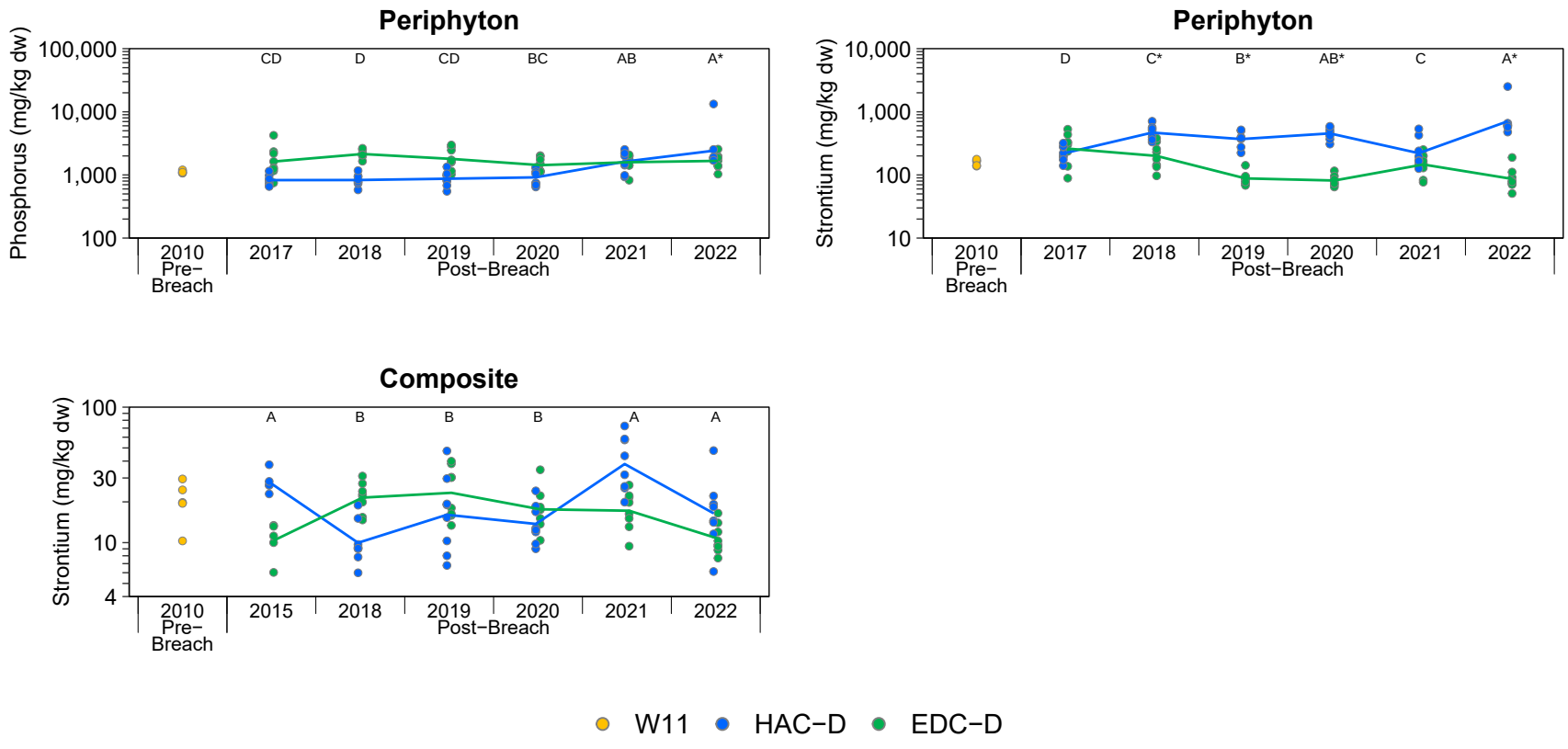


Figure 6.11: Periphyton, Caddisfly, and Composite-Taxa Benthic Invertebrate Tissue Primary and Secondary Analyte Concentrations with a Significant Positive Exposed - Reference Difference for Lower Hazeltine Creek (HAC-D; Exposed) and Lower Edney Creek (EDC-D; Reference), 2010 to 2022

Notes: BCMOE = British Columbia Ministry of the Environment; GL = Guideline; dw = dry weight. W11 (2010) is the pre-breach equivalent of HAC-D. Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Plots are only included for primary and secondary analytes that had either a significant Area × Time interaction term and were higher at exposed than reference areas in 2022 or had no significant interaction but had a higher exposed magnitude of difference across all years for a given tissue type. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted. Letters with a * designate years where the exposed site is different than pre-breach conditions, as determined using a one-way temporal ANOVA.

These findings indicate there is no evidence of increasing tissue concentrations or bioavailability of copper over time in biota from lower Hazeltine Creek.

Selenium concentrations in periphyton, caddisfly and composite-taxa tissues from lower Hazeltine Creek were significantly higher compared to the reference area in 2022 (Figure 6.11, Table 6.7; Appendix Figures F.4.11 to F.4.13, Appendix Tables F.4.17 to F.4.21). Selenium concentrations in periphyton and caddisfly in 2022 were higher than most prior years (periphyton: 2017 to 2021 except 2020; caddisfly: 2018 to 2020). In composite-taxa tissues, selenium concentrations in 2022 were similar to most prior years but higher than in 2018 and 2019 (Figure 6.11, Table 6.7). Compared to pre-breach conditions, selenium concentrations in periphyton tissue were similar to or lower than pre-breach in all years. In contrast, selenium concentrations in composite-taxa were lower than pre-breach in 2015, 2019, similar to pre-breach in 2018 and 2020, and increased to higher than pre-breach in 2021 and 2022 (Figure 6.11, Table 6.7; Appendix Tables F.4.18 and F.4.21). Mean selenium concentrations in caddisfly (4.58 mg/kg dw) and composite-taxa (4.54 mg/kg dw) were slightly above the BC interim guideline (4 mg/kg dw; BCMOE 2014) in 2022, which is consistent with 2021 but differs from prior years (2015 to 2020) when mean concentrations were below the guideline (Figure 6.11, Table 6.8; Appendix Tables D.5.5, D.5.7, D.5.10, D.5.11). The elevation of mean selenium concentrations over the guideline, although slight, suggests potential selenium-associated risks to aquatic life. The TTFs for selenium were similar to reference in 2022 (caddisfly tissues) or were higher than reference but temporally stable (composite-taxa tissues), which indicate selenium is not accumulating in aquatic biota over time (Table 6.9; Appendix Tables D.5.7 and D.5.8, F.4.22 to F.4.24). Overall, BCFs were lower than reference for all tissue types (Table 6.8) and the TTFs indicate there is no evidence of increasing bioavailability of selenium over time in lower Hazeltine Creek (Table 6.9). However, selenium concentrations in all exposed tissues in 2022 were significantly elevated relative to reference and were significantly higher in 2022 compared to 2018 and 2019 (for all tissues), relative to reference. In benthic invertebrate tissues, selenium concentrations that were previously below the interim guideline and pre-breach concentrations (2015 and 2019) were higher than the guideline and pre-breach concentrations in 2021 and 2022. Therefore, there is some evidence of a temporal increase in tissue selenium concentrations in lower Hazeltine Creek, and the elevation of mean selenium concentrations over the guideline for protection of aquatic life, although slight, suggests potential selenium-associated risks to aquatic life.

Temporal changes in the seven secondary analytes identified for data interpretation (barium, cadmium, calcium, manganese, molybdenum, phosphorus, and strontium) differed between tissue types from lower Hazeltine Creek (Figure 6.11, Table 6.7; Appendix Figures F.4.11 to F.4.13, Appendix Tables F.4.17 to F.4.21). Most notable in 2022 was that concentrations of all secondary analytes in caddisfly tissues from lower Hazeltine Creek were

either similar to or lower than reference (Table 6.7; Appendix Table F.4.16). A similar result was observed for caddisfly tissues at HAC-R1 in 2022 (see Section 6.1.4.2). Periphyton tissue concentrations of cadmium, calcium, phosphorus, and strontium were significantly elevated relative to reference in 2022 (Figure 6.11, Table 6.7; Appendix Tables F.4.17 and F.4.18). Tissue concentrations of cadmium were similar to pre-breach in 2022, which is consistent with previous monitoring years, and concentrations were temporally stable from 2017 to 2022, relative to reference (Figure 6.11, Table 6.7). Periphyton tissue concentrations of calcium and strontium in 2022 were significantly higher than pre-breach, and while differences in concentration (relative to reference) have varied from 2017, these differences were significantly higher than most previous monitoring years (except 2020; Figure 6.11, Table 6.7). However, these changes in the concentrations of calcium and strontium (relative to reference) in 2022 were driven by both a decrease in tissue concentration at the reference area and an increase in tissue concentrations at HAC-D in 2022 (with the exposed:reference ratio in 2022 being significantly higher than previous years; Figure 6.11, Table 6.7). Periphyton tissue concentrations for phosphorus were higher than pre-breach, the difference between exposed and reference were significantly higher than all previous monitoring years from 2017 except 2021, and the concentration of phosphorus (for the first time since monitoring began in 2017) was higher than reference in exposed tissues (Figure 6.11, Table 6.7; Appendix Tables F.4.17 and F.4.18).

Composite-taxa tissues from lower Hazeltine Creek had concentrations of barium, calcium, manganese, molybdenum, and strontium that were significantly elevated relative to reference, but that were similar to or lower than pre-breach tissue concentrations in 2022 (Figure 6.11, Table 6.7). Concentrations of these analytes in composite-taxa tissues in 2022 were similar to or lower than in the first year of monitoring (2015), except for molybdenum which was similar to or lower than concentrations from 2018 to 2021, relative to reference (Figure 6.11, Table 6.7; Appendix Tables F.4.14, F.4.15). Therefore, there is no evidence of a temporal increase in the concentrations of these secondary analytes in composite-taxa tissues, relative to reference. Calcium and strontium were the only two secondary analytes that were also significantly higher than reference in 2022 in other tissue types (i.e., periphyton) and which also showed a temporal increase, relative to reference (see description above).

The TTFs for most of the secondary analytes discussed above (barium, calcium, manganese, molybdenum, and strontium) in caddisfly and composite-taxa tissues from lower Hazeltine Creek in 2022 were similar to or lower than reference (Table 6.9; Appendix Figures F.4.14 and F.4.15, Appendix Tables D.5.7, D.5.8, F.4.22 to F.4.24). For manganese and molybdenum in composite taxa tissues, the TTFs in 2022 were significantly higher than reference (Table 6.9). A significant increase in the exposed:reference ratio for composite-taxa TTFs has not been observed since 2019 for any of the five secondary analytes assessed (including manganese

and molybdenum), and the TTFs for these five secondary analytes in composite-taxa tissue were lower than or similar to pre-breach (Appendix Tables F.5.18 to F.5.20, Appendix Figures F.5.13 and F.5.14). In addition, manganese and molybdenum did not have BCFs higher than reference. Overall, the TTFs for barium, calcium, manganese, molybdenum, and strontium in benthic invertebrate tissues were either similar to or lower than reference, temporally stable since 2019 (for those analytes with TTFs higher than reference), and similar to or lower than pre-breach, indicating there is no evidence of increased bioaccumulation of these analytes in aquatic biota in lower Hazeltine Creek.

6.1.4.4 Tissue-Type Comparison

A comparison between benthic invertebrate (caddisfly and composite) tissue findings was completed to evaluate if results were consistent between the two tissue types. This qualitative comparison focused on analytes with a significant positive exposed-reference difference (i.e., analytes with concentrations that were significantly higher in tissues from the exposed area compared to those from the reference area) in 2022 or in all monitoring years for at least one tissue type in at least one area.

In upper Hazeltine Creek, selenium was the only primary analyte for which both benthic invertebrate tissue concentrations (caddisfly and composite-taxa) and TTFs in 2022 were higher at HAC-R1 and HAC-U than reference. However, for selenium only the TTFs in caddisfly tissues from HAC-U had a significant (*AreaxYear*) interaction which indicates there has been a significant increase in TTFs over time (Tables 6.9 and 6.10). For both areas of upper Hazeltine Creek, the TTFs for arsenic, iron, cadmium, manganese, nickel, phosphorus, uranium, and vanadium were elevated relative to reference in both caddisfly and composite-taxa tissues, however tissue concentrations for most of these analytes were not similarly elevated in both tissue types (Table 6.10; see Section 6.1.4.2 for detailed discussion of these results). Molybdenum and titanium were the only analytes for which tissue concentrations were similar to reference (for at least one area) and TTFs were elevated in caddisfly tissues but not composite-taxa tissues (Table 6.10). Barium was the only analyte for which only composite-taxa tissues had a higher concentration and TTFs for both exposed areas (Table 6.10). Overall, there were only a handful of instances when higher tissue concentrations or TTFs relative to reference occurred in caddisfly tissues from upper Hazeltine Creek that were undetected in composite-taxa samples (i.e., molybdenum and titanium TTFs at HAC-U, and uranium tissue concentrations at HAC-U; Table 6.10). In addition, there were also a few instances when significant temporal increases in the TTFs for analytes in caddisfly tissues occurred that were undetected in composite-taxa samples (i.e., no temporal change in analyte TTFs was detected in composite-taxa tissues): nickel at HAC-R1, and iron, selenium, and vanadium at HAC-U (Table 6.10).

Table 6.10: Summary Magnitude of Difference (MOD)[a] of Exposed - Reference Contrasts of Primary and Secondary Analyte Concentrations and Trophic Transfer Factors (TTFs) in Caddisfly and Composite-Taxa Benthic Invertebrate Tissue for Upper Hazeltine Creek (HAC-R1, HAC-U; Exposed), Upper Edney Creek (EDC-U; Reference), Lower Hazeltine Creek (HAC-D; Exposed), and Lower Edney Creek (EDC-D; Reference), 2022

Analytes		Upper Hazeltine Creek Reach 1 (HAC-R1; Exposed)				Upper Hazeltine Creek Reach 2 (HAC-U; Exposed)				Lower Hazeltine Creek Reach 5 (HAC-D; Exposed)			
		Upper Edney Creek (EDC-U; Reference)				Upper Edney Creek (EDC-U; Reference)				Lower Edney Creek (EDC-D; Reference)			
		Caddisfly		Composite-Taxa		Caddisfly		Composite-Taxa		Caddisfly		Composite-Taxa	
		Tissue	TTF	Tissue	TTF	Tissue	TTF	Tissue	TTF	Tissue	TTF	Tissue	TTF
Primary Analytes	Arsenic	-44	557	99	1490	ns	419	202	1,849	-70	ns	ns	ns
	Copper	ns	ns	398	203	30	ns	1,564	759	62	-68	110	ns-i
	Iron	ns	1167	161	1832	ns	548	ns	613	-76	ns	ns	242
	Selenium	842	223	403	111	1,781	323	587	46	223	ns	170	105
Secondary Analytes	Barium	ns	ns	276	1,152	ns	ns	280	736	ns	-71	101	ns
	Cadmium	-65	398	-53	313	ns	560	-47	325	ns	ns	ns	ns
	Calcium	ns	-96	379	-80	72	-91	1,426	ns	ns	-98	53	-94
	Manganese	ns	451	ns	1,386	ns	438	ns	597	ns	ns	190	137
	Molybdenum	ns	ns	ns	126	ns	161	ns	ns	ns	ns	161	397
	Nickel	-58	440	88	1172	ns	641	ns	1,948	-85	ns	ns	83
	Phosphorus	ns	159	ns	250	ns	97	18	151	ns	-37	ns	-36
	Sodium	ns	-41	ns	ns	ns	-41	ns	ns-i	-21	-39	ns	ns
	Strontium	ns	-84	222	ns	58	-68	666	ns	-37	-92	54	-81
	Titanium	ns	ns	ns-i	838	ns	302	ns	ns	-71	ns	ns	178
	Uranium	ns	352	87	792	120	861	ns	573	-58	ns	ns	140
	Vanadium	ns	193	291	1,702	ns	432	ns	466	-74	ns	ns	225

Indicates significantly higher tissue concentration or TTF at exposed compared to reference area (α = 0.05), and the interaction (Area x Year) term of the two-way ANOVA was significant (α = 0.05; i.e., the difference between exposed and reference changed significantly among years).

Indicates significantly higher tissue concentrations or TTF at exposed compared to reference area (α = 0.05), without a significant (Area x Year) interaction of the two-way ANOVA. Values represent the MOD exposed:reference, which did not change significantly among monitoring years.

Notes: Results are shown for primary and secondary analytes that are presented in Table 6.7 (i.e., analytes that had a significant positive exposed - reference difference in 2022 or in all monitoring years for one or more tissue types [periphyton, caddisfly, or composite benthic invertebrate] in at least one area). "-" = not enough data available for test or comparison, ns = no significant difference between exposed at reference area. TTF calculated as (benthic invertebrate tissue analyte concentration) / (periphyton tissue analyte concentration).

[a] Magnitude of difference (MOD) calculated on backtransformed least-squares means as (Exp-Ref)/Ref x 100%.

At lower Hazeltine Creek (HAC-D) in 2022, none of the secondary analytes had higher concentrations or TTFs relative to reference in caddisfly tissues, but copper and selenium (primary analytes) were significantly higher than reference (Table 6.10). Only selenium, manganese, and molybdenum had both elevated tissues concentrations and TTFs relative to reference in composite-taxa tissue, and of these analytes, only TTFs for manganese increased significantly over time (but not since 2019; Tables 6.9 and 6.10). Iron, nickel, titanium, uranium, and vanadium had elevated TTFs, however tissue concentrations of these analytes were not similarly elevated in 2022 (Table 6.10). For lower Hazeltine Creek, there were no instances when higher tissue concentrations or TTFs relative to reference occurred in caddisfly tissues from upper Hazeltine Creek that were undetected in composite-taxa samples from this area (Table 6.10).

When comparing the magnitude of the exposed:reference ratio of analyte concentrations and TTF results in 2022, the magnitude of most ratios was lower in caddisfly samples compared to composite samples (Table 6.10). However, differences in exposed:reference ratios for tissue concentrations were consistently higher in caddisfly tissues compared composite-taxa tissues for selenium for all three exposed areas, and for uranium at HAC-U (Table 6.10). Among all areas (HAC-R1, HAC-U, and HAC-D), there were only a few instances when higher tissue concentrations or TTFs relative to reference occurred in caddisfly tissues that were undetected in composite-taxa samples (these are outlined above). Combined, these results indicate that if sampling were limited to composite-taxa tissue samples only, potential changes in tissue concentrations and TTFs in caddisfly tissues would largely be detected by continued monitoring composite-taxa tissues, which is consistent with results reported in 2020 and 2021 (Minnow 2021a, 2022a).

6.1.5 Summary

Sediment quality monitoring completed in upper and lower Hazeltine Creek in 2022 continued to document the physical and chemical characteristics of sediments from this erosional habitat. Sediments were characterized by concentrations of several analytes that were greater than reference/pre-breach concentrations and WSQG values: copper and selenium in upper Hazeltine Creek, and copper and iron in lower Hazeltine Creek. In both upper and lower Hazeltine Creek in 2022, copper was the most substantially elevated analyte with concentrations 2.0 and 1.7 times higher than the upper WSQG, respectively, and higher than reference/pre-breach concentrations. The TOC content of sediments from upper Hazeltine Creek was significantly higher in 2022 than in 2018, relative to reference, as were the concentrations of copper and selenium. Mean concentrations of copper and selenium in upper Hazeltine Creek sediments were significantly higher in 2022 than previously observed (2018 to 2021), relative to reference. For both analytes, this change was driven by a significant decrease in sediment copper and

selenium concentrations at the reference area, with copper concentrations within upper Hazeltine Creek sediments (i.e., not evaluated relative to reference) showing temporal stability. Sediment selenium concentrations evaluated within upper Hazeltine Creek in 2022 (not relative to reference) were significantly higher than in preceding years (2018 to 2020) which was associated with higher TOC and lower sand content of these sediments. In lower Hazeltine Creek, the TOC content of lower Hazeltine Creek sediments has remained unchanged relative to reference from 2018 to 2022. Copper and iron concentrations in lower Hazeltine Creek sediments in 2022 were similar to or lower than those observed in 2018, relative to reference, indicating sediment concentrations of these analytes have not increased significantly over that period. The 2022 sediment quality monitoring results continue to indicate that results related to variable sediment physical characteristics (i.e., TOC and sand content) that are driven by the necessity for opportunistic sampling due to limited availability of fine sediments in some monitoring years. The variability in sediment physical characteristics may stabilize as sediment accumulation continues to occur in this remediated system.

Periphyton monitoring indicated that primary productivity of upper Hazeltine Creek, as assessed by mean chlorophyll-a (mass per unit area; mg/m^2), was below BCWQG but above the threshold indicative of moderate enrichment in lower Hazeltine Creek. Primary productivity as measured by both chlorophyll-a and AFDM at both upper Hazeltine Creek areas (HAC-R1, HAC-U) has been consistently similar to or significantly higher than reference from 2018, and higher than pre-breach since 2019 at HAC-R1 and since 2021 at HAC-U. Chlorophyll-a concentrations and AFDM at HAC-R1 in 2022 were significantly higher than at HAC-U, indicating this area had greater periphyton productivity. Despite the increased productivity following remediation, water quality monitoring indicates that dissolved oxygen concentrations largely remain above the long-term BCWQG in upper Hazeltine Creek. The periphyton community of upper Hazeltine Creek in 2022 was characterized by taxon richness, Simpson's Evenness and Diversity, and diatom richness that were similar to or higher than the reference area. Periphyton densities in 2022 at HAC-R1 and HAC-U were similar to and lower than reference, respectively, but were temporally stable at HAC-U despite being lower than reference in 2022. The periphyton communities at the two upper Hazeltine Creek areas (HAC-R1 and HAC-U) were similar in 2022 in terms of all primary metrics (density, taxon richness, Simpson's Evenness and Diversity, and diatom richness) indicating similar recovery of the periphyton community in these two areas. Periphyton community composition at HAC-R1, but not HAC-U, was similar to reference in 2022. Community composition at HAC-U continued to differ from the reference area, with higher and lower relative densities of Diatoms and Cyanobacteria, respectively; differences which are indicative of healthy periphyton communities. The similarity (or exceedance) of the primary periphyton community metrics (density, richness, Simpson's Evenness, and Simpson's Diversity)

in upper Hazeltine Creek compared to the reference area in most years and/or temporal stability of these metrics are indicative of relatively stable periphyton communities at the remediated upper Hazeltine Creek areas and good periphyton community health.

The benthic invertebrate community of upper Hazeltine Creek in 2022 was characterized by total density, taxon richness, and Simpson's Evenness and Diversity that were similar between the two areas (HAC-R1 and HAC-U) and that were similar to reference and/or pre-breach conditions. Taxon richness at HAC-R1 in 2022 remained significantly lower than pre-breach conditions but was similar to reference conditions. These results indicate that the benthic invertebrate community at these areas of upper Hazeltine Creek have largely recovered to reference and/or pre-breach conditions when primary metrics (density, richness, Simpson's Evenness and Diversity) are considered. Key differences in the benthic community structure in 2022 at both areas of upper Hazeltine Creek, compared to pre-breach conditions, included higher relative densities of Chironomidae and Trichoptera, and lower relative densities of EPT (at HAC-R1 only), Arachnida (at HAC-U only), Ephemeroptera, and Plecoptera. Notable differences in EPT at both areas of upper Hazeltine Creek, compared to reference and pre-breach, were due to the lack of Plecoptera and the higher relative density of Trichoptera, which were dominated by a family of net-spinning caddisflies (Hydropsychidae) that are tolerant of habitat disturbances. The occurrence of Ephemeroptera families at the exposed areas that are less pollutant tolerant than those at the reference area suggests the chemical conditions (i.e., water chemistry) of the exposed areas are not limiting for benthic invertebrate community recovery. Comparison of community composition between the two upper Hazeltine Creek areas suggested greater recovery of the benthic invertebrate community in Reach 2 (at HAC-U) compared to Reach 1 (at HAC-R1), based on lower and higher relative densities of Chironomidae and Trichoptera at HAC-U compared to HAC-R1, respectively. Benthic invertebrate total dry weight biomass at both upper Hazeltine Creek areas in 2022 was unchanged since 2019 and was either similar to or higher than reference in each year from 2018 to 2022. In summary, these results indicate that both areas of upper Hazeltine Creek have recovered substantially since remediation to a condition that is similar to reference and/or pre-breach conditions based on primary metrics, but with some remaining differences in community composition compared to reference and pre-breach.

Periphyton and benthic invertebrate tissue quality monitoring in upper and lower Hazeltine Creek indicated that the primary analytes arsenic, copper, iron, and selenium had higher tissue concentrations compared to reference in 2022 for which the exposed-reference difference also increased significantly over time. There is some evidence of increased bioavailability and trophic transfer of copper in benthic invertebrate tissues in upper Hazeltine Creek, since BCFs and TTFs were elevated relative to reference and TTFs for composite-taxa tissues from HAC-U increased in 2022 to higher than pre-breach conditions. However, this was limited to composite-taxa benthic

invertebrate tissues from Reach 2 (HAC-U) and was not observed in caddisfly tissues from HAC-U nor in benthic invertebrate tissues (caddisfly or composite-taxa) from Reach 1 (HAC-R1) of upper Hazeltine Creek, indicating a potentially localized increase. In contrast, there is no evidence of increasing tissue concentrations or bioavailability and trophic transfer of copper over time in biota from lower Hazeltine Creek. For selenium, BCFs were lower than reference in periphyton tissues and elevated in caddisfly, but not composite-taxa samples (upper Hazeltine Creek only) and TTFs were typically stable over time compared to reference (except for caddisflies in Reach 2 of upper Hazeltine Creek). These results indicate that the bioavailability and trophic transfer of selenium has not increased due to mine influence, except for increased trophic transfer in caddisflies from Reach 2 of upper Hazeltine Creek. Selenium concentrations in most tissues in Hazeltine Creek (upper and lower) have increased since 2018 compared to reference (except composite-taxa benthic invertebrate samples from lower Hazeltine Creek), suggesting a mine influence on tissue concentrations, if not bioavailability and trophic transfer of selenium. In upper Hazeltine Creek, tissue selenium concentrations in 2022 were similar to or lower than pre-breach results in comparable tissues, while those in composite-taxa benthic invertebrate samples from lower Hazeltine Creek in 2022 exceeded pre-breach results. Mean selenium concentrations in benthic invertebrates from upper and lower Hazeltine Creek were above the BC interim guideline for aquatic life, suggesting potential selenium-associated risks to aquatic life. In composite-taxa benthic invertebrate samples from upper Hazeltine Creek, arsenic and iron concentrations in tissues from Reach 2 (HAC-U) and Reach 1 (HAC-R1), respectively, were higher in 2022 than previous monitoring years compared to reference, but this was owing to a temporal decrease at the reference area rather than an increase in tissues from upper Hazeltine Creek. Elevated concentrations of some secondary analytes in periphyton and/or benthic invertebrate tissues over time were also observed, relative to reference, but evidence was equivocal as to whether these observed increases in tissue concentrations were mine-related, and there was little or no evidence of increased metal bioavailability (based on assessment of BCFs and TTFs relative to reference and pre-breach). In comparison to 2021 when higher tissue concentrations and trophic transfer of mercury were identified compared to reference, mercury results in 2022 did not continue to demonstrate higher bioaccumulation in the aquatic biota compared to reference (as evidenced by tissue concentrations and TTFs similar to or lower than reference and/or prior years). Overall, periphyton and benthic invertebrate tissue quality data showed some evidence of moderately higher bioavailability and/or trophic transfer of selenium and copper in upper Hazeltine Creek, and selenium in lower Hazeltine Creek. Comparison of the two benthic invertebrate tissue types (caddisfly and composite-taxa) indicated that although some variability exists between the tissues, potential changes in analyte concentrations and TTFs in caddisfly tissues would largely be detected if sampling were limited to composite-taxa tissue samples only.

6.2 Edney Creek

6.2.1 Periphyton and Benthic Invertebrate Tissue Quality

Periphyton and benthic invertebrate tissue samples were collected from the remediated (exposed) section of lower Edney Creek (E1), with an upstream area of Edney Creek unaffected by the breach (EDC-D) serving as reference (Figure 4.2, Table 4.4). A review of the 2022 periphyton and benthic invertebrate tissue quality data (Appendix B) indicated that the data largely met the established DQOs, although laboratory and field precision were low (see Section 6.1.4.1 for details) and the heterogeneity in analyte results were considered during data interpretation. A review of 2022 supporting water data quality indicated these data can be used with a good level of confidence for interpretation (see Section 5.1.1 for details).

As indicated in Section 4.4.3.2, data interpretation was focused on primary and secondary analytes (Table 2.4) with a significant positive exposed-reference difference (i.e., analytes with concentrations that were significantly higher in tissues from the remediated [exposed] area compared to those from the reference area) in 2022 (if the analysis *Area*×*Year* interaction was significant) or in all monitoring years (if the *Area*×*Year* interaction was not significant[68]) for at least one tissue type (periphyton, caddisfly, or composite-taxa benthic invertebrate). Data interpretations were further focused by integrating the results of water quality monitoring (i.e., bioconcentration) and trophic transfer factors (TTFs) of benthic invertebrate tissue analyte concentrations as detailed in Section 6.1.4.1. Combined, these approaches were used to identify analytes for which concentrations in biota and TTFs at the exposed areas have increased at a rate that differs from reference and that may represent a potential risk to aquatic biota. Results for composite-taxa benthic invertebrate tissue samples are referred to as composite-taxa for the remainder of this section.

For most metals evaluated, there was no evidence of increasing metal concentrations in periphyton and/or benthic invertebrate tissues from the exposed (E1) relative to the reference (EDC-D) area over time (Appendix Figures F.4.16 to F.4.18, Appendix Tables D.5.2, D.5.4, D.5.6, D.5.9 to D.5.11, F.4.25 to F.4.27). The primary analyte copper and the nine secondary analytes cadmium, calcium, cobalt, silver, sodium, strontium, titanium, vanadium, and zinc met the criteria for inclusion in data interpretation (i.e., were significantly higher at the lower Edney Creek exposed area relative to reference in 2022 or in all years; Table 6.11). Of these analytes, only copper

[68] If no significant change was detected in the exposed:reference ratio among years (i.e., the *Area* x *Year* interaction was not significant), then data from all available years were combined for the analyses.

Table 6.11: Summary of Statistical Contrasts of Exposed - Reference Relative Differences of Primary and Secondary Analyte Concentrations in Periphyton, Caddisfly, and Composite-Taxa Benthic Invertebrate Tissue for Lower Edney Creek (E1 [Exposed]; EDC-D [Reference]), 2019 to 2022 [a]

Analytes		Lower Edney Creek (E1; Exposed) / Lower Edney Creek (EDC-D; Reference)											
		Periphyton				Caddisfly				Composite-Taxa Benthic Invertebrate			
		2019	2020	2021	2022	2019	2020	2021	2022	2019	2020	2021	2022
Primary Analyte	Copper	A	A	A	A	C	B	B	A	B	AB	A	AB
Secondary Analyte	Cadmium	A	A	A	A	A	A	A	A	A	A	A	A
	Calcium	BC	B	A	C	B	B	B	A	A	A	A	A
	Cobalt	A	A	A	A	A	A	A	A	A	A	A	A
	Silver	AB	A	AB	B	B	B	AB	A	A	A	A	A
	Sodium	B	AB	A	B	A	A	A	A	A	A	A	A
	Strontium	B	B	A	B	B	B	B	A	B	AB	A	A
	Titanium	BC	AB	A	C	A	A	A	A	A	A	A	A
	Vanadium	BC	A	AB	C	A	A	A	A	A	A	A	A
	Zinc	A	A	A	A	B	A	AB	A	A	A	A	A

Indicates significantly higher tissue concentration at exposed compared to reference area, and the interaction (Area x Year) term of the two-way ANOVA was not significant (α = 0.05; i.e., the difference between exposed and reference did not change significantly among years).

Indicates significantly lower tissue concentration at exposed compared to reference area (α = 0.05), and the interaction (Area x Year) term of the two-way ANOVA was not significant (α = 0.05; i.e., the difference between exposed and reference did not change significantly among years).

Indicates significantly higher tissue concentration at exposed compared to reference area (α = 0.05), and the interaction (Area x Year) term of the two-way ANOVA was significant (α = 0.05; i.e., the difference between exposed and reference changed significantly among years).

Indicates significantly lower tissue concentration at exposed compared to reference area (α = 0.05), and the interaction (Area x Year) term of the two-way ANOVA was significant (α = 0.05; i.e., the difference between exposed and reference changed significantly among years).

Notes: "-" = no statistical comparison could be made because data were not available or all were results below Laboratory Reporting Limit (LRL). Refer to Appendix Tables F.4.25 to F.4.27 for statistical analyses results and magnitude of difference calculations.

[a] Results are shown for primary and secondary analytes that had a significant positive exposed - reference difference in 2022 or in all monitoring years for one or more tissue types (periphyton, caddisfly, or composite benthic invertebrate) in at least one area. Years that share a letter (e.g., A,B,C) had ratios of analyte concentrations (Exposed:Reference) that did not differ significantly among years. Letters are assigned such that A is assigned to the year with the highest ratio of concentrations (Exposed:Reference).

calcium, silver, strontium, and zinc had a significant (*Area×Year*) interaction and significant positive exposed-reference difference for at least one tissue type in 2022 (Table 6.11; Appendix Tables F.4.25 to F.4.27).

MPMC implements routine water quality monitoring in lower Edney Creek at Station EDC-01a, a station within sampling area E1 (Figure 4.2). Results from this routine water quality monitoring station indicated that aqueous concentrations of dissolved copper exceeded the BLM-based chronic BCWQG in 75% of samples in the year preceding sampling (i.e., September 2021 to August 2022). Of the one primary analyte (copper) and the nine secondary analytes identified above for further evaluation (above), only dissolved aqueous concentrations of copper exceeded the reference concentrations by more than two times, while the cadmium, calcium, sodium, strontium, and vanadium were slightly (< 2 times) higher than the reference area (EDC-U; Table 6.12)[69]. Overall, this indicates very similar water quality between the exposed and reference areas, except for elevated dissolved copper concentrations, which was consistent with little to no upstream mine-related influence in lower Edney Creek. Mean BCFs were slightly (less than two-times) higher than reference for calcium, sodium, strontium, and vanadium and slightly greater than two-times reference for copper and cadmium for at least one tissue type (Table 6.12).

Copper concentrations in all three tissue types (periphyton, caddisfly, and composite-taxa) were significantly higher at the exposed area in 2022 relative to reference (Table 6.11; Appendix Tables D.5.9, F.4.25). Concentrations of copper in exposed periphyton tissues were consistently higher than the reference area (from 2019 to 2022), but the difference relative to reference was temporally stable (i.e., *AreaxYear* interaction was not significant; Figure 6.12, Table 6.11; Appendix Table F.4.25). Copper concentrations in exposed caddisfly tissues were higher than reference from 2020 to 2022 and were significantly higher in 2022 than in all prior years (2019 to 2021), relative to reference (Figure 6.12, Table 6.11; Appendix Tables D.5.4, D.5.10, F.4.26). For exposed composite-taxa tissues, copper concentrations were higher than reference in 2021 and 2022, but concentrations in 2022 were similar to all previous monitoring years (2019 to 2021) indicating temporal stability (Figure 6.12, Table 6.11; Appendix Tables D.5.6, D.5.11, F.4.27). Despite concentrations of copper in caddisfly and composite-taxa tissue in 2022 that were significantly higher than reference, TTFs for copper in both tissues from the exposed area were lower than reference in all years (Table 6.13; Appendix Figures F.4.19, F.4.20, Appendix Tables D.5.7, D.5.8, F.4.28, F.4.29). The elevated concentrations of copper in exposed caddisfly and composite-taxa tissues compared to reference in 2022, but lower TTFs in

[69] Elevated analytes were identified as those with mean concentrations at the exposed station that were at least twice the mean concentration at the reference station.

Table 6.12: Summary of Primary and Secondary Analytes Concentrations in Water, Periphyton, Composite-Taxa, and Caddisfly Tissues, BCFs and TTFs for Lower Edney Creek (E1 [Exposed]; EDC-D [Reference]), 2022

Analytes		Component	Metric	Units	n	Area	
						Reference	Breach-exposed
						Lower Edney Creek	
						EDC-D	E1
Primary Analytes	Copper (Cu)	Dissolved [a,b,c]	Mean [d]	mg/L	-	0.00195	***0.00602***
		Periphyton	Tissue Mean	mg/kg	8	25.8	208
			BCF [e]	unitless	-	13,231	34,551
		Caddisfly	Tissue Mean	mg/kg	8	19.8	84.9
			BCF [e]	unitless	-	10,154	14,103
			TTF [f]	unitless	-	0.787	0.951
		Composite	Tissue Mean	mg/kg	8	33.6	57.0
			BCF [e]	unitless	-	17,231	9,468
			TTF [f]	unitless	-	1.34	0.704
Secondary Analytes	Cadmium (Cd)	Dissolved [a,b,c]	Mean [d]	mg/L	-	0.00000633	0.00000753
		Periphyton	Tissue Mean	mg/kg	8	0.547	0.237
			BCF [e]	unitless	-	86,414	31,474
		Caddisfly	Tissue Mean	mg/kg	8	0.310	0.822
			BCF [e]	unitless	-	48,973	109,163
			TTF [f]	unitless	-	0.867	4.10
		Composite	Tissue Mean	mg/kg	8	1.07	1.67
			BCF [e]	unitless	-	169,036	221,780
			TTF [f]	unitless	-	3.18	9.66
	Calcium (Ca)	Dissolved [a,b,c]	Mean [d]	mg/L	-	26.2	32.7
		Periphyton	Tissue Mean	mg/kg	8	10,804	9,522
			BCF [e]	unitless	-	412	291
		Caddisfly	Tissue Mean	mg/kg	8	1,839	2,755
			BCF [e]	unitless	-	70	84
			TTF [f]	unitless	-	0.203	0.469
		Composite	Tissue Mean	mg/kg	8	1,968	2,222
			BCF [e]	unitless	-	75	68
			TTF [f]	unitless	-	0.208	0.420
	Cobalt (Co)	Dissolved [a,b,c]	Mean [d]	mg/L	-	<0.0001	<0.0001
		Periphyton	Tissue Mean	mg/kg	8	11.1	7.62
			BCF [e]	unitless	-	-	-
		Caddisfly	Tissue Mean	mg/kg	8	2.04	4.49
			BCF [e]	unitless	-	-	-
			TTF [f]	unitless	-	0.223	0.803
		Composite	Tissue Mean	mg/kg	8	1.06	2.02
			BCF [e]	unitless	-	-	-
			TTF [f]	unitless	-	0.101	0.377
	Silver (Ag)	Dissolved [a,b,c]	Mean [d]	mg/L	-	<0.00001	<0.00001
		Periphyton	Tissue Mean	mg/kg	8	0.103	0.0832
			BCF [e]	unitless	-	-	-
		Caddisfly	Tissue Mean	mg/kg	8	0.0496	0.0837
			BCF [e]	unitless	-	-	-
			TTF [f]	unitless	-	0.559	1.52
		Composite	Tissue Mean	mg/kg	8	0.153	0.102
			BCF [e]	unitless	-	-	-
			TTF [f]	unitless	-	1.76	2.52
	Sodium (Na)	Dissolved [a,b,c]	Mean [d]	mg/L	-	4.58	5.80
		Periphyton	Tissue Mean	mg/kg	8	334	318
			BCF [e]	unitless	-	73	55
		Caddisfly	Tissue Mean	mg/kg	8	3,121	3,359
			BCF [e]	unitless	-	681	579
			TTF [f]	unitless	-	9.60	11.4
		Composite	Tissue Mean	mg/kg	8	3,689	7,525
			BCF [e]	unitless	-	805	1,297
			TTF [f]	unitless	-	11.5	26.8

Dissolved concentration at exposed area exceeded reference area by less than 2-times.
Dissolved concentration at exposed area exceeded reference area by at least 2-times.
Dissolved concentration at exposed area exceeded reference area by at least than 5-times.
Indicates significantly higher tissue concentration at exposed compared to reference area (α = 0.05).
Indicates significantly lower tissue concentration at exposed compared to reference area (α = 0.05).
BCF for exposed area exceeded reference area by less than 2-times.
BCF for exposed area exceeded reference area by at least 2-times.
BCF for exposed area exceeded reference area by at least 10-times.
Mean TTF exceeds 1.
Mean TTF at exposed area exceeds 1 and the corresponding reference area TTF for a given year.

BOLD = mean tissue selenium value exceeds long-term benthic invertebrate tissue guideline for selenium (4 mg/kg dw; BCMOE 2014).

BOLD/ITALICS = Indicates dissolved water value greater than the long-term average British Columbia Water Quality Guideline (BCMOECCS 2021a,b).

Notes: Results are shown for primary and secondary analytes that are presented in Table 6.11 (i.e., those with a significant positive exposed - reference difference in 2022 or in all monitoring years for one or more tissue types [periphyton, caddisfly, or composite benthic invertebrate] in at least one area). "-" = Dissolved water concentration not data available or BCF/TTF was not calculated for analytes because no data available for calculation or one or more result used in the calculation was below the Laboratory Reporting Limit (LRL); "na" = not applicable; summary statistics reported to 3 significant figures for display purposes.

[a] Monitoring stations included EDC-01 and W10 for corresponding tissue sampling stations E1 and EDC-D, respectively (refer to Appendix Tables D.1.7 and D.1.8).

[b] Sample size for water quality monitoring is n=12 for EDC-01a (E1) and n=6 for EDC-D (W10).

[c] Guidelines were derived from the British Columbia Water Quality Guidelines for the protection of aquatic life (BCMOECCS 2021a,b) outlined in Table D.1.1.

[d] Means were calculated for routine water quality stations using data collected between January 1, 2022 and the time of sampling in August 2022 in order to be consistent with means calculated during previous years (Minnow 2016d, 2017c, 2018c, 2019, 2020a, 2021a, 2022a). See Appendix Tables D.1.7 to D.1.8 for raw data used in the calculation of mean values.

[e] Bioconcentration Factor (BCF) = Mean Tissue Concentration (mg/kg dw) / Mean Dissolved Water Concentration (mg/L). If the reported dissolved water or tissue analyte concentration was below the LRL, the BCF was not calculated.

[f] Trophic Transfer Factor (TTF) = Benthic Invertebrate Tissue Concentration / Periphyton Tissue Concentration. If the reported analyte concentrations for either periphyton or benthic invertebrate tissue were below the LRL, the TTF was not calculated.

Table 6.12: Summary of Primary and Secondary Analytes Concentrations in Water, Periphyton, Composite-Taxa, and Caddisfly Tissues, BCFs and TTFs for Lower Edney Creek (E1 [Exposed]; EDC-D [Reference]), 2022

Analytes		Component	Metric	Units	n	Area	
						Reference	Breach-exposed
						Lower Edney Creek	
						EDC-D	E1
Secondary Analytes	Strontium (Sr)	Dissolved [a,b,c]	Mean [d]	mg/L	-	0.172	0.224
		Periphyton	Tissue Mean	mg/kg	8	93	106
			BCF [e]	unitless	-	541	473
		Caddisfly	Tissue Mean	mg/kg	8	13.8	20.8
			BCF [e]	unitless	-	80	93
			TTF [f]	unitless	-	0.175	0.366
		Composite	Tissue Mean	mg/kg	8	11.0	11.1
			BCF [e]	unitless	-	64	50
			TTF [f]	unitless	-	0.131	0.255
	Titanium (Ti)	Dissolved [a,b,c]	Mean [d]	mg/L	-	<0.01	<0.01
		Periphyton	Tissue Mean	mg/kg	8	521	397
			BCF [e]	unitless	-	-	-
		Caddisfly	Tissue Mean	mg/kg	8	79.3	156
			BCF [e]	unitless	-	-	-
			TTF [f]	unitless	-	0.187	0.446
		Composite	Tissue Mean	mg/kg	8	24.5	58.3
			BCF [e]	unitless	-	-	-
			TTF [f]	unitless	-	0.0521	0.190
	Vanadium (V)	Dissolved [a,b,c]	Mean [d]	mg/L	-	0.000587	0.000808
		Periphyton	Tissue Mean	mg/kg	8	46.2	38.8
			BCF [e]	unitless	-	78,705	48,020
		Caddisfly	Tissue Mean	mg/kg	8	9.47	14.9
			BCF [e]	unitless	-	16,133	18,441
			TTF [f]	unitless	-	0.252	0.490
		Composite	Tissue Mean	mg/kg	8	3.00	5.50
			BCF [e]	unitless	-	5,111	6,807
			TTF [f]	unitless	-	0.0620	0.206
	Zinc (Zn)	Dissolved [a,b,c]	Mean [d]	mg/L	-	<0.003	<0.003
		Periphyton	Tissue Mean	mg/kg	8	62.6	42.5
			BCF [e]	unitless	-	-	-
		Caddisfly	Tissue Mean	mg/kg	8	110	137
			BCF [e]	unitless	-	-	-
			TTF [f]	unitless	-	1.76	4.57
		Composite	Tissue Mean	mg/kg	8	162	122
			BCF [e]	unitless	-	-	-
			TTF [f]	unitless	-	2.69	4.43

Dissolved concentration at exposed area exceeded reference area by less than 2-times.
Dissolved concentration at exposed area exceeded reference area by at least 2-times.
Dissolved concentration at exposed area exceeded reference area by at least than 5-times.
Indicates significantly higher tissue concentration at exposed compared to reference area (α = 0.05).
Indicates significantly lower tissue concentration at exposed compared to reference area (α = 0.05).
BCF for exposed area exceeded reference area by less than 2-times.
BCF for exposed area exceeded reference area by at least 2-times.
BCF for exposed area exceeded reference area by at least 10-times.
Mean TTF exceeds 1.
Mean TTF at exposed area exceeds 1 and the corresponding reference area TTF for a given year.

BOLD = mean tissue selenium value exceeds long-term benthic invertebrate tissue guideline for selenium (4 mg/kg dw; BCMOE 2014).

BOLD/ITALICS = Indicates dissolved water value greater than the long-term average British Columbia Water Quality Guideline (BCMOECCS 2021a,b).

Notes: Results are shown for primary and secondary analytes that are presented in Table 6.11 (i.e., those with a significant positive exposed - reference difference in 2022 or in all monitoring years for one or more tissue types [periphyton, caddisfly, or composite benthic invertebrate] in at least one area). "-" = Dissolved water concentration not data available or BCF/TTF was not calculated for analytes because no data available for calculation or one or more result used in the calculation was below the Laboratory Reporting Limit (LRL); "na" = not applicable; summary statistics reported to 3 significant figures for display purposes.

[a] Monitoring stations included EDC-01 and W10 for corresponding tissue sampling stations E1 and EDC-D, respectively (refer to Appendix Tables D.1.7 and D.1.8).

[b] Sample size for water quality monitoring is n=12 for EDC-01a (E1) and n=6 for EDC-D (W10).

[c] Guidelines were derived from the British Columbia Water Quality Guidelines for the protection of aquatic life (BCMOECCS 2021a,b) outlined in Table D.1.1.

[d] Means were calculated for routine water quality stations using data collected between January 1, 2022 and the time of sampling in August 2022 in order to be consistent with means calculated during previous years (Minnow 2016d, 2017c, 2018c, 2019, 2020a, 2021a, 2022a). See Appendix Tables D.1.7 to D.1.8 for raw data used in the calculation of mean values.

[e] Bioconcentration Factor (BCF) = Mean Tissue Concentration (mg/kg dw) / Mean Dissolved Water Concentration (mg/L). If the reported dissolved water or tissue analyte concentration was below the LRL, the BCF was not calculated.

[f] Trophic Transfer Factor (TTF) = Benthic Invertebrate Tissue Concentration / Periphyton Tissue Concentration. If the reported analyte concentrations for either periphyton or benthic invertebrate tissue were below the LRL, the TTF was not calculated.

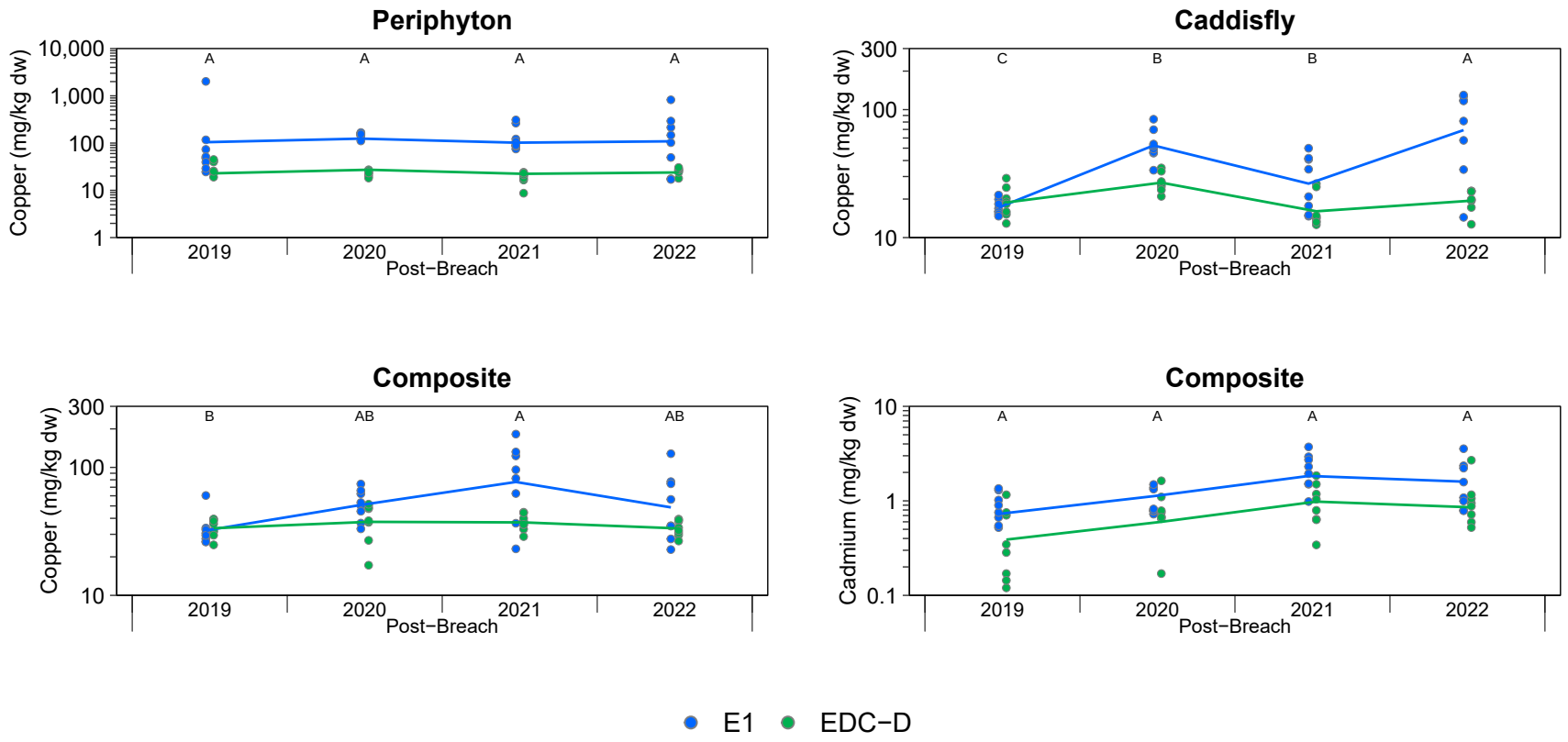


Figure 6.12: Periphyton, Caddisfly, and Composite-Taxa Benthic Invertebrate Tissue Primary and Secondary Analyte Concentrations with a Significant Positive Exposed - Reference Difference for Lower Edney Creek (E1 [Exposed]; EDC-D [Reference]), 2019 to 2022

Notes: Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Plots are only included for primary and secondary analytes that had either a significant Area × Time interaction term and were higher at exposed than reference areas in 2022 or had no significant interaction but had a higher exposed magnitude of difference across all years for a given tissue type. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted.

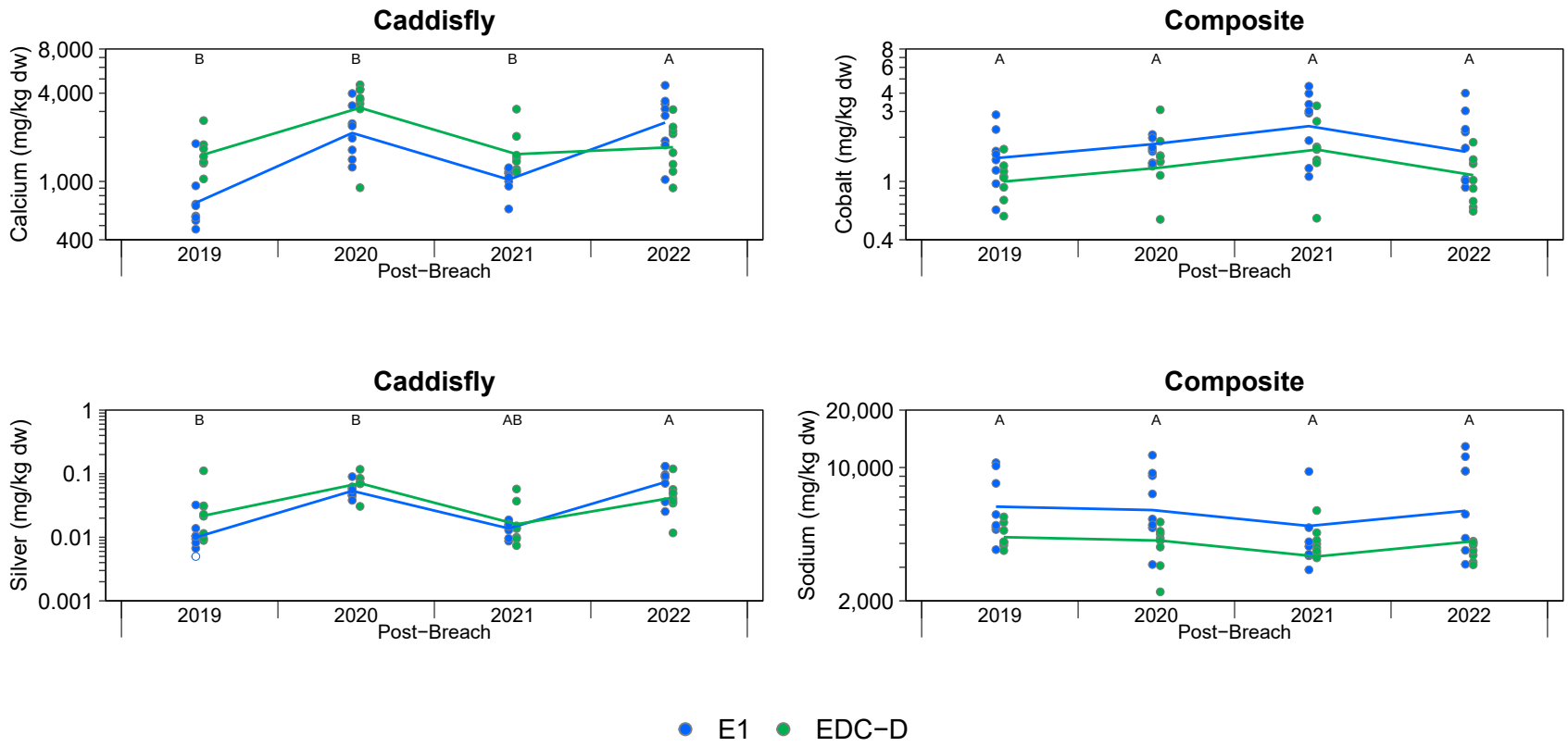


Figure 6.12: Periphyton, Caddisfly, and Composite-Taxa Benthic Invertebrate Tissue Primary and Secondary Analyte Concentrations with a Significant Positive Exposed - Reference Difference for Lower Edney Creek (E1 [Exposed]; EDC-D [Reference]), 2019 to 2022

Notes: Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Plots are only included for primary and secondary analytes that had either a significant Area × Time interaction term and were higher at exposed than reference areas in 2022 or had no significant interaction but had a higher exposed magnitude of difference across all years for a given tissue type. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted.

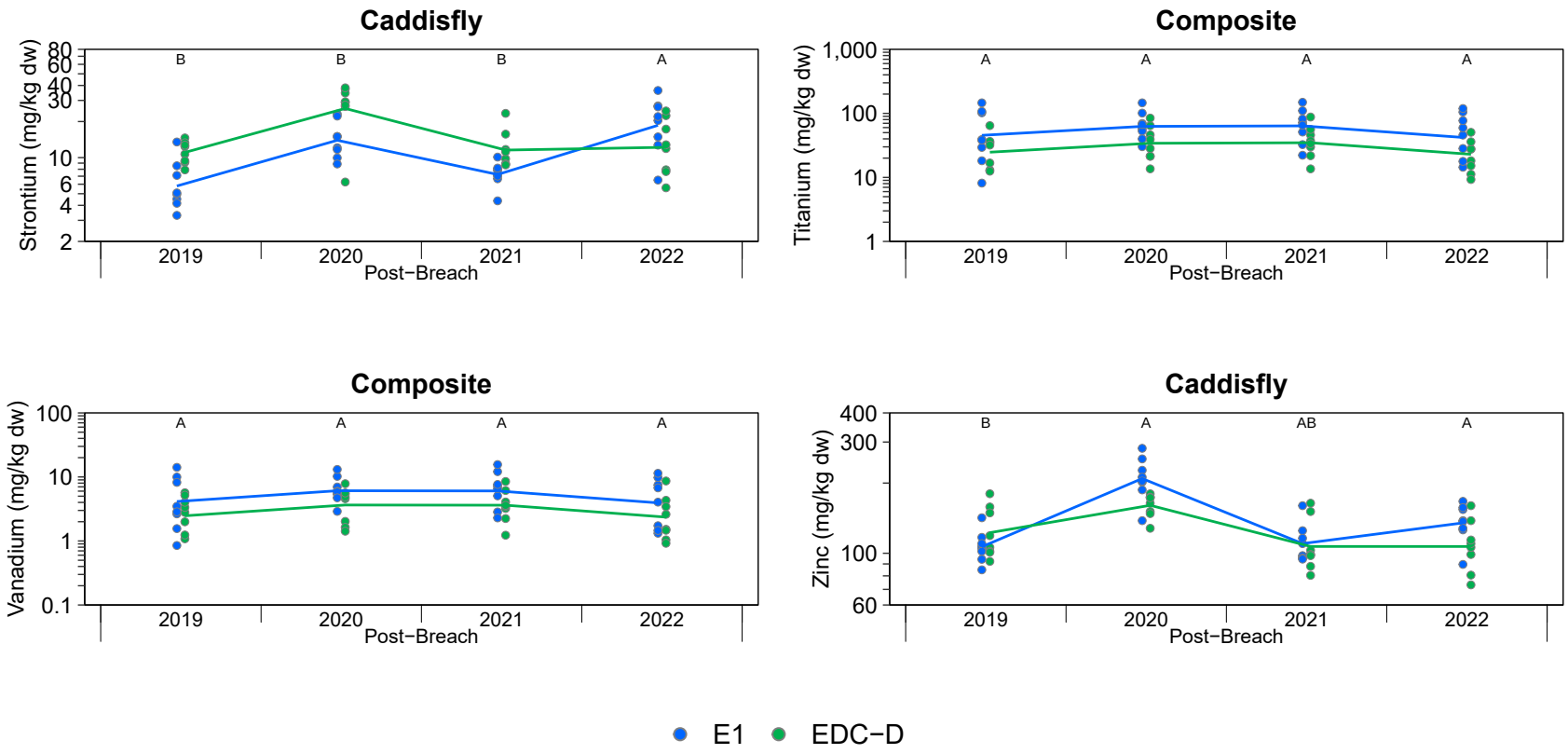


Figure 6.12: Periphyton, Caddisfly, and Composite-Taxa Benthic Invertebrate Tissue Primary and Secondary Analyte Concentrations with a Significant Positive Exposed - Reference Difference for Lower Edney Creek (E1 [Exposed]; EDC-D [Reference]), 2019 to 2022

Notes: Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Plots are only included for primary and secondary analytes that had either a significant Area × Time interaction term and were higher at exposed than reference areas in 2022 or had no significant interaction but had a higher exposed magnitude of difference across all years for a given tissue type. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted.

Table 6.13: Summary of Statistical Contrasts of Exposed - Reference Relative Differences in Trophic Transfer Factors of Primary and Secondary Analytes in Caddisfly and Composite-Taxa Benthic Invertebrate Tissue for Lower Edney Creek (E1 [Exposed]; EDC-D [Reference]), 2019 to 2022[a]

Analytes		Lower Edney Creek (E1; Exposed) / Lower Edney Creek (EDC-U; Reference)							
		Caddisfly				Composite-Taxa Benthic Invertebrate			
		2019	2020	2021	2022	2019	2020	2021	2022
Primary Analyte	Copper	A	A	A	A	A	A	A	A
Secondary Analyte	Cadmium	B	AB	A	A	A	A	A	A
	Calcium	B	B	C	A	B	B	C	A
	Cobalt	B	B	AB	A	A	A	A	A
	Silver	B	B	AB	A	A	B	AB	A
	Sodium	AB	AB	B	A	A	A	B	A
	Strontium	B	BC	C	A	B	AB	B	A
	Titanium	B	B	B	A	A	A	A	A
	Vanadium	B	B	B	A	A	A	A	A
	Zinc	B	A	A	A	A	A	A	A

Indicates significantly higher tissue concentration at exposed compared to reference area, and the interaction (Area x Year) term of the two-way ANOVA was not significant (α = 0.05; i.e., the difference between exposed and reference did not change significantly among years).

Indicates significantly lower tissue concentration at exposed compared to reference area (α = 0.05), and the interaction (Area x Year) term of the two-way ANOVA was not significant (α = 0.05; i.e., the difference between exposed and reference did not change significantly among years).

Indicates significantly higher tissue concentration at exposed compared to reference area (α = 0.05), and the interaction (Area x Year) term of the two-way ANOVA was significant (α = 0.05; i.e., the difference between exposed and reference changed significantly among years).

Indicates significantly lower tissue concentration at exposed compared to reference area (α = 0.05), and the interaction (Area x Year) term of the two-way ANOVA was significant (α = 0.05; i.e., the difference between exposed and reference changed significantly among years).

Notes: "-" = no statistical comparison could be made because data were not available or all were results below Laboratory Reporting Limit (LRL). Refer to Appendix Tables F.4.7, F.5.10, and F.5.11 for statistical analyses results and magnitude of difference calculations.

[a] Results are shown for primary and secondary analytes that are presented in Table 6.11 (i.e., those with a significant positive exposed - reference difference in 2022 or in all monitoring years for one or more tissue types [periphyton, caddisfly, or composite benthic invertebrate] in at least one area). Years that share a letter (e.g., A,B,C) had ratios of TTFs (Exposed:Reference) that did not differ significantly among years. Letters are assigned such that A is assigned to the year with the highest ratio of concentrations (Exposed:Reference).

all years, indicated there is no evidence of increased copper bioaccumulation in aquatic biota in lower Edney Creek. However, the significant increase in exposed caddisfly copper concentrations in 2020 and again in 2022, relative to reference, is consistent with the recent completion of final remediation works in this area (in the summer of 2020 and 2021).

Evaluation of the nine secondary analytes identified for data interpretation (cadmium, calcium, cobalt, silver, sodium, strontium, titanium, vanadium, and zinc) indicated that concentrations of these analytes in exposed periphyton tissues in 2022 were similar to or lower than reference (Table 6.11). This contrasts with 2021 when barium, calcium, strontium, titanium, and vanadium were elevated in exposed periphyton tissues relative to reference (Minnow 2022a; Table 6.11; Appendix Figure F.4.16, Appendix Tables D.5.2, D.5.9, F.4.25). For caddisfly tissues, the secondary analytes calcium, silver, strontium, and zinc had concentrations in exposed tissues in 2022 that were significantly higher than reference (Figure 6.12, Table 6.11; Appendix Figure 4.17, Appendix Table F.4.26). Temporal evaluation of these analytes showed that caddisfly tissue concentrations of calcium and strontium from the exposed area in 2022 were significantly higher than all prior years (2019 to 2021), relative to reference. However, the BCFs for calcium and strontium in caddisflies in 2022 were only slightly (< 1.2 times) higher than reference which did not suggest increased bioaccumulation of either analyte in caddisfly tissues (Figure 6.12, Table 6.12). Evaluation of the TTFs for calcium and strontium in caddisflies is discussed below. The exposed caddisfly tissue concentrations of silver in 2022 were higher than 2019 and 2020, relative to reference, while exposed caddisfly concentrations of zinc in 2022 were higher than 2019 but similar to other monitoring years, relative to reference (2020 and 2021; Figure 6.12, Table 6.11). Composite-taxa tissue concentrations of cadmium, cobalt, sodium, titanium, and vanadium were significantly elevated at the exposed area relative to reference in all years (2019 to 2022) but were temporally stable over this period (Figure 6.12, Tables 6.11; Appendix Figure F.4.18, Appendix Table F.4.27). The lack of consistency between exposed caddisfly and composite-taxa results for calcium, silver, strontium, and zinc concentrations indicate there is no consistent evidence of a mine-related influence on benthic invertebrate concentrations of these analytes. Lastly, the mean concentrations of selenium in caddisfly and composite benthic invertebrate tissue samples at E1 (1.5 and 1.9 mg/kg dw, respectively) were well below the BC interim guideline (4 mg/kg dw; BCMOE 2014) and pre-breach concentrations (3.5 mg/kg dw) and were similar to EDC-D (1.5 and 1.8 mg/kg dw, respectively; Appendix Figures F.4.17, F.4.18, Appendix Tables D.5.4, D.5.6, D.5.10, D.5.11, F.4.26, F.4.27). These results are consistent with previous years (2019 to 2021) and indicate mine related activities are not affecting the selenium concentrations in lower Hazeltine Creek, and the risk to aquatic biota from selenium is low.

The four secondary analytes (calcium, silver, strontium, and zinc) identified as having significantly higher exposed tissue concentrations in caddisflies relative to reference in 2022 also had

significantly higher TTFs in exposed tissues compared to reference in 2022 (Table 6.13; Appendix Table 4.28; Appendix Figure F.4.19). The TTFs for zinc in exposed caddisfly tissues have been significantly higher than reference since 2020. The exposed caddisfly TTFs for calcium, silver, and strontium were significantly higher than reference in 2022, and were significantly higher in 2022 than in all prior years (2019 to 2021) for calcium and strontium, and higher in 2022 than in 2019 and 2020 for silver, relative to reference (Table 6.13; Appendix Figure F.4.19, Appendix Table F.4.28). The temporal increases in exposed caddisfly TTFs for calcium, silver, strontium, and zinc suggest there is some evidence of increased bioavailability and bioaccumulation of these analytes in caddisflies, however this is not supported by the composite-taxa TTF results. The exposed composite-taxa TTF for cadmium, cobalt, sodium, and titanium were significantly higher than reference in 2022, but the TTFs in 2022 for all these analytes were similar to those in 2019, indicating no temporal increase in TTFs has occurred from 2019 to 2022 (Table 6.13; Appendix Figure F.4.20, Appendix Table F.4.29). As indicated above for tissue concentrations, the lack of consistency between exposed caddisfly and composite-taxa TTFs for calcium, silver, strontium, and zinc indicate there is no consistent evidence of increased bioavailability of these analytes in benthic invertebrate tissues from lower Edney Creek.

Overall, tissue concentrations did not exceed the guideline for protection of aquatic life for selenium. The BCFs were lower than or similar to reference for most analytes evaluated (except copper, cadmium, calcium, sodium, strontium, and vanadium), and TTFs showed little evidence of increasing bioavailability for most analytes, with the exception of calcium, silver, strontium, and zinc in caddisfly tissues. Increased tissue concentrations and TTFs of calcium, silver, strontium, and zinc in exposed caddisfly tissues were not corroborated by composite-taxa benthic invertebrate tissue results. As such, periphyton and benthic invertebrate tissues in Edney Creek did not exhibit consistent changes over time in tissue concentrations or the bioavailability for most analytes, except for copper. Tissue concentrations of copper from the exposed area in 2022 were higher than reference in all tissues, and copper BCFs were elevated for periphyton and caddisfly tissues, but TTFs in exposed benthic invertebrate tissues were lower than reference in all years. The elevated concentrations of copper in exposed caddisfly and composite-taxa tissues compared to reference in 2022, but lower TTFs in all years, indicated there is no evidence of increased copper bioavailability in aquatic biota in lower Edney Creek. However, the significant increase in exposed caddisfly copper concentrations in 2020, and again in 2022, relative to reference, is consistent with the recent completion of final remediation works in this area (in the summer of 2020 and 2021).

6.2.2 Summary

Periphyton and benthic invertebrate tissue quality monitoring in lower Edney Creek in 2022 indicated that tissue concentrations of several primary and secondary analytes were significantly higher at the exposed area (E1) than reference. However, for most metals, there was no consistent evidence of increasing metal concentrations in periphyton and/or benthic invertebrate tissues from the exposed area relative to the reference area over time. Copper was an exception, with concentrations in all exposed area tissues (i.e., periphyton, caddisfly, and composite-taxa benthic invertebrates) that were higher than reference. Most analytes demonstrated a lack of consistency among tissue types in concentrations and TTFs (except copper), BCFs that were only slightly above reference (except copper and cadmium), and TTFs that did not demonstrate increased bioavailability. These results collectively indicate that the potential mine-influence on analyte concentrations in lower Edney Creek appears limited to increased copper concentrations in benthic invertebrate tissues. Copper concentrations in exposed caddisfly and composite-taxa tissues were higher than reference in 2022, but copper TTFs were lower than reference in all years, indicating there is no evidence of increased copper bioavailability in aquatic biota in lower Edney Creek. However, the significant increase in copper concentrations in exposed caddisfly tissues in 2020, and again in 2022, relative to reference, is consistent with the recent completion of final remediation works in this area (in the summer of 2020 and 2021). Mean concentrations of selenium in caddisfly and composite benthic invertebrate tissue samples were well below the BC interim guideline for aquatic life, indicating that no selenium-associated effects to aquatic life would be expected.

7 SUMMARY OF FINDINGS

This section provides an overall summary of the findings of sediment and aquatic biological monitoring completed under the Mount Polley CEMP from 2022, drawing on additional historic monitoring results for data interpretation as required. As identified in Section 2, this section considers multiple lines of evidence to identify well supported findings versus those that are not fully supported and/or those for which uncertainty exists. Throughout the following sub-sections, each monitoring component builds on evidence from others, typically over the line of evidence sequence from sediment quality to primary producer to secondary producer/benthic invertebrates to fish.

7.1 Polley Lake

7.1.1 Sediment Quality

Sediments were collected from the shallow area of Polley Lake (and reference) in 2022 to support the evaluation of sediment toxicity. Sediments from this area were characterized by concentrations of arsenic, copper, and iron greater than reference concentrations and WSQG. Copper was the most substantially elevated Analyte of Interest, with a mean concentration 3.4 times the upper WSQG. Copper was also the only Analyte of Interest to exceed the lower WSQG in reference sediments, which it exceeded by approximately 2.5 times. Arsenic, copper, and iron concentrations in shallow Polley Lake sediments in 2022 were similar to those reported in the previous sampling event (i.e., 2019), relative to reference, indicating temporal stability of these analyte concentrations. The TOC content of Polley Lake shallow sediments in 2022 was significantly lower than reference and did not change from 2019 to 2022, relative to reference. Overall, the 2022 sediment quality results from the shallow area of Polley Lake indicate temporal stability in the physical and chemical characteristics of these sediments since initiation of monitoring in 2019.

Sediment toxicity testing of the shallow area of Polley Lake (and reference) in 2022 indicated no unacceptable response to survival or growth of *H. azteca* relative to the reference area or the sand control. The survival and growth responses observed in 2022 were similar to those in 2019 when sampling was initiated. Conditions of the CEMP outlined that sediment toxicity testing of the shallow Polley Lake area must be continued "*unless MPMC can clearly show that copper concentrations in all Polley Lake shallow sediment samples are below the 95th percentile of the copper concentrations in the Bootjack Lake reference area shallow sediment samples.*" (BCMOECCS 2021c). This condition was not met in 2022 in Polley Lake shallow sediments, indicating that toxicity testing of these shallow sediments must be completed in three years (in 2025) in accordance with the CEMP conditions.

7.1.2 Aquatic Life

Phytoplankton community and productivity monitoring in Polley Lake in 2022 indicated that phytoplankton productivity (in terms of chlorophyll-a concentrations) was higher than reference, despite being significantly lower in 2021 and similar between the two lakes in 2019 and 2020. The chlorophyll-a results characterize Polley Lake as mesotrophic and reference (Bootjack Lake) as oligotrophic. While the trophic state of Polley Lake increased from oligotrophic to mesotrophic between 2021 and 2022, this represented a return to the same mesotrophic status observed in Polley Lake in 2019. The phytoplankton community in Polley Lake in 2022 was characterized by higher total density, lower taxon richness, higher Simpson's Diversity and Evenness, higher relative densities of Chlorophytes and Chrysophytes, and lower relative densities of Cyanobacteria compared to reference. Overall, result for most primary endpoints in Polley Lake were similar to or higher than reference in 2022 (density, Simpson's Diversity and Evenness), while those endpoints that were lower than reference (e.g., taxon richness) were temporally stable, suggesting there is no mine-related influence on the phytoplankton community of Polley Lake.

Zooplankton community and productivity monitoring in Polley Lake in 2022 indicated that total zooplankton biomass (dw) was similar to reference, which is consistent with prior years (2019 to 2021) when biomass was either similar to or higher than reference. The consistently similar or significantly higher total biomass of zooplankton in Polley Lake compared to the reference is indicative of a healthy lentic system, providing critical habitat for fish. The zooplankton community of Polley Lake in 2022 was characterized by total density, taxon richness, and Simpson's Diversity and Evenness that were similar to reference. From 2019 to 2022, the zooplankton community of Polley Lake differed from the reference area in terms of significantly higher and lower density in 2019 and 2021, respectively, lower taxon richness in 2020, and lower Simpson's Diversity and Evenness in 2019 and 2020. Community composition from 2019 to 2022 has consistently been characterized by higher relative densities of Copepod Nauplii and Cyclopoida, and lower relative densities of Rotifera compared to reference. The consistent differences in zooplankton community composition between Polley Lake and the reference area suggests that temporal changes community composition (which were similar in both areas over time) were likely driven by natural variability in environmental parameters (e.g., water temperature, nutrient availability, phytoplankton community).

Zooplankton tissue quality monitoring in Polley Lake in 2022 indicated that concentrations of primary and secondary analytes in tissues from Polley Lake were similar to or lower than reference except for sodium. Sodium concentrations were significantly greater than reference between 2019 and 2022 but demonstrated temporal stability relative to reference (i.e., did not

differ between 2019 and 2022). Concentrations of two primary analytes (arsenic and copper) and three secondary analytes (manganese, mercury, molybdenum) in zooplankton tissue from Polley Lake in 2022 were significantly lower, relative to reference, than in 2019 when replicated sampling was initiated. Concentrations of selenium in zooplankton tissue from Polley Lake were below the BC interim guideline for aquatic life in 2022, which contrasts with prior years when individual zooplankton tissue selenium results have exceeded the guideline (2016, 2017, 2019, and 2021). Selenium concentrations in zooplankton tissue from Polley Lake in 2022 were similar to reference and were significantly lower than in 2020 and 2021 (but not 2019), relative to reference. The temporal stability or decreases in primary and secondary analyte concentrations in zooplankton tissue from Polley Lake in 2022 compared to 2019 was supported by trend analyses of surface water quality data which similarly showed stable or decreasing concentrations for all aqueous primary and secondary analytes except copper and vanadium.

Fish community and population health assessments undertaken from 2019 to 2022 documented the influence of the temporary loss of Hazeltine Creek due to the breach (August 2014 to April 2018), which previously supported the majority of fish recruitment to Polley Lake. Rainbow trout CPUE in spring was higher in 2022 than in all previous years since 2016. Prior to 2022, spring CPUE progressively decreased from 2019 to 2021, and was also substantially lower in all three years than in 2016, consistent with loss of recruitment and natural mortality of older fish since the breach. As such, the spring CPUE in 2022 suggests that most of the remaining 2018 and a portion of the 2019 cohort has reached maturity which is further supported by spring spawning surveys conducted in Hazeltine Creek that documented the highest abundance of adults since 2019 (Minnow 2023). In the fall of 2022, when fishing was randomized in Polley Lake, CPUE was lower than 2019 to 2021. However it should be noted that temporal comparisons of CPUE are subject to variability resulting from several factors that can affect the success of netting efforts, which is true even when considering the randomized and standardized fish collection methods employed. The assessment of rainbow trout size distribution provides a more temporally comparable basis for evaluating population recovery in Polley Lake. Length frequency distributions for rainbow trout over time showed a proportional shift towards smaller and younger fish in 2019, a continued to shift towards a more balanced distribution among size classes with the survivorship of the 2018 and 2019 cohorts, and in 2022, a size class distribution more closely resembling 2016. The length frequency distribution in 2022 had greater resemblance to 2016 than the length frequency distributions from any of the other years (2018 to 2021), suggesting the population has returned to a pre-breach size class distribution. Condition of female rainbow trout in spring 2022 was similar to 2021 but lower than in all prior years (2016 to 2020) whereas growth rate in 2022 was similar to prior years but lower than in 2020. CPUE for longnose sucker in the spring has varied without evidence of a consistent

directional trend over time, but CPUE in the fall has progressively decreased from 2016 to 2022. As indicated above, there are several sources of variability that can affect temporal comparisons of CPUE. Length frequency distributions for longnose sucker in Polley Lake from 2016 to 2022 showed more smaller fish were caught in 2022 compared to 2016, as was the case in 2018, 2020, and 2021, suggesting ongoing recruitment success despite the decrease in CPUE since 2016. Condition of longnose sucker females in spring has varied since 2016 but in 2022 was similar to baseline (2016) and weight-at-age also varied, although growth rate in 2022 did not significantly differ from prior years.

Fish tissue quality, evaluated in four tissues (muscle, liver, kidney, and ovary) from rainbow trout and longnose sucker, indicated that mean mercury and selenium concentrations in muscle tissue in 2022 were below guidelines for the protection of human health based on moderate consumption (i.e., indicating that fish are safe for moderate human consumption). The mean selenium concentration in muscle of longnose sucker from Polley Lake in 2022 exceeded the guideline for the protection of human health based on high consumption, which was consistent with data from 2016 (except 2017 and 2021). However, the likelihood that longnose sucker would be consumed at a high rate (i.e., subsistence consumers) is low. Selenium concentrations in ovary tissue in 2022 (the tissue most valuable in the assessment of potential selenium-associated effects on fish) for both species were lower than the BCWQG for the protection of aquatic life in all individuals except one rainbow trout in 2022 and were below the threshold for reproductive effects in all fish. Selenium concentrations in muscle tissue of rainbow trout and longnose sucker were moderately greater than the guideline for aquatic life, which was consistent with data from 2015 to 2021. Overall, selenium concentrations in Polley Lake fish tissue have remained elevated relative to reference conditions since the uncontrolled runoff from 2006 to 2009 but the difference has not increased over the post breach period. In fact, selenium concentrations in rainbow trout muscle and ovary tissues were both significantly lower in 2022, relative to reference, than in 2017 to 2019. Additionally, selenium concentrations in longnose sucker ovary tissues were significantly lower in 2022, relative to reference, than in 2015 to 2020. This decrease in fish tissue selenium concentrations in Polley Lake corresponds with a decrease in the selenium concentrations in zooplankton tissue (i.e., dietary exposure) in 2022 compared to 2020 and 2021, and with a significant decrease in total and dissolved selenium concentrations in surface waters of Polley Lake from 2015 to 2022. Evidence of a persistent mine influence was not detected for most other analytes assessed in fish tissue in 2022. All primary analytes (arsenic, copper, iron, and selenium), and the secondary analytes cobalt, manganese, molybdenum, nickel, sodium, tin, vanadium, and zinc were elevated relative to reference in 2022 in at least one tissue type in one or both species. However, results for most these analytes (excluding selenium) were inconsistent among tissues and species, and/or were temporally stable or decreased relative to reference,

indicating that the weight of evidence does not support a pattern of increasing analyte concentrations over time due to mine-exposure.

7.1.3 Key Findings

Key findings of CEMP monitoring of Polley Lake in 2022 (Table 7.1) are:

- Arsenic, copper and iron in shallow Polley Lake sediments were elevated relative to guidelines and reference while TOC content was lower than reference. Copper concentrations in all shallow Polley Lake sediment samples in 2022 were greater than the reference 95th percentile value, indicating a continued requirement for sediment toxicity testing of these shallow sediments. Arsenic, copper, and iron concentrations and TOC content were temporally stable since initiation of monitoring in 2019.
- Toxicity testing of sediment collected from shallow areas of Polley Lake (using *Hyalella azteca*) indicated no unacceptable responses to survival or growth relative to both field reference and laboratory controls.
- Phytoplankton productivity (chlorophyll-a) in 2022 was slightly higher than reference and 2020 and 2021, but similar to 2019. Chlorophyll-a measures resulted in the classification of Polley Lake as mesotrophic in 2022, similar to 2019. Phytoplankton community composition differed from reference, but differences relative to reference were generally stable over time (2019 to 2022). Zooplankton productivity was similar to or higher than reference from 2019 to 2022 and although community composition differed from reference, the differences compared to reference were stable from 2019 to 2022.
- Zooplankton tissue quality was similar to or lower than reference except the secondary analyte sodium which was higher than reference, but stable from 2019 to 2022 (compared to reference). Concentrations of two primary analytes (arsenic and copper) and four secondary analytes (manganese, mercury, molybdenum, and selenium) were lower in 2022 than prior years, relative to reference. Selenium concentrations in 2022 were below the BC interim guideline for aquatic life (which is different from the prior years 2016, 2017, 2019 when selenium concentrations were higher than the guideline).
- The number of rainbow trout spawners (assessed in spring) was higher in 2022 than in 2016 to 2021 due to accessibility to Hazeltine Creek since 2018 and successful recruitment of YOY from 2019 onwards. In the spring of 2022 growth of female rainbow trout was similar to prior years but lower than 2020 and CPUE was higher than 2016 to 2021. Although fall rainbow trout CPUE in 2022 was lower than 2019 to 2021, the length frequency distribution resembled 2016, suggesting the population has returned to

Table 7.1: Summary of Mount Polley CEMP Results for Polley Lake, 2022[a]

Area		Sediment			Plankton			Fish	
		Basic Chemistry[b]	Toxicity[c] *Hyalella azteca* (14-day)		Productivity[d]	Community[d]	Zooplankton Tissue Quality[e]	Usage and Population Health	Tissue Quality[f]
			Survival	Growth					
Shallow	POL-S	Analytes of Interest = As, Cu, Fe Cu, Fe > upper WSQG and reference 95th As > lower WSQG and reference 95th As, Cu, Fe in 2022 = 2019, relative to reference TOC < reference; TOC in 2022 = 2019, relative to reference	No unacceptable response (97% of Control; 104% of Reference) Survival in 2022 = 2019	No unacceptable response (126% of Control; 114% of Reference) Growth in 2022 = 2019	-	-	-	CPUE for RB in spring in 2022 > 2017 to 2021 CPUE for RB in spring = reference RB (all) condition spring 2022 < 2016, 2017, = 2018 to 2021 CPUE for LSU in spring 2022 <2017 to 2018, 2021, 2021, > 2019 CPUE for LSU in spring = reference LSU (all) condition spring 2022 < 2016 to 2020, = 2021 CPUE for RB in fall 2022 < 2019 to 2021, > 2016 and 2018 CPUE for LSU in fall 2022 < 2016, 2018 to 2021 RB condition fall 2022 < 2018 to 2021 LSU condition in fall 2022 < 2014, 2018 and 2019, = 2016, 2020 and 2021 RB female growth rate (spring) in 2022 < 2016 to 2020, = 2021 RB size distribution in fall 2022 similar to 2016, suggesting the population has returned to a pre-breach size class distribution LSU size distribution in fall 2022 showed more smaller fish than in 2016, suggesting ongoing recruitment success despite the decrease in CPUE since 2016.	RB and LSU (M) Hg < Human Health GL RB (M) Mean Se < Human Health GL (13% of samples > Se GL for high consumption) LSU (M) Mean Se > Human Health GL for high consumption (63% of samples > Se GL for high consumption) RB (M) and LSU (M) Mean Se > BCWQG Protection of Aquatic Life: RB (M) 50% and LSU (M) 100% of samples exceeded the GL RB (O) Mean Se < BCWQG Protection of Aquatic Life (13% of samples exceeded the GL) LSU (O) Mean Se < BCWQG Protection of Aquatic Life RB (M,O,L,K) and LSU (M,L,O,K) Se concentrations > reference Se (M) > reference since 2009 in RB and since 2012 in LSU Se in RB and LSU tissues stable or decreasing over time, relative to reference As in RB (M,O,L,K) and LSU (L,K) > reference, LSU (M,O) < reference (relative to reference); As stable or decreasing over time (relative to reference) Cu in RB (O,L,K) and LSU (M,L) > reference, RB (M) and LSU (O,K) = reference; Cu stable over time except in 2022 LSU (M,L) > 2017 to 2020 (relative to reference); Fe in RB (M,L,K) and LSU (K) > reference, RB (O) and LSU (M,O,L) ≤ reference; Fe stable over time except in 2022 RB (M) >2020, 2017 and LSU (K) > 2018, 2019; Concentration of most secondary analytes < reference except Co, Mn, Mo, V, and Zn > reference in more than one tissue type and species (relative to reference) but equivocal whether a mine-related effect Na, Ni, and Sn limited to a single tissue per species with exposed > reference and therefore equivocal whether a mine-related effect
Deep	POL-P2 (South Basin)	-	-	-	Phytoplankton: Chl-a > reference (Slightly 2.0 SD) Chl-a 2022 = 2019, > 2020 and 2021 Classified as mesotrophic Zooplankton: Dry biomass = reference Dry Biomass in 2022 = 2019 and 2020, > 2021	Phytoplankton: Density > reference (Moderately 2.1 SD); Richness < reference (Moderately -3.7 SD) Density in 2022 < 2019 and 2020, = 2021; Richness in 2022 = 2019 to 2022 Zooplankton: Density and richness = reference Density in 2022 >2019 and 2021, = 2020; Richness in 2022 = 2019 and 2021, >2020	Se tissue < BCWQG Protection of Aquatic Life Primary analytes ≤ reference; Secondary analyte Na > reference but stable over time (relative to reference);		

Notes: "-" = not applicable / no data available, WSQG = British Columbia Working Sediment Quality Guidelines, BCWQG = British Columbia Water Quality Guideline, Chl-a = Chlorophyll-a, 95th = 95th Percentile (applicable to sediment quality evaluation), CPUE = catch-per-unit-effort, YOY = young-of-the-year, RB = rainbow trout, LSU = longnose sucker, M = muscle tissue, O = ovary tissue, K = kidney tissue, L = liver tissue, GL = guideline. Temporal changes presented as "relative to reference" refer to changes in the exposed-reference difference over time as evaluated using a 2-way Analysis of Variance. Analytes presented for zooplankton and fish tissue quality endpoints are primary and secondary analytes (Table 2.4) with a significant positive exposed - reference difference in 2022 or in all monitoring years.

[a] Findings from 2022 are included at minimum. Additional years are displayed (as available) to support temporal comparisons.

[b] WSQG Lower = Lower BC Working Sediment Guideline; WSQG Upper = Upper BC Working Sediment Quality Guideline (BCMOECCS 2021a,b).

[c] Significant reductions in survival and growth are classed as high response (>50% reduction compared to control/reference); moderate response (20-50% reduction compared to control/reference, and significantly different than reference); low response (20-50% reduction compared to control/reference, and not significantly different than reference), and no unacceptable response (< 20% reduction compared to control/reference). Results relative to control or reference are shown in parentheses.

[d] Magnitude of significant differences are classed as highly (>5x SD), moderately (5x to 2x SD), and slightly (<2x SD) different, where SD is the pooled standard deviation.

[e] BCWQG = British Columbia Water Quality Guideline for the protection of aquatic life - interim selenium guideline for benthic invertebrates (4 mg/kg dw; BCMOE 2014).

[f] Human Health guideline for Hg in muscle tissue of fish (0.5 mg/kg dw; CFIA 2015); Human Health guideline for Se in fish muscle (moderate consumption; 14.5 mg/kg dw; BCMOE 2014); Guideline for the protection of aquatic life: Se in muscle tissue or whole body of fish (4 mg/kg dw; BCMOE 2014); Guideline for the protection of aquatic life: Se in fish ovary tissue (11 mg/kg dw; BCMOE 2014).

a pre-breach size class distribution. For longnose sucker,CPUE in the spring has varied and CPUE in the fall has progressively decreased from 2016 to 2022. Length frequency distributions for longnose sucker in Polley Lake from 2016 to 2022 showed more smaller fish were caught in 2022 compared to 2016, which was similar to previous years and suggests ongoing recruitment success despite the decrease in CPUE since 2016.

- Mercury and selenium concentrations in fish muscle in 2022 were below applicable human health guidelines for moderate consumption, while selenium concentrations in 13% of rainbow trout and 63% of longnose sucker samples exceeded the human health guideline for high consumption. Selenium concentations in rainbow trout (50% of samples) and longnose sucker (100% of samples) muscle in 2022 were above the BCWQG for the protection of aquatic life, exceeded the BCWQG in 13% of rainbow trout ovaries, and were below the threshold for reproductive effects. Selenium concentrations in fish tissues have been stable over time or decreasing over time (relative to reference) which is consistent with the temporal decrease in zooplankton tissue selenium concentrations.

7.2 Quesnel Lake

7.2.1 Sediment Quality

Sediment monitoring in 2022 continued to indicate a breach influence on sediment chemistry at both the deep and shallow areas of Quesnel Lake. Sediment collected from the deep near-field area of Quesnel Lake was characterized by concentrations of several analytes (arsenic, copper, iron, and manganese) that were greater than reference concentrations and WSQG, and TOC content lower than reference, consistent with previous post-breach results. Copper was the most substantially elevated analyte, with mean concentrations 4.2 times the upper WSQG in 2022. Mean iron and manganese concentrations were also greater than reference and upper WSQG, although to a lesser degree, and mean concentrations of arsenic were greater than reference and the lower WSQG. Temporal stability of these analytes in the deep near-field area sediments was demonstrated by arsenic, copper, and iron concentrations in 2022 that were similar to those reported in 2014, and manganese concentrations and TOC content in 2022 similar to 2015. Sediments from the shallow near-field area in 2022 had a very high sand content (92.8%), and were characterized by concentrations of arsenic, copper, iron, manganese, and silver that were greater than reference concentrations and WSQG. Copper was the most substantially elevated analyte, with mean concentrations 5.7 times the upper WSQG. Mean iron and manganese concentrations were also greater than reference and the upper WSQG (to a lesser extent than copper), while mean concentrations of arsenic and silver were greater than reference and lower WSQG. Concentrations, arsenic, copper, iron, manganese, silver, and TOC were

temporally stable, relative to reference, with concentrations in 2022 remaining similar to 2014 values for each of these analytes (compared to reference).

Sediment toxicity testing of *H. azteca* using sediments from the shallow near-field area of Quesnel Lake (QUL-LNF1) in 2022 resulted in a moderate survival response (44 to 45% mortality) and a high growth response (76 to 79% reduction). However, concentrations of dissolved copper in overlying waters of the toxicity test vessels were highly dissimilar from those documented in field-collected water from these sites, which is consistent with previous years of monitoring. Dissolved copper concentrations in the toxicity test vessels in 2022 were an average of 97-times greater than in field-collected water, which is similar to 2020 and 2021 (74- and 114-times greater, respectively) and lower than 2019 (174-times). This strongly suggests copper mobilization in the test setup that has either not occurred *in situ* or has attenuated over time *in situ*. Under these conditions, the observed mortality and growth response are consistent with dissolved copper concentrations in overlying water, particularly given that *H. azteca* have been documented to derive little nutrition from sediment and to respond primarily to contaminants in overlying water. Significant regression relationships evaluating results from 2014 to 2022 inferred lower *H. azteca* growth and survival at higher overlying water dissolved copper concentrations and higher sediment copper concentrations. This further corroborates the observation that toxicity responses of *H. azteca* are consistent with dissolved copper concentrations in overlying test waters of these shallow sediments. Overall, the toxicity test results from the shallow near-field area cannot be reliably extrapolated to the field but suggests potential for copper mobilization in this area with disturbance.

7.2.2 Aquatic Life

Phytoplankton community and productivity monitoring in Quesnel Lake in 2022 indicated that phytoplankton productivity (in terms of chlorophyll-a concentrations) was similar at the exposed and reference monitoring areas, as also observed in previous years (2019 to 2021). These results characterize both the exposed and reference areas of Quesnel Lake as mesotrophic in 2022, which is a change from the classification of ultraoligotrophic in 2016 to 2018 and as oligotrophic in 2019 to 2021; a change likely owing in part to a switch from surface grab (2018 and earlier) to depth-integrated sampling methods (2019 onwards). The plankton community of the exposed area of Quesnel Lake in July 2022 was characterized by density higher than reference, taxon richness lower than reference, and Simpson's Evenness and Diversity indices similar to reference. Total density has consistently been higher at the exposed compared to the reference area since 2019. Simpson's Diversity and Evenness at the exposed area have shown some temporal variability but have been either similar to or higher than reference in each year since 2019. Taxon richness at the exposed area in 2022 was lower than in previous years

(2019 to 2021) reflecting a decrease from conditions that were similar to reference from 2019 to 2021, to lower than reference in 2022. This decrease in taxon richness was attributable to the absence of relatively rare phytoplankton taxa at QUL-ZOO-1 in July 2022, and appeared to be a temporary change based on the results of samples collected in August 2022 which included some of these relatively rare taxa. Continued monitoring will help to further understand whether the decrease in taxon richness in 2022 is part of a longer-term change or was a single variable result. The community composition at the exposed area has been similar to reference in terms of the relative densities of Diatoms, Cyanobacteria, and Chlorophytes from 2019 to 2022. The relative densities of Chrysophytes, Cryptomonads, and Dinoflagellates at the exposed area differed from reference in 2022 but showed temporal stability either within the exposed area or temporal stability in the difference relative to reference from 2019 to 2022. The similarity of the phytoplankton community at the exposed and reference areas of Quesnel Lake for most endpoints, and the temporal stability throughout the study period for most endpoints that differed between the areas (excluding taxon richness), are suggestive of a lack of mine-related influence on the phytoplankton community of Quesnel Lake.

Zooplankton community and productivity monitoring in Quesnel Lake in 2022 indicated that total biomass of zooplankton (dw) at the exposed area was similar to reference, which is consistent with prior years. The zooplankton community at the exposed area of Quesnel Lake in 2022 was characterized by total density and Simpson's Evenness that were similar to reference, and taxon richness and Simpson's Diversity that were higher than reference. While there was temporal variability in these metrics at the exposed area from 2019 to 2022, the changes (i.e., direction and relative magnitude) were generally the same as those observed at the reference area, and metrics at the exposed area were largely similar to or greater than reference over this period. The community composition at the exposed area has been similar to reference in terms of the densities and relative densities of most zooplankton taxa (Calanoida, Cladocera, and Rotifera) from 2019 to 2022, with two exceptions, indicating that the communities at the exposed and reference areas were largely similar. The two exceptions were lower density and relative density of Cyclopoida in 2019, and consistently higher density and relative density of Copepod Nauplii in 2019 to 2022 at the exposed area compared to reference. The similarity of zooplankton communities between the exposed and reference areas for most endpoints and temporal stability of those endpoints that differed between the areas (i.e., Copepod Nauplii) from 2019 to 2022 are suggestive of a lack of mine-related influence on the zooplankton community of Quesnel Lake.

Zooplankton tissue quality monitoring in Quesnel Lake in 2022 indicated that concentrations of primary and secondary analytes in tissues from the exposed area were similar to or lower than reference, and also temporally stable from 2019 to 2022. The lack of temporal and spatial differences in zooplankton tissue quality results in 2022 was supported by trend analyses of

surface water quality data which indicated temporal stability (from 2015 to 2022) for most analytes, except for increasing trends at one or both exposed monitoring stations for total manganese, total phosphorus, total and dissolved selenium, and dissolved barium, molybdenum, and sodium. A measurable increase in concentrations of these analytes in zooplankton tissue was not observed since 2019, indicating no sustained impact of the increased aqueous concentrations of these analytes on zooplankton tissue quality. In addition, aqueous total selenium and manganese concentrations remained well below the BCWQG from 2015 to 2022. Despite the identified increasing trend in aqueous selenium concentrations, zooplankton tissue selenium concentrations were below the BC interim guideline for aquatic life at the exposed area in 2022 (similar to 2019 to 2021), and tissue selenium concentrations at the exposed area were similar to reference from 2019 to 2022. As such, monitoring results indicate that zooplankton tissue quality in 2019 to 2022 was unimpacted by the breach and potential effluent exposure.

Benthic invertebrate community monitoring in the deep-near field area of Quesnel Lake in 2022 documented a community with total density and Simpson's Evenness that were unchanged since 2016, taxon richness that was similar to all years since 2014, and Simpson's Diversity that was unchanged since 2014. Total density at the deep near-field area in 2022 remained much lower than the densities reported for the reference area in previous years (2014 to 2021), but the difference relative to reference has steadily decreased. These results indicate some recovery of the benthic invertebrate community at the exposed areas from the initial breach event in 2014, but no substantial change in community features since 2016 at the deep near-field exposed area of Quesnel Lake. This lack of significant recovery is consistent with the stability of sediment TOC content and concentrations of arsenic, copper, iron, and manganese in these sediments since at least 2016. Chironomidae, which are the dominant taxa at the deep near-field area, are intolerant to sediments with organic content (TOC) of less than 1% (Suedel et al. 1993) and the TOC content of near-field area sediments (mean = 0.614%) remains well below this level. The community composition has shown temporal stability since 2014, and in 2022 continued to be characterized by Chironomidae dominance. Several characteristics of the benthic invertebrate community at the deep near-field area were related to sediment characteristics, including lower total density, richness, Chironomidae density, and Oligochaeta density and relative density associated with greater proportion of fines, lower proportion of TOC, and higher metal concentrations in sediment. These sediment properties are consistent with the presence of breach-impacted sediments at the deep near-field area.

The catchability of lake trout at the exposed area of Quesnel Lake in 2022 was lower than at the reference area, while catchability of peamouth chub and northern pikeminnow in 2022 were both higher at the exposed area relative to reference. The catchability of rainbow trout from the Quesnel River in 2022 was higher than in previous years. Fish tissue quality in 2022 was

evaluated in up to four tissues (muscle, liver, kidney, and ovary) in four species (lake trout, northern pikeminnow, peamouth chub, and rainbow trout). Mean mercury and selenium concentrations in fish muscle tissue from Quesnel Lake and Quesnel River in 2022 were below the guidelines for the protection of human health (i.e., indicating that fish are safe for moderate human consumption). This was consistent with prior monitoring years except 2020 and 2021 when the mean mercury concentrations in muscle of reference lake trout exceeded the consumption guideline. Mean selenium concentrations in fish muscle or whole-body samples from Quesnel Lake and Quesnel River in 2022 were below the guideline for the protection of aquatic life except for peamouth chub from the exposed area which exceeded the guideline at a higher rate in 2022 (63%) than in previous years (2015 to 2021). Mean selenium concentrations in ovary tissue (the tissue most valuable in the assessment of potential selenium-associated effects on fish) from lake trout in 2022 were below the tissue specific guideline for the protection of aquatic life but exceeded the guideline in rainbow trout and peamouth chub. In rainbow trout ovary tissue, selenium concentrations in 2022 exceeded the guideline in 50% of samples which was within the range of previous years. In peamouth chub ovary tissue, selenium concentrations in the majority of exposed (86%) and reference (50%) samples in 2022 exceeded the tissue specific guideline for the protection of aquatic life, with 43% of exposed samples also exceeding the threshold for reproductive effects. The rate of the guideline/threshold exceedances in exposed peamouth chub ovary tissue was higher in 2022 than in prior years. Despite this, selenium concentrations in peamouth chub tissues (muscle liver, ovary, and kidney) and in northern pikeminnow whole-body samples (also a small home-range species) have been temporally stable from 2016 to 2022, relative to reference. The absence of pre-breach data precludes drawing definitive conclusions about the potential factors influencing tissue selenium concentrations (e.g., due to mine-exposure or due to inherent differences between the areas). However, results from 2016 to 2022 indicated there is no evidence that selenium concentrations in fish tissues from Quesnel Lake are increasing over time due to mine exposure. Evidence of a persistent mine influence was not detected for most analytes assessed in fish tissue from Quesnel Lake and Quesnel River in 2022. All primary analytes (arsenic, copper, iron, and selenium), and the secondary analytes barium, cadmium, calcium, manganese, mercury, molybdenum, phosphorus, sodium, strontium, tin, titanium, uranium, vanadium, and zinc were elevated relative to reference in 2022 in at least one tissue type in at least one species. However, the results for most these analytes were inconsistent among tissues and species, and/or were temporally stable, and/or the results were not supported by zooplankton tissue quality results, indicating that the weight of evidence does not support a pattern of increasing analyte concentrations over time due to mine-exposure.

7.2.3 Key Findings

Key findings of CEMP monitoring of Quesnel Lake in 2022 (Table 7.2) are:

- Arsenic, copper, iron, and manganese remain the analytes most elevated in Quesnel Lake deep near-field sediments relative to guidelines. Concentrations of these analytes in 2022 were similar to 2014 except manganese which was similar to 2015 (compared to reference). Mean TOC concentration (0.614% in 2022) of the deep near-field sediments remains very low and has increased slightly since 2014, although not significantly since 2016, relative to reference. In shallow near-field sediments, arsenic, copper, iron, manganese, and silver concentrations remained greater than guidelines and reference, and concentrations of these analytes in 2022 were similar to 2014 (compared to reference). Mean TOC content (0.826% in 2022) of the shallow near-field area sediments remains lower than reference and temporally unchanged since initiation of sampling (2014)
- Toxicity testing of shallow exposed sediments (using *H. azteca*) indicated a moderate survival response (44 to 45% mortality) and a high growth response (76 to 79% reduction in growth) in 2022. Survival and growth in 2022 were similar to 2021 (46% mortality, 78 to 82% reduction), slightly lower than 2020 (39% mortality, 50 to 65% reduction) but higher than 2019 (100% mortality) However, concentrations of dissolved copper in overlying waters of the toxicity test vessels in 2022 were highly dissimilar (an average of 97-times greater) than in field-collected water from these sites, consistent with previous years of monitoring. This suggests that the sediment toxicity test results cannot be reliably extrapolated to the field, but suggests potential for copper mobilization in this area with disturbance.
- Plankton productivity was similar to reference based on chorophyll-a concentrations and zooplankton biomass in 2022. Chlorophyll-a measures resulted in the classification of Quesnel Lake as mesotrophic (at exposed and reference areas). Phytoplankton and zooplankton community condition and structure were similar to reference and/or temporally stable (excluding phytoplankton taxon richness). Phytoplankton taxon richness decreased between 2021 to 2022 to richness that was lower than reference in 2022; a change that was due to the absence of relatively rare taxa.
- Concentrations of primary and secondary analytes in zooplankton tissues were consistently similar to or lower than reference from 2019 to 2022. Selenium concentrations in all exposed samples from 2019 to 2022 were below the BCWQG for the protection of aquatic life.

Table 7.2: Summary of Mount Polley CEMP Results for Quesnel Lake, 2019 to 2022[a]

Area		Sediment			Plankton			Benthic Invertebrate	Fish	
		Basic Chemistry[b]	Toxicity[c] *Hyalella azteca* (14-day)		Productivity[d]	Community[d]	Zooplankton Tissue Quality[e]	Community[d]	Community and Catchability	Tissue Quality[f]
			Survival	Growth						
Shallow	QUL-LNF1 (Near-field)	Analytes of Interest = As, Cu, Fe, Mn, Ag Cu, Fe, Mn > upper WSQG, and reference and pre-breach 95th; As and Ag > lower WSQG, and reference and pre-breach 95th As, Cu, Fe, Mn, and Ag in 2022 = 2014, relative to reference; TOC in 2022 = 2014, relative to reference Highest As, Cu, and Ag concentrations in 2019 likely related to movement of sampling location in 2019 (due to lower water levels)	Moderate response (56% of control, 55% of reference) Survival 2022 = 2016, 2020, 2021 (Moderate response) < 2019 (High response)	High response (21% of control, 24% of reference) Growth 2022 = 2016 to 2021 (High response)	-	-	-	-	CPUE for LT < reference and 2021; CPUE for PCC, NSC > reference CPUE for RB (Quesnel River) in 2022 < 2021, > 2019 and 2020	Mean Hg (M) and Se (M) < Human Health GL (25% of reference LT samples and 25% of exposed LT samples > Hg GL) Mean Se (M) < BCWQG Protection of Aquatic Life except exposed PCC (NSC WB: 25% of samples > GL; RB: 13% of samples > GL) Mean Se (M) > BCWQG Protection of Aquatic Life for exposed PCC (63% of samples < GL) Mean Se (O) > BCWQG Protection of Aquatic Life except LT (PCC exposed: 86% > GL; PCC reference: 50% > GL; RB: 80% > GL) Se (O) < Effects Threshold except exposed PCC (43% of PCC samples > Effects Threshold) Se concentrations in 2022 ≤ reference except PCC (M,O,L,K), LT (O), NSC (WB) Se in 2022 > reference; Se concentrations stable over time (relative to reference) As concentrations in 2022 ≤ reference except PCC (K), LT (M,K), and NSC (WB) As in 2022 > reference; As concentrations stable or decreasing over time (relative to reference) Cu concentrations in 2022 ≤ reference except LT (O) and PCC (K) Cu in 2022 > reference; Cu concentrations stable or decreasing over time (relative to reference) Fe concentrations in 2022 ≤ reference except PCC (L,K) Fe in 2022 > reference; Fe concentrations stable or decreasing over time (relative to reference) LT (M,K) and PCC (M,L,K) Mn concentrations > reference; Mn in LT (M) in 2022 > 2015 to 2018, = 2020, 2021 (relative to reference) but change was driven by a decrease in reference concentrations; Mn in PCC (M) in 2022 > 2016, 2020, = 2018, 2019, 2021 and PCC (L,K) stable over time; Concentrations of most secondary analytes < reference except Ba, Cd, Ca, Mn, Hg, Mo, P, Ti, V and Zn > reference in more than one tissue type and/or species (relative to reference) but equivocal whether a mine-related effect; Na, Sr, Ti and U > reference limited to single tissue per species with exposed > reference and therefore equivocal whether a mine-related effect
		Dissolved Cu concentrations in overlying water during laboratory testing were substantially higher in 2022 (97x) than *in situ* field-collected measures (compared to 56x, 74x, and 175x higher than *in situ* in 2021, 2020, 2019, respectively), indicating toxicity test results cannot be reliably extrapolated to the field.								
Deep	QUL-PNF (Near-field; QUL-ZOO-1 for plankton)	Analytes of Interest = As, Cu, Fe, Mn Cu, Fe, Mn > upper WSQG and reference 95th As > lower WSQG and reference 95th As, Cu, Fe in 2022 = 2014, relative to reference; Mn, TOC in 2022 = 2015, relative to reference	-	-	Phytoplankton: Chl-a = reference Classified as mesotrophic Zooplankton: Dry biomass = reference Phytoplankton: Chl-a in 2022 > 2019 to 2021 Zooplankton: Dry biomass in 2022 = 2019 and 2021, < 2020	Phytoplankton: Density > reference (Moderately 2.3 SD); Richness < reference (Moderately -2.6 SD) Zooplankton: Density = reference; Richness > reference (Slightly 0.41 SD) Phytoplankton: Density in 2022 > 2019 to 2021; Richness in 2022 < 2019 to 2021 Zooplankton: Density in 2022 > 2019, < 2020, = 2021; Richness in 2022 = 2019 and 2020, < 2021	Se tissue < BCWQG Protection of Aquatic Life; Primary and secondary analytes ≤ reference;	Density in 2022 > 2014 and 2015, = 2016 to 2021; Richness in 2022 = 2014 to 2021 (Reference area monitored most recently in 2021)		

Notes: "-" = no data available, WSQG = British Columbia Working Sediment Quality Guidelines, BCWQG = British Columbia Water Quality Guideline, TOC = total organic carbon, Chl-a = Chlorophyll-a, 95th = 95th Percentile (applicable to sediment quality evaluation), CPUE = catch-per-unit-effort, LT = lake trout, NSC = northern pikeminnow, PCC = peamouth chub, RB = rainbow trout, M = muscle tissue, O = ovary tissue, L = liver tissue, K = kidney tissue, WB = whole body, GL = guideline. Temporal changes presented as "relative to reference" refer to changes in the exposed-reference difference over time as evaluated using a 2-way Analysis of Variance. Analytes presented for zooplankton and fish tissue quality endpoints are primary and secondary analytes (Table 2.4) with a significant positive exposed - reference difference in 2022 or in all monitoring years.

[a] Findings in 2022 are included at minimum. Additional years are displayed (as available) to support temporal comparisons.

[b] WSQG Lower = Lower BC Working Sediment Guideline; WSQG Upper = Upper BC Working Sediment Quality Guideline (BCMOECCS 2021a,b).

[c] Significant reductions in survival and growth are classed as high response (>50% reduction compared to control/reference); moderate response (20-50% reduction compared to control/reference, and significantly different than reference); low response (20-50% reduction compared to control/reference, and not significantly different than reference), and no unacceptable response (< 20% reduction compared to control/reference). Results relative to control or reference are shown in parentheses.

[d] Magnitude of significant differences are classed as highly (>5x SD), moderately (5x to 2x SD), and slightly (<2x SD) different, where SD is the pooled standard deviation.

[c] BCWQG = British Columbia Water Quality Guideline for the protection of aquatic life - interim selenium guideline for benthic invertebrates (4 mg/kg dw; BCMOE 2014).

[e] Human Health guideline for Hg in muscle tissue of fish (0.5 mg/kg dw; CFIA 2015); Human Health guideline for Se in fish muscle (moderate consumption; 14.5 mg/kg dw; BCMOE 2014); Guideline for the protection of aquatic life: Se in muscle tissue or whole body of fish (4 mg/kg dw; BCMOE 2014); Guideline for the protection of aquatic life: Se in fish ovary tissue (11 mg/kg dw; BCMOE 2014); Effects Threshold indicates mean selenium concentration greater than DeForest et al. (2012) threshold for ovary tissue in fish (20 mg/kg dw) and the BCMOE guideline.

- The benthic invertebrate community at the deep near-field area showed initial recovery in the years immediately after the breach (i.e., between 2014 and 2015). Since then, there has been no substantial change in community at this area (i.e., from 2016 to 2022), which is consistent with the stability of sediment quality and the limited increase in sediment TOC content over this period.
- Mercury and selenium concentrations in fish muscle were below human health guidelines in 2022 except in 25% of exposed and reference lake trout which exceeded the mercury guideline. Selenium concentrations in most fish muscle or whole-body tissues were below the BCWQG for the protection of aquatic life in 2022, except for exposed peamouth chub muscle (63%), northern pikeminnow (25%), and rainbow trout (13%) samples. Selenium concentrations in ovary tissues of exposed (86%) and reference (50%) peamouth chub and exposed rainbow trout (80%) samples were above the guideline for the protection of aquatic life, and above the threshold for reproductive effects for exposed peamouth chub (43%) samples. Despite the guideline/threshold exceedances for tissue selenium concentrations, there is no evidence that selenium concentrations in fish tissues from Quesnel Lake or Quesnel River are increasing over time due to mine exposure.

7.3 Hazeltine Creek

7.3.1 Sediment Quality

Sediment quality monitoring completed in upper and lower Hazeltine Creek in 2022 continued to document the physical and chemical characteristics of sediments from this erosional habitat. Sediments were characterized by concentrations of several analytes that were greater than reference/pre-breach concentrations and WSQG values: copper and selenium in upper Hazeltine Creek, and copper and iron in lower Hazeltine Creek. In both upper and lower Hazeltine Creek in 2022, copper was the most substantially elevated analyte with concentrations 2.0 and 1.7 times higher than the upper WSQG, respectively, and higher than reference/pre-breach concentrations. The TOC content of sediments from upper Hazeltine Creek was significantly higher in 2022 than in 2018, relative to reference, as were the concentrations of copper and selenium. Mean concentrations of copper and selenium in upper Hazeltine Creek sediments were significantly higher in 2022 than previously observed (2018 to 2021), relative to reference. For both analytes, this change was driven by a significant decrease in sediment copper and selenium concentrations at the reference area, with copper concentrations within upper Hazeltine Creek sediments (i.e., not evaluated relative to reference) showing temporal stability. Sediment selenium concentrations evaluated within upper Hazeltine Creek in 2022 (not relative to reference) were significantly higher than in preceding years (2018 to 2020) which was

associated with higher TOC and lower sand content of these sediments. In lower Hazeltine Creek, the TOC content of lower Hazeltine Creek sediments has remained unchanged relative to reference from 2018 to 2022. Copper and iron concentrations in lower Hazeltine Creek sediments in 2022 were similar to or lower than those observed in 2018, relative to reference, indicating sediment concentrations of these analytes have not increased significantly over that period. The 2022 sediment quality monitoring results continue to indicate that results related to variable sediment physical characteristics (i.e., TOC and sand content) that are driven by the necessity for opportunistic sampling due to limited availability of fine sediments in some monitoring years. The variability in sediment physical characteristics may stabilize as sediment accumulation continues to occur in this remediated system.

7.3.2 Aquatic Life

Periphyton monitoring indicated that primary productivity of upper Hazeltine Creek, as assessed by mean chlorophyll-a (mass per unit area; mg/m²), was below BCWQG but above the threshold indicative of moderate enrichment in lower Hazeltine Creek. Primary productivity as measured by both chlorophyll-a and AFDM at both upper Hazeltine Creek areas (HAC-R1, HAC-U) has been consistently similar to or significantly higher than reference from 2018, and higher than pre-breach since 2019 at HAC-R1 and since 2021 at HAC-U. Chlorophyll-a concentrations and AFDM at HAC-R1 in 2022 were significantly higher than at HAC-U, indicating this area had greater periphyton productivity. Despite the increased productivity following remediation, water quality monitoring indicates that dissolved oxygen concentrations largely remain above the long-term BCWQG in upper Hazeltine Creek. The periphyton community of upper Hazeltine Creek in 2022 was characterized by taxon richness, Simpson's Evenness and Diversity, and diatom richness that were similar to or higher than the reference area. Periphyton densities in 2022 at HAC-R1 and HAC-U were similar to and lower than reference, respectively, but were temporally stable at HAC-U despite being lower than reference in 2022. The periphyton communities at the two upper Hazeltine Creek areas (HAC-R1 and HAC-U) were similar in 2022 in terms of all primary metrics (density, taxon richness, Simpson's Evenness and Diversity, and diatom richness) indicating similar recovery of the periphyton community in these two areas. Periphyton community composition at HAC-R1, but not HAC-U, was similar to reference in 2022. Community composition at HAC-U continued to differ from the reference area, with higher and lower relative densities of Diatoms and Cyanobacteria, respectively; differences which are indicative of healthy periphyton communities. The similarity (or exceedance) of the primary periphyton community metrics (density, richness, Simpson's Evenness, and Simpson's Diversity) in upper Hazeltine Creek compared to the reference area in most years and/or temporal stability of these metrics are indicative of relatively stable periphyton communities at the remediated upper Hazeltine Creek areas and good periphyton community health.

The benthic invertebrate community of upper Hazeltine Creek in 2022 was characterized by total density, taxon richness, and Simpson's Evenness and Diversity that were similar between the two areas (HAC-R1 and HAC-U) and that were similar to reference and/or pre-breach conditions. Taxon richness at HAC-R1 in 2022 remained significantly lower than pre-breach conditions but was similar to reference conditions. These results indicate that the benthic invertebrate community at these areas of upper Hazeltine Creek have largely recovered to reference and/or pre-breach conditions when primary metrics (density, richness, Simpson's Evenness and Diversity) are considered. Key differences in the benthic community structure in 2022 at both areas of upper Hazeltine Creek, compared to pre-breach conditions, included higher relative densities of Chironomidae and Trichoptera, and lower relative densities of EPT (at HAC-R1 only), Arachnida (at HAC-U only), Ephemeroptera, and Plecoptera. Notable differences in EPT at both areas of upper Hazeltine Creek, compared to reference and pre-breach, were due to the lack of Plecoptera and the higher relative density of Trichoptera, which were dominated by a family of net-spinning caddisflies (Hydropsychidae) that are tolerant of habitat disturbances. The occurrence of Ephemeroptera families at the exposed areas that are less pollutant tolerant than those at the reference area suggests the chemical conditions (i.e., water chemistry) of the exposed areas are not limiting for benthic invertebrate community recovery. Comparison of community composition between the two upper Hazeltine Creek areas suggested greater recovery of the benthic invertebrate community in Reach 2 (at HAC-U) compared to Reach 1 (at HAC-R1), based on lower and higher relative densities of Chironomidae and Trichoptera at HAC-U compared to HAC-R1, respectively. Benthic invertebrate total dry weight biomass at both upper Hazeltine Creek areas in 2022 was unchanged since 2019 and was either similar to or higher than reference in each year from 2018 to 2022. In summary, these results indicate that both areas of upper Hazeltine Creek have recovered substantially since remediation to a condition that is similar to reference and/or pre-breach conditions based on primary metrics, but with some remaining differences in community composition compared to reference and pre-breach.

Periphyton and benthic invertebrate tissue quality monitoring in upper and lower Hazeltine Creek indicated that the primary analytes arsenic, copper, iron, and selenium had higher tissue concentrations compared to reference in 2022 for which the exposed-reference difference also increased significantly over time. There is some evidence of increased bioavailability and trophic transfer of copper in benthic invertebrate tissues in upper Hazeltine Creek, since BCFs and TTFs were elevated relative to reference and TTFs for composite-taxa tissues from HAC-U increased in 2022 to higher than pre-breach conditions. However, this was limited to composite-taxa benthic invertebrate tissues from Reach 2 (HAC-U) and was not observed in caddisfly tissues from HAC-U nor in benthic invertebrate tissues (caddisfly or composite-taxa) from Reach 1 (HAC-R1) of upper Hazeltine Creek, indicating a potentially localized increase. In contrast, there is no evidence of

increasing tissue concentrations or bioavailability and trophic transfer of copper over time in biota from lower Hazeltine Creek. For selenium, BCFs were lower than reference in periphyton tissues and elevated in caddisfly, but not composite-taxa samples (upper Hazeltine Creek only) and TTFs were typically stable over time compared to reference (except for caddisflies in Reach 2 of upper Hazeltine Creek). These results indicate that the bioavailability and trophic transfer of selenium has not increased due to mine influence, except for increased trophic transfer in caddisflies from Reach 2 of upper Hazeltine Creek. Selenium concentrations in most tissues in Hazeltine Creek (upper and lower) have increased since 2018 compared to reference (except composite-taxa benthic invertebrate samples from lower Hazeltine Creek), suggesting a mine influence on tissue concentrations, if not bioavailability and trophic transfer of selenium. In upper Hazeltine Creek, tissue selenium concentrations in 2022 were similar to or lower than pre-breach results in comparable tissues, while those in composite-taxa benthic invertebrate samples from lower Hazeltine Creek in 2022 exceeded pre-breach results. Mean selenium concentrations in benthic invertebrates from upper and lower Hazeltine Creek were above the BC interim guideline for aquatic life, suggesting potential selenium-associated risks to aquatic life. In composite-taxa benthic invertebrate samples from upper Hazeltine Creek, arsenic and iron concentrations in tissues from Reach 2 (HAC-U) and Reach 1 (HAC-R1), respectively, were higher in 2022 than previous monitoring years compared to reference, but this was owing to a temporal decrease at the reference area rather than an increase in tissues from upper Hazeltine Creek. Elevated concentrations of some secondary analytes in periphyton and/or benthic invertebrate tissues over time were also observed, relative to reference, but evidence was equivocal as to whether these observed increases in tissue concentrations were mine-related, and there was little or no evidence of increased metal bioavailability (based on assessment of BCFs and TTFs relative to reference and pre-breach). In comparison to 2021 when higher tissue concentrations and trophic transfer of mercury were identified compared to reference, mercury results in 2022 did not continue to demonstrate higher bioaccumulation in the aquatic biota compared to reference (as evidenced by tissue concentrations and TTFs similar to or lower than reference and/or prior years). Overall, periphyton and benthic invertebrate tissue quality data showed some evidence of moderately higher bioavailability and/or trophic transfer of selenium and copper in upper Hazeltine Creek, and selenium in lower Hazeltine Creek. Comparison of the two benthic invertebrate tissue types (caddisfly and composite-taxa) indicated that although some variability exists between the tissues, potential changes in analyte concentrations and TTFs in caddisfly tissues would largely be detected if sampling were limited to composite-taxa tissue samples only.

7.3.3 Key Findings

Key findings of CEMP monitoring of Hazeltine Creek from 2022 (Table 7.3) are:

Table 7.3: Summary of Mount Polley CEMP Results for Hazeltine Creek, 2022[a]

Area	Sediment	Periphyton		Benthic Invertebrate		Periphyton and Benthic Invertebrate Tissue Quality[d]
	Basic Chemistry[b]	Productivity[c]	Community[c]	Productivity[c]	Community[c]	
Reach 1 (HAC-R1)	-	Mean Chl-a < BCWQG and > moderately enriched stream threshold Chl-a > reference (slightly 1.7 SD) and baseline (1995, 1996) and pre-breach, > HAC-U (moderately 2.4 SD) AFDM > reference (moderate 4.2 SD) and HAC-U (slightly 1.9) Chl-a and AFDM in 2022 > 2017, 2018 and 2021, = 2019, 2020	Density = reference and HAC-U; Richness = reference and HAC-U Density in 2022 > 2021, 2019, = 2018 and 2020; Richness in 2022 > 2021, = 2018 to 2020	Dry biomass > reference (slightly 2.0 SD), = HAC-U; Dry biomass in 2022 = 2019 to 2021, > 2018	Density > reference (slightly 1.4 SD), = pre-breach and HAC-U; Richness = reference and HAC-U, < pre-breach (highly -5.4 SD) Density in 2022 = 2018 to 2020, >2021; Taxonomic richness in 2022 = 2019 to 2021, > 2018	Mean Se in caddisfly and BIC at HAC-U, HAC-R1, and HAC-D in 2022 > BCWQG Protection of Aquatic Life Se concentrations in 2022 > reference; Se concentrations in 2022 > 2018 (except HAC-D [BIC] = 2018), relative to reference; Se concentrations in 2022 ≤ pre-breach (except HAC-D [BIC] > pre-breach); Se BCFs in 2022 < reference, except HAC-R1 (Caddis) and HAC-U (Caddis) slightly > than reference; Se TTFs > reference but stable or decreasing over time except HAC-U (Caddis) in 2022 = 2021, > 2018 to 2020 Cu concentrations in 2022 > reference (except HAC-R1 [Caddis] < reference); Cu concentrations in 2022 ≤ 2018 (except HAC-U (BIC) > 2018 to 2021), relative to reference; Cu concentrations in 2022 > pre-breach (HAC-R1 and HAC-U [BIC], HAC-D [Peri, BIC]), = pre-breach (HAC-R1 and HAC-U [Peri]); Cu BCFs in 2022 = or slightly > reference (except HAC-U [BIC] > 2x reference); Cu TTFs in 2022 > reference at HAC-R1 (BIC) and HAC-U (BIC), ≤ 2018 (except HAC-U [BIC] and HAC-D [Caddis] > 2018), ≤ to pre-breach (except HAC-U [BIC] > pre-breach) Secondary analytes at HAC-R1, HAC-U and HAC-D showed some increases in concentration relative to reference and pre-breach but equivocal as to whether observed increases were mine-related and there was little or no evidence of increased metal bioavailability.
Upper (HAC-U)	Analytes of Interest = Cu, Se Cu > upper WSQG, and reference and pre-breach 95th percentile; Se > lower WSQG, and reference and pre-breach 95th percentile Cu in 2022 > 2018 to 2021, relative to reference; Se in 2022 > 2018 to 2021, relative to reference Cu and Se at reference in 2022 < 2018 to 2021, so temporal changes evaluated independent of reference: Cu in 2022 = 2019 to 2021, > 2018; Se in 2022 = 2021, > 2018 to 2020 TOC in 2022 = 2019 and 2021, > 2018 and 2020, relative to reference Temporal changes in metal concentrations associated with variability in sediment texture and physical characteristics among years	Chl-a < BCWQG and > moderately enriched stream threshold and baseline (1995) Chl-a = reference, = pre-breach, > baseline (1995); AFDM > reference (moderate 2.3 SD) Chl-a in 2022 = 2018 to 2021; AFDM in 2022 = 2019 to 2021, > 2018	Density < reference (slightly -1.7 SD); Richness > reference (slightly 1.4 SD) Density in 2022 = 2018 to 2021; Richness in 2022 > 2018, = 2019 to 2021	Dry biomass > reference (moderately 3.6 SD); Dry biomass in 2022 = 2019 to 2021, > 2018	Density = reference and pre-breach; Taxonomic richness = reference and pre-breach Density in 2022 = 2018 to 2021; Taxonomic richness in 2022 = 2019, 2020, > 2018, 2021	
Lower (HAC-D)	Analytes of Interest = Cu, Fe Cu > upper WSQG, and reference and pre-breach 95th; Fe > lower WSQG, and reference and pre-breach 95th Cu in 2022 = 2018, 2021, > 2019, 2020 relative to reference; Fe in 2022 < 2018, > 2019, = 2020, 2021 relative to reference; TOC in 2022 = 2018 to 2021 relative to reference Temporal changes in metal concentrations associated with variability in sediment texture and physical characteristics among years	-		-	-	

Notes: "-" = no data available, WSQG = British Columbia Working Sediment Quality Guidelines, Chl-a = Chlorophyll-a, AFDM = Ash Free Dry Mass, BCF = Bioconcentration Factor, TTF = Trophic Transfer Factor; Peri = Periphyton; Caddis = Caddisfly; BIC = Composite-taxa benthic invertebrate, GL = guideline. Temporal changes presented as "relative to reference" refer to changes in the exposed-reference difference over time as evaluated using a 2-way Analysis of Variance. Analytes presented for zooplankton and fish tissue quality endpoints are primary and secondary analytes (Table 2.4) with a significant positive exposed - reference difference in 2022 or in all monitoring years.

[a] Findings in 2022 are included at minimum. Additional years are displayed (as available) to support temporal comparisons.

[b] WSQG Lower = Lower BC Working Sediment Guideline; WSQG Upper = Upper BC Working Sediment Quality Guideline (BCMOECCS 2021a,b).

[c] Magnitude of significant differences are classed as highly (>5x SD), moderately (5x to 2x SD), and slightly (<2x SD) different, where SD is the pooled standard deviation.

[d] BCWQG = British Columbia Water Quality Guideline for the protection of aquatic life - interim selenium guideline for benthic invertebrates (4 mg/kg dw; BCMOE 2014).

- Copper and selenium in upper Hazeltine Creek and copper and iron in lower Hazeltine Creek were the analytes most elevated relative to sediment quality guidelines and reference. Copper concentrations in upper Hazeltine Creek sediments were temporally stable from 2019 to 2022, while selenium concentrations in 2022 were higher than in 2018 to 2020 but this increase was associated with higher TOC and lower sand content of sediments in 2022 (when evaluated independently of reference comparisons). Copper and iron concentrations in lower Hazeltine Creek sediments in 2022 were similar to or lower than in 2018 and TOC content of these sediments was temporally stable from 2018 to 2022, relative to reference.
- Periphyton productivity (measured as chlorophyll-a) in upper Hazeltine Creek areas was similar to or higher than reference and/or pre-breach from 2018 to 2022. Mean chlorophyll-a (mass per unit area) in upper Hazeltine Creek in 2022 was below the BCWQG and above the threshold for moderately enriched streams. Periphyton community condition was similar to reference and/or temporally stable for most endpoints. Community composition differences relative to reference were indicative of healthy periphyton communities in upper Hazeltine Creek.
- Benthic invertebrate community monitoring indicated that the community in upper Hazeltine Creek areas has recovered to reference and/or pre-breach conditions when primary metrics (density, richness, Simpson's Evenness and Diversity) are considered. Some remaining key differences in the benthic community structure at both areas of upper Hazeltine Creek, compared to pre-breach conditions, indicate the community composition has not fully recovered to pre-breach conditions, and differences between the two areas suggest greater recovery at HAC-U than HAC-R1.
- Concentrations of copper and selenium were higher than reference and increased over time and showed some evidence of moderately higher bioavailability and/or trophic transfer of selenium and copper in upper Hazeltine Creek, and selenium in lower Hazeltine Creek. Selenium concentrations in most tissues in Hazeltine Creek (upper and lower) have increased since 2018 compared to reference (except composite-taxa benthic invertebrate samples from lower Hazeltine Creek) but remained similar to or lower than pre-breach in upper Hazeltine Creek while those in lower Hazeltine Creek were higher than pre-breach in 2022. Mean selenium concentrations in benthic invertebrate tissue have exceeded the BC interim guideline since 2020 and 2022 in upper (HAC-R1 and HAC-U) and lower (HAC-D) Hazeltine Creek (1.23-, 1.67- and 1.14-times guideline, respectively). Copper was elevated relative to reference in 2022, and higher than pre-breach in most tissues and sampling years but the

difference relative to reference has been similar to reference over monitoring years except at HAC-U where concentrations in composite taxa-benthic invertebrate tissue samples were higher in 2022 than 2018 to 2021 (relative to reference). Copper TTFs were stable or decreasing over time and lower than pre-breach except for composite taxa-benthic invertebrate tissue samples from HAC-U which increased over time, and higher than pre-breach. This temporal increase in copper concentrations and TTFs in benthic invertebrates was limited to composite-taxa benthic invertebrate tissues from Reach 2 (HAC-U), indicating a potentially localized increase. The concentration and TTFs of most secondary analytes were similar to reference and pre-breach, and for analytes with increased concentrations, none showed bioaccumulation in tissues indicating equivocal mine-related effects over time.

7.4 Edney Creek

7.4.1 Aquatic Life

Periphyton and benthic invertebrate tissue quality monitoring in lower Edney Creek in 2022 indicated that tissue concentrations of several primary and secondary analytes were significantly higher at the exposed area (E1) than reference. However, for most metals, there was no consistent evidence of increasing metal concentrations in periphyton and/or benthic invertebrate tissues from the exposed area relative to the reference area over time. Copper was an exception, with concentrations in all exposed area tissues (i.e., periphyton, caddisfly, and composite-taxa benthic invertebrates) that were higher than reference. Most analytes demonstrated a lack of consistency among tissue types in concentrations and TTFs (except copper), BCFs that were only slightly above reference (except copper and cadmium), and TTFs that did not demonstrate increased bioavailability. These results collectively indicate that the potential mine-influence on analyte concentrations in lower Edney Creek appears limited to increased copper concentrations in benthic invertebrate tissues. Copper concentrations in exposed caddisfly and composite-taxa tissues were higher than reference in 2022, but copper TTFs were lower than reference in all years, indicating there is no evidence of increased copper bioavailability in aquatic biota in lower Edney Creek. However, the significant increase in copper concentrations in exposed caddisfly tissues in 2020, and again in 2022, relative to reference, is consistent with the recent completion of final remediation works in this area (in the summer of 2020 and 2021). Mean concentrations of selenium in caddisfly and composite benthic invertebrate tissue samples were well below the BC interim guideline for aquatic life, indicating that no selenium-associated effects to aquatic life would be expected.

7.4.2 Key Findings

Key findings of CEMP monitoring of Edney Creek in 2022 (Table 7.4) are:

- Periphyton and benthic invertebrate tissue from lower Edney Creek (E1) showed significantly elevated concentrations of several primary and secondary analytes relative to reference, including copper. For most analytes there was no evidence of increasing concentrations or bioavailability, and results were inconsistent among tissue types. Copper concentrations were higher in all tissue types in 2022 than 2019 to 2021, relative to reference, which was accompanied by higher BCFs than reference, but TTFs remained lower than reference. Mean selenium concentrations in benthic invertebrate tissue were below the BC interim guideline for aquatic life.

Table 7.4: Summary of Mount Polley CEMP Results for Lower Edney Creek, 2022 [a]

Periphyton and Benthic Invertebrate Tissue Quality [b]
Mean Se in caddisfly and BIC < BCWQG Protection of Aquatic Life Cu concentrations in 2022 (Peri, BIC, Caddis) > reference; Cu concentrations in 2022 = 2019 to 2021 (Peri and BIC), > 2019 to 2021 (Caddis), relative to reference Cu BCFs in 2022 = reference (BIC), slightly > reference (Caddis), moderately > reference (Peri) Cu TTFs in 2022 < reference, = 2019 to 2021 Secondary analytes showed some increases in concentration relative to reference but equivocal as to whether observed increases were mine-related and there was little or no evidence of increased metal bioavailability

Notes: TTFs = Trophic Transfer Factors; BCF = Bioconcentration Factor; Peri = Periphyton; Caddis = Caddisfly; BIC = Composite-taxa benthic invertebrate. Temporal changes presented as "relative to reference" refer to changes in the exposed-reference difference over time as evaluated using a 2-way Analysis of Variance. Analytes presented for zooplankton and fish tissue quality endpoints are primary and secondary analytes (Table 2.4) with a significant positive exposed - reference difference in 2022 or in all monitoring years.

[a] Findings in 2022 are included at minimum. Additional years are displayed (as available) to support temporal comparisons.

[b] BCWQG = British Columbia Water Quality Guideline for the protection of aquatic life - interim selenium guideline for benthic invertebrates (4 mg/kg dw; BCMOE 2014).

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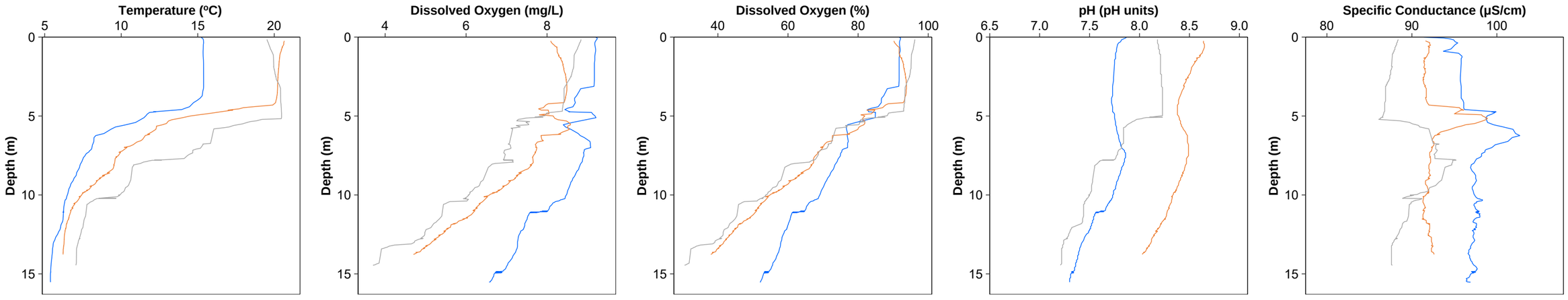
APPENDIX A
SAMPLING LOCATIONS AND SUPPORTING INFORMATION

APPENDIX A.1
LAKES

Bootjack Lake (BOL-B2; Reference)



Polley Lake (POL-P2; Exposed)

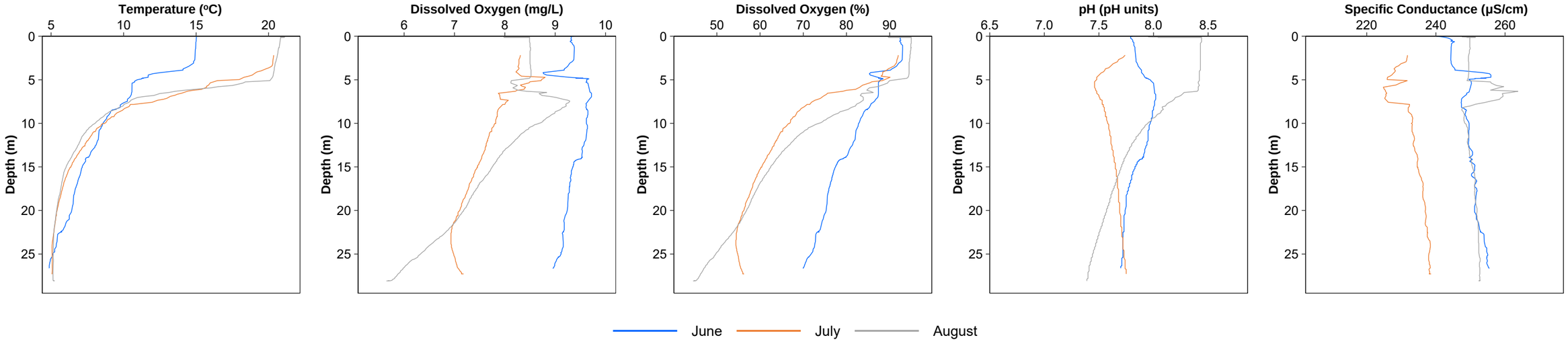


Figure A.1.1: Vertical Profiles of Temperature, Dissolved Oxygen, pH, and Specific Conductance during Plankton Sampling Events for Polley Lake (POL-P2; Exposed) and Bootjack Lake (BOL-B2; Reference) Areas, June to August 2022

Notes: mg/L = milligrams per litre, µS/cm = microSiemens per centimeter, ºC = degrees Celsius, % = percent.

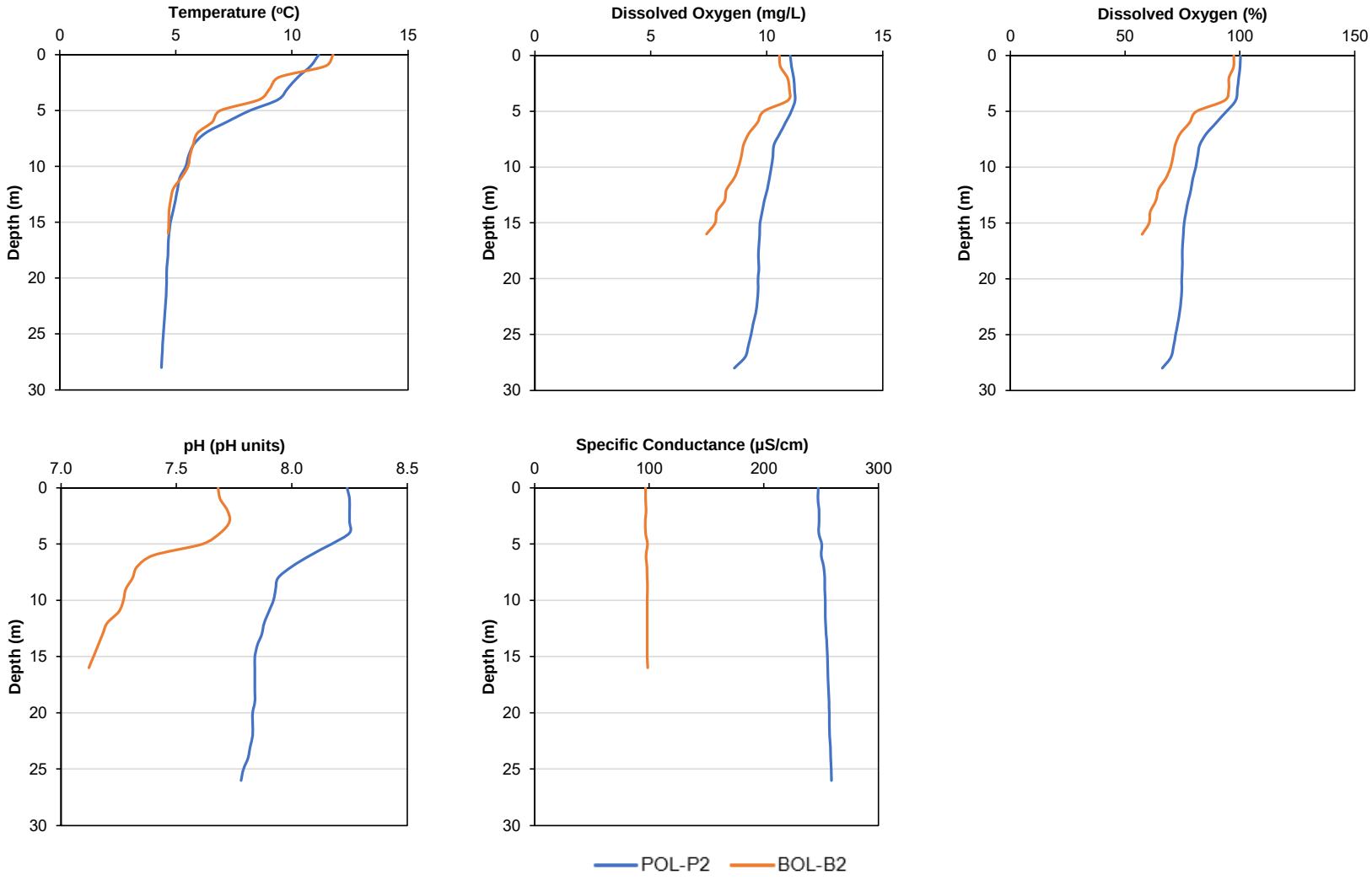


Figure A.1.2: Vertical Profiles of Temperature, Dissolved Oxygen, pH, and Specific Conductance during Fish Monitoring for Polley Lake (POL-P2; Exposed) and Bootjack Lake (BOL-B2; Reference) Areas, May 2022

Notes: mg/L = milligrams per litre, µS/cm = microSiemens per centimeter, °C = degrees Celsius, % = percent.

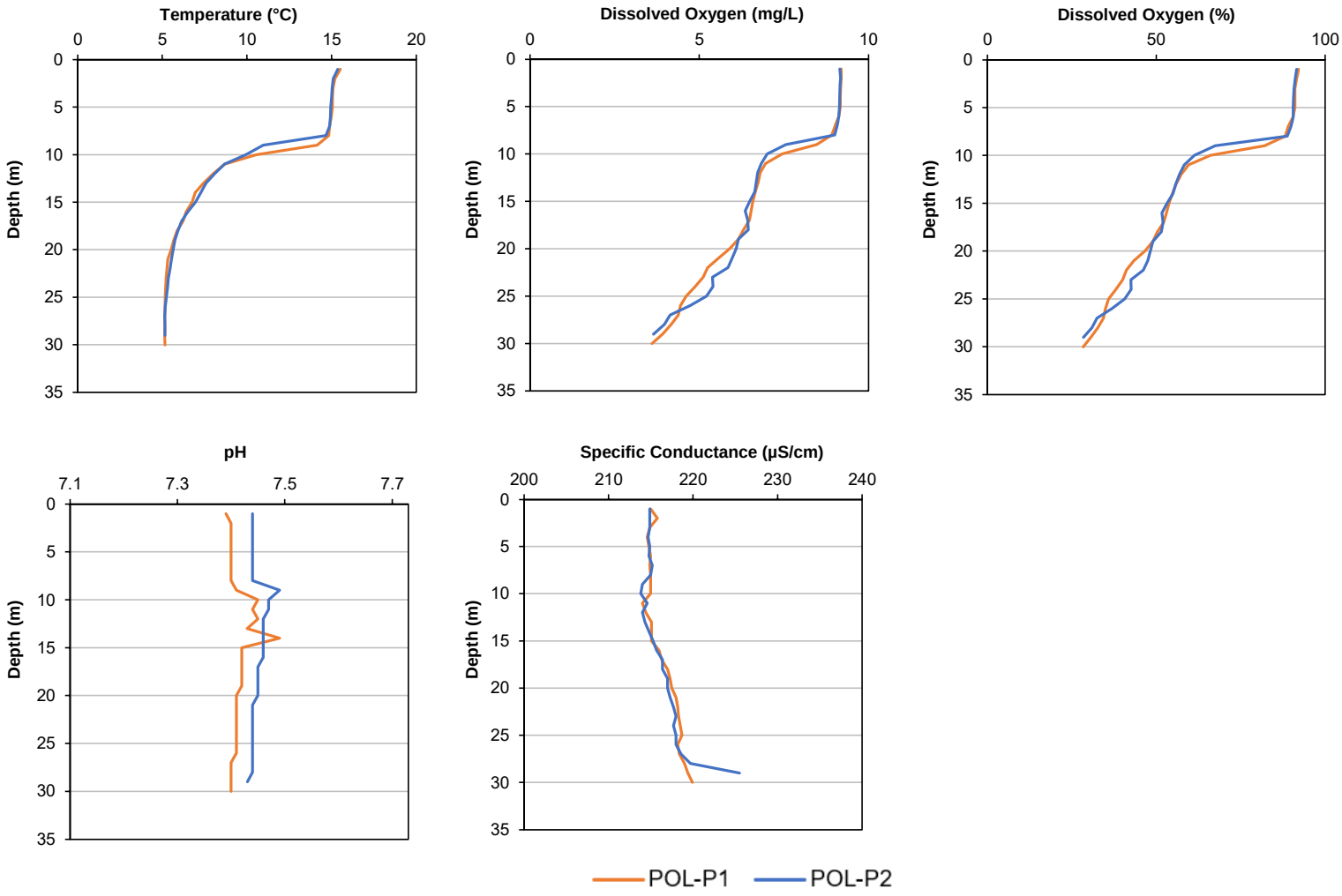


Figure A.1.3: Vertical Profiles of Temperature, Dissolved Oxygen, pH, and Specific Conductance during Fish Monitoring for Polley Lake (POL-P1, POL-P2; Exposed), September 2022

Notes: mg/L = milligrams per litre, µS/cm = microSiemens per centimeter, °C = degrees Celsius, % = percent.

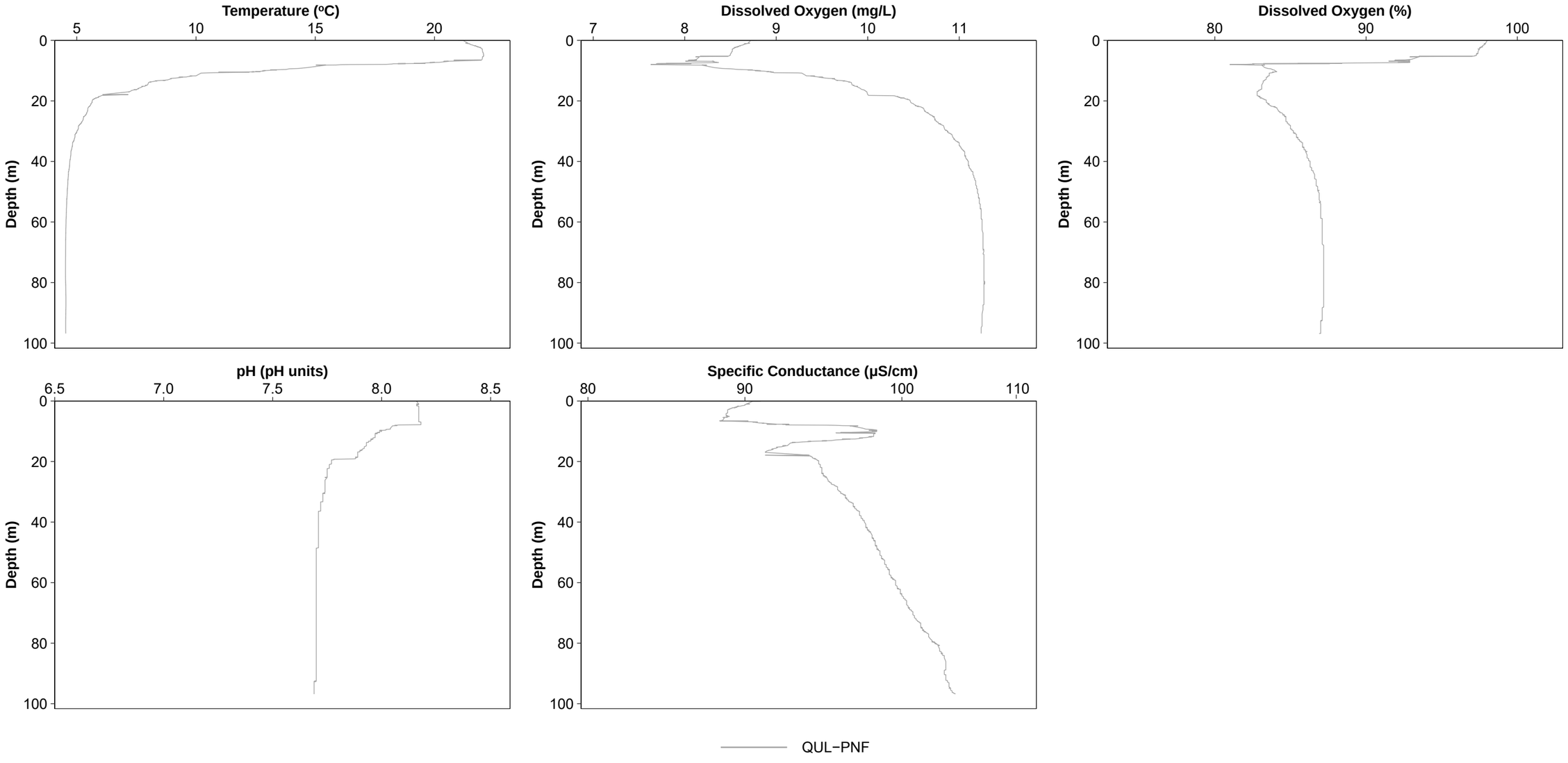


Figure A.1.4: Vertical Profiles of Temperature, Dissolved Oxygen, pH, and Specific Conductance during Sediment Quality and Benthic Invertebrate Monitoring for Quesnel Lake at QUL-PNF (Exposed) Deep Area, August 2022

Notes: mg/L = milligrams per litre, µS/cm = microSiemens per centimeter, °C = degrees Celsius, % = percent.

Quesnel Lake – QUL-ZOO-7 (Reference)

Quesnel Lake – QUL-ZOO-1 (Exposed)

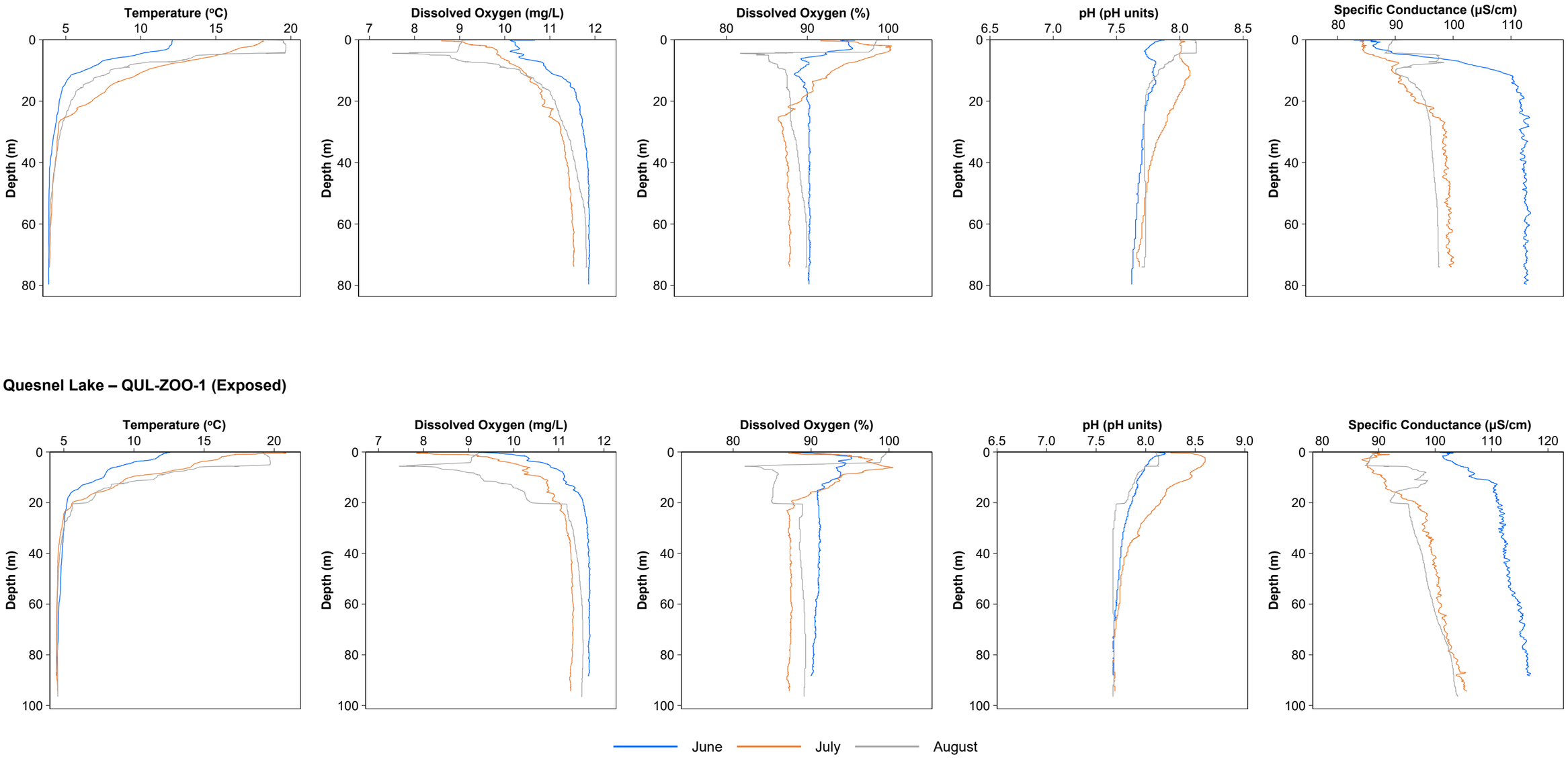


Figure A.1.5: Vertical Profiles of Temperature, Dissolved Oxygen, pH, and Specific Conductance during Plankton Sampling Events for Quesnel Lake at QUL-ZOO-1 (Exposed) and QUL-ZOO-7 (Reference) Areas, June to August, 2022

Notes: mg/L = milligrams per litre, µS/cm = microSiemens per centimeter, ºC = degrees Celsius, % = percent.

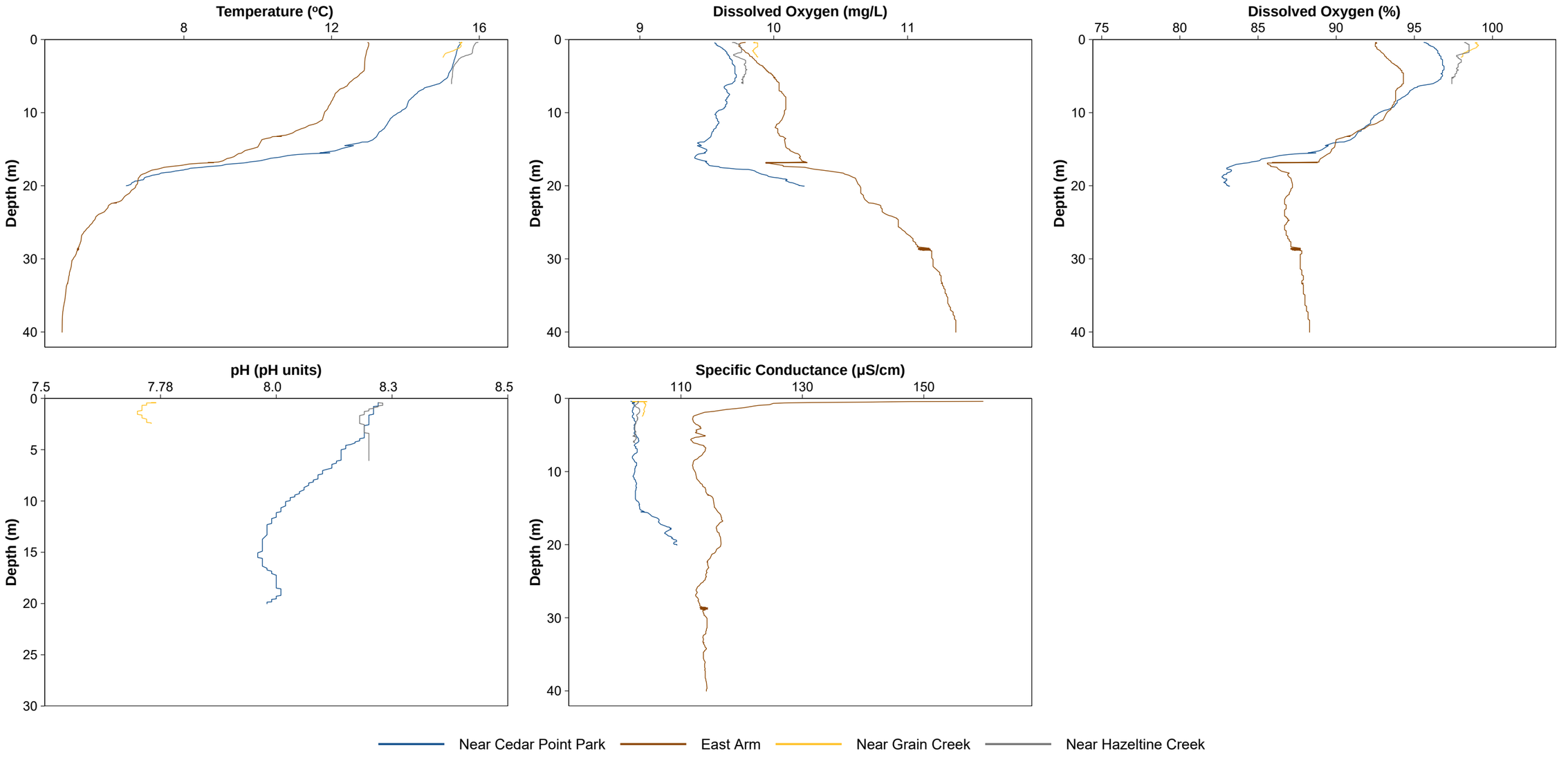


Figure A.1.6: Vertical Profiles of Temperature, Dissolved Oxygen, pH, and Specific Conductance during Fish Monitoring for Quesnel Lake (Exposed and Reference) Areas, October 2022

Notes: Accurate pH results for the East Arm (Reference) could not be recorded due to an equipment malfunction, therefore are not displayed. mg/L = milligrams per litre, µS/cm = microSiemens per centimeter, ºC = degrees Celsius, % = percent

Table A.1.1: Sediment and Benthic Invertebrate Community Monitoring Methods and Locations for Polley Lake (Exposed), Bootjack Lake (Reference), and Quesnel Lake (Exposed and Reference) Shallow and Deep Areas, August 2022

Location		Area Code	Type	Replicate	UTM (NAD 83, Zone 10U)		Water Sample	Sediment Sample			Benthic Invertebrate Community Sample [a]
					Easting	Northing	Date	Date	Sampling Method	Grabs per Sample	Date
Bootjack Lake Shallow	Bootjack Lake (South)	BOL-S	Reference	1	591914	5820690	24-Aug-22	24-Aug-22	Petite Ponar	5	-
				2	591899	5820721				5	
				3	591921	5820672				5	
				4	591933	5820662				5	
				5	591931	5820670				5	
Polley Lake Shallow	Polley Lake (South)	POL-S	Exposed	1	595591	5820969	25-Aug-22	25-Aug-22	Petite Ponar	5	-
				2	595625	5820980				5	
				3	595630	5821150				6	
				4	595633	5821039				5	
				5	595616	5821020				5	
Quesnel Lake Shallow	Reference (Horsefly Bay)	QUL-LREF1	Reference	1	610136	5813949	24-Aug-22	23-Aug-22	Petite Ponar	6	-
				2	610003	5813958				7	
				3	610097	5813939				5	
				4	610164	5813960				5	
				5	610031	5813948				8	
	Near-field	QUL-LNF1	Exposed	1	601431	5818141	24-Aug-22	23-Aug-22	Petite Ponar	8	-
				2	601468	5818105				9	
				3	601420	5818165				6	
				4	601491	5818072				5	
				5	601518	5818017				7	
Quesnel Lake Deep	Near-field	QUL-PNF	Exposed	1	601814	5818205	-	26-Aug-22	Petite Ponar	5	26-Aug-22
				2	601666	5818294				5	27-Aug-22
				3	601909	5818117		27-Aug-22		5	
				4	601545	5818372				5	
				5	601489	5818469				5	

Note: "-" = no data available or not applicable.

[a] Benthic invertebrate community samples were collected using a Petite Ponar, with 5 grabs per sample, 250 µm sieve size. No macrophytes or algae were documented in the samples collected.

Table A.1.2: **Supporting Measures Collected during Sediment and Benthic Invertebrate Community Monitoring for Polley Lake (Exposed), Bootjack Lake (Reference), and Quesnel Lake (Exposed and Reference) Shallow and Deep Areas, August 2022**

Location		Area Code	Type	Date	Replicate	Station Depth	Secchi Depth	Surface					Bottom				
								Temperature	Dissolved Oxygen		pH	Specific Conductance	Temperature	Dissolved Oxygen		pH	Specific Conductance
						(m)	(m)	°C	mg/L	%	pH units	µS/cm	°C	mg/L	%	pH units	µS/cm
Bootjack Lake Shallow	Bootjack Lake (South)	BOL-S	Reference	24-Aug-22	1	3.0	TSB	25.382	8.21	98.9	8.32	85.8	22.610	8.62	100.3	8.56	84.7
				24-Aug-22	2	1.5	TSB	25.000	8.29	100.3	8.35	85.8	22.591	8.68	100.5	8.57	84.6
				24-Aug-22	3	2.0	TSB	24.060	8.86	105.5	8.40	85.5	22.494	8.93	103.6	8.63	85.2
				24-Aug-22	4	2.5	TSB	25.133	8.27	100.6	8.40	85.7	22.705	9.66	112.1	8.91	85.3
				24-Aug-22	5	3.5	TSB	24.890	8.48	102.2	8.47	85.6	22.465	8.59	99.1	8.48	85.0
Polley Lake Shallow	Polley Lake (South)	POL-S	Exposed	25-Aug-22	1	3.0	TSB	22.638	8.80	101.8	8.63	216.1	22.662	8.94	103.0	8.62	210.9
				25-Aug-22	2	2.5	TSB	22.749	9.30	108.0	8.70	214.5	22.391	9.85	113.6	8.51	213.1
				25-Aug-22	3	3.5	TSB	22.701	8.61	99.9	8.63	216.6	22.366	9.20	105.9	8.70	214.2
				25-Aug-22	4	2.5	TSB	22.855	9.15	106.5	8.70	215.4	22.763	9.22	107.1	8.69	214.8
				25-Aug-22	5	2.0	TSB	22.888	9.30	108.2	8.73	214.7	22.669	10.10	117.1	8.78	212.6
Quesnel Lake Shallow	Reference (Horsefly Bay)	QUL-LREF1	Reference	24-Aug-22	1	2.1	TSB	21.682	9.36	106.4	8.45	89.1	21.753	9.34	106.3	8.45	89.1
				24-Aug-22	2	1.5	TSB	21.563	9.53	108.0	8.45	88.4	21.627	9.74	110.6	8.55	88.2
				24-Aug-22	3	2.1	TSB	21.689	9.69	109.9	8.43	88.6	21.704	10.03	114.1	8.63	88.2
				24-Aug-22	4	2.0	TSB	21.751	9.22	105.0	8.37	89.4	21.740	9.16	104.2	8.35	89.9
				24-Aug-22	5	-	TSB	21.770	9.86	112.2	8.65	88.3	21.690	9.81	111.0	8.59	88.2
	Near-field	QUL-LNF1	Exposed	24-Aug-22	1	1.6	TSB	21.660	8.92	101.4	8.06	87.2	21.744	8.93	101.7	8.07	87.0
				24-Aug-22	2	2.5	TSB	21.678	8.94	101.8	8.08	86.9	21.811	8.95	102.0	8.07	86.8
				24-Aug-22	3	2.1	TSB	21.681	8.90	101.1	8.05	87.3	21.705	8.90	101.2	8.05	87.2
				24-Aug-22	4	1.7	TSB	21.642	8.89	101.0	8.06	87.2	21.660	8.87	100.8	8.09	87.2
				24-Aug-22	5	1.5	TSB	21.703	8.91	101.4	8.15	87.3	21.694	8.91	101.3	8.16	87.1
Quesnel Lake Deep	Near-field	QUL-PNF	Exposed	26-Aug-22	1	113	8.3	20.978	8.79	98.1	8.16	91.0	4.539	11.24	86.9	7.69	103.4
				26-Aug-22	2	112	7.3	21.073	8.77	98.1	8.16	90.8	4.539	11.24	86.9	7.69	103.4
				27-Aug-22	3	110	6.5	20.199	8.80	96.6	8.15	89.7	4.700	11.18	86.9	7.68	106.0
				27-Aug-22	4	112	7.0	19.267	9.36	100.9	8.10	91.5	4.561	11.20	86.8	7.69	103.5
				27-Aug-22	5	110	8.5	19.893	8.85	96.7	8.03	90.6	4.551	11.19	86.7	7.70	103.3

Notes: TSB = to substrate bed material, "-" = not available.

Table A.1.3: Plankton Monitoring Sampling Methods and Locations for Polley Lake (POL-P2; Exposed) and Bootjack Lake (BOL-B2; Reference) and for Quesnel Lake at QUL-ZOO-1 (Exposed) and QUL-ZOO-7 (Reference) Areas, June to August 2022

Area	Station ID	Date	Time (24 hr)	UTM (NAD 83, 10U)		Station Total Depth (m)	Secchi Depth (m)	Temperature	Dissolved Oxygen		Conductivity	Specific Conductance	pH	Phytoplankton Community and Productivity	Zooplankton					Water Quality
														DI Sampler Depth (m)	Community	Tissue				
				Easting	Northing			°C	mg/L	%	µS/cm	µS/cm	pH units		Tow Depth (m)	Haul Type	Tow Depth (m)	# of Hauls	Time (min)	DI Sample? (Y/N)
Bootjack Lake (Reference)	BOL-B2-1	21-Jun-2022	14:25	591256	5821677	17.9	4.0	11.554	8.77	80.6	71.6	97.0	7.54	11.5	15.0	Vertical	15.0	1	-	Y
	BOL-B2-1	26-Jul-2022	08:30	591252	5821630	19.7	5.6	14.183	7.32	71.4	73.3	92.2	7.68	12.0	16.0	Vertical	15.5[a]	2	-	Y[c]
	BOL-B2-2	26-Jul-2022	10:40	591239	5821692	19.6	5.9	15.680	7.64	76.9	76.6	92.2	7.59	11.5	14.0	Vertical	14.0	2	-	N
	BOL-B2-3	26-Jul-2022	11:30	591259	5821749	15.4	5.4	14.800	7.16	70.6	74.2	92.6	7.31	11.5	11.5	Vertical	11.0[c]	3	-	N
	BOL-B2-4	26-Jul-2022	12:45	591312	5821796	11.0	6.6	16.380	8.13	83.0	77.8	93.1	7.77	10.0	10.0	Vertical	10.0	2	-	N
	BOL-B2-5	26-Jul-2022	14:00	591333	5821568	16.0	4.7	15.240	7.29	72.7	74.1	91.7	7.48	11.5	12.0	Vertical	12.0	2	-	N
	BOL-B2-1	28-Aug-2022	8:10	591256	5821677	18.5	4.8	14.000	6.32	61.4	68.1	86.2	7.47	12.0	14.0	Vertical	14.0	2	-	Y
Polley Lake (Exposed)	POL-P2-1	21-Jun-2022	12:00	595346	5821859	29.6	4.5	11.679	9.66	89.1	186.1	249.1	7.64	11.5	26.0	Vertical	26.0	2	-	Y
	POL-P2-1	25-Jul-2022	11:56	595173	5822030	28.0	4.3	16.107	8.62	87.7	193.0	232.0	8.10	12.0[c]	26.0	Vertical	26.0	1	-	Y[c]
	POL-P2-2	25-Jul-2022	13:30	595377	5822077	26.0	4.3	17.030	8.57	88.7	197.0	232.5	8.18	11.5	24.0	Vertical	24.0	1	-	N
	POL-P2-3	25-Jul-2022	14:25	595436	5821798	27.5	4.0	17.120	8.55	88.7	198.3	233.4	8.12	11.5	24.5	Vertical	25.0	1	-	N
	POL-P2-4	25-Jul-2022	15:00	594869	5822411	25.5	4.3	17.980	8.55	90.3	203.3	234.1	8.19	11.5	23.5	Vertical	23.5	1	-	N
	POL-P2-5	25-Jul-2022	15:45	595134	5821976	23.0	4.2	17.670	8.58	90.0	191.3	231.9	8.23	11.5	21.5	Vertical	21.5	1	-	N
	POL-P2-1	25-Aug-2022	10:55	595346	5821859	31.0	6.0	16.222	8.40	85.8	178.5	214.1	8.12	12.0	26.0	Vertical	26.0	2	-	Y
Quesnel Lake (Reference)	QUL-ZOO-7-1	22-Jun-2022	11:00	612448	5816654	84.5	2.5	9.590	10.83	95.1	68.0	96.3	7.67	12.0	33.0	Horizontal	33.0	1	5	Y
	QUL-ZOO-7-1	27-Jul-2022	09:00	612427	5816677	75.8	5.0	16.070	9.92	100.5	74.4	89.7	7.28	11.0	33.0	Horizontal	33.0	1	5	Y[c]
	QUL-ZOO-7-2	27-Jul-2022	10:30	612087	5816568	82.9	4.2	15.450	10.13	101.2	63.1	89.0	7.76	11.0	33.0	Horizontal	33.0	1	4	N
	QUL-ZOO-7-3	27-Jul-2022	11:15	612568	5816302	161	4.9	15.300	10.12	100.5	71.6	88.2	7.94	11.0	33.0	Horizontal	33.0	1	5	N
	QUL-ZOO-7-4	27-Jul-2022	11:45	612621	5816968	44.3	5.8	15.510	10.22	102.5	71.7	87.3	7.95	11.0	33.0	Horizontal	33.0	1	4	N
	QUL-ZOO-7-5	27-Jul-2022	12:36	612220	5816796	64.0	5.1	15.750	10.20	102.9	72.9	88.4	7.93	11.0	33.0	Horizontal	33.0	1	4	N
	QUL-ZOO-7-1	28-Aug-2022	12:45	612448	5816654	79.3	-	13.720	10.02	96.5	70.4	89.7	7.86	11.5	33.0	Horizontal	33.0	1	5	Y
Quesnel Lake (Exposed)	QUL-ZOO-1-1	22-Jun-2022	11:00	601053	5819934	94.0	4.0	9.741	11.02	97.0	75.1	105.5	7.85	11.5[c]	33.0	Horizontal	33.0[c]	1	5	Y[c]
	QUL-ZOO-1-1	27-Jul-2022	13:40	601062	5819924	99.9	5.9	14.710	10.41	102.5	70.8	88.9	7.98	11.0	33.0	Horizontal	33.0	1	4	Y[c]
	QUL-ZOO-1-2	27-Jul-2022	14:45	601282	5819755	60.0	6.6	15.990	10.33	103.3	73.6	88.9	7.94	11.0	33.0	Horizontal	33.0	1	4	N
	QUL-ZOO-1-3	28-Jul-2022	07:20	600975	5819623	115	4.8	14.630	10.37	101.6	71.0	88.7	-[b]	11.0	33.0	Horizontal	33.0	1	4	N
	QUL-ZOO-1-4	28-Jul-2022	08:10	600786	5819932	114	4.8	14.880	10.45	103.3	70.4	87.6	-[b]	11.0	33.0	Horizontal	33.0	1	4	N
	QUL-ZOO-1-5	28-Jul-2022	08:50	600945	5820229	84.0	6.1	14.960	10.34	102.4	70.1	87.1	-[b]	11.0	33.0	Horizontal	33.0	1	4	N
	QUL-ZOO-1-1	28-Aug-2022	11:10	601053	5819934	98.0	8.0	14.190	10.04	97.8	71.2	89.7	7.90	11.5	33.0	Horizontal	33.0[c]	1	10	Y[c]

Notes: "-" = no data available, Y = Yes, N = No. DI = Depth-Integrated. Measurement increments on Secchi disk rope were more precise in July (to nearest 0.10 m) than in June and August (to nearest 0.5 m).

[a] Zooplankton tissue hauls for BOL-B2-1 in July were collected at a depth of 16 m (Haul #1) and 15 m (Haul #2), as the first haul potentially had some suspended sediment present. The presented depth is a mean of these two haul depths.

[b] pH not recorded due to probe malfunction.

[c] Field duplicate sample collected at this station. For phytoplankton sampling, the duplicate identified was a chlorophyll-a productivity sample, for zooplankton tissue it was a split duplicate zooplankton tissue sample, and for water quality sampling it was a split duplicate water quality sample.

Table A.1.4: Habitat Information Associated with Fish Population Monitoring in Polley Lake, September 2022

Station ID		Exposed
		Polley Lake
Date Sampled		26-Sep-22
UTM (NAD83, Zone 10U)	Easting	595166
	Northing	5822183
Habitat Characteristics		
Surrounding Land Use		Mining, recreational
Riparian Vegetation (decreasing dominance)		Alder, cedar, spruce, grasses, reeds
Evidence of Anthropogenic Disturbances		Mining, access road, water intake pipe, public boat launch
Aquatic Vegetation	% Emergent	5
	% Submergent	15
	% Floating	5
	% Attached Algae	10
Shoreline (% area coverage)	% Bedrock	0
	% Boulder	0
	% Cobble	5
	% Gravel	5
	% Sand / Finer	75
	% Organic Debris	15
Littoral Substrate (% area coverage)	% Bedrock	0
	% Boulder	0
	% Cobble	5
	% Gravel	5
	% Sand / Finer	75
	% Organic Debris	15

Note: Littoral assessment largely based on shoreline observations, as majority of lake could not be observed.

Table A.1.5: Habitat Information Associated with Fish Tissue Collections in Quesnel Lake, October 2022

Station ID		Reference		Exposed	
		East Arm	Near Grain Creek	Near Hazeltine Creek	Near Cedar Point
Date Sampled		4-Oct-22	6-Oct-22	4-Oct-22	3-Oct-22
UTM (NAD83, Zone 10U)	Easting	677255	633132	602368	598832
	Northing	5832530	5828731	5817479	5827205
Habitat Characteristics					
Surrounding Land Use		Forest	Burned forest	Mining, residential	Residential, recreational
Riparian Vegetation (decreasing dominance)		Shrubs, mixed forest	Mixed forest, cottonwood, cedar	Spruce, cottonwood, fir, cedar, birch	Spruce, cedar, birch, fir, alder
Evidence of Anthropogenic Disturbances		Fishing cabin	Recent fire	Mining, boat traffic	Boat traffic
Aquatic Vegetation	% Emergent	0	0	0	0
	% Submergent	0	10	5	5
	% Floating	0	0	0	0
	% Attached Algae	0	0	0	0
Shoreline (% area coverage)	% Bedrock	0	0	0	0
	% Boulder	0	0	0	0
	% Cobble	5	20	5	10
	% Gravel	45	70	25	80
	% Sand / Finer	40	5	70	10
	% Organic Debris	10	5	0	0
Littoral Substrate (% area coverage)	% Bedrock	0	0	0	0
	% Boulder	0	0	0	0
	% Cobble	5	25	0	5
	% Gravel	5	65	5	30
	% Sand / Finer	90	10	70	35
	% Organic Debris	0	0	25	30

APPENDIX A.2
CREEKS

Figure A.2.1: Representative Periphyton Coverage at FPC-R3 (Frypan Creek, Reference; top panel) and EDC-U (Upper Edney Creek, Reference; bottom panel), August 2022

Figure A.2.1: Representative Periphyton Coverage at HAC-R1 (Upper Hazeltine Creek, Reach 1, Exposed; top panel) and HAC-U (Upper Hazeltine Creek, Reach 2, Exposed; bottom panel), August 2022

Figure A.2.1: Representative Periphyton Coverage at Station HAC-R3 (Upper Hazeltine Creek, Reach 3; Exposed; top panel) and HAC-D (Lower Hazeltine Creek; Exposed; bottom panel), August 2022

Figure A.2.1: Representative Periphyton Coverage at EDC-D (Lower Edney Creek, Reference; top panel) and E1 (Lower Edney Creek, Exposed; bottom panel), August 2022

Table A.2.1: Supporting Measures and Sampling Locations for Sediment Monitoring for Upper (HAC-R1, HAC-U; Exposed) and Lower (HAC-D; Exposed) Hazeltine Creek and Upper (EDC-U; Reference) and Lower (EDC-D; Reference) Edney Creek, August 2022

Station ID		Reference					Exposed				
		Upper Edney Creek					Upper Hazeltine Creek				
		EDC-U					HAC-U				
		EDC-U-1	EDC-U-2	EDC-U-3	EDC-U-4	EDC-U-5	HAC-U-1	HAC-U-2	HAC-U-3	HAC-U-4	HAC-U-5
Date Sampled		7-Aug-22	7-Aug-22	7-Aug-22	7-Aug-22	7-Aug-22	6-Aug-22	6-Aug-22	6-Aug-22	6-Aug-22	6-Aug-22
UTM (NAD83, 10U)	Easting	597938	597980	598009	598002	597994	596351	596414	596481	596623	596668
	Northing	5814539	5814582	5814647	5814676	5814704	5819526	5819484	5819414	5819303	5819259
Sediment Quality Measures											
Sampling Device		Spoon	Spoon	Spoon	Spoon	Spoon	Spoon	Spoon	Spoon	Spoon	Spoon
Grabs in Composite		>20	>20	>20	>20	>20	>20	>20	>20	>20	>20
Sample Stratum (cm)		0-3	0-3	0-3	0-3	0-3	0-3	0-3	0-3	0-3	0-3

Table A.2.1: Supporting Measures and Sampling Locations for Sediment Monitoring for Upper (HAC-R1, HAC-U; Exposed) and Lower (HAC-D; Exposed) Hazeltine Creek and Upper (EDC-U; Reference) and Lower (EDC-D; Reference) Edney Creek, August 2022

Station ID		Reference					Exposed				
		Lower Edney Creek					Lower Hazeltine Creek				
		EDC-D					HAC-D				
		EDC-D-1	EDC-D-2	EDC-D-3	EDC-D-4	EDC-D-5	HAC-D-1	HAC-D-2	HAC-D-3	HAC-D-4	HAC-D-5
Date Sampled		3-Aug-22	3-Aug-22	3-Aug-22	3-Aug-22	3-Aug-22	5-Aug-22	5-Aug-22	5-Aug-22	5-Aug-22	5-Aug-22
UTM (NAD83, 10U)	Easting	601040	601110	601108	601120	601163	601189	601300	601400	601428	601515
	Northing	5816765	5816767	5816742	5816733	5816817	5817168	5817131	5817134	5817133	5817183
Sediment Quality Measures											
Sampling Device		Spoon	Spoon	Spoon	Spoon	Spoon	Spoon	Spoon	Spoon	Spoon	Spoon
Grabs in Composite		>20	>20	>20	>20	>20	>20	>20	>20	>20	>20
Sample Stratum (cm)		0-3	0-3	0-3	0-3	0-3	0-3	0-3	0-3	0-3	0-3

Table A.2.2: Habitat Information Associated with Biological Monitoring for Upper (HAC-R1, HAC-U, HAC-R3) and Lower (HAC-D) Hazeltine Creek (Exposed), Lower Edney Creek (E1; Exposed), Upper (EDC-U) and Lower (EDC-D) Edney Creek (Reference), and Frypan Creek (FPC-R3; Reference), August 2022

Station ID		Upper Creek Areas					Lower Creek Areas		
		Reference		Exposed			Reference	Exposed	
		Frypan Creek (Reach 3)	Edney Creek	Hazeltine Creek (Reach 1)	Hazeltine Creek (Reach 2)	Hazeltine Creek (Reach 3)	Edney Creek	Hazeltine Creek	Edney Creek
		FPC-R3	EDC-U	HAC-R1	HAC-U	HAC-R3	EDC-D	HAC-D	E1
Date Sampled		9-Aug-22	7-Aug-22	10-Aug-22	6-Aug-22	10-Aug-22	4-Aug-22	5-Aug-22	5-Aug-22
UTM (NAD83, 10U)	Easting	592419	597948	595737	596331	597435	601022	600800	601315
	Northing	5826720	5814503	5820098	5819541	5818500	5816625	5817300	5817002
Length of Reach Assessed (m)		25	40	20	30	25	60	40	90
Channel Measurements	Bankfull Width (m)	2.4	6.7	6.9	4.8	5.4	8.70	4.80	14.7
	Wetted Width (m)	1.3	3.3	4.8	3.3	3.5	4.60	2.95	4.00
	Mean depth (cm)	10	14	18	2.1	17	15	17	14
	Maximum depth (cm)	13	38	34	75	83	93	38	31
	Gradient (%)	2	3.0	3	1	2	2	3.0	1
Residual (refuge) pool depth (cm)		7.0	30	36	60	50	93	63	31
Anthropogenic Disturbances		None	Bridge upstream of stations 2 through 8	Mine upstream; remediated channel from breach	Mine upstream; remediated channel from breach	Mine upstream; remediated channel from breach	None	Remediated creek channel; public road	Mining; remediated channel from breach; public road
Weather notes		Clear, hot	Clear, sunny, warm	Clear	Warm, partly cloudy	Clear	Steady rain	Overcast, warm	Warm, partly cloudy
Other instream features		LWD overhanging creek (>1 m from water surface)	-	-	Anchored LWD and root wads	-	LWD jams at side of channel; LWD cover	Sand and fines accumulation in pools	Point gravel bar
Bank Stability		Stable	Moderate	Stable	Moderate	-	Moderate	Moderate	Stable
Water Colour & Clarity		Clear, colourless	Clear, colourless	Clear	Clear, colourless	Clear	Clear, colourless	Clear	Clear, colourless
General Morphology	% Pool / Back Eddy	0	20	50	70	0	30	40	0
	% Riffle	15	10	40	20	20	40	60	50
	% Run	85	70	10	10	80	30	0	50
Substrate	% Bedrock	0	0	0	0	0	0	0	0
	% Boulder	0	0	20	5	5	10	10	10
	% Cobble	10	40	70	40	75	60	30	50
	% Gravel	30	50	10	30	20	30	30	30
	% Sand / Finer	60	10	0	25	0	10	30	10
	% Organic	-	-	-	-	-	-	-	-
Instream Cover	% Undercut banks	10	5	0	0	0	5	0	0
	% Boulder	0	0	5	5	5	<5	15	5
	% Woody debris	0	5	10	10	20	<5	5	0
	% Deep pool	0	10	20	15	5	10	5	5
	% Macrophytes	0	0	0	<5	0	0	0	0
	% Other	30 (OV)	15 (OV)	0	-	-	-	-	-
Riparian Vegetation (most dominant first)		Devil's club, alder, young cedar	Alder, dogwood	Willow, alder	-	Alder (90%)	Alder, willow, cedar	Grasses, small shrubs and plantings	Willow, alder, young cedar
Aquatic Vegetation	% Emergent	0	0	1 (Cattail)	0	0	0	0	0
	% Submergent	0	0	0	0	0	0	0	0
	% Floating	0	0	0	0	<2 (Water buttercup)	0	0	0
	% Attached algae (Type)	<5 (Brown periphyton)	<5 (Brown periphyton)	5 (Green periphyton)	0	Sparse (Periphyton)	0	<5	<5
Canopy Coverage (%)	Dense	40	60	0	0	0	20	0	0
	Partially Open	40	20	0	0	0	40	0	0
	Open	20	20	100	100	100	40	100	100
Surrounding land use		Forest	Forest; some logging in area	Mining, logging	Mining, logging	Mining, forest	Logging upstream, forest in immediate area	Mining, remediated area	Mining, forest

Notes: m = meters. cm = centimeters. "-" = no data available. LWD = large woody debris. OV = overhanging vegetation. Pool depth may exceed mean channel depth.

Table A.2.3: Supporting Measures and Locations for Biological Sample Collection for Upper (HAC-R1, HAC-U, HAC-R3) and Lower (HAC-D) Hazeltine Creek (Exposed), Lower Edney Creek (E1; Exposed), Upper (EDC-U) and Lower (EDC-D) Edney Creek (Reference), and Frypan Creek (FPC-R3; Reference), August 2022

Station ID			Reference				
			Frypan Creek				
			FPC-R3				
			FPC-R3-1	FPC-R3-2	FPC-R3-3	FPC-R3-4	FPC-R3-5
Biological Sampling		Date	9-Aug-22	9-Aug-22	9-Aug-22	9-Aug-22	9-Aug-22
UTM (NAD83, 10U)		Easting	592265	592360	592400	592419	592466
		Northing	5826883	5826844	5826751	5826720	5826708
Periphyton	**Productivity & Community**						
	Sample Collection Type		AFDM, Chlorophyll-a	AFDM, Chlorophyll-a	AFDM, Chlorophyll-a	AFDM, Chlorophyll-a	AFDM, Chlorophyll-a
	Surface Area Sampled (m^2)		0.002	0.002	0.002	0.002	0.002
	Water Depth (cm)		6.0	9.0	11.0	8.0	4.0
	Water Velocity (m/s)		0.113	0.203	0.0150	0.113	0.192
Benthic Invertebrate	**Productivity & Community**						
	Sampling Device (and size, cm)		Surber (30 cm x 30 cm)	Surber (30 cm x 30 cm)	Surber (30 cm x 30 cm)	Surber (30 cm x 30 cm)	Surber (30 cm x 30 cm)
	Mesh Size (µm)		250	250	250	250	250
	Grabs in Composite		3	3	3	3	3
	Mean Water Depth (cm)		7.7	6.0	7.0	6.7	5.3
	Mean Water Velocity (m/s)		0.175	0.244	0.222	0.295	0.209
	Average Depth Sampler is Pushed into Substrate (cm)		4	4	5	4	3
	Average Depth Which Substrate is Sampled (cm)		7	6	7	6	5
	Average Sampling Time per Grab (min)		9	8	7	8	9
	Sample Texture	% Cobble	70	80	60	70	80
		% Gravel	20	20	40	30	20
		% Sand and Finer	10	0	0	0	0
		% Organic	0	0	0	0	0
	Macrophytes		None	None	None	None	None
	Algae		Sparse	Sparse	Sparse	Sparse	Sparse
	Macrophyte / Algae Type / Species		-	Periphyton	Periphyton	Periphyton	Periphyton
	Tissue Chemistry						
	Taxa (Composite Samples)		-	-	-	-	-
	Taxa (Single-Taxon Samples)		-	-	-	-	-
Water Quality Measures	Temperature	°C	16.3	14.4	13.4	12.7	12.0
	Dissolved Oxygen	mg/L	4.57	5.96	7.79	8.12	8.76
		%	46.6	58.6	74.8	76.7	79.4
	pH	pH units	7.22	7.26	7.71	7.64	7.69
	Conductance	µS/cm	124.9	123.8	125.5	123.4	56.0
	Specific Conductance	µS/cm	149.7	155.4	161.1	161.2	161.3

Notes: "-" = not applicable, µS = micrometer, cm = centimeters, m = meters, mg/L = milligrams per liter, µS/cm = micro Siemens per centimeter, m^3/s = metres cubed per second. AFDM = ash free dry mass.

Table A.2.3: Supporting Measures and Locations for Biological Sample Collection for Upper (HAC-R1, HAC-U, HAC-R3) and Lower (HAC-D) Hazeltine Creek (Exposed), Lower Edney Creek (E1; Exposed), Upper (EDC-U) and Lower (EDC-D) Edney Creek (Reference), and Frypan Creek (FPC-R3; Reference), August 2022

Station ID			Reference							
			Upper Edney Creek							
			EDC-U[a]							
			EDC-U-1	EDC-U-2	EDC-U-3	EDC-U-4	EDC-U-5	EDC-U-6	EDC-U-7	EDC-U-8
Biological Sampling		Date	8-Aug-22	7-Aug-22	7-Aug-22	7-Aug-22	7-Aug-22	7-Aug-22	7-Aug-22	7-Aug-22
UTM (NAD83, 10U)		Easting	597935	597948	597941	597965	597986	598008	597996	597994
		Northing	5814447	5814503	5814556	5814574	5814604	5814642	5814688	5814704
Periphyton	**Productivity & Community**									
	Sample Collection Type		AFDM, Chlorophyll-a, Community, Tissue Chemistry	AFDM, Chlorophyll-a, Community, Tissue Chemistry	AFDM, Chlorophyll-a, Community, Tissue Chemistry	AFDM, Chlorophyll-a, Community, Tissue Chemistry	AFDM, Chlorophyll-a, Community, Tissue Chemistry	Tissue Chemistry	Tissue Chemistry	Tissue Chemistry
	Surface Area Sampled (m^2)		0.002	0.002	0.002	0.002	0.002	-	-	-
	Water Depth (cm)		15.0	11.0	10.0	9.0	10.0	-	-	-
	Water Velocity (m/s)		0.211	0.197	0.210	0.339	0.103	-	-	-
Benthic Invertebrate	**Productivity & Community**									
	Sampling Device (and size, cm)		Surber (30 cm x 30 cm)	Surber (30 cm x 30 cm)	Surber (30 cm x 30 cm)	Surber (30 cm x 30 cm)	Surber (30 cm x 30 cm)	-	-	-
	Mesh Size (µm)		250	250	250	250	250	-	-	-
	Grabs in Composite		3	3	3	3	3	-	-	-
	Mean Water Depth (cm)		14.3	9.3	10.7	12.0	13.7	-	-	-
	Mean Water Velocity (m/s)		0.290	0.403	0.377	0.324	0.302	-	-	-
	Average Depth Sampler is Pushed into Substrate (cm)		4	3	5	3	3	-	-	-
	Average Depth Which Substrate is Sampled (cm)		7	5	7	10	10	-	-	-
	Average Sampling Time per Grab (min)		7	8	8	8	8	-	-	-
	Sample Texture	% Cobble	90	30	80	25	30	-	-	-
		% Gravel	10	60	20	65	60	-	-	-
		% Sand and Finer	0	10	0	10	10	-	-	-
		% Organic	0	0	0	0	0	-	-	-
	Macrophytes		None	None	None	None	None	-	-	-
	Algae		Sparse	Sparse	Sparse	None	None	-	-	-
	Macrophyte / Algae Type / Species		Brown periphyton	Brown periphyton	Brown periphyton	-	-	-	-	-
	Tissue Chemistry									
	Taxa (Composite Samples)		Caddisfly, Mayfly and Stonefly	Stonefly	Caddisfly, Mayfly, Stonefly	Stonefly, Mayfly, Caddisfly	Stonefly, Mayfly, Caddisfly	Stonefly, Mayfly	Stonefly, Mayfly, Caddisfly	Stonefly, Mayfly, Caddisfly
	Taxa (Single-Taxon Samples)		Caddisfly	Caddisfly	Caddisfly	Caddisfly	Caddisfly	Caddisfly	Caddisfly	Caddisfly
Water Quality Measures	Temperature	°C	13.1	16.0	15.9	15.0	13.9	12.8	12.3	12.2
	Dissolved Oxygen	mg/L	8.05	8.55	8.65	8.56	8.72	8.69	8.49	8.77
		%	76.6	86.7	87.4	84.9	84.5	82.0	79.5	81.9
	pH	pH units	7.58	7.67	7.72	7.59	7.61	7.57	7.51	7.56
	Conductance	µS/cm	96.4	91.8	103.9	102.0	57.2	96.9	95.7	95.3
	Specific Conductance	µS/cm	125.2	111.1	125.9	126.2	69.5	126.3	126.1	126.0

Notes: "-" = not applicable, µS = micrometer, cm = centimeters, m = meters, mg/L = milligrams per liter, µS/cm = micro Siemens per centimeter, m^3/s = metres cubed per second. AFDM = ash free dry mass.

Table A.2.3: Supporting Measures and Locations for Biological Sample Collection for Upper (HAC-R1, HAC-U, HAC-R3) and Lower (HAC-D) Hazeltine Creek (Exposed), Lower Edney Creek (E1; Exposed), Upper (EDC-U) and Lower (EDC-D) Edney Creek (Reference), and Frypan Creek (FPC-R3; Reference), August 2022

Station ID			Exposed							
			Upper Hazeltine Creek (Reach 1)							
			HAC-R1							
			HAC-R1-1	HAC-R1-2	HAC-R1-3	HAC-R1-4	HAC-R1-5	HAC-R1-6	HAC-R1-7	HAC-R1-8
Biological Sampling		Date	10-Aug-22	10-Aug-22	10-Aug-22	10-Aug-22	10-Aug-22	10-Aug-22	10-Aug-22	10-Aug-22
UTM (NAD83, 10U)		Easting	595751	595756	595693	595694	595737	595798	595835	595862
		Northing	5820278	5820256	5820188	5820147	5820098	5820033	5820022	5820015
Periphyton	**Productivity & Community**									
	Sample Collection Type		AFDM, Chlorophyll-a, Community, Tissue Chemistry	AFDM, Chlorophyll-a, Community, Tissue Chemistry	AFDM, Chlorophyll-a, Community, Tissue Chemistry	AFDM, Chlorophyll-a, Community, Tissue Chemistry	AFDM, Chlorophyll-a, Community, Tissue Chemistry	Tissue Chemistry	Tissue Chemistry	Tissue Chemistry
	Surface Area Sampled (m^2)		0.002	0.002	0.002	0.002	0.002	-	-	-
	Water Depth (cm)		46.0	37.0	40.0	40.0	26.0	-	-	-
	Water Velocity (m/s)		0.251	0.309	0.147	0.194	0.179	-	-	-
Benthic Invertebrate	**Productivity & Community**									
	Sampling Device (and size, cm)		Hess (0.1m^2)	Hess (0.1m^2)	Hess (0.1m^2)	Hess (0.1m^2)	Hess (0.1m^2)	-	-	-
	Mesh Size (µm)		250	250	250	250	250	-	-	-
	Grabs in Composite		3	3	3	3	3	-	-	-
	Mean Water Depth (cm)		21.3	35.3	27.3	31.3	28.7	-	-	-
	Mean Water Velocity (m/s)		0.423	0.407	0.397	0.297	0.330	-	-	-
	Average Depth Sampler is Pushed into Substrate (cm)		5	5	5	5	5	-	-	-
	Average Depth Which Substrate is Sampled (cm)		7	8	10	10	8	-	-	-
	Average Sampling Time per Grab (min)		7	8	8	7	8	-	-	-
	Sample Texture	% Cobble	40	25	30	15	70	-	-	-
		% Gravel	60	75	70	80	30	-	-	-
		% Sand and Finer	0	0	0	5	0	-	-	-
		% Organic	0	0	0	0	0	-	-	-
	Macrophytes		None	None	None	None	None	-	-	-
	Algae		Sparse	Sparse	Sparse	Sparse	Sparse	-	-	-
	Macrophyte / Algae Type / Species		Green and brown Periphyton	Periphyton	Green and brown Periphyton	Green and brown Periphyton	Periphyton	-	-	-
	Tissue Chemistry									
	Taxa (Composite Samples)		Caddisfly, Oligochaete, Mayfly	Caddisfly, Amphipod, Oligochaete	Caddisfly, Amphipod, Mayfly	Caddisfly, Diptera, Oligochaete	Caddisfly, Mayfly, Oligochaete	Caddisfly, Mayfly	Caddisfly, Mayfly, Stonefly	Tipulidae, Mayfly, Caddisfly
	Taxa (Single-Taxon Samples)		Caddisfly	Caddisfly	Caddisfly	Caddisfly	Caddisfly	Caddisfly	Caddisfly	Caddisfly
Water Quality Measures	Temperature	°C	20.5	20.4	20.3	20.2	19.9	20.0	19.9	19.7
	Dissolved Oxygen	mg/L	9.42	10.30	10.17	10.03	8.85	8.10	7.54	8.30
		%	102.1	114.1	112.4	110.8	97.2	88.5	82.5	90.8
	pH	pH units	8.79	8.81	8.54	8.54	8.53	8.52	8.32	8.34
	Conductance	µS/cm	226.7	226.9	226.4	-	225.5	198.3	225.7	225.2
	Specific Conductance	µS/cm	248.3	248.7	248.8	249.1	249.9	219.3	250.4	250.4

Notes: "-" = not applicable, µS = micrometer, cm = centimeters, m = meters, mg/L = milligrams per liter, µS/cm = micro Siemens per centimeter, m^3/s = metres cubed per second. AFDM = ash free dry mass.

Table A.2.3: Supporting Measures and Locations for Biological Sample Collection for Upper (HAC-R1, HAC-U, HAC-R3) and Lower (HAC-D) Hazeltine Creek (Exposed), Lower Edney Creek (E1; Exposed), Upper (EDC-U) and Lower (EDC-D) Edney Creek (Reference), and Frypan Creek (FPC-R3; Reference), August 2022

Station ID			Exposed							
			Upper Hazeltine Creek (Reach 2)							
			HAC-U							
			HAC-U-1	HAC-U-2	HAC-U-3	HAC-U-4	HAC-U-5	HAC-U-6	HAC-U-7	HAC-U-8
Biological Sampling		Date	6-Aug-22	6-Aug-22	6-Aug-22	6-Aug-22	6-Aug-22	5-Aug-22	6-Aug-22	5-Aug-22
UTM (NAD83, 10U)		Easting	596331	596397	596480	596602	596668	596687	596717	596744
		Northing	5819543	5819501	5819433	5819302	5819259	5819230	5819203	5819194
Periphyton	**Productivity & Community**									
	Sample Collection Type		AFDM, Chlorophyll-a, Community, Tissue Chemistry	AFDM, Chlorophyll-a, Community, Tissue Chemistry	AFDM, Chlorophyll-a, Community, Tissue Chemistry	AFDM, Chlorophyll-a, Community, Tissue Chemistry	AFDM, Chlorophyll-a, Community, Tissue Chemistry	Tissue Chemistry	Tissue Chemistry	Tissue Chemistry
	Surface Area Sampled (m^2)		0.002	0.002	0.002	0.002	0.002	-	-	-
	Water Depth (cm)		37.0	37.0	34.0	31.0	25.0	-	-	-
	Water Velocity (m/s)		0.331	0.270	0.345	0.703	0.652	-	-	-
Benthic Invertebrate	**Productivity & Community**									
	Sampling Device (and size, cm)		Hess (0.1m^2)	Hess (0.1m^2)	Hess (0.1m^2)	Hess (0.1m^2)	Hess (0.1m^2)	-	-	-
	Mesh Size (µm)		250	250	250	250	250	-	-	-
	Grabs in Composite		3	3	3	3	3	-	-	-
	Mean Water Depth (cm)		24.7	24.7	33.0	31.0	31.3	-	-	-
	Mean Water Velocity (m/s)		0.433	0.415	0.458	0.528	0.406	-	-	-
	Average Depth Sampler is Pushed into Substrate (cm)		5	5	5	5	5	-	-	-
	Average Depth Which Substrate is Sampled (cm)		10	10	5	10	10	-	-	-
	Average Sampling Time per Grab (min)		8	8	8	10	7	-	-	-
	Sample Texture	% Cobble	25	30	20	20	50	-	-	-
		% Gravel	70	60	70	70	40	-	-	-
		% Sand and Finer	5	10	10	10	10	-	-	-
		% Organic	0	0	0	0	0	-	-	-
	Macrophytes		None	None	None	None	None	-	-	-
	Algae		None	None	None	None	None	-	-	-
	Macrophyte / Algae Type / Species		-	-	-	-	-	-	-	-
	Tissue Chemistry									
	Taxa (Composite Samples)		-	Snail, Caddisfly	Snail, Caddisfly, Amphipod	Snail, Caddisfly, Mayfly	Snail, Caddisfly	Caddisfly, Snail, Mayfly	Snail, Caddisfly	Caddisfly, Snail, Mayfly
	Taxa (Single-Taxon Samples)		Caddisfly	Caddisfly	Caddisfly	Caddisfly	Caddisfly	Caddisfly	Caddisfly	Caddisfly
Water Quality Measures	Temperature	°C	19.5	18.9	18.1	16.5	16.2	19.4	16.0	19.5
	Dissolved Oxygen	mg/L	7.92	8.10	8.23	8.00	7.35	7.63	7.85	7.42
		%	86.2	87.2	87.1	82.0	74.9	83.0	79.5	80.9
	pH	pH units	8.40	8.37	8.32	8.17	8.10	8.46	8.03	8.51
	Conductance	µS/cm	245.0	241.3	237.1	230.3	229.1	243.4	228.4	243.9
	Specific Conductance	µS/cm	273.8	273.3	273.5	274.8	275.3	272.4	276.0	272.5

Notes: "-" = not applicable, µS = micrometer, cm = centimeters, m = meters, mg/L = milligrams per liter, µS/cm = micro Siemens per centimeter, m^3/s = metres cubed per second. AFDM = ash free dry mass.

Table A.2.3: Supporting Measures and Locations for Biological Sample Collection for Upper (HAC-R1, HAC-U, HAC-R3) and Lower (HAC-D) Hazeltine Creek (Exposed), Lower Edney Creek (E1; Exposed), Upper (EDC-U) and Lower (EDC-D) Edney Creek (Reference), and Frypan Creek (FPC-R3; Reference), August 2022

Station ID			Exposed				
			Upper Hazeltine Creek (Reach 3)				
			HAC-R3				
			HAC-R3-1	HAC-R3-2	HAC-R3-3	HAC-R3-4	HAC-R3-5
Biological Sampling		Date	10-Aug-22	10-Aug-22	8-Aug-22	8-Aug-22	8-Aug-22
UTM (NAD83, 10U)		Easting	597368	597485	598043	598120	598634
		Northing	5818703	5810500	5817747	5817691	5817350
Periphyton	**Productivity & Community**						
	Sample Collection Type		AFDM, Chlorophyll-a	AFDM, Chlorophyll-a	AFDM, Chlorophyll-a	AFDM, Chlorophyll-a	AFDM, Chlorophyll-a
	Surface Area Sampled (m^2)		0.002	0.002	0.002	0.002	0.002
	Water Depth (cm)		33.0	28.0	19.0	29.0	20.0
	Water Velocity (m/s)		0.281	0.272	0.420	0.508	0.300
Benthic Invertebrate	**Productivity & Community**						
	Sampling Device (and size, cm)		Hess (0.1m^2)	Hess (0.1m^2)	Hess (0.1m^2)	Hess (0.1m^2)	Hess (0.1m^2)
	Mesh Size (µm)		250	250	250	250	250
	Grabs in Composite		3	3	3	3	3
	Mean Water Depth (cm)		25.0	26.7	22.7	22.3	23.0
	Mean Water Velocity (m/s)		0.384	0.472	0.563	0.496	0.469
	Average Depth Sampler is Pushed into Substrate (cm)		5	5	5	7	6
	Average Depth Which Substrate is Sampled (cm)		10	10	9	10	10
	Average Sampling Time per Grab (min)		8	8	7	8	7
	Sample Texture	% Cobble	90	90	80	70	60
		% Gravel	10	10	20	30	40
		% Sand and Finer	0	0	0	0	0
		% Organic	0	0	0	0	0
	Macrophytes		None	None	None	None	None
	Algae		Sparse	Sparse	Sparse	Sparse	Sparse
	Macrophyte / Algae Type / Species		Periphyton	Periphyton	Green and brown periphyton	Brown periphyton	Periphyton
	Tissue Chemistry						
	Taxa (Composite Samples)		-	-	-	-	-
	Taxa (Single-Taxon Samples)		-	-	-	-	-
Water Quality Measures	Temperature	°C	17.9	17.1	20.1	20.2	20.3
	Dissolved Oxygen	mg/L	7.15	8.24	7.52	7.43	7.67
		%	80.9	85.6	84.0	81.6	85.0
	pH	pH units	8.24	8.22	8.63	8.37	8.50
	Conductance	µS/cm	240.0	236.1	253.9	253.3	255.6
	Specific Conductance	µS/cm	277.7	277.7	280.2	279.2	280.7

Notes: "-" = not applicable, µS = micrometer, cm = centimeters, m = meters, mg/L = milligrams per liter, µS/cm = micro Siemens per centimeter, m^3/s = metres cubed per second. AFDM = ash free dry mass.

Table A.2.3: Supporting Measures and Locations for Biological Sample Collection for Upper (HAC-R1, HAC-U, HAC-R3) and Lower (HAC-D) Hazeltine Creek (Exposed), Lower Edney Creek (E1; Exposed), Upper (EDC-U) and Lower (EDC-D) Edney Creek (Reference), and Frypan Creek (FPC-R3; Reference), August 2022

Station ID			Reference							
			Lower Edney Creek							
			EDC-D							
			EDC-D-1	EDC-D-2	EDC-D-3	EDC-D-4	EDC-D-5	EDC-D-6	EDC-D-7	EDC-D-8
Biological Sampling		Date	4-Aug-22	4-Aug-22	3-Aug-22	3-Aug-22	3-Aug-22	3-Aug-22	3-Aug-22	3-Aug-22
UTM (NAD83, 10U)		Easting	601022	601016	601024	601027	601058	601119	601119	601169
		Northing	5816625	5816686	5816731	5816766	5816766	5816735	5816761	5816817
Periphyton	**Productivity & Community**									
	Sample Collection Type		Tissue Chemistry	Tissue Chemistry	Tissue Chemistry	Tissue Chemistry	Tissue Chemistry	Tissue Chemistry	Tissue Chemistry	Tissue Chemistry
	Surface Area Sampled (m^2)		-	-	-	-	-	-	-	-
	Water Depth (cm)		-	-	-	-	-	-	-	-
	Water Velocity (m/s)		-	-	-	-	-	-	-	-
Benthic Invertebrate	**Productivity & Community**									
	Sampling Device (and size, cm)		-	-	-	-	-	-	-	-
	Mesh Size (µm)		-	-	-	-	-	-	-	-
	Grabs in Composite		-	-	-	-	-	-	-	-
	Mean Water Depth (cm)		-	-	-	-	-	-	-	-
	Mean Water Velocity (m/s)		-	-	-	-	-	-	-	-
	Average Depth Sampler is Pushed into Substrate (cm)		-	-	-	-	-	-	-	-
	Average Depth Which Substrate is Sampled (cm)		-	-	-	-	-	-	-	-
	Average Sampling Time per Grab (min)		-	-	-	-	-	-	-	-
	Sample Texture	% Cobble	-	-	-	-	-	-	-	-
		% Gravel	-	-	-	-	-	-	-	-
		% Sand and Finer	-	-	-	-	-	-	-	-
		% Organic	-	-	-	-	-	-	-	-
	Macrophytes		-	-	-	-	-	-	-	-
	Algae		-	-	-	-	-	-	-	-
	Macrophyte / Algae Type / Species		-	-	-	-	-	-	-	-
	Tissue Chemistry									
	Taxa (Composite Samples)		Stonefly, Mayfly, Caddisfly	Stonefly, Mayfly	Stonefly, Mayfly, Caddisfly	Stonefly, Caddisfly	Stonefly, Caddisfly	Stonefly, Caddisfly	Mayfly, Caddisfly	Stonefly, Mayfly, Caddisfly
	Taxa (Single-Taxon Samples)		Caddisfly	Caddisfly	Caddisfly	Caddisfly	Caddisfly	Caddisfly	Caddisfly	Caddisfly
Water Quality Measures	Temperature	°C	12.1	12.1	14.2	14.3	14.4	14.6	14.6	14.6
	Dissolved Oxygen	mg/L	10.58	10.36	8.82	9.47	9.34	9.99	10.19	9.51
		%	98.4	96.4	86.0	92.0	91.5	97.7	100.6	93.3
	pH	pH units	8.10	8.10	8.16	8.19	8.21	8.31	8.27	8.22
	Conductance	µS/cm	199.2	198.7	230.2	230.9	230.6	232.6	233.9	230.8
	Specific Conductance	µS/cm	264.5	263.6	290.0	290.3	289.4	290.5	291.2	288.0

Notes: "-" = not applicable, µS = micrometer, cm = centimeters, m = meters, mg/L = milligrams per liter, µS/cm = micro Siemens per centimeter, m^3/s = metres cubed per second. AFDM = ash free dry mass.

Table A.2.3: Supporting Measures and Locations for Biological Sample Collection for Upper (HAC-R1, HAC-U, HAC-R3) and Lower (HAC-D) Hazeltine Creek (Exposed), Lower Edney Creek (E1; Exposed), Upper (EDC-U) and Lower (EDC-D) Edney Creek (Reference), and Frypan Creek (FPC-R3; Reference), August 2022

Station ID			Exposed							
			Lower Edney Creek							
			E1							
			E1-1	E1-2	E1-3	E1-4	E1-5	E1-6	E1-7	E1-8
Biological Sampling		Date	5-Aug-22	5-Aug-22	5-Aug-22	4-Aug-22	4-Aug-22	4-Aug-22	4-Aug-22	4-Aug-22
UTM (NAD83, 10U)		Easting	601315	601338	601399	601432	601466	601537	601561	601586
		Northing	5817002	5817014	5817070	5817078	5817121	5817137	5817176	5817227
Periphyton	**Productivity & Community**									
	Sample Collection Type		Tissue Chemistry	Tissue Chemistry	Tissue Chemistry	Tissue Chemistry	Tissue Chemistry	Tissue Chemistry	Tissue Chemistry	Tissue Chemistry
	Surface Area Sampled (m^2)		-	-	-	-	-	-	-	-
	Water Depth (cm)		-	-	-	-	-	-	-	-
	Water Velocity (m/s)		-	-	-	-	-	-	-	-
Benthic Invertebrate	**Productivity & Community**									
	Sampling Device (and size, cm)		-	-	-	-	-	-	-	-
	Mesh Size (µm)		-	-	-	-	-	-	-	-
	Grabs in Composite		-	-	-	-	-	-	-	-
	Mean Water Depth (cm)		-	-	-	-	-	-	-	-
	Mean Water Velocity (m/s)		-	-	-	-	-	-	-	-
	Average Depth Sampler is Pushed into Substrate (cm)		-	-	-	-	-	-	-	-
	Average Depth Which Substrate is Sampled (cm)		-	-	-	-	-	-	-	-
	Average Sampling Time per Grab (min)		-	-	-	-	-	-	-	-
	Sample Texture	% Cobble	-	-	-	-	-	-	-	-
		% Gravel	-	-	-	-	-	-	-	-
		% Sand and Finer	-	-	-	-	-	-	-	-
		% Organic	-	-	-	-	-	-	-	-
	Macrophytes		-	-	-	-	-	-	-	-
	Algae		-	-	-	-	-	-	-	-
	Macrophyte / Algae Type / Species		-	-	-	-	-	-	-	-
	Tissue Chemistry									
	Taxa (Composite Samples)		Stonefly, Tipulidae, Mayfly	Mayfly, Diptera	Tipulidae, Stonefly, Mayfly	Mayfly, Stonefly, Caddisfly	Tipulidae, Stonefly, Caddisfly	Caddisfly, Stonefly, Tipulidae	Mayfly, Stonefly, Caddisfly	Stonefly, Mayfly
	Taxa (Single-Taxon Samples)		Caddisfly	Caddisfly	Caddisfly	Caddisfly	Caddisfly	Caddisfly	Caddisfly	Caddisfly
Water Quality Measures	Temperature	°C	12.0	11.8	11.8	14.6	13.9	14.3	14.3	13.7
	Dissolved Oxygen	mg/L	9.30	9.81	8.96	9.11	9.06	9.56	9.59	9.68
		%	86.3	90.3	82.9	89.6	87.8	93.4	93.6	92.8
	pH	pH units	8.34	8.19	8.16	8.28	8.23	8.22	8.20	8.13
	Conductance	µS/cm	-	168.9	174.6	210.9	205.2	210.2	211.1	207.3
	Specific Conductance	µS/cm	214.4	225.5	233.5	263.5	260.6	264.4	265.3	264.5

Notes: "-" = not applicable, µS = micrometer, cm = centimeters, m = meters, mg/L = milligrams per liter, µS/cm = micro Siemens per centimeter, m^3/s = metres cubed per second. AFDM = ash free dry mass.

Table A.2.3: Supporting Measures and Locations for Biological Sample Collection for Upper (HAC-R1, HAC-U, HAC-R3) and Lower (HAC-D) Hazeltine Creek (Exposed), Lower Edney Creek (E1; Exposed), Upper (EDC-U) and Lower (EDC-D) Edney Creek (Reference), and Frypan Creek (FPC-R3; Reference), August 2022

Station ID			Exposed							
			Lower Hazeltine Creek							
			HAC-D							
			HAC-D-1	HAC-D-2	HAC-D-3	HAC-D-4	HAC-D-5	HAC-D-6	HAC-D-7	HAC-D-8
Biological Sampling		Date	5-Aug-22	5-Aug-22	5-Aug-22	5-Aug-22	5-Aug-22	5-Aug-22	5-Aug-22	5-Aug-22
UTM (NAD83, 10U)		Easting	600800	600928	601081	601189	601300	601391	601428	601517
		Northing	5817300	5817290	5817225	5817168	5817131	5817130	5817133	5817189
Periphyton	**Productivity & Community**									
	Sample Collection Type		Tissue Chemistry	Tissue Chemistry	Tissue Chemistry	Tissue Chemistry	Tissue Chemistry	Tissue Chemistry	Tissue Chemistry	Tissue Chemistry
	Surface Area Sampled (m^2)		-	-	-	-	-	-	-	-
	Water Depth (cm)		-	-	-	-	-	-	-	-
	Water Velocity (m/s)		-	-	-	-	-	-	-	-
Benthic Invertebrate	**Productivity & Community**									
	Sampling Device (and size, cm)		-	-	-	-	-	-	-	-
	Mesh Size (µm)		-	-	-	-	-	-	-	-
	Grabs in Composite		-	-	-	-	-	-	-	-
	Mean Water Depth (cm)		-	-	-	-	-	-	-	-
	Mean Water Velocity (m/s)		-	-	-	-	-	-	-	-
	Average Depth Sampler is Pushed into Substrate (cm)		-	-	-	-	-	-	-	-
	Average Depth Which Substrate is Sampled (cm)		-	-	-	-	-	-	-	-
	Average Sampling Time per Grab (min)		-	-	-	-	-	-	-	-
	Sample Texture	% Cobble	-	-	-	-	-	-	-	-
		% Gravel	-	-	-	-	-	-	-	-
		% Sand and Finer	-	-	-	-	-	-	-	-
		% Organic	-	-	-	-	-	-	-	-
	Macrophytes		-	-	-	-	-	-	-	-
	Algae		-	-	-	-	-	-	-	-
	Macrophyte / Algae Type / Species		-	-	-	-	-	-	-	-
	Tissue Chemistry									
	Taxa (Composite Samples)		Caddisfly, Stonefly, Annelids, Diptera	Tipulidae, Caddisfly, Stonefly, Diptera	Caddisfly, Diptera, Mayfly	Caddisfly, Diptera, Mayfly	Caddisfly, Mayfly	Tipulidae, Caddisfly, Mayfly	Tipulidae, Caddisfly, Mayfly	Tipulidae, Caddisfly
	Taxa (Single-Taxon Samples)		Caddisfly	Caddisfly	Caddisfly	Caddisfly	Caddisfly	Caddisfly	Caddisfly	Caddisfly
Water Quality Measures	Temperature	°C	17.8	18.0	18.3	18.2	17.7	17.0	16.6	16.0
	Dissolved Oxygen	mg/L	7.56	7.30	8.07	7.75	8.03	8.45	8.69	8.55
		%	79.6	77.2	85.5	82.3	84.3	87.7	89.2	86.8
	pH	pH units	8.46	8.46	8.46	8.47	8.55	8.35	8.56	8.28
	Conductance	µS/cm	248.2	250.0	255.1	255.8	254.6	251.2	249.9	247.4
	Specific Conductance	µS/cm	287.5	288.2	292.4	293.7	296.0	296.2	297.7	299.0

Notes: "-" = not applicable, µS = micrometer, cm = centimeters, m = meters, mg/L = milligrams per liter, µS/cm = micro Siemens per centimeter, m^3/s = metres cubed per second. AFDM = ash free dry mass.

Table A.2.4: In Situ Water Quality Measures Collected during Spot Water Quality Sampling for Upper (HAC-R1, HAC-U, HAC-R3) and Lower (HAC-D) Hazeltine Creek (Exposed), Lower Edney Creek (E1; Exposed), Upper (EDC-U) and Lower (EDC-D) Edney Creek (Reference), and Frypan Creek (FPC-R3; Reference), August 2022

Area			Area ID	Sampling Date	Temperature	Dissolved Oxygen		Specific Conductance	Conductivity	pH
					°C	mg/L	%	µS/cm	µS/cm	pH units
Upper Creek Areas	Frypan Creek[a]	Reference	FPC-R3	8-Aug-22	12.0	8.76	79.4	161.3	56.0	7.69
	Edney Creek		EDC-U	8-Aug-22	13.0	8.16	77.3	125.4	96.8	7.65
	Hazeltine Creek	Exposed	HAC-R1	8-Aug-22	17.9	7.43	78.4	247.9	214.1	8.31
			HAC-U	8-Aug-22	18.3	8.46	90.8	273.3	238.2	8.32
			HAC-R3	8-Aug-22	20.0	7.39	86.9	280.6	253.2	8.42
Lower Creek Areas	Edney Creek	Reference	EDC-D	8-Aug-22	13.1	8.85	84.3	236.9	182.9	8.18
		Exposed	E1	8-Aug-22	14.9	9.04	89.4	237.2	191.3	8.25
	Hazeltine Creek	Exposed	HAC-D	8-Aug-22	19.3	7.95	86.4	281.4	259.9	8.41

Notes: mg/L = milligrams per litre, µS/cm = microSiemens per centimetre. "-" indicates no data available.

[a] *In situ* measurements displayed are those recorded at the benthic invertebrate community monitoring station located closest to the where the water sample was collected.

Table A.2.5: Substrate Size and Embeddedness Measures Associated with Biological Monitoring for Upper Hazeltine Creek (HAC-R1, HAC-U, HAC-R3; Exposed), Upper Edney Creek (EDC-U; Reference), and Frypan Creek (FPC-R3; Reference), August 2022

Cobble Number	Upper Creek Areas															
	Reference						Exposed									
	Frypan Creek			Edney Creek			Hazeltine Creek									
	FPC-R3			EDC-U			HAC-R1			HAC-U			HAC-R3			
	Station	Intermediate Axis Length (cm)[a]	Embeddedness (%)[b]	Station	Intermediate Axis Length (cm)[a]	Embeddedness (%)[b]	Station	Intermediate Axis Length (cm)[a]	Embeddedness (%)[b]	Station	Intermediate Axis Length (cm)[a]	Embeddedness (%)[b]	Station	Intermediate Axis Length (cm)[a]	Embeddedness (%)[b]
1	FPC-R3-1	11.8	-	EDC-U-1	5.5	-	HAC-R1-1	10.1	-	HAC-U-1	13.0	-	HAC-R3-1	5.6	-
2		8.9	-		5.7	-		6.2	-		7.1	-		5.5	-
3		7.7	-		5.5	-		8.8	-		6.9	-		5.0	-
4		6.8	-		3.9	-		3.6	-		4.7	-		4.4	-
5		5.5	-		5.6	-		5.5	-		6.2	-		5.2	-
6		6.2	-		4.8	-		4.2	-		7.4	-		4.4	-
7		9.8	-		6.7	-		6.2	-		5.7	-		5.3	-
8		6.8	-		8.2	-		3.1	-		6.5	-		4.1	-
9		7.4	-		9.3	-		7.2	-		6.1	-		4.2	-
10		8.2	50		6.1	0		3.7	50		4.4	50		4.1	25
11		4.2	-		5.5	-		6.1	-		4.9	-		3.9	-
12		4.4	-		3.8	-		4.9	-		7.3	-		4.3	-
13		5.8	-		5.9	-		6.2	-		6.9	-		3.1	-
14		4.3	-		7.1	-		5.4	-		3.9	-		4.5	-
15		4.3	-		5.7	-		4.8	-		5.6	-		3.7	-
16		4.4	-		4.5	-		4.5	-		4.9	-		5.2	-
17		5.1	-		2.4	-		4.4	-		4.6	-		4.3	-
18		5.2	-		5.0	-		5.1	-		2.8	-		3.6	-
19		5.0	-		3.5	-		6.8	-		5.9	-		3.8	-
20		3.5	25		4.5	50		5.0	25		3.3	50		3.7	25
Minimum		**3.5**	**25**		**2.4**	**0**		**3**	**25**		**2.8**	**50.0**		**3.1**	**25**
Maximum		**11.8**	**50**		**9.3**	**50**		**10.1**	**50**		**13.0**	**50**		**5.6**	**25**
Mean		**6.3**	**38**		**5.5**	**25**		**5.6**	**38**		**5.9**	**50.0**		**4.4**	**25**
Median		**5.7**	**38**		**5.5**	**25**		**5.3**	**38**		**5.8**	**50.0**		**4.3**	**25**
Standard Deviation		**2.2**	**-**		**1.6**	**-**		**1.7**	**-**		**2.1**	**-**		**0.7**	**-**
1	FPC-R3-2	4.6	-	EDC-U-2	6.1	-	HAC-R1-2	7.8	-	HAC-U-2	6.5	-	HAC-R3-2	10.4	-
2		4.9	-		4.7	-		6.4	-		6.6	-		3.9	-
3		3.8	-		8.0	-		5.9	-		6.2	-		5.5	-
4		7.8	-		4.7	-		4.9	-		5.7	-		4.6	-
5		8.7	-		7.4	-		5.7	-		5.6	-		3.7	-
6		7.4	-		5.3	-		4.9	-		3.0	-		9.1	-
7		6.4	-		8.4	-		5.9	-		7.7	-		8.6	-
8		3.4	-		6.3	-		5.5	-		4.0	-		5.1	-
9		7.3	-		7.8	-		4.6	-		7.2	-		4.5	-
10		10.2	75		5.9	50		5.5	50		4.8	50		4.7	0
11		6.6	-		6.7	-		4.9	-		5.7	-		4.8	-
12		2.5	-		4.8	-		5.2	-		4.0	-		2.7	-
13		9.6	-		5.6	-		5.1	-		7.4	-		2.5	-
14		5.7	-		8.1	-		5.0	-		5.5	-		4.4	-
15		5.0	-		6.1	-		4.5	-		5.4	-		4.9	-
16		6.5	-		5.8	-		4.8	-		4.1	-		3.6	-
17		7.2	-		5.7	-		4.4	-		3.9	-		4.4	-
18		6.5	-		5.7	-		4.0	-		4.3	-		3.2	-
19		8.4	-		6.2	-		4.5	-		4.3	-		5.7	-
20		5.0	50		3.8	25		3.9	25		3.9	25		4.3	25
Minimum		**2.5**	**50**		**3.8**	**25**		**3.9**	**25**		**3.0**	**25**		**2.5**	**0**
Maximum		**10.2**	**75**		**8.4**	**50**		**7.8**	**50**		**7.7**	**50**		**10.4**	**25**
Mean		**6.4**	**63**		**6.2**	**37.5**		**5.2**	**38**		**5.3**	**38**		**5.0**	**13**
Median		**6.5**	**63**		**6.0**	**37.5**		**5.0**	**38**		**5.5**	**38**		**4.6**	**13**
Standard Deviation		**2.0**	**-**		**1.3**	**-**		**0.9**	**-**		**1.3**	**-**		**2.07**	**-**
1	FPC-R3-3	2.7	-	EDC-U-3	6.3	-	HAC-R1-3	5.6	-	HAC-U-3	6.1	-	HAC-R3-3	5.2	-
2		4.3	-		8.0	-		12.5	-		6.9	-		3.9	-
3		3.9	-		7.0	-		6.0	-		4.4	-		5.6	-
4		3.7	-		6.5	-		4.8	-		5.9	-		10.5	-
5		2.8	-		6.1	-		6.0	-		3.4	-		3.0	-
6		3.4	-		4.9	-		6.0	-		5.0	-		6.0	-
7		4.2	-		6.9	-		4.5	-		5.6	-		5.2	-
8		4.5	-		5.6	-		5.6	-		3.2	-		5.1	-
9		3.5	-		7.6	-		5.0	-		6.3	-		4.1	-
10		3.2	50		4.9	25		5.6	25		4.7	50		4.0	25
11		3.4	-		6.0	-		4.1	-		11.1	-		4.1	-
12		2.9	-		7.6	-		5.5	-		8.3	-		3.9	-
13		3.6	-		3.5	-		10.5	-		6.8	-		3.9	-
14		3.2	-		4.9	-		6.8	-		3.7	-		5.1	-
15		3.4	-		4.8	-		4.0	-		4.0	-		4.9	-
16		3.3	-		4.0	-		4.2	-		6.2	-		6.3	-
17		4.7	-		3.4	-		3.6	-		5.2	-		5.4	-
18		5.4	-		3.7	-		7.0	-		9.8	-		5.5	-
19		5.4	-		4.6	-		4.2	-		13.6	-		4.6	-
20		4.4	75		5.0	25		3.3	50		8.1	75		4.7	0
Minimum		**2.7**	**50**		**3.4**	**25**		**3.3**	**25**		**3.2**	**50**		**3.0**	**0**
Maximum		**5.4**	**75**		**8.0**	**25**		**12.5**	**50**		**13.6**	**75**		**10.5**	**25**
Mean		**3.8**	**63**		**5.6**	**25**		**5.7**	**38**		**6.4**	**63**		**5.1**	**13**
Median		**3.6**	**63**		**5.3**	**25**		**5.6**	**38**		**6.0**	**63**		**5.0**	**13**
Standard Deviation		**0.8**	**-**		**1.4**	**-**		**2.2**	**-**		**2.7**	**-**		**1.5**	**-**

Note: "-" = not applicable or data not collected.

[a] Intermediate axis length is measured perpendicular to the longest axis.

[b] Embeddedness measured for every tenth rock.

Table A.2.5: Substrate Size and Embeddedness Measures Associated with Biological Monitoring for Upper Hazeltine Creek (HAC-R1, HAC-U, HAC-R3; Exposed), Upper Edney Creek (EDC-U; Reference), and Frypan Creek (FPC-R3; Reference), August 2022

Cobble Number	Upper Creek Areas														
	Reference						Exposed								
	Frypan Creek			Edney Creek			Hazeltine Creek								
	FPC-R3			EDC-U			HAC-R1			HAC-U			HAC-R3		
	Station	Intermediate Axis Length (cm)[a]	Embeddedness (%)[b]	Station	Intermediate Axis Length (cm)[a]	Embeddedness (%)[b]	Station	Intermediate Axis Length (cm)[a]	Embeddedness (%)[b]	Station	Intermediate Axis Length (cm)[a]	Embeddedness (%)[b]	Station	Intermediate Axis Length (cm)[a]	Embeddedness (%)[b]
1	FPC-R3-4	7.9	-	EDC-U-4	3.1	-	HAC-R1-4	3.7	-	HAC-U-4	8.4	-	HAC-R3-4	7.2	-
2		6.5	-		8.0	-		7.1	-		6.3	-		3.1	-
3		5.7	-		4.0	-		4.5	-		6.6	-		5.9	-
4		6.3	-		2.9	-		6.0	-		4.6	-		3.2	-
5		4.2	-		5.4	-		3.9	-		3.8	-		6.2	-
6		5.1	-		3.4	-		4.2	-		3.9	-		6.8	-
7		4.3	-		3.5	-		4.3	-		5.7	-		5.8	-
8		3.9	-		7.6	-		5.2	-		4.8	-		4.7	-
9		4.9	-		4.4	-		4.8	-		11.5	-		4.3	-
10		5.5	25		6.3	50		4.3	0		6.5	25		3.7	25
11		8.2	-		4.8	-		4.8	-		5.9	-		3.4	-
12		2.0	-		4.4	-		6.3	-		3.2	-		5.5	-
13		3.4	-		8.1	-		4.5	-		3.4	-		3.8	-
14		7.5	-		4.8	-		5.4	-		4.8	-		3.9	-
15		6.4	-		7.1	-		4.1	-		6.3	-		4.1	-
16		5.5	-		5.7	-		7.3	-		4.9	-		3.8	-
17		7.6	-		6.2	-		3.4	-		6.5	-		4.6	-
18		11.6	-		4.9	-		3.4	-		4.3	-		3.9	-
19		3.4	-		5.6	-		4.0	-		3.0	-		3.5	-
20		5.5	0		6.4	25		5.0	75		3.8	75		3.2	25
Minimum		**2.0**	**0**		**2.9**	**25**		**3.4**	**0**		**3.0**	**25**		**3.1**	**25**
Maximum		**11.6**	**25**		**8.1**	**50**		**7.3**	**75**		**11.5**	**75**		**7.2**	**25**
Mean		**5.8**	**13**		**5.3**	**37.5**		**4.8**	**38**		**5.4**	**50**		**4.5**	**25**
Median		**5.5**	**13**		**5.2**	**37.5**		**4.5**	**38**		**4.9**	**50**		**4.0**	**25**
Standard Deviation		**2.1**	**-**		**1.6**	**-**		**1.1**	**-**		**2.0**	**-**		**1.26**	**-**
1	FPC-R3-5	7.4	-	EDC-U-5	8.5	-	HAC-R1-5	6.0	-	HAC-U-5	10.6	-	HAC-R3-5	6.2	-
2		7.5	-		6.9	-		7.4	-		6.7	-		7.1	-
3		4.8	-		7.1	-		9.9	-		10.7	-		4.5	-
4		4.5	-		7.2	-		7.4	-		6.7	-		4.2	-
5		6.3	-		8.8	-		4.6	-		7.6	-		5.0	-
6		9.6	-		9.5	-		6.5	-		7.0	-		7.4	-
7		5.5	-		7.8	-		5.6	-		4.7	-		5.9	-
8		6.7	-		4.4	-		7.3	-		5.7	-		5.4	-
9		6.4	-		6.3	-		6.8	-		3.8	-		8.7	-
10		5.2	50		8.7	-		3.7	50		4.9	0		6.8	0
11		7.6	-		11.7	-		6.4	-		4.5	-		6.0	-
12		7.0	-		5.5	-		5.5	-		3.1	-		5.7	-
13		4.4	-		4.6	-		6.7	-		3.9	-		4.0	-
14		6.6	-		6.2	-		5.2	-		4.3	-		5.1	-
15		7.3	-		5.3	-		6.4	-		5.1	-		4.2	-
16		6.2	-		4.7	-		6.3	-		4.2	-		4.9	-
17		6.3	-		7.4	-		4.8	-		4.1	-		7.1	-
18		7.1	-		6.1	-		4.0	-		5.1	-		4.6	-
19		7.6	-		4.9	-		6.1	-		4.8	-		6.4	-
20		6.2	50		4.1	-		5.5	25		4.6	50		4.6	25
Minimum		**4.4**	**50**		**4.1**	**-**		**3.7**	**25**		**3.1**	**0**		**4.0**	**0**
Maximum		**9.6**	**50**		**11.7**	**-**		**9.9**	**50**		**10.7**	**50**		**8.7**	**25**
Mean		**6.5**	**50**		**6.8**	**-**		**6.1**	**38**		**5.6**	**25**		**5.7**	**13**
Median		**6.5**	**50**		**6.6**	**-**		**6.2**	**38**		**4.9**	**25**		**5.6**	**13**
Standard Deviation		**1.2**	**-**		**2.0**	**-**		**1.4**	**-**		**2.1**	**-**		**1.3**	**-**

Note: "-" = not applicable or data not collected.

[a] Intermediate axis length is measured perpendicular to the longest axis.

[b] Embeddedness measured for every tenth rock.

APPENDIX B
DATA QUALITY REVIEW

APPENDIX B DATA QUALITY REVIEW

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B1 INTRODUCTION

B1.1 Background

A variety of factors can influence the physical, chemical, and biological measurements made in an environmental study and thus affect the accuracy and/or precision of the data. Depending on the magnitude of inaccuracy or imprecision within the data, these sources of variation have the potential to affect interpretation and the reliability of conclusions made from the data. Therefore, it is important to ensure that programs incorporate appropriate steps to control the non-natural sources of data variability (i.e., minimize the variability that does not reflect natural spatial and temporal variability in the environment) and thus assure the quality of the data. Data quality as a concept is meaningful only when it relates to the intended use of the data. That is, one must know the context in which the data will be interpreted in order to establish a relevant basis for judging whether or not the data set is adequate. A data quality review (DQR) involves comparison of actual field and laboratory measurement performance to Data Quality Objectives (DQOs) established for a particular study, such as evaluation of Laboratory Reporting Limits (LRL), blank sample data, data precision (based on field and laboratory duplicate samples), and data accuracy (based on matrix spike recoveries and/or analysis of standards or certified reference materials). Trusted analytical laboratories certified by Canadian Association for Laboratory Accreditation (CALA) with a rigorous internal quality assurance program were selected to ensure the highest possible data quality. DQOs were established *a priori* to reflect reasonable and achievable performance expectations. Programs involving a large number of samples and analytes usually yield some results that exceed DQOs. This is particularly so for multi-element scans since the analytical conditions are not necessarily optimal for every element included in the scan. Scan results may be considered acceptable if no more than 20% of the parameters fail to meet DQOs. Overall, the intent of DQR is not to reject any measurement that did not meet a DQO, but to ensure that any questionable data received more scrutiny to determine what effect, if any, this had on interpretation of results within the context of the project.

B1.2 Quality Control Samples

A DQR was conducted on all laboratory data collected as part of the Mount Polley Mine Comprehensive Environmental Monitoring Program (CEMP) 2022. The objective of a DQR is to define the overall quality of the data presented in the report, and, by extension, the confidence with which the data can be used to derive conclusions.

A DQR involves the examination of analytical results associated with several types of Quality Control (QC) samples collected (or prepared) in the field and laboratory. General QC samples collected for this project, and a description of each, include the following:

- **Blanks** are samples of de-ionized water and/or appropriate reagent(s) that are handled and analyzed in the same way as regular samples. These samples will reflect any contamination of samples occurring in the field (in the case of field or trip blanks) or in the laboratory (in the case of laboratory or method blanks). Analyte concentrations should be non-detectable.
- **Laboratory Duplicates** are replicate sub-samples created in the laboratory from randomly selected field samples which are sub-sampled and then analyzed independently using identical analytical methods. The laboratory duplicate sample results reflect any variability introduced during laboratory sample handling and analysis and thus provide a measure of laboratory precision.
- **Field Duplicates** are samples collected from a randomly selected field station that are homogenized to the extent possible, split and analyzed separately in the laboratory. The duplicate samples are handled and analyzed in an identical manner in the laboratory.
- **Spike Recovery Samples** are created in the laboratory by adding a known amount/concentration of a given analyte (or mixture of analytes) to a randomly selected test sample previously divided to create two sub-samples. The spiked and regular sub-samples are then analyzed in an identical manner. The spike recovery represents the difference between the measured spike amount (total amount in the spiked sample minus the amount in the original sample) relative to the known spike amount (as a percentage). Two types of spike recovery samples are commonly analyzed. Spiked blanks (or blank spikes) are created by adding a known concentration of analytes to an uncontaminated blank (e.g. resin gel, distilled water) whereas matrix spikes (MS) are created using field-collected samples. The analysis of spiked samples provides an indication of the accuracy of analytical results.
- **Certified Reference Materials** are commercially prepared (or commercially homogenized) samples containing known chemical concentrations that are processed and analyzed along with batches of environmental samples. The sample results are then compared to target results to provide a measure of analytical accuracy. The results are reported as the percent of the known concentration that was recovered in the analysis.
- **Laboratory Control Samples** are created in the laboratory to have a known analyte concentration in a matrix free of interferences, such as deionized water or reference sand.

The sample results are compared to the target results to confirm that the analytical method is accurate in a purified reference sample. The results are reported as the percent of the known concentration that was recovered in the analysis.

- **Reference Toxicant Tests** are toxicity tests run concurrent to the sediment toxicity test where a reference toxicant with laboratory-developed limits are used. The results of the reference toxicant testing should fall within the developed limits. This testing ensures that internal test systems are in check and that the sensitivity of the test organisms are within an expected range.

- **Laboratory Sorting Duplicates** are randomly selected grabs of the initially sorted benthic invertebrate community material. These samples are recounted and the number of benthic invertebrates that were not recovered during the initial sort was determined. In order to reduce bias, the recounting was conducted by an analyst uninvolved in the initial sample processing. This check was performed on 10% of samples and determines the accuracy through assessment of recovery (sorting) efficiency and quantifies any under-estimation of organism enumeration.

- **Taxonomic Quality Control Samples** are a randomly selected portion of a benthic invertebrate community field sample to be assessed by the laboratory using an internal quality control audit. A blind re-enumeration and re-identification of random samples is performed by an analyst uninvolved in the original sample processing. This assessment quantifies taxonomic misidentification among laboratory analysts and ensures accurate organism identities are reported.

- **Laboratory Subsamples** are community samples prepared by the laboratory to ensure that the fraction of the total sample examined was an accurate representation of the total number of organisms. By comparing the amount recovered between at least two sub-samples, one can assess the analytical precision. In addition, comparisons of the sub-samples from the whole community sample allows for an evaluation of sub-sampling accuracy.

B2 WATER CHEMISTRY

B2.1 Laboratory Reporting Limits

The analytical ALS laboratory reports for water chemistry (VA222B4117, VA22B4435, KS2202711, VA22B7687, VA22B8478, VA22C0064, VA22C0091, and VA22C0362; Appendix G) were examined to provide an inventory of analytes for which one or more results were below the LRL. The range of reported LRLs for these analytes (were assessed relative to existing British Columbia water quality guidelines (BCMOECCS 2021a,b; Table B.1). For analytes with results <LRL, all reported LRLs were lower than applicable BCWQG guidelines. Overall, the achieved LRLs were appropriate for this study.

B2.2 Laboratory and Field Blanks

A total of 134 method blank (MB) samples were analyzed in the ALS Laboratory Reports (VA222B4117, VA22B4435, KS2202711, VA22B7687, VA22B8478, VA22C0064, VA22C0091, and VA22C0362; Appendix G). Of the 756 reported MB results, only two (total alkalinity in one sample and total manganese in one sample; see laboratory reports VA22B7687 and VA22C0091, respectively; Appendix G) exceeded the laboratory DQO and had detectable concentrations. However, results for these analytes were considered reliable by the laboratory, as they were greater than five-times the detected MB result. As the number of MBs that exceeded the laboratory DQO was low (0.294%), and the MB results were deemed as not having impact on the reliability of the results, these laboratory flags had a negligible impact on data reliability.

One field blank and one trip blank sample were submitted to ALS for water chemistry analyses to assess the potential for field sampling and shipping/transport contamination (KS2202711; Appendix G). Field and trip blanks were subject to the same laboratory DQOs as were used for MBs (i.e., concentrations should be <LRL). All analytes in the field blank and trip blank samples were below detection, indicating no appreciable field sampling or shipping/transportation contamination.

B2.3 Data Precision

A total of 22 laboratory duplicate samples were used to evaluate precision within the ALS Laboratory Reports (VA222B4117, VA22B4435, KS2202711, VA22B7687, VA22B8478, VA22C0064, VA22C0091, and VA22C0362; Appendix G), totaling 743 individual analyte results. All measurements were within the laboratory DQO, indicating that the laboratory analytical precision can be considered excellent.

Table B.1: Laboratory Reporting Limit (LRL) Evaluation for Water Chemistry Relative to BCWQG, Mount Polley Mine, 2022

Analyte	Units	British Columbia Water Quality Guidelines[a]		Range of LRLs	No. Sample Results < LRL
		Long-term	Short-Term		
Anions, Organics, Nutrients, and Physical Properties					
Nitrite (as N)	mg/L	0.02	0.06	0.001	48 (100%)
Nitrate (as N)	mg/L	3	32.8	0.005	24 (50.0%)
Sulfate (as SO_4)	mg/L	218	-	0.3	3 (6.25%)
Ammonia Total (As N)	mg/L	0.102	0.752	0.005	23 (47.9%)
Chloride	mg/L	150	600	0.5	25 (52.1%)
Fluoride	mg/L	-	0.983	0.02	2 (4.17%)
Total Metals					
Antimony	mg/L	0.009	-	0.0001	41 (85.4%)
Arsenic	mg/L	-	0.005	0.0001	2 (4.17%)
Barium	mg/L	1	-	0.0001	2 (4.17%)
Beryllium	mg/L	0.00013	-	0.0001	48 (100%)
Bismuth	mg/L	1.2	-	0.00005	48 (100%)
Chromium	mg/L	0.001	-	0.0005	45 (93.8%)
Cobalt	mg/L	0.004	0.11	0.0001	47 (97.9%)
Iron	mg/L	-	1	0.03	22 (45.8%)
Manganese	mg/L	0.789	1	0.0001	2 (4.17%)
Nickel	mg/L	0.025	-	0.0005	40 (83.3%)
Selenium	mg/L	0.002	-	0.00005	2 (4.17%)
Silver	mg/L	0.00005	0.0001	0.00001	47 (97.9%)
Thallium	mg/L	0.0008	-	0.00001	48 (100%)
Uranium	mg/L	0.0085	-	0.00001	2 (4.17%)
Zinc	mg/L	0.0075	0.033	0.003	41 (85.4%)
Dissolved Metals					
Aluminum	mg/L	0.0121	0.0334	0.003	2 (4.35%)
Cadmium	mg/L	0.111	0.24	0.000005	13 (28.3%)
Iron	mg/L	-	0.35	0.03	41 (89.1%)
Lead	mg/L	0.00436	0.0269	0.00005	23 (50.0%)

Notes: "-" = no applicable guideline. Only analytes one or more result <LRL or LRLs above applicable guidelines are displayed. are displayed. The total number of water chemistry samples collected in 2022 was 217, which included six field duplicate samples. <LRL counts include results for one trip and one field blank (n=2 samples).

[a] British Columbia Water Quality Guidelines (BCWQG; BCMOECCS 2021a,b).

Field sampling precision looks at relative percent difference (RPD), calculated as follows:

$$RPD = \frac{|R1 - R2|}{(|R1 + R2|/2)} * 100$$

Where R1 is the value of the original ("parent") sample and R2 is the value of the duplicate sample, with the absolute difference and sum of the two samples used. RPDs cannot be calculated if both values are below the LRL. If the original and duplicate sample have the same value, then the RPD is 0%.

There are two applicable DQOs for field duplicates:

1. Each RPD comparison between the original and duplicate result should be ≤ 30%; and,
2. Within each original and duplicate pairing (i.e., each duplicate pair), fewer than 20% of the total comparisons should be above the 30% DQO.

Six pairs of field duplicate samples were collected to assess water chemistry field sampling precision (Table B.2). Several RPDs could not be calculated as both analyte concentrations were below the LRL. Of the six field duplicate sets, five of six sets had <20% of analyte comparisons in exceedance of the RPD DQO (Table B.2), indicating excellent field precision. Several analytes of interest exceeded the RPD DQO. Though RPDs for these analytes were above the 30% DQO, they were not consistently above the DQO in all duplicate sets (i.e., were >30% RPD in only one or two duplicate sets; Table B.2). High RPDs could be a result of field sampling inconsistencies, contamination (field or laboratory), or variability associated with multi-element scans (see section B2.6). Overall, water chemistry samples can be considered to have excellent field precision and reproducibility.

B2.4 Data Accuracy

Data accuracy was evaluated based on results of 139 Laboratory Control Samples (LCS) and 19 Matrix Spike (MS) samples within the ALS Laboratory Reports (VA222B4117, VA22B4435, KS2202711, VA22B7687, VA22B8478, VA22C0064, VA22C0091, and VA22C0362; Appendix G). All of 688 LCS individual analyte results met the laboratory DQO. Out of 614 individual MS analyte results, 118 (19.2%) individual MS results could not be reliably calculated due to high background concentrations (Appendix G); however, the remainder of the MS results met the laboratory DQO. As all LCS and MS results that could be reliably calculated met the laboratory DQO, the accuracy achieved by the laboratory in this study can be considered acceptable.

Table B.2: Field Duplicate Results for Water Chemistry, Mount Polley Mine CEMP, 2022

Parameter	Units	HAC-U_WS-1_2022-08	HAC-U_WS-1X_2022-08	RPD (%)	POL-P2_WS_DI-1_2022-07	POL-P2_WS_DI-1X_2022-07	RPD (%)	POL-S_WS-1_2022-08	POL-S_WS-1X_2022-08	RPD (%)	QUL-LREF1_WS-1_2022-08	QUL-LREF1_WS-1X_2022-08	RPD (%)	QUL-ZOO1_WS_DI-1_2022-06	QUL-ZOO1_WS_DI-1X_2022-06	RPD (%)	QUL-ZOO1_WS_DI-1_2022-08	QUL-ZOO1_WS_DI-1X_2022-08	RPD (%)
Anions, Organics, Nutrients, and Physical Properties																			
Alkalinity (as $CaCO_3$)	mg/L	93	91.8	1.30	91.7	92.3	0.65	87.9	90.9	3.36	44.8	47.5	5.85	48.1	46.3	3.81	46.8	46.1	1.51
Ammonia (as N)	mg/L	0.0227	0.0147	42.8	0.0085	0.0054	44.6	<0.0050	<0.0050	-	<0.0050	<0.0050	-	<0.0050	<0.0050	-	0.0072	0.0107	39.1
Chloride (Cl)	mg/L	0.92	0.92	0	0.80	0.810	1.24	0.80	0.78	2.53	<0.50	<0.50	-	<0.50	<0.50	-	<0.50	<0.50	-
Conductivity	µS/cm	271	274	1.10	239	241	0.83	246	236	4.15	101	98.9	2.10	113	116	2.62	103	101	1.96
Dissolved Organic Carbon	mg/L	5.83	6.54	11.5	6.56	6.54	0.31	6.60	6.67	1.06	2.74	3.43	22.4	2.92	3.40	15.2	2.62	3	13.5
Fluoride (F)	mg/L	0.062	0.062	0	0.062	0.058	6.67	0.08	0.074	7.79	0.036	0.035	2.82	0.033	0.033	0	0.03	0.037	20.9
Hardness (as $CaCO_3$)	mg/L	114	114	0	106	106	0	108	111	2.74	50.3	48.7	3.23	49.4	50.5	2.20	46.3	49.3	6.28
Hardness (as $CaCO_3$) from total Ca/Mg	mg/L	123	122	0.82	105	103	1.92	112	113	0.89	50.2	50.1	0.2	44.6	49	9.40	46.6	47.4	1.70
Nitrate (as N)	mg/L	0.0343	0.0319	7.25	<0.0050	<0.0050	-	<0.0050	<0.0050	-	<0.0050	<0.0050	-	0.1	0.0992	0.8	0.0696	0.0642	8.07
Nitrate and Nitrite (as N)	mg/L	0.0343	0.0319	7.25	<0.0051	<0.0051	-	<0.0051	<0.0051	-	<0.0051	<0.0051	-	0.1	0.0992	0.8	0.0696	0.0642	8.07
Nitrite (as N)	mg/L	<0.0010	<0.0010	-	<0.0010	<0.0010	-	<0.0010	<0.0010	-	<0.0010	<0.0010	-	<0.0010	<0.0010	-	<0.0010	<0.0010	-
Orthophosphate	mg/L	0.0034	0.0033	2.99	0.0037	0.0044	17.3	<0.0010	<0.0010	-	<0.0010	<0.0010	-	<0.0010	<0.0010	-	<0.0010	<0.0010	-
pH	pH units	8.11	8.11	0	8.20	8.2	0	8.34	8.15	2.30	8	7.75	3.17	7.89	7.87	0.25	7.73	7.69	0.519
Phosphorus (P; dissolved)	mg/L	0.0094	0.0092	2.15	0.0126	0.0121	4.05	0.0036	0.0037	2.74	0.0022	<0.0020	9.52	0.003	0.0025	18.2	0.0029	0.0029	0
Phosphorus (P; total)	mg/L	0.0138	0.0116	17.3	0.0145	0.0155	6.67	0.0091	0.0061	39.5	0.0047	0.005	6.19	0.0064	0.009	33.8	0.0092	0.0074	21.7
Sulphate	mg/L	44.1	44	0.23	34.1	34.2	0.29	36.1	35.1	2.81	5.85	5.65	3.48	5.92	8.08	30.9	5.58	6.01	7.42
Dissolved Solids	mg/L	191	167	13.4	169	181	6.86	203	188	7.67	76	69	9.66	80	76	5.13	80	70	13.3
Nitrogen (N; total)	mg/L	0.318	0.314	1.27	0.324	0.296	9.03	0.272	0.288	5.71	0.104	0.095	9.05	0.232	0.247	6.26	1.67	1.54	8.10
Total Suspended Solids	mg/L	1.60	<1.0	46.2	1.30	1.40	7.41	<1.0	<1.0	-	<1.0	<1.0	-	1.50	1.20	22.2	-	-	-
Turbidity	NTU	0.58	0.58	0	0.59	0.52	12.6	0.34	0.36	5.71	0.46	0.38	19	1.25	1.03	19.3	1.67	1.54	8.10
Total Metals																			
Aluminum	mg/L	0.0297	0.0258	14.1	0.0242	0.0146	49.5	0.0085	0.0068	22.2	0.0185	0.0188	1.61	0.0285	0.0445	43.8	0.0111	0.0631	140
Antimony	mg/L	<0.00010	<0.00010	-	<0.00010	<0.00010	-	<0.00010	<0.00010	-	<0.00010	<0.00010	-	<0.00010	<0.00010	-	<0.00010	<0.00010	-
Arsenic	mg/L	0.00061	0.0006	1.65	0.00051	0.00051	0	0.00055	0.00052	5.61	0.00026	0.00024	8	0.00014	0.00019	30.3	0.00012	0.00021	54.5
Barium	mg/L	0.0116	0.0116	0	0.0103	0.0101	1.96	0.0106	0.0106	0	0.00711	0.00715	0.56	0.00544	0.00629	14.5	0.00571	0.00644	12.0
Beryllium	mg/L	<0.000100	<0.000100	-	<0.000100	<0.000100	-	<0.000100	<0.000100	-	<0.000100	<0.000100	-	<0.000100	<0.000100	-	<0.000100	<0.000100	-
Bismuth	mg/L	<0.000050	<0.000050	-	<0.000050	<0.000050	-	<0.000050	<0.000050	-	<0.000050	<0.000050	-	<0.000050	<0.000050	-	<0.000050	<0.000050	-
Boron	mg/L	0.021	0.023	9.09	0.021	0.021	0	0.02	0.02	0	<0.010	<0.010	-	<0.010	<0.010	-	<0.010	<0.010	-
Cadmium	mg/L	<0.0000050	<0.0000100	-	0.0000379	0.0000872	78.8	<0.0000100	<0.0000100	-	0.0000125	0.0000098	24.2	0.0000072	0.0000067	7.19	0.000118	0.000261	75.5
Calcium	mg/L	38.9	38.8	0.26	33.6	33.2	1.20	36.1	36.5	1.10	16.3	16.3	0	14.8	16.2	9.03	15.6	15.8	1.27
Chromium	mg/L	<0.00050	<0.00050	-	<0.00050	<0.00050	-	<0.00050	<0.00050	-	<0.00050	<0.00050	-	<0.00050	<0.00050	-	<0.00050	<0.00050	-
Cobalt	mg/L	<0.00010	<0.00010	-	<0.00010	<0.00010	-	<0.00010	<0.00010	-	<0.00010	<0.00010	-	<0.00010	<0.00010	-	<0.00010	<0.00010	-
Copper	mg/L	0.00506	0.00518	2.34	0.00543	0.00497	8.85	0.00419	0.00419	0	0.00074	0.00084	12.7	0.00168	0.00223	28.1	0.00091	0.00328	113
Iron	mg/L	0.036	0.033	8.70	<0.030	<0.030	-	<0.030	<0.030	-	0.05	0.049	2.02	0.035	0.057	47.8	<0.030	0.059	-
Lead	mg/L	<0.000050	<0.000050	-	0.000117	0.000128	8.98	<0.000050	0.00006	18.2	0.000107	0.00012	11.5	<0.000050	0.000052	3.92	<0.000050	0.000279	-
Lithium	mg/L	<0.0010	<0.0010	-	<0.0010	<0.0010	-	<0.0010	<0.0010	-	<0.0010	<0.0010	-	<0.0010	<0.0010	-	<0.0010	<0.0010	-
Magnesium	mg/L	6.28	6.23	0.8	5.03	5	0.6	5.41	5.31	1.87	2.32	2.29	1.30	1.85	2.07	11.2	1.86	1.92	3.17
Manganese	mg/L	0.0385	0.0371	3.70	0.00462	0.00404	13.4	0.00711	0.00682	4.16	0.00668	0.00674	0.89	0.00224	0.00327	37.4	0.00125	0.00409	106
Molybdenum	mg/L	0.0069	0.0071	2.86	0.00666	0.00654	1.82	0.00691	0.00702	1.58	0.000512	0.000498	2.77	0.000396	0.000419	5.64	0.000363	0.000362	0.276
Nickel	mg/L	<0.00050	<0.00050	-	<0.00050	<0.00050	-	<0.00050	<0.00050	-	<0.00050	<0.00050	-	0.00092	0.00102	10.3	<0.00050	<0.00050	-
Potassium	mg/L	1	1.01	1	1.11	1.10	0.91	0.942	0.907	3.79	0.502	0.508	1.19	0.489	0.557	13	0.46	0.524	13.0
Selenium	mg/L	0.0012	0.00135	11.8	0.000565	0.000675	17.7	0.000787	0.000732	7.24	0.000208	0.000165	23.1	0.000156	0.000141	10.1	0.00016	0.000163	1.86
Silicon	mg/L	3.45	3.60	4.26	3.11	3.10	0.32	2.87	2.67	7.22	2	1.89	5.66	2.05	2.04	0.49	1.71	1.86	8.40
Silver	mg/L	<0.000010	<0.000010	-	<0.000010	<0.000010	-	<0.000010	<0.000010	-	<0.000010	<0.000010	-	<0.000010	<0.000010	-	<0.000010	<0.000010	-
Sodium	mg/L	7.50	7.82	4.18	7.27	7.46	2.58	7.51	7.40	1.48	1.08	1.07	0.93	0.943	1.02	7.85	0.863	0.93	7.47
Strontium	mg/L	0.271	0.266	1.86	0.242	0.235	2.94	0.252	0.256	1.57	0.108	0.111	2.74	0.11	0.129	15.9	0.129	0.127	1.56
Thallium	mg/L	<0.000010	<0.000010	-	<0.000010	<0.000010	-	<0.000010	<0.000010	-	<0.000010	<0.000010	-	<0.000010	<0.000010	-	<0.000010	<0.000010	-
Tin	mg/L	<0.00010	<0.00010	-	<0.00010	<0.00010	-	<0.00010	<0.00010	-	<0.00010	<0.00010	-	<0.00010	<0.00010	-	<0.00010	<0.00010	-
Titanium	mg/L	<0.0100	<0.0100	-	<0.0100	<0.0100	-	<0.0100	<0.0100	-	<0.0100	<0.0100	-	<0.0100	<0.0100	-	<0.0100	<0.0100	-
Uranium	mg/L	0.00023	0.000247	7.13	0.000197	0.000192	2.57	0.000183	0.000187	2.16	0.000128	0.000125	2.37	0.00014	0.000154	9.52	0.00015	0.000149	0.669
Vanadium	mg/L	0.00143	0.00142	0.7	0.00132	0.00129	2.30	0.00144	0.00135	6.45	<0.00050	<0.00050	-	<0.00050	<0.00050	-	<0.00050	<0.00050	-
Zinc	mg/L	<0.0030	<0.0030	-	<0.0030	<0.0030	-	<0.0030	<0.0030	-	<0.0030	<0.0030	-	<0.0030	<0.0030	-	<0.0030	<0.0030	-

Value did not meet the data quality objective of ≤ 30% Relative Percent Difference (RPD).

Notes: LRL = Laboratory Reporting Limit. If one result in a duplicate pair was below the LRL, RPD was calculated using the LRL in place of the value below detection results. RPD was not calculated if both results were < LRL. "-" indicates that the RPD was not calculated.

Table B.2: Field Duplicate Results for Water Chemistry, Mount Polley Mine CEMP, 2022

Parameter	Units	HAC-U_WS-1_2022-08	HAC-U_WS-1X_2022-08	RPD (%)	POL-P2_WS_DI-1_2022-07	POL-P2_WS_DI-1X_2022-07	RPD (%)	POL-S_WS-1_2022-08	POL-S_WS-1X_2022-08	RPD (%)	QUL-LREF1_WS-1_2022-08	QUL-LREF1_WS-1X_2022-08	RPD (%)	QUL-ZOO1_WS_DI-1_2022-06	QUL-ZOO1_WS_DI-1X_2022-06	RPD (%)	QUL-ZOO1_WS_DI-1_2022-08	QUL-ZOO1_WS_DI-1X_2022-08	RPD (%)
Dissolved Metals																			
Aluminum	mg/L	0.0041	0.0034	18.7	0.004	0.0049	20.2	0.0032	<0.0030	6.45	0.0113	0.0107	5.45	0.0142	0.0129	9.59	0.0439	0.011	119.9
Antimony	mg/L	0.0001	<0.00010	0	<0.00010	<0.00010	-	<0.00010	<0.00010	-	<0.00010	<0.00010	-	<0.00010	<0.00010	-	<0.00010	<0.00010	-
Arsenic	mg/L	0.00046	0.00046	0	0.00047	0.00042	11.2	0.00052	0.00051	1.94	0.00023	0.00021	9.09	0.00012	0.00012	0	0.00017	0.00012	34.5
Barium	mg/L	0.00932	0.00919	1.40	0.00946	0.00876	7.68	0.00991	0.00939	5.39	0.00634	0.00641	1.10	0.00568	0.00561	1.24	0.00615	0.00577	6.38
Beryllium	mg/L	<0.000100	<0.000100	-	<0.000100	<0.000100	-	<0.000100	<0.000100	-	<0.000100	<0.000100	-	<0.000100	<0.000100	-	<0.000100	<0.000100	-
Bismuth	mg/L	<0.000050	<0.000050	-	<0.000050	<0.000050	-	<0.000050	<0.000050	-	<0.000050	<0.000050	-	<0.000050	<0.000050	-	<0.000050	<0.000050	-
Boron	mg/L	0.02	0.02	0	0.02	0.019	5.13	0.018	0.019	5.41	<0.010	<0.010	-	<0.010	<0.010	-	<0.010	<0.010	-
Cadmium	mg/L	<0.0000050	<0.0000050	-	0.0000653	0.0000504	25.8	0.0000188	0.00001	61.1	0.0000205	0.000029	34.3	0.000009	0.0000054	50	0.000178	0.000189	5.99
Calcium	mg/L	37.4	37.4	0	34.2	34.9	2.03	34.6	35.6	2.85	16.5	16	3.08	16.5	16.9	2.40	15.4	16.5	6.90
Chromium	mg/L	<0.00050	<0.00050	-	<0.00050	<0.00050	-	<0.00050	<0.00050	-	<0.00050	<0.00050	-	<0.00050	<0.00050	-	<0.00050	<0.00050	-
Cobalt	mg/L	<0.00010	<0.00010	-	<0.00010	<0.00010	-	<0.00010	<0.00010	-	<0.00010	<0.00010	-	<0.00010	<0.00010	-	<0.00010	<0.00010	-
Copper	mg/L	0.00367	0.00371	1.08	0.00436	0.00419	3.98	0.00372	0.00359	3.56	0.00069	0.0008	14.8	0.0012	0.001	18.2	0.0024	0.00092	89.2
Iron	mg/L	<0.030	<0.030	-	<0.030	<0.030	-	<0.030	<0.030	-	<0.030	<0.030	-	<0.030	<0.030	-	0.044	<0.030	-
Lead	mg/L	<0.000050	<0.000050	-	<0.000050	<0.000050	-	0.00007	0.000293	123	0.000052	0.000146	94.9	<0.000050	<0.000050	-	0.000167	<0.000050	-
Lithium	mg/L	<0.0010	<0.0010	-	<0.0010	<0.0010	-	<0.0010	<0.0010	-	<0.0010	<0.0010	-	<0.0010	<0.0010	-	<0.0010	<0.0010	-
Magnesium	mg/L	5.11	5.04	1.38	4.90	4.56	7.19	5.25	5.42	3.19	2.20	2.13	3.23	2	2.01	0.5	1.91	1.96	2.58
Manganese	mg/L	0.0221	0.0214	3.22	0.00184	0.00194	5.29	0.00096	0.00097	1.04	0.00131	0.00117	11.3	0.00086	0.0007	20.5	0.00309	0.00113	92.9
Molybdenum	mg/L	0.00663	0.00667	0.6	0.00617	0.00634	2.72	0.00677	0.00675	0.3	0.000468	0.000496	5.81	0.000488	0.000397	20.6	0.000318	0.000334	4.91
Nickel	mg/L	<0.00050	<0.00050	-	0.00062	0.00059	4.96	<0.00050	<0.00050	-	<0.00050	<0.00050	-	0.00089	0.00086	3.43	<0.00050	<0.00050	-
Potassium	mg/L	0.821	0.815	0.73	1.05	0.995	5.38	0.924	0.919	0.54	0.528	0.501	5.25	0.532	0.526	1.13	0.482	0.513	6.23
Selenium	mg/L	0.00126	0.00131	3.89	0.000461	0.000476	3.20	0.000763	0.000702	8.33	0.000159	0.000155	2.55	0.00014	0.000146	4.20	0.000119	0.000108	9.69
Silicon	mg/L	3.11	3.25	4.40	3.10	2.94	5.30	2.69	2.70	0.37	1.88	1.83	2.70	2.03	1.97	3	1.64	1.63	0.612
Silver	mg/L	<0.000010	<0.000010	-	<0.000010	<0.000010	-	<0.000010	<0.000010	-	<0.000010	<0.000010	-	<0.000010	<0.000010	-	<0.000010	<0.000010	-
Sodium	mg/L	6.42	6.44	0.31	7.71	7.42	3.83	6.99	7	0.14	1.04	0.973	6.66	0.983	0.963	2.06	0.856	0.906	5.68
Strontium	mg/L	0.252	0.259	2.74	0.252	0.256	1.57	0.235	0.24	2.11	0.101	0.0978	3.22	0.122	0.118	3.33	0.122	0.121	0.823
Thallium	mg/L	<0.000010	<0.000010	-	<0.000010	<0.000010	-	<0.000010	<0.000010	-	<0.000010	<0.000010	-	<0.000010	<0.000010	-	<0.000010	<0.000010	-
Tin	mg/L	<0.00010	<0.00010	-	<0.00010	<0.00010	-	<0.00010	<0.00010	-	<0.00010	<0.00010	-	0.00064	<0.00010	146	<0.00010	<0.00010	-
Titanium	mg/L	<0.0100	<0.0100	-	<0.0100	<0.0100	-	<0.0100	<0.0100	-	<0.0100	<0.0100	-	<0.0100	<0.0100	-	<0.0100	<0.0100	-
Uranium	mg/L	0.000224	0.000245	8.96	0.000196	0.000196	0	0.000189	0.000184	2.68	0.000118	0.000122	3.33	0.000144	0.000138	4.26	0.000148	0.000142	4.14
Vanadium	mg/L	0.0011	0.0011	0	0.00132	0.00122	7.87	0.00124	0.00124	0	<0.00050	<0.00050	-	<0.00050	<0.00050	-	<0.00050	<0.00050	-
Zinc	mg/L	<0.0030	<0.0030	-	<0.0030	<0.0030	-	0.0059	0.0046	24.8	<0.0030	<0.0030	-	<0.0030	<0.0030	-	<0.0030	<0.0030	-

Value did not meet the data quality objective of ≤ 30% Relative Percent Difference (RPD).

Notes: LRL = Laboratory Reporting Limit. If one result in a duplicate pair was below the LRL, RPD was calculated using the LRL in place of the value below detection results. RPD was not calculated if both results were < LRL. "-" indicates that the RPD was not calculated.

B2.5 Hold Times

The recommended hold times were exceeded for several physical tests, such as laboratory pH (hold time of 15 minutes; exceeded in all samples collected), turbidity, and conductivity (Appendix G)[1]. For these physical tests (pH, turbidity, conductivity), *in situ* measures were used for data interpretation and, as such, hold time exceedances for these laboratory results have no impact on data interpretability. The recommended hold time for total suspended solids (TSS), total dissolved solids (TDS), and dissolved orthophosphate were exceeded in two samples (TSS and orthophosphate) and four samples (TDS; VA22B4435, VA22B4117; Appendix G). Hold time for nitrite and nitrate were exceeded in two samples each (VA22B7687; Appendix G). Most of these hold time exceedances occurred after receipt of the samples by the laboratory (i.e., samples were received by the laboratory in sufficient time for analysis). For two samples, the hold times were exceeded prior to laboratory receipt due to a combination of challenges associated with the logistics of expedited sample shipments from a remote area and the short hold times. Analyte results with hold time exceedances were similar to those samples without hold time exceedances 2022 and were within the range of historic results, suggesting little if any impact of the hold time exceedances on analyte results

B2.6 Other Concerns

Results for several analytes showed dissolved concentrations that were greater than the corresponding total concentrations (VA220362, VA22B4435, VA22C0091; Appendix G). Differences were less than two-times the concentration of total analytes and these results were verified by repeat analysis. This unexpected result could be a result of contamination during field filtration, during the sample preparation at the laboratory, or could represent inevitable variability associated with multi-element scans.

B2.7 Data Quality Statement

Water chemistry data collected for the 2022 CEMP were of acceptable quality as characterized by good detectability, appropriate LRLs, negligible analyte concentrations in MBs, good laboratory precision and accuracy, and few hold time exceedances. Only three primary analytes (arsenic, and copper, and iron) and four secondary analytes (cadmium, manganese, total phosphorous, and dissolved tin) were identified as having failed a DQO (in field duplicate samples), and these analytes were not consistently elevated across sample pairs. Since all other quality control samples for these analytes were good, overall

[1] Laboratory-filtered chlorophyll-a results exceeded the recommended hold times as reported in laboratory reports VA22B4117 and VA22B4435. These results were excluded from the DQR section field-filtered chlorophyll-a results reported in VA22B4431 were used for data analysis.

quality of these analyte data would be good. Overall, the 2022 water quality data can be used with a good level of confidence for interpretation.

B3 SEDIMENT CHEMISTRY

B3.1 Laboratory Reporting Limits

The analytical ALS laboratory reports for sediment chemistry (VA22B8489 and VA22C0370; Appendix G) were examined to provide an inventory of analytes for which for which one or more results were below the LRL. The range of reported LRLs for these analytes were assessed relative to applicable British Columbia working sediment guidelines (BCMOECCS 2021a,b; Appendix Table B.3). Analytes that had LRLs that were frequently below detection did not have associated guidelines (i.e., all analytes that had associated guidelines were 100% detectable; Appendix Table B.3). Overall, the achieved LRLs were appropriate for this study.

B3.2 Laboratory Blanks

A total of 12 MB samples were analyzed in the ALS Laboratory Reports (VA22B8489 and VA22C0370; Appendix G). All 144 reported MB results met the laboratory DQO, indicating no inadvertent contamination within the laboratory.

B3.3 Data Precision

A total of 12 laboratory duplicate samples were used to evaluate precision in the ALS Laboratory Reports (VA22B8489 and VA22C0370; Appendix G). Of the 148 analyte results, only two results (antimony and lead; VA22B8489) did not meet the laboratory DQO due to sample heterogeneity. As these results only represents 1.35% of all laboratory duplicate analyte results, laboratory analytical precision was considered excellent.

A total of five sets of field duplicate samples were collected to assess sediment chemistry field sampling precision (Appendix Table B.4; see Section B.2.3 for explanation on RPD calculation and DQOs). Several RPDs could not be calculated as both analyte concentrations were below the LRL. Of the 202 comparisons that could be calculated, only seven RPDs exceeded the DQO of 30% (3.47% of all comparisons; Appendix Table B.4). These exceedances were isolated to two of the five sets of samples, and included one comparison for each total nitrogen, antimony, cadmium, lead, titanium, and zirconium. As such, it is expected that differences were related to sample heterogeneity and/or variability during the multi-element scan. Since the overall occurrence of field duplicate analyses DQO exceedances was low, samples were considered to have excellent field precision and reproducibility.

B3.4 Data Accuracy

Table B.3: Laboratory Reporting Limits (LRLs) for Sediment Chemistry Analyses, Mount Polley Mine, 2022

Analyte	Unit	BCWSG[a]		Range of LRLs	No. Sample Results < LRL
		Long-term	Short-term		
Anions and Nutrients					
Total Nitrogen	%	-	-	0.02	3 (6.0%)
Metals					
Bismuth	mg/kg	-	-	0.1	22 (44.0%)
Boron	mg/kg	-	-	5.0	14 (28.0%)
Thallium	mg/kg	-	-	0.05	14 (28.0%)
Tin	mg/kg	-	-	0.20	2 (4.00%)
Zirconium	mg/kg	-	-	1.0	3 (6.00%)

Notes: "-" = no applicable guideline. Only analytes with one or more results < LRL or LRLs above applicable guidelines are displayed. The total number of sediment samples collected in 2022 was 50, which includes six field duplicate samples.

[a] British Columbia Working Sediment Guidelines (BCWSG; BCMOECCS 2021a) and approved BC Sediment Quality Guideline for Selenium (BCMOECCS 2021b).

Table B.4: Field Duplicate Results for Sediment Analyses, Mount Polley Mine CEMP, 2022

Analyte	Unit	HAC-D_SE-5_2022-08	HAC-D_SE-5X_2022-08	RPD (%)	QUL-LNF1_SE-2_2022-08	QUL-LNF1_SE-2X_2022-08	RPD (%)	EDC-D_SE-4_2022-08	EDC-D_SE-4X_2022-08	RPD (%)	QUL-PNF_SE-2_2022-08	QUL-PNF_SE-2X_2022-08	RPD (%)	POL-S_SE-1_2022-08	POL-S_SE-1X_2022-08	RPD (%)
Physical Tests																
Moisture	%	69.7	63.4	9.47	25.8	25.4	1.56	43.8	40.8	7.09	63.0	63.5	0.79	40.6	42.2	3.86
pH (1:2 soil:water)	pH	7.22	7.39	2.33	8.19	8.21	0.24	7.69	7.47	2.90	8.02	8.03	0.13	7.63	7.63	0
Particle Size																
Gravel (>2mm)	%	<1.0	<1.0	-	<1.0	<1.0	-	<1.0	<1.0	-	<1.0	<1.0	-	<1.0	<1.0	-
Sand (2.0mm - 0.063mm)	%	23.7	35.2	39.0	90.6	91.3	0.77	70.0	66.5	5.13	3.10	3.70	17.6	33.9	31.2	8.29
Silt (0.063mm - 0.004mm)	%	65.4	55.0	17.3	7.70	7.40	3.97	24.1	27.7	13.9	50.5	51.8	2.54	55.8	58.2	4.21
Clay (<0.004mm)	%	10.0	9.80	2.02	1.10	1.20	8.70	5.80	5.40	7.14	46.4	44.5	4.18	10.3	10.6	2.87
Organic / Inorganic Carbon																
Carbon total organic [TOC] <63µm	%	1.91	1.84	3.73	1.03	1.02	0.98	3.05	2.59	16.3	0.70	0.75	7.88	0.87	1.00	13.7
Nutrients (Bulk sediment)																
Total Nitrogen	%	0.23	0.18	22.1	<0.020	0.03	49.1	0.09	0.10	11.9	0.10	0.09	13.5	0.08	0.10	15.9
Metals (<63 µm)																
Aluminum	mg/kg	14,500	15,300	5.37	15,800	15,500	1.92	13,100	14,600	10.8	29,900	31,300	4.58	22,900	21,800	4.92
Antimony	mg/kg	0.49	0.82	50.4	0.45	0.35	25.0	0.35	0.38	8.22	0.50	0.54	7.69	0.50	0.50	0
Arsenic	mg/kg	15.5	17.8	13.8	13.3	10.4	24.5	11.3	12.0	6.01	15.3	15.2	0.66	15.3	14.3	6.76
Barium	mg/kg	244	229	6.34	104	109	4.69	126	115	9.13	265	272	2.61	192	189	1.57
Beryllium	mg/kg	0.57	0.53	7.27	0.53	0.53	0	0.37	0.38	2.67	0.97	1.03	6.00	0.86	0.82	4.76
Bismuth	mg/kg	0.13	0.12	8.00	0.11	0.10	9.52	0.12	0.12	0	0.16	0.16	0	<0.10	<0.10	-
Boron	mg/kg	11.3	10.8	4.52	7.80	6.60	16.7	<5.0	<5.0	-	9.80	11.4	15.1	11.5	11.4	0.87
Cadmium	mg/kg	0.27	0.39	34.4	0.35	0.37	6.92	0.28	0.28	1.78	0.24	0.24	2.09	0.15	0.15	3.37
Calcium	mg/kg	23,400	21,900	6.62	16,700	16,300	2.42	8,700	8,670	0.35	20,300	21,600	6.21	29,900	29,600	1.01
Chromium	mg/kg	33.3	32.9	1.21	38.0	34.3	10.2	43.9	45.0	2.47	30.5	30.6	0.33	13.0	12.4	4.72
Cobalt	mg/kg	14.3	14.7	2.76	18.5	17.6	4.99	12.1	13.2	8.70	24.9	24.8	0.40	21.2	20.6	2.87
Copper	mg/kg	325	337	3.63	900	864	4.08	27.6	28.1	1.80	794	793	0.13	756	739	2.27
Iron	mg/kg	42,800	44,700	4.34	74,300	66,000	11.8	28,900	30,400	5.06	43,100	42,900	0.47	61,500	59,900	2.64
Lead	mg/kg	8.61	18.9	74.8	7.48	7.07	5.64	6.87	7.56	9.56	12.0	12.0	0	5.78	5.43	6.24
Lithium	mg/kg	14.5	14.8	2.05	14.2	14.0	1.42	13.4	14.6	8.57	29.0	29.6	2.05	20.5	20.0	2.47
Magnesium	mg/kg	7,710	8,020	3.94	8,370	8,330	0.48	6,620	6,790	2.54	17,600	17,500	0.57	13,600	13,400	1.48
Manganese	mg/kg	1,110	1,050	5.56	1,030	959	7.14	904	839	7.46	1,360	1,350	0.74	862	843	2.23
Mercury	mg/kg	0.11	0.11	1.87	0.13	0.13	3.89	0.05	0.05	0.38	0.10	0.11	5.83	0.07	0.08	6.45
Molybdenum	mg/kg	1.60	1.78	10.7	2.50	2.87	13.8	0.54	0.57	5.41	3.35	3.44	2.65	5.05	5.22	3.31
Nickel	mg/kg	24.4	24.9	2.03	23.3	22.0	5.74	27.9	29.1	4.21	28.3	27.9	1.42	10.9	10.3	5.66
Phosphorus	mg/kg	1,220	1,580	25.7	1,470	1,150	24.4	960	1,240	25.5	1,200	1,170	2.53	1,910	1,870	2.12
Potassium	mg/kg	1,360	1,260	7.63	1,180	1,150	2.58	1,110	1,040	6.51	2,620	2,980	12.9	1,780	1,760	1.13
Selenium	mg/kg	1.06	1.03	2.87	1.20	0.99	19.2	0.39	0.45	14.3	1.08	1.20	10.5	1.43	1.48	3.44
Silver	mg/kg	0.29	0.31	7.26	0.40	0.41	0.99	0.10	0.11	1.92	0.35	0.36	1.97	0.34	0.32	5.18
Sodium	mg/kg	357	360	0.84	540	537	0.56	257	244	5.19	1,110	1,160	4.41	956	950	0.63
Strontium	mg/kg	171	149	13.8	116	115	0.87	80.5	67.7	17.3	207	223	7.44	204	201	1.48
Sulfur Total	mg/kg	780	870	10.9	720	850	16.6	<500	580	14.8	880	1,080	20.4	1,740	2,090	18.3
Thallium	mg/kg	0.12	0.11	6.22	0.07	0.06	4.65	0.09	0.09	2.20	0.09	0.09	6.82	<0.050	<0.050	-
Tin	mg/kg	0.63	0.69	9.09	1.20	1.06	12.4	0.37	0.45	19.5	1.68	1.67	0.60	2.35	2.16	8.43
Titanium	mg/kg	901	953	5.61	1,380	692	66.4	666	683	2.52	1,690	1,870	10.1	2,120	1,970	7.33
Uranium	mg/kg	0.99	0.96	3.28	1.18	0.93	23.3	0.97	0.92	4.88	1.44	1.48	2.74	1.46	1.36	7.09
Vanadium	mg/kg	129	140	8.18	266	230	14.5	68.5	70.0	2.17	130	129	0.77	238	229	3.85
Zinc	mg/kg	75.2	86.9	14.4	64.5	63.2	2.04	62.7	65.0	3.60	99.6	98.4	1.21	70.9	66.5	6.40
Zirconium	mg/kg	2.70	2.90	7.14	5.10	2.20	79.5	1.70	1.80	5.71	4.80	5.30	9.90	8.30	7.90	4.94

Value did not meet the data quality objective of ≤ 30% Relative Percent Difference (RPD).

Notes: Relative Percent Difference (RPD) was calculated using < Laboratory Reporting Limit (LRL) results at the LRL if one result in a duplicate pair was below the LRL. RPD was not calculated if both results were < LRL. "-" indicates that the RPD was not calculated.

Data accuracy for sediment chemistry analyses completed by ALS was evaluated based on the analysis of 16 LCS samples and 10 reference material (RM) samples. Of the 148 individual LCS results, only one result for zirconium (0.676% of LCS samples) did not meet the laboratory DQO due to a greater recovery limit compared to the upper control limit (VA22B8489; Appendix G). However, this result exceeded the DQO by fewer than 10% of analytes in a multi-element scan, which is considered acceptable as per the OMOE and the CCME (VA22B8489; Appendix G). All 130 individual RM results met the laboratory DQO. Overall, accuracy achieved by the laboratory was considered excellent.

B3.5 Hold Times and General Laboratory Flags

There were no exceedances in hold times for any samples. All samples were delivered to the laboratory and were analyzed within the appropriate hold times.

B3.6 Other Concerns

The measurement uncertainty for particle size analysis in samples BOL-S_SE-3 and BOL-S_SE-4 from August 2022 were higher than usual due to limited sample availability (VA22C0370; Appendix G). The minimum standard sample size is 100g, but this may sometimes be hard to achieve at sites with fine substrate (as is found at Bootjack Lake) since decanting water may also lead to loss of important sample material. Results for calcium and iron were flagged in one sample each due to the result exceeding the maximum concentration inputted for the method used (VA22C0370; Appendix G)[2]. However, the results were correct and within the calibration range and are not expected to affect data interpretation.

B3.7 Data Quality Statement

Sediment chemistry data collected for the 2022 CEMP were of good quality as characterized by appropriate LRLs, appropriate detectability, negligible concentrations in MB samples, laboratory blanks, excellent laboratory precision and field sampling precision, and excellent laboratory accuracy. All quality control samples generally met the laboratory DQOs, and overall the associated data can be used with a high level of confidence in the derivation of conclusions.

[2] Samples were diluted for the analysis so that the results were within the laboratory's calibration range. When these results were back-calculated using the dilution factor, the final results were higher than the range input by laboratory staff for the analysis method. The qualifier/flag was automatically added to these results,

B4 SEDIMENT TOXICITY

B4.1 Laboratory Control

Sediment toxicity test laboratory controls met the acceptable criteria and water quality requirements of the Environment Canada protocols (Nautilus Environmental; Appendix G). Sediment toxicity data were considered of excellent quality for data interpretation.

B4.2 Reference Toxicants

The results of the reference toxicant (NaCl) on *Hyallela azteca* produced toxicity endpoints that met the passing control criterion of >80% survival. The results for the test were within the acceptable range of organism performance (mean LC_{50} within two standard deviations of historical laboratory values; Nautilus Environmental; Appendix G). The required one-day holding period before test initiation was not met due to the late arrival of *H. azteca* from the supplier. However, this delay did not appear to affect the test results as water quality was within the acceptable ranges and there were no mortalities upon arrival.

B4.3 Data Quality Statement

Based on acceptability criteria, water quality requirements of the Environment Canada protocols and reference toxicant test results, data from sediment toxicity tests can be used with a high degree of confidence in the 2022 CEMP.

B5 PHYTOPLANKTON COMMUNITY AND PRODUCTIVITY

B5.1 Laboratory Reporting Limits

The analytical ALS Laboratory Reports for phytoplankton productivity were examined to assess the LRLs for chlorophyll-a results (see laboratory reports VA22B4431, VA22B7705, VA22C0064, and VA22C0362; Appendix G)[3]. All individual measures of chlorophyll-a were above the LRL; therefore, the achieved LRLs were appropriate for the study.

B5.2 Laboratory Blanks

A total of three MB samples were analyzed in the ALS Laboratory Reports (VA22B4431, and VA22B7705; Appendix G). All chlorophyll-a results met the laboratory DQO, indicating that no inadvertent laboratory contamination occurred.

B5.3 Data Precision

Three sets of field duplicates were collected to assess the precision of field sampling for chlorophyll-a (Appendix Table B.5; see Section B.2.3 for explanation on RPD calculation and DQOs). All RPDs met the DQO of 30%, and therefore, chlorophyll-a samples can be considered to have excellent field precision and reproducibility. An analysis of laboratory analytical precision using laboratory duplicates was not conducted for chlorophyll-a as the entire sample must be consumed for analysis.

B5.4 Data Accuracy

Chlorophyll-a accuracy was evaluated based on results of three LCS samples which all met the laboratory DQO (within 20% of accepted value; VA22B4431, VA22B7705; Appendix G). The accuracy achieved by the laboratory in this study was therefore considered excellent.

B5.5 Hold Times

Recommended preparation hold times for chlorophyll-a were exceeded by one day in four samples from August (VA22C0362; Appendix G). Chlorophyll-a samples from August were not field filtered due to logistical issues, and as such, had shorter hold times (48 hours) than the field filtered chlorophyll-a samples collected in June and July. Overall, hold times for chlorophyll-a were exceeded in 21.1% of samples. Upon examination, chlorophyll-a concentrations in samples that exceeded hold times appear similar to those in similar samples

[3] Reports with field filtered chlorophyll-a from June and July (VA22B4431 and VA22B7705) were used for control/blank counts. Laboratory quality control/blank counts for unfiltered (aqueous) chlorophyll-a results from reports VA22C0064 and VA22C0062 were tabulated along with the water chemistry results in Section B2. LRL analysis was conducted with all four reports.

Table B.5: Field Duplicate Results for Aqueous Chlorophyll-a, Mount Polley Mine CEMP, 2022

Parameter	Units	QUL-ZOO-1_CHLA-1_2022-06	QUL-ZOO-1_CHLA-1X_2022-06	RPD (%)	POL-P2_CHLA-1_2022-07	POL-P2_CHLA-1X_2022-07	RPD (%)	QUL-ZOO-1_WS_DI-1_2022-08	QUL-ZOO-1_WS_DI-1X_2022-08	RPD (%)
Chlorophyll-a	µg/L	1.58	1.63	3.12	2.57	2.56	0.390	1.04	1.01	2.93

that did not exceed hold times, suggesting that these exceeded hold times did not impact chlorophyll-a results. However, these hold time exceedances will be taken into consideration during interpretation (mainly, comparison to historical data from prior years).

B5.6 Phytoplankton Density Accuracy

Phytoplankton density was re-measured in a total of three samples to evaluate sub-sampling accuracy within the phytoplankton enumeration and identification laboratory report (10% of all samples; fp22-078, Appendix G). Since there was a high percent of agreement between the duplicate pairs (mean = 89.0%), the samples can be considered to have good laboratory subsampling precision and reproducibility (Appendix Table B.6).

B5.7 Zooplankton Abundance Accuracy

Zooplankton density was re-measured in a total of three samples to evaluate sub-sampling accuracy and taxonomic consistency within the zooplankton enumeration and identification laboratory report (10% of all samples; fz22-078, Appendix G). Since there was a high percent of agreement between the duplicate pairs (mean = 95.6%) the samples are considered to have excellent laboratory subsampling precision and reproducibility (Appendix Table B.7).

B5.8 Data Quality Statement

Plankton community data collected for the 2022 CEMP were of good quality as characterized by good or excellent sub-sampling accuracy. Additionally, productivity measurements (chlorophyll-a) results were characterized by appropriate LRLs, excellent detectability, negligible analyte concentrations in MBs, good laboratory precision, and good laboratory accuracy. Therefore, the associated data can be used with a good level of confidence in the derivation of conclusions.

Table B.6: Duplicate Freshwater Phytoplankton Density Samples, Mount Polley Mine CEMP, 2022

Sample ID	Laboratory ID	Original Density	Quality Assurance Density	Percent Agreement[a] (%)
BOL-B2_PHYTO-1_2022-06	fp22-078-002	2,081,855	1,757,654	84.4
POL-P2_PHYTO-5_2022-07	fp22-078-038	5,177,576	6,082,124	82.5
QUL-ZOO-7_PHYTO-3_2022-07	fp22-078-046	1,225,803	1,225,803	100
			Average	**89.0**

[a] Percent agreement calculated as: (100- [(difference in abundance between samples) / total abundance of original sample)] *100)%.

Table B.7: Duplicate Zooplankton Density Samples, Mount Polley Mine CEMP, 2022

Sample ID	Laboratory ID	Abundance #/ L (Original Replicate)	Abundance #/ L (QA Replicate)	Percent Agreement[a] (%)
BOL-B2_ZOO-3_2022-07	fz22-078-011	83,425	87,875	94.7
POL-P2_ZOO-5_2022-07	fz22-078-018	124,766	118,666	95.1
QUL-ZOO-7_ZOO-1_2022-08	fz22-078-056	14,974	14,534	97.1
			Average	**95.6**

[a] Percent agreement calculated as: (100- [(difference in abundance between samples) / total abundance of original sample)] *100)%.

B6 ZOOPLANKTON TISSUE CHEMISTRY

B6.1 Laboratory Reporting Limits

The analytical ALS Laboratory Reports for zooplankton tissue chemistry (VA22B7702, VA22B4432, and VA22C0442; Appendix G) were examined to provide an inventory of analytes for which sample results were less than the LRL. LRLs for selenium were compared to the British Columbia benthic invertebrate dietary guidelines (BCMOE 2014). The LRL was adjusted for several analytes across samples due to sample dilution, high moisture content, insufficient sample, or amount of sample used by the laboratory. For sample POL-P2_ZOOT-1_2022-08, LRLs for 35 of 37 analytes were adjusted due to laboratory dilution of sample (VA22C0442; Appendix G). All resulting selenium LRLs were below the available guideline for selenium (Appendix Table B.8), indicating that the achieved LRLs were appropriate for the study.

B6.2 Laboratory Blanks

A total of 11 MB samples were analyzed in the ALS Laboratory Reports (VA22B7702, VA22B4432, and VA22C0442; Appendix G). All 190 individual analyte results met the laboratory DQO, indicating that laboratory analytical precision was excellent.

B6.3 Data Precision

One laboratory duplicate sample was analyzed to evaluate laboratory precision for moisture within the zooplankton tissue chemistry results (VA22B7702; Appendix G). The number of laboratory duplicates for zooplankton tissue chemistry was low as sample volumes were limited and needed to be conserved for metals analysis. Efforts will be made in future sampling (where possible) to collect more sample volume and/or drain off more water when submitting the sample. The resulting one analyte result met the laboratory DQO. Due to limited laboratory duplicate sample results (i.e., one comparison), laboratory precision and reproducibility could not be assessed.

A total of three sets of field duplicate zooplankton tissue samples were collected to assess field sampling and reproducibility (Appendix Table B.9; see Section B.2.3 for explanation on RPD calculation and DQOs). Several RPDs could not be calculated as both analyte concentrations were below the LRL. For all three sets of field duplicate samples, <20% of analyte comparisons exceeded the DQO of 30% (Appendix Table B.9); as such, field precision was considered good. RPDs for certain analytes of interest (arsenic, iron, lead, nickel, tin, titanium, and vanadium) exceeded the DQO in one or more duplicate sets, but not in all three

Table B.8: Evaluation of Laboratory Reporting Limits (LRL) in Zooplankton Tissue Chemistry Results, Mount Polley Mine CEMP, 2022

Parameter	Units	Range of LRLs	No. Sample Results <LRL
Metals			
Bismuth	mg/kg	0.01 to 0.016	13 (41.9%)
Boron	mg/kg	1 to 2.2	5 (16.1%)
Lithium	mg/kg	0.5 to 0.83	4 (12.9%)
Mercury	mg/kg	0.01 to 0.055	2 (6.45%)
Mercury	mg/kg wwt	0.001 to 0.002	25 (80.6%)
Tellurium	mg/kg	0.02 to 0.033	30 (96.8%)

Notes: Only analytes for which at least one sample was <LRL are displayed. mg/kg = milligrams per kilogram dry weight, wwt = wet weight. The total number of samples in 2022 was 31, which included three field duplicate samples.

Table B.9: Field Duplicate Results for Zooplankton Tissue Chemistry, Mount Polley Mine CEMP, 2022

Analyte	Units	BOL-B2_ZOOT-3_2022-07	BOL-B2_ZOOT-3X_2022-07	RPD (%)	QUL-ZOO-1_ZOOT-1_2022-06	QUL-ZOO-1_ZOOT-1X_2022-06	RPD (%)	QUL-ZOO-1_ZOOT-1_2022-08	QUL-ZOO-1_ZOOT-1X_2022-08	RPD (%)
Physical Tests										
Moisture	%	97.4	96.9	0.515	94.6	94.7	0.106	97.9	98.0	0.102
Metals										
Aluminum	mg/kg	5,430	5,590	2.90	1,220	1,210	0.823	1,450	1,240	15.6
Antimony	mg/kg	0.237	0.493	70.1	0.0790	0.171	73.6	0.170	0.0710	82.2
Arsenic	mg/kg	38.3	63.1	48.9	2.62	2.63	0.381	4.24	3.70	13.6
Barium	mg/kg	109	108	0.922	20.0	19.6	2.02	26.0	25.0	3.92
Beryllium	mg/kg	0.196	0.218	10.6	0.0560	0.0580	3.51	0.0520	0.0450	14.4
Bismuth	mg/kg	0.0370	0.0420	12.7	<0.010	<0.010	-	0.0140	0.0120	15.4
Boron	mg/kg	10.2	10.3	0.976	1.20	<1.0	18.2	3.30	3.80	14.1
Cadmium	mg/kg	0.384	0.393	2.32	0.940	0.926	1.50	1.50	1.51	0.664
Calcium	mg/kg	25,900	27,000	4.16	3,360	3,440	2.35	34,500	36,900	6.72
Cesium	mg/kg	0.664	0.717	7.68	0.103	0.0927	10.5	0.177	0.166	6.41
Chromium	mg/kg	52.8	98.5	60.4	2.69	3.37	22.4	21.3	12.8	49.9
Cobalt	mg/kg	3.64	3.81	4.56	0.983	0.983	0	1.97	1.59	21.3
Copper	mg/kg	174	178	2.27	16.5	18.1	9.25	36.3	31.6	13.8
Iron	mg/kg	9,390	9,760	3.86	1,180	1,190	0.844	3,110	2,090	39.2
Lead	mg/kg	4.45	6.65	39.6	0.464	0.514	10.2	0.933	0.750	21.7
Lithium	mg/kg	3.68	4.09	10.6	0.900	0.920	2.20	1.63	1.13	36.2
Magnesium	mg/kg	2,920	2,800	4.20	1,300	1,330	2.28	2,330	1,770	27.3
Manganese	mg/kg	1,210	1,210	0.00	97.7	97.3	0.410	164	145	12.3
Mercury	mg/kg	0.131	0.133	1.52	0.0370	0.0360	2.74	0.0820	0.0750	8.92
	mg/kg ww	0.00340	0.00410	18.7	<0.0020	<0.0020	-	<0.0020	<0.0020	-
Molybdenum	mg/kg	1.55	2.03	26.8	0.308	0.318	3.19	0.744	0.552	29.6
Nickel	mg/kg	8.89	14.3	46.7	2.50	2.81	11.7	10.0	6.01	49.8
Phosphorus	mg/kg	10,200	10,100	0.985	11,300	11,500	1.75	11,200	11,500	2.64
Potassium	mg/kg	6,860	5,640	19.5	9,280	9,500	2.34	8,840	9,130	3.23
Rubidium	mg/kg	10.0	8.92	11.4	15.4	15.9	3.19	13.7	13.4	2.21
Selenium	mg/kg	2.99	2.70	10.2	2.88	2.87	0.348	2.65	2.67	0.752
Silver	mg/kg	0.170	0.174	2.33	0.0547	0.0506	7.79	0.0587	0.0560	4.71
Sodium	mg/kg	3,870	3,230	18.0	3,300	3,350	1.50	7,070	7,490	5.77
Strontium	mg/kg	173	183	5.62	20.4	20.8	1.94	167	186	10.8
Tellurium	mg/kg	<0.020	<0.029	-	<0.020	<0.020	-	<0.020	<0.020	-
Thallium	mg/kg	0.0641	0.0727	12.6	0.0307	0.0304	0.982	0.0192	0.0189	1.57
Tin	mg/kg	0.730	0.880	18.6	0.300	0.220	30.8	0.210	0.220	4.65
Titanium	mg/kg	232	235	1.28	35.1	36.3	3.36	85.7	59.7	35.8
Uranium	mg/kg	0.701	0.770	9.38	0.0901	0.0883	2.02	0.143	0.131	8.76
Vanadium	mg/kg	21.8	21.8	0	2.48	2.56	3.17	10.4	6.85	41.2
Zinc	mg/kg	133	142	6.55	84.6	81.5	3.73	71.0	74.7	5.08
Zirconium	mg/kg	4.98	5.43	8.65	0.610	0.570	6.78	1.50	1.13	28.1

Value did not meet the data quality objective of ≤ 30% Relative Percent Difference (RPD).

Notes: Relative Percent Difference (RPD) was calculated using < Laboratory Reporting Limit (LRL) results at the LRL if one result in a duplicate pair was below the LRL. RPD was not calculated if both results were < LRL. "-" indicates that the RPD was not calculated; "wwt" indicates wet weight.

duplicate pairs. Differences are believed to be a result of natural variability, and these variations will be taken into consideration when interpreting the findings.

B6.4 Data Accuracy

Data accuracy was evaluated based on the results of 11 LCS samples (VA22B7702, VA22B4432, and VA22C0442; Appendix G). Of the 190 individual LCS results, only three samples (for silver) did not meet the laboratory DQO (VA22B7702 and VA22C0442; Appendix G). For these three samples, the laboratory DQO was marginally exceeded but results were considered acceptable as per CCME standards. As these results only represent 1.58% of LCS analyte results, the accuracy achieved by the laboratory in this study was considered excellent.

B6.5 Hold Times

Recommended hold times for the zooplankton tissue chemistry samples were met for all parameters in all samples (Appendix G).

B6.6 Data Quality Statement

Zooplankton tissue chemistry collected as part of the 2022 CEMP was of good quality as characterized by appropriate detection limits, no detectable concentrations in MBs, and good field sampling precision. Laboratory accuracy and precision could not be assessed, as comparisons were limited to analysis of moisture in one sample. The number of laboratory duplicates was low due to limited sample volume, laboratory dilution, and/or high moisture content. Field sampling precision was considered good, as fewer than 20% of all analyte comparisons from each field duplicate set exceeded the 30% DQO for RPDs. Overall, zooplankton tissue chemistry collected as part of the 2022 CEMP can be used with a high level of confidence in the derivation of conclusions, provided that natural variability is considered.

B7 PERIPHYTON COMMUNITY AND PRODUCTIVITY

B7.1 Laboratory Reporting Limits

Periphyton dry weight, ash weight, ash free dry weight, and chlorophyll-a results (VA22B8786; Appendix G) were examined to provide an inventory of analytes that were less than the LRL. All individual measures were found to be above the LRL. Therefore, the achieved LRLs were appropriate for the study.

B7.2 Laboratory Blanks

Four MB samples were analyzed in the ALS Laboratory Report (VA22B8786; Appendix G). All eight results for dry weight, ash weight, ash free, dry weight, and chlorophyll-a met the laboratory DQO, meaning that laboratory contamination had no impact on the results.

B7.3 Data Accuracy

Accuracy of periphyton productivity analytes was evaluated based on results of four LCS. All eight results met the laboratory DQO (within 30% of accepted value; VA22B8786, Appendix G). Therefore, accuracy achieved by the laboratory in this study was considered excellent.

B7.4 Density Accuracy

Periphyton density was re-measured in a total of two samples to evaluate sub-sampling accuracy and taxonomic consistency within the periphyton enumeration and identification laboratory report (10% of all samples; pp22-078; Appendix G). Since there was a high percent of agreement between the duplicate pairs (mean = 85.0%) the samples were considered to have good laboratory subsampling precision and reproducibility (Appendix Table B.10).

B7.5 Data Quality Statement

Periphyton community data collected for the 2022 CEMP were of acceptable quality as characterized by good sub-sampling accuracy. Additionally, productivity measurements (ash free dry weight and chlorophyll-a) results had appropriate LRLs, were of acceptable detectability, and demonstrated good laboratory precision and laboratory accuracy. Therefore, the associated data can be used with a high level of confidence in the derivation of conclusions.

Table B.10: Duplicate Freshwater Periphyton Density Samples, Mount Polley Mine CEMP, 2022

Sample ID	Laboratory ID	Original Density	Quality Assurance Density	Percent Agreement[a] (%)
EDC-U_PERI-2_2022-08	pp22-078-050	3,685,304	3,174,032	86.1
HAC-R1_PERI-4_2022-08	pp22-078-057	2,239,208	1,876,189	83.8
			Average	**85.0**

[a] Percent agreement calculated as: (100- [(difference in abundance between samples) / total abundance of original sample)] *100)%.

B8 BENTHIC INVERTEBRATE COMMUNITY

B8.1 Sorting Efficiency

The analytical laboratory reports for benthic invertebrate community composition (Appendix H) assessed the organism sorting efficiency relative to the laboratory's DQO (≥ 90%) in four samples (Appendix Table B.11). The average recovery was 99.3% and so organism sorting efficiency was considered excellent.

B8.2 Subsampling Precision and Accuracy

Of the 30 benthic invertebrate community samples analyzed, 25 were subsampled. The proportion of sub-sampled material ranged from 5% to 20% of the total sample material (Appendix Table B.12). Of the samples that were sub-sampled, four (13% of all samples) were assessed for precision and accuracy. All assessed samples met the laboratory DQO (<20%) for both precision and accuracy (Appendix Table B.13). Thus, the precision and accuracy for sub-sampling of the benthic invertebrate community samples was considered excellent.

B8.3 Taxonomic Identification Accuracy

The laboratory performed an internal audit of taxonomic identification for 13% of all samples (n = 4; Appendix Table B.14). The analysts reported total identification error rate (TIR) of 0%, percent difference in enumeration (PDE) of 0 to 0.645%, percent taxonomic disagreement (PTD) of 0% to 1.603%, and Bray Curtis Dissimilarity Index (BCDI, a measure of the differences in identifications between different analysts) of 0 to 0.01 (Appendix Table B.14). All TIRs were below the laboratory DQO (<5% TIR), which is based on CABIN laboratory methods (Environment Canada 2014), so the taxonomic accuracy of analyses was considered excellent.

B8.4 Data Quality Statement

Benthic community data collected for the 2022 CEMP were of excellent quality as characterized by excellent sorting efficiency, subsampling precision and accuracy, and excellent taxonomic identification accuracy. Therefore, the associated data can be used with a high level of confidence in the derivation of conclusions.

Table B.11: Benthic Invertebrate Community Sorting Efficiency, Mount Polley Mine CEMP, 2022

Habitat	Sample ID	Laboratory ID	Number of Organisms Recovered (Initial Sort)	Number of Organisms in Re-sort	Sorting Efficiency (%)
Creek	HAC-R1_BIC-1_2022- 08	CC230214	781	5	99.0
	HAC-U_BIC-4_2022-08	CC230222	388	5	99.0
	HAC-R3_BIC-3_2022-08	CC230211	342	6	99.0
Lake	QUL-PNF_BIC-1_2022-08	CC230336	95	0	100
				Average Recovery	**99.3**

Table B.12: Percent of Sample Sorted and the Total Number of Invertebrates Recovered from the Sampled Fraction, Mine Polley Mine CEMP, 2022

Habitat	Sample ID	Sieve Size (µm)	Laboratory ID	% Sampled	# Invertebrates
Creek	FPC-R3_BIC-1_2022-08	250	CC230204	7%	377
	FPC-R3_BIC-2_2022-08	250	CC230205	5%	371
	FPC-R3_BIC-3_2022-08	250	CC230206	10%	403
	FPC-R3_BIC-4_2022-08	250	CC230207	6%	308
	FPC-R3_BIC-5_2022-08	250	CC230208	9%	411
	HAC-R3_BIC-1_2022-08	250	CC230209	6%	329
	HAC-R3_BIC-2_2022-08	250	CC230210	6%	333
	HAC-R3_BIC-3_2022-08	250	CC230211	5%	342
	HAC-R3_BIC-4_2022-08	250	CC230212	6%	376
	HAC-R3_BIC-5_2022-08	250	CC230213	10%	328
	HAC-R1_BIC-1_2022-08	250	CC230214	5%	781
	HAC-R1_BIC-2_2022-08	250	CC230215	5%	782
	HAC-R1_BIC-3_2022-08	250	CC230216	5%	914
	HAC-R1_BIC-4_2022-08	250	CC230217	5%	424
	HAC-R1_BIC-5_2022-08	250	CC230218	5%	434
	HAC-U_BIC-1_2022-08	250	CC230219	5%	545
	HAC-U_BIC-2_2022-08	250	CC230220	5%	424
	HAC-U_BIC-3_2022-08	250	CC230221	5%	561
	HAC-U_BIC-4_2022-08	250	CC230222	5%	588
	HAC-U_BIC-5_2022-08	250	CC230223	5%	413
	EDC-U_BIC-1_2022-08	250	CC230224	5%	388
	EDC-U_BIC-2_2022-08	250	CC230225	5%	391
	EDC-U_BIC-3_2022-08	250	CC230226	5%	547
	EDC-U_BIC-4_2022-08	250	CC230227	20%	504
	EDC-U_BIC-5_2022-08	250	CC230228	14%	307
Lake	QUL-PNF_BIC-1_2022-08	250	CC230336	100%	95
	QUL-PNF_BIC-2_2022-08	250	CC230337	100%	70
	QUL-PNF_BIC-3_2022-08	250	CC230338	100%	118
	QUL-PNF_BIC-4_2022-08	250	CC230339	100%	137
	QUL-PNF_BIC-5_2022-08	250	CC230340	100%	158

Table B.13: Benthic Invertebrate Community Sub-sampling Precision and Accuracy, Mount Polley Mine CEMP, 2022

Habitat	Station ID		Organisms in Subsample										Total	Precision Error		Accuracy Error	
	Sample ID	Laboratory ID	1	2	3	4	5	6	7	8	9	10		Min (%)	Max (%)	Min (%)	Max (%)
Creek	HAC-R3_BIC- 5_2022-08	CC230213	328	335	401	403	382	404	333	392	350	332	3,660	0.25	18.8	4.370	10.4
	EDC-U_BIC- 4_2022-08	CC230227	532	491	525	564	488	-	-	-	-	-	2,600	0.61	13.48	0.96	8.46
	HAC-U_BIC- 5_2022-08	CC230223	413	402	385	420	348	-	-	-	-	-	1,968	1.67	17.14	2.13	11.59
Lake	QUL-PREF1-3	CC220762	394	393	-	-	-	-	-	-	-	-	787	0.25	0.25	0.13	0.13
													Average	**0.70**	**12.4**	**1.90**	**7.64**

Note: "-" indicates no data available.

Table B.14: Percent Benthic Invertebrate Community Organism Recovery[a], Mount Polley Mine CEMP, 2022

Habitat	Sample ID	Laboratory ID	Percent Sampled (%)	Taxa Identified	TIR (%)	PDE (%)	PTD (%)	BCDI
Creek	FPC-R3_BIC-4_2022-08	CC230207	6	312	0	0.645	1.603	0.010
	HAC-R1_BIC-1_2022-8	CC230214	5	780	0	0.064	0.512	0.004
	HAC-U_BIC-4_2022-08	CC230222	5	588	0	0	0.680	0.007
Lake	QUL-PNF_BIC-2_2022-08	CC230337	100	70	0	0	0	0

Notes: TIR = Total Identification Error Rate, PDE = Percent Difference in Enumeration, PTD = Percent Taxonomic Disagreement, BCDI = Bray Curtis Dissimilarity Index to quantify differences in identifications.

[a] For error rationale and calculations, refer to Cordillera report (Appendix G).

B9 BENTHIC INVERTEBRATE AND PERIPHYTON TISSUE CHEMISTRY

B9.1 Laboratory Reporting Limits

One analytical ALS Laboratory Report for benthic invertebrate and periphyton tissue chemistry (VA22B8779; Appendix G) was examined to provide an inventory of analytes for which sample results were less than the LRL. The maximum LRLs for these analytes were assessed relative to existing British Columbia benthic invertebrate dietary guidelines (available only for selenium; BCMOE 2014). Achieved LRLs were below the available guideline for selenium (Appendix Table B.15), indicating the achieved LRLs were appropriate for the study.

B9.2 Laboratory Blanks

A total of 22 MB samples were analyzed in the ALS Laboratory Report (VA22B8779; Appendix G). All the 407 individual results met the laboratory DQO. Therefore, laboratory precision was considered excellent.

B9.3 Data Precision

A total of 17 laboratory duplicate samples were used to evaluate precision within the ALS Laboratory Report (VA22B8779; Appendix G). Out of the 259 laboratory duplicate results, 29 results in five samples did not pass the laboratory DQO (i.e., 11.2% of all pairs) due to sample heterogeneity. For primary analytes, this included one duplicate result each for arsenic and copper and two duplicate results for iron that did not pass the laboratory DQO. For secondary analytes, this included one duplicate result each for barium, cobalt and uranium, and two duplicate pairs each for silver, titanium, and vanadium that did not pass the laboratory DQO. Since these analytes have been identified as potentially indicative of mine influence, consideration will be given to other quality control samples and interpretation of data. Since the overall occurrence of lab duplicate DQO exceedances was low, samples can be considered to have overall good laboratory precision and reproducibility.

A total of 10 sets of field duplicate benthic invertebrate samples were collected (five of each composite-taxa and caddisfly samples) and five sets periphyton tissue samples were collected to assess the precision associated with field sampling (Appendix Table B.16; see Section B.2.3 for explanation on RPD calculation and DQOs). Of the 15 sets of duplicate samples, 11 sets had >20% of analytes with RPDs >30%: all five of the periphyton duplicate sets (100%), four of five composite-taxa duplicate sets (80%), and two of five caddisfly duplicate sets (40%) had >20% of analytes with RPDs >30%. All primary and secondary analytes had at least one

Table B.15: Evaluation of Laboratory Reporting Limits (LRLs) in Benthic Invertebrate and Periphyton Tissue Chemistry Results Relative to Guidelines, Mount Polley

Parameter	Units	Range of LRLs	No. Sample Results < LRL
Antimony	mg/kg	0.01 to 0.054	5 (3.14%)
Beryllium	mg/kg	0.01 to 0.035	38 (23.9%)
Bismuth	mg/kg	0.01 to 0.035	91 (57.2%)
Boron	mg/kg	1 to 3.6	54 (34.0%)
Cadmium	mg/kg	0.01 to 0.035	4 (2.52%)
Cesium	mg/kg	0.005 to 0.0174	6 (3.77%)
Chromium	mg/kg	0.2 to 0.7	6 (3.77%)
Lead	mg/kg	0.05 to 0.174	13 (8.18%)
Lithium	mg/kg	0.5 to 1.74	54 (34.0%)
Nickel	mg/kg	0.2 to 0.7	7 (4.40%)
Silver	mg/kg	0.005 to 0.0174	20 (12.6%)
Tellurium	mg/kg	0.02 to 0.07	133 (83.6%)
Thallium	mg/kg	0.002 to 0.0072	23 (14.5%)
Tin	mg/kg	0.1 to 0.35	133 (83.6%)
Uranium	mg/kg	0.002 to 0.007	2 (1.26%)
Zirconium	mg/kg	0.2 to 0.7	37 (23.3%)

Notes: All concentrations are in milligrams per kilogram dry weight (mg/kg dw). The total number of samples in 2022 was 159, which included 15 field duplicate samples.

Table B.16: **Field Duplicate Results for Benthic Invertebrate and Periphyton Tissue Analyses, Mount Polley Mine CEMP, 2022**

Analyte	Unit	E1_INV-5_2022-08	E1_INV-5X_2022-08	RPD (%)	E1_INV-7_2022-08	E1_INV-7X_2022-08	RPD (%)	E1_INVCAD-5_2022-08	E1_INVCAD-5X_2022-08	RPD (%)	E1_INVCAD-7_2022-08	E1_INVCAD-7X_2022-08	RPD (%)	E1_PERT-5_2022-08	E1_PERT-5X_2022-08	RPD (%)
Physical Tests																
Moisture	%	84.3	79.6	5.74	77.4	78.2	1.03	80.4	82.4	2.46	76.8	78	1.55	78.4	91.2	15.1
Metals																
Aluminum	mg/kg	1,730	1,930	10.9	356	1,910	137	4,140	4,750	13.7	4,520	3,900	14.7	12,300	19,300	44.3
Antimony	mg/kg	0.0440	0.0450	2.25	0.0160	0.0480	100	0.0730	0.0760	4.03	0.0760	0.0670	12.6	0.0490	0.0570	15.1
Arsenic	mg/kg	3.03	3.91	25.4	1.44	3.38	80.5	6.05	6.66	9.60	6.24	6.20	0.643	11.4	9.62	16.9
Barium	mg/kg	87.6	68.1	25.0	11.7	70.0	143	163	215	27.5	179	171	4.57	157	550	111
Beryllium	mg/kg	0.0590	0.0580	1.71	0.0120	0.0670	139	0.148	0.161	8.41	0.164	0.135	19.4	0.411	0.417	1.45
Bismuth	mg/kg	0.0140	0.0150	6.90	<0.010	0.0160	46.2	0.0320	0.0380	17.1	0.0330	0.0300	9.52	0.0890	0.0730	19.8
Boron	mg/kg	1.70	2.30	30.0	<1.0	2.40	82.4	5.30	4.90	7.84	4.40	4.30	2.30	11.9	14.8	21.7
Cadmium	mg/kg	2.22	1.84	18.7	0.786	1.50	62.5	0.903	1.10	19.7	0.923	0.895	3.08	0.275	0.256	7.16
Calcium	mg/kg	2,350	2,240	4.79	1,050	2,540	83.0	3,120	3,920	22.7	3,530	3,130	12.0	9,300	13,200	34.7
Cesium	mg/kg	0.210	0.226	7.34	0.0440	0.214	132	0.392	0.453	14.4	0.447	0.407	9.37	1.36	1.18	14.2
Chromium	mg/kg	5.06	6.49	24.8	1.14	6.16	138	23.2	16.1	36.1	13.8	10.4	28.1	32.0	65.6	68.9
Cobalt	mg/kg	3.03	3.76	21.5	1.01	3.42	109	6.32	6.80	7.32	6.06	5.61	7.71	11.7	14.6	22.1
Copper	mg/kg	77.4	87.9	12.7	34.8	90.0	88.5	118	137	14.9	130	121	7.17	214	164	26.5
Iron	mg/kg	3,610	3,950	8.99	671	4,040	143	8,410	9,940	16.7	9,370	8,180	13.6	25,000	35,700	35.3
Lead	mg/kg	0.881	0.914	3.68	0.190	0.985	135	1.96	2.34	17.7	2.05	1.87	9.18	5.97	5.78	3.23
Lithium	mg/kg	1.60	1.77	10.1	<0.50	1.82	114	4.09	4.26	4.07	4.20	3.51	17.9	13.4	14.7	9.25
Magnesium	mg/kg	2,420	2,090	14.6	1,480	2,260	41.7	3,240	3,590	10.2	3,240	2,960	9.03	7,020	11,000	44.2
Manganese	mg/kg	597	481	21.5	206	848	122	1,310	1,640	22.4	1,650	1,630	1.22	1,200	1,300	8.00
Mercury	mg/kg	0.0780	0.0554	33.9	0.0642	0.0700	8.64	0.0480	0.0578	18.5	0.0489	0.0531	8.24	0.0637	0.0451	34.2
Molybdenum	mg/kg	0.815	0.874	6.99	2.52	1.06	81.6	1.86	1.53	19.5	1.84	1.54	17.8	1.44	1.85	24.9
Nickel	mg/kg	3.18	5.91	60.1	6.54	5.91	10.1	16.8	14.5	14.7	12.2	10.5	15.0	25.4	40.6	46.1
Phosphorus	mg/kg	9,580	8,550	11.4	8,080	7,780	3.78	6,890	7,430	7.54	6,870	7,020	2.16	1,860	2,580	32.4
Potassium	mg/kg	11,100	9,940	11.0	7,720	9,830	24.0	13,700	15,300	11.0	13,200	14,100	6.59	2,420	3,510	36.8
Rubidium	mg/kg	5.52	6.66	18.7	3.18	5.63	55.6	6.10	7.21	16.7	6.40	7.09	10.2	10.4	9.43	9.78
Selenium	mg/kg	1.91	2.04	6.58	1.74	2.03	15.4	1.44	1.65	13.6	1.59	1.69	6.10	0.940	0.970	3.14
Silver	mg/kg	0.108	0.0970	10.7	0.0362	0.0955	90.1	0.0882	0.0993	11.8	0.0919	0.0882	4.11	0.129	0.109	16.8
Sodium	mg/kg	9,590	3,820	86.1	3,110	3,010	3.27	3,380	3,520	4.06	2,690	2,710	0.741	447	1,560	111
Strontium	mg/kg	13.3	17.1	25.0	5.93	16.5	94.2	27.0	31.6	15.7	26.5	24.2	9.07	87.1	148	51.8
Tellurium	mg/kg	<0.020	<0.020	-	<0.020	<0.020	-	<0.020	<0.020	-	<0.020	<0.020	-	0.0320	0.0210	41.5
Thallium	mg/kg	0.0240	0.0226	6.01	0.0063	0.0226	113	0.0351	0.0416	16.9	0.0306	0.0327	6.64	0.0766	0.0498	42.4
Tin	mg/kg	<0.10	<0.10	-	<0.10	<0.10	-	0.120	0.160	28.6	0.110	0.120	8.70	0.280	0.310	10.2
Titanium	mg/kg	105	109	3.74	17.8	100	140	224	262	15.6	232	213	8.54	647	1,260	64.3
Uranium	mg/kg	0.157	0.159	1.27	0.0321	0.183	140	0.383	0.451	16.3	0.352	0.319	9.84	0.544	0.652	18.1
Vanadium	mg/kg	9.79	10.1	3.12	1.46	9.34	146	19.3	23.8	20.9	24.6	20.8	16.7	59.5	121	68.1
Zinc	mg/kg	143	139	2.84	106	132	21.8	154	171	10.5	137	138	0.727	61.8	62.6	1.29
Zirconium	mg/kg	1.34	1.52	12.6	0.280	1.65	142	3.12	3.49	11.2	3.45	3.10	10.7	7.58	13.0	52.7

Value did not meet the data quality objective of ≤ 30% Relative Percent Difference (RPD).

Notes: Relative Percent Difference (RPD) was calculated using < Laboratory Reporting Limit (LRL) results at the LRL if one result in a duplicate pair was below the LRL. RPD was not calculated if both results were < LRL. "-" indicates that the RPD was not calculated.

Table B.16: **Field Duplicate Results for Benthic Invertebrate and Periphyton Tissue Analyses, Mount Polley Mine CEMP, 2022**

Analyte	Unit	E1_PERT-7_2022-08	E1_PERT-7X_2022-08	RPD (%)	HAC-D_INV-7_2022-08	HAC-D_INV-7X_2022-08	RPD (%)	HAC-D_INVCAD-7_2022-08	HAC-D_INVCAD-7X_2022-08	RPD (%)	HAC-D_PERT-7_2022-08	HAC-D_PERT-7X_2022-08	RPD (%)	HAC-R1_INV-7_2022-08	HAC-R1_INV-7X_2022-08	RPD (%)
Physical Tests																
Moisture	%	87.3	79.9	8.85	79.6	80.3	0.876	70.1	70.6	0.711	61.9	56.8	8.59	81.8	77	6.05
Metals																
Aluminum	mg/kg	6,810	14,500	72.2	541	1,820	108	186	166	11.4	2,320	2,700	15.1	2,360	838	95.2
Antimony	mg/kg	0.0850	0.0700	19.4	0.0300	0.0890	99.2	0.0190	0.0190	0	0.0820	0.0650	23.1	0.0470	0.0360	26.5
Arsenic	mg/kg	9.48	11.9	22.6	2.10	3.39	47.0	0.782	0.547	35.4	6.29	5.47	13.9	1.75	1.60	8.96
Barium	mg/kg	103	573	139	31.7	35.9	12.4	12.7	6.08	70.5	222	163	30.6	103	26.0	119
Beryllium	mg/kg	0.224	0.447	66.5	0.0210	0.0840	120	<0.010	<0.010	-	0.105	0.0960	8.96	0.0580	0.0290	66.7
Bismuth	mg/kg	0.0510	0.0840	48.9	<0.010	0.0100	0	<0.010	<0.010	-	<0.024	0.0190	23.3	<0.010	<0.010	-
Boron	mg/kg	56.2	24.8	77.5	4.00	3.10	25.4	<1.0	<1.0	-	88.8	39.9	76.0	3.40	2.60	26.7
Cadmium	mg/kg	0.248	0.342	31.9	2.31	1.31	55.2	0.193	0.0790	83.8	0.597	0.317	61.3	0.935	0.873	6.86
Calcium	mg/kg	16,800	12,600	28.6	4,840	4,640	4.22	980	790	21.5	260,000	202,000	25.1	4,080	2,600	44.3
Cesium	mg/kg	0.808	1.28	45.2	0.0860	0.399	129	0.0269	0.0261	3.02	0.315	0.325	3.13	0.152	0.0752	67.6
Chromium	mg/kg	23.2	33.1	35.2	2.29	5.17	77.2	0.860	0.470	58.6	7.85	8.89	12.4	2.67	2.63	1.51
Cobalt	mg/kg	6.87	11.1	47.1	1.61	2.51	43.7	0.488	0.243	67.0	3.93	3.39	14.8	2.09	1.46	35.5
Copper	mg/kg	147	520	112	81.5	68.0	18.1	28.3	20.6	31.5	194	102	62.2	134	107	22.4
Iron	mg/kg	15,000	27,100	57.5	1,270	4,730	115	396	376	5.18	4,740	6,470	30.9	3,020	1,530	65.5
Lead	mg/kg	3.28	5.25	46.2	0.350	1.62	129	0.130	0.113	14.0	1.12	1.47	27.0	0.693	0.344	67.3
Lithium	mg/kg	7.19	13.0	57.6	0.560	1.86	107	<0.50	<0.50	-	2.65	2.70	1.87	1.31	0.670	64.6
Magnesium	mg/kg	4,800	7,290	41.2	1,500	2,160	36.1	1,070	1,090	1.85	4,170	3,540	16.3	1,800	1,440	22.2
Manganese	mg/kg	1,490	1,600	7.12	1,390	983	34.3	534	354	40.5	7,210	3,820	61.5	981	780	22.8
Mercury	mg/kg	0.0450	0.0602	28.9	0.0842	0.0656	24.8	0.0353	0.0480	30.5	0.0212	0.0245	14.4	0.0761	0.0460	49.3
Molybdenum	mg/kg	1.72	1.77	2.87	1.79	1.74	2.83	4.15	5.68	31.1	0.998	1.19	17.6	3.60	4.54	23.1
Nickel	mg/kg	16.8	25.0	39.2	2.23	3.53	45.1	0.860	0.420	68.8	6.17	5.67	8.45	3.24	2.82	13.9
Phosphorus	mg/kg	2,930	2,300	24.1	9,300	8,190	12.7	6,340	6,480	2.18	1,910	1,440	28.1	7,980	8,290	3.81
Potassium	mg/kg	6,040	3,170	62.3	8,210	7,820	4.87	6,210	5,850	5.97	3,480	2,920	17.5	8,380	7,940	5.39
Rubidium	mg/kg	11.4	10.4	9.17	3.35	2.66	23.0	1.38	1.14	19.0	5.26	5.07	3.68	3.09	2.82	9.14
Selenium	mg/kg	0.830	2.03	83.9	4.23	3.59	16.4	3.21	4.18	26.3	2.53	1.78	34.8	4.91	4.48	9.16
Silver	mg/kg	0.0709	0.150	71.6	0.0296	0.0337	13.0	0.0065	<0.0050	26.1	0.0265	0.0285	7.27	0.0356	0.0219	47.7
Sodium	mg/kg	351	441	22.7	8,240	6,690	20.8	2,170	2,070	4.72	341	267	24.3	3,420	3,040	11.8
Strontium	mg/kg	87.7	117	28.6	19.2	21.4	10.8	7.72	5.90	26.7	618	522	16.8	39.7	14.4	93.5
Tellurium	mg/kg	<0.020	0.0280	33.3	<0.020	<0.020	-	<0.020	<0.020	-	<0.048	<0.024	-	<0.020	<0.020	-
Thallium	mg/kg	0.0649	0.0737	12.7	0.0120	0.0229	62.5	0.0040	0.0022	58.1	0.0344	0.0285	18.8	0.0070	0.0044	45.6
Tin	mg/kg	0.220	0.380	53.3	<0.10	<0.10	-	0.100	<0.10	0	<0.24	0.120	66.7	<0.10	<0.10	-
Titanium	mg/kg	386	786	68.3	34.4	204	142	11.0	9.79	11.6	142	190	28.9	102	45.8	76.0
Uranium	mg/kg	0.386	0.613	45.4	0.0721	0.118	48.3	0.0190	0.0131	36.8	0.210	0.215	2.35	0.128	0.0908	34.0
Vanadium	mg/kg	34.7	71.7	69.5	3.94	13.2	108	1.02	0.970	5.03	16.9	19.4	13.8	9.99	5.12	64.5
Zinc	mg/kg	39.6	57.5	36.9	142	116	20.2	84.3	81.4	3.50	28.6	21.1	30.2	119	108	9.69
Zirconium	mg/kg	4.68	7.97	52.0	0.420	1.98	130	<0.20	<0.20	-	1.22	1.65	30.0	1.11	0.570	64.3

Value did not meet the data quality objective of ≤ 30% Relative Percent Difference (RPD).

Notes: Relative Percent Difference (RPD) was calculated using < Laboratory Reporting Limit (LRL) results at the LRL if one result in a duplicate pair was below the LRL. RPD was not calculated if both results were < LRL. "-" indicates that the RPD was not calculated.

Table B.16: **Field Duplicate Results for Benthic Invertebrate and Periphyton Tissue Analyses, Mount Polley Mine CEMP, 2022**

Analyte	Unit	HAC-R1_INV-8_2022-08	HAC-R1_INV-8X_2022-08	RPD (%)	HAC-R1_INVCAD-7_2022-08	HAC-R1_INVCAD-7X_2022-08	RPD (%)	HAC-R1_INVCAD-8_2022-08	HAC-R1_INVCAD-8X_2022-08	RPD (%)	HAC-R1_PERT-7_2022-08	HAC-R1_PERT-7X_2022-08	RPD (%)	HAC-R1_PERT-8_2022-08	HAC-R1_PERT-8X_2022-08	RPD (%)
Physical Tests																
Moisture	%	82.6	85.3	3.22	71	72.9	2.64	73.6	73.1	0.682	69.8	72.4	3.66	71.3	60.2	16.9
Metals																
Aluminum	mg/kg	898	2,200	84.1	64.4	84.8	27.3	56.3	33.7	50.2	4,720	1,650	96.4	4,470	1,880	81.6
Antimony	mg/kg	0.0360	0.0800	75.9	0.0210	0.0190	10.0	0.0260	0.0180	36.4	0.0720	0.0690	4.26	0.0780	0.0840	7.41
Arsenic	mg/kg	2.08	3.48	50.4	0.317	0.321	1.25	0.338	0.272	21.6	3.41	2.16	44.9	3.97	2.78	35.3
Barium	mg/kg	25.0	50.9	68.2	2.49	2.93	16.2	5.84	3.80	42.3	246	96.1	87.6	165	90.7	58.1
Beryllium	mg/kg	0.0290	0.0780	91.6	<0.010	<0.010	-	<0.010	<0.010	-	0.171	0.0560	101	0.138	0.0640	73.3
Bismuth	mg/kg	<0.010	0.0130	26.1	<0.010	<0.010	-	<0.010	<0.010	-	<0.012	<0.010	-	0.0160	0.0140	13.3
Boron	mg/kg	2.30	4.00	54.0	<1.0	<1.0	-	<1.0	<1.0	-	232	284	20.2	150	179	17.6
Cadmium	mg/kg	1.97	1.15	52.6	0.0350	0.0200	54.5	0.0430	0.0130	107	0.180	0.218	19.1	0.238	0.218	8.77
Calcium	mg/kg	6,620	5,560	17.4	664	643	3.21	701	748	6.49	247,000	196,000	23.0	210,000	204,000	2.90
Cesium	mg/kg	0.0978	0.210	72.9	0.0082	0.0100	19.8	0.0078	0.0060	26.1	0.258	0.176	37.8	0.267	0.173	42.7
Chromium	mg/kg	1.88	5.04	91.3	0.400	0.310	25.4	0.250	<0.20	22.2	19.3	11.2	53.1	88.5	123	32.6
Cobalt	mg/kg	1.68	2.83	51.0	0.140	0.128	8.96	0.269	0.0790	109	3.01	2.99	0.667	3.47	2.14	47.4
Copper	mg/kg	138	223	47.1	14.3	16.5	14.3	16.4	13.7	17.9	57.5	56.8	1.22	160	56.0	96.3
Iron	mg/kg	1,820	4,080	76.6	175	210	18.2	177	119	39.2	4,450	3,850	14.5	7,680	4,250	57.5
Lead	mg/kg	0.386	0.832	73.2	0.0560	<0.050	11.3	<0.050	<0.050	-	0.747	0.512	37.3	1.17	0.828	34.2
Lithium	mg/kg	0.810	1.76	73.9	<0.50	<0.50	-	<0.50	<0.50	-	2.56	1.47	54.1	2.80	1.60	54.5
Magnesium	mg/kg	1,740	2,440	33.5	999	1,010	1.10	1,020	1,070	4.78	3,260	3,220	1.23	3,660	2,730	29.1
Manganese	mg/kg	828	1,140	31.7	151	125	18.8	368	170	73.6	1,780	2,410	30.1	2,100	1,580	28.3
Mercury	mg/kg	0.0844	0.0637	28.0	0.0329	0.0366	10.6	0.0429	0.0364	16.4	0.0160	0.0088	58.1	0.0243	0.0102	81.7
Molybdenum	mg/kg	2.52	5.68	77.1	8.77	7.37	17.3	5.49	9.03	48.8	1.23	1.67	30.3	2.29	1.05	74.3
Nickel	mg/kg	2.52	4.96	65.2	0.270	0.230	16.0	0.230	<0.20	14.0	4.68	6.42	31.4	11.1	8.33	28.5
Phosphorus	mg/kg	10,600	8,220	25.3	6,450	6,400	0.778	6,540	6,880	5.07	880	879	0.114	1,340	1,040	25.2
Potassium	mg/kg	8,350	10,300	20.9	6,130	5,520	10.5	5,850	5,680	2.95	3,410	4,280	22.6	3,370	2,680	22.8
Rubidium	mg/kg	3.95	4.04	2.25	1.01	1.24	20.4	1.14	1.09	4.48	4.05	4.52	11.0	4.55	2.98	41.7
Selenium	mg/kg	5.16	6.07	16.2	7.87	6.17	24.2	5.35	7.35	31.5	1.51	1.82	18.6	1.92	1.62	16.9
Silver	mg/kg	0.0332	0.0557	50.6	<0.0050	<0.0050	-	<0.0050	<0.0050	-	0.0259	0.0195	28.2	0.0295	0.0228	25.6
Sodium	mg/kg	3,620	5,710	44.8	2,400	2,200	8.70	2,440	2,160	12.2	333	306	8.45	370	295	22.6
Strontium	mg/kg	25.8	28.1	8.53	3.95	3.95	0	4.80	5.48	13.2	571	432	27.7	439	429	2.30
Tellurium	mg/kg	<0.020	<0.020	-	<0.020	<0.020	-	<0.020	<0.020	-	0.0270	0.0220	20.4	0.0210	<0.024	13.3
Thallium	mg/kg	0.0067	0.0167	85.5	<0.0020	<0.0020	-	<0.0020	<0.0020	-	0.0068	0.0066	2.99	0.0087	0.0066	27.5
Tin	mg/kg	<0.10	<0.10	-	<0.10	<0.10	-	<0.10	<0.10	-	<0.12	<0.10	-	0.220	<0.12	58.8
Titanium	mg/kg	57.4	128	76.2	3.56	5.59	44.4	3.54	2.17	48.0	228	304	28.6	365	162	77.0
Uranium	mg/kg	0.0896	0.237	90.3	0.0065	0.0072	10.2	0.0116	0.0035	107	0.215	0.132	47.8	0.195	0.152	24.8
Vanadium	mg/kg	5.75	14.2	84.7	0.400	0.520	26.1	0.420	0.210	66.7	18.2	11.8	42.7	25.7	12.8	67.0
Zinc	mg/kg	131	122	7.11	87.0	79.0	9.64	99.3	92.3	7.31	27.4	19.7	32.7	59.8	40.8	37.8
Zirconium	mg/kg	0.620	1.30	70.8	<0.20	<0.20	-	<0.20	<0.20	-	2.10	2.67	23.9	2.38	1.35	55.2

Value did not meet the data quality objective of ≤ 30% Relative Percent Difference (RPD).

Notes: Relative Percent Difference (RPD) was calculated using < Laboratory Reporting Limit (LRL) results at the LRL if one result in a duplicate pair was below the LRL. RPD was not calculated if both results were < LRL. "-" indicates that the RPD was not calculated.

RPD that exceeded the 30% RPD DQO, with iron (primary), barium, cadmium, cobalt, titanium, uranium, and vanadium (all secondary) exceeding the DQO in over half of the duplicate sets (Appendix Table B.16). This variability is not a result of inconsistent field sampling, but as a result of sample heterogeneity (e.g., taxonomic variability in composite-taxa samples or natural variability within a single taxon). Field crews strived to collect and/or split sample between duplicate sample sets evenly, but a perfect split is not always feasible. It should be mentioned that tissue samples were collected in replicates of eight for each periphyton, composite-taxa, and caddisfly tissue to account for sampling heterogeneity (i.e., a total of 24 tissue samples per sampling area). As a high proportion of all field duplicate analyses exceeded the DQO, samples were considered to have poor field precision. These sources of variability will be considered during data interpretation.

B9.4 Data Accuracy

Data accuracy was evaluated based on results of 12 RM samples and 22 LCS samples, which yielded 291 RM results and 407 LCS results (VA22B8779; Appendix G). Of these, one RM result (titanium) exceeded the DQO. As the laboratory DQO was only exceeded in 0.344% of RM results and all LCS results met the laboratory DQO, accuracy achieved by the laboratory in this study is therefore considered excellent.

B9.5 Hold Times

Recommended hold times for the benthic and periphyton tissue chemistry samples were met for all parameters (VA22B8779; Appendix G).

B9.6 Data Quality Statement

Benthic and periphyton tissue chemistry data collected as part of the 2022 CEMP was of good quality as characterized by good detectability and appropriate LRLs (below the BCMOE guideline for selenium), no detectable analyte concentrations in MBs, and good laboratory accuracy and precision. Evaluation of field precision indicated high variability among parents and duplicate sample results (high relative percent differences) for composite-taxa, caddisfly, and periphyton tissue quality. Though field duplicates exceeded the DQO in a high percentage of comparisons, this does not reflect incorrect sampling methods, but rather natural variability due to sample heterogeneity. Collection of replicate samples should help to address the natural variability in biological tissue samples. Interpretation benthic invertebrate and periphyton chemistry tissue results from the 2022 CEMP should be approached carefully and compared relative to historic results before derivation of conclusions. Several primary and secondary analytes did not meet the DQO in laboratory and field duplicate samples, further

suggesting natural heterogeneity in samples. These sources of variability will be considered during data interpretation.

B10 FISH TISSUE CHEMISTRY

B10.1 Laboratory Reporting Limits

The analytical ALS Laboratory Reports for fish tissue chemistry (see laboratory reports VA22B2820, VA22B2821, VA22B4917, and VA22B5055; Appendix G) were examined to provide an inventory of analytes for which the sample results were less than the LRL. The LRL range for these analytes were also assessed relative to available guidelines, namely for mercury and selenium (BCMOE 2014, CFIA 2015; Appendix Table B.17). Results for several analytes were frequently below the LRL; however, fish tissue guidelines did not exist for those analytes (Appendix Table B.17). All achieved LRLs were below the available guidelines for mercury and selenium; therefore the achieved LRLs were appropriate for this study.

B10.2 Laboratory Blanks

A total of 60 MB samples were analyzed in the ALS Laboratory Reports (see laboratory reports VA22B2820, VA22B2821, VA22B4917, and VA22B5055; Appendix G). All reported MB results (1,029) met the laboratory DQO (VA22B2820, VA22B2821, VA22B4917, and VA22B5055; Appendix G), therefore, laboratory precision was considered excellent.

B10.3 Data Precision

A total of 32 laboratory duplicate samples were used to evaluate laboratory precision within the ALS Laboratory Reports (see laboratory reports VA22B2820, VA22B2821, and VA22B4917, and VA22B5055; Appendix G). Of the 930 duplicate pair results, 11 (1.18%) did not meet the laboratory DQO due to sample heterogeneity (VA22B2820, VA22B2821, and VA22B4917, and VA22B5055; Appendix G), including one result each for calcium, manganese, and phosphorous, two results each for barium and strontium, and four results for chromium. As a relatively low number of laboratory duplicate samples exceeded the laboratory DQO, laboratory precision and reproducibility were overall considered good.

A total of 32 sets of field duplicate samples were collected to assess field sampling precision (Appendix Table B.18), with 12 sets collected during spring fish tissue monitoring and 20 sets collected during fall fish tissue monitoring. These samples consisted of eight kidney, eight liver, eight muscle, and eight ovary duplicate samples from longnose sucker and rainbow trout (spring tissue monitoring at Polley and Bootjack Lakes), lake trout, peamouth chub (fall tissue monitoring at Quesnel Lake), and rainbow trout (fall tissue monitoring at Quesnel River). Several RPDs could not be calculated as both analyte concentrations were below the LRL (see Section B.2.3 for explanation on RPD calculation and DQOs). Of the 32 field duplicate sets, 14 sets (43.8 % of sets) had >20% of analytes that exceeded the DQO of 30%.

Table B.17: Evaluation of Laboratory Reporting Limits (LRL) in Fish Tissue Chemistry Results, Mount Polley Mine CEMP, 2022

Parameter	Units	Range of LRLs	No. Sample Results < LRL
Metals			
Aluminum	mg/kg	2 to 6.4	98 (55.1%)
Antimony	mg/kg	0.01 to 0.026	144 (80.9%)
Arsenic	mg/kg	0.02 to 0.064	9 (5.06%)
Beryllium	mg/kg	0.01 to 0.013	178 (100%)
Bismuth	mg/kg	0.01 to 0.013	161 (90.4%)
Boron	mg/kg	1 to 1.7	155 (87.1%)
Cadmium	mg/kg	0.005 to 0.013	59 (33.1%)
Chromium	mg/kg	0.05 to 0.26	87 (48.9%)
Colbat	mg/kg	0.02 to 0.026	23 (12.9%)
Led	mg/kg	0.02 to 0.064	157 (88.2%)
Lithium	mg/kg	0.5 to 0.64	178 (100%)
Molybdenum	mg/kg	0.02 to 0.051	28 (15.7%)
Nickle	mg/kg	0.2 to 3.6	123 (69.1%)
Silver	mg/kg	0.005 to 0.0064	80 (57.1%)
Tellurium	mg/kg	0.02 to 0.026	159 (89.3%)
Thallium	mg/kg	0.002 to 0.0034	65 (36.5%)
Tin	mg/kg	0.1 to 0.13	61 (34.3%)
Titanium	mg/kg	0.25 to 0.85	113 (80.7%)
Uranium	mg/kg	0.002 to 0.0026	76 (42.7%)
Vanadium	mg/kg	0.1 to 0.13	72 (40.4%)
Zirconium	mg/kg	0.2 to 0.26	111 (62.4%)

Notes: Only analytes with at least one result below the LRL is displayed. Fish tissue guidelines only exist for mercury and selenium. The total number of samples in 2022 was 178, which included 32 field duplicate samples.

Table B.18: **Field Duplicate Results for Fish Tissue Chemistry, Mount Polley Mine CEMP, 2022**

Analyte	Unit	BOL_LSU-Ki-6_2022-05	BOL_LSU-Ki-6X_2022-05	RPD (%)	BOL_LSU-Li-2_2022-05	BOL_LSU-Li-2X_2022-05	RPD (%)	BOL_RB-M-7_2022-05	BOL_RB-M-7X_2022-05	RPD (%)	BOL_RB-O-8_2022-05	BOL_RB-O-8X_2022-05	RPD (%)
Physical Test													
Moisture	%	79	79	0	80.4	80.6	0.248	79.5	79.4	0.126	68.5	68.5	0
Metals													
Aluminum	mg/kg	<5.0	<5.0	-	<5.0	<5.0	-	<5.0	<5.0	-	<2.0	<2.0	-
Antimony	mg/kg	<0.010	<0.010	-	0.022	0.022	0	<0.010	<0.010	-	<0.010	<0.010	-
Arsenic	mg/kg	0.093	0.091	2.17	0.152	0.153	0.656	0.031	0.031	0	0.024	0.021	13.3
Barium	mg/kg	3.15	2.28	32.0	0.454	0.708	43.7	0.622	1.26	67.8	1.12	1.04	7.41
Beryllium	mg/kg	<0.010	<0.010	-	<0.010	<0.010	-	<0.010	<0.010	-	<0.010	<0.010	-
Bismuth	mg/kg	<0.010	<0.010	-	<0.010	<0.010	-	<0.010	<0.010	-	<0.010	<0.010	-
Boron	mg/kg	<1.0	<1.0	-	<1.0	<1.0	-	<1.0	<1.0	-	<1.0	<1.0	-
Cadmium	mg/kg	1.75	1.7	2.90	0.469	0.459	2.16	<0.010	<0.010	-	<0.0050	<0.0050	-
Calcium	mg/kg	2520	1040	83.1	285	293	2.77	516	828	46.4	1440	1410	2.11
Cesium	mg/kg	0.0459	0.0483	5.10	0.0216	0.0201	7.19	0.0611	0.0614	0.490	0.0174	0.0168	3.51
Chromium	mg/kg	<0.20	<0.20	-	<0.20	<0.20	-	<0.20	<0.20	-	<0.050	<0.050	-
Cobalt	mg/kg	0.452	0.423	6.63	0.12	0.112	6.90	<0.020	<0.020	-	0.08	0.078	2.53
Copper	mg/kg	4.24	4.3	1.41	23	26	12.2	2.14	1.94	9.80	10.3	10.5	1.92
Iron	mg/kg	338	513	41.1	424	449	5.73	30.4	26.8	12.6	61.9	67.4	8.51
Lead	mg/kg	<0.050	<0.050	-	<0.050	<0.050	-	<0.050	<0.050	-	<0.020	<0.020	-
Lithium	mg/kg	<0.50	<0.50	-	<0.50	<0.50	-	<0.50	<0.50	-	<0.50	<0.50	-
Magnesium	mg/kg	692	646	6.88	1030	959	7.14	1390	1170	17.2	1650	1610	2.45
Manganese	mg/kg	66.1	14.3	129	14.2	12.7	11.2	0.714	0.843	16.6	12.9	12	7.23
Mercury	mg/kg dwt	0.306	0.282	8.16	0.192	0.186	3.17	0.343	0.32	6.94	0.006	0.0066	9.52
	mg/kg wwt	0.0641	0.0592	7.95	0.0376	0.0362	3.79	0.0703	0.0659	6.46	0.0192	0.0209	8.48
Molybdenum	mg/kg	0.595	0.566	5.00	1.13	1.08	4.52	<0.040	<0.040	-	0.045	0.047	4.35
Nickel	mg/kg	0.61	0.52	15.9	<0.20	<0.20	-	<0.20	<0.20	-	<0.20	<0.20	-
Phosphorus	mg/kg	14500	12800	12.5	15900	15100	5.16	14100	14400	2.11	12800	12100	5.62
Potassium	mg/kg	12600	13100	3.89	11300	10600	6.39	23700	23600	0.423	8440	7920	6.36
Rubidium	mg/kg	6.44	6.39	0.779	6.43	6.21	3.48	11.9	11.9	0	5.12	5.11	0.196
Selenium	mg/kg	6.11	5.93	2.99	6.89	6.37	7.84	2.28	2.2	3.57	6.35	6.22	2.07
Silver	mg/kg	<0.0050	<0.0050	-	0.0284	0.0316	10.7	<0.0050	<0.0050	-	0.0059	0.0072	19.8
Sodium	mg/kg	6460	6110	5.57	6940	6690	3.67	2190	1820	18.5	3860	3860	0
Strontium	mg/kg	6.84	2.16	104	0.64	0.64	0	0.67	1.3	64.0	4.16	4.07	2.19
Tellurium	mg/kg	0.024	0.021	13.3	<0.020	<0.020	-	<0.020	<0.020	-	<0.020	<0.020	-
Thallium	mg/kg	0.0125	0.0138	9.89	0.0021	<0.0020	4.88	0.0129	0.0142	9.59	<0.0020	<0.0020	-
Tin	mg/kg	0.66	0.74	11.4	0.5	0.5	0	1.34	0.89	40.4	<0.10	0.14	33.3
Titanium	mg/kg	<0.50	<0.50	-	<0.50	<0.50	-	<0.50	<0.50	-	<0.25	<0.25	-
Uranium	mg/kg	0.0186	0.0153	19.5	0.0051	0.0048	6.06	<0.0020	<0.0020	-	<0.0020	<0.0020	-
Vanadium	mg/kg	0.97	0.86	12.0	0.3	0.31	3.28	<0.10	<0.10	-	<0.10	<0.10	-
Zinc	mg/kg	105	107	1.89	79.9	77.5	3.05	18.3	17.6	3.90	104	106	1.90
Zirconium	mg/kg	0.2	0.2	0	0.24	<0.20	18.2	0.25	<0.20	22.2	<0.20	<0.20	-

Value did not meet the data quality objective of ≤ 30% Relative Percent Difference (RPD).

Notes: Relative Percent Difference (RPD) was calculated using the LRL if one result in a duplicate pair was below the LRL. RPD was not calculated if both results were < LRL. "-" indicates that the RPD was not calculated; "wwt" indicates wet weight.

Table B.18: **Field Duplicate Results for Fish Tissue Chemistry, Mount Polley Mine CEMP, 2022**

Analyte	Unit	POL_LSU-Ki-3_2022-05	POL_LSU-Ki-3X_2022-05	RPD (%)	POL_LSU-Li-3_2022-05	POL_LSU-Li-3X_2022-05	RPD (%)	POL_LSU-M-8_2022-05	POL_LSU-M-8X_2022-05	RPD (%)	POL_RB-Ki-1_2022-05	POL_RB-Ki-1X_2022-05	RPD (%)
Physical Test													
Moisture	%	78.2	78.7	0.637	77.4	78	0.772	76	74.8	1.59	79.8	75.4	5.67
Metals													
Aluminum	mg/kg	<5.0	<5.0	-	<2.0	3.1	43.1	7.2	<2.0	113	10	10	0
Antimony	mg/kg	<0.010	<0.010	-	0.035	0.032	8.96	<0.010	<0.010	-	<0.010	<0.010	-
Arsenic	mg/kg	0.156	0.115	30.3	0.244	0.278	13.0	0.101	0.077	27.0	0.662	0.421	44.5
Barium	mg/kg	1.38	0.606	77.9	0.427	0.663	43.3	0.654	0.905	32.2	0.32	0.113	95.6
Beryllium	mg/kg	<0.010	<0.010	-	<0.010	<0.010	-	<0.010	<0.010	-	<0.010	<0.010	-
Bismuth	mg/kg	<0.010	<0.010	-	<0.010	<0.010	-	<0.010	<0.010	-	<0.010	<0.010	-
Boron	mg/kg	<1.0	<1.0	-	<1.0	<1.0	-	<1.0	<1.0	-	<1.0	<1.0	-
Cadmium	mg/kg	4.61	3.42	29.6	0.63	0.627	0.477	<0.0050	<0.0050	-	0.847	0.51	49.7
Calcium	mg/kg	534	491	8.39	209	243	15.0	528	394	29.1	638	411	43.3
Cesium	mg/kg	0.0423	0.0382	10.2	0.0309	0.035	12.4	0.0821	0.0707	14.9	0.0438	0.0318	31.7
Chromium	mg/kg	<0.20	0.23	14.0	0.073	0.105	36.0	0.234	0.065	113	0.29	<0.20	36.7
Cobalt	mg/kg	0.52	0.398	26.6	0.109	0.128	16.0	<0.020	<0.020	-	2.35	1.78	27.6
Copper	mg/kg	7.7	6	24.8	56	67.1	18.0	3.01	4.15	31.8	8.16	6.64	20.5
Iron	mg/kg	317	385	19.4	230	256	10.7	37.7	45.4	18.5	788	1100	33.1
Lead	mg/kg	<0.050	<0.050	-	<0.020	<0.020	-	<0.020	<0.020	-	0.078	0.075	3.92
Lithium	mg/kg	<0.50	<0.50	-	<0.50	<0.50	-	<0.50	<0.50	-	<0.50	<0.50	-
Magnesium	mg/kg	642	654	1.85	1270	1300	2.33	1350	1080	22.2	661	558	16.9
Manganese	mg/kg	4.3	4.61	6.96	11.1	11.7	5.26	0.985	0.89	10.1	3.4	2.7	23.0
Mercury	mg/kg dwt	0.197	0.148	28.4	0.022	0.023	4.44	0.0556	0.0502	10.2	0.405	0.418	3.16
	mg/kg wwt	0.043	0.0315	30.9	0.0971	0.104	6.86	0.231	0.199	14.9	0.0818	0.103	22.9
Molybdenum	mg/kg	1.86	1.3	35.4	1.9	2.1	10.0	0.023	0.029	23.1	0.499	0.347	35.9
Nickel	mg/kg	0.58	0.55	5.31	<0.20	<0.20	-	<0.20	0.34	51.9	0.45	0.34	27.8
Phosphorus	mg/kg	14000	14200	1.42	20200	21400	5.77	11200	10100	10.3	10900	10800	0.922
Potassium	mg/kg	11600	12400	6.67	16400	17100	4.18	19200	16200	16.9	10800	9990	7.79
Rubidium	mg/kg	12	11.7	2.53	15	15.6	3.92	13.8	12.3	11.5	6.24	5.59	11.0
Selenium	mg/kg	12.9	11.7	9.76	14.2	15.4	8.11	8.74	7.44	16.1	13.8	11.5	18.2
Silver	mg/kg	<0.0050	<0.0050	-	0.0224	0.0302	29.7	<0.0050	<0.0050	-	<0.0050	<0.0050	-
Sodium	mg/kg	6560	6380	2.78	4520	5050	11.1	1740	1790	2.83	8850	6210	35.1
Strontium	mg/kg	0.77	0.71	8.11	0.291	0.373	24.7	0.555	0.459	18.9	2.26	1.11	68.2
Tellurium	mg/kg	0.057	0.042	30.3	<0.020	<0.020	-	<0.020	<0.020	-	<0.020	<0.020	-
Thallium	mg/kg	0.0025	<0.0020	22.2	<0.0020	<0.0020	-	<0.0020	<0.0020	-	0.078	0.0694	11.7
Tin	mg/kg	0.77	<0.10	154	0.59	0.62	4.96	0.73	0.5	37.4	<0.10	<0.10	-
Titanium	mg/kg	<0.50	<0.50	-	<0.25	<0.25	-	<0.25	<0.25	-	0.68	0.68	0
Uranium	mg/kg	0.0059	0.0049	18.5	<0.0020	<0.0020	-	<0.0020	<0.0020	-	0.0042	0.0041	2.41
Vanadium	mg/kg	4.24	3.53	18.3	0.88	0.93	5.52	<0.10	<0.10	-	0.5	0.47	6.19
Zinc	mg/kg	220	172	24.5	123	138	11.5	34.4	42.7	21.5	195	186	4.72
Zirconium	mg/kg	0.26	<0.20	26.1	0.26	<0.20	26.1	0.26	<0.20	26.1	<0.20	<0.20	-

Value did not meet the data quality objective of ≤ 30% Relative Percent Difference (RPD).

Notes: Relative Percent Difference (RPD) was calculated using the LRL if one result in a duplicate pair was below the LRL. RPD was not calculated if both results were < LRL. "-" indicates that the RPD was not calculated; "wwt" indicates wet weight.

Table B.18: **Field Duplicate Results for Fish Tissue Chemistry, Mount Polley Mine CEMP, 2022**

Analyte	Unit	POL_RB-Li-6_2022-05	POL_RB-Li-6X_2022-05	RPD (%)	POL_RB-M-2_2022-05	POL_RB-M-2X_2022-05	RPD (%)	POL_RB-O-4_2022-05	POL_RB-O-4X_2022-05	RPD (%)	POL_RB-O-7_2022-05	POL_RB-O-7X_2022-05	RPD (%)
Physical Test													
Moisture	%	76.7	77	0.390	81.1	82.5	1.71	65.9	70.4	6.60	66.5	61.8	7.33
Metals													
Aluminum	mg/kg	25.4	11.9	72.4	<5.0	27	138	<5.0	<5.0	-	<2.0	<2.0	-
Antimony	mg/kg	<0.010	<0.010	-	<0.010	<0.010	-	<0.010	<0.010	-	<0.010	<0.010	-
Arsenic	mg/kg	0.139	0.122	13.0	<0.030	0.031	3.28	0.034	0.032	6.06	0.042	0.04	4.88
Barium	mg/kg	1.57	1.12	33.5	0.582	1.24	72.2	0.631	0.866	31.4	0.265	0.148	56.7
Beryllium	mg/kg	<0.010	<0.010	-	<0.010	<0.010	-	<0.010	<0.010	-	<0.010	<0.010	-
Bismuth	mg/kg	<0.010	<0.010	-	<0.010	<0.010	-	<0.010	<0.010	-	<0.010	<0.010	-
Boron	mg/kg	1.4	<1.0	33.3	<1.0	<1.0	-	<1.0	<1.0	-	<1.0	<1.0	-
Cadmium	mg/kg	0.248	0.218	12.9	<0.010	<0.010	-	<0.010	<0.010	-	<0.0050	<0.0050	-
Calcium	mg/kg	469	310	40.8	1470	1500	2.02	1210	1540	24.0	1150	1190	3.42
Cesium	mg/kg	0.0574	0.0453	23.6	0.112	0.0976	13.7	0.0143	0.0157	9.33	0.0228	0.0195	15.6
Chromium	mg/kg	0.24	<0.20	18.2	<0.20	<0.20	-	<0.20	<0.20	-	0.055	<0.050	9.52
Cobalt	mg/kg	0.145	0.108	29.2	0.02	0.032	46.2	0.073	0.078	6.62	0.11	0.096	13.6
Copper	mg/kg	153	134	13.2	1.84	1.87	1.62	6.62	6.01	9.66	8.28	8.9	7.22
Iron	mg/kg	1990	2060	3.46	48.2	87.2	57.6	76.2	90.6	17.3	64.1	48.5	27.7
Lead	mg/kg	<0.050	<0.050	-	<0.050	<0.050	-	<0.050	<0.050	-	<0.020	<0.020	-
Lithium	mg/kg	<0.50	<0.50	-	<0.50	<0.50	-	<0.50	<0.50	-	<0.50	<0.50	-
Magnesium	mg/kg	856	562	41.5	1300	1190	8.84	1400	1400	0	1520	1580	3.87
Manganese	mg/kg	12.2	13.7	11.6	1.24	1.8	36.8	4.23	4.02	5.09	3.09	3	2.96
Mercury	mg/kg dwt	1.07	1.22	13.1	0.991	0.842	16.3	0.0224	0.0252	11.8	0.0044	0.0021	70.8
	mg/kg wwt	0.249	0.28	11.7	0.188	0.147	24.5	0.0076	0.0072	5.41	0.013	0.0056	79.6
Molybdenum	mg/kg	1.3	1.35	3.77	<0.040	<0.040	-	0.056	0.062	10.2	0.05	0.056	11.3
Nickel	mg/kg	<0.20	<0.20	-	<0.20	<0.20	-	<0.20	<0.20	-	<0.20	<0.20	-
Phosphorus	mg/kg	14900	13500	9.86	15200	15000	1.32	11300	12100	6.84	12200	12100	0.823
Potassium	mg/kg	12000	10300	15.2	26700	25100	6.18	7560	8120	7.14	7660	7280	5.09
Rubidium	mg/kg	8.54	7.39	14.4	18.5	17.1	7.87	3.28	3.39	3.30	4.6	4.34	5.82
Selenium	mg/kg	38.9	36.2	7.19	7.41	6.6	11.6	6.49	6.61	1.83	7.64	7.26	5.10
Silver	mg/kg	0.599	0.475	23.1	<0.0050	<0.0050	-	<0.0050	<0.0050	-	<0.0050	0.005	0
Sodium	mg/kg	4940	4170	16.9	1550	1080	35.7	2350	3130	28.5	3150	2090	40.5
Strontium	mg/kg	0.74	0.53	33.1	1.71	2.04	17.6	3.5	3.81	8.48	3.1	3.28	5.64
Tellurium	mg/kg	<0.020	<0.020	-	<0.020	<0.020	-	<0.020	<0.020	-	<0.020	<0.020	-
Thallium	mg/kg	0.0337	0.0342	1.47	0.0036	0.0032	11.8	<0.0020	<0.0020	-	<0.0020	<0.0020	-
Tin	mg/kg	1.29	0.53	83.5	0.95	0.78	19.7	0.37	0.2	59.6	0.12	<0.10	18.2
Titanium	mg/kg	1.67	<0.50	108	<0.50	4.59	161	<0.50	<0.50	-	<0.25	<0.25	-
Uranium	mg/kg	0.0127	0.0162	24.2	<0.0020	<0.0020	-	<0.0020	<0.0020	-	<0.0020	<0.0020	-
Vanadium	mg/kg	0.98	0.98	0	<0.10	0.23	78.8	<0.10	<0.10	-	<0.10	<0.10	-
Zinc	mg/kg	183	186	1.63	21.3	18	16.8	85.9	98.4	13.6	66.2	64.1	3.22
Zirconium	mg/kg	0.25	<0.20	22.2	<0.20	0.29	36.7	<0.20	<0.20	-	<0.20	<0.20	-

Value did not meet the data quality objective of ≤ 30% Relative Percent Difference (RPD).

Notes: Relative Percent Difference (RPD) was calculated using the LRL if one result in a duplicate pair was below the LRL. RPD was not calculated if both results were < LRL. "-" indicates that the RPD was not calculated; "wwt" indicates wet weight.

Table B.18: **Field Duplicate Results for Fish Tissue Chemistry, Mount Polley Mine CEMP, 2022**

Analyte	Unit	QUL-EAA_LT-Ki-4_2022-10	QUL-EAA_LT-Ki-4X_2022-10	RPD (%)	QUL-EAA_LT-Li-4_2022-10	QUL-EAA_LT-Li-4X_2022-10	RPD (%)	QUL-EAA_LT-M-4_2022-10	QUL-EAA_LT-M-4X_2022-10	RPD (%)	QUL-EAA_LT-O-4_2022-10	QUL-EAA_LT-O-4X_2022-10	RPD (%)
Physical Test													
Moisture	%	71.5	77.3	7.80	80.2	80.2	0	72.2	71	1.68	87.2	84.4	3.26
Metals													
Aluminum	mg/kg	3.7	6.2	50.5	<2.0	<2.0	-	<2.0	<2.0	-	<2.0	<2.0	-
Antimony	mg/kg	<0.010	<0.010	-	<0.010	<0.010	-	<0.010	<0.010	-	<0.010	<0.010	-
Arsenic	mg/kg	0.168	0.314	60.6	0.36	0.348	3.39	0.168	0.207	20.8	0.092	0.059	43.7
Barium	mg/kg	0.069	0.181	89.6	<0.050	<0.050	-	<0.050	0.056	11.3	0.104	<0.050	70.1
Beryllium	mg/kg	<0.010	<0.010	-	<0.010	<0.010	-	<0.010	<0.010	-	<0.010	<0.010	-
Bismuth	mg/kg	<0.010	<0.010	-	<0.010	<0.010	-	<0.010	<0.010	-	<0.010	<0.010	-
Boron	mg/kg	<1.0	<1.0	-	<1.0	<1.0	-	<1.0	<1.0	-	<1.0	<1.0	-
Cadmium	mg/kg	0.398	0.553	32.6	0.251	0.226	10.5	<0.0050	<0.0050	-	0.0132	0.0169	24.6
Calcium	mg/kg	417	545	26.6	537	629	15.8	462	4670	164	1130	985	13.7
Cesium	mg/kg	0.137	0.17	21.5	0.203	0.207	1.95	0.289	0.262	9.80	0.381	0.296	25.1
Chromium	mg/kg	0.193	0.503	89.1	0.291	0.257	12.4	0.058	0.055	5.31	0.084	0.057	38.3
Cobalt	mg/kg	0.074	0.095	24.9	0.132	0.134	1.50	<0.020	<0.020	-	0.096	0.082	15.7
Copper	mg/kg	4.56	5.73	22.7	144	135	6.45	1.13	1.19	5.17	9.22	9.38	1.72
Iron	mg/kg	513	446	14.0	609	799	27.0	16.5	20.8	23.1	276	216	24.4
Lead	mg/kg	<0.020	0.023	14.0	<0.020	<0.020	-	<0.020	<0.020	-	<0.020	0.02	0
Lithium	mg/kg	<0.50	<0.50	-	<0.50	<0.50	-	<0.50	<0.50	-	<0.50	<0.50	-
Magnesium	mg/kg	469	457	2.59	795	782	1.65	902	916	1.54	835	896	7.05
Manganese	mg/kg	0.906	1.07	16.6	3.51	3.25	7.69	0.311	0.482	43.1	5.04	3.9	25.5
Mercury	mg/kg dwt	0.698	0.658	5.90	0.668	0.669	0.150	0.346	0.318	8.43	0.184	0.17	7.91
	mg/kg wwt	2.45	2.9	16.8	3.37	3.38	0.296	1.24	1.1	12.0	1.44	1.09	27.7
Molybdenum	mg/kg	0.097	0.14	36.3	0.276	0.268	2.94	<0.020	<0.020	-	0.083	0.063	27.4
Nickel	mg/kg	<0.20	0.24	18.2	<0.20	<0.20	-	<0.20	<0.20	-	<0.20	<0.20	-
Phosphorus	mg/kg	6970	8060	14.5	14600	14600	0	8130	9290	13.3	12500	11600	7.47
Potassium	mg/kg	6390	7120	10.8	12100	12100	0	14900	11200	28.4	15300	12600	19.4
Rubidium	mg/kg	18.3	20.5	11.3	30.8	31.6	2.56	35	25.2	32.6	47.1	35.8	27.3
Selenium	mg/kg	3.95	6.67	51.2	6.12	5.96	2.65	1.37	1.22	11.6	4.16	3.8	9.05
Silver	mg/kg	0.0164	0.0206	22.7	1.36	1.16	15.9	<0.0050	<0.0050	-	0.0156	0.0164	5.00
Sodium	mg/kg	7120	8240	14.6	9480	9600	1.26	1090	1060	2.79	16300	13000	22.5
Strontium	mg/kg	1.13	1.31	14.8	0.774	2.15	94.1	0.448	6.85	175	1.36	1.68	21.1
Tellurium	mg/kg	<0.020	<0.020	-	<0.020	<0.020	-	<0.020	<0.020	-	<0.020	<0.020	-
Thallium	mg/kg	0.0617	0.0768	21.8	0.401	0.368	8.58	0.0288	0.0325	12.1	0.0966	0.0838	14.2
Tin	mg/kg	0.33	0.7	71.8	0.67	0.66	1.50	0.16	0.16	0	0.32	0.28	13.3
Titanium	mg/kg	0.38	0.51	29.2	<0.25	<0.25	-	<0.25	0.26	3.92	<0.25	0.29	14.8
Uranium	mg/kg	<0.0020	0.0024	18.2	<0.0020	<0.0020	-	<0.0020	<0.0020	-	<0.0020	<0.0020	-
Vanadium	mg/kg	<0.10	<0.10	-	<0.10	<0.10	-	<0.10	<0.10	-	<0.10	<0.10	-
Zinc	mg/kg	48.2	66	31.2	157	151	3.90	9.88	11.9	18.5	152	122	21.9
Zirconium	mg/kg	<0.20	<0.20	-	<0.20	<0.20	-	<0.20	<0.20	-	<0.20	<0.20	-

Value did not meet the data quality objective of ≤ 30% Relative Percent Difference (RPD).

Notes: Relative Percent Difference (RPD) was calculated using the LRL if one result in a duplicate pair was below the LRL. RPD was not calculated if both results were < LRL. "-" indicates that the RPD was not calculated; "wwt" indicates wet weight.

Table B.18: Field Duplicate Results for Fish Tissue Chemistry, Mount Polley Mine CEMP, 2022

Analyte	Unit	QUL-NCP_LT-Ki-1_2022-10	QUL-NCP_LT-Ki-1X_2022-10	RPD (%)	QUL-NCP_LT-Li-1_2022-10	QUL-NCP_LT-Li-1X_2022-10	RPD (%)	QUL-NCP_LT-M-1_2022-10	QUL-NCP_LT-M-1X_2022-10	RPD (%)	QUL-NCP_LT-O-1_2022-10	QUL-NCP_LT-O-1X_2022-10	RPD (%)
Physical Test													
Moisture	%	84.1	82.3	2.16	79.7	78.8	1.14	76.9	76.2	0.914	64.8	64.4	0.619
Metals													
Aluminum	mg/kg	15.9	11.8	29.6	3.3	3.1	6.25	<2.0	<2.0	-	<2.0	<2.0	-
Antimony	mg/kg	<0.010	<0.010	-	<0.010	<0.010	-	<0.010	<0.010	-	<0.010	<0.010	-
Arsenic	mg/kg	0.239	0.19	22.8	0.265	0.222	17.7	0.09	0.092	2.20	0.046	0.042	9.09
Barium	mg/kg	0.195	0.161	19.1	<0.050	0.052	3.92	<0.050	<0.050	-	<0.050	<0.050	-
Beryllium	mg/kg	<0.010	<0.010	-	<0.010	<0.010	-	<0.010	<0.010	-	<0.010	<0.010	-
Bismuth	mg/kg	<0.010	<0.010	-	<0.010	<0.010	-	<0.010	<0.010	-	<0.010	<0.010	-
Boron	mg/kg	<1.0	<1.0	-	<1.0	<1.0	-	<1.0	<1.0	-	<1.0	<1.0	-
Cadmium	mg/kg	3.54	2.52	33.7	0.519	0.422	20.6	<0.0050	<0.0050	-	<0.0050	<0.0050	-
Calcium	mg/kg	830	729	13.0	345	337	2.35	826	428	63.5	1060	978	8.05
Cesium	mg/kg	0.246	0.224	9.36	0.296	0.308	3.97	0.309	0.297	3.96	0.0725	0.0694	4.37
Chromium	mg/kg	1.16	0.859	29.8	0.28	0.228	20.5	<0.050	<0.050	-	0.053	<0.050	5.83
Cobalt	mg/kg	0.217	0.174	22.0	0.098	0.09	8.51	<0.020	<0.020	-	0.045	0.042	6.90
Copper	mg/kg	3.56	3.18	11.3	12.6	11.1	12.7	0.71	0.74	4.14	12.8	12.4	3.17
Iron	mg/kg	718	635	12.3	354	347	2.00	8.6	8.6	0	53.7	47.7	11.8
Lead	mg/kg	0.032	0.028	13.3	<0.020	<0.020	-	<0.020	<0.020	-	<0.020	<0.020	-
Lithium	mg/kg	<0.50	<0.50	-	<0.50	<0.50	-	<0.50	<0.50	-	<0.50	<0.50	-
Magnesium	mg/kg	719	632	12.9	1070	1070	0	1110	1060	4.61	1330	1350	1.49
Manganese	mg/kg	1.39	0.901	42.7	6.53	5.94	9.46	0.272	0.28	2.90	0.799	0.747	6.73
Mercury	mg/kg dwt	1.26	1.16	8.26	0.624	0.547	13.2	0.515	0.498	3.36	0.0955	0.0957	0.209
	mg/kg wwt	7.89	6.57	18.3	3.08	2.58	17.7	2.23	2.09	6.48	0.271	0.269	0.741
Molybdenum	mg/kg	0.276	0.227	19.5	0.336	0.338	0.593	<0.020	<0.020	-	<0.020	<0.020	-
Nickel	mg/kg	0.7	0.51	31.4	<0.20	<0.20	-	<0.20	<0.20	-	<0.20	<0.20	-
Phosphorus	mg/kg	15100	11400	27.9	21400	18200	16.2	11100	10300	7.48	11200	9800	13.3
Potassium	mg/kg	14200	10100	33.7	21300	17300	20.7	19600	18700	4.70	6430	5250	20.2
Rubidium	mg/kg	36.9	27	31.0	89.8	83.7	7.03	40.5	38.7	4.55	11.9	10.1	16.4
Selenium	mg/kg	13.1	10.2	24.9	6.12	5.35	13.4	1.88	1.58	17.3	4.21	3.96	6.12
Silver	mg/kg	0.0179	0.0151	17.0	0.0718	0.0569	23.2	<0.0050	<0.0050	-	0.04	0.0355	11.9
Sodium	mg/kg	14900	12800	15.2	5570	5270	5.54	1090	1050	3.74	3320	3040	8.81
Strontium	mg/kg	1.9	1.76	7.65	0.366	0.387	5.58	1.02	0.385	90.4	2.56	2.53	1.18
Tellurium	mg/kg	<0.020	<0.020	-	<0.020	<0.020	-	<0.020	<0.020	-	<0.020	<0.020	-
Thallium	mg/kg	0.12	0.0929	25.5	0.695	0.646	7.31	0.0254	0.0246	3.20	0.0202	0.0183	9.87
Tin	mg/kg	1.3	0.73	56.2	0.22	0.21	4.65	0.22	0.26	16.7	0.11	0.1	9.52
Titanium	mg/kg	0.84	0.84	0	<0.25	0.29	14.8	<0.25	<0.25	-	<0.25	<0.25	-
Uranium	mg/kg	0.0105	0.0074	34.6	<0.0020	<0.0020	-	<0.0020	<0.0020	-	<0.0020	<0.0020	-
Vanadium	mg/kg	0.22	0.14	44.4	0.1	<0.10	0	<0.10	<0.10	-	<0.10	<0.10	-
Zinc	mg/kg	98.4	71.1	32.2	110	97.2	12.4	11.5	9.99	14.1	75.4	69.7	7.86
Zirconium	mg/kg	<0.20	<0.20	-	<0.20	<0.20	-	<0.20	<0.20	-	<0.20	<0.20	-

Value did not meet the data quality objective of ≤ 30% Relative Percent Difference (RPD).

Notes: Relative Percent Difference (RPD) was calculated using the LRL if one result in a duplicate pair was below the LRL. RPD was not calculated if both results were < LRL. "-" indicates that the RPD was not calculated; "wwt" indicates wet weight.

Table B.18: Field Duplicate Results for Fish Tissue Chemistry, Mount Polley Mine CEMP, 2022

Analyte	Unit	QUL-NGC_PCC-Ki-7_2022-10	QUL-NGC_PCC-Ki-7X_2022-10	RPD (%)	QUL-NGC_PCC-Li-5_2022-10	QUL-NGC_PCC-Li-5X_2022-10	RPD (%)	QUL-NGC_PCC-M-5_2022-10	QUL-NGC_PCC-M-5X_2022-10	RPD (%)	QUL-NGC_PCC-O-5_2022-10	QUL-NGC_PCC-O-5X_2022-10	RPD (%)
Physical Test													
Moisture	%	60.8	69.9	13.9	62.2	57	8.72	76.7	78.3	2.06	69	68.4	0.873
Metals													
Aluminum	mg/kg	<5.0	<5.0	-	13.5	15.6	15.6	2.7	<2.0	29.8	<2.0	<2.0	-
Antimony	mg/kg	<0.020	<0.020	-	0.011	<0.020	58.1	<0.010	<0.010	-	<0.010	<0.010	-
Arsenic	mg/kg	0.351	0.505	36.0	1.29	1.11	14.0	0.26	0.274	5.24	0.106	0.114	7.27
Barium	mg/kg	0.927	0.931	0.431	0.099	0.149	50.5	0.918	0.336	92.8	0.415	0.483	15.1
Beryllium	mg/kg	<0.010	<0.010	-	<0.010	<0.010	-	<0.010	<0.010	-	<0.010	<0.010	-
Bismuth	mg/kg	0.059	0.094	45.8	0.031	0.032	3.23	<0.010	<0.010	-	<0.010	<0.010	-
Boron	mg/kg	<1.0	1.3	26.1	<1.0	<1.0	-	<1.0	<1.0	-	<1.0	<1.0	-
Cadmium	mg/kg	6.21	10.9	54.8	1.19	1.11	6.72	0.0108	<0.0050	73.4	0.031	0.0298	3.95
Calcium	mg/kg	269	275	2.21	121	126	4.13	2160	2190	1.38	662	687	3.71
Cesium	mg/kg	0.0443	0.0746	51.0	0.0259	0.0199	23.2	0.136	0.143	5.02	0.067	0.0675	0.743
Chromium	mg/kg	0.25	0.42	50.7	0.28	0.33	17.9	0.194	<0.050	118	<0.050	<0.050	-
Cobalt	mg/kg	1.49	2.47	49.5	0.236	0.228	3.39	0.03	0.037	20.9	0.186	0.185	0.539
Copper	mg/kg	3.7	5.6	40.9	13.9	11.2	19.4	1.09	1.85	51.7	4.61	4.62	0.217
Iron	mg/kg	314	334	6.17	421	518	23.0	14	19.4	32.3	70.4	70.7	0.425
Lead	mg/kg	<0.050	<0.050	-	<0.050	<0.050	-	<0.020	<0.020	-	<0.020	<0.020	-
Lithium	mg/kg	<0.50	<0.50	-	<0.50	<0.50	-	<0.50	<0.50	-	<0.50	<0.50	-
Magnesium	mg/kg	342	603	55.2	532	425	20.1	1630	1660	1.82	927	960	3.50
Manganese	mg/kg	1.73	3.18	59.1	3.4	3.03	10.9	0.837	0.917	9.12	15.1	14.2	6.14
Mercury	mg/kg dwt	0.279	0.517	59.8	0.317	0.315	0.631	0.24	0.237	1.26	0.0158	0.0168	6.13
	mg/kg wwt	0.109	0.156	35.5	0.12	0.135	12.5	1.03	1.09	5.66	0.0512	0.0532	3.83
Molybdenum	mg/kg	0.5	0.845	51.3	0.715	0.579	19.0	<0.020	<0.020	-	0.154	0.155	0.647
Nickel	mg/kg	<1.00	<3.50	-	<0.20	<0.20	-	<0.20	<0.20	-	<0.20	<0.20	-
Phosphorus	mg/kg	6930	11700	51.2	9360	8340	10.9	12300	12400	0.810	10700	9500	11.9
Potassium	mg/kg	6160	10700	53.9	7090	6180	12.8	22200	21100	5.08	10900	9450	14.3
Rubidium	mg/kg	9.61	16.8	54.4	11.5	10.2	11.3	32.5	31.9	1.86	19.4	17.1	12.6
Selenium	mg/kg	4.33	6.71	43.1	6.01	5.90	1.83	1.66	1.74	4.71	9.08	8.98	1.11
Silver	mg/kg	<0.0050	0.006	18.2	0.0372	0.0234	37.1	<0.0050	<0.0050	-	0.0205	0.0205	0
Sodium	mg/kg	2910	4260	37.7	2450	2110	13.9	1160	1230	5.86	2240	2120	5.50
Strontium	mg/kg	0.6	0.63	4.88	0.31	0.29	6.45	3.66	4.01	9.13	0.716	0.753	5.04
Tellurium	mg/kg	0.04	0.07	54.5	<0.020	<0.020	-	<0.020	<0.020	-	<0.020	<0.020	-
Thallium	mg/kg	0.0268	0.0393	37.8	0.0165	0.0165	0	0.0049	0.0069	33.9	0.0059	0.0058	1.71
Tin	mg/kg	<0.10	<0.10	-	<0.10	<0.10	-	0.74	0.26	96.0	0.52	0.53	1.90
Titanium	mg/kg	0.65	1.04	46.2	<0.50	<0.50	-	1.06	0.29	114	<0.25	0.27	7.69
Uranium	mg/kg	0.0303	0.0513	51.5	0.0511	0.0580	13.5	0.0035	0.003	15.4	0.0104	0.01	3.92
Vanadium	mg/kg	0.28	0.48	52.6	0.31	0.36	16.1	<0.10	<0.10	-	<0.10	<0.10	-
Zinc	mg/kg	103	135	26.9	70.7	69.9	1.13	20.2	28.1	32.7	140	151	7.56
Zirconium	mg/kg	<0.20	<0.20	-	<0.20	<0.20	-	<0.20	<0.20	-	<0.20	<0.20	-

Value did not meet the data quality objective of ≤ 30% Relative Percent Difference (RPD).

Notes: Relative Percent Difference (RPD) was calculated using the LRL if one result in a duplicate pair was below the LRL. RPD was not calculated if both results were < LRL. "-" indicates that the RPD was not calculated; "wwt" indicates wet weight.

Table B.18: **Field Duplicate Results for Fish Tissue Chemistry, Mount Polley Mine CEMP, 2022**

Analyte	Unit	QUL-NHC_PCC-Ki-6_2022-10	QUL-NHC_PCC-Ki-6X_2022-10	RPD (%)	QUL-NHC_PCC-Li-6_2022-10	QUL-NHC_PCC-Li-6X_2022-10	RPD (%)	QUL-NHC_PCC-M-6_2022-10	QUL-NHC_PCC-M-6X_2022-10	RPD (%)	QUL-NHC_PCC-O-6_2022-10	QUL-NHC_PCC-O-6X_2022-10	RPD (%)
Physical Test													
Moisture	%	50	59.1	16.7	61	71	15.2	80.5	77.6	3.67	61	64.2	5.11
Metals													
Aluminum	mg/kg	7.1	8.2	14.4	15.4	16.7	8.10	<2.0	<2.0	-	<2.0	<2.0	-
Antimony	mg/kg	<0.020	<0.020	-	0.016	0.016	0	<0.010	<0.010	-	<0.010	<0.010	-
Arsenic	mg/kg	0.419	0.289	36.7	0.299	0.34	12.8	0.384	0.276	32.7	0.166	0.159	4.31
Barium	mg/kg	2.29	1.57	37.3	0.212	0.199	6.33	1.06	0.73	36.9	0.511	0.367	32.8
Beryllium	mg/kg	<0.010	<0.010	-	<0.010	<0.010	-	<0.010	<0.010	-	<0.010	<0.010	-
Bismuth	mg/kg	0.038	0.029	26.9	0.033	0.037	11.4	<0.010	<0.010	-	<0.010	<0.010	-
Boron	mg/kg	1.2	<1.0	18.2	<1.0	<1.0	-	<1.0	<1.0	-	<1.0	<1.0	-
Cadmium	mg/kg	24.6	18.9	26.2	1.59	2.02	23.8	0.021	0.0417	66.0	0.027	0.0544	67.3
Calcium	mg/kg	958	2720	95.8	170	199	15.7	3400	4350	24.5	272	270	0.738
Cesium	mg/kg	0.0462	0.0315	37.8	0.0224	0.0331	38.6	0.103	0.0852	18.9	0.0298	0.033	10.2
Chromium	mg/kg	0.48	0.41	15.7	0.37	0.4	7.79	0.129	<0.050	88.3	0.082	<0.050	48.5
Cobalt	mg/kg	4	3.14	24.1	0.25	0.33	27.6	0.046	0.038	19.0	0.106	0.124	15.7
Copper	mg/kg	7	4.69	39.5	24.7	26.6	7.41	2.75	1.42	63.8	4.33	5.54	24.5
Iron	mg/kg	336	236	35.0	1240	1380	10.7	31.5	17.6	56.6	47.1	74.8	45.4
Lead	mg/kg	0.181	0.149	19.4	0.06	0.054	10.5	0.024	0.027	11.8	<0.020	<0.020	-
Lithium	mg/kg	<0.50	<0.50	-	<0.50	<0.50	-	<0.50	<0.50	-	<0.50	<0.50	-
Magnesium	mg/kg	673	498	29.9	585	850	36.9	2100	1730	19.3	641	670	4.42
Manganese	mg/kg	6.54	5.42	18.7	5.15	6.36	21.0	1.76	1.62	8.28	10.1	9.91	1.90
Mercury	mg/kg dwt	0.347	0.266	26.4	0.407	0.432	5.96	0.167	0.17	1.78	0.0097	0.0122	22.8
	mg/kg wwt	0.173	0.109	45.4	0.159	0.125	23.9	0.856	0.76	11.9	0.0249	0.034	30.9
Molybdenum	mg/kg	0.742	0.569	26.4	1.04	1.1	5.61	<0.020	<0.020	-	0.088	0.108	20.4
Nickel	mg/kg	<2.40	<1.80	-	<0.20	0.39	64.4	<0.20	<0.20	-	<0.20	<0.20	-
Phosphorus	mg/kg	12800	9900	25.6	11000	14000	24.0	16400	12600	26.2	10600	10600	0
Potassium	mg/kg	10800	7630	34.4	8390	10900	26.0	25600	18800	30.6	7940	7650	3.72
Rubidium	mg/kg	14.9	10.6	33.7	9.62	13	29.9	28.7	20.7	32.4	10.4	9.92	4.72
Selenium	mg/kg	8.99	6.6	30.7	9.62	10.9	12.5	5.24	4.23	21.3	16.6	18.6	11.4
Silver	mg/kg	0.0118	0.0073	47.1	0.118	0.101	15.5	<0.0050	<0.0050	-	0.018	0.0238	27.8
Sodium	mg/kg	4950	3270	40.9	3290	3920	17.5	1400	1150	19.6	1580	1700	7.32
Strontium	mg/kg	2.16	7.12	107	0.45	0.5	10.5	5.79	7.48	25.5	0.317	0.378	17.6
Tellurium	mg/kg	0.045	0.036	22.2	<0.020	<0.020	-	<0.020	<0.020	-	<0.020	<0.020	-
Thallium	mg/kg	0.0488	0.0352	32.4	0.0276	0.0282	2.15	0.0104	0.0062	50.6	0.0054	0.0058	7.14
Tin	mg/kg	0.52	<0.10	135	0.27	1.91	150	1.52	1.47	3.34	0.22	0.31	34.0
Titanium	mg/kg	0.55	0.87	45.1	<0.50	<0.50	-	0.25	0.28	11.3	<0.25	<0.25	-
Uranium	mg/kg	0.144	0.112	25.0	0.0605	0.077	24.0	0.0054	0.0056	3.64	0.0103	0.0126	20.1
Vanadium	mg/kg	1.23	0.92	28.8	1.13	1.3	14.0	<0.10	<0.10	-	<0.10	<0.10	-
Zinc	mg/kg	156	102	41.9	85	105	21.1	29.8	21	34.6	93	101	8.25
Zirconium	mg/kg	<0.20	<0.20	-	<0.20	<0.20	-	<0.20	<0.20	-	<0.20	<0.20	-

Value did not meet the data quality objective of ≤ 30% Relative Percent Difference (RPD).

Notes: Relative Percent Difference (RPD) was calculated using the LRL if one result in a duplicate pair was below the LRL. RPD was not calculated if both results were < LRL. "-" indicates that the RPD was not calculated; "wwt" indicates wet weight.

Table B.18: **Field Duplicate Results for Fish Tissue Chemistry, Mount Polley Mine CEMP, 2022**

Analyte	Unit	QUR_RB-Ki-5_2022-10	QUR_RB-Ki-5X_2022-10	RPD (%)	QUR_RB-Li-5_2022-10	QUR_RB-Li-5X_2022-10	RPD (%)	QUR_RB-M-5_2022-10	QUR_RB-M-5X_2022-10	RPD (%)	QUR_RB-O-5_2022-10	QUR_RB-O-5X_2022-10	RPD (%)
Physical Test													
Moisture	%	78.4	77.6	1.03	69.7	70.4	0.999	78.1	77.5	0.771	72.7	69.5	4.50
Metals													
Aluminum	mg/kg	19.2	21.4	10.8	50.2	34.7	36.5	3.4	3.1	9.23	12.7	9.3	30.9
Antimony	mg/kg	0.022	0.016	31.6	0.055	<0.010	138	<0.010	<0.010	-	<0.010	<0.010	-
Arsenic	mg/kg	3.25	2.34	32.6	1.01	0.769	27.1	5.27	4.98	5.66	0.35	0.288	19.4
Barium	mg/kg	1.62	1.16	33.1	0.69	0.343	67.2	0.82	0.491	50.2	0.704	0.524	29.3
Beryllium	mg/kg	<0.010	<0.010	-	<0.010	<0.010	-	<0.010	<0.010	-	<0.010	<0.010	-
Bismuth	mg/kg	<0.010	<0.010	-	<0.010	<0.010	-	<0.010	<0.010	-	<0.010	<0.010	-
Boron	mg/kg	1.7	2	16.2	1	<1.0	0	<1.0	<1.0	-	1.2	1	18.2
Cadmium	mg/kg	3.32	1.85	56.9	1.82	1.38	27.5	<0.0050	0.0084	50.7	0.04	0.032	22.2
Calcium	mg/kg	1330	754	55.3	247	238	3.71	644	870	29.9	845	835	1.19
Cesium	mg/kg	0.0773	0.0507	41.6	0.0631	0.0467	29.9	0.117	0.106	9.87	0.0519	0.0486	6.57
Chromium	mg/kg	0.44	0.5	12.8	<0.20	<0.20	-	0.11	0.054	68.3	<0.20	<0.20	-
Cobalt	mg/kg	1.57	1.35	15.1	0.264	0.218	19.1	0.077	0.079	2.56	0.732	0.612	17.9
Copper	mg/kg	8.18	5.6	37.4	46.8	39.6	16.7	1.59	1.69	6.10	45.3	38.7	15.7
Iron	mg/kg	956	1170	20.1	2960	2150	31.7	23.5	23.3	0.855	335	271	21.1
Lead	mg/kg	0.081	0.093	13.8	0.082	0.064	24.7	<0.020	0.028	33.3	<0.050	<0.050	-
Lithium	mg/kg	<0.50	<0.50	-	<0.50	<0.50	-	<0.50	<0.50	-	<0.50	<0.50	-
Magnesium	mg/kg	806	740	8.54	776	640	19.2	1520	1370	10.4	1220	1060	14.0
Manganese	mg/kg	3.38	2.76	20.2	11.9	9.49	22.5	0.648	0.647	0.154	19.1	16.5	14.6
Mercury	mg/kg dwt	0.708	0.899	23.8	0.251	0.211	17.3	0.128	0.129	0.778	0.0869	0.074	16.0
	mg/kg wwt	0.153	0.202	27.6	0.076	0.0625	19.5	0.583	0.574	1.56	0.0237	0.0226	4.75
Molybdenum	mg/kg	0.684	0.41	50.1	1.4	1.04	29.5	<0.020	<0.020	-	0.043	<0.040	7.23
Nickel	mg/kg	1.56	1.77	12.6	<0.20	<0.20	-	<0.20	0.51	87.3	<0.20	<0.20	-
Phosphorus	mg/kg	11000	10400	5.61	17300	13500	24.7	14000	13400	4.38	9860	8470	15.2
Potassium	mg/kg	13800	12500	9.89	14100	10500	29.3	25000	23500	6.19	8480	7140	17.2
Rubidium	mg/kg	16.4	13.8	17.2	18.3	13.9	27.3	26.4	24.9	5.85	11.3	9.81	14.1
Selenium	mg/kg	16.2	15.1	7.03	17	13.8	20.8	2.83	2.71	4.33	14.7	13	12.3
Silver	mg/kg	0.0639	0.0335	62.4	2.35	1.92	20.1	<0.0050	<0.0050	-	0.12	0.114	5.13
Sodium	mg/kg	8970	6180	36.8	3650	3150	14.7	1700	1830	7.37	5490	4280	24.8
Strontium	mg/kg	5.43	2.76	65.2	0.38	0.38	0	0.744	1.07	35.9	2.13	2	6.30
Tellurium	mg/kg	0.038	0.054	34.8	<0.020	<0.020	-	<0.020	<0.020	-	<0.020	<0.020	-
Thallium	mg/kg	0.109	0.0747	37.3	0.143	0.109	27.0	0.0276	0.0258	6.74	0.0114	0.0104	9.17
Tin	mg/kg	0.1	<0.10	0	<0.10	<0.10	-	<0.10	<0.10	-	<0.10	<0.10	-
Titanium	mg/kg	0.52	<0.50	3.92	<0.50	<0.50	-	<0.25	<0.25	-	<0.50	<0.50	-
Uranium	mg/kg	0.0796	0.102	24.7	0.074	0.0486	41.4	<0.0020	<0.0020	-	0.0123	0.0107	13.9
Vanadium	mg/kg	0.78	1.13	36.6	0.67	0.5	29.1	<0.10	<0.10	-	0.15	0.12	22.2
Zinc	mg/kg	117	120	2.53	105	87.2	18.5	16	16.7	4.28	168	147	13.3
Zirconium	mg/kg	0.31	0.53	52.4	0.68	0.23	98.9	<0.20	<0.20	-	0.23	<0.20	14.0

Value did not meet the data quality objective of ≤ 30% Relative Percent Difference (RPD).

Notes: Relative Percent Difference (RPD) was calculated using the LRL if one result in a duplicate pair was below the LRL. RPD was not calculated if both results were < LRL. "-" indicates that the RPD was not calculated; "wwt" indicates wet weight.

Kidney tissue had the highest rate of DQO exceedances (21.9% of duplicate sets) and liver and ovary tissue had the lowest average rate of DQO exceedances (3.13% of duplicate sets, each). These relatively high rates of DQO exceedances were likely due to sample heterogeneity expected in biological tissues and this source of variability will be considered during data interpretation, especially with regards to kidney and muscle tissue. Generally, field duplicate samples of fish tissue were considered to have acceptable field precision and reproducibility.

B10.4 Data Accuracy

Data accuracy was evaluated based on results of 28 RM samples and 57 LCS samples (see laboratory reports VA22B2820, VA22B2821, VA22B4917, and VA22B5055; Appendix G). Out of 756 individual analyte results for RM samples, three did not meet the laboratory DQO (0.40% of analyte results), including one result for nickel and two results for lead. Both of these DQO exceedances occurred in multi-element scans where >10% of analytes met the laboratory DQO, which is a level deemed acceptable by the CCME (VA22B2820, VA22B2821; Appendix G). Out of the 1,029 individual LCS results, eight did not meet the laboratory DQO (0.78% of analyte results), including one result for iron, two results each for lithium and silver, and three results for boron. All of the above DQO exceedances were due to multi-element scans where >10% of analytes met the laboratory DQO, which is a level deemed acceptable by the CCME (VA22B2820, VA22B2821, VA22B4917, and VA22B5055; Appendix G). As these DQO exceedances only represent 0.40 and 0.78% of all individual analyte results for RM and LSC samples respectively, laboratory accuracy can be considered excellent.

B10.5 Hold Times

Recommended hold times for fish tissue samples were met for all parameters in all samples (VA22B2820, VA22B2821, and VA22B4917, and VA22B5055; Appendix G).

B10.6 Data Quality Statement

Fish tissue chemistry data collected as part of the 2022 CEMP were of good quality as characterized by appropriate LRLs, excellent laboratory precision, no evidence of laboratory contamination, and excellent laboratory accuracy. Field sampling precision, as quantified using field duplicate samples, was relatively low, especially in kidney and muscle tissue; however, this is likely compensated for by the number of replicate fish tissue samples employed in this study. Therefore, fish tissue chemistry data can be used with a high level of confidence in the derivation of conclusions for the 2022 CEMP, though these sources of variability will be considered during data interpretation.

B11 FISH AGING

Data Accuracy

Analytical reports of fish age estimates from AAE Tech Services Inc. (see laboratory reports in Appendix G) were examined to evaluate data accuracy. To determine the accuracy of rainbow trout, longnose sucker, peamouth chub, lake trout, and northern pikeminnow age estimates, all aging structures that were analyzed by AAE Technical Service were re-processed by a second analyst. The original and second analyst assigned a confidence index to each age estimate and check. Original and re-assessed age estimates were in agreement for all samples. Accuracy achieved by the laboratory in this study can therefore be considered excellent.

B12 DATA QUALITY REVIEW SUMMARY

Data collected for the 2022 CEMP were of acceptable quality as characterized by appropriate LRLs, good detectability, negligible analyte concentration in MB samples, good laboratory precision, and good laboratory accuracy. Field sampling precision, as measured by RPD in field duplicate pairs, was low in benthic invertebrate and periphyton tissue samples, reflecting natural variability. The hold times for chlorophyll-a were exceeded in four samples from August as these samples were not field-filtered, which highlights the importance of filtering these samples in the field to ensure the highest data quality possible. Additionally, the concentrations of several dissolved analytes were greater than the concentration of the corresponding total analyte. These unexpected results could be due to contamination during field filtration or could represent inaccuracies that are inevitable when conducting multi-element scans.

Overall, data collected as part of the 2022 Mount Polley Mine CEMP can be used with a high level of confidence in the derivation of conclusions.

B13 REFERENCES

BCMOE (British Columbia Ministry of Environment). 2014. Ambient Water Quality Guidelines for Selenium. Technical Report Update. Water Protection and Sustainability Branch. April 2014.

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BCMOECCS. 2021b. British Columbia Approved Water Quality Guidelines: Aquatic Life, Wildlife and Agriculture – Guideline Summary. Water Quality Guideline Series, WQG-20. Water Protection and Sustainability Branch, Province of British Columbia, Victoria, B.C.

CFIA (Canadian Food Inspection Agency). 2015. Canadian Food Inspection Agency Fish Products Standards and Methods Manual: Appendix 3, Canadian Guidelines for Chemical Contaminants and Toxins in Fish and Fish Products. Ottawa, ON.

Environment Canada. 2014. CABIN (Canadian Aquatic Biomonitoring Network) Laboratory Methods: Processing, Taxonomy, and Quality Control of Benthic Macroinvertebrate Samples. Environment Canada. May 2014.

Minnow (Minnow Environmental Inc.). 2020 Mount Polley Mine Comprehensive Environmental Monitoring Program 2019 – Sediment and Aquatic Life. Prepared for Mount Polley Mining Corporation, Likely, BC. March 2020. Project 197202.0021.

APPENDIX C
DATA - LAKES

APPENDIX C.1
WATER QUALITY

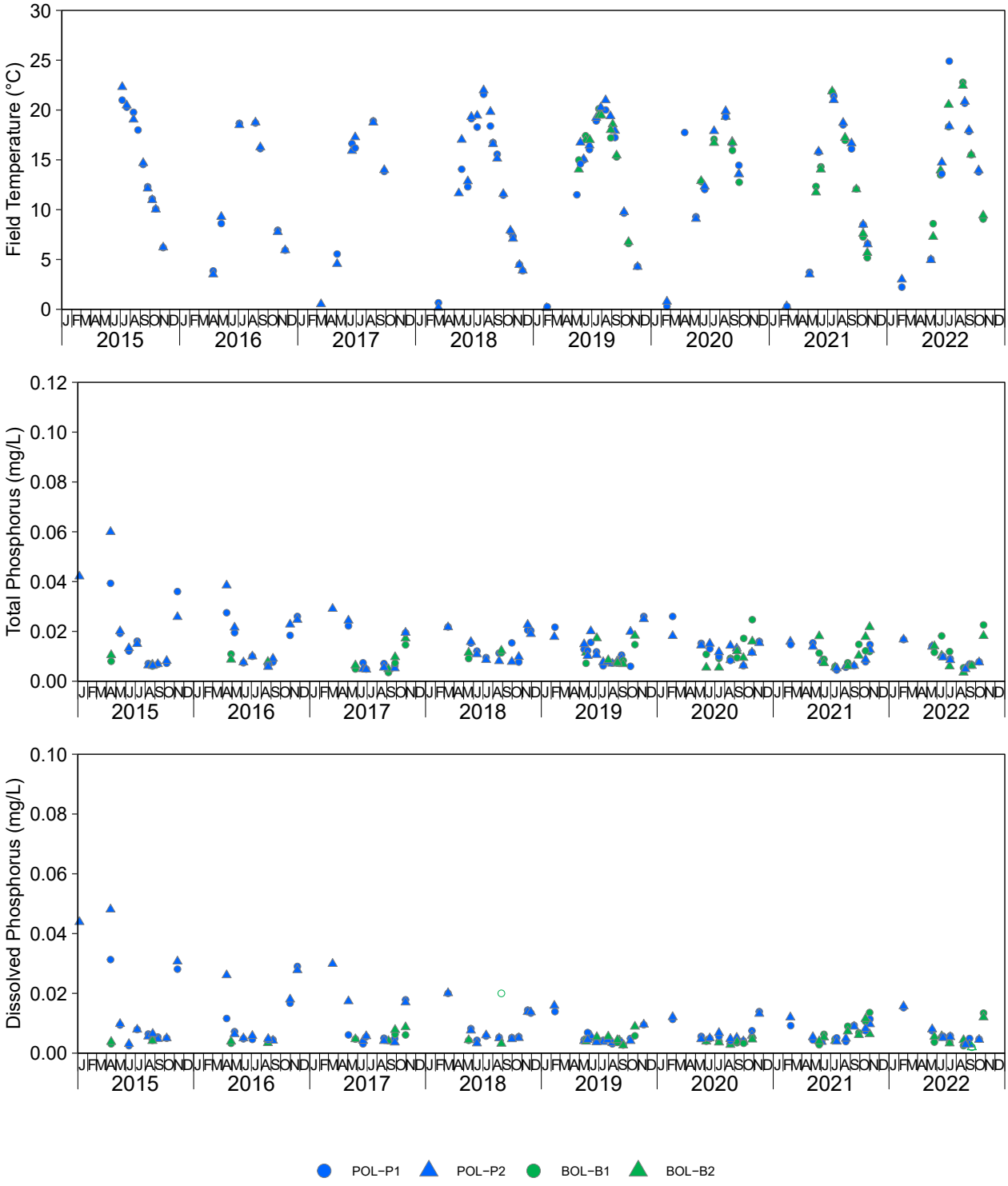
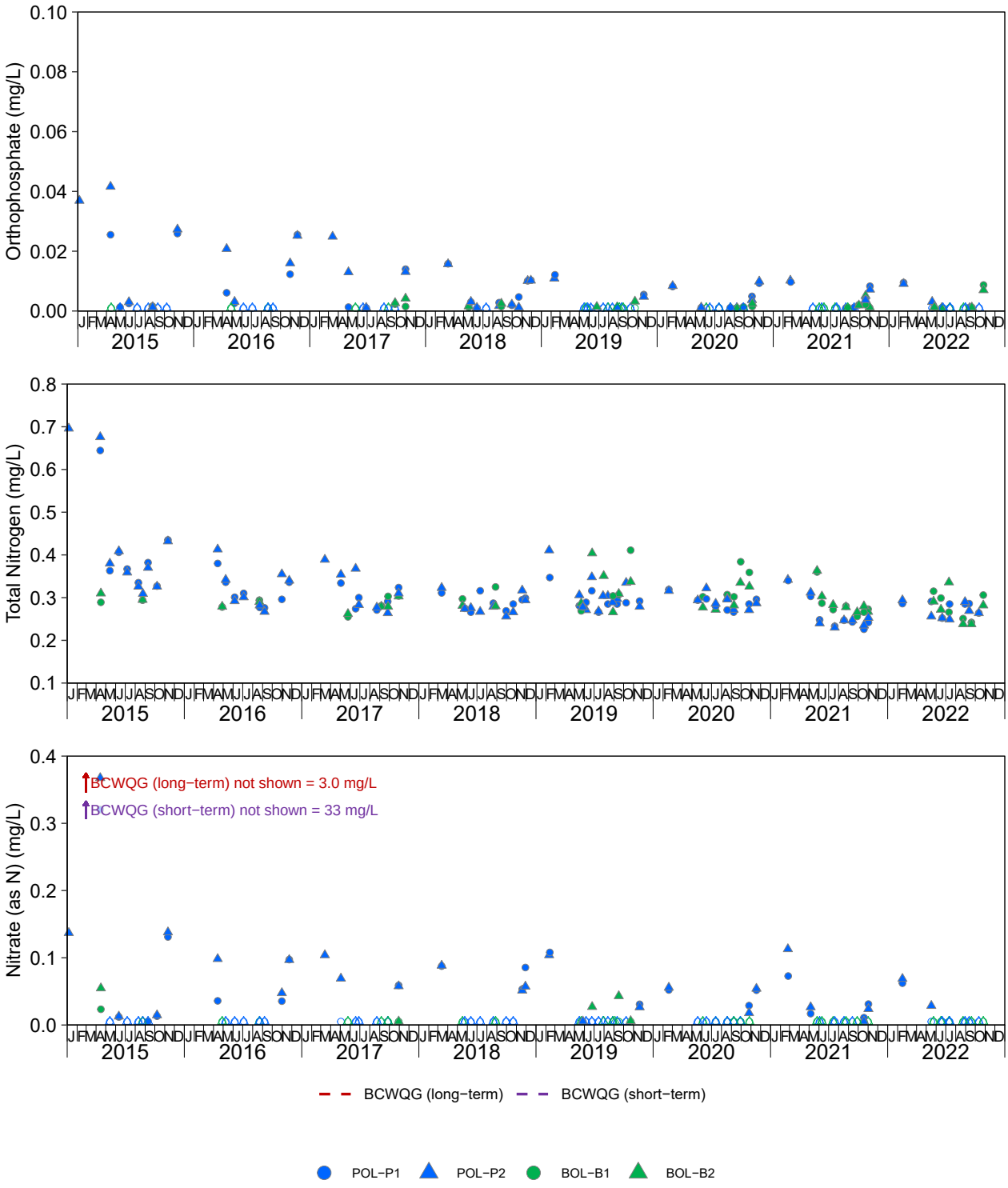


Figure C.1.1: Temperature and Nutrient Concentrations in Post−Breach Surface Water for Polley Lake (POL−P1, POL−P2; Exposed) and Bootjack Lake (BOL−B1, BOL−B2; Reference) Monitoring Stations, 2015 to 2022

Notes: BCWQG = British Columbia Water Quality Guideline (BCMOECCS 2021a,b). Green represents reference stations and blue represents exposed stations. Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL.



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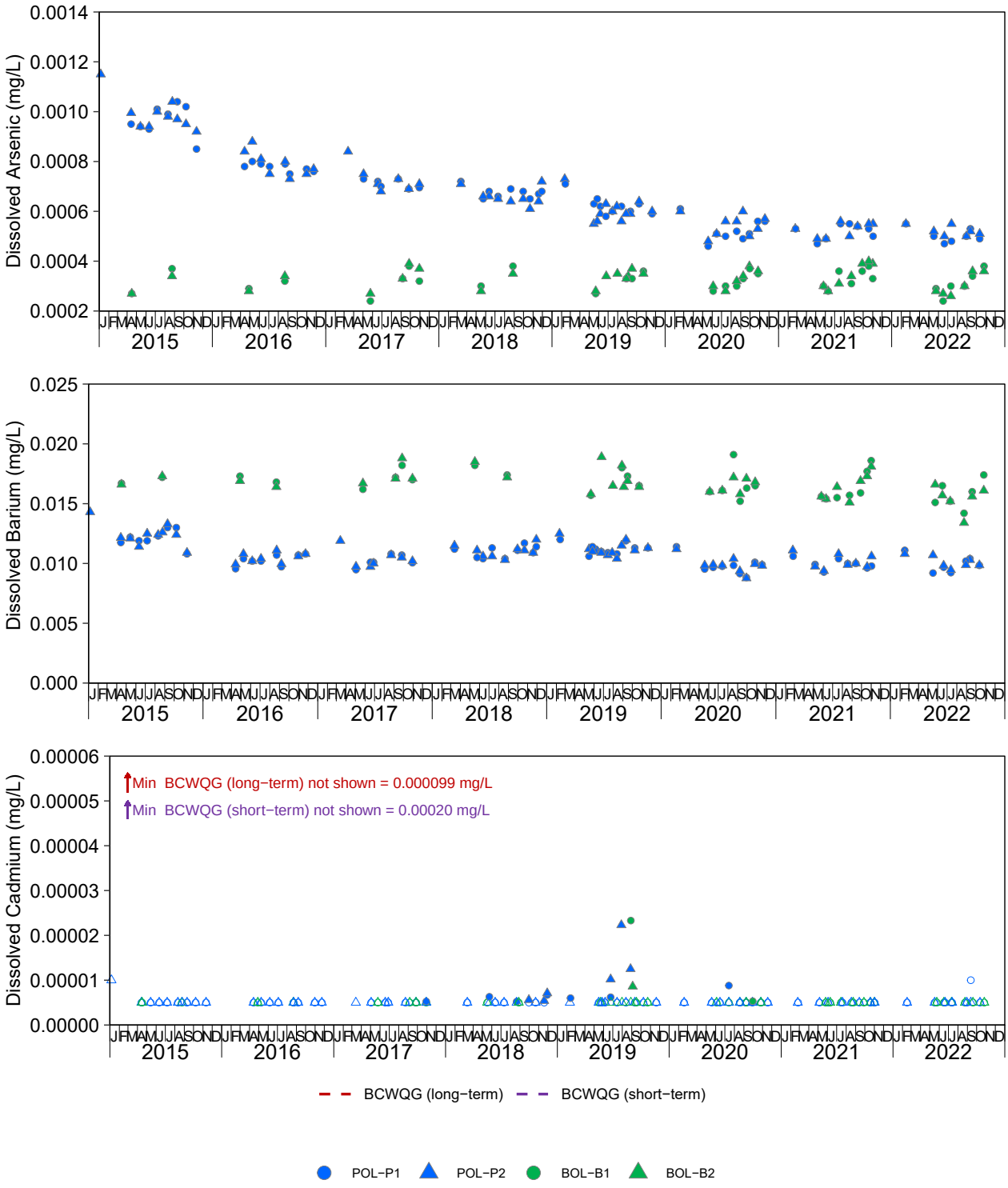

Figure C.1.2: Dissolved Aqueous Concentrations of Primary and Secondary Analytes in Post−Breach Surface Water for Polley Lake (POL−P1, POL−P2; Exposed) and Bootjack Lake (BOL−B1, BOL−B2; Reference) Monitoring Stations, 2015 to 2022

Notes: BCWQG = British Columbia Water Quality Guideline (BCMOECCS 2021a,b). Green represents reference stations and blue represents exposed stations. Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Values displayed for BCWQG that are condition specific (i.e., hardness dependent or based on the Biotic Ligand Model) are the most conservative (i.e., lowest) of those calculated for the multiple monitoring stations displayed. Dissolved phosphorus data are plotted in Figure C.1.1. Dissolved mercury data were not collected.

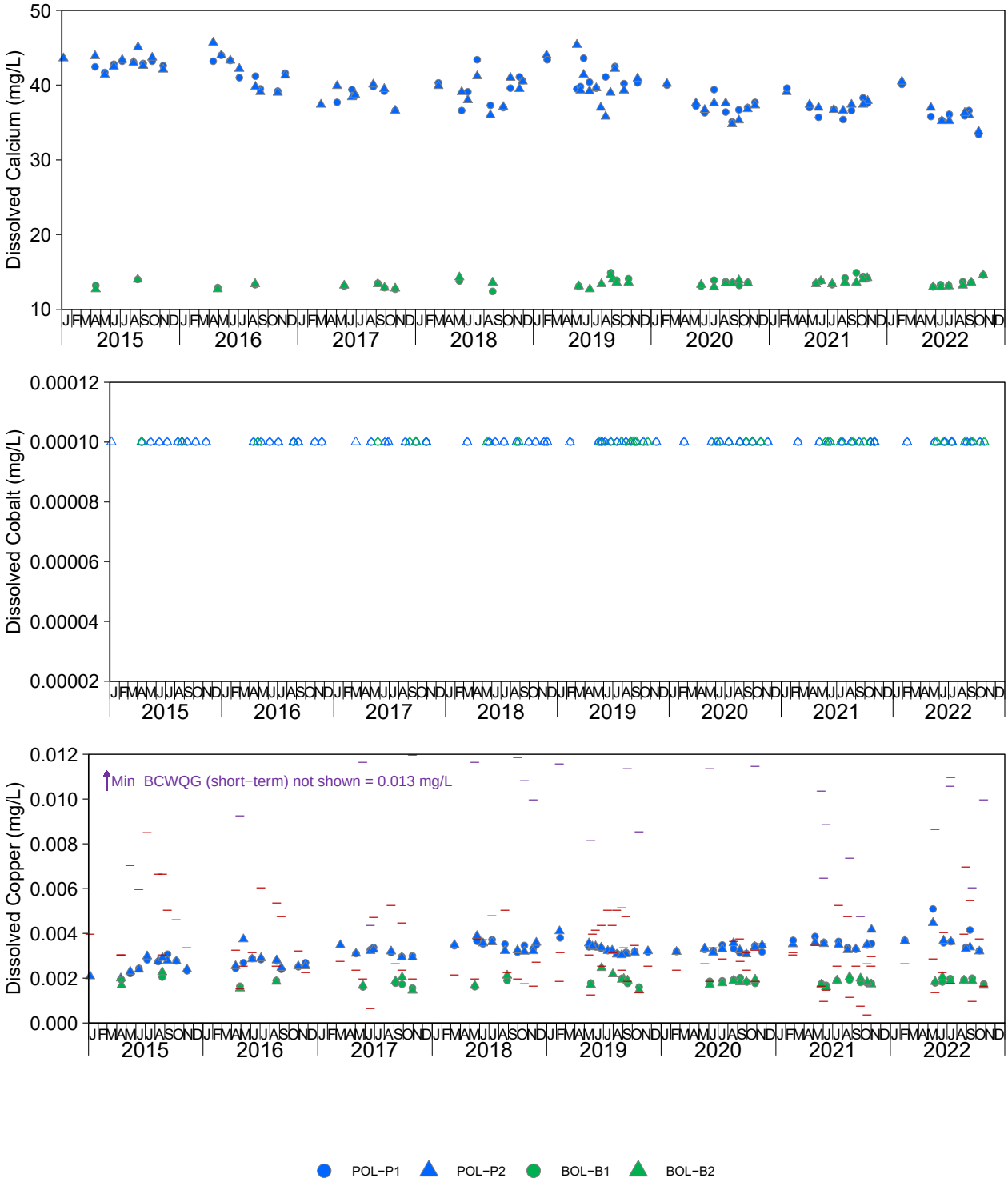

Figure C.1.2: Dissolved Aqueous Concentrations of Primary and Secondary Analytes in Post−Breach Surface Water for Polley Lake (POL−P1, POL−P2; Exposed) and Bootjack Lake (BOL−B1, BOL−B2; Reference) Monitoring Stations, 2015 to 2022

Notes: BCWQG = British Columbia Water Quality Guideline (BCMOECCS 2021a,b). Green represents reference stations and blue represents exposed stations. Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Values displayed for BCWQG that are condition specific (i.e., hardness dependent or based on the Biotic Ligand Model) are the most conservative (i.e., lowest) of those calculated for the multiple monitoring stations displayed. Dissolved phosphorus data are plotted in Figure C.1.1. Dissolved mercury data were not collected.

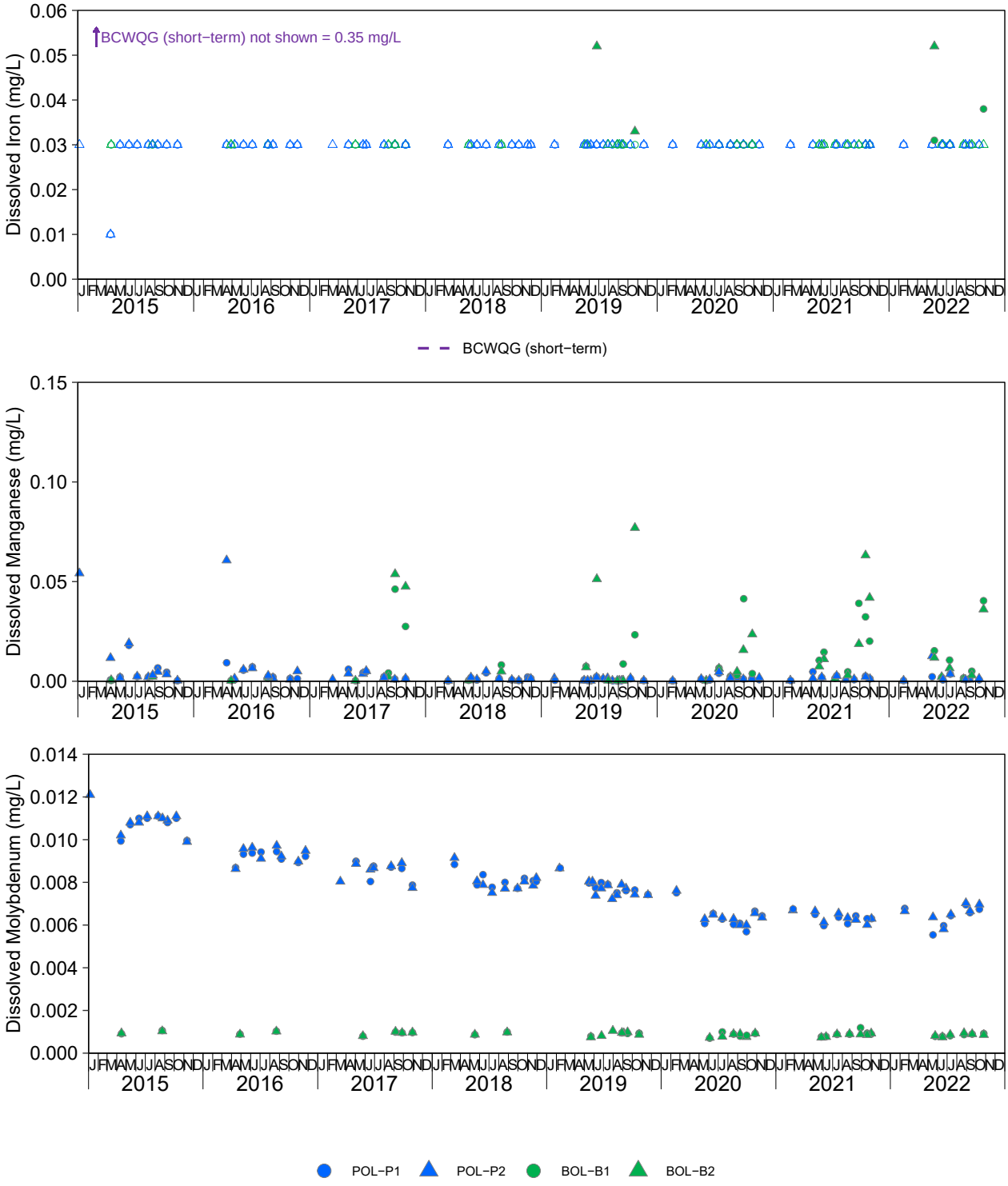

Figure C.1.2: Dissolved Aqueous Concentrations of Primary and Secondary Analytes in Post−Breach Surface Water for Polley Lake (POL−P1, POL−P2; Exposed) and Bootjack Lake (BOL−B1, BOL−B2; Reference) Monitoring Stations, 2015 to 2022

Notes: BCWQG = British Columbia Water Quality Guideline (BCMOECCS 2021a,b). Green represents reference stations and blue represents exposed stations. Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Values displayed for BCWQG that are condition specific (i.e., hardness dependent or based on the Biotic Ligand Model) are the most conservative (i.e., lowest) of those calculated for the multiple monitoring stations displayed. Dissolved phosphorus data are plotted in Figure C.1.1. Dissolved mercury data were not collected.

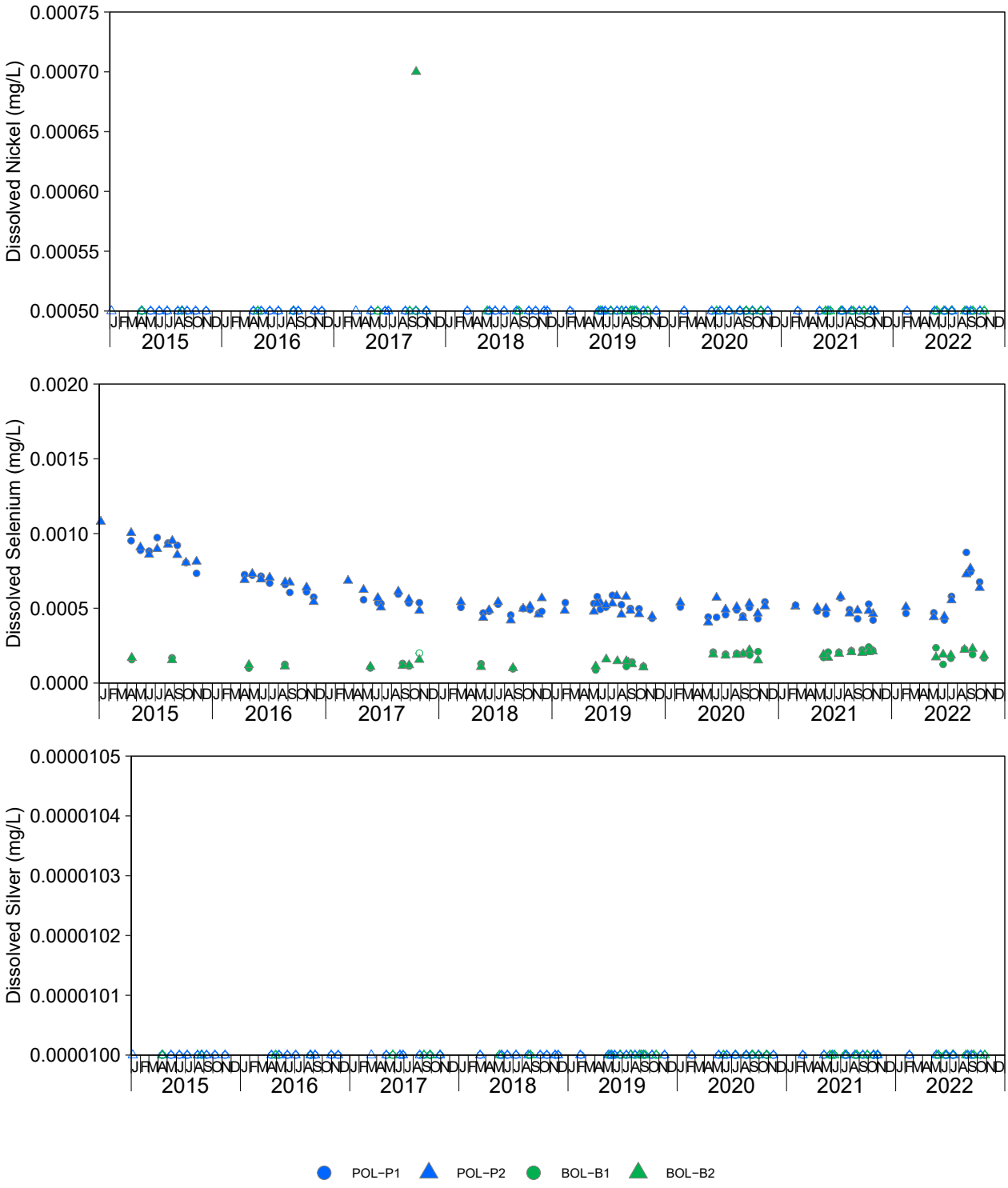

Figure C.1.2: Dissolved Aqueous Concentrations of Primary and Secondary Analytes in Post−Breach Surface Water for Polley Lake (POL−P1, POL−P2; Exposed) and Bootjack Lake (BOL−B1, BOL−B2; Reference) Monitoring Stations, 2015 to 2022

Notes: BCWQG = British Columbia Water Quality Guideline (BCMOECCS 2021a,b). Green represents reference stations and blue represents exposed stations. Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Values displayed for BCWQG that are condition specific (i.e., hardness dependent or based on the Biotic Ligand Model) are the most conservative (i.e., lowest) of those calculated for the multiple monitoring stations displayed. Dissolved phosphorus data are plotted in Figure C.1.1. Dissolved mercury data were not collected.

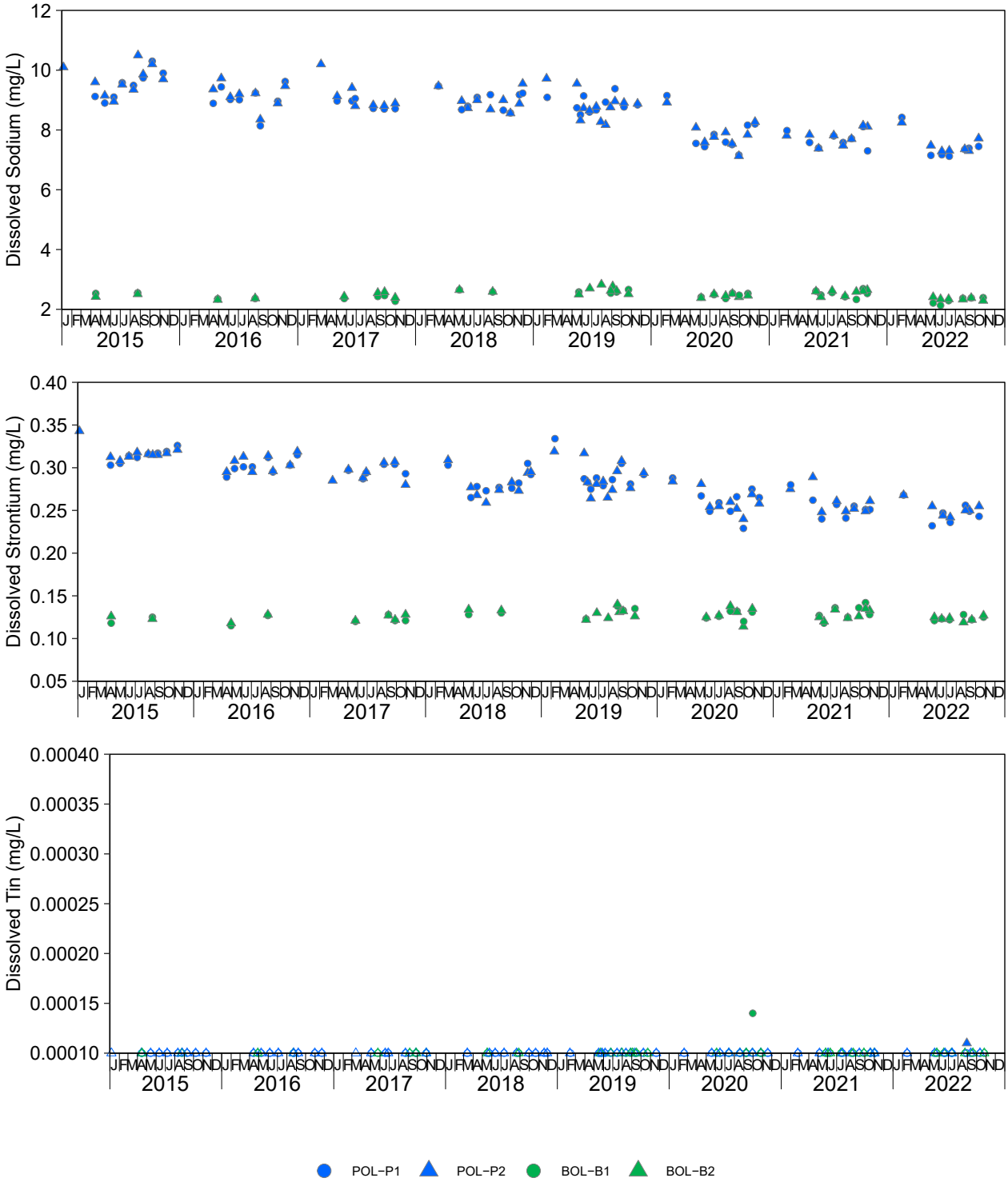

Figure C.1.2: Dissolved Aqueous Concentrations of Primary and Secondary Analytes in Post−Breach Surface Water for Polley Lake (POL−P1, POL−P2; Exposed) and Bootjack Lake (BOL−B1, BOL−B2; Reference) Monitoring Stations, 2015 to 2022

Notes: BCWQG = British Columbia Water Quality Guideline (BCMOECCS 2021a,b). Green represents reference stations and blue represents exposed stations. Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Values displayed for BCWQG that are condition specific (i.e., hardness dependent or based on the Biotic Ligand Model) are the most conservative (i.e., lowest) of those calculated for the multiple monitoring stations displayed. Dissolved phosphorus data are plotted in Figure C.1.1. Dissolved mercury data were not collected.

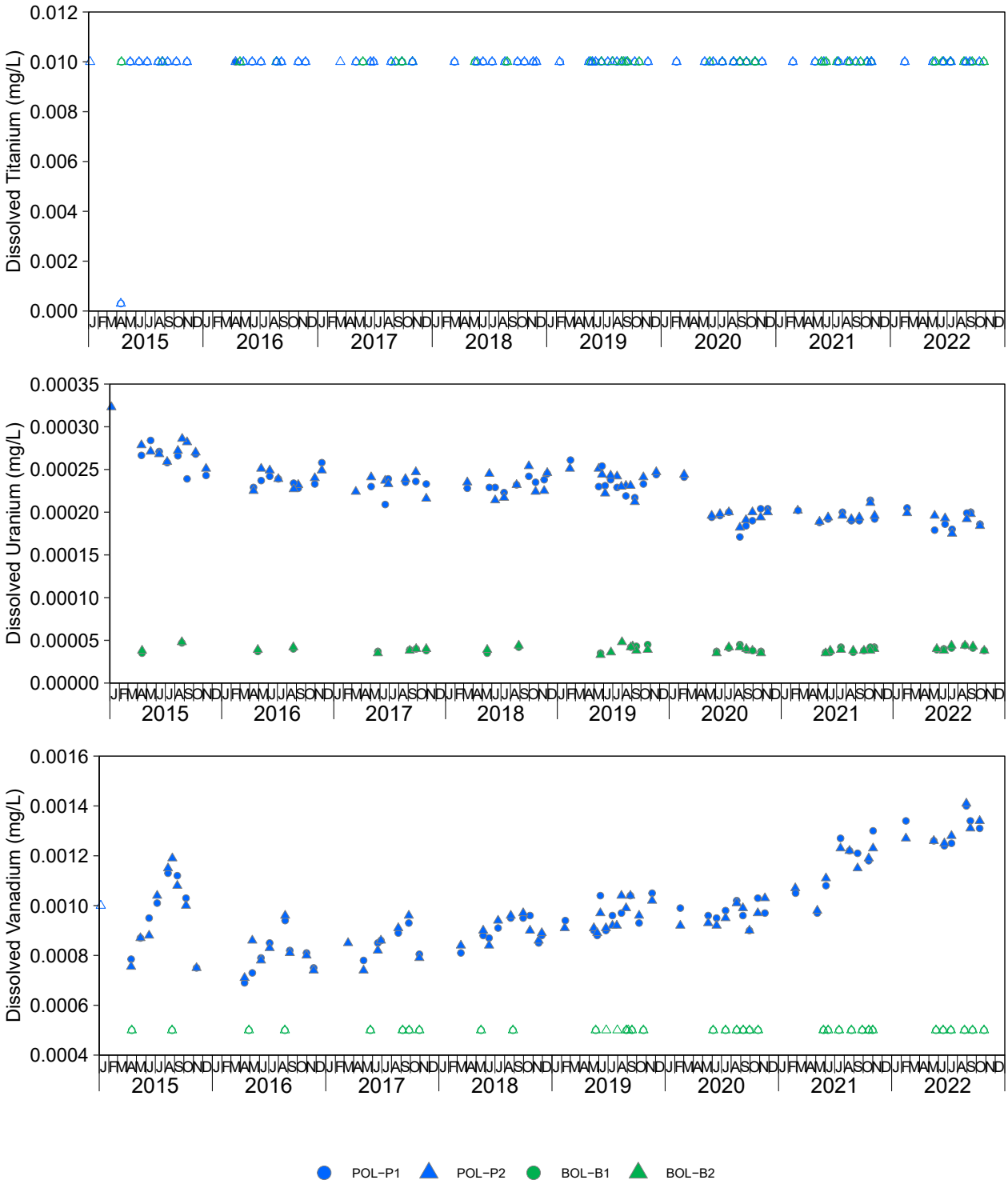

Figure C.1.2: Dissolved Aqueous Concentrations of Primary and Secondary Analytes in Post−Breach Surface Water for Polley Lake (POL−P1, POL−P2; Exposed) and Bootjack Lake (BOL−B1, BOL−B2; Reference) Monitoring Stations, 2015 to 2022

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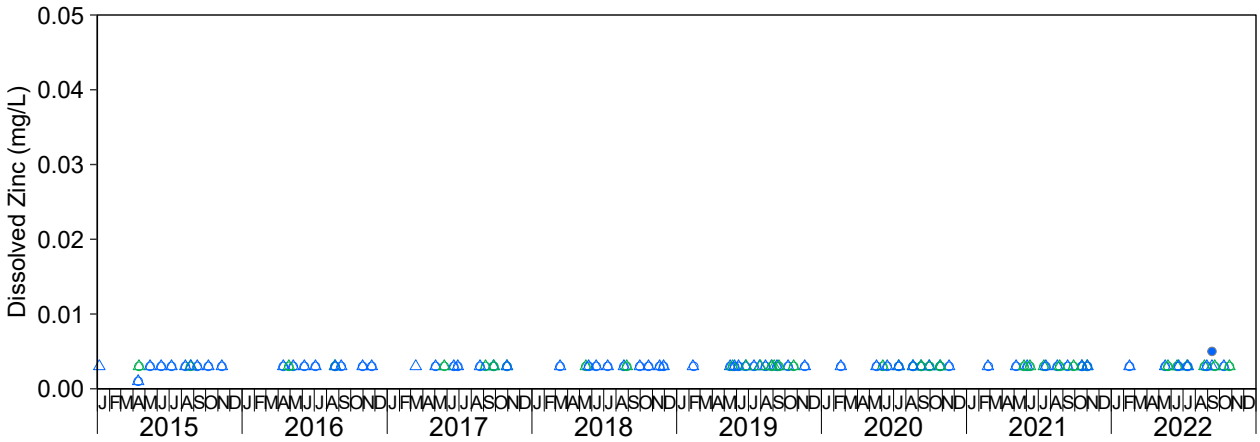

Figure C.1.2: Dissolved Aqueous Concentrations of Primary and Secondary Analytes in Post−Breach Surface Water for Polley Lake (POL−P1, POL−P2; Exposed) and Bootjack Lake (BOL−B1, BOL−B2; Reference) Monitoring Stations, 2015 to 2022

Notes: BCWQG = British Columbia Water Quality Guideline (BCMOECCS 2021a,b). Green represents reference stations and blue represents exposed stations. Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Values displayed for BCWQG that are condition specific (i.e., hardness dependent or based on the Biotic Ligand Model) are the most conservative (i.e., lowest) of those calculated for the multiple monitoring stations displayed. Dissolved phosphorus data are plotted in Figure C.1.1. Dissolved mercury data were not collected.

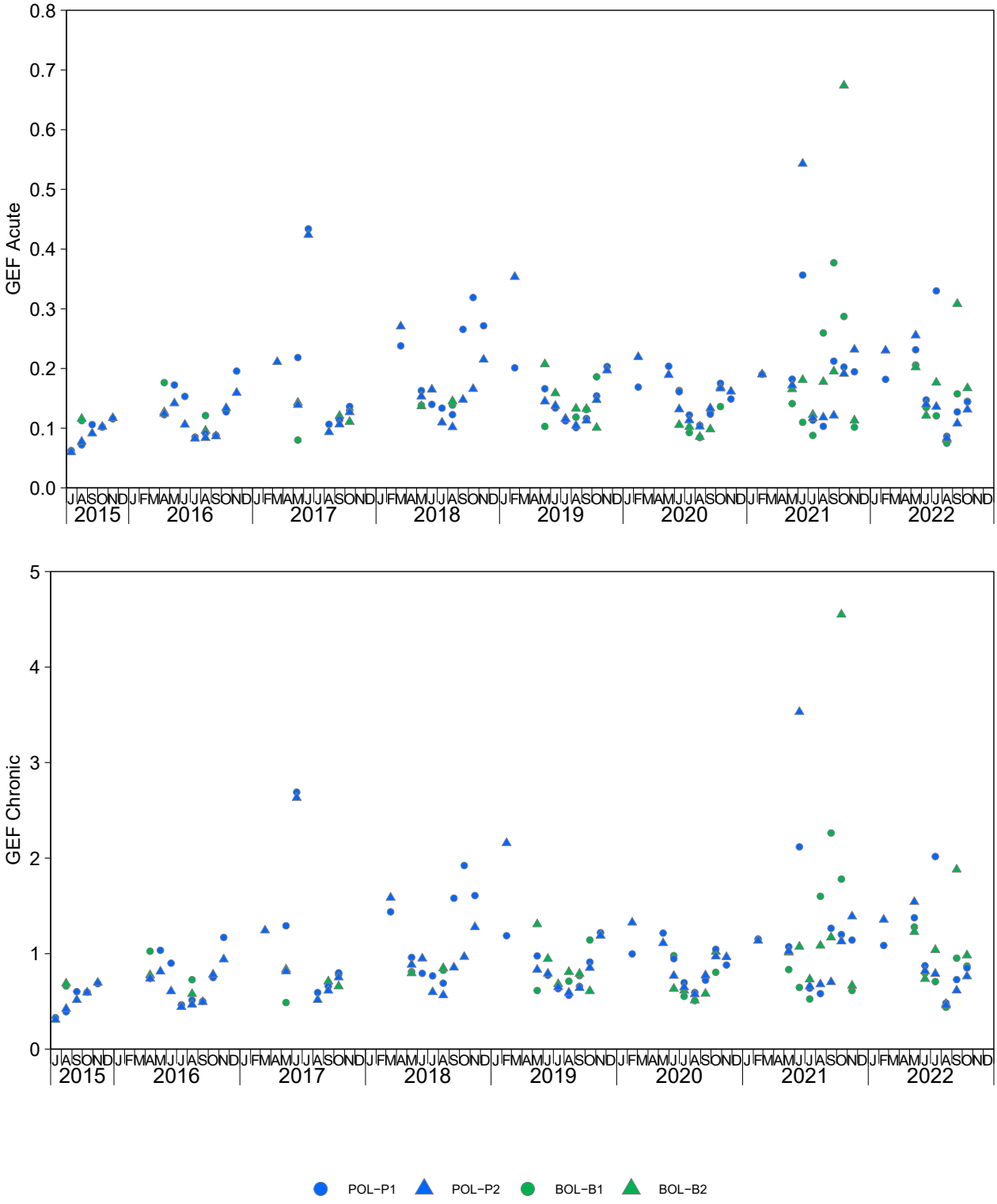

Figure C.1.3: Guideline Exceedance Factor (GEF) of Dissolved Copper in Post−Breach Surface Water for Polley Lake (POL−P1, POL−P2; Exposed) and Bootjack Lake (BOL−B1, BOL−B2; Reference) Monitoring Stations, 2015 to 2022

Notes: GEF = Guideline Exceedance Factor. Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Acute and Chronic GEF's calculated from monthly averages. Green represents reference stations and blue represents exposed stations.

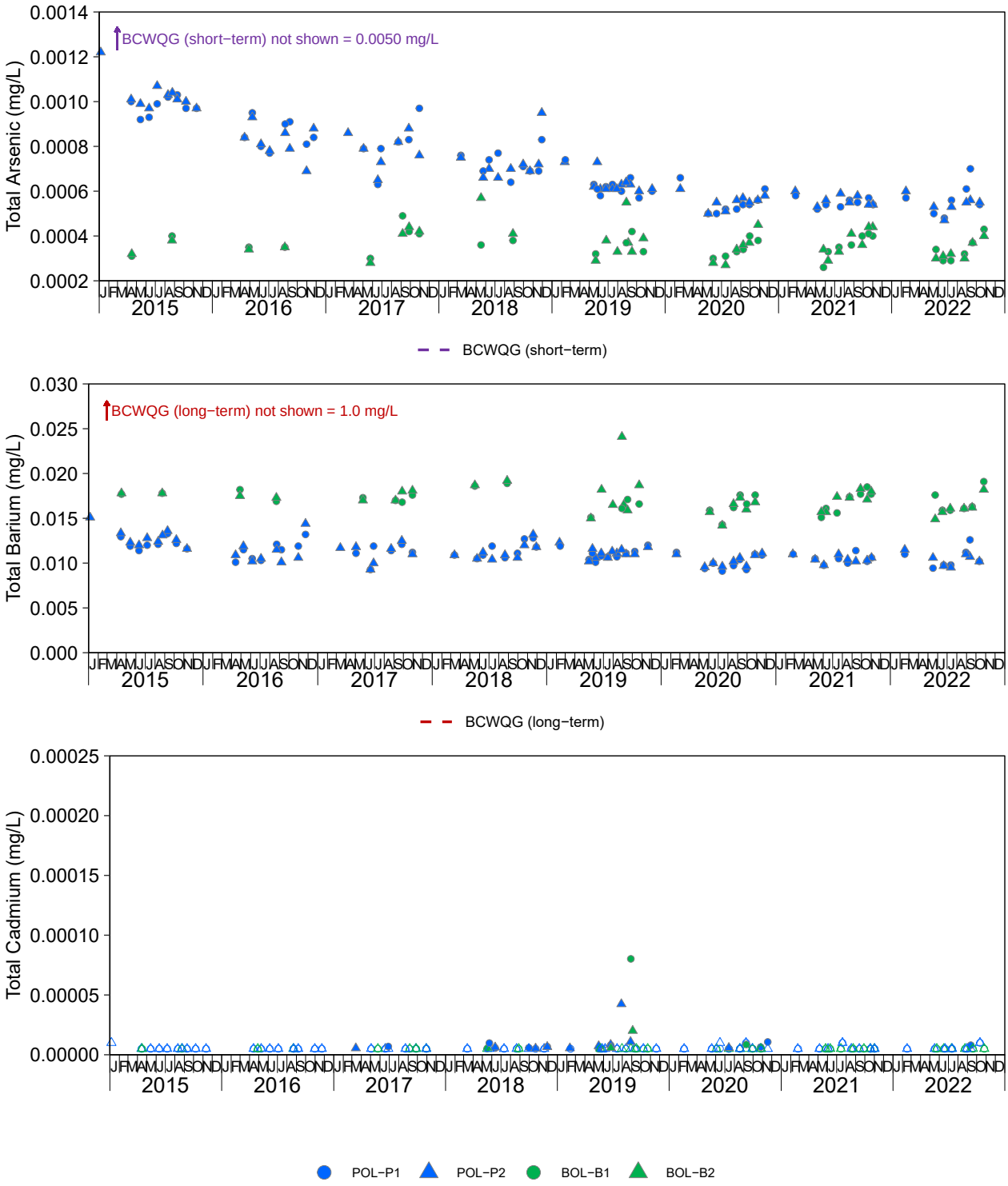

Figure C.1.4: Total Aqueous Concentrations of Primary and Secondary Analytes in Post−Breach Surface Water for Polley Lake (POL−P1, POL−P2; Exposed) and Bootjack Lake (BOL−B1, BOL−B2; Reference) Monitoring Stations, 2015 to 2022

Notes: BCWQG = British Columbia Water Quality Guideline (BCMOECCS 2021a,b). Green represents reference stations and blue represents exposed stations. Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Values displayed for BCWQG that are condition specific (i.e., hardness dependent) are the most conservative (i.e., lowest) of those calculated for the multiple monitoring stations displayed. Total phosphorus data are plotted in Figure C.1.1. Dissolved mercury data were not collected.

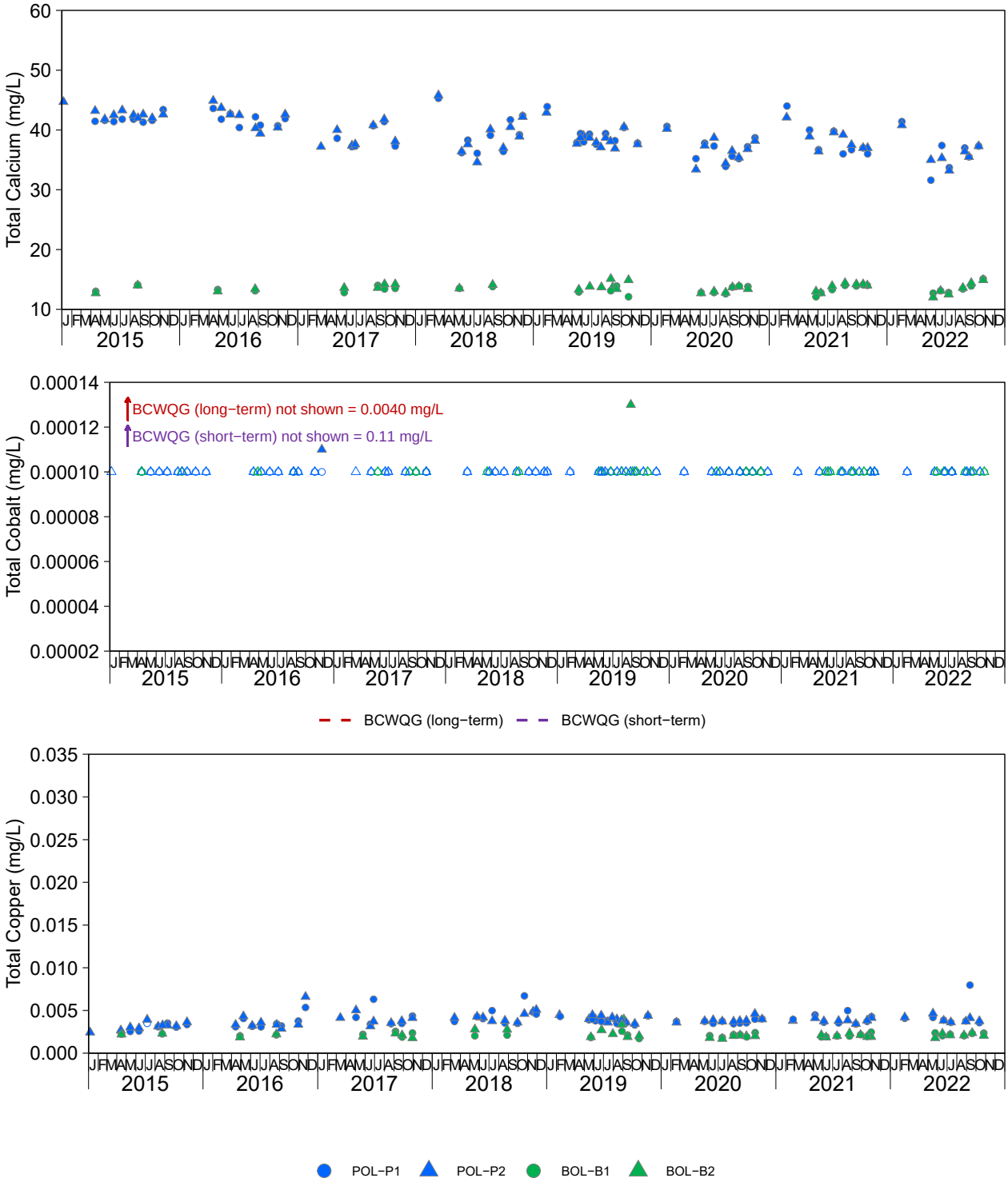

Figure C.1.4: Total Aqueous Concentrations of Primary and Secondary Analytes in Post−Breach Surface Water for Polley Lake (POL−P1, POL−P2; Exposed) and Bootjack Lake (BOL−B1, BOL−B2; Reference) Monitoring Stations, 2015 to 2022

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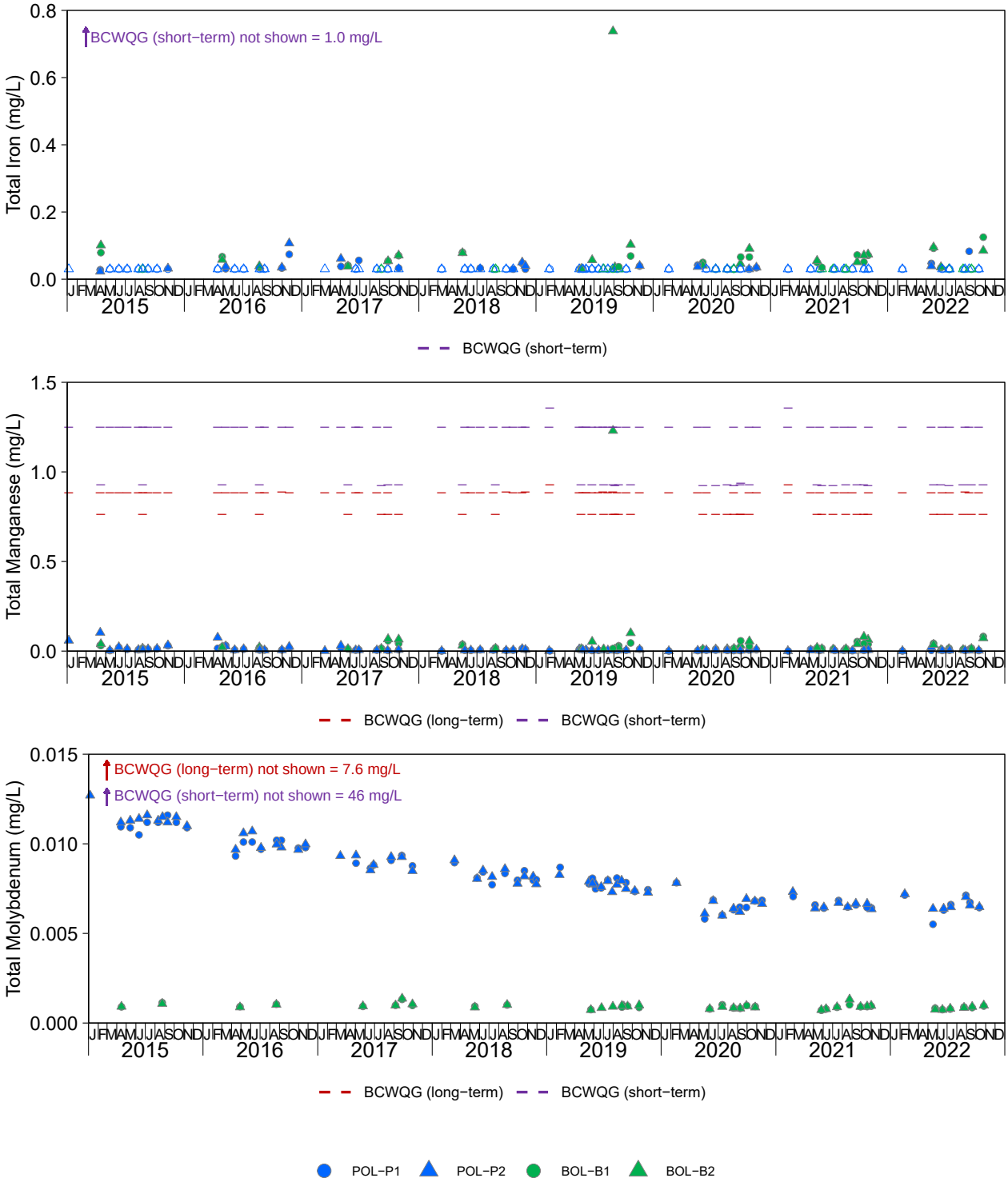

Figure C.1.4: Total Aqueous Concentrations of Primary and Secondary Analytes in Post−Breach Surface Water for Polley Lake (POL−P1, POL−P2; Exposed) and Bootjack Lake (BOL−B1, BOL−B2; Reference) Monitoring Stations, 2015 to 2022

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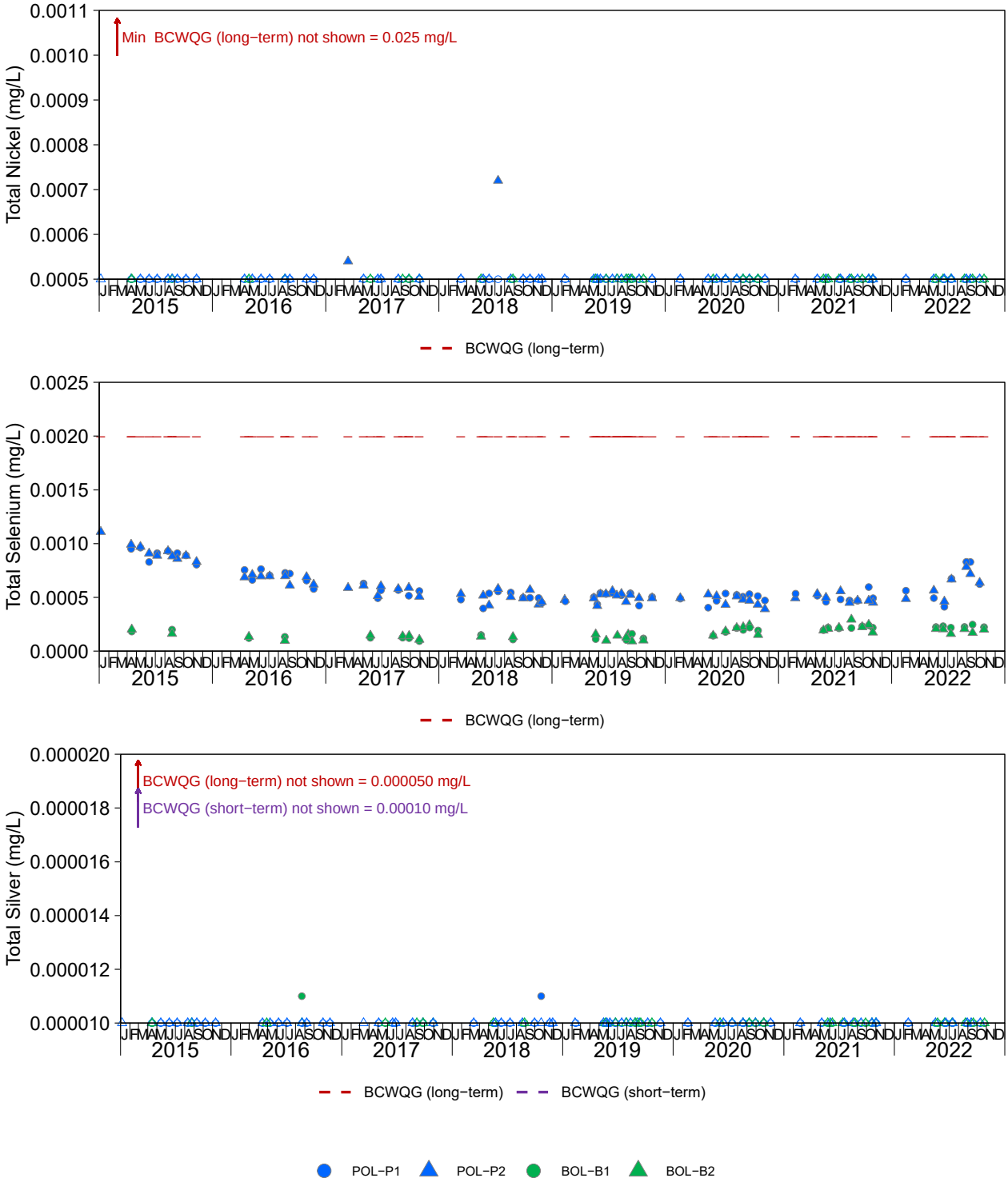

Figure C.1.4: Total Aqueous Concentrations of Primary and Secondary Analytes in Post−Breach Surface Water for Polley Lake (POL−P1, POL−P2; Exposed) and Bootjack Lake (BOL−B1, BOL−B2; Reference) Monitoring Stations, 2015 to 2022

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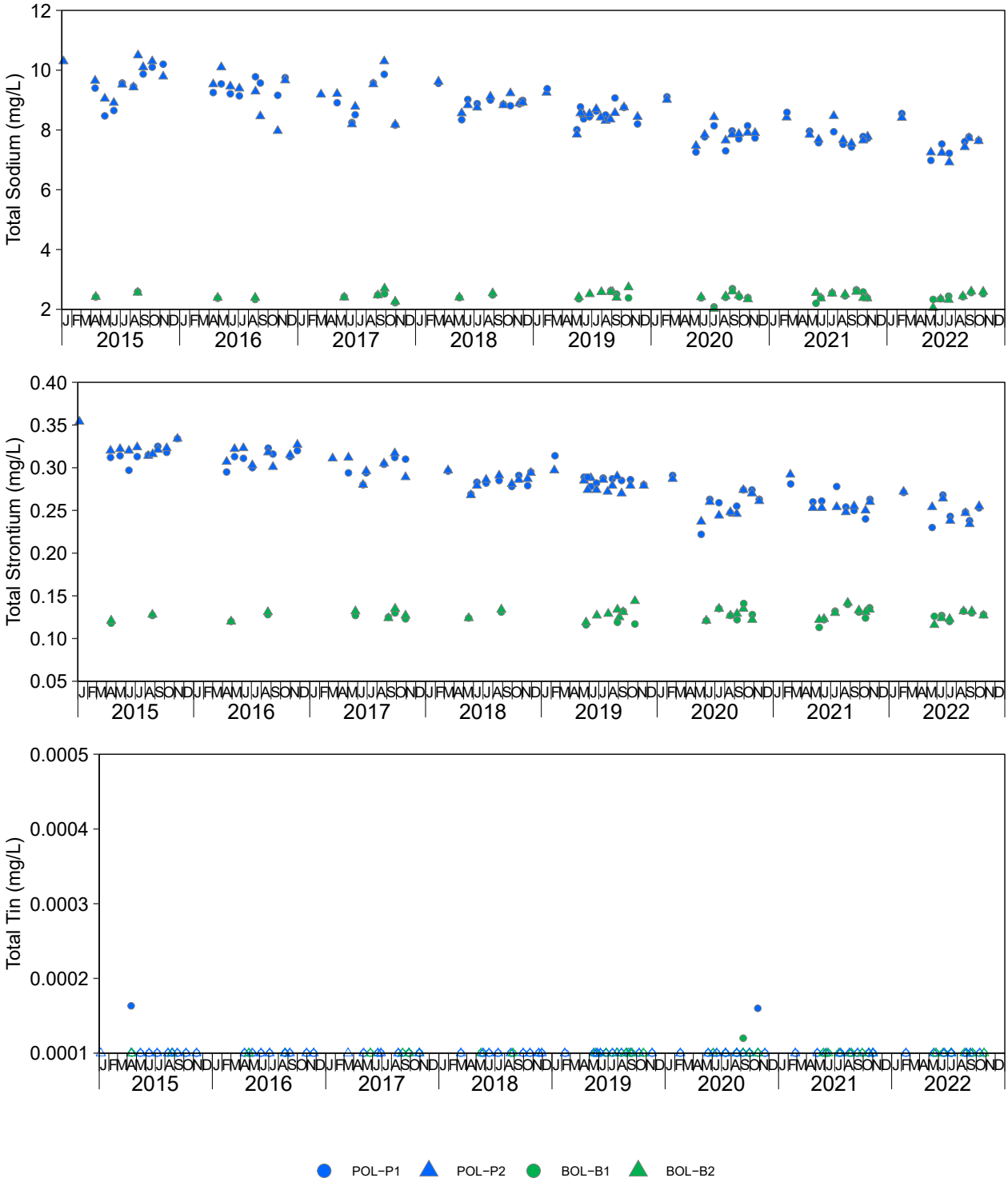

Figure C.1.4: Total Aqueous Concentrations of Primary and Secondary Analytes in Post−Breach Surface Water for Polley Lake (POL−P1, POL−P2; Exposed) and Bootjack Lake (BOL−B1, BOL−B2; Reference) Monitoring Stations, 2015 to 2022

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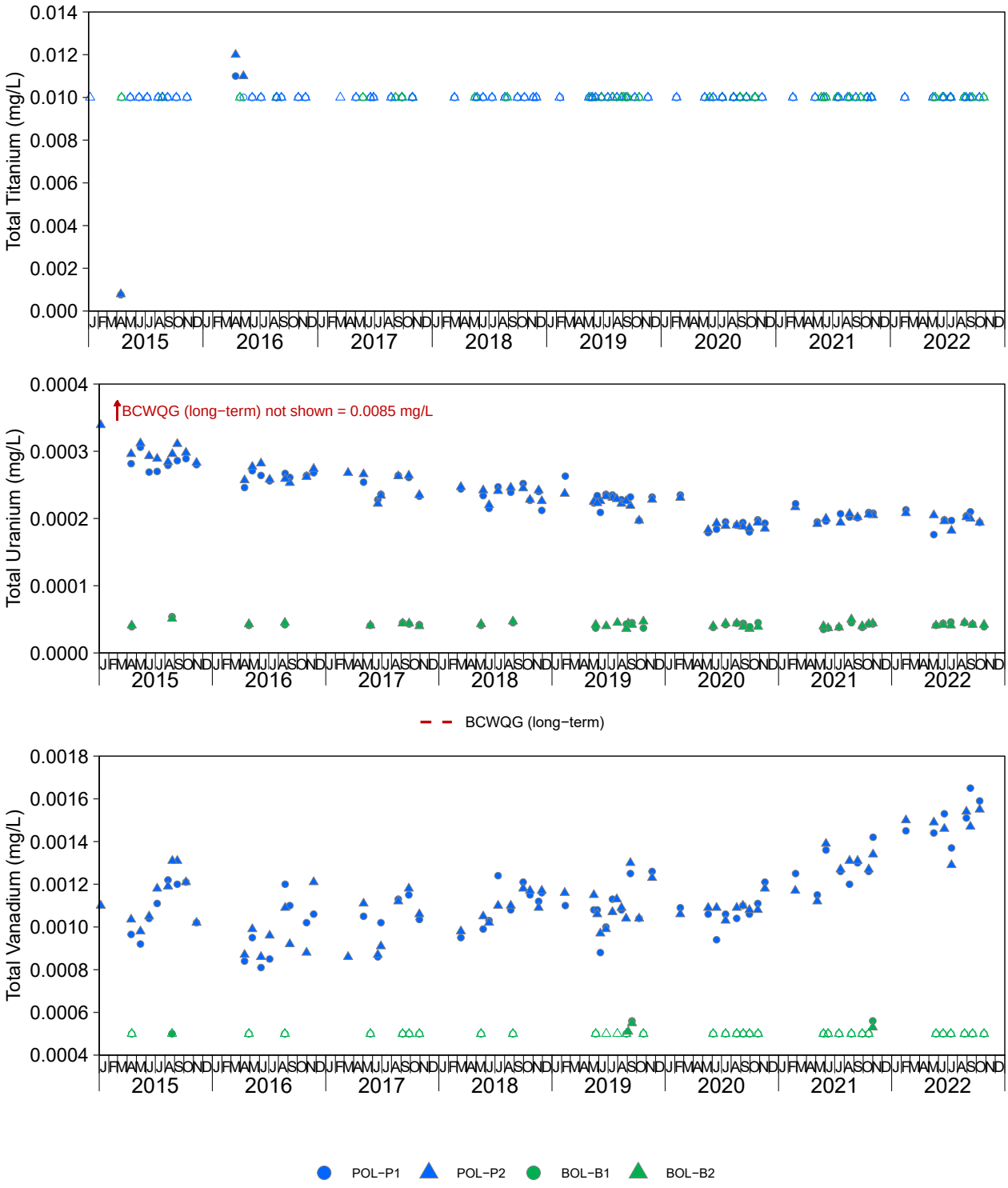


Figure C.1.4: Total Aqueous Concentrations of Primary and Secondary Analytes in Post−Breach Surface Water for Polley Lake (POL−P1, POL−P2; Exposed) and Bootjack Lake (BOL−B1, BOL−B2; Reference) Monitoring Stations, 2015 to 2022

Notes: BCWQG = British Columbia Water Quality Guideline (BCMOECCS 2021a,b). Green represents reference stations and blue represents exposed stations. Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Values displayed for BCWQG that are condition specific (i.e., hardness dependent) are the most conservative (i.e., lowest) of those calculated for the multiple monitoring stations displayed. Total phosphorus data are plotted in Figure C.1.1. Dissolved mercury data were not collected.

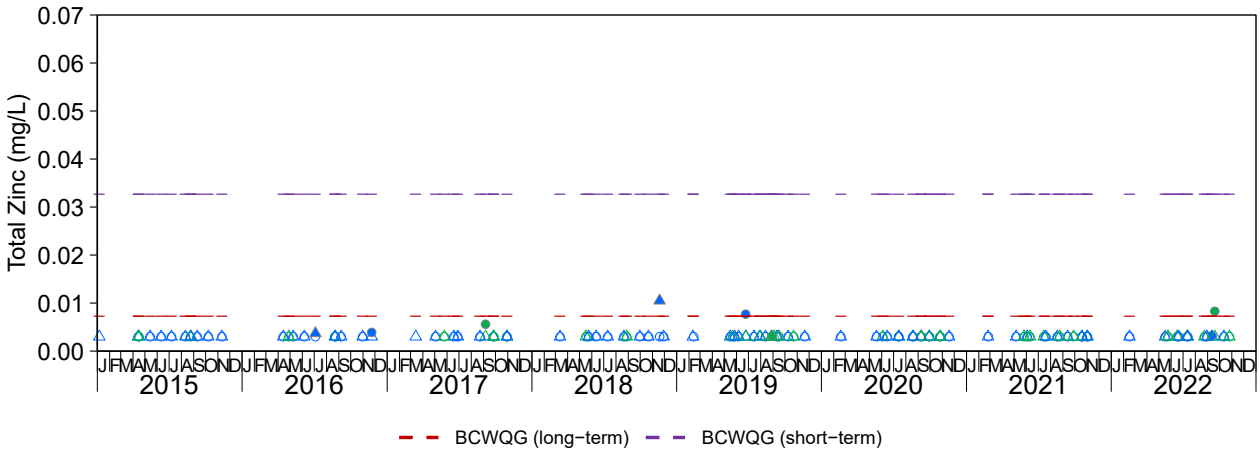


Figure C.1.4: Total Aqueous Concentrations of Primary and Secondary Analytes in Post−Breach Surface Water for Polley Lake (POL−P1, POL−P2; Exposed) and Bootjack Lake (BOL−B1, BOL−B2; Reference) Monitoring Stations, 2015 to 2022

Notes: BCWQG = British Columbia Water Quality Guideline (BCMOECCS 2021a,b). Green represents reference stations and blue represents exposed stations. Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Values displayed for BCWQG that are condition specific (i.e., hardness dependent) are the most conservative (i.e., lowest) of those calculated for the multiple monitoring stations displayed. Total phosphorus data are plotted in Figure C.1.1. Dissolved mercury data were not collected.

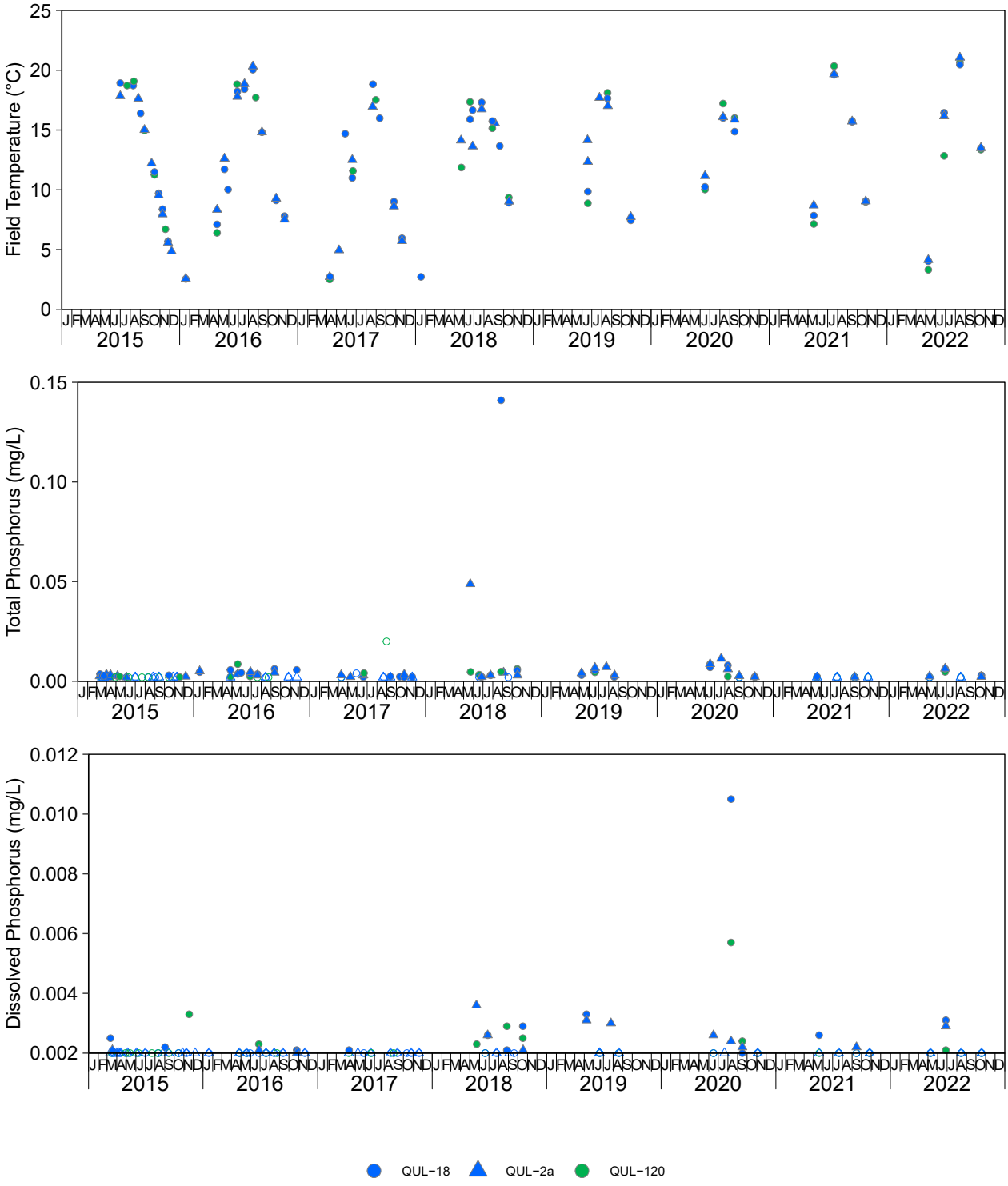


Figure C.1.5: Temperature and Nutrient Concentrations in Post−Breach Surface Water for Quesnel Lake at QUL−18, QUL−2a (Exposed) and QUL−120 (Reference) Monitoring Stations, 2015 to 2022

Notes: BCWQG = British Columbia Water Quality Guideline (BCMOECCS 2021a,b). Green represents reference stations and blue represents exposed stations. Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Station QUL−120 was named QUL−120a in 2021 and 2022.

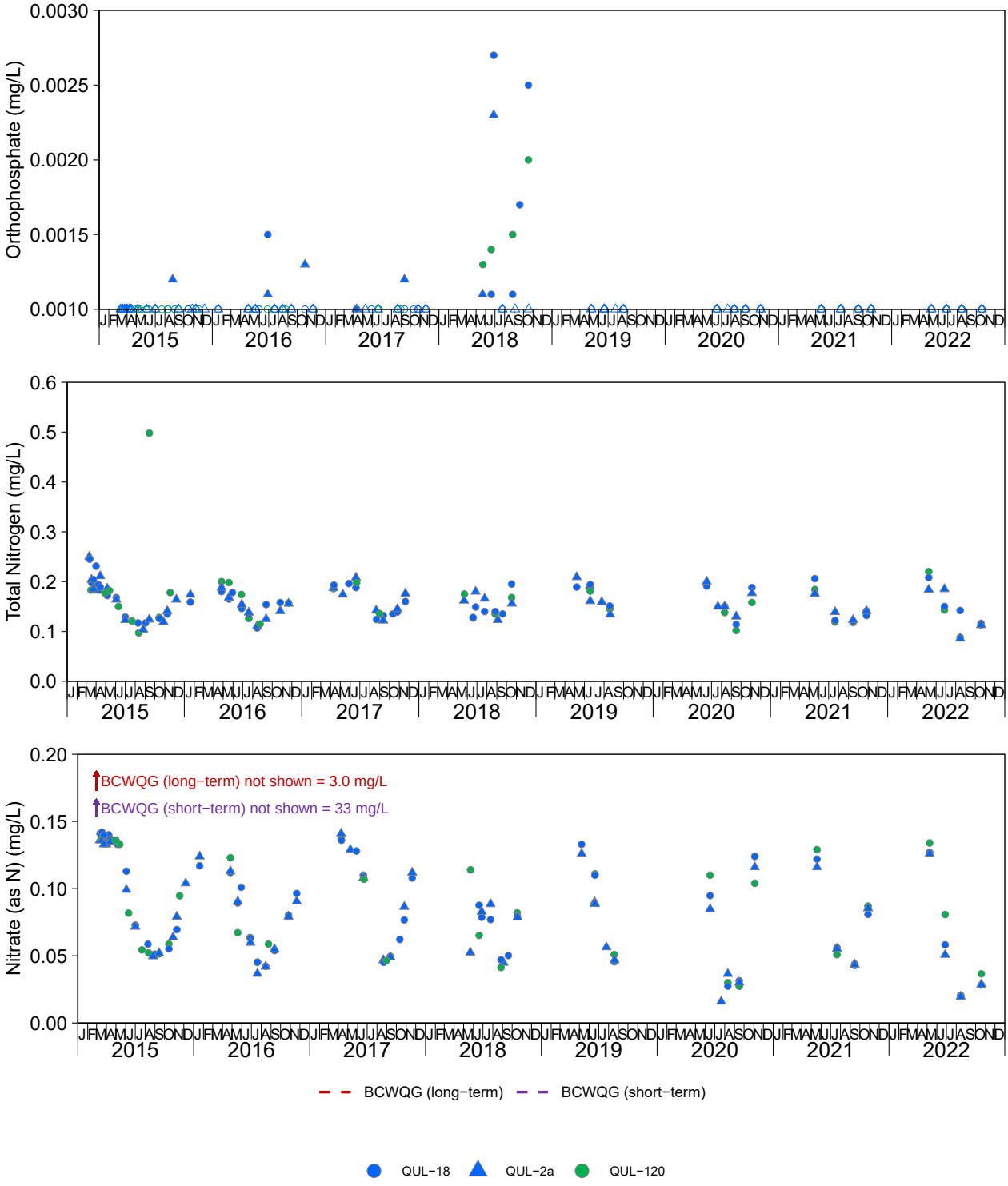


Figure C.1.5: Temperature and Nutrient Concentrations in Post−Breach Surface Water for Quesnel Lake at QUL−18, QUL−2a (Exposed) and QUL−120 (Reference) Monitoring Stations, 2015 to 2022

Notes: BCWQG = British Columbia Water Quality Guideline (BCMOECCS 2021a,b). Green represents reference stations and blue represents exposed stations. Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Station QUL−120 was named QUL−120a in 2021 and 2022.

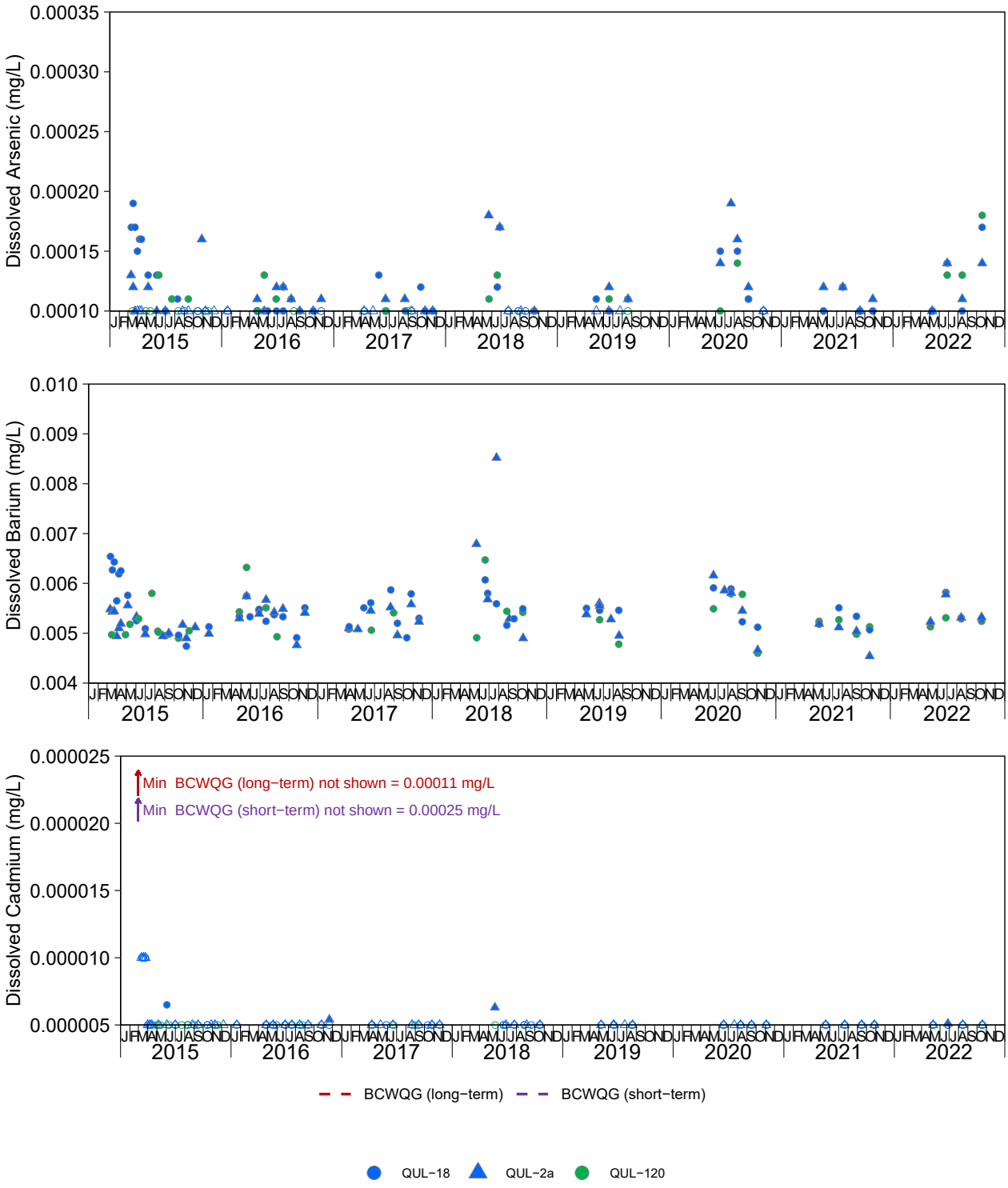


Figure C.1.6: Dissolved Aqueous Concentrations of Primary and Secondary Analytes in Post−Breach Surface Water for Quesnel Lake at QUL−18, QUL−2a (Exposed) and QUL−120 (Reference) Monitoring Stations, 2015 to 2022

Notes: BCWQG = British Columbia Water Quality Guideline (BCMOECCS 2021a,b). Green represents reference stations and blue represents exposed stations. Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Values displayed for BCWQG that are condition specific (i.e., hardness dependent or based on the Biotic Ligand Model) are the most conservative (i.e., lowest) of those calculated for the multiple monitoring stations displayed. Station QUL−120 was named QUL−120a in 2021 and 2022. Dissolved phosphorus data are plotted in Figure C.1.5. Dissolved mercury data were not collected.

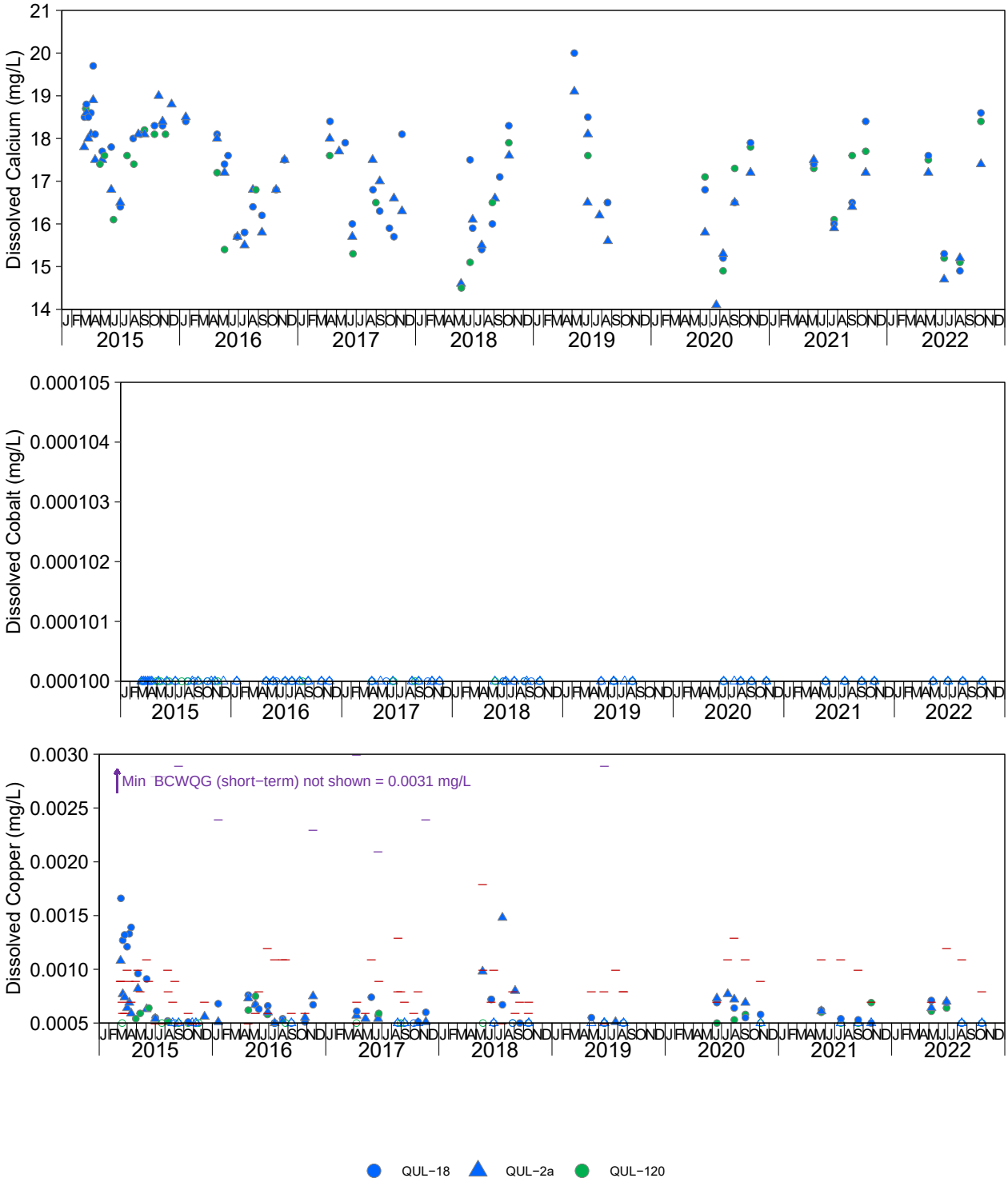
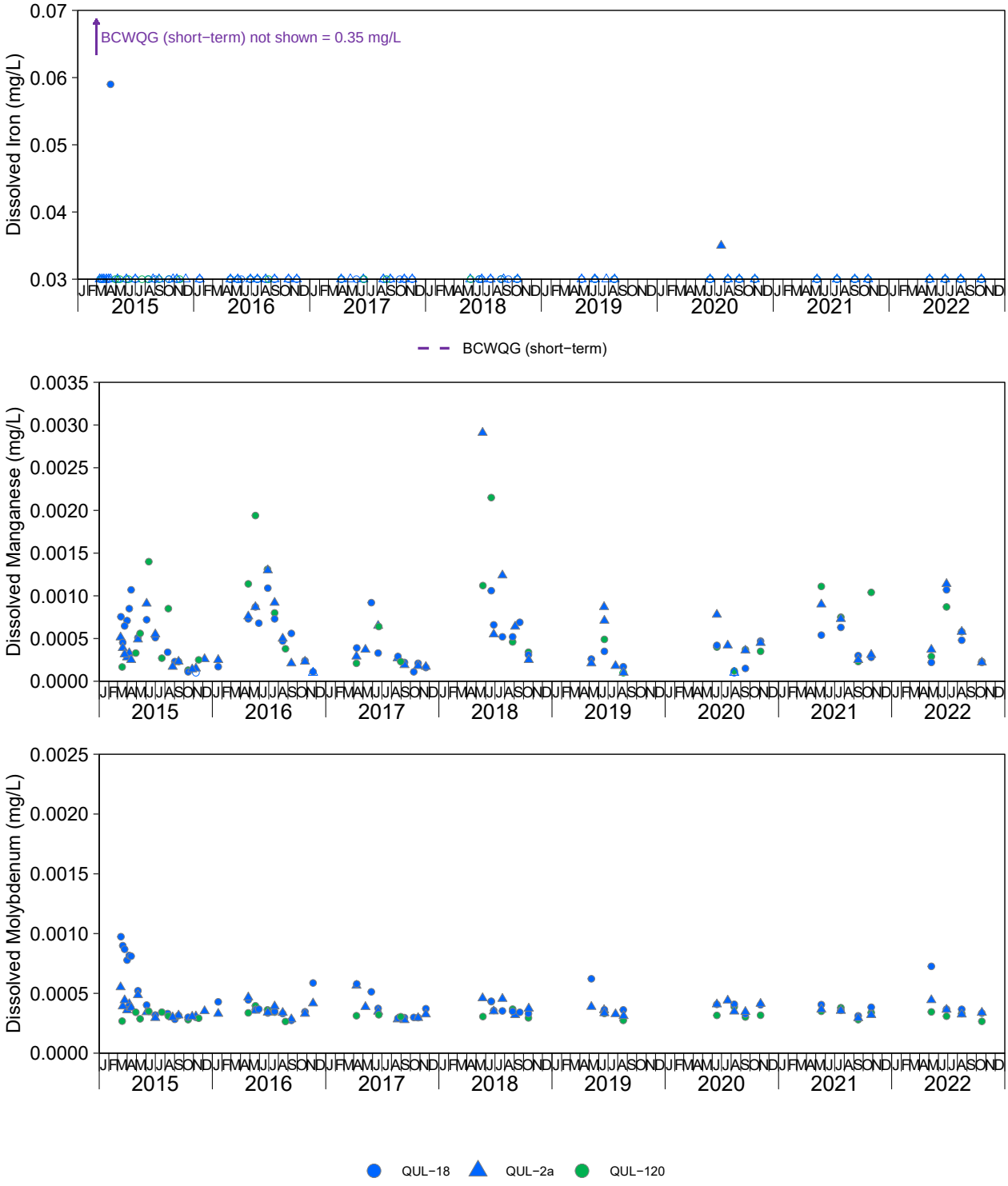


Figure C.1.6: Dissolved Aqueous Concentrations of Primary and Secondary Analytes in Post−Breach Surface Water for Quesnel Lake at QUL−18, QUL−2a (Exposed) and QUL−120 (Reference) Monitoring Stations, 2015 to 2022

Notes: BCWQG = British Columbia Water Quality Guideline (BCMOECCS 2021a,b). Green represents reference stations and blue represents exposed stations. Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Values displayed for BCWQG that are condition specific (i.e., hardness dependent or based on the Biotic Ligand Model) are the most conservative (i.e., lowest) of those calculated for the multiple monitoring stations displayed. Station QUL−120 was named QUL−120a in 2021 and 2022. Dissolved phosphorus data are plotted in Figure C.1.5. Dissolved mercury data were not collected.



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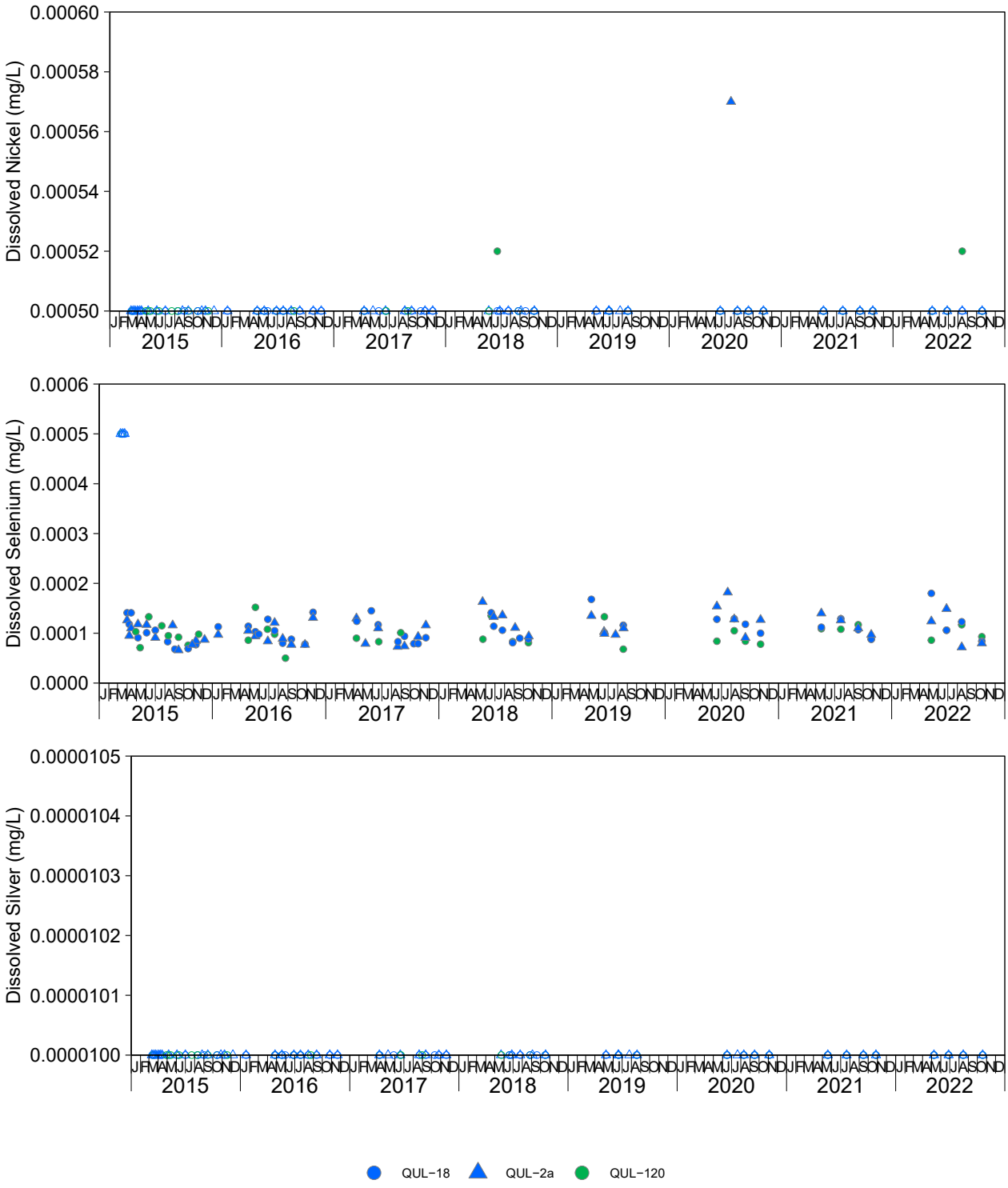

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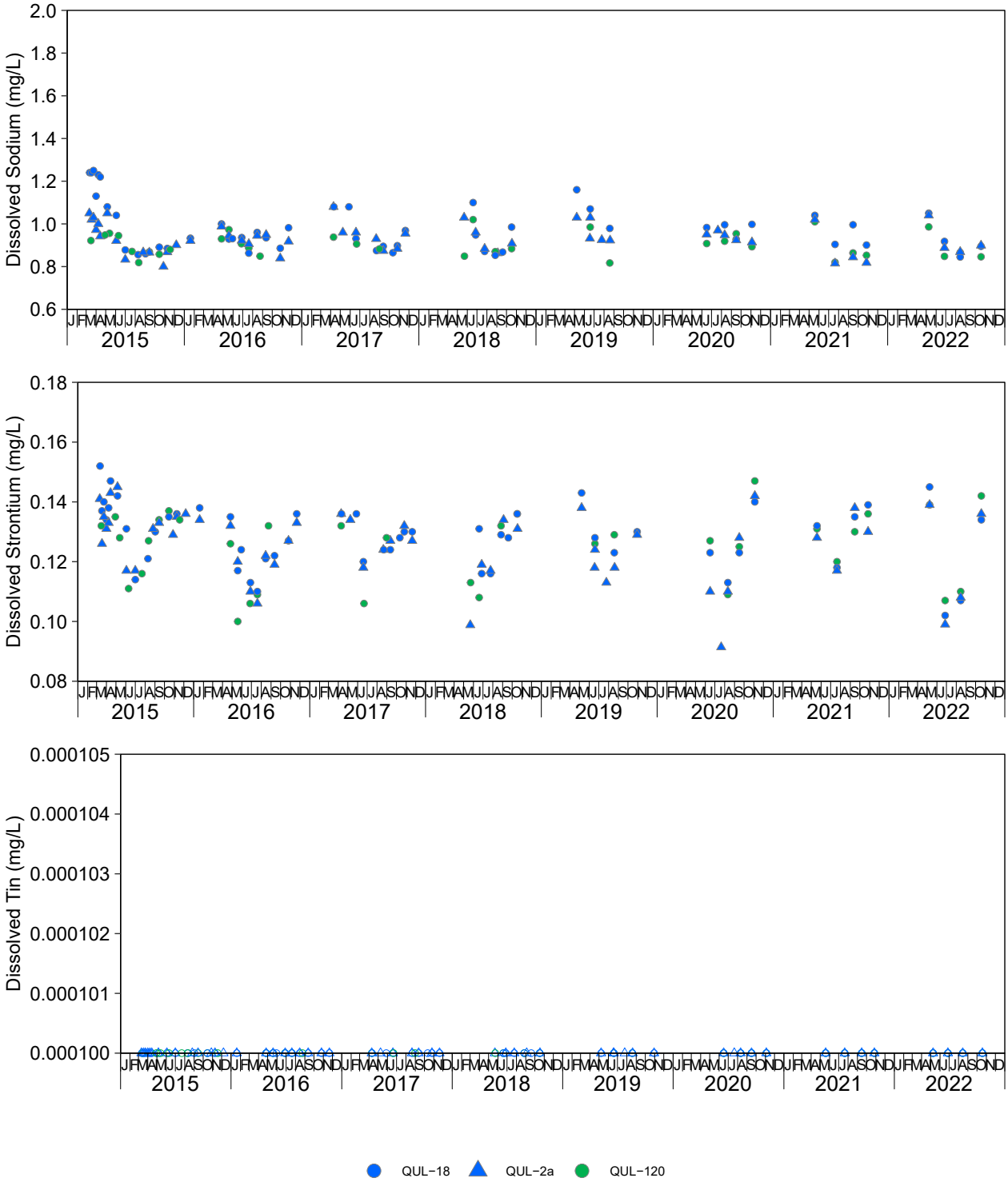

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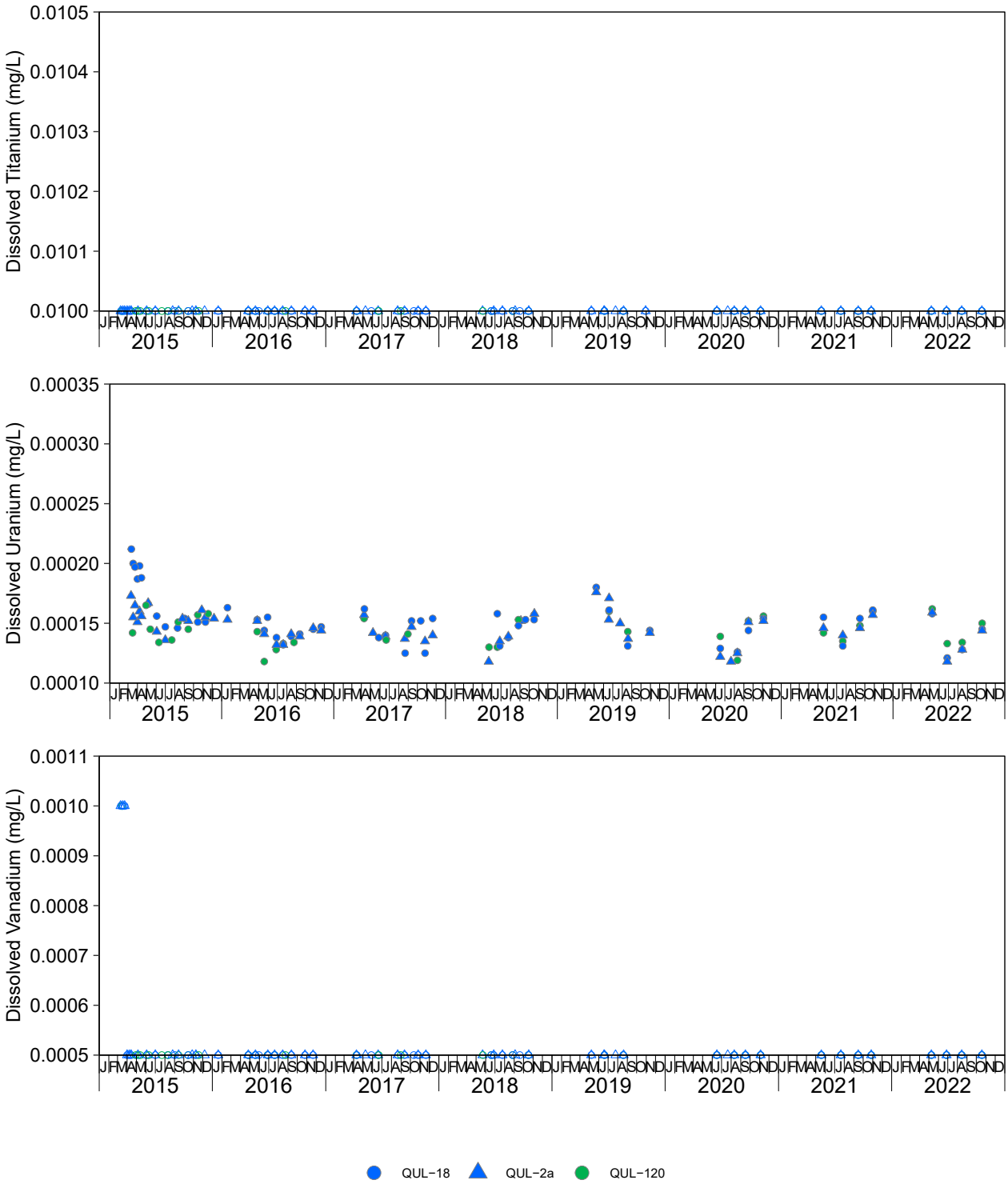

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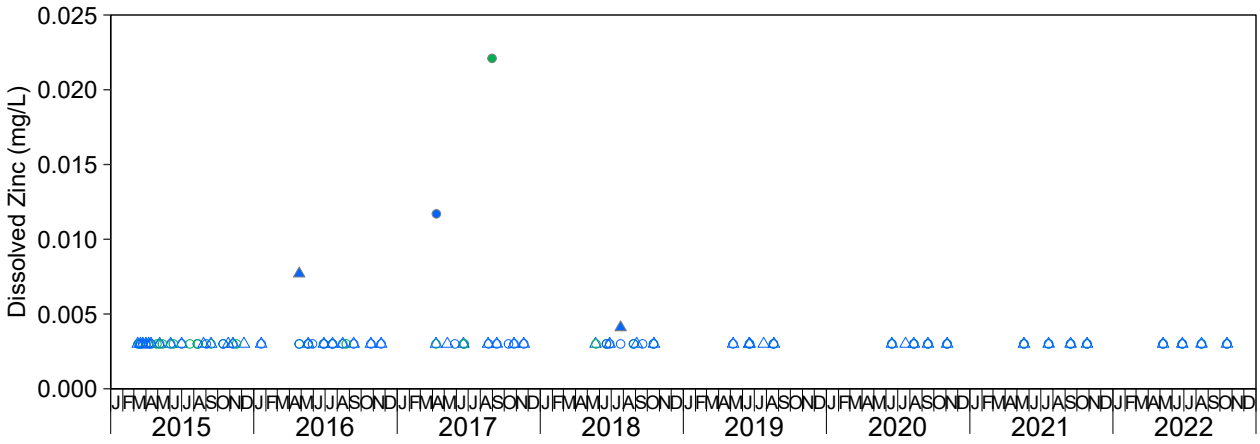

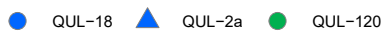

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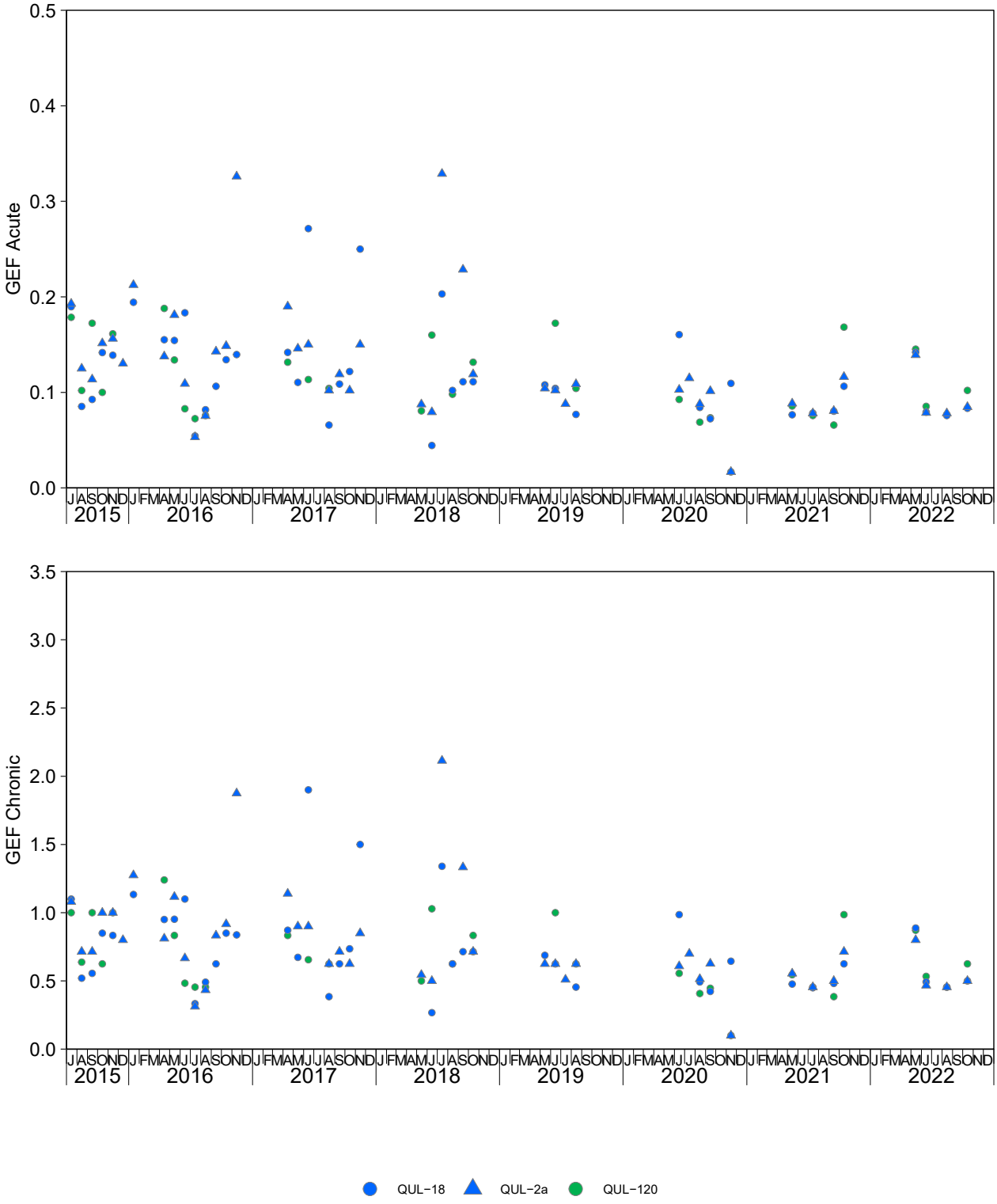

Figure C.1.7: Guideline Exceedance Factor (GEF) of Dissolved Copper in Post−Breach Surface Water for Quesnel Lake at QUL−18, QUL−2a (Exposed) and QUL−120 (Reference) Monitoring Stations, 2015 to 2022

Notes: GEF = Guideline Exceedance Factor. Acute and Chronic GEF's calculated from monthly averages. Green represents reference stations and blue represents exposed stations. Station QUL−120 was named QUL−120a in 2021 and 2022.

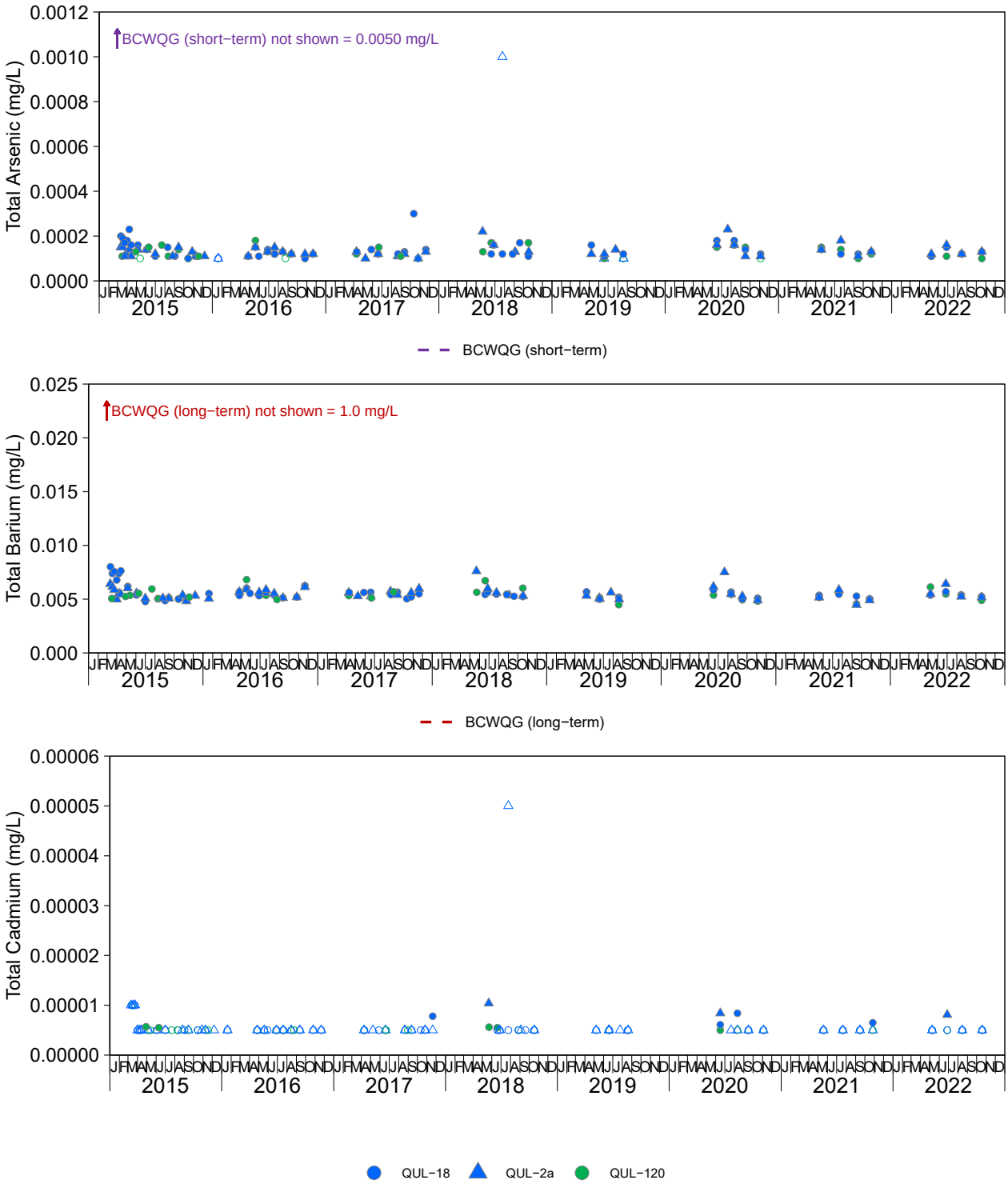

Figure C.1.8: Total Aqueous Concentrations of Primary and Secondary Analytes in Post−Breach Surface Water for Quesnel Lake at QUL−18, QUL−2a (Exposed) and QUL−120 (Reference) Monitoring Stations, 2015 to 2022

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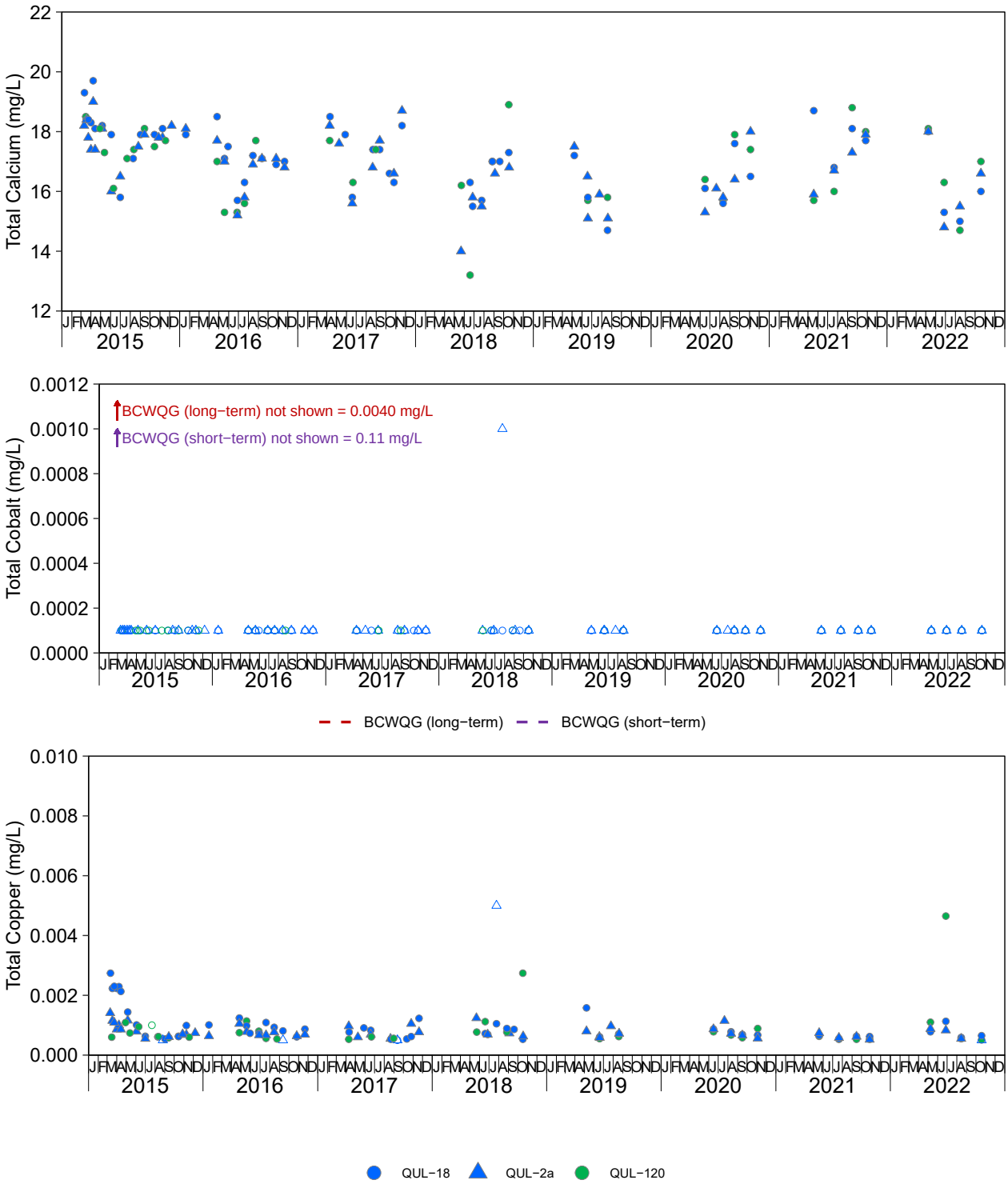

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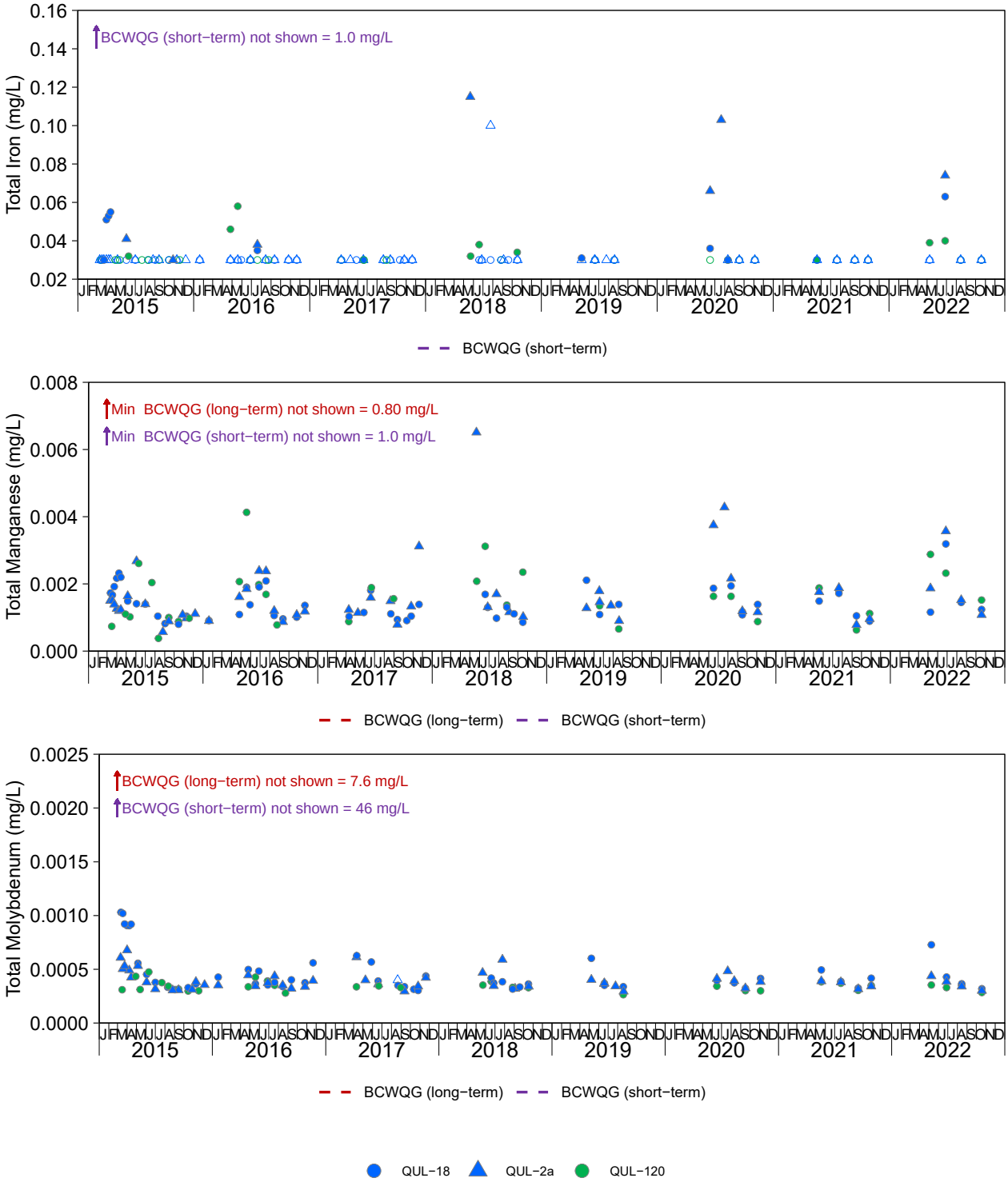

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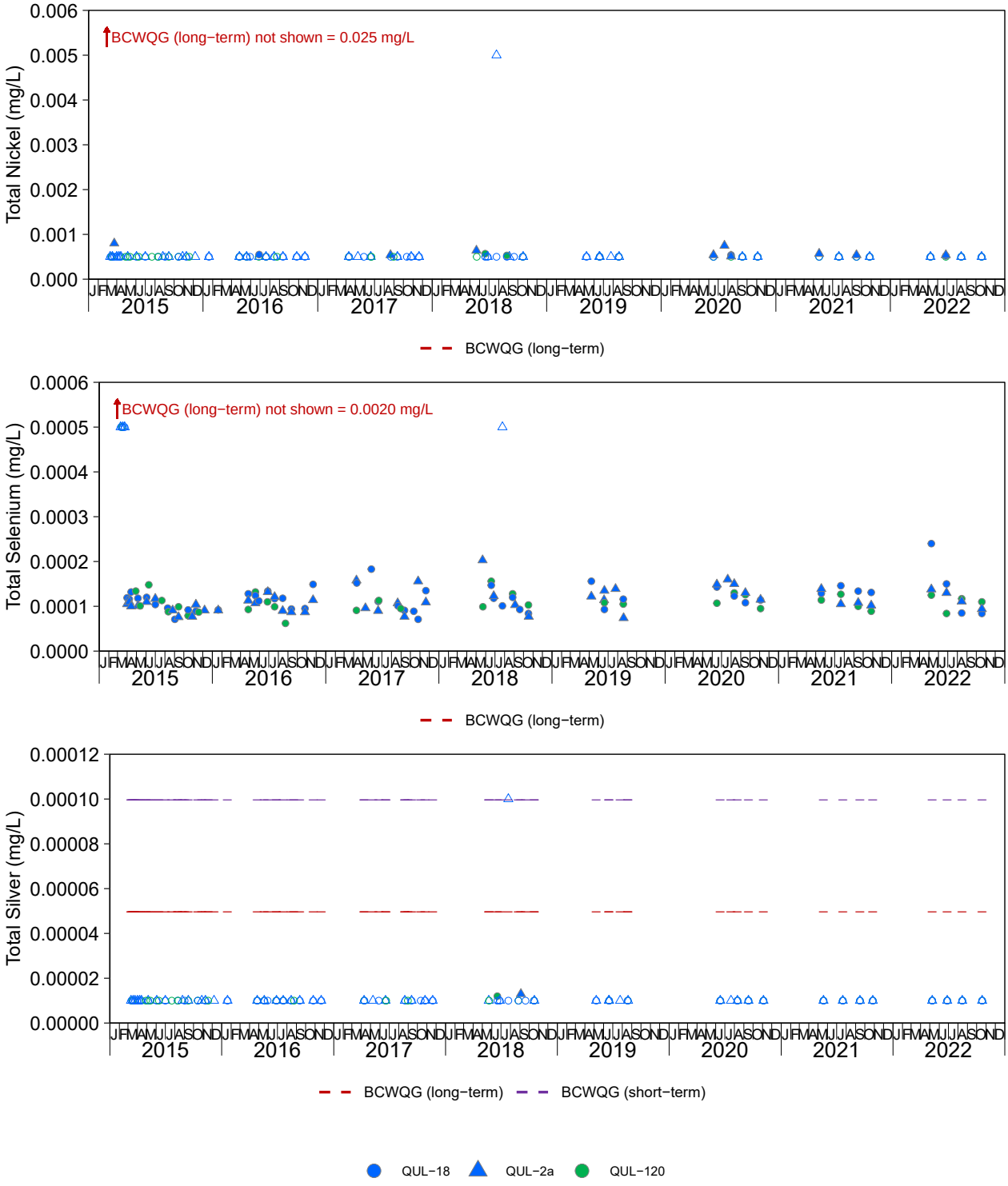

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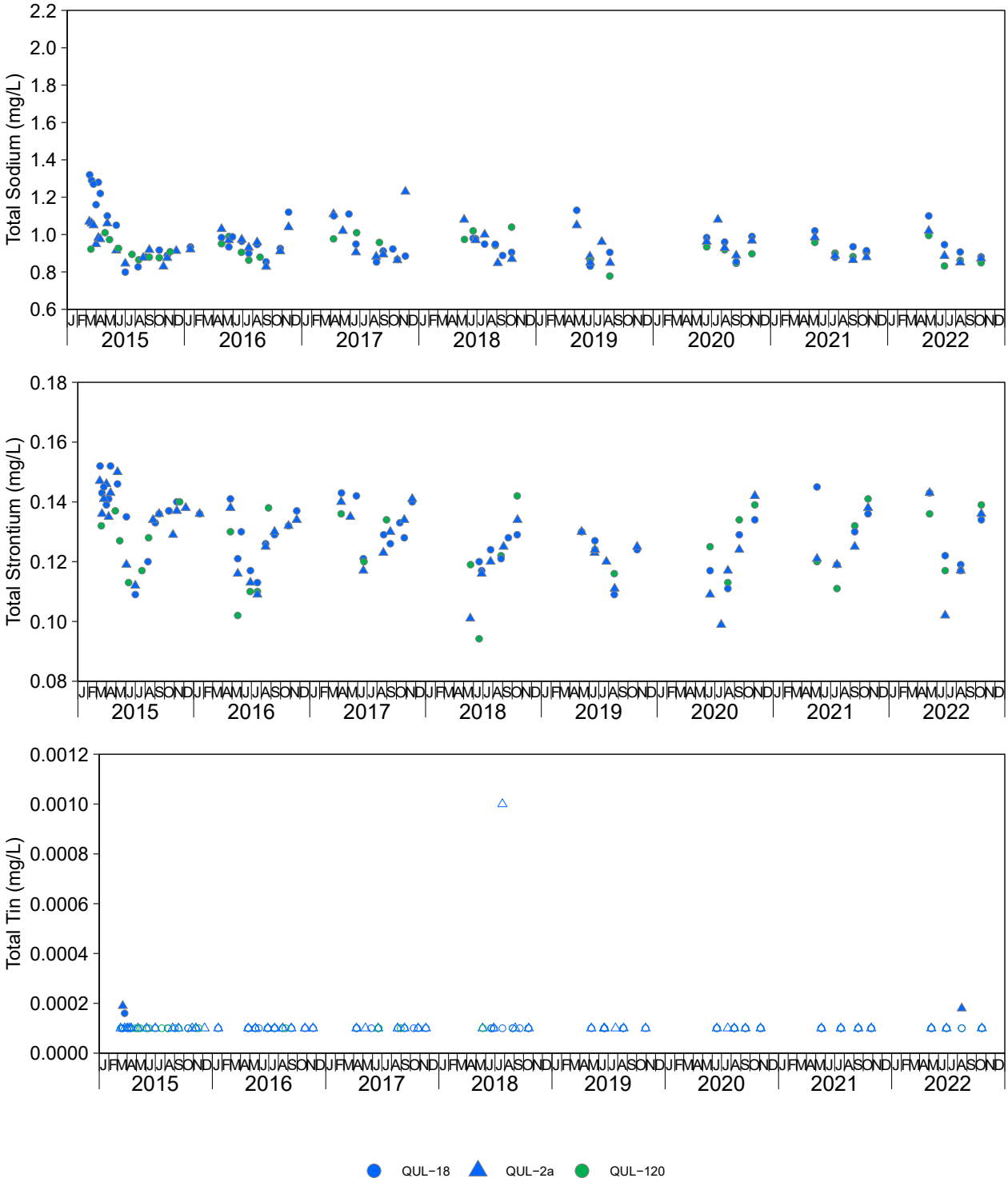

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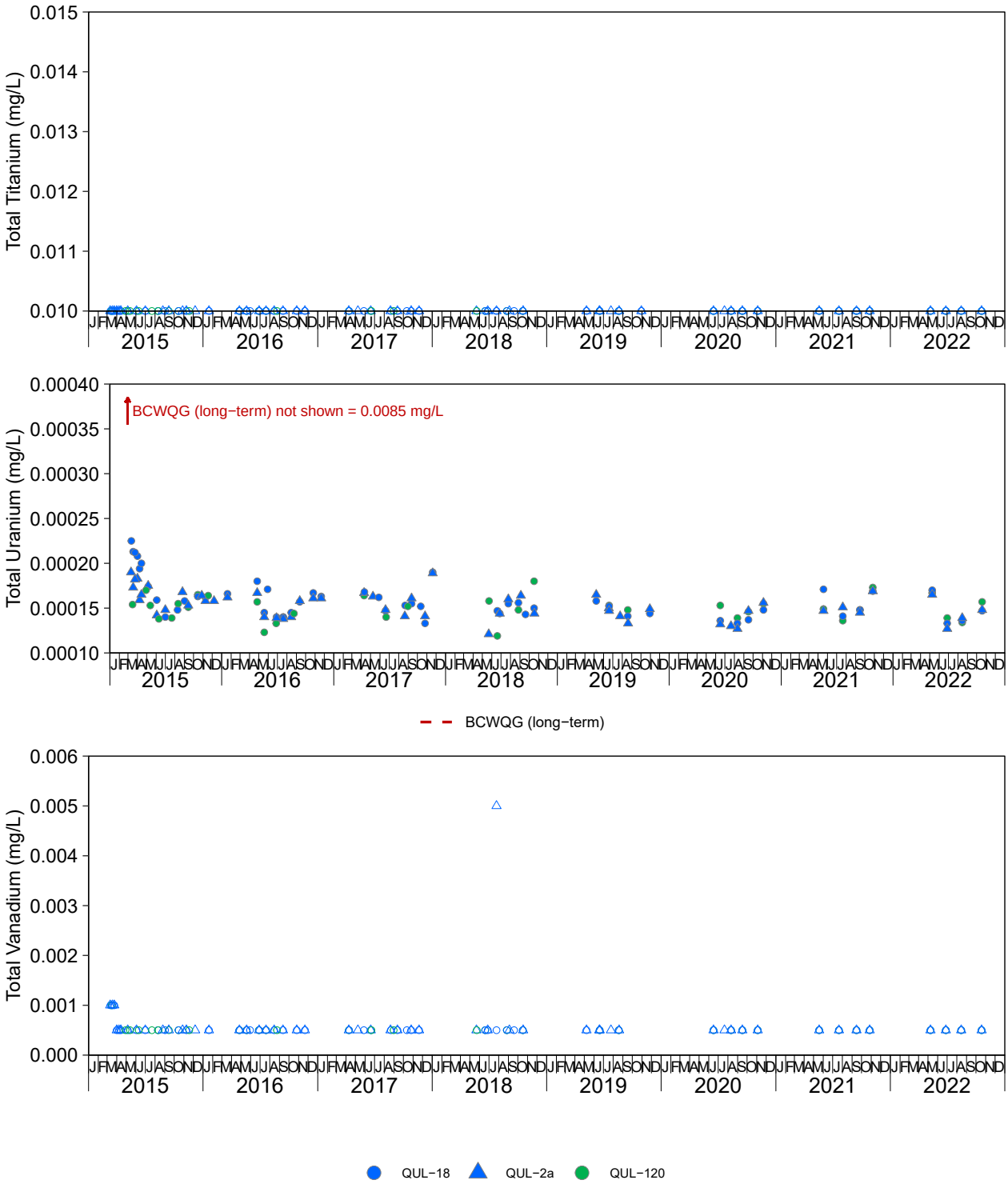

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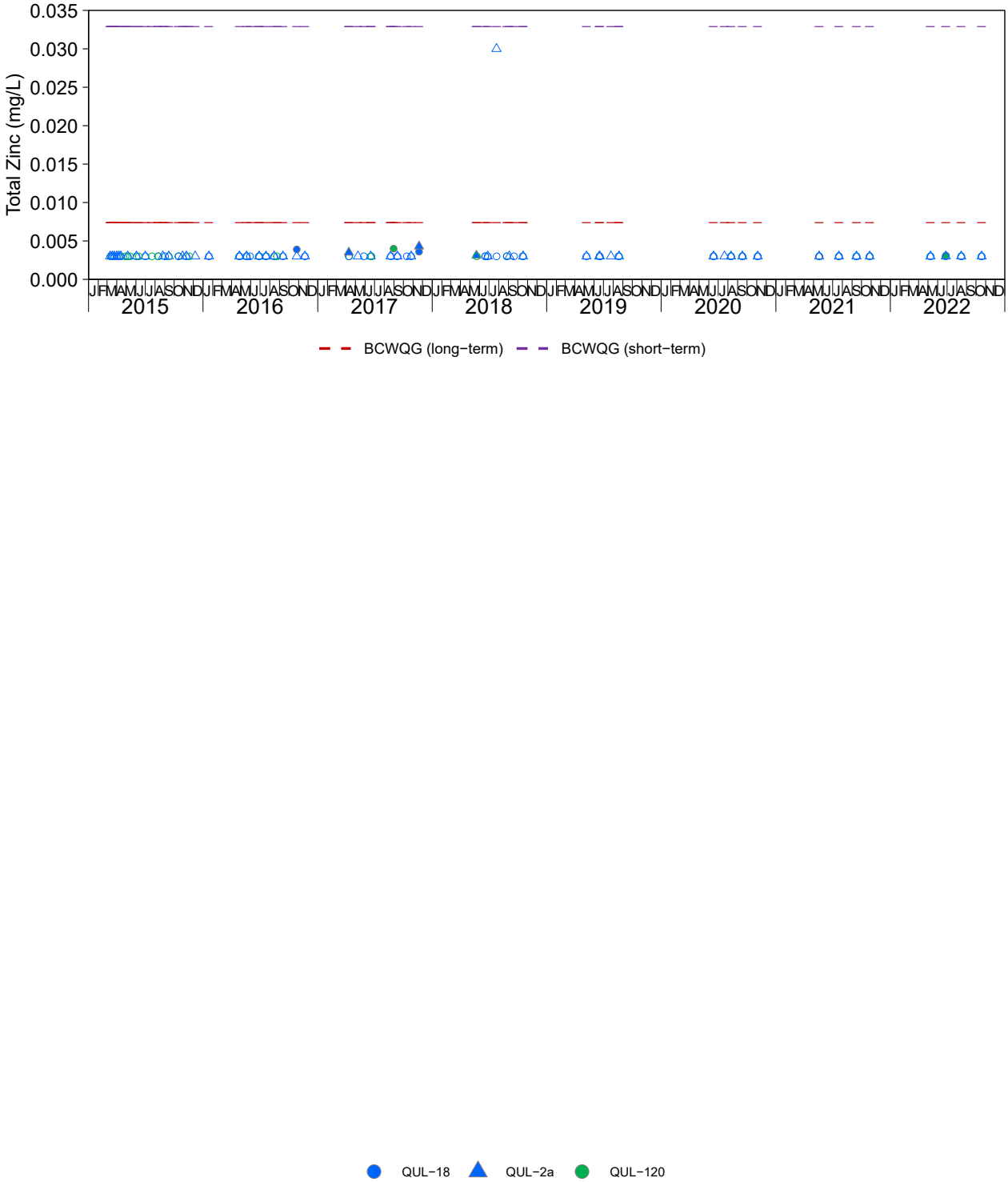

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Table C.1.1: British Columbia Water Quality Guidelines for the Protection of Aquatic Life (BCMOECCS 2019b, 2019c, 2021a, 2021b), 2022

Parameter	Units	Long-term Average	Short-term Maximum
Anions, Organics, Nutrients, and Physical Properties			
pH	pH units	6.5 - 9.0	
Temperature (*in situ*)[a]	°C	± 1	
Alkalinity ($CaCO_3$)	mg/L	> 20[b]	-
Conductivity	µS/cm	-	-
Dissolved Oxygen (*in situ*)[c]	mg/L	> 8	> 5
Dissolved Oxygen (*in situ*)[d]	mg/L	> 11	> 9
Total Suspended Solids[e]	mg/L	+ 5	+ 25
Turbidity[e]	NTU	+ 2	+ 8
Chloride	mg/L	150	600
Fluoride[f]	mg/L	-	For hardness ≤ 10 mg/L, WQG = 0.4 For hardness > 10 mg/L, WQG = [-51.73 + 92.57 × log10]×0.01 Maximum applicable hardness = 385 mg/L
Sulphate[g]	mg/L	hardness dependent	-
Ammonia (as N)[h]	mg/L	temperature and pH dependent	temperature and pH dependent
Nitrate (as N)	mg/L	3.0	32.8
Nitrite (as N)[i]	mg/L	chloride dependent	chloride dependent
Phosphorus - Total[j]	mg/L	0.005 - 0.015	
Dissolved Organic Carbon[k]	mg/L	-	± 20%[k]
Total Metals			
Antimony	µg/L	9	-
Arsenic	µg/L	-	5
Beryllium	µg/L	0.13	-
Boron	mg/L	1.2	-
Chromium[l]	µg/L	For Cr, WQG = 0.001 For Cr, WQG = 0.0089	-
Cobalt	µg/L	4	110
Iron	mg/L	-	1
Lead[f]	µg/L	For hardness ≤ 8 mg/L, none proposed For hardness 8 to 360 mg/L, WQG = 0.001×{3.31+ exp[1.273 × ln - 4.704]} Maximum applicable hardness = 360 mg/L	For hardness ≤ 8 mg/L, WQG ≤ 0.003 For hardness 8 to 360 mg/L, WQG = 0.001×{exp[1.273 × ln - 1.460]} Maximum applicable hardness = 360 mg/L
Manganese[f]	mg/L	For hardness 37 to 450 mg/L, WQG ≤ 0.004 × hardness + 0.605 Maximum applicable hardness = 450 mg/L	For hardness 25 to 259 mg/L, WQG ≤ 0.01102 × hardness + 0.54 Maximum applicable hardness = 259 mg/L
Mercury[m]	mg/L	WQG = [0.0001/] OR When MeHg = 0.5% of THg, WQG= 0.00002	-
Molybdenum	mg/L	7.6	46
Nickel[f]	µg/L	For hardness ≤60, WQG = 0.025 For hardness 60 to 180, WQG = exp{0.76[ln]+1.06} For hardness ≥180, WQG = 0.15	-
Selenium	µg/L	2	-
Silver	mg/L	For hardness ≤ 100 mg/L, WQG = 0.00005 For hardness > 100 mg/L, WQG = 0.0015	For hardness ≤ 100 mg/L, WQG = 0.0001 For hardness > 100 mg/L, WQG = 0.003
Thallium	µg/L	0.8	-
Uranium	µg/L	8.5	-
Zinc[f]	µg/L	For hardness ≤ 90 mg/L, WQG = 0.0075 For hardness 90 to 330 mg/L, WQG = [7.5 + 0.75]; Maximum applicable hardness = 330 mg/L	For hardness ≤ 90 mg/L, WQG = 0.033 For hardness 90 to 500 mg/L, WQG = [33 + 0.75]; Maximum applicable hardness = 500 mg/L
Dissolved Metals			
Aluminum	mg/L	0.05	0.1
Cadmium[f]	µg/L	For hardness = 3.4 to 285 mg/L, WQG = {exp[0.736×ln - 4.943]} Maximum applicable hardness = 285 mg/L	For hardness = 7 to 455 mg/L, WQG = {exp[1.03×ln-5.274]} Maximum applicable hardness = 455 mg/L
Copper[n]	mg/L	Biotic Ligand Model	Biotic Ligand Model
Iron	mg/L	-	0.35

Notes: "-" indicates no applicable guideline. BCMOECCS = British Columbia Ministry of Environment and Climate Change Strategy.

[a] Change from optimal . No guideline applied.

[b] For waterbodies with low sensitivity to acid inputs.

[c] Minimum for all life stages other than buried embryo / alevin.

[d] Minimum for buried embryo / alevin life stages.

[e] Increase relative to background; no guideline applied.

[f] For hardness-based guidelines, concurrent hardness values were used for calculating guidelines. If hardness values exceeding the maximum applicable hardness, then guidelines were determined using the maximum applicable hardness. If hardness values are lower than the minimum hardness, then guidelines were determined using the minimum hardness.

[g] 128 mg/L at hardness 0-30 mg/L; 218 mg/L at hardness 31-75 mg/L; 309 mg/L at hardness 76-180 mg/L; 429 mg/L at hardness > 250 mg/L.

[h] Use tables in BCMOECCS 2021b.

[i] When chloride < 2 mg/L, long-term = 0.02 mg/L and short-term = 0.06 mg/L; increase with increasing chloride.

[j] Aquatic Life - Lakes; minimum guideline was applied.

[k] ±20% of the background median; no guideline applied.

[l] Chromium is the dominant oxidation state in oxygenated environments, and so its guideline was applied.

[m] Values were screened against 0.00002 mg/L which assumes MeHg = 0.5% of THg.

[n] Site specific guidelines developed using the BLM model and calculated concurrently for each sample .

Table C.1.2: Supporting Overlying Water Quality Data Collected Concurrently with Sediment Quality Sampling in Polley Lake (POL-S; Exposed) and Bootjack Lake (BOL-S; Reference) Shallow Areas, 2022

Analyte	Units	Guidelines for the Protection of Aquatic Life[a]		BOL-S (Reference)							POL-S (Exposed)						
				BOL-S-1	BOL-S-2	BOL-S-3	BOL-S-4	BOL-S-5	Mean	Standard Deviation	POL-S-1	POL-S-2	POL-S-3	POL-S-4	POL-S-5	Mean	Standard Deviation
		Long-term Average	Short-term Maximum	24-Aug-22	24-Aug-22	24-Aug-22	24-Aug-22	24-Aug-22			25-Aug-22	25-Aug-22	25-Aug-22	25-Aug-22	25-Aug-22		
Anions, Organics, Nutrients, and Physical Properties																	
Alkalinity (as $CaCO_3$)	mg/L	>20	-	40.2	39.9	39.3	39.2	39.5	39.6	0.421	87.9	88.3	88.8	89.9	88.9	88.8	0.754
Ammonia (as N)	mg/L	0.65 to 1.8	3.6 to 12	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.00500	-	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.00500	-
Chloride	mg/L	150	600	0.580	0.580	0.580	0.580	0.590	0.582	0.00447	0.800	0.810	0.820	0.820	0.830	0.816	0.0114
Conductivity	µS/cm	-	-	98.0	97.7	98.8	97.1	97.4	97.8	0.652	246	244	247	247	245	246	1.30
Specific Conductance (*in situ*)	µS/cm	-	-	84.7	84.6	85.2	85.3	85.0	85.0	0.305	211	213	214	215	213	213	1.52
Dissolved Organic Carbon[b]	mg/L	-	-	7.51	7.54	7.90	7.55	7.56	7.61	0.162	6.60	6.20	6.92	6.87	7.08	6.73	0.345
Dissolved Oxygen (*in situ*)	%	-	-	100	100	104	112	99.1	103	5.29	103	114	106	107	117	109	5.82
Dissolved Oxygen (*in situ*)	mg/L	>8	>5	8.62	8.68	8.93	9.66	8.59	8.90	0.448	8.94	9.85	9.20	9.22	10.1	9.46	0.489
Fluoride	mg/L	-	0.98 to 1.4	0.0590	0.0620	0.0620	0.0630	0.0630	0.0618	0.00164	0.0800	0.0820	0.0820	0.0810	0.0800	0.0810	0.00100
Hardness (as $CaCO_3$)	mg/L	-	-	43.4	44.6	42.7	43.3	43.8	43.6	0.702	108	109	110	109	115	110	2.77
Hardness, from Total CaMg (as $CaCO_3$)	mg/L	-	-	45.0	44.8	45.0	44.6	44.8	44.8	0.167	112	112	116	114	114	114	1.67
Nitrate (as N)	mg/L	3.0	33	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.00500	-	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.00500	-
Nitrate and Nitrite (as N)	mg/L	-	-	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	0.00510	-	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	0.00510	-
Nitrite (as N)	mg/L	0.020	0.060	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.00100	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.00100	-
Orthophosphate-Dissolved (as P)	mg/L	-	-	0.00110	<0.0010	<0.0010	<0.0010	<0.0010	0.00102	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.00100	-
pH (*in situ*)	pH units	6.5 - 9.0	6.5 - 9.0	8.56	8.57	8.63	8.91	8.48	8.63	0.165	8.62	8.51	8.70	8.69	8.78	8.66	0.101
pH (lab)	pH units	-	-	7.91	7.91	7.95	7.92	7.93	7.92	0.0167	8.34	8.36	8.36	8.36	8.36	8.36	0.00894
Phosphorus - Total Dissolved	mg/L	-	-	0.00290	0.00270	0.00290	0.00300	0.00290	0.00288	0.000110	0.00360	0.00410	0.00370	0.00420	0.00310	0.00374	0.000439
Phosphorus - Total	mg/L	0.0050		0.0160	0.00630	0.00700	0.00660	0.00880	0.00894	0.00406	0.00910	0.00830	0.0297	0.00800	0.00970	0.0130	0.00938
Sulphate	mg/L	218 to 309	-	7.57	7.56	7.58	7.53	7.54	7.56	0.0207	36.1	36.2	36.6	36.6	36.7	36.4	0.270
Temperature (*in situ*)	°C	-	-	22.6	22.6	22.5	22.7	22.5	22.6	0.0962	22.7	22.4	22.4	22.8	22.7	22.6	0.180
Total Dissolved Solids	mg/L	-	-	91.0	91.0	90.0	88.0	94.0	90.8	2.17	203	196	196	185	199	196	6.69
Total Nitrogen	mg/L	-	-	0.276	0.277	0.264	0.264	0.367	0.290	0.0437	0.272	0.275	0.259	0.250	0.262	0.264	0.0101
Total Suspended Solids[b]	mg/L	-	-	<1.0	<1.0	1.20	1.00	1.30	1.10	0.155	<1.0	<1.0	2.20	1.70	<1.0	1.38	0.283
Turbidity[b]	NTU	-	-	0.410	0.420	0.340	0.330	0.410	0.382	0.0432	0.340	0.460	0.350	0.330	0.320	0.360	0.0570
Total Metals																	
Aluminum	mg/L	-	-	0.0107	0.0121	0.00700	0.00880	0.00710	0.00914	0.00224	0.00850	0.00790	0.0120	0.00800	0.0208	0.0114	0.00550
Antimony	mg/L	0.0090	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.000100	-	<0.00010	<0.00010	<0.00010	0.000120	0.000120	0.000108	0
Arsenic	mg/L	-	0.0050	0.000340	0.000340	0.000340	0.000380	0.000350	0.000350	0.0000173	0.000550	0.000560	0.000570	0.000570	0.000640	0.000578	0.0000356
Barium	mg/L	1.0	-	0.0156	0.0159	0.0156	0.0157	0.0160	0.0158	0.000182	0.0106	0.0107	0.0107	0.0105	0.0108	0.0107	0.000114
Beryllium	mg/L	0.00013	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.000100	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.000100	-
Bismuth	mg/L	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	0.0000500	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	0.0000500	-
Boron	mg/L	1.2	-	0.0430	0.0440	0.0440	0.0440	0.0440	0.0438	0.000447	0.0200	0.0200	0.0200	0.0200	0.0200	0.0200	0
Cadmium	mg/L	-	-	0.00000620	<0.0000050	<0.0000050	<0.0000050	0.00000710	0.00000566	0.000000509	<0.000010	<0.000010	<0.0000050	<0.0000050	<0.000010	0.00000500	-
Calcium	mg/L	-	-	13.7	13.7	13.7	13.6	13.7	13.7	0.0447	36.1	35.9	37.5	36.5	36.8	36.6	0.631
Chromium	mg/L	0.0010	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.000500	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.000500	-
Cobalt	mg/L	0.0040	0.11	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.000100	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.000100	-
Copper	mg/L	-	-	0.00235	0.00248	0.00218	0.00279	0.00232	0.00242	0.000231	0.00419	0.00393	0.00420	0.00389	0.00488	0.00422	0.000397
Iron	mg/L	-	1.0	<0.030	<0.030	<0.030	<0.030	<0.030	0.0300	-	<0.030	<0.030	<0.030	<0.030	<0.030	0.0300	-
Lead	mg/L	0.0043 to 0.0068	0.026 to 0.090	0.0000880	0.000258	0.000144	0.000564	<0.000050	0.000221	0.000207	<0.000050	0.000171	0.000143	0.000158	0.000549	0.000214	0.000183
Lithium	mg/L	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.00100	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.00100	-
Magnesium	mg/L	-	-	2.61	2.58	2.61	2.59	2.58	2.59	0.0152	5.41	5.38	5.55	5.56	5.43	5.47	0.0832
Manganese	mg/L	0.79 to 1.1	0.99 to 1.7	0.0122	0.0105	0.0113	0.0124	0.0140	0.0121	0.00131	0.00711	0.00734	0.00678	0.00524	0.00556	0.00641	0.000946
Molybdenum	mg/L	7.6	46	0.000916	0.000906	0.000878	0.000885	0.000873	0.000892	0.0000186	0.00691	0.00694	0.00713	0.00694	0.00707	0.00700	0.0000963
Nickel	mg/L	0.025 to 0.10	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.000500	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.000500	-
Potassium	mg/L	-	-	0.431	0.454	0.437	0.439	0.431	0.438	0.00942	0.942	0.928	0.962	0.949	0.939	0.944	0.0126
Selenium	mg/L	0.0020	-	0.000241	0.000235	0.000244	0.000189	0.000164	0.000215	0.0000360	0.000787	0.000749	0.000846	0.000873	0.000751	0.000801	0.0000561
Silicon	mg/L	-	-	1.55	1.58	1.54	1.56	1.53	1.55	0.0192	2.87	2.83	3.02	3.02	2.98	2.94	0.0885
Silver	mg/L	0.000050 to 0.0015	0.00010 to 0.0030	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	0.0000100	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	0.0000100	-
Sodium	mg/L	-	-	2.42	2.41	2.44	2.40	2.42	2.42	0.0148	7.51	7.48	7.57	7.58	7.45	7.52	0.0563
Strontium	mg/L	-	-	0.134	0.133	0.133	0.133	0.135	0.134	0.000894	0.252	0.252	0.255	0.254	0.256	0.254	0.00179
Thallium	mg/L	0.00080	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	0.0000100	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	0.0000100	-
Tin	mg/L	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.000100	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.000100	-
Titanium	mg/L	-	-	<0.010	<0.010	<0.010	<0.010	<0.010	0.0100	-	<0.010	<0.010	<0.010	<0.010	<0.010	0.0100	-
Uranium	mg/L	0.0085	-	0.0000410	0.0000440	0.0000440	0.0000450	0.0000430	0.0000434	0.00000152	0.000183	0.000186	0.000194	0.000192	0.000191	0.000189	0.00000455
Vanadium	mg/L	-	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.000500	-	0.00144	0.00136	0.00141	0.00140	0.00144	0.00141	0.0000332
Zinc	mg/L	0.0075 to 0.021	0.033 to 0.046	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	0.00300	-	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	0.00300	-

Indicates value greater than the long-term average British Columbia Water Quality Guideline (BCMOECCS 2019c, 2021a,b)
Indicates value greater than the short-term maximum British Columbia Water Quality Guideline (BCMOECCS 2019c, 2021a,b)

Notes: "-" indicates data not available. Standard deviation was not calculated where all results were below the laboratory reporting limit.

[a] Guidelines were derived from the British Columbia Water Quality Guidelines for the protection of aquatic life (BCMOECCS 2019c, 2021a,b) outlined in Table C.1.1.
[b] Guidelines for these parameters (Total Suspended Solids, Turbidity, Dissolved Organic Carbon) are narrative and were not evaluated.

Table C.1.2: Supporting Overlying Water Quality Data Collected Concurrently with Sediment Quality Sampling in Polley Lake (POL-S; Exposed) and Bootjack Lake (BOL-S; Reference) Shallow Areas, 2022

Analyte	Units	Guidelines for the Protection of Aquatic Life[a]		BOL-S (Reference)							POL-S (Exposed)						
				BOL-S-1	BOL-S-2	BOL-S-3	BOL-S-4	BOL-S-5	Mean	Standard Deviation	POL-S-1	POL-S-2	POL-S-3	POL-S-4	POL-S-5	Mean	Standard Deviation
		Long-term Average	Short-term Maximum	24-Aug-22	24-Aug-22	24-Aug-22	24-Aug-22	24-Aug-22			25-Aug-22	25-Aug-22	25-Aug-22	25-Aug-22	25-Aug-22		
Dissolved Metals																	
Aluminum	mg/L	0.050	0.10	0.00520	0.00450	0.00430	0.00440	0.00510	0.00470	0.000418	0.00320	<0.0030	0.00410	0.00400	0.00360	0.00358	0.000441
Antimony	mg/L	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.000100	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.000100	-
Arsenic	mg/L	-	-	0.000330	0.000300	0.000340	0.000310	0.000310	0.000318	0.0000164	0.000520	0.000550	0.000560	0.000540	0.000510	0.000536	0.0000207
Barium	mg/L	-	-	0.0145	0.0141	0.0139	0.0151	0.0148	0.0145	0.000492	0.00991	0.00962	0.00936	0.00946	0.00950	0.00957	0.000212
Beryllium	mg/L	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.000100	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.000100	-
Bismuth	mg/L	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	0.0000500	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	0.0000500	-
Boron	mg/L	-	-	0.0400	0.0420	0.0400	0.0420	0.0420	0.0412	0.00110	0.0180	0.0180	0.0180	0.0180	0.0190	0.0182	0.000447
Cadmium	mg/L	0.00011 to 0.00022	0.00023 to 0.00064	0.00000890	<0.0000050	0.00000820	0.0000102	0.0000117	0.00000880	0.00000155	0.0000188	<0.0000050	<0.0000050	<0.0000050	0.00000580	0.00000792	0.00000735
Calcium	mg/L	-	-	13.2	13.7	13.0	13.2	13.4	13.3	0.265	34.6	34.7	35.4	34.5	37.0	35.2	1.05
Chromium	mg/L	-	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.000500	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.000500	-
Cobalt	mg/L	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.000100	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.000100	-
Copper	mg/L	0.0021 to 0.0048	0.013 to 0.028	0.00218	0.00215	0.00199	0.00198	0.00209	0.00208	0.0000909	0.00372	0.00362	0.00370	0.00357	0.00355	0.00363	0.0000760
Iron	mg/L	-	0.35	<0.030	<0.030	<0.030	<0.030	<0.030	0.0300	-	<0.030	<0.030	<0.030	<0.030	<0.030	0.0300	-
Lead	mg/L	-	-	<0.000050	0.000358	0.0000580	0.0000910	0.0000530	0.000122	0.000137	0.0000700	0.0000540	0.000898	0.0000610	0.000187	0.000254	0.000364
Lithium	mg/L	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.00100	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.00100	-
Magnesium	mg/L	-	-	2.54	2.52	2.49	2.51	2.52	2.52	0.0182	5.25	5.43	5.38	5.52	5.46	5.41	0.102
Manganese	mg/L	-	-	0.00364	0.00224	0.00255	0.00421	0.00506	0.00354	0.00117	0.000960	0.000920	0.00112	0.000730	0.000940	0.000934	0.000139
Molybdenum	mg/L	-	-	0.000846	0.000822	0.000809	0.000840	0.000858	0.000835	0.0000195	0.00677	0.00691	0.00688	0.00698	0.00692	0.00689	0.0000773
Nickel	mg/L	-	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.000500	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.000500	-
Potassium	mg/L	-	-	0.457	0.443	0.434	0.440	0.456	0.446	0.0101	0.924	0.950	0.953	0.953	0.938	0.944	0.0126
Selenium	mg/L	-	-	0.000186	0.000158	0.000196	0.000246	0.000239	0.000205	0.0000370	0.000763	0.000763	0.000799	0.000755	0.000813	0.000779	0.0000257
Silicon	mg/L	-	-	1.49	1.49	1.47	1.52	1.51	1.50	0.0195	2.69	2.68	2.82	2.86	2.84	2.78	0.0861
Silver	mg/L	-	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	0.0000100	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	0.0000100	-
Sodium	mg/L	-	-	2.42	2.43	2.42	2.35	2.47	2.42	0.0432	6.99	7.26	7.13	7.14	7.18	7.14	0.0982
Strontium	mg/L	-	-	0.121	0.122	0.121	0.125	0.123	0.122	0.00167	0.235	0.236	0.241	0.237	0.231	0.236	0.00361
Thallium	mg/L	-	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	0.0000100	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	0.0000100	-
Tin	mg/L	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.000100	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.000100	-
Titanium	mg/L	-	-	<0.010	<0.010	<0.010	<0.010	<0.010	0.0100	-	<0.010	<0.010	<0.010	<0.010	<0.010	0.0100	-
Uranium	mg/L	-	-	0.0000450	0.0000410	0.0000440	0.0000430	0.0000420	0.0000430	0.00000158	0.000189	0.000189	0.000196	0.000195	0.000184	0.000191	0.00000493
Vanadium	mg/L	-	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.000500	-	0.00124	0.00131	0.00131	0.00132	0.00137	0.00131	0.0000464
Zinc	mg/L	-	-	0.00420	<0.0030	<0.0030	<0.0030	0.00300	0.00324	0.000679	0.00590	<0.0030	0.00360	<0.0030	<0.0030	0.00370	0.00130

Indicates value greater than the long-term average British Columbia Water Quality Guideline (BCMOECCS 2019c, 2021a,b)

Indicates value greater than the short-term maximum British Columbia Water Quality Guideline (BCMOECCS 2019c, 2021a,b)

Notes: "-" indicates data not available. Standard deviation was not calculated where all results were below the laboratory reporting limit.

[a] Guidelines were derived from the British Columbia Water Quality Guidelines for the protection of aquatic life (BCMOECCS 2019c, 2021a,b) outlined in Table C.1.1. [b] Guidelines for these parameters (Total Suspended Solids, Turbidity, Dissolved Organic Carbon) are narrative and were not evaluated.

Table C.1.3: Supporting Spot Water Quality Data Collected During Plankton Sampling in Polley Lake (POL-P2; Exposed) and Bootjack Lake (BOL-B2; Reference), 2022

Analyte	Units	Guidelines for the Protection of Aquatic Life[a]		BOL-B2 (Reference)			POL-P2 (Exposed)		
				June	July	August	June	July	August
		Long-term Average	Short-term Maximum	21-Jun-22	26-Jul-22	28-Aug-22	21-Jun-22	25-Jul-22	25-Aug-22
Anions, Organics, Nutrients, and Physical Properties									
Alkalinity (as $CaCO_3$)	mg/L	>20	-	38.1	41.8	42.5	88.2	91.7	89.1
Ammonia (as N)	mg/L	0.65 to 1.8	3.6 to 12	0.00520	0.00520	0.00720	<0.0050	0.00850	0.0107
Chloride	mg/L	150	600	0.620	0.560	0.640	1.03	0.800	0.870
Conductivity	µS/cm	-	-	92.2	95.8	98.7	242	239	242
Specific Conductance (*in situ*)	µS/cm	-	-	97.0	92.2	86.2	249	232	214
Dissolved Organic Carbon[b]	mg/L	-	-	7.43	7.85	7.81	6.77	6.56	7.40
Dissolved Oxygen (*in situ*)	%	-	-	80.6	71.4	61.4	89.1	87.7	85.8
Dissolved Oxygen (*in situ*)	mg/L	>8	>5	8.77	7.32	6.32	9.66	8.62	8.40
Fluoride	mg/L	-	0.98 to 1.4	0.0570	0.0480	0.0560	0.0740	0.0620	0.0800
Hardness (as $CaCO_3$)	mg/L	-	-	44.2	41.8	45.0	109	106	111
Hardness, from Total CaMg (as $CaCO_3$)	mg/L	-	-	44.2	41.0	44.8	106	105	108
Nitrate (as N)	mg/L	3.0	33	<0.0050	<0.0050	0.00640	<0.0050	<0.0050	0.00780
Nitrate and Nitrite (as N)	mg/L	-	-	<0.0051	<0.0051	0.00640	<0.0051	<0.0051	0.00780
Nitrite (as N)	mg/L	0.020	0.060	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Orthophosphate-Dissolved (as P)	mg/L	-	-	<0.0010	<0.0010	0.00160	<0.0010	0.00370	<0.0010
pH (*in situ*)	pH units	6.5 - 9.0	6.5 - 9.0	7.54	7.68	7.47	7.64	8.10	8.12
pH	pH units	-	-	7.72	7.80	7.49	8.12	8.20	8.12
Phosphorus - Total Dissolved	mg/L	-	-	0.00610	0.00530	0.00720	0.00720	0.0126	0.00590
Phosphorus - Total	mg/L	0.0050		0.0130	0.0120	0.0170	0.0180	0.0145	0.0134
Sulphate	mg/L	218 to 309	-	7.16	6.98	6.78	33.8	34.1	34.9
Temperature (*in situ*)	°C	-	-	11.6	14.2	14.0	11.7	16.1	16.2
Total Dissolved Solids	mg/L	-	-	79.0	91.0	83.0	162	169	174
Total Nitrogen	mg/L	-	-	0.314	0.287	-	0.367	0.324	0.388
Total Suspended Solids[b]	mg/L	-	-	3.00	2.00	3.60	3.00	1.30	2.80
Turbidity[b]	NTU	-	-	1.27	0.810	2.47	1.44	0.590	1.73
Total Metals									
Aluminum	mg/L	-	-	0.0586	0.0354	0.0551	0.103	0.0242	0.0399
Antimony	mg/L	0.0090	-	0.000150	<0.00010	0.000120	0.000120	<0.00010	0.000100
Arsenic	mg/L	-	0.0050	0.000580	0.000360	0.000710	0.000850	0.000510	0.000580
Barium	mg/L	1.0	-	0.0181	0.0167	0.0168	0.0126	0.0103	0.0111
Beryllium	mg/L	0.00013	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Bismuth	mg/L	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Boron	mg/L	1.2	-	0.0450	0.0460	0.0440	0.0200	0.0210	0.0200
Cadmium	mg/L	-	-	0.0000120	0.0000222	0.00000750	0.00000700	0.0000379	0.00000570
Calcium	mg/L	-	-	13.6	12.4	13.8	34.2	33.6	34.6
Chromium	mg/L	0.0010	-	<0.00050	<0.00050	<0.00050	0.000530	<0.00050	<0.00050
Cobalt	mg/L	0.0040	0.11	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Copper	mg/L	-	-	0.00554	0.00342	0.00528	0.00807	0.00543	0.00623
Iron	mg/L	-	1.0	0.0740	0.0500	0.0890	0.101	<0.030	0.0360
Lead	mg/L	0.0043 to 0.0068	0.026 to 0.090	0.0000980	0.0000970	0.000107	0.000210	0.000117	0.000144
Lithium	mg/L	-	-	0.00110	<0.0010	<0.0010	0.00140	<0.0010	<0.0010
Magnesium	mg/L	-	-	2.50	2.43	2.52	4.97	5.03	5.27
Manganese	mg/L	0.79 to 1.1	0.99 to 1.7	0.0140	0.0212	0.0431	0.00857	0.00462	0.00746
Molybdenum	mg/L	7.6	46	0.000788	0.000824	0.000853	0.00596	0.00666	0.00658
Nickel	mg/L	0.025 to 0.10	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Potassium	mg/L	-	-	0.517	0.496	0.541	1.28	1.11	1.07
Selenium	mg/L	0.0020	-	0.000192	0.000253	0.000180	0.000509	0.000565	0.000658
Silicon	mg/L	-	-	1.99	1.89	2.40	3.68	3.11	3.32
Silver	mg/L	0.000050 to 0.0015	0.00010 to 0.0030	<0.000010	<0.000010	<0.000010	0.0000160	<0.000010	<0.000010
Sodium	mg/L	-	-	2.43	2.45	2.54	7.00	7.27	7.04
Strontium	mg/L	-	-	0.126	0.127	0.137	0.233	0.242	0.258
Thallium	mg/L	0.00080	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Tin	mg/L	-	-	0.000230	<0.00010	<0.00010	0.000110	<0.00010	<0.00010
Titanium	mg/L	-	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Uranium	mg/L	0.0085	-	0.0000410	0.0000390	0.0000410	0.000192	0.000197	0.000192
Vanadium	mg/L	-	-	<0.00050	<0.00050	<0.00050	0.00159	0.00132	0.00141
Zinc	mg/L	0.0075 to 0.021	0.033 to 0.046	0.00450	<0.0030	0.00370	0.00340	<0.0030	<0.0030
Dissolved Metals									
Aluminum	mg/L	0.050	0.10	0.0103	0.00690	0.00890	0.00560	0.00400	0.00370
Antimony	mg/L	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Arsenic	mg/L	-	-	0.000290	0.000280	0.000340	0.000500	0.000470	0.000520
Barium	mg/L	-	-	0.0173	0.0142	0.0160	0.0101	0.00946	0.00958
Beryllium	mg/L	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Bismuth	mg/L	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Boron	mg/L	-	-	0.0460	0.0410	0.0480	0.0200	0.0200	0.0200
Cadmium	mg/L	0.00011 to 0.00022	0.00023 to 0.00064	<0.0000050	0.0000142	0.00000680	<0.0000050	0.0000653	<0.0000050
Calcium	mg/L	-	-	13.5	12.9	13.8	35.2	34.2	35.9
Chromium	mg/L	-	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Cobalt	mg/L	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Copper	mg/L	0.0021 to 0.0048	0.013 to 0.028	0.00265	0.00232	0.00282	0.00435	0.00436	0.00428
Iron	mg/L	-	0.35	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
Lead	mg/L	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	0.000158
Lithium	mg/L	-	-	<0.0010	<0.0010	<0.0010	0.00120	<0.0010	<0.0010
Magnesium	mg/L	-	-	2.54	2.33	2.56	5.11	4.90	5.16
Manganese	mg/L	-	-	0.00233	0.00279	0.00646	0.00155	0.00184	0.00176
Molybdenum	mg/L	-	-	0.000765	0.000794	0.000777	0.00586	0.00617	0.00629
Nickel	mg/L	-	-	<0.00050	0.000500	<0.00050	<0.00050	0.000620	<0.00050
Potassium	mg/L	-	-	0.494	0.495	0.536	1.27	1.05	1.02
Selenium	mg/L	-	-	0.000178	0.000180	0.000185	0.000469	0.000461	0.000634
Silicon	mg/L	-	-	1.99	1.83	2.19	3.44	3.10	3.23
Silver	mg/L	-	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium	mg/L	-	-	2.62	2.38	2.55	7.35	7.71	7.22
Strontium	mg/L	-	-	0.135	0.136	0.128	0.235	0.252	0.229
Thallium	mg/L	-	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Tin	mg/L	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium	mg/L	-	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Uranium	mg/L	-	-	0.0000380	0.0000370	0.0000380	0.000190	0.000196	0.000191
Vanadium	mg/L	-	-	<0.00050	<0.00050	<0.00050	0.00136	0.00132	0.00130
Zinc	mg/L	-	-	0.00500	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030

Indicates value greater than the long-term average British Columbia Water Quality Guideline (BCMOECCS 2019c, 2021a,b)
Indicates value greater than the short-term maximum British Columbia Water Quality Guideline (BCMOECCS 2019c, 2021a,b)

Note: "-" indicates data not available.

[a] Guidelines were derived from the British Columbia Water Quality Guidelines for the protection of aquatic life (BCMOECCS 2019c, 2021a,b) outlined in Table C.1.1. [b] Guidelines for these parameters (Total Suspended Solids, Turbidity, Dissolved Organic Carbon) are narrative and were not evaluated.

Table C.1.4: Supporting Overlying Water Quality Data Collected During Sediment Quality Sampling in Quesnel Lake at QUL-LNF1 (Exposed) and QUL-LREF1 (Reference) Shallow Areas, 2022

Analyte	Units	Guidelines for the Protection of Aquatic Life[a]		Reference							Exposed (Near-Field)						
				QUL-LREF1-1	QUL-LREF1-2	QUL-LREF1-3	QUL-LREF1-4	QUL-LREF1-5	Mean	Standard Deviation	QUL-LNF-1	QUL-LNF-2	QUL-LNF-3	QUL-LNF-4	QUL-LNF-5	Mean	Standard Deviation
		Long-term Average	Short-term Maximum	24-Aug-22	24-Aug-22	24-Aug-22	24-Aug-22	24-Aug-22			24-Aug-22	24-Aug-22	24-Aug-22	24-Aug-22	24-Aug-22		
Anions, Organics, Nutrients, and Physical Properties																	
Alkalinity (as $CaCO_3$)	mg/L	>20	-	44.8	44.6	45.2	45.0	44.6	44.8	0.261	43.5	43.4	43.7	43.8	43.7	43.6	0.164
Ammonia (as N)	mg/L	0.65 to 1.8	3.6 to 12	<0.0050	0.00740	<0.0050	<0.0050	<0.0050	0.00548	-	0.0107	0.00510	0.00760	0.00950	<0.0050	0.00758	0.00262
Chloride	mg/L	150	600	<0.50	<0.50	<0.50	<0.50	<0.50	0.500	-	<0.50	<0.50	<0.50	<0.50	<0.50	0.500	-
Conductivity	µS/cm	-	-	101	101	101	102	102	101	0.548	101	99.7	99.4	99.9	100	100	0.604
Specific Conductance (*in situ*)	µS/cm	-	-	89.1	88.2	88.2	89.9	88.2	88.7	0.766	87.0	86.8	87.2	87.2	87.1	87.1	0.167
Dissolved Organic Carbon[b]	mg/L	-	-	2.74	2.65	2.80	2.73	2.77	2.74	0.0563	2.80	2.58	2.52	2.38	2.38	2.53	0.174
Dissolved Oxygen (*in situ*)	%	-	-	106	111	114	104	111	109	3.96	102	102	101	101	101	101	0.464
Dissolved Oxygen (*in situ*)	mg/L	>8	>5	9.34	9.74	10.0	9.16	9.81	9.62	0.357	8.93	8.95	8.90	8.87	8.91	8.91	0.0303
Fluoride	mg/L	-	0.98 to 1.4	0.0360	0.0360	0.0360	0.0360	0.0360	0.0360	0	0.0350	0.0340	0.0340	0.0340	0.0340	0.0342	0.000447
Hardness (as $CaCO_3$)	mg/L	-	-	50.3	48.0	47.6	48.1	47.4	48.3	1.16	46.9	47.6	48.3	48.2	47.7	47.7	0.559
Hardness, from Total CaMg (as $CaCO_3$)	mg/L	-	-	50.2	49.9	49.7	50.5	50.4	50.1	0.336	48.8	49.2	48.4	48.4	48.8	48.7	0.335
Nitrate (as N)	mg/L	3.0	33	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.00500	-	0.0131	0.0127	0.0121	0.0125	0.0120	0.0125	0.000449
Nitrate and Nitrite (as N)	mg/L	-	-	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	0.00510	-	0.0131	0.0127	0.0121	0.0125	0.0120	0.0125	0.000449
Nitrite (as N)	mg/L	0.020	0.060	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.00100	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.00100	-
Orthophosphate-Dissolved (as P)	mg/L	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.00100	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.00100	-
pH (*in situ*)	pH units	6.5 - 9.0	6.5 - 9.0	8.45	8.55	8.63	8.35	8.59	8.51	0.113	8.07	8.07	8.05	8.09	8.16	8.09	0.0427
pH	pH units	-	-	8.00	8.02	8.00	8.00	8.00	8.00	0.00894	7.96	7.97	7.98	7.98	7.97	7.97	0.00837
Phosphorus - Total Dissolved	mg/L	-	-	0.00220	<0.0020	<0.0020	0.00240	0.00200	0.00212	0.000196	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	0.00200	-
Phosphorus - Total	mg/L	0.0050		0.00470	0.0109	0.00500	0.00550	0.00540	0.00630	0.00259	0.00270	0.00270	0.00270	0.00370	0.00390	0.00314	0.000607
Sulphate	mg/L	218 to 309	-	5.85	5.80	5.85	5.83	5.83	5.83	0.0205	5.92	5.82	5.85	5.86	5.85	5.86	0.0367
Temperature (*in situ*)	°C	-	-	21.8	21.6	21.7	21.7	21.7	21.7	0.0495	21.7	21.8	21.7	21.7	21.7	21.7	0.0577
Total Dissolved Solids	mg/L	-	-	76.0	70.0	69.0	68.0	62.0	69.0	5.00	68.0	68.0	69.0	67.0	72.0	68.8	1.92
Total Nitrogen	mg/L	-	-	0.104	0.106	0.100	0.104	0.115	0.106	0.00559	0.101	0.0920	0.0960	0.0950	0.101	0.0970	0.00394
Total Suspended Solids[b]	mg/L	-	-	<1.0	<1.2	<1.3	<1.0	<1.0	1.00	-	<1.0	<1.0	<1.0	<1.0	<1.0	1.00	-
Turbidity[b]	NTU	-	-	0.460	0.480	0.450	0.480	0.610	0.496	0.0650	0.250	0.220	0.240	0.190	0.290	0.238	0.0370
Total Metals																	
Aluminum	mg/L	-	-	0.0185	0.0208	0.0261	0.0217	0.0247	0.0224	0.00305	0.0153	0.0141	0.0142	0.0152	0.0185	0.0155	0.00179
Antimony	mg/L	0.0090	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.000100	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.000100	-
Arsenic	mg/L	-	0.0050	0.000260	0.000270	0.000220	0.000260	0.000230	0.000248	0.0000217	0.000140	0.000140	0.000130	0.000140	0.000150	0.000140	0.00000707
Barium	mg/L	1.0	-	0.00711	0.00710	0.00720	0.00709	0.00723	0.00715	0.0000643	0.00542	0.00557	0.00544	0.00544	0.00560	0.00549	0.0000841
Beryllium	mg/L	0.00013	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.000100	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.000100	-
Bismuth	mg/L	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	0.0000500	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	0.0000500	-
Boron	mg/L	1.2	-	<0.010	<0.010	<0.010	<0.010	<0.010	0.0100	-	<0.010	<0.010	<0.010	<0.010	<0.010	0.0100	-
Cadmium	mg/L	-	-	0.0000125	0.00000690	0.00000980	0.00000560	0.00000530	0.00000802	0.00000307	0.0000191	0.0000101	0.00000770	0.00000740	<0.0000050	0.00000986	0.00000519
Calcium	mg/L	-	-	16.3	16.2	16.2	16.4	16.5	16.3	0.130	16.3	16.4	16.1	16.2	16.2	16.2	0.114
Chromium	mg/L	0.0010	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.000500	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.000500	-
Cobalt	mg/L	0.0040	0.11	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.000100	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.000100	-
Copper	mg/L	-	-	0.000740	0.00102	0.00115	0.000960	0.00110	0.000994	0.000160	0.000880	0.000690	0.000720	0.000660	0.00129	0.000848	0.000261
Iron	mg/L	-	1.0	0.0500	0.0560	0.0600	0.0570	0.0650	0.0576	0.00550	<0.030	<0.030	<0.030	<0.030	<0.030	0.0300	-
Lead	mg/L	0.0043 to 0.0068	0.026 to 0.090	0.000107	0.000780	0.000382	0.000348	0.000662	0.000456	0.000268	0.0000880	<0.000050	<0.000050	<0.000050	0.000992	0.000246	0.000511
Lithium	mg/L	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.00100	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.00100	-
Magnesium	mg/L	-	-	2.32	2.29	2.24	2.31	2.23	2.28	0.0409	1.96	2.01	1.98	1.94	2.02	1.98	0.0335
Manganese	mg/L	0.79 to 1.1	0.99 to 1.7	0.00668	0.00626	0.00692	0.00844	0.00842	0.00734	0.00102	0.00174	0.00176	0.00175	0.00177	0.00187	0.00178	0.0000526
Molybdenum	mg/L	7.6	46	0.000512	0.000498	0.000495	0.000515	0.000521	0.000508	0.0000112	0.000366	0.000377	0.000364	0.000354	0.000376	0.000367	0.00000948
Nickel	mg/L	0.025 to 0.10	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.000500	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.000500	-
Potassium	mg/L	-	-	0.502	0.464	0.478	0.496	0.473	0.483	0.0159	0.450	0.462	0.459	0.450	0.452	0.455	0.00555
Selenium	mg/L	0.0020	-	0.000208	0.000163	0.000183	0.000129	0.000179	0.000172	0.0000291	0.000133	0.000101	0.000127	0.000117	0.0000930	0.000114	0.0000169
Silicon	mg/L	-	-	2.00	1.92	1.94	1.97	1.91	1.95	0.0370	1.59	1.61	1.60	1.66	1.62	1.62	0.0270
Silver	mg/L	0.000050 to 0.0015	0.00010 to 0.0030	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	0.0000100	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	0.0000100	-
Sodium	mg/L	-	-	1.08	1.04	1.04	1.08	1.04	1.06	0.0219	0.878	0.894	0.886	0.868	0.900	0.885	0.0127
Strontium	mg/L	-	-	0.108	0.109	0.107	0.108	0.114	0.109	0.00277	0.117	0.119	0.119	0.119	0.118	0.118	0.000894
Thallium	mg/L	0.00080	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	0.0000100	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	0.0000100	-
Tin	mg/L	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.000100	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.000100	-
Titanium	mg/L	-	-	<0.010	<0.010	<0.010	<0.010	<0.010	0.0100	-	<0.010	<0.010	<0.010	<0.010	<0.010	0.0100	-
Uranium	mg/L	0.0085	-	0.000128	0.000127	0.000128	0.000120	0.000128	0.000126	0.00000349	0.000135	0.000137	0.000135	0.000133	0.000134	0.000135	0.00000148
Vanadium	mg/L	-	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.000500	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.000500	-
Zinc	mg/L	0.0075 to 0.021	0.033 to 0.046	<0.0030	<0.0030	0.00430	<0.0030	<0.0030	0.00326	-	0.00710	<0.0030	<0.0030	<0.0030	<0.0030	0.00382	-

Indicates value greater than the long-term average British Columbia Water Quality Guideline (BCMOECCS 2019c, 2021a,b)
Indicates value greater than the short-term maximum British Columbia Water Quality Guideline (BCMOECCS 2019c, 2021a,b)

Notes: "-" indicates data not available. Standard deviation was not calculated where all results were below the laboratory reporting limit.

[a] Guidelines were derived from the British Columbia Water Quality Guidelines for the protection of aquatic life (BCMOECCS 2019c, 2021a,b) outlined in Table C.1.1.
[b] Guidelines for these parameters (Total Suspended Solids, Turbidity, Dissolved Organic Carbon) are narrative and were not evaluated.

Table C.1.4: Supporting Overlying Water Quality Data Collected During Sediment Quality Sampling in Quesnel Lake at QUL-LNF1 (Exposed) and QUL-LREF1 (Reference) Shallow Areas, 2022

Analyte	Units	Guidelines for the Protection of Aquatic Life[a]		Reference							Exposed (Near-Field)						
				QUL-LREF1-1	QUL-LREF1-2	QUL-LREF1-3	QUL-LREF1-4	QUL-LREF1-5	Mean	Standard Deviation	QUL-LNF-1	QUL-LNF-2	QUL-LNF-3	QUL-LNF-4	QUL-LNF-5	Mean	Standard Deviation
		Long-term Average	Short-term Maximum	24-Aug-22	24-Aug-22	24-Aug-22	24-Aug-22	24-Aug-22			24-Aug-22	24-Aug-22	24-Aug-22	24-Aug-22	24-Aug-22		
Dissolved Metals																	
Aluminum	mg/L	0.050	0.10	0.0113	0.0108	0.0103	0.0103	0.00970	0.0105	0.000602	0.00970	0.00980	0.0106	0.0104	0.0105	0.0102	0.000418
Antimony	mg/L	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.000100	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.000100	-
Arsenic	mg/L	-	-	0.000230	0.000200	0.000230	0.000250	0.000210	0.000224	0.0000195	0.000120	<0.00010	0.000120	0.000140	0.000120	0.000120	0.00000924
Barium	mg/L	-	-	0.00634	0.00639	0.00606	0.00623	0.00645	0.00629	0.000154	0.00491	0.00474	0.00500	0.00479	0.00503	0.00489	0.000127
Beryllium	mg/L	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.000100	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.000100	-
Bismuth	mg/L	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	0.0000500	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	0.0000500	-
Boron	mg/L	-	-	<0.010	<0.010	<0.010	<0.010	<0.010	0.0100	-	<0.010	<0.010	<0.010	<0.010	<0.010	0.0100	-
Cadmium	mg/L	0.00011 to 0.00022	0.00023 to 0.00064	0.0000205	0.00000910	0.0000193	0.0000118	<0.0000050	0.0000131	0.00000573	0.0000200	0.0000269	0.0000263	0.00000760	0.0000252	0.0000212	0.00000808
Calcium	mg/L	-	-	16.5	15.5	15.5	15.6	15.4	15.7	0.453	15.7	16.0	16.3	16.2	16.0	16.0	0.230
Chromium	mg/L	-	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.000500	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.000500	-
Cobalt	mg/L	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.000100	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.000100	-
Copper	mg/L	0.0021 to 0.0048	0.013 to 0.028	0.000690	0.000880	0.000730	0.000940	0.000600	0.000768	0.000140	0.000790	0.000680	0.000850	0.000630	0.000860	0.000762	0.000103
Iron	mg/L	-	0.35	<0.030	<0.030	<0.030	<0.030	<0.030	0.0300	-	<0.030	<0.030	<0.030	<0.030	<0.030	0.0300	-
Lead	mg/L	-	-	0.0000520	0.000128	0.000123	0.000188	0.000101	0.000118	0.0000492	0.0000850	0.0000660	0.000117	<0.000050	0.000174	0.0000984	0.0000470
Lithium	mg/L	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.00100	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.00100	-
Magnesium	mg/L	-	-	2.20	2.26	2.17	2.23	2.17	2.21	0.0391	1.88	1.87	1.85	1.88	1.88	1.87	0.0130
Manganese	mg/L	-	-	0.00131	0.00124	0.00148	0.00222	0.00193	0.00164	0.000423	0.000480	0.000440	0.000680	0.000510	0.000580	0.000538	0.0000944
Molybdenum	mg/L	-	-	0.000468	0.000460	0.000466	0.000492	0.000486	0.000474	0.0000138	0.000374	0.000344	0.000368	0.000360	0.000373	0.000364	0.0000124
Nickel	mg/L	-	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.000500	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.000500	-
Potassium	mg/L	-	-	0.528	0.485	0.492	0.505	0.484	0.499	0.0183	0.475	0.466	0.474	0.471	0.483	0.474	0.00622
Selenium	mg/L	-	-	0.000159	0.000159	0.000149	0.000197	0.000171	0.000167	0.0000185	0.000117	0.000116	0.000103	0.000115	0.000124	0.000115	0.00000758
Silicon	mg/L	-	-	1.88	1.80	1.77	1.85	1.80	1.82	0.0442	1.53	1.53	1.53	1.53	1.58	1.54	0.0224
Silver	mg/L	-	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	0.0000100	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	0.0000100	-
Sodium	mg/L	-	-	1.04	1.00	0.993	1.04	0.991	1.01	0.0251	0.855	0.847	0.847	0.862	0.862	0.855	0.00750
Strontium	mg/L	-	-	0.101	0.103	0.0999	0.0986	0.0978	0.100	0.00205	0.113	0.108	0.114	0.113	0.115	0.113	0.00270
Thallium	mg/L	-	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	0.0000100	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	0.0000100	-
Tin	mg/L	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.000100	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.000100	-
Titanium	mg/L	-	-	<0.010	<0.010	<0.010	<0.010	<0.010	0.0100	-	<0.010	<0.010	<0.010	<0.010	<0.010	0.0100	-
Uranium	mg/L	-	-	0.000118	0.000125	0.000122	0.000120	0.000121	0.000121	0.00000259	0.000135	0.000136	0.000134	0.000136	0.000138	0.000136	0.00000148
Vanadium	mg/L	-	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.000500	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.000500	-
Zinc	mg/L	-	-	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	0.00300	-	0.0109	0.00840	0.00760	<0.0030	0.00430	0.00684	0.00292

Indicates value greater than the long-term average British Columbia Water Quality Guideline (BCMOECCS 2019c, 2021a,b)
Indicates value greater than the short-term maximum British Columbia Water Quality Guideline (BCMOECCS 2019c, 2021a,b)

Notes: "-" indicates data not available. Standard deviation was not calculated where all results were below the laboratory reporting limit.

[a] Guidelines were derived from the British Columbia Water Quality Guidelines for the protection of aquatic life (BCMOECCS 2019c, 2021a,b) outlined in Table C.1.1.
[b] Guidelines for these parameters (Total Suspended Solids, Turbidity, Dissolved Organic Carbon) are narrative and were not evaluated.

Table C.1.5: Supporting Spot Water Quality Data Collected During Plankton Sampling in Quesnel Lake at QUL-ZOO-1 (Exposed) and QUL-ZOO-7 (Reference) Areas, 2022

Analyte	Units	Guidelines for the Protection of Aquatic Life[a]		QUL-ZOO-7 (Reference)			QUL-ZOO-1 (Exposed)		
				June	July	August	June	July	August
		Long-term Average	Short-term Maximum	22-Jun-22	27-Jul-22	28-Aug-22	22-Jun-22	27-Jul-22	28-Aug-22
Anions, Organics, Nutrients, and Physical Properties									
Alkalinity (as $CaCO_3$)	mg/L	>20	-	46.2	44.1	46.8	48.1	44.8	46.8
Ammonia (as N)	mg/L	0.65 to 1.8	3.6 to 12	<0.0050	0.00730	0.00900	<0.0050	0.0100	0.00720
Chloride	mg/L	150	600	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Conductivity	µS/cm	-	-	107	94.4	103	113	98.1	103
Specific Conductance (*in situ*)	µS/cm	-	-	96.3	89.7	89.7	106	88.9	89.7
Dissolved Organic Carbon[b]	mg/L	-	-	3.60	2.69	2.62	2.92	2.42	2.62
Dissolved Oxygen (*in situ*)	%	-	-	95.1	100	96.5	97.0	102	97.8
Dissolved Oxygen (*in situ*)	mg/L	>8	>5	10.8	9.92	10.0	11.0	10.4	10.0
Fluoride	mg/L	-	0.98 to 1.4	0.0310	0.0300	0.0300	0.0330	0.0310	0.0300
Hardness (as $CaCO_3$)	mg/L	-	-	46.0	46.6	49.1	49.4	46.2	46.3
Hardness, from Total CaMg (as $CaCO_3$)	mg/L	-	-	41.0	47.7	48.9	44.6	45.6	46.6
Nitrate (as N)	mg/L	3.0	33	0.0750	0.0694	0.0712	0.100	0.0690	0.0696
Nitrate and Nitrite (as N)	mg/L	-	-	0.0750	0.0694	0.0712	0.100	0.0690	0.0696
Nitrite (as N)	mg/L	0.020	0.060	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Orthophosphate-Dissolved (as P)	mg/L	-	-	<0.0010	<0.0010	0.00160	<0.0010	<0.0010	<0.0010
pH (*in situ*)	pH units	6.5 - 9.0	6.5 - 9.0	7.67	7.28	7.86	7.85	7.98	7.90
pH	pH units	-	-	7.87	7.90	7.70	7.89	7.94	7.73
Phosphorus - Total Dissolved	mg/L	-	-	0.00420	0.00220	0.00320	0.00300	<0.0020	0.00290
Phosphorus - Total	mg/L	0.0050		0.00880	0.00330	0.00830	0.00640	0.00750	0.00920
Sulphate	mg/L	218 to 309	-	5.03	5.36	5.63	5.92	5.38	5.58
Temperature (*in situ*)	°C	-	-	9.59	16.1	13.7	9.74	14.7	14.2
Total Dissolved Solids	mg/L	-	-	69.0	63.0	73.0	80.0	68.0	80.0
Total Nitrogen	mg/L	-	-	0.210	0.156	-	0.232	0.209	-
Total Suspended Solids[b]	mg/L	-	-	2.20	<1.0	2.70	1.50	<1.0	2.50
Turbidity[b]	NTU	-	-	2.16	0.720	1.83	1.25	0.330	1.67
Total Metals									
Aluminum	mg/L	-	-	0.0443	0.0303	0.0808	0.0285	0.0237	0.0111
Antimony	mg/L	0.0090	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Arsenic	mg/L	-	0.0050	0.000220	0.000340	0.000230	0.000140	0.000140	0.000120
Barium	mg/L	1.0	-	0.00605	0.00606	0.00648	0.00544	0.00530	0.00571
Beryllium	mg/L	0.00013	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Bismuth	mg/L	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Boron	mg/L	1.2	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cadmium	mg/L	-	-	0.0000115	0.0000309	0.0000578	0.00000720	0.0000119	0.000118
Calcium	mg/L	-	-	13.4	16.1	16.4	14.8	15.3	15.6
Chromium	mg/L	0.0010	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Cobalt	mg/L	0.0040	0.11	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Copper	mg/L	-	-	0.00166	0.00195	0.00396	0.00168	0.00102	0.000910
Iron	mg/L	-	1.0	0.0720	0.0490	0.0720	0.0350	<0.030	<0.030
Lead	mg/L	0.0043 to 0.0068	0.026 to 0.090	<0.000050	0.0000930	0.000183	<0.000050	0.0000910	<0.000050
Lithium	mg/L	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Magnesium	mg/L	-	-	1.83	1.83	1.94	1.85	1.80	1.86
Manganese	mg/L	0.79 to 1.1	0.99 to 1.7	0.00394	0.00341	0.00422	0.00224	0.00168	0.00125
Molybdenum	mg/L	7.6	46	0.000414	0.000432	0.000364	0.000396	0.000348	0.000363
Nickel	mg/L	0.025 to 0.10	-	0.000620	<0.00050	0.000520	0.000920	<0.00050	<0.00050
Potassium	mg/L	-	-	0.495	0.541	0.569	0.489	0.486	0.460
Selenium	mg/L	0.0020	-	0.000170	0.000135	0.000113	0.000156	0.000101	0.000160
Silicon	mg/L	-	-	2.19	1.86	1.97	2.05	1.76	1.71
Silver	mg/L	0.000050 to 0.0015	0.00010 to 0.0030	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium	mg/L	-	-	0.930	0.879	0.932	0.943	0.856	0.863
Strontium	mg/L	-	-	0.0983	0.116	0.131	0.110	0.117	0.129
Thallium	mg/L	0.00080	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Tin	mg/L	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium	mg/L	-	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Uranium	mg/L	0.0085	-	0.000120	0.000131	0.000147	0.000140	0.000146	0.000150
Vanadium	mg/L	-	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Zinc	mg/L	0.0075 to 0.021	0.033 to 0.046	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
Dissolved Metals									
Aluminum	mg/L	0.050	0.10	0.0190	0.0125	0.0122	0.0142	0.0118	0.0439
Antimony	mg/L	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Arsenic	mg/L	-	-	0.000180	0.000170	0.000120	0.000120	0.000110	0.000170
Barium	mg/L	-	-	0.00624	0.00557	0.00582	0.00568	0.00520	0.00615
Beryllium	mg/L	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Bismuth	mg/L	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Boron	mg/L	-	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cadmium	mg/L	0.00011 to 0.00022	0.00023 to 0.00064	0.0000160	0.0000246	0.0000561	0.00000900	0.0000200	0.000178
Calcium	mg/L	-	-	15.1	15.5	16.4	16.5	15.4	15.4
Chromium	mg/L	-	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Cobalt	mg/L	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Copper	mg/L	0.0021 to 0.0048	0.013 to 0.028	0.00107	0.00138	0.00107	0.00120	0.000640	0.00240
Iron	mg/L	-	0.35	<0.030	<0.030	<0.030	<0.030	<0.030	0.0440
Lead	mg/L	-	-	<0.000050	0.0000570	<0.000050	<0.000050	<0.000050	0.000167
Lithium	mg/L	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Magnesium	mg/L	-	-	2.01	1.91	1.99	2.00	1.88	1.91
Manganese	mg/L	-	-	0.00147	0.00118	0.000870	0.000860	0.000560	0.00309
Molybdenum	mg/L	-	-	0.000453	0.000371	0.000328	0.000488	0.000346	0.000318
Nickel	mg/L	-	-	0.000550	0.000520	<0.00050	0.000890	<0.00050	<0.00050
Potassium	mg/L	-	-	0.545	0.598	0.557	0.532	0.541	0.482
Selenium	mg/L	-	-	0.000160	0.000126	0.0000960	0.000140	0.000112	0.000119
Silicon	mg/L	-	-	2.26	1.79	1.71	2.03	1.71	1.64
Silver	mg/L	-	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium	mg/L	-	-	0.972	0.912	0.916	0.983	0.881	0.856
Strontium	mg/L	-	-	0.101	0.113	0.121	0.122	0.120	0.122
Thallium	mg/L	-	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Tin	mg/L	-	-	<0.00010	<0.00010	<0.00010	0.000640	<0.00010	<0.00010
Titanium	mg/L	-	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Uranium	mg/L	-	-	0.000118	0.000123	0.000138	0.000144	0.000135	0.000148
Vanadium	mg/L	-	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Zinc	mg/L	-	-	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030

Indicates value greater than the long-term average British Columbia Water Quality Guideline (BCMOECCS 2019e, 2021a,b)

Indicates value greater than the short-term maximum British Columbia Water Quality Guideline (BCMOECCS 2019e, 2021a,b)

Note: "-" indicates data not available.

[a] Guidelines were derived from the British Columbia Water Quality Guidelines for the protection of aquatic life (BCMOECCS 2019e, 2021a,b) outlined in Table C.1.1.

[b] Guidelines for these parameters (Total Suspended Solids, Turbidity, Dissolved Organic Carbon) are narrative and were not evaluated.

APPENDIX C.2
SEDIMENT QUALITY

Table C.2.1: Sediment Quality Data for Bootjack Lake (BOL-S; Reference) Shallow Area, 2019 to 2022

Analyte	Units	BC Working Sediment Quality Guidelines[a]		Bootjack Lake BOL-S										95th Percentile (2019 and 2022)[b]
		Lower	Upper	2019					2022					
Physical Tests														
Moisture	%	-	-	60.1	70.7	79.7	89.7	85.4	51.5	68.8	83.7	69.3	65.1	89.7
pH (1:2 soil:water)	pH	-	-	***7.97***	***6.01***	***5.98***	6.02	***6.28***	***6.34***	***7.67***	***6.37***	***7.67***	***7.69***	5.98
Particle Size														
% Gravel (>2 mm)	%	-	-	5.30	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.20	3.50	5.80	5.80
% Sand (2.0 mm - 0.063 mm)	%	-	-	63.4	59.5	29.3	4.50	6.90	79.3	30.5	40.8	52.1	50.6	79.3
% Silt (0.063 mm - 4 µm)	%	-	-	29.4	36.9	65.0	76.4	86.2	18.2	63.0	50.8	39.1	38.3	86.2
% Clay (<4 µm)	%	-	-	1.90	3.60	5.10	19.1	7.00	1.90	5.90	7.20	5.30	5.30	19.1
Organic / Inorganic Carbon (<63 µm)														
Total Organic Carbon	%	-	-	5.80	8.49	13.6	12.3	13.8	8.11	5.98	14.6	7.55	7.77	14.6
Nutrients (Bulk sediment)														
Total Nitrogen	%	-	-	0.182	0.337	0.705	1.13	1.17	0.195	0.341	0.961	0.371	0.369	1.17
Metals (<63 µm)														
Aluminum	mg/kg	-	-	5,210	8,870	9,620	12,900	10,500	9,710	6,470	10,200	6,380	6,630	12,900
Antimony	mg/kg	-	-	0.290	0.540	0.580	0.760	0.790	0.410	0.350	0.520	0.140	0.340	0.790
Arsenic	mg/kg	5.9	17	2.72	3.94	4.39	5.57	6.70	3.92	2.80	5.72	3.94	4.36	6.70
Barium	mg/kg	-	-	163	124	135	193	148	124	143	123	132	123	193
Beryllium	mg/kg	-	-	0.200	0.370	0.400	0.510	0.420	0.360	0.190	0.410	0.260	0.240	0.510
Bismuth	mg/kg	-	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.100
Boron	mg/kg	-	-	<10	<10	<10	<10	12.0	9.10	7.50	10.2	5.30	7.50	12.0
Cadmium	mg/kg	0.6	3.5	0.143	0.134	0.186	0.251	0.282	0.136	0.172	0.228	0.175	0.172	0.282
Calcium	mg/kg	-	-	177,000	7,830	7,760	6,660	8,780	7,850	183,000	8,840	168,000	158,000	183,000
Chromium	mg/kg	37.3	90	15.1	20.7	20.4	29.2	25.2	19.9	16.2	19.6	11.9	13.6	29.2
Cobalt	mg/kg	-	-	4.14	4.72	5.30	7.35	7.58	4.60	4.59	6.58	4.03	3.95	7.58
Copper	mg/kg	35.7	197	47.6	105	142	177	215	100	37.8	151	82.5	79.1	215
Iron	mg/kg	21,200	43,766	10,800	11,600	10,900	15,900	15,700	12,000	11,200	14,700	10,600	11,800	15,900
Lead	mg/kg	35	91.3	2.06	3.41	3.03	5.13	3.15	2.83	2.20	3.17	2.30	2.25	5.13
Lithium	mg/kg	-	-	4.20	6.40	6.10	8.30	7.10	5.70	4.60	6.40	4.20	4.40	8.30
Magnesium	mg/kg	-	-	4,980	2,820	2,680	3,810	3,460	2,810	5,600	3,070	4,850	4,570	5,600
Manganese	mg/kg	460	1,100	642	343	596	679	1,070	384	635	904	775	747	1,070
Mercury	mg/kg	0.17	0.486	0.0376	0.0857	0.0925	0.146	0.0985	0.0906	0.0321	0.119	0.0521	0.0549	0.146
Molybdenum	mg/kg	25	23,000	1.33	2.22	3.08	4.16	5.57	1.27	1.87	2.68	3.35	3.74	5.57
Nickel	mg/kg	16	75	9.61	12.7	14.4	22.9	20.9	11.5	9.77	15.5	10.3	10.1	22.9
Phosphorus	mg/kg	-	-	639	667	583	703	602	694	528	549	488	547	703
Potassium	mg/kg	-	-	420	610	670	990	770	750	590	790	460	510	990
Selenium	mg/kg	2	-	1.83	0.850	1.32	1.56	2.74	1.11	2.21	1.81	2.08	2.68	2.74
Silver	mg/kg	0.5	-	0.0570	0.106	0.129	0.181	0.180	0.100	0.0510	0.143	0.0680	0.0790	0.181
Sodium	mg/kg	-	-	187	192	177	178	191	248	230	227	175	186	248
Strontium	mg/kg	-	-	1,060	76.5	80.0	73.7	86.9	78.8	1,030	88.6	768	694	1,060
Sulphur[c]	mg/kg	-	-	2,300	3,900	5,000	5,700	6,600	910	2,810	4,730	1,130	1,470	6,600
Thallium	mg/kg	-	-	<0.050	<0.050	0.0530	0.0810	0.0730	<0.050	<0.050	0.0680	<0.050	<0.050	0.0810
Tin	mg/kg	-	-	0.220	0.300	0.300	0.430	0.210	0.330	<0.20	0.220	<0.20	0.230	0.430
Titanium	mg/kg	-	-	383	490	435	390	514	578	455	419	187	284	578
Uranium	mg/kg	-	-	0.848	1.17	1.45	1.83	1.63	1.13	0.958	1.36	2.10	2.15	2.15
Vanadium	mg/kg	-	-	24.9	37.5	32.8	45.0	42.4	35.3	28.3	36.8	22.3	24.9	45.0
Zinc	mg/kg	123	315	27.5	30.6	34.3	46.3	50.0	29.8	28.5	39.4	25.7	25.8	50.0

Value is > BC Lower Working Sediment Quality Guideline.

Value is > BC Upper Working Sediment Quality Guideline.

Notes: "-" indicates no guideline available or no data, mg/kg = milligrams per kilogram, ***Bold/Italics*** : Value is > reference 95th percentile value (<5th percentile value for pH).

[a] British Columbia Working Sediment Guidelines (BCMOECCS 2021a) and approved BC Sediment Quality Guideline for Selenium (BCMOECCS 2021b).

[b] 5th percentile value for pH.

[c] Total sulphur measured in bulk sediment, not the <63 µm fraction.

Table C.2.2: **Sediment Quality Data for Bootjack Lake (BOL-S; Reference) Shallow Area, 2022**

Parameter	Units	BC Working Sediment Quality Guidelines [a]		Reference 95th Percentile[b]	BOL-S									
				BOL-S	BOL-S-1	BOL-S-2	BOL-S-3	BOL-S-4	BOL-S-5	Mean	Median	Standard Deviation	Minimum	Maximum
		Lower	Upper	(2019 to 2022)	24-Aug-22	24-Aug-22	24-Aug-22	24-Aug-22	24-Aug-22					
Physical Tests														
Moisture	%	-	-	89.7	51.5	68.8	83.7	69.3	65.1	67.7	68.8	11.5	51.5	83.7
pH (1:2 soil:water)	pH	-	-	5.98	6.34	7.67	6.37	7.67	7.69	7.15	7.67	0.724	6.34	7.69
Particle Size														
% Gravel (>2 mm)	%	-	-	5.80	<1.0	<1.0	1.20	3.50	5.80	2.50	1.20	2.13	1.00	5.80
% Sand (2.0 mm - 0.063 mm)	%	-	-	79.3	79.3	30.5	40.8	52.1	50.6	50.7	50.6	18.2	30.5	79.3
% Silt (0.063 mm - 4 µm)	%	-	-	86.2	18.2	63.0	50.8	39.1	38.3	41.9	39.1	16.6	18.2	63.0
% Clay (<4 µm)	%	-	-	19.1	1.90	5.90	7.20	5.30	5.30	5.12	5.30	1.96	1.90	7.20
Organic / Inorganic Carbon														
Total Organic Carbon (63 µm)	%	-	-	14.6	8.11	5.98	14.6	7.55	7.77	8.80	7.77	3.34	5.98	14.6
Nutrients (Bulk sediment)														
Total Nitrogen by LECO	%	-	-	1.17	0.195	0.341	0.961	0.371	0.369	0.447	0.369	0.296	0.195	0.961
Metals (<63 µm)														
Aluminum	mg/kg	-	-	12,900	9,710	6,470	10,200	6,380	6,630	7,878	6,630	1,906	6,380	10,200
Antimony	mg/kg	-	-	0.790	0.410	0.350	0.520	0.140	0.340	0.352	0.350	0.138	0.140	0.520
Arsenic	mg/kg	5.90	17.0	6.70	3.92	2.80	5.72	3.94	4.36	4.15	3.94	1.05	2.80	5.72
Barium	mg/kg	-	-	193	124	143	123	132	123	129	124	8.69	123	143
Beryllium	mg/kg	-	-	0.510	0.360	0.190	0.410	0.260	0.240	0.292	0.260	0.0904	0.190	0.410
Bismuth	mg/kg	-	-	0.100	<0.10	<0.10	<0.10	<0.10	<0.10	0.100	0.100	-	0.100	0.100
Boron	mg/kg	-	-	12.0	9.10	7.50	10.2	5.30	7.50	7.92	7.50	1.86	5.30	10.2
Cadmium	mg/kg	0.600	3.50	0.282	0.136	0.172	0.228	0.175	0.172	0.177	0.172	0.0329	0.136	0.228
Calcium	mg/kg	-	-	183,000	7,850	183,000	8,840	168,000	158,000	105,138	158,000	88,807	7,850	183,000
Chromium	mg/kg	37.3	90.0	29.2	19.9	16.2	19.6	11.9	13.6	16.2	16.2	3.55	11.9	19.9
Cobalt	mg/kg	-	-	7.58	4.60	4.59	6.58	4.03	3.95	4.75	4.59	1.07	3.95	6.58
Copper	mg/kg	35.7	197	215	100	37.8	151	82.5	79.1	90.1	82.5	41.0	37.8	151
Iron	mg/kg	21,200	43,766	15,900	12,000	11,200	14,700	10,600	11,800	12,060	11,800	1,574	10,600	14,700
Lead	mg/kg	35.0	91.3	5.13	2.83	2.20	3.17	2.30	2.25	2.55	2.30	0.429	2.20	3.17
Lithium	mg/kg	-	-	8.30	5.70	4.60	6.40	4.20	4.40	5.06	4.60	0.948	4.20	6.40
Magnesium	mg/kg	-	-	5,600	2,810	5,600	3,070	4,850	4,570	4,180	4,570	1,196	2,810	5,600
Manganese	mg/kg	460	1,100	1,070	384	635	904	775	747	689	747	196	384	904
Mercury	mg/kg	0.170	0.486	0.146	0.0906	0.0321	0.119	0.0521	0.0549	0.0697	0.0549	0.0347	0.0321	0.119
Molybdenum	mg/kg	-	-	5.57	1.27	1.87	2.68	3.35	3.74	2.58	2.68	1.02	1.27	3.74
Nickel	mg/kg	16.0	75.0	22.9	11.5	9.77	15.5	10.3	10.1	11.4	10.3	2.36	9.77	15.5
Phosphorus	mg/kg	-	-	703	694	528	549	488	547	561	547	78.2	488	694
Potassium	mg/kg	-	-	990	750	590	790	460	510	620	590	145	460	790
Selenium	mg/kg	2.00	-	2.74	1.11	2.21	1.81	2.08	2.68	1.98	2.08	0.579	1.11	2.68
Silver	mg/kg	0.500	-	0.181	0.100	0.0510	0.143	0.0680	0.0790	0.0882	0.0790	0.0354	0.0510	0.143
Sodium	mg/kg	-	-	248	248	230	227	175	186	213	227	31.2	175	248
Strontium	mg/kg	-	-	1,060	78.8	1,030	88.6	768	694	532	694	428	78.8	1,030
Sulphur[c]	mg/kg	-	-	6,600	910	2,810	4,730	1,130	1,470	2,210	1,470	1,590	910	4,730
Thallium	mg/kg	-	-	0.0810	<0.050	<0.050	0.0680	<0.050	<0.050	0.0536	0.0500	0.00805	0.0500	0.0680
Tin	mg/kg	-	-	0.430	0.330	<0.20	0.220	<0.20	0.230	0.236	0.220	0.0541	0.200	0.330
Titanium	mg/kg	-	-	578	578	455	419	187	284	385	419	152	187	578
Uranium	mg/kg	-	-	2.15	1.13	0.958	1.36	2.10	2.15	1.54	1.36	0.553	0.958	2.15
Vanadium	mg/kg	-	-	45.0	35.3	28.3	36.8	22.3	24.9	29.5	28.3	6.35	22.3	36.8
Zinc	mg/kg	123	315	50.0	29.8	28.5	39.4	25.7	25.8	29.8	28.5	5.63	25.7	39.4

Value is > Lower BC Working Sediment Quality Guideline.

Value is > Upper BC Working Sediment Quality Guideline.

Notes: "-" indicates no guideline available or no data, ***Bold/Italics*** : Value is > reference 95th percentile value (<5th percentile value for pH).

[a] British Columbia Working Sediment Guidelines (BCMOECCS 2021a) and approved BC Sediment Quality Guideline for Selenium (BCMOECCS 2021b).

[b] The 5th percentile is reported and screened for the pH reference data. For calculation reference 95th percentile values see Appendix Table C.2.1.

[c] Total sulphur measured in bulk sediment, not the <63 µm fraction.

Table C.2.3: **Sediment Quality Data for Polley Lake (POL-S; Exposed) Shallow Area, 2022**

Parameter	Units	BC Working Sediment Quality Guidelines [a]		Reference 95th Percentile[b]	POL-S									
				BOL-S (2019 to 2022)	POL-S-1	POL-S-2	POL-S-3	POL-S-4	POL-S-5	Mean	Median	Standard Deviation	Minimum	Maximum
		Lower	Upper		24-Aug-22	24-Aug-22	24-Aug-22	24-Aug-22	24-Aug-22					
Physical Tests														
Moisture	%	-	-	-	40.6	37.6	38.9	48.9	46.6	42.5	40.6	4.96	37.6	48.9
pH (1:2 soil:water)	pH	-	-	-	7.63	7.57	7.55	7.51	7.44	7.54	7.55	0.0707	7.44	7.63
Particle Size														
% Gravel (>2 mm)	%	-	-	-	<1.0	<1.0	<1.0	<1.0	<1.0	1.00	1.00	-	1.00	1.00
% Sand (2.0 mm - 0.063 mm)	%	-	-	-	33.9	45.0	49.1	30.2	34.2	38.5	34.2	8.11	30.2	49.1
% Silt (0.063 mm - 4 µm)	%	-	-	-	55.8	47.8	45.8	60.7	58.3	53.7	55.8	6.55	45.8	60.7
% Clay (<4 µm)	%	-	-	-	10.3	7.00	4.20	9.10	7.50	7.62	7.50	2.32	4.20	10.3
Organic / Inorganic Carbon														
Total Organic Carbon (63 µm)	%	-	-	-	0.872	1.02	0.914	1.12	1.20	1.03	1.02	0.137	0.872	1.20
Nutrients (Bulk sediment)														
Total Nitrogen by LECO	%	-	-	-	0.0810	0.0920	0.0610	0.118	0.127	0.0958	0.0920	0.0270	0.0610	0.127
Metals (<63 µm)														
Aluminum	mg/kg	-	-	-	***22,900***	***20,900***	***19,200***	***22,100***	***21,200***	***21,260***	***21,200***	1,394	***19,200***	***22,900***
Antimony	mg/kg	-	-	-	0.500	0.450	0.450	0.450	0.420	0.454	0.450	0.0288	0.420	0.500
Arsenic	mg/kg	5.90	17.0	17.00	***15.3***	***13.9***	***13.7***	***13.9***	***13.4***	***14.0***	***13.9***	0.733	***13.4***	***15.3***
Barium	mg/kg	-	-	-	192	180	169	189	179	182	180	9.09	169	192
Beryllium	mg/kg	-	-	-	***0.860***	***0.800***	***0.710***	***0.780***	***0.770***	***0.784***	***0.780***	0.0541	***0.710***	***0.860***
Bismuth	mg/kg	-	-	-	<0.10	<0.10	<0.10	<0.10	<0.10	0.100	0.100	-	0.100	0.100
Boron	mg/kg	-	-	-	11.5	10.5	10.6	10.6	10.5	10.7	10.6	0.428	10.5	11.5
Cadmium	mg/kg	0.600	3.50	3.500	0.146	0.119	0.128	0.124	0.143	0.132	0.128	0.0119	0.119	0.146
Calcium	mg/kg	-	-	-	29,900	28,900	24,200	29,100	27,300	27,880	28,900	2,263	24,200	29,900
Chromium	mg/kg	37.3	90.0	90.0	13.0	13.2	13.3	12.6	13.2	13.1	13.2	0.279	12.6	13.3
Cobalt	mg/kg	-	-	-	***21.2***	***20.8***	***19.7***	***20.7***	***20.2***	***20.5***	***20.7***	0.581	***19.7***	***21.2***
Copper	mg/kg	35.7	197	197	***756***	***672***	***646***	***647***	***646***	***673***	***647***	47.5	***646***	***756***
Iron	mg/kg	21,200	43,766	43,766	***61,500***	***65,500***	***76,700***	***58,900***	***61,500***	***64,820***	***61,500***	7,048	***58,900***	***76,700***
Lead	mg/kg	35.0	91.3	91.30	***5.78***	4.77	4.27	4.50	4.69	4.80	4.69	0.580	4.27	***5.78***
Lithium	mg/kg	-	-	-	***20.5***	***18.3***	***15.6***	***19.1***	***18.4***	***18.4***	***18.4***	1.79	***15.6***	***20.5***
Magnesium	mg/kg	-	-	-	***13,600***	***12,500***	***10,900***	***13,400***	***12,500***	***12,580***	***12,500***	1,066	***10,900***	***13,600***
Manganese	mg/kg	460	1,100	1,100	862	764	735	730	730	764	735	56.5	730	862
Mercury	mg/kg	0.170	0.486	0.486	0.0735	0.0676	0.0695	0.0669	0.0689	0.0693	0.0689	0.00257	0.0669	0.0735
Molybdenum	mg/kg	-	-	-	5.05	4.96	4.35	5.18	4.80	4.87	4.96	0.321	4.35	5.18
Nickel	mg/kg	16.0	75.0	75.0	10.9	10.6	10.1	10.7	10.7	10.6	10.7	0.300	10.1	10.9
Phosphorus	mg/kg	-	-	-	***1,910***	***1,860***	***1,980***	***1,820***	***1,930***	***1,900***	***1,910***	62.0	***1,820***	***1,980***
Potassium	mg/kg	-	-	-	***1,780***	***1,690***	***1,480***	***1,780***	***1,670***	***1,680***	***1,690***	123	***1,480***	***1,780***
Selenium	mg/kg	2.00	-	-	1.43	1.43	1.23	1.50	1.59	1.44	1.43	0.133	1.23	1.59
Silver	mg/kg	0.500	-	-	***0.337***	***0.292***	***0.312***	***0.274***	***0.288***	***0.301***	***0.292***	0.0245	***0.274***	***0.337***
Sodium	mg/kg	-	-	-	***956***	***936***	***849***	***994***	***928***	***932.6***	***936***	53.2	***849***	***994***
Strontium	mg/kg	-	-	-	204	217	195	230	221	213	217	13.9	195	230
Sulphur[c]	mg/kg	-	-	-	1,740	2,270	1,550	2,140	2,280	1,996	2,140	332	1,550	2,280
Thallium	mg/kg	-	-	-	<0.050	<0.050	<0.050	<0.050	<0.050	0.0500	0.0500	-	0.0500	0.0500
Tin	mg/kg	-	-	-	***2.35***	***2.16***	***2.06***	***2.19***	***1.95***	***2.14***	***2.16***	0.150	***1.95***	***2.35***
Titanium	mg/kg	-	-	-	***2,120***	***1,820***	***1,790***	***1,930***	***1,780***	***1,888***	***1,820***	143	***1,780***	***2,120***
Uranium	mg/kg	-	-	-	1.46	1.36	1.29	1.31	1.28	1.34	1.31	0.0738	1.28	1.46
Vanadium	mg/kg	-	-	-	***238***	***268***	***300***	***234***	***243***	***257***	***243***	27.6	***234***	***300***
Zinc	mg/kg	123	315	315.0	***70.9***	***63.1***	***58.1***	***61.6***	***61.0***	***62.9***	***61.6***	4.81	***58.1***	***70.9***

Value is > Lower BC Working Sediment Quality Guideline.

Value is > Upper BC Working Sediment Quality Guideline.

Notes: "-" indicates no guideline available or no data, ***Bold/Italics*** : Value is > reference 95th percentile value (<5th percentile value for pH).

[a] British Columbia Working Sediment Guidelines (BCMOECCS 2021a) and approved BC Sediment Quality Guideline for Selenium (BCMOECCS 2021b).

[b] The 5th percentile is reported and screened for the pH reference data. For calculation reference 95th percentile values see Appendix Table C.2.1.

[c] Total sulphur measured in bulk sediment, not the <63 µm fraction.

Table C.2.4: Sediment Quality Data for Quesnel Lake at QUL-PREF1 (Reference) Deep Area, 2014 to 2021

Analyte	Units	BC Working Sediment Quality Guidelines[a]		Quesnel Lake QUL-PREF1													
		Lower	Upper	2014					2015					2016					
Physical Tests																			
Moisture	%	-	-	51.8	47.6	53.3	54.3	52.0	52.6	-	53.3	-	54.2	54.2	54.2	55.9	55.8	54.9
pH (1:2 soil:water)	pH	-	-	6.89	6.86	7.03	6.84	6.90	7.36	-	6.69	-	7.01	6.52	6.49	6.53	6.52	6.56
Particle Size																			
% Gravel (>2 mm)	%	-	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
% Sand (2.0 mm - 0.063 mm)	%	-	-	30.6	***31.7***	21.4	16.7	17.1	21.1	28.1	15.2	18.7	14.3	29.1	23.5	20.2	13.5	12.7
% Silt (0.063 mm - 4 µm)	%	-	-	58.8	60.9	69.3	74.1	74.1	67.7	62.5	73.0	71.7	74.3	60.8	66.4	69.2	76.4	73.9
% Clay (<4 µm)	%	-	-	10.7	7.43	9.31	9.18	8.79	11.2	9.34	11.8	9.64	11.4	10.1	10.1	10.6	10.1	***13.4***
Organic / Inorganic Carbon (<63 µm)																			
Total Organic Carbon	%	-	-	1.62	1.70	1.72	1.64	1.71	1.76	-	1.71	-	1.98	2.02	2.01	2.03	1.67	1.89
Nutrients (Bulk sediment)																			
Total Nitrogen	%	-	-	0.140	0.127	0.141	0.149	0.145	0.169	-	0.158	-	0.182	0.164	0.170	0.162	0.146	0.146
Metals (<63 µm)																			
Aluminum	mg/kg	-	-	15,300	14,000	15,400	15,300	13,900	16,900	-	***17,300***	-	15,500	16,800	15,800	16,800	16,200	14,700
Antimony	mg/kg	-	-	0.430	0.400	0.400	0.440	0.410	0.470	-	0.430	-	0.410	0.460	0.440	0.440	0.440	0.400
Arsenic	mg/kg	5.9	17	7.15	6.95	8.60	8.15	7.89	8.64	-	8.98	-	9.02	9.89	9.57	***11.0***	9.05	8.37
Barium	mg/kg	-	-	147	140	152	144	135	147	-	151	-	143	167	164	***172***	169	142
Beryllium	mg/kg	-	-	0.450	0.410	0.390	0.410	0.400	***0.520***	-	0.500	-	0.450	0.470	0.430	0.480	0.450	0.450
Bismuth	mg/kg	-	-	0.150	0.140	0.140	0.140	0.130	***0.170***	-	0.150	-	0.150	0.160	0.150	0.160	0.150	0.150
Boron	mg/kg	-	-	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	-	<10.0	-	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
Cadmium	mg/kg	0.6	3.5	0.416	0.346	0.404	0.390	0.363	0.475	-	0.422	-	0.364	***0.476***	0.457	0.471	0.435	0.384
Calcium	mg/kg	-	-	8,050	7,650	7,970	7,740	7,300	8,780	-	***8,840***	-	8,620	8,130	7,500	8,080	7,950	7,840
Chromium	mg/kg	37.3	90	56.3	50.2	53.6	52.1	47.9	***60.1***	-	59.5	-	53.6	59.8	57.6	59.4	56.3	50.3
Cobalt	mg/kg	-	-	14.0	12.7	13.8	13.3	12.5	15.2	-	15.0	-	13.4	15.1	14.3	***15.7***	14.5	13.3
Copper	mg/kg	35.7	197	46.7	39.1	44.0	42.2	38.8	59.4	-	55.8	-	50.0	***61.1***	56.4	59.4	56.3	47.5
Iron	mg/kg	21,200	43,766	29,200	26,900	29,900	29,500	27,400	32,300	-	***32,700***	-	28,900	30,900	29,000	32,100	30,700	29,400
Lead	mg/kg	35	91.3	7.09	6.84	7.27	7.11	6.68	8.06	-	7.51	-	7.39	7.97	7.53	***8.11***	7.59	7.03
Lithium	mg/kg	-	-	12.8	13.0	13.9	13.4	12.6	***15.5***	-	15.2	-	12.6	13.7	12.8	14.4	13.2	13.6
Magnesium	mg/kg	-	-	8,040	7,350	8,020	7,720	7,200	8,410	-	***8,660***	-	7,380	8,450	7,930	8,510	8,130	7,390
Manganese	mg/kg	460	1,100	456	421	484	494	496	477	-	479	-	516	469	457	495	451	480
Mercury	mg/kg	0.17	0.486	0.0461	0.0474	0.0517	0.0506	0.0473	0.0627	-	0.0515	-	0.0594	0.0519	0.0557	0.0535	0.0574	0.0572
Molybdenum	mg/kg	25	23,000	0.960	0.840	0.940	0.910	0.900	***1.20***	-	1.02	-	1.01	1.08	0.980	1.07	0.990	0.930
Nickel	mg/kg	16	75	38.1	33.8	36.9	36.0	33.2	41.2	-	40.1	-	36.1	41.2	38.9	***42.3***	39.3	35.1
Phosphorus	mg/kg	-	-	1,110	1,070	1,110	1,130	1,050	1,150	-	1,190	-	1,200	1,350	1,280	1,400	1,340	1,200
Potassium	mg/kg	-	-	1,370	1,230	1,370	1,350	1,240	1,550	-	1,570	-	1,430	***1,580***	1,440	1,560	1,510	1,370
Selenium	mg/kg	2	-	0.950	0.820	0.900	0.870	0.760	1.10	-	0.930	-	0.880	0.970	0.980	1.04	0.880	0.970
Silver	mg/kg	0.5	-	0.205	0.172	0.196	0.191	0.177	0.238	-	0.216	-	0.189	***0.239***	0.220	0.228	0.226	0.202
Sodium	mg/kg	-	-	420	370	420	390	380	470	-	***520***	-	500	480	420	440	430	410
Strontium	mg/kg	-	-	75.6	71.3	78.6	76.0	71.4	82.0	-	84.5	-	88.9	81.4	76.2	82.3	80.3	76.3
Sulphur[c]	mg/kg	-	-	-	-	-	-	-	1,400	-	1,300	-	800	1,400	1,200	1,100	900	1,300
Thallium	mg/kg	-	-	0.147	0.161	0.161	0.167	0.149	***0.194***	-	0.171	-	0.158	0.170	0.162	0.175	0.159	0.166
Tin	mg/kg	-	-	0.470	0.350	0.380	0.460	0.380	0.490	-	0.460	-	0.410	***0.660***	0.390	0.450	0.420	0.410
Titanium	mg/kg	-	-	1,090	1,010	1,060	1,050	969	1,160	-	***1,190***	-	1,040	1,100	1,050	1,060	1,080	954
Uranium	mg/kg	-	-	1.32	1.30	1.36	1.30	1.22	***1.57***	-	1.43	-	1.39	1.50	1.43	1.51	1.41	1.36
Vanadium	mg/kg	-	-	66.8	60.5	64.1	62.1	57.4	***73.0***	-	72.3	-	64.9	71.7	67.9	70.2	67.6	61.9
Zinc	mg/kg	123	315	74.1	71.4	77.6	75.3	70.3	85.1	-	82.6	-	71.6	84.4	80.6	***87.7***	80.7	68.4
Zirconium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Value is > BC Lower Working Sediment Quality Guideline.

Value is > BC Upper Working Sediment Quality Guideline.

Notes: "-" indicates no guideline available or no data, mg/kg = milligrams per kilogram, ***Bold/Italics:*** Value is > reference 95th percentile value (<5th percentile value for pH). QUL-PREF1 was not sampled in 2022, therefore displayed data include to 2021 only and the reference 95th percentile value was calculated using data from 2014 to 2021.

[a] British Columbia Working Sediment Guidelines (BCMOECCS 2021a) and approved BC Sediment Quality Guideline for Selenium (BCMOECCS 2021b).

[b] 5th percentile value for pH.

[c] Total sulphur measured in bulk sediment, not the <63 µm fraction.

Table C.2.4: Sediment Quality Data for Quesnel Lake at QUL-PREF1 (Reference) Deep Area, 2014 to 2021

Analyte	Units	BC Working Sediment Quality Guidelines[a]		Quesnel Lake QUL-PREF1															95th Percentile (2014 to 2021)[b]
		Lower	Upper	2018					2019					2021					
Physical Tests																			
Moisture	%	-	-	55.7	62.2	***65.1***	55.3	54.8	56.9	53.7	57.2	56.5	56.0	52.5	52.0	53.8	55.6	54.4	62.2
pH (1:2 soil:water)	pH	-	-	6.80	6.79	6.85	6.67	6.78	6.45	6.50	6.50	6.48	6.45	6.52	6.44	6.50	***6.40***	6.64	6.44
Particle Size																			
% Gravel (>2 mm)	%	-	-	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
% Sand (2.0 mm - 0.063 mm)	%	-	-	15.1	17.8	13.4	15.3	14.1	10.1	19.8	11.5	13.9	11.8	20.0	22.8	20.1	17.9	19.5	30.6
% Silt (0.063 mm - 4 µm)	%	-	-	75.2	73.7	77.2	75.6	76.8	***80.4***	71.5	79.4	77.0	79.3	67.9	66.5	68.2	71.5	69.4	79.4
% Clay (<4 µm)	%	-	-	9.70	8.50	9.30	9.10	9.10	9.50	8.70	9.10	9.10	8.90	12.1	10.7	11.7	10.6	11.1	12.1
Organic / Inorganic Carbon (<63 µm)																			
Total Organic Carbon	%	-	-	2.07	2.22	2.13	***2.26***	1.92	2.07	1.78	1.56	1.71	1.88	2.13	2.07	2.03	2.08	2.17	2.22
Nutrients (Bulk sediment)																			
Total Nitrogen	%	-	-	***0.191***	0.180	0.170	0.181	0.164	0.182	0.148	0.155	0.164	0.157	0.137	0.149	0.161	0.175	0.150	0.182
Metals (<63 µm)																			
Aluminum	mg/kg	-	-	14,300	15,800	15,100	15,100	14,100	16,300	16,100	15,700	16,200	15,200	17,100	15,700	17,100	15,700	16,800	17,100
Antimony	mg/kg	-	-	0.410	0.390	0.390	0.390	0.390	0.410	0.420	0.400	0.400	0.400	0.470	0.440	0.440	0.440	0.440	0.470
Arsenic	mg/kg	5.9	17	8.47	8.47	7.99	7.50	7.39	8.49	8.18	7.74	7.86	7.23	8.00	9.50	9.66	8.55	9.38	9.89
Barium	mg/kg	-	-	150	139	153	147	134	159	164	157	159	155	158	152	166	146	165	169
Beryllium	mg/kg	-	-	0.450	0.460	0.460	0.440	0.450	0.470	0.480	0.470	0.450	0.460	0.480	0.440	0.500	0.420	0.440	0.500
Bismuth	mg/kg	-	-	0.150	0.140	0.140	0.140	0.140	0.150	0.150	0.140	0.140	0.140	0.130	0.120	0.140	0.120	0.130	0.160
Boron	mg/kg	-	-	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<5.0	<5.0	<5.0	<5.0	<5.0	<10.0
Cadmium	mg/kg	0.6	3.5	0.442	0.436	0.409	0.422	0.392	0.442	0.429	0.408	0.414	0.375	0.432	0.392	0.418	0.387	0.381	0.475
Calcium	mg/kg	-	-	7,570	7,850	8,050	7,720	7,810	7,320	7,590	7,330	7,400	7,210	8,030	7,860	8,350	7,520	8,310	8,780
Chromium	mg/kg	37.3	90	53.4	55.9	53.9	53.9	51.6	54.9	56.4	53.4	54.4	52.3	58.0	55.7	56.4	54.8	56.7	59.8
Cobalt	mg/kg	-	-	13.8	13.5	13.3	13.1	13.1	14.0	14.0	13.6	13.5	13.4	14.4	13.9	14.4	13.4	13.8	15.2
Copper	mg/kg	35.7	197	48.9	46.8	45.3	46.7	43.2	49.7	50.2	48.8	49.4	46.9	50.0	44.4	46.3	43.5	42.4	59.4
Iron	mg/kg	21,200	43,766	29,500	29,200	28,400	28,100	28,300	30,700	30,700	29,300	30,600	28,900	30,400	30,500	31,000	29,600	30,800	32,300
Lead	mg/kg	35	91.3	7.00	6.67	6.41	6.60	6.49	7.25	7.27	7.09	7.03	6.80	6.80	6.43	6.70	6.52	6.46	8.06
Lithium	mg/kg	-	-	13.8	13.2	13.5	13.2	13.2	14.9	14.5	14.5	14.3	14.0	15.1	13.4	15.2	13.9	14.1	15.2
Magnesium	mg/kg	-	-	7,640	7,560	7,410	7,250	7,150	8,250	8,180	7,860	7,840	7,730	8,330	7,990	8,500	7,960	8,080	8,510
Manganese	mg/kg	460	1,100	416	397	425	405	449	401	413	399	408	445	416	441	485	440	***572***	516
Mercury	mg/kg	0.17	0.486	0.0552	0.0578	0.0525	0.0555	0.0521	0.0493	0.0458	0.0473	0.0466	0.0472	0.0477	0.0440	0.0558	***0.0971***	0.0446	0.0627
Molybdenum	mg/kg	25	23,000	1.05	0.910	0.890	0.850	0.880	1.06	0.980	0.990	0.870	0.920	1.11	0.990	1.01	0.990	0.990	1.11
Nickel	mg/kg	16	75	37.1	36.2	35.6	35.4	34.6	38.4	38.0	36.8	36.8	35.6	39.4	37.5	38.9	37.4	37.5	41.2
Phosphorus	mg/kg	-	-	1,260	1,310	1,220	1,250	1,140	1,300	1,330	1,230	1,310	1,200	1,290	***1,460***	1,340	1,320	1,370	1,400
Potassium	mg/kg	-	-	1,240	1,300	1,290	1,290	1,290	1,290	1,260	1,280	1,280	1,240	1,440	1,290	1,430	1,320	1,470	1,570
Selenium	mg/kg	2	-	1.06	1.01	0.840	0.950	0.870	0.990	0.970	0.920	0.920	0.900	1.25	1.07	***1.44***	1.28	1.23	1.28
Silver	mg/kg	0.5	-	0.212	0.193	0.189	0.191	0.191	0.221	0.219	0.209	0.211	0.210	0.231	0.191	0.196	0.201	0.200	0.238
Sodium	mg/kg	-	-	339	379	390	378	364	373	376	388	393	390	449	421	461	400	478	500
Strontium	mg/kg	-	-	73.6	73.7	74.4	75.1	73.8	73.4	78.9	78.6	75.3	77.7	87.2	81.8	81.3	82.7	***90.0***	88.9
Sulphur[c]	mg/kg	-	-	1,200	1,200	900	1,000	900	***1,500***	1,300	1,300	1,200	1,100	940	830	850	950	760	1,400
Thallium	mg/kg	-	-	0.149	0.148	0.145	0.146	0.144	0.156	0.155	0.151	0.154	0.145	0.157	0.139	0.152	0.145	0.149	0.175
Tin	mg/kg	-	-	0.350	0.410	0.510	0.370	0.370	0.370	0.380	0.400	0.400	0.400	0.490	0.440	0.460	0.450	0.500	0.510
Titanium	mg/kg	-	-	816	963	961	959	928	899	977	959	1,000	944	974	937	1,000	934	1,100	1,160
Uranium	mg/kg	-	-	1.30	1.34	1.25	1.27	1.26	1.41	1.40	1.40	1.39	1.37	1.35	1.25	1.30	1.24	1.33	1.51
Vanadium	mg/kg	-	-	59.8	63.5	61.9	62.2	59.9	62.9	65.1	62.6	63.2	61.3	66.2	64.7	66.1	61.5	67.1	72.3
Zinc	mg/kg	123	315	77.7	75.8	73.3	72.9	71.9	85.0	82.5	79.3	80.1	75.4	84.9	78.2	81.7	76.9	78.6	85.1
Zirconium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	4.20	4.00	3.60	3.90	3.80	4.20

Value is > BC Lower Working Sediment Quality Guideline.

Value is > BC Upper Working Sediment Quality Guideline.

Notes: "-" indicates no guideline available or no data, mg/kg = milligrams per kilogram, ***Bold/Italics:*** Value is > reference 95th percentile value (<5th percentile value for pH). QUL-PREF1 was not sampled in 2022, therefore displayed data include to 2021 only and the reference 95th percentile value was calculated using data from 2014 to 2021.

[a] British Columbia Working Sediment Guidelines (BCMOECCS 2021a) and approved BC Sediment Quality Guideline for Selenium (BCMOECCS 2021b).

[b] 5th percentile value for pH.

[c] Total sulphur measured in bulk sediment, not the <63 µm fraction.

Table C.2.5: Sediment Quality Data for Quesnel Lake at QUL-PNF (Exposed) Deep Area, 2022

Parameter	Units	BC Working Sediment Quality Guidelines[a]		Reference 95th Percentile[b]	QUL-PNF									
		Lower	Upper	QUL-PREF1 (2014 to 2021)	QUL-PNF-1	QUL-PNF-2	QUL-PNF-3	QUL-PNF-4	QUL-PNF-5	Mean	Median	Standard Deviation	Minimum	Maximum
					26-Aug-22	26-Aug-22	27-Aug-22	27-Aug-22	28-Aug-22					
Physical Tests														
Moisture	%	-	-	62.2	60.1	***63.0***	49.4	61.0	61.2	58.9	61.0	5.44	49.4	***63.0***
pH (1:2 soil:water)	pH	-	-	6.44	8.01	8.02	8.22	8.07	8.16	8.10	8.07	0.0913	8.01	8.22
Particle Size														
% Gravel (>2 mm)	%	-	-	1.00	<1	<1	<1	<1	<1	1.00	1.00	-	1.00	1.00
% Sand (2.0 mm - 0.063 mm)	%	-	-	30.6	12.8	3.10	23.0	7.50	4.70	10.2	7.50	8.04	3.10	23.0
% Silt (0.063 mm - 4 µm)	%	-	-	79.4	45.4	50.5	43.6	42.9	47.7	46.0	45.4	3.12	42.9	50.5
% Clay (<4 µm)	%	-	-	12.1	***41.8***	***46.4***	***33.4***	***49.6***	***47.6***	***43.8***	***46.4***	6.46	***33.4***	***49.6***
Organic / Inorganic Carbon (<63 µm)														
Total Organic Carbon	%	-	-	2.22	0.622	0.695	0.456	0.736	0.559	0.614	0.622	0.111	0.456	0.736
Nutrients (Bulk sediment)														
Total Nitrogen	%	-	-	0.182	0.0800	0.103	0.0560	0.0840	0.0700	0.0786	0.0800	0.0174	0.0560	0.103
Metals (<63 µm)														
Aluminum	mg/kg	-	-	17,100	***31,900***	***29,900***	***26,800***	***31,700***	***32,500***	***30,560***	***31,700***	2,315	***26,800***	***32,500***
Antimony	mg/kg	-	-	0.470	***0.500***	***0.500***	***0.500***	***0.500***	***0.530***	***0.506***	***0.500***	0.0134	***0.500***	***0.530***
Arsenic	mg/kg	5.9	17	9.89	***15.8***	***15.3***	***15.1***	***15.5***	***16.3***	***15.6***	***15.5***	0.469	***15.1***	***16.3***
Barium	mg/kg	-	-	169	***279***	***265***	***244***	***280***	***286***	***271***	***279***	16.8	***244***	***286***
Beryllium	mg/kg	-	-	0.500	***1.04***	***0.970***	***0.880***	***1.05***	***1.08***	***1.00***	***1.04***	0.0802	***0.880***	***1.08***
Bismuth	mg/kg	-	-	0.160	0.150	0.160	0.150	***0.170***	0.160	0.158	0.160	0.00837	0.150	***0.170***
Boron	mg/kg	-	-	10.0	***11.1***	9.80	9.30	9.90	***11.3***	***10.3***	9.90	0.873	9.30	***11.3***
Cadmium	mg/kg	0.6	3.5	0.475	0.246	0.242	0.241	0.251	0.250	0.246	0.246	0.00453	0.241	0.251
Calcium	mg/kg	-	-	8,780	***24,800***	***20,300***	***21,200***	***19,700***	***24,200***	***22,040***	***21,200***	2,318	***19,700***	***24,800***
Chromium	mg/kg	37.3	90	59.8	27.1	30.5	28.7	32.0	28.9	29.4	28.9	1.87	27.1	32.0
Cobalt	mg/kg	-	-	15.2	***27.8***	***24.9***	***23.4***	***25.5***	***27.6***	***25.8***	***25.5***	1.86	***23.4***	***27.8***
Copper	mg/kg	35.7	197	59.4	***925***	***794***	***745***	***797***	***915***	***835***	***797***	80.2	***745***	***925***
Iron	mg/kg	21,200	43,766	32,300	***46,100***	***43,100***	***50,600***	***42,000***	***43,700***	***45,100***	***43,700***	3,421	***42,000***	***50,600***
Lead	mg/kg	35	91.3	8.06	***11.8***	***12.0***	***11.2***	***12.6***	***12.4***	***12.0***	***12.0***	0.548	***11.2***	***12.6***
Lithium	mg/kg	-	-	15.2	***32.6***	***29.0***	***26.6***	***30.3***	***32.1***	***30.1***	***30.3***	2.44	***26.6***	***32.6***
Magnesium	mg/kg	-	-	8,510	***20,100***	***17,600***	***15,300***	***18,100***	***19,800***	***18,180***	***18,100***	1,933	***15,300***	***20,100***
Manganese	mg/kg	460	1,100	516	***1,190***	***1,360***	***1,220***	***1,320***	***1,370***	***1,292***	***1,320***	82.3	***1,190***	***1,370***
Mercury	mg/kg	0.17	0.486	0.0627	***0.0997***	***0.100***	***0.0922***	***0.0999***	***0.103***	***0.0990***	***0.0999***	0.00402	***0.0922***	***0.103***
Molybdenum	mg/kg	25	23,000	1.11	***3.61***	***3.35***	***3.19***	***3.24***	***3.66***	***3.41***	***3.35***	0.214	***3.19***	***3.66***
Nickel	mg/kg	16	75	41.2	25.7	28.3	25.9	29.6	27.2	27.3	27.2	1.64	25.7	29.6
Phosphorus	mg/kg	-	-	1,400	1,280	1,200	1,310	1,180	1,330	1,260	1,280	66.7	1,180	1,330
Potassium	mg/kg	-	-	1,570	***2,780***	***2,620***	***2,420***	***2,910***	***2,950***	***2,736***	***2,780***	219	***2,420***	***2,950***
Selenium	mg/kg	2	-	1.28	1.23	1.08	1.02	1.10	1.22	1.13	1.10	0.0917	1.02	1.23
Silver	mg/kg	0.5	-	0.238	***0.363***	***0.351***	***0.334***	***0.343***	***0.372***	***0.353***	***0.351***	0.0152	***0.334***	***0.372***
Sodium	mg/kg	-	-	500	***1,150***	***1,110***	***1,030***	***1,190***	***1,230***	***1,142***	***1,150***	76.9	***1,030***	***1,230***
Strontium	mg/kg	-	-	88.9	***211***	***207***	***195***	***224***	***228***	***213***	***211***	13.3	***195***	***228***
Sulphur[c]	mg/kg	-	-	1,400	1,190	880	900	860	870	940	880	141	860	1,190
Thallium	mg/kg	-	-	0.175	0.0770	0.0850	0.0760	0.0960	0.0840	0.0836	0.0840	0.00802	0.0760	0.0960
Tin	mg/kg	-	-	0.510	***1.86***	***1.68***	***1.62***	***1.66***	***1.87***	***1.74***	***1.68***	0.118	***1.62***	***1.87***
Titanium	mg/kg	-	-	1,160	***1,920***	***1,690***	***1,660***	***1,720***	***1,940***	***1,786***	***1,720***	133	***1,660***	***1,940***
Uranium	mg/kg	-	-	1.51	***1.53***	1.44	1.32	***1.52***	***1.59***	1.48	***1.52***	0.104	1.32	***1.59***
Vanadium	mg/kg	-	-	72.3	***142***	***130***	***166***	***125***	***137***	***140***	***137***	15.9	***125***	***166***
Zinc	mg/kg	123	315	85.1	***106***	***99.6***	***90.4***	***103***	***107***	***101***	***103***	6.69	***90.4***	***107***
Zirconium	mg/kg	-	-	4.20	***5.60***	***4.80***	***5.30***	***4.70***	***5.50***	***5.18***	***5.30***	0.409	***4.70***	***5.60***

Value is > BC Lower Working Sediment Quality Guideline.

Value is > BC Upper Working Sediment Quality Guideline.

Notes: "-" = no current BC Working Sediment Quality Guidelines/ no data. ***Bold/ Italics*** indicates value is > reference 95th percentile value (<5th percentile value for pH).

[a] British Columbia Working Sediment Guidelines (BCMOECCS 2021a) and approved BC Sediment Quality Guideline for Selenium (BCMOECCS 2021b).

[b] The 5th percentile is reported and screened for the pH reference data. For calculation of reference 95th percentile values see Appendix Table C.2.4.

[c] Total sulphur measured in bulk sediment, not the <63 µm fraction.

Table C.2.6: Sediment Quality Data for Quesnel Lake at QUL-LREF1 (Reference) Shallow Area, 2014 to 2022

Analyte	Units	BC Working Sediment Quality Guidelines[a]		Quesnel Lake QUL-LREF1															
		Lower	Upper	2014					2015			2016				2019			
Physical Tests																			
Moisture	%	-	-	44.1	36.9	39.6	42.3	40.4	43.5	42.4	36.5	39.7	30.6	33.7	32.5	30.7	***46.3***	44.9	44.4	43.1	37.5
pH (1:2 soil:water)	pH	-	-	6.73	6.36	6.60	6.68	6.43	7.02	7.17	6.71	6.16	5.98	6.46	6.42	***5.69***	6.71	6.96	6.48	6.44	5.92
Particle Size																			
% Gravel (>2 mm)	%	-	-	2.01	0.240	1.10	0.740	1.02	1.78	0.600	2.08	0.730	0.990	3.59	1.16	2.57	<1.0	<1.0	3.50	5.40	<1.0
% Sand (2.0 mm - 0.063 mm)	%	-	-	61.1	53.6	52.4	66.0	65.2	57.8	56.8	65.3	33.9	73.1	69.7	***76.8***	66.5	52.3	57.2	57.0	60.6	37.0
% Silt (0.063 mm - 4 µm)	%	-	-	31.9	42.1	42.2	29.1	30.4	35.8	36.3	29.6	***59.5***	24.1	22.7	18.9	28.9	43.5	41.2	36.9	31.0	58.1
% Clay (<4 µm)	%	-	-	4.99	4.04	4.29	4.20	3.34	4.62	***6.30***	2.99	5.85	1.84	3.99	3.14	2.12	3.60	1.60	2.70	3.00	4.60
Organic / Inorganic Carbon (<63 µm)																			
Total Organic Carbon	%	-	-	1.23	0.910	1.04	1.38	1.03	1.64	1.23	1.54	1.07	1.12	1.31	1.36	1.08	1.48	0.860	1.26	1.69	1.05
Nutrients (Bulk sediment)																			
Total Nitrogen	%	-	-	0.0710	0.0610	0.0680	0.0690	0.0600	***0.115***	0.101	0.0970	0.0730	0.0450	0.0530	0.0460	0.0500	0.0880	0.0590	0.0750	0.0830	0.0910
Metals (<63 µm)																			
Aluminum	mg/kg	-	-	14,600	12,300	12,900	14,800	11,700	13,600	12,300	13,500	10,700	9,570	10,500	14,100	11,600	13,700	10,800	12,800	12,400	12,500
Antimony	mg/kg	-	-	***0.370***	0.260	0.260	0.330	0.260	0.330	0.300	0.300	0.250	0.230	0.260	0.290	0.250	0.280	0.220	0.290	0.260	0.270
Arsenic	mg/kg	5.9	17	4.90	3.30	3.56	4.92	3.71	5.37	3.82	4.43	3.47	3.47	4.13	4.99	3.67	4.12	3.16	3.55	3.72	3.24
Barium	mg/kg	-	-	126	135	114	124	120	117	107	122	100	104	104	111	124	114	85.5	111	107	***151***
Beryllium	mg/kg	-	-	0.370	0.340	0.330	0.400	0.310	0.400	0.330	0.370	0.300	0.300	0.330	0.380	0.310	0.340	0.300	0.300	0.320	0.360
Bismuth	mg/kg	-	-	0.140	<0.10	<0.10	0.120	<0.10	0.120	<0.10	0.110	<0.10	<0.10	<0.10	0.100	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Boron	mg/kg	-	-	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Cadmium	mg/kg	0.6	3.5	0.341	0.286	0.311	0.354	0.275	0.345	0.287	0.358	0.282	0.273	0.286	0.344	0.297	0.309	0.237	0.270	0.295	0.283
Calcium	mg/kg	-	-	7,760	6,690	6,970	7,640	6,620	8,170	7,040	7,240	6,780	5,770	6,490	7,100	5,960	6,940	6,990	6,810	6,500	6,490
Chromium	mg/kg	37.3	90	53.6	46.3	46.1	54.4	47.3	51.4	45.5	52.2	43.2	43.0	44.4	52.9	55.4	49.0	52.8	48.6	46.7	48.3
Cobalt	mg/kg	-	-	11.5	8.99	9.90	12.0	8.99	11.6	9.78	11.0	9.63	8.66	9.79	11.1	8.82	10.8	8.68	10.4	9.77	9.58
Copper	mg/kg	35.7	197	33.1	26.9	28.7	35.2	27.4	33.8	27.9	33.0	26.7	25.8	28.8	32.1	25.8	28.5	20.7	26.5	27.2	29.9
Iron	mg/kg	21,200	43,766	25,700	21,500	22,000	26,300	22,900	24,800	21,400	23,400	20,200	20,800	22,700	24,800	22,700	22,800	22,500	22,100	21,400	21,500
Lead	mg/kg	35	91.3	5.78	4.72	4.99	6.07	4.80	6.29	5.04	6.02	4.82	4.58	5.30	5.58	5.00	5.03	3.77	4.45	4.60	4.82
Lithium	mg/kg	-	-	12.4	10.5	11.1	13.4	9.90	11.8	10.1	11.0	10.2	9.80	10.8	13.6	10.9	11.1	8.00	10.1	10.6	11.0
Magnesium	mg/kg	-	-	6,790	5,980	6,170	6,990	5,870	6,800	5,860	6,600	5,600	5,300	5,790	6,980	5,790	6,520	5,440	6,070	5,950	6,630
Manganese	mg/kg	460	1,100	364	254	298	365	264	370	299	298	252	233	263	287	234	310	260	333	262	241
Mercury	mg/kg	0.17	0.486	0.0403	0.0316	0.0354	0.0470	0.0340	***0.0481***	0.0362	0.0471	0.0319	0.0363	0.0383	0.0454	0.0268	0.0323	0.0254	0.0277	0.0308	0.0285
Molybdenum	mg/kg	25	23,000	0.870	0.820	0.690	0.830	0.700	0.990	0.690	0.820	0.650	0.690	0.830	0.880	0.930	0.810	0.550	0.820	0.800	0.760
Nickel	mg/kg	16	75	32.6	26.3	28.1	33.2	26.2	32.2	27.5	32.3	26.5	25.1	28.1	31.8	29.7	29.0	23.1	26.6	26.7	28.3
Phosphorus	mg/kg	-	-	1,230	1,040	1,080	1,100	1,230	1,110	1,130	1,190	1,100	955	1,090	1,050	1,080	1,070	***1,290***	1,160	1,020	1,110
Potassium	mg/kg	-	-	1,280	950	1,060	1,320	990	1,300	1,070	1,270	990	900	1,000	1,160	910	1,110	910	1,060	1,050	1,000
Selenium	mg/kg	2	-	0.700	0.480	0.520	0.700	0.520	0.710	0.530	0.670	0.510	0.520	0.610	0.620	0.550	0.570	0.310	0.500	0.630	0.520
Silver	mg/kg	0.5	-	0.152	0.130	0.151	0.169	0.120	0.158	0.135	0.152	0.134	0.138	0.144	0.151	0.125	0.139	0.0910	0.122	0.136	0.147
Sodium	mg/kg	-	-	410	390	370	390	370	480	440	460	350	320	350	380	340	402	364	395	355	386
Strontium	mg/kg	-	-	70.6	58.4	62.2	69.5	55.8	76.0	63.9	66.9	57.8	50.9	56.8	64.1	49.1	67.3	58.2	67.3	62.0	57.8
Sulphur[c]	mg/kg	-	-	-	-	-	-	-	<500	<500	<500	***1,000***	700	600	<500	600	600	500	<500	<500	700
Thallium	mg/kg	-	-	***0.153***	0.119	0.110	0.130	0.102	0.135	0.106	0.118	0.100	0.0950	0.103	0.118	0.101	0.106	0.0830	0.0950	0.100	0.106
Tin	mg/kg	-	-	0.400	0.370	0.340	0.380	0.280	0.380	0.370	0.390	0.300	0.270	0.320	0.550	0.320	0.360	0.320	0.390	0.340	0.340
Titanium	mg/kg	-	-	1,090	962	961	1,060	876	945	897	965	862	743	770	1,020	927	1,020	975	1,010	890	930
Uranium	mg/kg	-	-	1.13	0.855	0.935	1.15	0.869	1.25	0.985	1.18	0.981	0.996	1.08	1.15	0.971	1.03	0.925	1.01	0.963	0.862
Vanadium	mg/kg	-	-	61.6	53.8	53.3	61.1	54.8	59.0	52.7	59.4	50.6	48.1	51.6	61.8	54.7	56.6	57.8	56.6	51.1	55.2
Zinc	mg/kg	123	315	66.8	55.5	58.7	68.5	54.6	64.3	57.2	65.3	51.4	50.1	54.8	62.3	52.9	61.5	48.2	57.7	58.0	61.3
Zirconium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Value is > BC Lower Working Sediment Quality Guideline.

Value is > BC Upper Working Sediment Quality Guideline.

Notes: "-" indicates no guideline available or no data, mg/kg = milligrams per kilogram, ***Bold/Italics*** : Value is > reference 95th percentile value (<5th percentile value for pH).

[a] British Columbia Working Sediment Guidelines (BCMOECCS 2021a) and approved BC Sediment Quality Guideline for Selenium (BCMOECCS 2021b)

[b] 5th percentile value for pH.

[c] Total sulphur measured in bulk sediment, not the <63 µm fraction

Table C.2.6: Sediment Quality Data for Quesnel Lake at QUL-LREF1 (Reference) Shallow Area, 2014 to 2022

Analyte	Units	BC Working Sediment Quality Guidelines[a]		Quesnel Lake QUL-LREF1														95th Percentile (2014 to 2022)[b]
		Lower	Upper	2020					2021					2022				
Physical Tests																		
Moisture	%	-	-	40.3	41.1	42.1	40.4	43.2	37.1	43.8	32.3	37.6	30.6	30.6	26.6	30.6	34.9	29.6	44.9
pH (1:2 soil:water)	pH	-	-	6.52	6.20	6.62	6.56	6.23	6.73	6.16	6.40	6.28	5.92	6.19	5.97	6.07	6.38	6.01	5.92
Particle Size																		
% Gravel (>2 mm)	%	-	-	1.80	<1.0	<1.0	<1.0	***22.2***	4.20	<1.0	4.10	1.80	<1.0	2.00	4.00	3.40	<1.0	2.10	5.40
% Sand (2.0 mm - 0.063 mm)	%	-	-	71.6	58.8	74.9	74.3	52.1	63.9	56.8	58.8	60.9	60.0	60.3	64.4	60.4	73.3	48.6	74.9
% Silt (0.063 mm - 4 µm)	%	-	-	23.9	38.4	22.4	22.7	23.5	28.6	40.0	33.5	33.2	37.2	33.6	29.0	32.3	22.5	44.9	58.1
% Clay (<4 µm)	%	-	-	2.70	2.80	2.10	2.50	2.20	3.30	3.20	3.60	4.10	2.80	4.10	2.60	3.90	3.60	4.40	5.85
Organic / Inorganic Carbon (<63 µm)																		
Total Organic Carbon	%	-	-	1.60	1.12	1.51	***1.98***	1.37	1.86	0.998	1.42	1.82	1.06	1.55	0.984	1.48	1.87	1.12	1.87
Nutrients (Bulk sediment)																		
Total Nitrogen	%	-	-	0.0790	0.0760	0.0720	0.0750	0.0810	0.0620	0.0480	0.0570	0.0740	0.0440	0.0780	0.0580	0.0930	0.0740	0.0870	0.101
Metals (<63 µm)																		
Aluminum	mg/kg	-	-	14,200	12,800	16,000	14,600	13,200	17,100	12,000	14,500	14,300	11,300	15,600	14,200	16,300	***17,800***	15,100	17,100
Antimony	mg/kg	-	-	0.310	0.270	0.350	0.310	0.280	0.340	0.250	0.310	0.310	0.250	0.290	0.250	0.340	0.300	0.260	0.350
Arsenic	mg/kg	5.9	17	4.61	3.86	5.40	5.49	4.33	***6.01***	3.56	4.68	5.08	3.45	4.68	4.14	5.08	5.71	3.97	5.71
Barium	mg/kg	-	-	113	118	149	129	136	144	115	130	128	124	128	108	130	138	124	149
Beryllium	mg/kg	-	-	0.380	0.340	0.450	0.410	0.350	0.410	0.300	0.370	0.360	0.300	0.430	0.380	0.410	0.450	0.390	0.450
Bismuth	mg/kg	-	-	0.110	<0.10	0.140	0.130	0.100	0.120	<0.10	<0.10	0.110	<0.10	0.110	<0.10	0.100	0.130	<0.10	0.140
Boron	mg/kg	-	-	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	10.0
Cadmium	mg/kg	0.6	3.5	0.310	0.276	***0.408***	0.368	0.281	0.357	0.245	0.308	0.352	0.273	0.358	0.268	0.328	0.388	0.289	0.388
Calcium	mg/kg	-	-	7,510	7,110	8,150	7,660	6,800	***9,400***	7,380	8,660	7,100	6,820	7,790	7,970	8,230	8,680	7,680	8,680
Chromium	mg/kg	37.3	90	52.9	51.7	***60.5***	57.2	51.3	60.3	50.8	56.9	54.3	49.1	53.9	58.0	55.6	59.0	52.6	60.3
Cobalt	mg/kg	-	-	11.2	9.76	13.3	11.8	10.1	13.3	9.29	12.0	12.5	8.52	11.8	10.1	12.2	12.9	10.5	13.3
Copper	mg/kg	35.7	197	30.9	30.7	35.2	35.8	34.0	35.0	25.1	31.0	34.5	25.3	34.1	26.9	33.0	***36.6***	29.7	35.8
Iron	mg/kg	21,200	43,766	23,000	23,400	27,100	25,800	24,300	28,200	22,200	25,900	24,800	20,900	25,300	25,000	27,200	***28,500***	24,200	28,200
Lead	mg/kg	35	91.3	5.75	4.86	***6.72***	6.02	5.37	6.08	4.25	5.38	5.58	4.54	5.96	4.88	5.69	6.47	5.14	6.47
Lithium	mg/kg	-	-	12.1	10.4	***13.8***	12.8	11.5	12.7	8.70	11.4	11.7	9.10	12.6	10.0	12.1	13.7	10.9	13.7
Magnesium	mg/kg	-	-	6,830	6,490	7,590	7,410	6,700	***8,360***	6,500	7,700	7,940	6,420	7,570	6,770	7,670	8,320	7,350	8,320
Manganese	mg/kg	460	1,100	330	292	443	409	290	***498***	277	366	354	241	353	306	430	407	320	443
Mercury	mg/kg	0.17	0.486	0.0337	0.0288	0.0364	0.0361	0.0322	0.0342	0.0253	0.0302	0.0397	0.0255	0.0370	0.0292	0.0357	0.0439	0.0310	0.0471
Molybdenum	mg/kg	25	23,000	0.940	0.750	0.980	***1.13***	0.950	1.10	0.600	0.830	0.920	0.740	0.860	0.610	0.850	0.940	0.620	1.10
Nickel	mg/kg	16	75	30.6	27.7	34.6	33.4	29.1	33.6	25.3	30.5	32.3	24.5	32.7	28.2	32.3	***34.8***	29.6	34.6
Phosphorus	mg/kg	-	-	1,090	1,240	1,210	1,200	1,180	1,220	1,000	1,200	1,130	1,190	1,090	1,160	1,210	1,110	1,120	1,240
Potassium	mg/kg	-	-	1,160	1,020	1,330	1,220	1,100	1,470	1,100	1,280	1,290	940	1,360	1,150	1,510	***1,630***	1,300	1,510
Selenium	mg/kg	2	-	0.700	0.710	0.930	***0.970***	0.820	0.880	0.510	0.660	0.770	0.500	0.710	0.520	0.700	0.880	0.580	0.930
Silver	mg/kg	0.5	-	0.150	0.129	0.174	0.167	0.139	0.165	0.104	***0.197***	0.164	0.118	0.159	0.127	0.140	0.167	0.128	0.174
Sodium	mg/kg	-	-	403	393	445	414	408	514	462	468	406	380	463	496	546	***560***	515	546
Strontium	mg/kg	-	-	73.1	64.8	78.6	74.7	68.0	***86.6***	64.5	78.1	68.8	57.9	74.3	70.2	77.2	83.7	72.0	83.7
Sulphur[c]	mg/kg	-	-	720	610	540	500	600	<500	<500	<500	<500	<500	530	<500	<500	<500	510	720
Thallium	mg/kg	-	-	0.119	0.102	0.138	0.123	0.100	0.131	0.0920	0.111	0.116	0.0890	0.130	0.105	0.129	0.147	0.112	0.147
Tin	mg/kg	-	-	0.360	0.330	0.480	0.410	0.340	0.570	0.390	0.510	0.480	0.370	0.490	0.510	0.490	0.570	0.450	0.570
Titanium	mg/kg	-	-	1,070	1,060	1,180	1,050	966	***1,210***	1,070	1,160	981	934	991	1,090	1,140	1,080	1,080	1,180
Uranium	mg/kg	-	-	1.32	1.06	***1.41***	1.34	1.14	1.30	0.936	1.18	1.07	0.852	1.20	1.19	1.30	1.39	1.06	1.39
Vanadium	mg/kg	-	-	59.9	59.6	68.7	62.8	58.3	***70.1***	58.8	65.3	60.8	55.8	61.6	65.5	65.1	67.8	61.8	68.7
Zinc	mg/kg	123	315	58.9	55.1	70.4	64.7	58.1	***71.2***	54.2	65.8	68.7	53.2	66.4	56.2	65.0	70.3	61.2	70.4
Zirconium	mg/kg	-	-	3.80	4.20	4.10	3.50	3.50	4.10	4.00	4.30	4.20	4.00	3.20	3.60	3.40	3.00	3.50	4.30

Value is > BC Lower Working Sediment Quality Guideline.

Value is > BC Upper Working Sediment Quality Guideline.

Notes: "-" indicates no guideline available or no data, mg/kg = milligrams per kilogram, ***Bold/Italics*** : Value is > reference 95th percentile value (<5th percentile value for pH).

[a] British Columbia Working Sediment Guidelines (BCMOECCS 2021a) and approved BC Sediment Quality Guideline for Selenium (BCMOECCS 2021b)

[b] 5th percentile value for pH.

[c] Total sulphur measured in bulk sediment, not the <63 µm fraction

Table C.2.7 Sediment Quality Data for Quesnel Lake at QUL-LREF1 (Reference) Shallow Area, 2022

Parameter	Units	BC Working Sediment Quality Guidelines[a]		Reference 95th Percentile[b]	QUL-LREF1									
		Lower	Upper	QUL-LREF1 (2014 to 2022)	QUL-LREF1-1	QUL-LREF1-2	QUL-LREF1-3	QUL-LREF1-4	QUL-LREF1-5	Mean	Median	Standard Deviation	Minimum	Maximum
					23-Aug-22	23-Aug-22	23-Aug-22	23-Aug-22	23-Aug-22					
Physical Tests														
Moisture	%	-	-	44.9	30.6	26.6	30.6	34.9	29.6	30.5	30.6	2.97	26.6	34.9
pH (1:2 soil:water)	pH	-	-	5.92	6.19	5.97	6.07	6.38	6.01	6.12	6.07	0.165	5.97	6.38
Particle Size														
% Gravel (>2 mm)	%	-	-	5.40	2.00	4.00	3.40	<1	2.10	2.50	2.10	1.20	1.00	4.00
% Sand (2.0 mm - 0.063 mm)	%	-	-	74.9	60.3	64.4	60.4	73.3	48.6	61.4	60.4	8.90	48.6	73.3
% Silt (0.063 mm - 4 µm)	%	-	-	58.1	33.6	29.0	32.3	22.5	44.9	32.5	32.3	8.17	22.5	44.9
% Clay (<4 µm)	%	-	-	5.85	4.10	2.60	3.90	3.60	4.40	3.72	3.90	0.691	2.60	4.40
Organic / Inorganic Carbon (<63 µm)														
Total Organic Carbon	%	-	-	1.87	1.55	0.984	1.48	1.87	1.12	1.40	1.48	0.354	0.984	1.87
Nutrients (Bulk sediment)														
Total Nitrogen	%	-	-	0.101	0.0780	0.0580	0.0930	0.0740	0.0870	0.0780	0.0780	0.0134	0.0580	0.0930
Metals (<63 µm)														
Aluminum	mg/kg	-	-	17,100	15,600	14,200	16,300	***17,800***	15,100	15,800	15,600	1,355	14,200	***17,800***
Antimony	mg/kg	-	-	0.350	0.290	0.250	0.340	0.300	0.260	0.288	0.290	0.0356	0.250	0.340
Arsenic	mg/kg	5.9	17	5.71	4.68	4.14	5.08	5.71	3.97	4.72	4.68	0.709	3.97	5.71
Barium	mg/kg	-	-	149	128	108	130	138	124	126	128	11.1	108	138
Beryllium	mg/kg	-	-	0.450	0.430	0.380	0.410	0.450	0.390	0.412	0.410	0.0286	0.380	0.450
Bismuth	mg/kg	-	-	0.140	0.110	<0.1	0.100	0.130	<0.1	0.108	0.100	0.0130	0.100	0.130
Boron	mg/kg	-	-	10.0	<5	<5	<5	<5	<5	5.00	5.00	-	5.00	5.00
Cadmium	mg/kg	0.6	3.5	0.388	0.358	0.268	0.328	0.388	0.289	0.326	0.328	0.0490	0.268	0.388
Calcium	mg/kg	-	-	8,680	7,790	7,970	8,230	8,680	7,680	8,070	7,970	399	7,680	8,680
Chromium	mg/kg	37.3	90	60.3	53.9	58.0	55.6	59.0	52.6	55.8	55.6	2.69	52.6	59.0
Cobalt	mg/kg	-	-	13.3	11.8	10.1	12.2	12.9	10.5	11.5	11.8	1.17	10.1	12.9
Copper	mg/kg	35.7	197	35.8	34.1	26.9	33.0	***36.6***	29.7	32.1	33.0	3.80	26.9	***36.6***
Iron	mg/kg	21,200	43,766	28,200	25,300	25,000	27,200	***28,500***	24,200	26,040	25,300	1,762	24,200	***28,500***
Lead	mg/kg	35	91.3	6.47	5.96	4.88	5.69	6.47	5.14	5.63	5.69	0.637	4.88	6.47
Lithium	mg/kg	-	-	13.7	12.6	10.0	12.1	13.7	10.9	11.9	12.1	1.45	10.0	13.7
Magnesium	mg/kg	-	-	8,320	7,570	6,770	7,670	8,320	7,350	7,536	7,570	560	6,770	8,320
Manganese	mg/kg	460	1,100	443	353	306	430	407	320	363	353	53.9	306	430
Mercury	mg/kg	0.17	0.486	0.0471	0.0370	0.0292	0.0357	0.0439	0.0310	0.0354	0.0357	0.00576	0.0292	0.0439
Molybdenum	mg/kg	25	23,000	1.10	0.860	0.610	0.850	0.940	0.620	0.776	0.850	0.151	0.610	0.940
Nickel	mg/kg	16	75	34.6	32.7	28.2	32.3	***34.8***	29.6	31.5	32.3	2.62	28.2	***34.8***
Phosphorus	mg/kg	-	-	1,240	1,090	1,160	1,210	1,110	1,120	1,138	1,120	47.6	1,090	1,210
Potassium	mg/kg	-	-	1,510	1,360	1,150	1,510	***1,630***	1,300	1,390	1,360	186	1,150	***1,630***
Selenium	mg/kg	2	-	0.930	0.710	0.520	0.700	0.880	0.580	0.678	0.700	0.139	0.520	0.880
Silver	mg/kg	0.5	-	0.174	0.159	0.127	0.140	0.167	0.128	0.144	0.140	0.0181	0.127	0.167
Sodium	mg/kg	-	-	546	463	496	546	***560***	515	516	515	38.9	463	***560***
Strontium	mg/kg	-	-	83.7	74.3	70.2	77.2	83.7	72.0	75.5	74.3	5.29	70.2	83.7
Sulphur[c]	mg/kg	-	-	720	530	<500	<500	<500	510	508	500	13.0	500	530
Thallium	mg/kg	-	-	0.147	0.130	0.105	0.129	0.147	0.112	0.125	0.129	0.0165	0.105	0.147
Tin	mg/kg	-	-	0.570	0.490	0.510	0.490	0.570	0.450	0.502	0.490	0.0438	0.450	0.570
Titanium	mg/kg	-	-	1,180	991	1,090	1,140	1,080	1,080	1,076	1,080	53.7	991	1,140
Uranium	mg/kg	-	-	1.39	1.20	1.19	1.30	1.39	1.06	1.23	1.20	0.124	1.06	1.39
Vanadium	mg/kg	-	-	68.7	61.6	65.5	65.1	67.8	61.8	64.4	65.1	2.64	61.6	67.8
Zinc	mg/kg	123	315	70.4	66.4	56.2	65.0	70.3	61.2	63.8	65.0	5.36	56.2	70.3
Zirconium	mg/kg	-	-	4.30	3.20	3.60	3.40	3.00	3.50	3.34	3.40	0.241	3.00	3.60

Value is > BC Lower Working Sediment Quality Guideline.
Value is > BC Upper Working Sediment Quality Guideline.

Notes: "-" = no current BC Working Sediment Quality Guidelines/ no data. ***Bold/ Italics*** indicates value is > reference 95th percentile value (<5th percentile value for pH).

[a] British Columbia Working Sediment Guidelines (BCMOECCS 2021a) and approved BC Sediment Quality Guideline for Selenium (BCMOECCS 2021b).

[b] The 5th percentile is reported and screened for the pH reference data. For calculation of reference 95th percentile values see Appendix Table C.2.6.

[c] Total sulphur measured in bulk sediment, not the <63 µm fraction.

Table C.2.8: Pre-Breach Sediment Quality Data for Quesnel Lake at QUL-LNF1 (Exposed) Shallow Area, 2007

Sample ID	Units	BC Working Sediment Quality Guidelines[a]		QUL-LNF1					95th Percentile[b]
				QUL-LNF1-1	QUL-LNF1-2	QUL-LNF1-3	QUL-LNF1-4	QUL-LNF1-5	
		Lower	Upper	2007					
Physical Tests									
Moisture	%	-	-	-	-	-	-	-	-
pH (1:2 soil:water)	pH	-	-	-	-	-	-	-	-
Particle Size									
% Gravel (>2 mm)	%	-	-	7.00	2.00	1.00	2.00	5.00	7.00
% Sand (2.0 mm - 0.063 mm)	%	-	-	36.0	56.0	39.0	58.0	33.0	58.0
% Silt (0.063 mm - 4 µm)	%	-	-	48.0	37.0	50.0	35.0	53.0	53.0
% Clay (<4 µm)	%	-	-	8.00	5.00	9.00	5.00	9.00	9.00
Organic / Inorganic Carbon									
Total Organic Carbon	%	-	-	1.92	1.72	2.45	1.28	2.07	2.45
Nutrients (Bulk sediment)									
Total Nitrogen by LECO	%	-	-	-	-	-	-	-	-
Metals									
Aluminum	mg/kg	-	-	11,300	8,820	12,500	10,100	11,000	12,500
Antimony	mg/kg	-	-	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
Arsenic	mg/kg	5.9	17.0	5.90	<5.0	7.50	6.60	<5.0	7.50
Barium	mg/kg	-	-	82.4	65.1	91.4	73.7	82.6	91.4
Beryllium	mg/kg	-	-	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Bismuth	mg/kg	-	-	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0
Boron	mg/kg	-	-	-	-	-	-	-	-
Cadmium	mg/kg	0.600	3.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Calcium	mg/kg	-	-	5,320	4,680	5,660	4,810	5,080	5,660
Chromium	mg/kg	37.3	90.0	30.1	23.0	32.3	25.8	27.4	32.3
Cobalt	mg/kg	-	-	8.40	6.50	9.60	7.80	7.80	9.60
Copper	mg/kg	35.7	197	23.7	19.4	29.6	20.7	21.8	29.6
Iron	mg/kg	21,200	43,766	21,100	15,400	23,100	19,700	18,600	23,100
Lead	mg/kg	35.0	91.3	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0
Lithium	mg/kg	-	-	12.3	8.80	13.2	10.6	11.8	13.2
Magnesium	mg/kg	-	-	5,300	3,730	5,770	5,130	4,850	5,770
Manganese	mg/kg	460	1,100	337	265	514	334	345	514
Mercury	mg/kg	0.170	0.486	0.0529	0.0465	0.0729	0.0442	0.0420	0.0729
Molybdenum	mg/kg	25	23,000	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0
Nickel	mg/kg	16.0	75.0	18.8	14.2	21.1	16.3	17.3	21.1
Phosphorus	mg/kg	-	-	-	-	-	-	-	-
Potassium	mg/kg	-	-	810	550	890	670	760	890
Selenium	mg/kg	2.00	-	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Silver	mg/kg	0.500	-	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Sodium	mg/kg	-	-	200	<200	210	240	<200	240
Strontium	mg/kg	-	-	55.3	45.7	58.5	54.4	52.1	58.5
Sulphur	mg/kg	-	-	-	-	-	-	-	-
Thallium	mg/kg	-	-	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Tin	mg/kg	-	-	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Titanium	mg/kg	-	-	561	512	607	546	561	607
Uranium	mg/kg	-	-	-	-	-	-	-	-
Vanadium	mg/kg	-	-	49.8	44.8	54.9	52.2	45.7	54.9
Zinc	mg/kg	123	315	44.2	28.3	46.7	38.7	38.1	46.7

Value is > BC Lower Working Sediment Quality Guideline.

Value is > BC Upper Working Sediment Quality Guideline.

Notes: "-" indicates no data. Sediment metal concentrations are based on bulk (<2 mm fraction) sediment samples.

[a] Pre-breach values that were reported as < the laboratory reporting limit were not used for screening.

[b] 5th percentile value for pH.

Table C.2.9: Sediment Quality Data for Quesnel Lake at QUL-LNF1 (Exposed) Shallow Area, 2022

Parameter	Units	BC Working Sediment Quality Guidelines[a]		Reference 95th Percentile[b]		QUL-LNF1									
		Lower	Upper	Pre-Breach (QUL-LNF1; 2007)	Reference (QUL-LREF1; 2014 to 2022)	QUL-LNF1-1	QUL-LNF1-2	QUL-LNF1-3	QUL-LNF1-4	QUL-LNF1-5	Mean	Median	Standard Deviation	Minimum	Maximum
						23-Aug-22	23-Aug-22	23-Aug-22	23-Aug-22	23-Aug-22					
Physical Tests															
Moisture	%	-	-	-	44.9	22.2	25.8	24.7	23.5	23.1	23.9	23.5	1.41	22.2	25.8
pH (1:2 soil:water)	pH	-	-	-	5.92	8.38	8.19	8.54	8.06	8.56	8.35	8.38	0.218	8.06	8.56
Particle Size															
% Gravel (>2 mm)	%	-	-	7.00	5.40	<1	<1	<1	1.20	<1	1.04	1.00	0.0894	1.00	1.20
% Sand (2.0 mm - 0.063 mm)	%	-	-	58.0	74.9	***90.0***	***90.6***	***92.2***	***94.5***	***96.7***	***92.8***	***92.2***	2.79	***90.0***	***96.7***
% Silt (0.063 mm - 4 µm)	%	-	-	53.0	58.1	8.90	7.70	7.80	2.90	2.80	6.02	7.70	2.93	2.80	8.90
% Clay (<4 µm)	%	-	-	9.00	5.85	1.10	1.10	<1	1.40	<1	1.12	1.10	0.164	1.00	1.40
Organic / Inorganic Carbon (<63 µm)[c]															
Total Organic Carbon	%	-	-	2.45	1.87	0.483	1.03	0.452	1.25	0.917	0.826	0.917	0.349	0.452	1.25
Nutrients (Bulk sediment)															
Total Nitrogen	%	-	-	-	0.101	0.0330	<0.02	<0.02	<0.02	0.0250	0.0236	0.0200	0.00568	0.0200	0.0330
Metals (<63 µm)[c]															
Aluminum	mg/kg	-	-	12,500	17,100	10,400	15,800	11,400	16,500	15,800	13,980	15,800	2,848	10,400	16,500
Antimony	mg/kg	-	-	<10.0	0.350	***0.480***	***0.450***	***0.430***	***0.470***	***0.560***	***0.478***	***0.470***	0.0497	***0.430***	***0.560***
Arsenic	mg/kg	5.9	17	7.50	5.71	***14.3***	***13.3***	***14.4***	***14.7***	***20.4***	***15.4***	***14.4***	2.83	***13.3***	***20.4***
Barium	mg/kg	-	-	91.4	149	83.2	104	85.6	138	146	111	104	29.2	83.2	146
Beryllium	mg/kg	-	-	<0.50	0.450	0.410	***0.530***	0.430	***0.550***	***0.560***	***0.496***	***0.530***	0.0706	0.410	***0.560***
Bismuth	mg/kg	-	-	<20.0	0.140	0.120	0.110	0.120	0.140	***0.160***	0.130	0.120	0.0200	0.110	***0.160***
Boron	mg/kg	-	-	-	10.0	6.40	7.80	6.50	7.00	8.80	7.30	7.00	1.00	6.40	8.80
Cadmium	mg/kg	0.6	3.5	<0.50	0.388	0.183	0.349	0.248	***0.477***	***0.456***	0.343	0.349	0.128	0.183	***0.477***
Calcium	mg/kg	-	-	5,660	8,680	***15,800***	***16,700***	***17,900***	***14,000***	***19,500***	***16,780***	***16,700***	2,083	***14,000***	***19,500***
Chromium	mg/kg	37.3	90	32.3	60.3	***68.6***	38.0	57.0	46.0	47.3	51.4	47.3	11.8	38.0	***68.6***
Cobalt	mg/kg	-	-	9.60	13.3	***40.8***	***18.5***	***34.1***	***19.8***	***26.7***	***28.0***	***26.7***	9.49	***18.5***	***40.8***
Copper	mg/kg	35.7	197	29.6	35.8	***693***	***900***	***938***	***1,080***	***2,000***	***1,122***	***938***	510	***693***	***2,000***
Iron	mg/kg	21,200	43,766	23,100	28,200	***291,000***	***74,300***	***218,000***	***67,300***	***112,000***	***152,520***	***112,000***	98,091	***67,300***	***291,000***
Lead	mg/kg	35	91.3	<30.0	6.47	6.46	***7.48***	***6.97***	***9.56***	***10.3***	***8.15***	***7.48***	1.68	6.46	***10.3***
Lithium	mg/kg	-	-	13.2	13.7	11.8	***14.2***	12.2	***15.6***	***15.8***	***13.9***	***14.2***	1.86	11.8	***15.8***
Magnesium	mg/kg	-	-	5,770	8,320	5,690	***8,370***	6,610	***9,020***	***9,330***	7,804	***8,370***	1,583	5,690	***9,330***
Manganese	mg/kg	460	1,100	514	443	***945***	***1,030***	***927***	***1,280***	***1,550***	***1,146***	***1,030***	266	***927***	***1,550***
Mercury	mg/kg	0.17	0.486	0.0729	0.0471	***0.0842***	***0.126***	***0.109***	***0.143***	***0.184***	***0.129***	***0.126***	0.0375	***0.0842***	***0.184***
Molybdenum	mg/kg	25	23,000	<4.0	1.10	***2.23***	***2.50***	***2.47***	***2.37***	***3.82***	***2.68***	***2.47***	0.647	***2.23***	***3.82***
Nickel	mg/kg	16	75	21.1	34.6	25.6	23.3	23.5	29.6	25.8	25.6	25.6	2.54	23.3	29.6
Phosphorus	mg/kg	-	-	-	1,240	***1,500***	***1,470***	***1,770***	***1,410***	***1,560***	***1,542***	***1,500***	138	***1,410***	***1,770***
Potassium	mg/kg	-	-	890	1,510	710	1,180	740	1,210	1,110	990	1,110	245	710	1,210
Selenium	mg/kg	2	-	<2.0	0.930	***1.18***	***1.20***	***1.31***	***1.22***	***2.15***	***1.41***	***1.22***	0.416	***1.18***	***2.15***
Silver	mg/kg	0.5	-	<2.0	0.174	***0.391***	***0.402***	***0.460***	***0.448***	***0.906***	***0.521***	***0.448***	0.217	***0.391***	***0.906***
Sodium	mg/kg	-	-	240	546	365	540	389	517	530	468	517	84.1	365	540
Strontium	mg/kg	-	-	58.5	83.7	78.1	***116***	83.3	***112***	***113***	***100***	***112***	18.2	78.1	***116***
Sulphur[d]	mg/kg	-	-	-	720	***810***	720	***790***	690	***730***	***748***	***730***	50.2	690	***810***
Thallium	mg/kg	-	-	<1.0	0.147	<0.05	0.0660	<0.05	0.0800	0.0640	0.0620	0.0640	0.0126	0.0500	0.0800
Tin	mg/kg	-	-	<5.0	0.570	***1.83***	***1.20***	***1.42***	***1.17***	***1.58***	***1.44***	***1.42***	0.275	***1.17***	***1.83***
Titanium	mg/kg	-	-	607	1,180	***1,870***	***1,380***	***1,510***	1,110	***1,480***	***1,470***	***1,480***	274	1,110	***1,870***
Uranium	mg/kg	-	-	-	1.39	***1.45***	1.18	1.04	1.00	1.02	1.14	1.04	0.188	1.00	***1.45***
Vanadium	mg/kg	-	-	54.9	68.7	***1,140***	***266***	***831***	***227***	***409***	***575***	***409***	397	***227***	***1,140***
Zinc	mg/kg	123	315	46.7	70.4	***94.2***	64.5	***86.1***	***77.4***	***85.3***	***81.5***	***85.3***	11.2	64.5	***94.2***
Zirconium	mg/kg	-	-	-	4.30	***5.60***	***5.10***	***5.10***	4.00	***4.80***	***4.92***	***5.10***	0.589	4.00	***5.60***

Value is > BC Lower Working Sediment Quality Guideline.

Value is > BC Upper Working Sediment Quality Guideline.

Notes: "-" = no current BC Working Sediment Quality Guidelines/ no data. ***Bold/ Italics*** indicates value is > pre-breach and is > reference 95th percentile value (<5th percentile value for pH).

[a] British Columbia Working Sediment Guidelines (BCMOECCS 2021a) and approved BC Sediment Quality Guideline for Selenium (BCMOECCS 2021b).

[b] Pre-breach values that were reported as < the laboratory reporting limit were not used for screening. The 5th percentile is reported and screened for the pH reference data. For calculation of reference and pre-breach 95th percentile values, see Appendix Tables C.2.6 and C.2.8, respectively.

[c] Total Organic Carbon (TOC) and metals data are presented for the <63 µm sediment fraction for post-breach (2014 to 2022) data only. TOC and metals data presented for pre-breach results represent bulk sediment samples (see Appendix Table C.2.8).

[d] Total sulphur measured in bulk sediment, not the <63 µm fraction.

APPENDIX C.3
PLANKTON COMMUNITY & PRODUCTIVITY

Table C.3.1: Phytoplankton Community Metrics for Polley Lake (POL-P2; Exposed) and Bootjack Lake (BOL-B2; Reference) Areas, 2019 to 2022[a]

Year	Area	Type	Date	Replicate	Density (cells/L)	Richness (# of Taxa)	Simpson's Diversity	Simpson's Evenness	Chlorophyll-a (µg/L)	Diatom (cells/L)	Chlorophyte (cells/L)	Chrysophyte (cells/L)	Cryptomonad (cells/L)	Cyanobacteria (cells/L)
2019	BOL-B2	Reference	Jun 25	-	16,710,532	19	0.114	0.0594	2.03	80,380	168,799	417,979	257,218	15,778,118
			Jul 31	1	16,818,503	17	0.135	0.0680	2.58	48,228	116,552	522,473	156,742	15,974,508
			Jul 31	2	13,739,324	23	0.286	0.0609	2.49	63,156	688,976	1,016,239	206,693	11,758,519
			Jul 31	3	20,677,883	24	0.173	0.0504	2.71	16,076	152,723	614,911	257,218	19,636,956
			Jul 31	4	18,345,174	20	0.118	0.0567	2.91	20,095	337,598	534,530	188,894	17,264,057
			Jul 31	5	15,019,218	17	0.131	0.0677	3.10	10,717	401,902	324,201	88,419	14,193,978
			Sep 4	-	5,919,483	25	0.334	0.0601	0.0910	6,430	181,660	41,798	141,470	5,522,403
	POL-P2	Exposed	Jun 24	-	3,958,740	21	0.464	0.0889	1.40	18,755	100,476	95,117	99,136	3,642,576
			Jul 29	1	25,314,116	17	0.143	0.0686	2.18	114,829	172,244	895,668	126,312	23,999,321
			Jul 29	2	19,520,978	13	0.181	0.0939	2.69	45,932	482,283	1,194,225	114,829	17,677,968
			Jul 29	3	16,181,958	16	0.284	0.0873	2.26	63,156	235,400	1,010,498	149,278	14,723,626
			Jul 29	4	12,479,073	17	0.225	0.0759	2.60	64,304	281,332	795,767	92,438	11,241,213
			Jul 29	5	21,754,408	14	0.146	0.0836	2.58	40,190	206,693	970,307	132,054	20,405,164
			Aug 28	-	732,162	15	0.655	0.193	0.400	42,811	61,159	32,327	151,150	444,714
2020	BOL-B2	Reference	Jun 22	-	1,240,656	21	0.786	0.222	2.47	234,152	559,169	132,803	178,235	136,297
			Jul 29	1	15,951,510	25	0.120	0.0455	1.39	34,162	62,295	40,190	245,161	15,567,693
			Jul 29	2	16,813,067	20	0.129	0.0574	1.94	0	68,149	43,685	174,740	16,526,493
			Jul 29	3	14,903,672	20	0.191	0.0618	2.10	4,728	134,756	42,554	257,690	14,463,944
			Jul 29	4	15,433,056	19	0.230	0.0683	2.59	4,728	156,033	101,658	210,408	14,960,229
			Jul 29	5	15,745,121	16	0.160	0.0744	2.24	2,364	99,294	66,196	226,957	15,350,311
			Aug 30	-	13,795,274	16	0.566	0.144	2.38	0	287,515	58,740	191,677	13,257,343
	POL-P2	Exposed	Jun 22	-	696,631	21	0.775	0.212	1.20	135,307	77,701	8,038	187,554	282,671
			Jul 27	1	7,654,935	21	0.399	0.0792	1.57	12,366	420,452	491,558	247,325	6,480,143
			Jul 27	2	8,306,655	17	0.496	0.117	2.04	8,038	357,693	622,949	305,446	7,008,510
			Jul 27	3	5,379,539	17	0.332	0.0881	1.62	32,748	226,256	339,384	297,706	4,483,446
			Jul 27	4	11,202,774	18	0.181	0.0678	1.83	9,275	228,775	404,994	287,515	10,269,124
			Jul 27	5	9,006,513	16	0.196	0.0777	1.75	5,359	222,386	332,239	214,348	8,226,822
			Aug 30	-	7,656,332	17	0.673	0.180	2.68	10,717	345,636	219,707	251,859	6,825,733
2021	BOL-B2	Reference	Jun 22	-	2,824,035	23	0.773	0.192	20.2	58,946	428,696	916,338	187,554	1,232,501
			Jul 27	1	2,668,930	19	0.315	0.0768	1.50	4,466	56,564	50,610	324,499	2,228,326
			Jul 27	2	3,038,383	24	0.256	0.0560	1.65	16,076	53,051	32,152	323,130	2,604,328
			Jul 27	3	4,013,088	20	0.262	0.0678	1.72	12,179	36,537	30,447	213,130	3,717,141
			Jul 27	4	5,506,064	19	0.191	0.0651	1.55	13,397	28,011	32,883	226,527	5,200,375
			Jul 27	5	3,461,184	20	0.245	0.0662	1.96	38,583	56,266	20,899	326,345	3,019,092
			Aug 30	-	5,314,570	27	0.501	0.0742	2.30	23,641	267,147	104,022	276,603	4,631,335
	POL-P2	Exposed	Jun 22	-	3,443,995	17	0.493	0.116	1.69	43,282	86,564	680,143	219,501	2,411,415
			Jul 26	1	7,608,014	19	0.134	0.0608	0.947	26,124	108,514	215,018	176,837	7,081,522
			Jul 26	2	5,924,516	15	0.212	0.0846	1.30	2,364	122,935	368,805	182,038	5,248,374
			Jul 26	3	5,961,554	13	0.189	0.0948	1.09	11,164	93,777	189,787	305,892	5,360,933
			Jul 26	4	4,784,649	13	0.218	0.0984	1.39	0	142,675	172,818	249,180	4,219,976
			Jul 26	5	6,664,489	13	0.198	0.0959	1.42	2,364	170,218	196,223	338,071	5,957,614
			Aug 30	-	1,697,368	21	0.492	0.0938	1.02	12,057	103,155	14,736	258,557	1,303,504
2022	BOL-B2	Reference	Jun 21	-	2,081,855	28	0.704	0.121	6.28	211,669	80,381	318,843	227,745	1,232,501
			Jul 26	1	1,921,549	29	0.734	0.130	1.82	69,764	66,731	160,761	142,562	1,480,215
			Jul 26	2	4,093,135	30	0.684	0.106	2.07	68,409	172,733	198,386	123,136	3,527,051
			Jul 26	3	2,531,093	26	0.730	0.142	1.94	71,449	64,304	225,065	153,616	2,014,871
			Jul 26	4	1,928,735	29	0.599	0.0859	2.50	53,587	125,036	207,203	151,830	1,385,720
			Jul 26	5	3,809,516	30	0.552	0.0744	2.09	19,716	131,945	107,680	151,661	3,398,514
			Aug 28	-	1,388,071	31	0.622	0.0852	2.18	35,166	129,614	36,171	45,214	1,137,886
	POL-P2	Exposed	Jun 21	-	1,026,397	17	0.744	0.230	2.60	510,107	253,508	37,099	166,944	52,556
			Jul 25	1	4,035,101	15	0.784	0.309	2.57	257,218	375,109	803,805	251,859	2,347,111
			Jul 25	2	3,531,383	21	0.861	0.343	2.46	144,685	439,413	841,316	203,631	1,902,338
			Jul 25	3	3,933,286	20	0.831	0.295	2.55	198,272	471,566	707,348	246,500	2,309,600
			Jul 25	4	6,608,867	16	0.800	0.312	3.78	43,282	636,861	1,174,792	166,944	4,586,988
			Jul 25	5	5,177,576	17	0.744	0.230	2.73	128,609	348,315	787,729	289,370	3,618,194
			Aug 25	-	9,239,164	27	0.461	0.0688	3.47	53,587	251,859	192,913	155,402	8,582,724

Notes: "-" = only one sample (replicate) collected. Cells/L = cells per litre. µg/L = micrograms per litre. Displayed data were collected using depth-integrated (DI) sampling methods. Sampling methods employed in 2019 included both surface (S) and DI methods. See Minnow (2019a, 2020a) for results of surface phytoplankton sampling completed in 2018 and 2019. See Minnow 2020a for a comparison of results from the S and DI sampling methodologies, and for rationale regarding the selection of DI methods for ongoing phytoplankton monitoring.

[a] Phytoplankton data for area POL-P1 collected in June 2019 are not displayed. These data were presented in Minnow (2020a).

Table C.3.1: Phytoplankton Community Metrics for Polley Lake (POL-P2; Exposed) and Bootjack Lake (BOL-B2; Reference) Areas, 2019 to 2022[a]

Year	Area	Type	Date	Replicate	Dinoflagellates (cells/L)	Euglenophytes (cells/L)	Diatoms (%)	Chlorophytes (%)	Chrysophytes (%)	Cryptomonads (%)	Cyanobacteria (%)	Dinoflagellates (%)	Euglenophytes (%)
2019	BOL-B2	Reference	Jun 25	-	8,038	0	0.481	1.01	2.50	1.54	94.4	0.0481	0
			Jul 31	1	0	0	0.287	0.693	3.11	0.932	95.0	0	0
			Jul 31	2	5,741	0	0.460	5.01	7.40	1.50	85.6	0.0418	0
			Jul 31	3	0	0	0.0777	0.739	2.97	1.24	95.0	0	0
			Jul 31	4	0	0	0.110	1.84	2.91	1.03	94.1	0	0
			Jul 31	5	0	0	0.0714	2.68	2.16	0.589	94.5	0	0
			Sep 4	-	6,430	19,291	0.109	3.07	0.706	2.39	93.3	0.109	0.326
	POL-P2	Exposed	Jun 24	-	0	2,679	0.474	2.54	2.40	2.50	92.0	0	0.0677
			Jul 29	1	5,741	0	0.454	0.680	3.54	0.499	94.8	0.0227	0
			Jul 29	2	0	5,741	0.235	2.47	6.12	0.588	90.6	0	0.0294
			Jul 29	3	0	0	0.390	1.45	6.24	0.922	91.0	0	0
			Jul 29	4	4,019	0	0.515	2.25	6.38	0.741	90.1	0.0322	0
			Jul 29	5	0	0	0.185	0.950	4.46	0.607	93.8	0	0
			Aug 28	-	0	0	5.85	8.35	4.42	20.6	60.7	0	0
2020	BOL-B2	Reference	Jun 22	-	0	0	18.9	45.1	10.7	14.4	11.0	0	0
			Jul 29	1	2,010	0	0.214	0.391	0.252	1.54	97.6	0.0126	0
			Jul 29	2	0	0	0	0.405	0.260	1.04	98.3	0	0
			Jul 29	3	0	0	0.0317	0.904	0.286	1.73	97.0	0	0
			Jul 29	4	0	0	0.0306	1.01	0.659	1.36	96.9	0	0
			Jul 29	5	0	0	0.0150	0.631	0.420	1.44	97.5	0	0
			Aug 30	-	0	0	0	2.08	0.426	1.39	96.1	0	0
	POL-P2	Exposed	Jun 22	-	5,359	0	19.4	11.2	1.15	26.9	40.6	0.769	0
			Jul 27	1	3,092	0	0.162	5.49	6.42	3.23	84.7	0.0404	0
			Jul 27	2	4,019	0	0.0968	4.31	7.50	3.68	84.4	0.0484	0
			Jul 27	3	0	0	0.609	4.21	6.31	5.53	83.3	0	0
			Jul 27	4	3,092	0	0.0828	2.04	3.62	2.57	91.7	0.0276	0
			Jul 27	5	5,359	0	0.0595	2.47	3.69	2.38	91.3	0.0595	0
			Aug 30	-	2,679	0	0.140	4.51	2.87	3.29	89.2	0.0350	0
2021	BOL-B2	Reference	Jun 22	-	0	0	2.09	15.2	32.5	6.64	43.6	0	0
			Jul 27	1	2,977	1,489	0.167	2.12	1.90	12.2	83.5	0.112	0.0558
			Jul 27	2	3,215	6,430	0.529	1.75	1.06	10.6	85.7	0.106	0.212
			Jul 27	3	3,654	0	0.303	0.910	0.759	5.31	92.6	0.0910	0
			Jul 27	4	1,218	3,654	0.243	0.509	0.597	4.11	94.5	0.0221	0.0664
			Jul 27	5	0	0	1.11	1.63	0.604	9.43	87.2	0	0
			Aug 30	-	9,457	2,364	0.445	5.03	1.96	5.20	87.1	0.178	0.0445
	POL-P2	Exposed	Jun 22	-	0	3,092	1.26	2.51	19.8	6.37	70.0	0	0.0898
			Jul 26	1	0	0	0.343	1.43	2.83	2.32	93.1	0	0
			Jul 26	2	0	0	0.0399	2.08	6.23	3.07	88.6	0	0
			Jul 26	3	0	0	0.187	1.57	3.18	5.13	89.9	0	0
			Jul 26	4	0	0	0	2.98	3.61	5.21	88.2	0	0
			Jul 26	5	0	0	0.0355	2.55	2.94	5.07	89.4	0	0
			Aug 30	-	5,359	0	0.710	6.08	0.868	15.2	76.8	0.316	0
2022	BOL-B2	Reference	Jun 21	-	10,717	0	10.2	3.86	15.3	10.9	59.2	0.515	0
			Jul 26	1	1,517	0	3.63	3.47	8.37	7.42	77.0	0.0789	0
			Jul 26	2	3,420	0	1.67	4.22	4.85	3.01	86.2	0.0836	0
			Jul 26	3	1,786	0	2.82	2.54	8.89	6.07	79.6	0.0706	0
			Jul 26	4	5,359	0	2.78	6.48	10.7	7.87	71.8	0.278	0
			Jul 26	5	0	0	0.518	3.46	2.83	3.98	89.2	0	0
			Aug 28	-	2,010	2,010	2.53	9.34	2.61	3.26	82.0	0.145	0.145
	POL-P2	Exposed	Jun 21	-	6,183	0	49.7	24.7	3.61	16.3	5.12	0.602	0
			Jul 25	1	0	0	6.37	9.30	19.9	6.24	58.2	0	0
			Jul 25	2	0	0	4.10	12.4	23.8	5.77	53.9	0	0
			Jul 25	3	0	0	5.04	12.0	18.0	6.27	58.7	0	0
			Jul 25	4	0	0	0.655	9.64	17.8	2.53	69.4	0	0
			Jul 25	5	5,359	0	2.48	6.73	15.2	5.59	69.9	0.103	0
			Aug 25	-	2,679	0	0.580	2.73	2.09	1.68	92.9	0.0290	0

Notes: "-" = only one sample (replicate) collected. Displayed data were collected using depth-integrated (DI) sampling methods. Sampling methods employed in 2019 included both surface (S) and DI methods. See Minnow (2019a, 2020a) for results of surface phytoplankton sampling completed in 2018 and 2019. See Minnow 2020a for a comparison of results from the S and DI sampling methodologies, and for rationale regarding the selection of DI methods for ongoing phytoplankton monitoring.

[a] Phytoplankton data for area POL-P1 collected in June 2019 are not displayed. These data were presented in Minnow (2020a).

Table C.3.2: Summary Statistics for Phytoplankton Community Metrics for Polley Lake (POL-P2; Exposed) and Bootjack Lake (BOL-B2; Reference) in July, 2019 to 2022[a]

Endpoint	Year	Area	Type	n	Mean	Standard Deviation	Minimum	Median	Maximum
Density (cells/L)	2019	BOL-B2	Reference	5	16,920,021	2,733,715	13,739,324	16,818,503	20,677,883
		POL-P2	Exposed	5	19,050,107	4,954,229	12,479,073	19,520,978	25,314,116
	2020	BOL-B2	Reference	5	15,769,285	704,558	14,903,672	15,745,121	16,813,067
		POL-P2	Exposed	5	8,310,083	2,113,646	5,379,539	8,306,655	11,202,774
	2021	BOL-B2	Reference	5	3,737,530	1,108,008	2,668,930	3,461,184	5,506,064
		POL-P2	Exposed	5	6,188,644	1,040,862	4,784,649	5,961,554	7,608,014
	2022	BOL-B2	Reference	5	2,856,805	1,034,200	1,921,549	2,531,093	4,093,135
		POL-P2	Exposed	5	4,657,243	1,250,831	3,531,383	4,035,101	6,608,867
Richness (# of Taxa)	2019	BOL-B2	Reference	5	20.2	3.3	17	20	24
		POL-P2	Exposed	5	15.4	1.8	13	16	17
	2020	BOL-B2	Reference	5	20.0	3.2	16	20	25
		POL-P2	Exposed	5	17.8	1.9	16	17	21
	2021	BOL-B2	Reference	5	20.4	2.1	19	20	24
		POL-P2	Exposed	5	14.6	2.6	13	13	19
	2022	BOL-B2	Reference	5	28.8	1.6	26	29	30
		POL-P2	Exposed	5	17.8	2.6	15	17	21
Simpson's Diversity	2019	BOL-B2	Reference	5	0.168	0.0686	0.118	0.135	0.286
		POL-P2	Exposed	5	0.196	0.0595	0.143	0.181	0.284
	2020	BOL-B2	Reference	5	0.166	0.0453	0.120	0.160	0.230
		POL-P2	Exposed	5	0.321	0.134	0.181	0.332	0.496
	2021	BOL-B2	Reference	5	0.254	0.0442	0.191	0.256	0.315
		POL-P2	Exposed	5	0.190	0.0333	0.134	0.198	0.218
	2022	BOL-B2	Reference	5	0.660	0.0813	0.552	0.684	0.734
		POL-P2	Exposed	5	0.804	0.0448	0.744	0.800	0.861
Simpson's Evenness	2019	BOL-B2	Reference	5	0.0607	0.00749	0.0504	0.0609	0.0680
		POL-P2	Exposed	5	0.0819	0.00985	0.0686	0.0836	0.0939
	2020	BOL-B2	Reference	5	0.0615	0.0110	0.0455	0.0618	0.0744
		POL-P2	Exposed	5	0.0859	0.0186	0.0678	0.0792	0.117
	2021	BOL-B2	Reference	5	0.0664	0.00743	0.0560	0.0662	0.0768
		POL-P2	Exposed	5	0.0869	0.0155	0.0608	0.0948	0.0984
	2022	BOL-B2	Reference	5	0.108	0.0287	0.0744	0.106	0.142
		POL-P2	Exposed	5	0.298	0.0420	0.230	0.309	0.343
Chlorophyll-a (µg/L)	2019	BOL-B2	Reference	5	2.76	0.248	2.49	2.71	3.10
		POL-P2	Exposed	5	2.46	0.227	2.18	2.58	2.69
	2020	BOL-B2	Reference	5	2.05	0.441	1.39	2.10	2.59
		POL-P2	Exposed	5	1.76	0.186	1.57	1.75	2.04
	2021	BOL-B2	Reference	5	1.68	0.180	1.50	1.65	1.96
		POL-P2	Exposed	5	1.23	0.204	0.947	1.30	1.42
	2022	BOL-B2	Reference	5	2.08	0.257	1.82	2.07	2.50
		POL-P2	Exposed	5	2.82	0.547	2.46	2.57	3.78
Diatom (cells/L)	2019	BOL-B2	Reference	5	31,655	22,813	10,717	20,095	63,156
		POL-P2	Exposed	5	65,682	29,426	40,190	63,156	114,829
	2020	BOL-B2	Reference	5	9,196	14,093	0	4,728	34,162
		POL-P2	Exposed	5	13,557	11,019	5,359	9,275	32,748
	2021	BOL-B2	Reference	5	16,940	12,845	4,466	13,397	38,583
		POL-P2	Exposed	5	8,403	10,784	0	2,364	26,124
	2022	BOL-B2	Reference	5	56,585	21,810	19,716	68,409	71,449
		POL-P2	Exposed	5	154,413	80,005	43,282	144,685	257,218
Chlorophyte (cells/L)	2019	BOL-B2	Reference	5	339,550	229,468	116,552	337,598	688,976
		POL-P2	Exposed	5	275,590	122,268	172,244	235,400	482,283
	2020	BOL-B2	Reference	5	104,105	40,927	62,295	99,294	156,033
		POL-P2	Exposed	5	291,113	92,165	222,386	228,775	420,452
	2021	BOL-B2	Reference	5	46,086	13,037	28,011	53,051	56,564
		POL-P2	Exposed	5	127,624	29,890	93,777	122,935	170,218
	2022	BOL-B2	Reference	5	112,150	46,315	64,304	125,036	172,733
		POL-P2	Exposed	5	454,253	113,305	348,315	439,413	636,861
Chrysophyte (cells/L)	2019	BOL-B2	Reference	5	602,471	254,857	324,201	534,530	1,016,239
		POL-P2	Exposed	5	973,293	148,109	795,767	970,307	1,194,225
	2020	BOL-B2	Reference	5	58,857	26,125	40,190	43,685	101,658
		POL-P2	Exposed	5	438,225	121,526	332,239	404,994	622,949
	2021	BOL-B2	Reference	5	33,398	10,759	20,899	32,152	50,610
		POL-P2	Exposed	5	228,530	79,856	172,818	196,223	368,805
	2022	BOL-B2	Reference	5	179,819	46,661	107,680	198,386	225,065
		POL-P2	Exposed	5	862,998	181,026	707,348	803,805	1,174,792
Cryptomonad (cells/L)	2019	BOL-B2	Reference	5	179,593	62,613	88,419	188,894	257,218
		POL-P2	Exposed	5	122,982	21,120	92,438	126,312	149,278
	2020	BOL-B2	Reference	5	222,991	32,395	174,740	226,957	257,690
		POL-P2	Exposed	5	270,468	38,539	214,348	287,515	305,446
	2021	BOL-B2	Reference	5	282,726	57,624	213,130	323,130	326,345
		POL-P2	Exposed	5	250,404	72,201	176,837	249,180	338,071
	2022	BOL-B2	Reference	5	144,561	12,731	123,136	151,661	153,616
		POL-P2	Exposed	5	231,661	47,256	166,944	246,500	289,370
Cyanobacteria (cells/L)	2019	BOL-B2	Reference	5	15,765,604	2,991,785	11,758,519	15,974,508	19,636,956
		POL-P2	Exposed	5	17,609,458	4,937,955	11,241,213	17,677,968	23,999,321
	2020	BOL-B2	Reference	5	15,373,734	769,046	14,463,944	15,350,311	16,526,493
		POL-P2	Exposed	5	7,293,609	2,142,697	4,483,446	7,008,510	10,269,124
	2021	BOL-B2	Reference	5	3,353,852	1,170,714	2,228,326	3,019,092	5,200,375
		POL-P2	Exposed	5	5,573,684	1,049,356	4,219,976	5,360,933	7,081,522
	2022	BOL-B2	Reference	5	2,361,274	1,034,754	1,385,720	2,014,871	3,527,051
		POL-P2	Exposed	5	2,952,846	1,117,738	1,902,338	2,347,111	4,586,988
Dinoflagellates (cells/L)	2019	BOL-B2	Reference	5	1,148	2,568	0	0	5,741
		POL-P2	Exposed	5	1,952	2,742	0	0	5,741
	2020	BOL-B2	Reference	5	402	899	0	0	2,010
		POL-P2	Exposed	5	3,112	1,972	0	3,092	5,359
	2021	BOL-B2	Reference	5	2,213	1,545	0	2,977	3,654
		POL-P2	Exposed	5	0	0	0	0	0
	2022	BOL-B2	Reference	5	2,416	2,044	0	1,786	5,359
		POL-P2	Exposed	5	1,072	2,396	0	0	5,359
Euglenophytes (cells/L)	2019	BOL-B2	Reference	5	0	0	0	0	0
		POL-P2	Exposed	5	1,148	2,568	0	0	5,741
	2020	BOL-B2	Reference	5	0	0	0	0	0
		POL-P2	Exposed	5	0	0	0	0	0
	2021	BOL-B2	Reference	5	2,315	2,745	0	1,489	6,430
		POL-P2	Exposed	5	0	0	0	0	0
	2022	BOL-B2	Reference	5	0	0	0	0	0
		POL-P2	Exposed	5	0	0	0	0	0

Notes: Cell/L = cells per litre. µg/L = micrograms per litre. Displayed data were collected using depth-integrated (DI) sampling methods. Sampling methods employed in 2019 included both surface (S) and DI methods. See Minnow (2019a, 2020a) for results of surface phytoplankton sampling completed in 2018 and 2019. See Minnow 2020a for a comparison of results from the S and DI sampling methodologies, and for rationale regarding the selection of DI methods for ongoing phytoplankton monitoring

[a] Summary statistics are displayed for replicated data collected in July 2019 to 2022. For results without replicates collected in June and August 2019 to 2022, see Appendix Table C.3.1.

Table C.3.2: Summary Statistics for Phytoplankton Community Metrics for Polley Lake (POL-P2; Exposed) and Bootjack Lake (BOL-B2; Reference) in July, 2019 to 2022[a]

Endpoint	Year	Area	Type	n	Mean	Standard Deviation	Minimum	Median	Maximum
Diatoms (%)	2019	BOL-B2	Reference	5	0.201	0.169	0.0714	0.110	0.460
		POL-P2	Exposed	5	0.356	0.141	0.185	0.390	0.515
	2020	BOL-B2	Reference	5	0.0583	0.0881	0	0.0306	0.214
		POL-P2	Exposed	5	0.202	0.231	0.0595	0.0968	0.609
	2021	BOL-B2	Reference	5	0.472	0.384	0.167	0.303	1.11
		POL-P2	Exposed	5	0.121	0.144	0	0.0399	0.343
	2022	BOL-B2	Reference	5	2.28	1.21	0.518	2.78	3.63
		POL-P2	Exposed	5	3.73	2.23	0.655	4.10	6.37
Chlorophytes (%)	2019	BOL-B2	Reference	5	2.19	1.78	0.693	1.84	5.01
		POL-P2	Exposed	5	1.56	0.786	0.680	1.45	2.47
	2020	BOL-B2	Reference	5	0.668	0.283	0.391	0.631	1.01
		POL-P2	Exposed	5	3.70	1.42	2.04	4.21	5.49
	2021	BOL-B2	Reference	5	1.38	0.656	0.509	1.63	2.12
		POL-P2	Exposed	5	2.12	0.655	1.43	2.08	2.98
	2022	BOL-B2	Reference	5	4.04	1.49	2.54	3.47	6.48
		POL-P2	Exposed	5	10.0	2.31	6.73	9.64	12.4
Chrysophytes (%)	2019	BOL-B2	Reference	5	3.71	2.09	2.16	2.97	7.40
		POL-P2	Exposed	5	5.35	1.28	3.54	6.12	6.38
	2020	BOL-B2	Reference	5	0.375	0.172	0.252	0.286	0.659
		POL-P2	Exposed	5	5.51	1.76	3.62	6.31	7.50
	2021	BOL-B2	Reference	5	0.983	0.544	0.597	0.759	1.90
		POL-P2	Exposed	5	3.76	1.41	2.83	3.18	6.23
	2022	BOL-B2	Reference	5	7.13	3.22	2.83	8.37	10.7
		POL-P2	Exposed	5	18.9	3.20	15.2	18.0	23.8
Cryptomonads (%)	2019	BOL-B2	Reference	5	1.06	0.343	0.589	1.03	1.50
		POL-P2	Exposed	5	0.671	0.165	0.499	0.607	0.922
	2020	BOL-B2	Reference	5	1.42	0.254	1.04	1.44	1.73
		POL-P2	Exposed	5	3.48	1.26	2.38	3.23	5.53
	2021	BOL-B2	Reference	5	8.33	3.47	4.11	9.43	12.2
		POL-P2	Exposed	5	4.16	1.36	2.32	5.07	5.21
	2022	BOL-B2	Reference	5	5.67	2.12	3.01	6.07	7.87
		POL-P2	Exposed	5	5.28	1.57	2.53	5.77	6.27
Cyanobacteria (%)	2019	BOL-B2	Reference	5	92.8	4.07	85.6	94.5	95.0
		POL-P2	Exposed	5	92.0	2.11	90.1	91.0	94.8
	2020	BOL-B2	Reference	5	97.5	0.538	96.9	97.5	98.3
		POL-P2	Exposed	5	87.1	4.07	83.3	84.7	91.7
	2021	BOL-B2	Reference	5	88.7	4.65	83.5	87.2	94.5
		POL-P2	Exposed	5	89.8	1.93	88.2	89.4	93.1
	2022	BOL-B2	Reference	5	80.8	6.99	71.8	79.6	89.2
		POL-P2	Exposed	5	62.0	7.22	53.9	58.7	69.9
Dinoflagellates (%)	2019	BOL-B2	Reference	5	0.00836	0.0187	0	0	0.0418
		POL-P2	Exposed	5	0.0110	0.0154	0	0	0.0322
	2020	BOL-B2	Reference	5	0.00252	0.00563	0	0	0.0126
		POL-P2	Exposed	5	0.0352	0.0228	0	0.0404	0.0595
	2021	BOL-B2	Reference	5	0.0661	0.0514	0	0.0910	0.112
		POL-P2	Exposed	5	0	0	0	0	0
	2022	BOL-B2	Reference	5	0.102	0.104	0	0.0789	0.278
		POL-P2	Exposed	5	0.0207	0.0463	0	0	0.103
Euglenophytes (%)	2019	BOL-B2	Reference	5	0	0	0	0	0
		POL-P2	Exposed	5	0.00588	0.0132	0	0	0.0294
	2020	BOL-B2	Reference	5	0	0	0	0	0
		POL-P2	Exposed	5	0	0	0	0	0
	2021	BOL-B2	Reference	5	0.0668	0.0866	0	0.0558	0.212
		POL-P2	Exposed	5	0	0	0	0	0
	2022	BOL-B2	Reference	5	0	0	0	0	0
		POL-P2	Exposed	5	0	0	0	0	0

Notes: Cell/L = cells per litre. µg/L = micrograms per litre. Displayed data were collected using depth-integrated (DI) sampling methods. Sampling methods employed in 2019 included both surface (S) and DI methods. See Minnow (2019a, 2020a) for results of surface phytoplankton sampling completed in 2018 and 2019. See Minnow 2020a for a comparison of results from the S and DI sampling methodologies, and for rationale regarding the selection of DI methods for ongoing phytoplankton monitoring

[a] Summary statistics are displayed for replicated data collected in July 2019 to 2022. For results without replicates collected in June and August 2019 to 2022, see Appendix Table C.3.1.

Table C.3.3: Zooplankton Community Metrics from Polley Lake (POL-P2) and Reference (Bootjack Lake; BOL-B2), 2019 to 2022 [a]

Year	Area	Type	Date	Replicate	Density (cells/L)	Richness (# of Taxa)	Simpson's Diversity	Simpson's Evenness	Wet Weight Biomass (mg/L)	Dry Weight Biomass (mg/L)	Calanoida (#/L)	Cladocera (#/L)
2019	BOL-B2	Reference	Jun 25	-	36.1	11	0.351	0.140	0.161	0.0319	2.32	1.05
			Jul 31	1	6.31	10	0.653	0.288	0.0162	0.00311	0.101	0.204
			Jul 31	2	3.13	8	0.756	0.511	0.0196	0.00387	0.0725	0.367
			Jul 31	3	4.33	7	0.719	0.508	0.0342	0.00675	0.242	0.395
			Jul 31	4	4.88	9	0.725	0.404	0.0308	0.00608	0.186	0.296
			Jul 31	5	6.42	8	0.732	0.467	0.0377	0.00737	0.134	0.561
			Sep 4	-	1.92	10	0.841	0.629	0.0169	0.00334	0.0216	0.296
	POL-P2	Exposed	Jun 24	-	20.9	8	0.689	0.402	0.204	0.0408	0.0262	2.04
			Jul 29	1	17.4	8	0.473	0.237	0.122	0.0243	0.210	0.252
			Jul 29	2	18.2	10	0.599	0.250	0.163	0.0325	0.183	0.262
			Jul 29	3	5.99	10	0.694	0.327	0.0581	0.0116	0.0905	0.249
			Jul 29	4	4.67	8	0.711	0.433	0.0445	0.00889	0.118	0.219
			Jul 29	5	5.57	10	0.705	0.339	0.0544	0.0109	0.125	0.125
			Aug 28	-	38.4	7	0.646	0.404	0.375	0.0749	0.588	0.849
2020	BOL-B2	Reference	Jun 22	-	68.8	12	0.759	0.346	0.292	0.0575	1.02	4.70
			Jul 29	1	22.8	12	0.762	0.351	0.0729	0.0142	0.523	1.27
			Jul 29	2	27.6	12	0.724	0.302	0.0992	0.0193	0.364	0.909
			Jul 29	3	24.5	10	0.777	0.449	0.0979	0.0191	0.444	1.25
			Jul 29	4	36.7	10	0.729	0.369	0.0901	0.0172	0.525	0.891
			Jul 29	5	24.5	12	0.798	0.412	0.0598	0.0116	0.327	1.07
			Aug 30	-	7.32	7	0.701	0.478	0.0934	0.0185	0.296	1.86
	POL-P2	Exposed	Jun 22	-	44.2	11	0.623	0.241	0.0941	0.0187	0.113	1.58
			Jul 27	1	30.5	8	0.566	0.288	0.125	0.0249	0.340	0.905
			Jul 27	2	20.1	10	0.547	0.221	0.0849	0.0170	0.186	0.584
			Jul 27	3	26.3	7	0.495	0.283	0.118	0.0236	0.218	0.618
			Jul 27	4	33.2	8	0.494	0.247	0.118	0.0235	0.728	1.27
			Jul 27	5	35.1	12	0.513	0.171	0.127	0.0253	0.340	1.40
			Aug 30	-	13.1	8	0.587	0.302	0.0525	0.0105	0.196	0.712
2021	BOL-B2	Reference	Jun 22	-	70.3	10	0.553	0.224	0.106	0.0202	0.764	0.873
			Jul 27	1	14.8	9	0.694	0.363	0.0327	0.00624	0.400	0.280
			Jul 27	2	8.11	10	0.689	0.322	0.0236	0.00446	0.373	0.286
			Jul 27	3	18.4	11	0.671	0.276	0.0339	0.00626	0.301	0.443
			Jul 27	4	30.6	9	0.689	0.358	0.0543	0.00974	0.819	0.568
			Jul 27	5	21.7	10	0.643	0.280	0.0263	0.00487	0.190	0.475
			Aug 30	-	12.2	10	0.782	0.459	0.0174	0.00275	0.153	0.382
	POL-P2	Exposed	Jun 22	-	35.8	11	0.734	0.342	0.119	0.0235	0.431	1.38
			Jul 26	1	19.1	9	0.481	0.214	0.0362	0.00720	0.380	1.26
			Jul 26	2	8.13	10	0.668	0.301	0.0354	0.00706	0.0784	0.556
			Jul 26	3	9.70	10	0.607	0.255	0.0332	0.00663	0.0646	0.736
			Jul 26	4	13.6	10	0.686	0.318	0.0480	0.00956	0.373	1.31
			Jul 26	5	8.98	10	0.687	0.319	0.0384	0.00766	0.216	0.597
			Aug 30	-	9.94	10	0.645	0.282	0.0601	0.0120	0.154	0.308
2022	BOL-B2	Reference	Jun 21	-	40.6	10	0.539	0.217	0.175	0.0347	0.475	2.04
			Jul 26	1	19.6	11	0.576	0.215	0.101	0.0198	0.129	0.272
			Jul 26	2	33.8	12	0.601	0.209	0.158	0.0308	0.309	0.509
			Jul 26	3	37.0	9	0.395	0.184	0.0849	0.0160	0.509	0.365
			Jul 26	4	27.8	10	0.566	0.230	0.0774	0.0149	0.306	0.418
			Jul 26	5	33.2	10	0.513	0.205	0.107	0.0204	0.357	0.959
			Aug 28	-	8.61	12	0.794	0.405	0.0611	0.0120	0.314	0.704
	POL-P2	Exposed	Jun 21	-	13.8	9	0.591	0.272	0.129	0.0258	0.0646	0.366
			Jul 25	1	20.4	10	0.732	0.372	0.161	0.0321	0.496	1.49
			Jul 25	2	22.1	11	0.547	0.201	0.0705	0.0140	0.354	0.639
			Jul 25	3	32.9	10	0.450	0.182	0.0939	0.0186	0.375	0.732
			Jul 25	4	23.0	11	0.609	0.233	0.0955	0.0189	0.586	0.860
			Jul 25	5	29.6	12	0.623	0.221	0.109	0.0215	0.699	1.14
			Aug 25	-	4.52	9	0.695	0.365	0.0810	0.0161	0.167	0.402

Note: "-" = only one sample (replicate) collected. #/L = organisms per litre. mg/L = miligrams per litre. Results displayed for POL-P2 (August 2019) in the current figure differ from those presented in previous reports (Minnow 2020a, 2021a, 2022a) for the same sampling area and date. This discrepany is due to an incorrect calculation for these results in the prior reporting years.

[a] Zooplankton data for area POL-P1 collected in June 2019 are not displayed. These data were presented in Minnow (2020a).

Table C.3.3: Zooplankton Community Metrics from Polley Lake (POL-P2) and Reference (Bootjack Lake; BOL-B2), 2019 to 2022 [a]

Year	Area	Type	Date	Replicate	Copepod Nauplii (#/L)	Cyclopoida (#/L)	Rotifera (#/L)	Calanoida (%)	Cladocera (%)	Copepod Nauplii (%)	Cyclopoida (%)	Rotifera (%)
2019	BOL-B2	Reference	Jun 25	1	0.202	2.22	30.3	6.44	2.91	0.560	6.16	83.9
			Jul 31	1	0.896	0.437	4.67	1.60	3.24	14.2	6.93	74.0
			Jul 31	2	0.472	0.403	1.81	2.32	11.7	15.1	12.9	58.0
			Jul 31	3	0.157	0.784	2.75	5.58	9.12	3.63	18.1	63.5
			Jul 31	4	0.514	0.797	3.09	3.82	6.06	10.5	16.3	63.2
			Jul 31	5	0.326	1.00	4.39	2.09	8.74	5.09	15.7	68.4
			Sep 04	1	0.346	0.310	0.943	1.12	15.5	18.0	16.2	49.2
	POL-P2	Exposed	Jun 24	1	9.33	5.79	3.67	0.126	9.80	44.7	27.8	17.6
			Jul 29	1	12.3	4.07	0.629	1.20	1.44	70.4	23.4	3.61
			Jul 29	2	10.1	5.87	1.78	1.01	1.44	55.4	32.3	9.81
			Jul 29	3	2.52	1.95	1.19	1.51	4.15	42.0	32.5	19.8
			Jul 29	4	2.06	1.32	0.943	2.53	4.69	44.2	28.3	20.2
			Jul 29	5	2.16	1.85	1.31	2.25	2.25	38.7	33.2	23.6
			Aug 28	1	21.0	12.5	3.53	1.53	2.21	54.6	32.5	9.18
2020	BOL-B2	Reference	Jun 22	-	17.0	9.39	36.7	1.48	6.83	24.7	13.7	53.3
			Jul 29	1	2.73	3.02	15.3	2.29	5.58	11.9	13.2	66.9
			Jul 29	2	3.82	3.25	19.3	1.32	3.29	13.8	11.8	69.8
			Jul 29	3	4.88	2.24	15.7	1.81	5.11	19.9	9.13	64.0
			Jul 29	4	13.5	2.21	19.6	1.43	2.43	36.7	6.02	53.4
			Jul 29	5	6.00	2.76	14.4	1.33	4.37	24.5	11.3	58.6
			Aug 30	-	0.382	0.439	4.34	4.04	25.4	5.22	6.00	59.3
	POL-P2	Exposed	Jun 22	-	25.8	5.53	11.1	0.256	3.59	58.5	12.5	25.2
			Jul 27	1	19.1	6.60	3.58	1.11	2.97	62.5	21.7	11.8
			Jul 27	2	12.7	4.75	1.80	0.926	2.91	63.5	23.7	8.99
			Jul 27	3	17.6	6.58	1.27	0.829	2.35	67.0	25.0	4.83
			Jul 27	4	23.0	5.28	2.88	2.19	3.81	69.4	15.9	8.67
			Jul 27	5	23.6	6.79	2.97	0.969	4.00	67.2	19.4	8.47
			Aug 30	-	8.19	3.08	0.890	1.50	5.45	62.7	23.6	6.81
2021	BOL-B2	Reference	Jun 22	-	12.7	6.44	49.5	1.09	1.24	18.1	9.16	70.4
			Jul 27	1	2.60	1.44	10.1	2.70	1.89	17.5	9.72	68.2
			Jul 27	2	0.407	0.862	6.18	4.61	3.52	5.02	10.6	76.2
			Jul 27	3	1.86	1.76	14.0	1.64	2.41	10.1	9.60	76.2
			Jul 27	4	4.56	1.47	23.2	2.68	1.86	14.9	4.79	75.8
			Jul 27	5	4.14	1.33	15.5	0.877	2.19	19.1	6.14	71.7
			Aug 30	-	1.42	0.628	9.60	1.25	3.13	11.6	5.15	78.8
	POL-P2	Exposed	Jun 22	-	11.0	9.09	13.9	1.20	3.85	30.7	25.4	38.9
			Jul 26	1	13.9	1.48	2.04	1.99	6.61	73.0	7.74	10.7
			Jul 26	2	3.81	2.75	0.927	0.965	6.84	46.9	33.9	11.4
			Jul 26	3	5.54	2.51	0.853	0.666	7.59	57.1	25.8	8.79
			Jul 26	4	6.71	2.92	2.29	2.75	9.62	49.3	21.5	16.9
			Jul 26	5	4.10	2.65	1.41	2.40	6.65	45.7	29.6	15.7
			Aug 30	-	3.17	5.02	1.29	1.55	3.10	31.9	50.5	13.0
2022	BOL-B2	Reference	Jun 21	-	5.98	4.38	27.8	1.17	5.01	14.7	10.8	68.3
			Jul 26	1	2.64	2.86	13.8	0.656	1.38	13.4	14.6	70.0
			Jul 26	2	5.18	4.24	23.6	0.915	1.51	15.3	12.5	69.7
			Jul 26	3	3.01	1.88	31.2	1.38	0.989	8.15	5.09	84.4
			Jul 26	4	5.81	1.58	19.7	1.10	1.50	20.9	5.69	70.8
			Jul 26	5	3.82	1.88	26.1	1.07	2.89	11.5	5.68	78.8
			Aug 28	-	1.30	0.858	5.44	3.64	8.18	15.1	9.96	63.2
	POL-P2	Exposed	Jun 21	-	0.776	4.74	7.89	0.467	2.65	5.61	34.3	57.0
			Jul 25	1	7.66	3.24	7.52	2.43	7.29	37.5	15.9	36.9
			Jul 25	2	14.3	1.03	5.78	1.60	2.89	64.7	4.65	26.2
			Jul 25	3	23.8	1.51	6.45	1.14	2.23	72.4	4.59	19.6
			Jul 25	4	13.3	1.46	6.83	2.55	3.74	57.7	6.34	29.7
			Jul 25	5	16.8	1.23	9.71	2.36	3.86	56.8	4.17	32.9
			Aug 25	-	1.45	1.95	0.548	3.69	8.89	32.1	43.2	12.2

Note: "-" = only one sample (replicate) collected. #/L = organisms per litre. mg/L = miligrams per litre. Results displayed for POL-P2 (August 2019) in the current figure differ from those presented in previous reports (Minnow 2020a, 2021a, 2022a) for the same sampling area and date. This discrepany is due to an incorrect calculation for these results in the prior reporting years.

[a] Zooplankton data for area POL-P1 collected in June 2019 are not displayed. These data were presented in Minnow (2020a).

Table C.3.4: Summary Statistics for Zooplankton Community Metrics for Polley Lake (POL-P2; Exposed) and Bootjack Lake (BOL-B2; Reference) in July, 2019 to 2022[a]

Endpoint	Year	Area	Type	n	Mean	Standard Deviation	Minimum	Median	Maximum
Density (#/L)	2019	BOL-B2	Reference	5	5.01	1.39	3.13	4.88	6.42
		POL-P2	Exposed	5	10.4	6.80	4.67	5.99	18.2
	2020	BOL-B2	Reference	5	27.2	5.58	22.8	24.5	36.7
		POL-P2	Exposed	5	29.0	5.99	20.1	30.5	35.1
	2021	BOL-B2	Reference	5	18.7	8.33	8.11	18.4	30.6
		POL-P2	Exposed	5	11.9	4.54	8.13	9.70	19.1
	2022	BOL-B2	Reference	5	30.3	6.79	19.6	33.2	37.0
		POL-P2	Exposed	5	25.6	5.36	20.4	23.0	32.9
Richness (# of Taxa)	2019	BOL-B2	Reference	5	8.40	1.14	7	8	10
		POL-P2	Exposed	5	9.20	1.10	8	10	10
	2020	BOL-B2	Reference	5	11.2	1.10	10	12	12
		POL-P2	Exposed	5	9.00	2.00	7	8	12
	2021	BOL-B2	Reference	5	9.80	0.837	9	10	11
		POL-P2	Exposed	5	9.80	0.447	9	10	10
	2022	BOL-B2	Reference	5	10.4	1.14	9	10	12
		POL-P2	Exposed	5	10.8	0.837	10	11	12
Simpson's Diversity	2019	BOL-B2	Reference	5	0.717	0.0385	0.653	0.725	0.756
		POL-P2	Exposed	5	0.637	0.102	0.473	0.694	0.711
	2020	BOL-B2	Reference	5	0.758	0.0314	0.724	0.762	0.798
		POL-P2	Exposed	5	0.523	0.0321	0.494	0.513	0.566
	2021	BOL-B2	Reference	5	0.677	0.0210	0.643	0.689	0.694
		POL-P2	Exposed	5	0.626	0.0872	0.481	0.668	0.687
	2022	BOL-B2	Reference	5	0.530	0.0821	0.395	0.566	0.601
		POL-P2	Exposed	5	0.592	0.103	0.450	0.609	0.732
Simpson's Evenness	2019	BOL-B2	Reference	5	0.436	0.0932	0.288	0.467	0.511
		POL-P2	Exposed	5	0.317	0.0789	0.237	0.327	0.433
	2020	BOL-B2	Reference	5	0.377	0.0565	0.302	0.369	0.449
		POL-P2	Exposed	5	0.242	0.0482	0.171	0.247	0.288
	2021	BOL-B2	Reference	5	0.320	0.0411	0.276	0.322	0.363
		POL-P2	Exposed	5	0.282	0.0460	0.214	0.301	0.319
	2022	BOL-B2	Reference	5	0.208	0.0169	0.184	0.209	0.230
		POL-P2	Exposed	5	0.242	0.0756	0.182	0.221	0.372
Wet Weight Biomass (mg/L)	2019	BOL-B2	Reference	5	0.0277	0.00936	0.0162	0.0308	0.0377
		POL-P2	Exposed	5	0.0883	0.0515	0.0445	0.0581	0.163
	2020	BOL-B2	Reference	5	0.0840	0.0171	0.0598	0.0901	0.0992
		POL-P2	Exposed	5	0.114	0.0170	0.0849	0.118	0.127
	2021	BOL-B2	Reference	5	0.0342	0.0120	0.0236	0.0327	0.0543
		POL-P2	Exposed	5	0.0383	0.00576	0.0332	0.0362	0.0480
	2022	BOL-B2	Reference	5	0.106	0.0315	0.0774	0.101	0.158
		POL-P2	Exposed	5	0.106	0.0338	0.0705	0.0955	0.161
Dry Weight Biomass (mg/L)	2019	BOL-B2	Reference	5	0.00544	0.00185	0.00311	0.00608	0.00737
		POL-P2	Exposed	5	0.0176	0.0103	0.00889	0.0116	0.0325
	2020	BOL-B2	Reference	5	0.0163	0.00334	0.0116	0.0172	0.0193
		POL-P2	Exposed	5	0.0229	0.00340	0.0170	0.0236	0.0253
	2021	BOL-B2	Reference	5	0.00631	0.00208	0.00446	0.00624	0.00974
		POL-P2	Exposed	5	0.00762	0.00114	0.00663	0.00720	0.00956
	2022	BOL-B2	Reference	5	0.0204	0.00627	0.0149	0.0198	0.0308
		POL-P2	Exposed	5	0.0210	0.00676	0.0140	0.0189	0.0321
Calanoida (#/L)	2019	BOL-B2	Reference	5	0.147	0.0678	0.0725	0.134	0.242
		POL-P2	Exposed	5	0.145	0.0493	0.0905	0.125	0.210
	2020	BOL-B2	Reference	5	0.437	0.0903	0.327	0.444	0.525
		POL-P2	Exposed	5	0.362	0.216	0.186	0.340	0.728
	2021	BOL-B2	Reference	5	0.417	0.239	0.190	0.373	0.819
		POL-P2	Exposed	5	0.222	0.153	0.0646	0.216	0.380
	2022	BOL-B2	Reference	5	0.322	0.136	0.129	0.309	0.509
		POL-P2	Exposed	5	0.502	0.145	0.354	0.496	0.699
Cladocera (#/L)	2019	BOL-B2	Reference	5	0.365	0.132	0.204	0.367	0.561
		POL-P2	Exposed	5	0.221	0.0561	0.125	0.249	0.262
	2020	BOL-B2	Reference	5	1.08	0.182	0.891	1.07	1.27
		POL-P2	Exposed	5	0.955	0.370	0.584	0.905	1.40
	2021	BOL-B2	Reference	5	0.410	0.125	0.280	0.443	0.568
		POL-P2	Exposed	5	0.892	0.366	0.556	0.736	1.31
	2022	BOL-B2	Reference	5	0.505	0.268	0.272	0.418	0.959
		POL-P2	Exposed	5	0.972	0.345	0.639	0.860	1.49
Copepod Nauplii (#/L)	2019	BOL-B2	Reference	5	0.473	0.275	0.157	0.472	0.896
		POL-P2	Exposed	5	5.81	4.95	2.06	2.52	12.3
	2020	BOL-B2	Reference	5	6.19	4.26	2.73	4.88	13.5
		POL-P2	Exposed	5	19.2	4.41	12.7	19.1	23.6
	2021	BOL-B2	Reference	5	2.71	1.69	0.407	2.60	4.56
		POL-P2	Exposed	5	6.82	4.15	3.81	5.54	13.9
	2022	BOL-B2	Reference	5	4.09	1.37	2.64	3.82	5.81
		POL-P2	Exposed	5	15.2	5.88	7.66	14.3	23.8
Cyclopoida (#/L)	2019	BOL-B2	Reference	5	0.685	0.258	0.403	0.784	1.00
		POL-P2	Exposed	5	3.01	1.91	1.32	1.95	5.87
	2020	BOL-B2	Reference	5	2.70	0.465	2.21	2.76	3.25
		POL-P2	Exposed	5	6.00	0.923	4.75	6.58	6.79
	2021	BOL-B2	Reference	5	1.37	0.327	0.862	1.44	1.76
		POL-P2	Exposed	5	2.46	0.569	1.48	2.65	2.92
	2022	BOL-B2	Reference	5	2.49	1.09	1.58	1.88	4.24
		POL-P2	Exposed	5	1.69	0.888	1.03	1.46	3.24
Rotifera (#/L)	2019	BOL-B2	Reference	5	3.34	1.18	1.81	3.09	4.67
		POL-P2	Exposed	5	1.17	0.430	0.629	1.19	1.78
	2020	BOL-B2	Reference	5	16.9	2.42	14.4	15.7	19.6
		POL-P2	Exposed	5	2.50	0.939	1.27	2.88	3.58
	2021	BOL-B2	Reference	5	13.8	6.38	6.18	14.0	23.2
		POL-P2	Exposed	5	1.50	0.646	0.853	1.41	2.29
	2022	BOL-B2	Reference	5	22.9	6.59	13.8	23.6	31.2
		POL-P2	Exposed	5	7.26	1.51	5.78	6.83	9.71

Notes: #/L = organisms per litre. mg/L = milligrams per litre.

[a] Summary statistics are displayed for replicated data collected in July 2019 to 2022. For results without replicates collected in June and August 2019 to 2022,see Appendix Table C.3.3.

Table C.3.4: Summary Statistics for Zooplankton Community Metrics for Polley Lake (POL-P2; Exposed) and Bootjack Lake (BOL-B2; Reference) in July, 2019 to 2022[a]

Endpoint	Year	Area	Type	n	Mean	Standard Deviation	Minimum	Median	Maximum
Calanoida (%)	2019	BOL-B2	Reference	5	3.08	1.63	1.60	2.32	5.58
		POL-P2	Exposed	5	1.70	0.660	1.01	1.51	2.53
	2020	BOL-B2	Reference	5	1.64	0.417	1.32	1.43	2.29
		POL-P2	Exposed	5	1.21	0.561	0.829	0.969	2.19
	2021	BOL-B2	Reference	5	2.50	1.40	0.877	2.68	4.61
		POL-P2	Exposed	5	1.75	0.904	0.666	1.99	2.75
	2022	BOL-B2	Reference	5	1.02	0.265	0.656	1.07	1.38
		POL-P2	Exposed	5	2.02	0.615	1.14	2.36	2.55
Cladocera (%)	2019	BOL-B2	Reference	5	7.78	3.24	3.24	8.74	11.7
		POL-P2	Exposed	5	2.80	1.53	1.44	2.25	4.69
	2020	BOL-B2	Reference	5	4.16	1.30	2.43	4.37	5.58
		POL-P2	Exposed	5	3.21	0.684	2.35	2.97	4.00
	2021	BOL-B2	Reference	5	2.37	0.680	1.86	2.19	3.52
		POL-P2	Exposed	5	7.46	1.27	6.61	6.84	9.62
	2022	BOL-B2	Reference	5	1.66	0.723	0.989	1.50	2.89
		POL-P2	Exposed	5	4.00	1.95	2.23	3.74	7.29
Copepod Nauplii (%)	2019	BOL-B2	Reference	5	9.71	5.20	3.63	10.5	15.1
		POL-P2	Exposed	5	50.1	12.9	38.7	44.2	70.4
	2020	BOL-B2	Reference	5	21.4	9.92	11.9	19.9	36.7
		POL-P2	Exposed	5	65.9	2.85	62.5	67.0	69.4
	2021	BOL-B2	Reference	5	13.3	5.75	5.02	14.9	19.1
		POL-P2	Exposed	5	54.4	11.3	45.7	49.3	73.0
	2022	BOL-B2	Reference	5	13.9	4.75	8.15	13.4	20.9
		POL-P2	Exposed	5	57.8	13.0	37.5	57.7	72.4
Cyclopoida (%)	2019	BOL-B2	Reference	5	14.0	4.37	6.93	15.7	18.1
		POL-P2	Exposed	5	29.9	4.15	23.4	32.3	33.2
	2020	BOL-B2	Reference	5	10.3	2.80	6.02	11.3	13.2
		POL-P2	Exposed	5	21.1	3.61	15.9	21.7	25.0
	2021	BOL-B2	Reference	5	8.18	2.55	4.79	9.60	10.6
		POL-P2	Exposed	5	23.7	10.0	7.74	25.8	33.9
	2022	BOL-B2	Reference	5	8.72	4.49	5.09	5.69	14.6
		POL-P2	Exposed	5	7.13	4.97	4.17	4.65	15.9
Rotifera (%)	2019	BOL-B2	Reference	5	65.5	6.05	58.0	63.5	74.0
		POL-P2	Exposed	5	15.4	8.37	3.61	19.8	23.6
	2020	BOL-B2	Reference	5	62.5	6.59	53.4	64.0	69.8
		POL-P2	Exposed	5	8.55	2.47	4.83	8.67	11.8
	2021	BOL-B2	Reference	5	73.6	3.59	68.2	75.8	76.2
		POL-P2	Exposed	5	12.7	3.44	8.79	11.4	16.9
	2022	BOL-B2	Reference	5	74.7	6.59	69.7	70.8	84.4
		POL-P2	Exposed	5	29.1	6.58	19.6	29.7	36.9

Notes: #/L = organisms per litre. mg/L = milligrams per litre.

[a] Summary statistics are displayed for replicated data collected in July 2019 to 2022. For results without replicates collected in June and August 2019 to 2022,see Appendix Table C.3.3.

Table C.3.5: Phytoplankton Community Metrics for Quesnel Lake at QUL-ZOO-1 (Exposed) and QUL-ZOO-7 (Reference) Areas, 2019 to 2022[a]

Year	Area	Type	Date	Replicate	Density (cells/L)	Richness (# of Taxa)	Simpson's Diversity	Simpson's Evenness	Chlorophyll-a (µg/L)	Diatom (cells/L)	Chlorophyte (cells/L)	Chrysophyte (cells/L)	Cryptomonad (cells/L)
2019	QUL-ZOO-7	Reference	Jun 25	-	608,882	17	0.757	0.242	1.25	309,465	84,400	58,276	156,742
			Jul 30	1	697,301	20	0.854	0.343	2.08	269,275	76,361	227,075	116,552
			Jul 30	2	803,805	24	0.903	0.427	1.78	279,322	114,542	208,989	102,485
			Jul 30	3	580,138	20	0.869	0.380	2.06	206,193	52,422	131,055	136,297
			Jul 30	4	606,873	19	0.876	0.425	0.974	241,142	32,152	202,961	112,533
			Jul 30	5	567,906	22	0.910	0.505	1.97	178,235	80,380	167,751	117,076
			Aug 29	-	1,181,593	20	0.781	0.229	0.571	380,468	75,022	484,962	109,853
	QUL-ZOO-1	Exposed	Jun 25	-	653,092	21	0.712	0.165	1.39	365,731	72,342	48,228	152,723
			Jul 30	1	711,367	19	0.853	0.359	2.21	287,360	60,285	190,904	118,561
			Jul 30	2	737,609	25	0.872	0.313	1.99	234,049	134,756	260,055	92,201
			Jul 30	3	770,707	20	0.854	0.342	1.92	212,772	47,283	319,158	122,935
			Jul 30	4	683,234	26	0.882	0.327	2.17	190,904	60,285	253,199	118,561
			Jul 30	5	787,256	20	0.863	0.364	1.90	255,326	85,109	276,603	156,033
			Aug 29	-	852,033	17	0.633	0.160	0.442	166,120	26,793	554,625	80,380
2020	QUL-ZOO-7	Reference	Jun 23	-	793,321	24	0.880	0.347	1.22	71,643	52,422	269,100	186,972
			Jul 28	1	836,903	24	0.824	0.237	1.28	134,756	108,750	198,587	340,435
			Jul 28	2	924,376	25	0.837	0.245	1.48	78,016	115,842	222,228	345,163
			Jul 28	3	801,795	20	0.797	0.246	1.63	86,409	70,333	128,609	343,627
			Jul 28	4	886,865	18	0.816	0.301	1.61	142,006	115,212	257,218	359,033
			Jul 28	5	998,573	23	0.890	0.395	1.53	120,571	170,036	389,536	247,325
			Aug 27	-	1,029,489	16	0.643	0.175	1.93	95,838	61,831	775,981	95,838
	QUL-ZOO-1	Exposed	Jun 23	-	622,075	24	0.879	0.345	1.15	92,612	43,685	260,363	145,034
			Jul 28	1	637,802	25	0.907	0.430	1.64	188,719	101,349	197,456	50,675
			Jul 28	2	998,573	23	0.890	0.395	1.47	120,571	170,036	389,536	247,325
			Jul 28	3	820,354	25	0.902	0.406	1.46	172,582	127,663	269,511	179,674
			Jul 28	4	1,619,976	21	0.857	0.334	1.64	238,050	151,486	439,001	244,233
			Jul 28	5	1,256,615	20	0.872	0.392	1.75	139,326	104,495	364,392	267,935
			Aug 27	-	1,425,208	19	0.833	0.315	1.47	207,134	132,937	544,114	108,205
2021	QUL-ZOO-7	Reference	Jun 23	-	757,184	24	0.874	0.331	1.07	91,634	62,697	181,660	73,950
			Jul 28	1	499,967	19	0.846	0.341	1.06	274,901	59,482	136,647	25,722
			Jul 28	2	699,310	25	0.907	0.431	1.11	331,570	52,247	116,552	124,590
			Jul 28	3	485,260	22	0.894	0.429	1.12	171,181	41,679	189,043	56,564
			Jul 28	4	605,150	19	0.881	0.442	1.29	186,023	37,894	126,312	25,262
			Jul 28	5	462,188	24	0.900	0.416	1.04	166,944	60,285	106,659	120,571
			Aug 29	-	629,647	28	0.905	0.377	1.34	204,970	48,228	29,473	85,739
	QUL-ZOO-1	Exposed	Jun 23	-	620,537	22	0.901	0.458	1.15	67,520	67,520	147,900	104,495
			Jul 28	1	555,674	23	0.909	0.476	0.969	225,415	85,623	192,214	41,938
			Jul 28	2	520,927	26	0.919	0.472	1.06	211,772	43,282	165,398	88,109
			Jul 28	3	527,715	23	0.922	0.555	1.10	185,225	57,664	195,709	76,886
			Jul 28	4	514,744	23	0.910	0.481	0.991	247,325	26,278	148,395	71,106
			Jul 28	5	683,234	28	0.857	0.250	1.14	95,308	47,080	143,537	41,339
			Aug 29	-	415,299	22	0.878	0.371	1.22	168,799	49,568	96,457	99,136
2022	QUL-ZOO-7	Reference	Jun 22	-	709,645	26	0.855	0.266	2.02	87,270	41,339	319,225	197,506
			Jul 27	1	1,511,153	20	0.480	0.0962	3.97	88,419	76,361	1,173,555	140,666
			Jul 27	2	1,107,853	25	0.702	0.134	2.26	139,792	41,938	698,961	213,183
			Jul 27	3	1,225,803	22	0.670	0.138	2.48	148,704	68,323	775,672	229,084
			Jul 27	4	1,278,050	21	0.746	0.188	4.24	192,913	100,476	703,329	265,256
			Jul 27	5	1,079,895	24	0.759	0.173	3.15	157,266	90,865	615,086	195,709
			Aug 28	-	436,734	29	0.897	0.335	1.09	230,424	40,190	41,530	96,457
	QUL-ZOO-1	Exposed	Jun 22	-	471,863	21	0.863	0.348	1.58	114,617	56,564	128,013	128,013
			Jul 27	1	2,065,161	18	0.585	0.134	2.76	216,409	61,831	1,415,933	296,790
			Jul 27	2	1,498,860	17	0.572	0.137	2.50	226,957	42,554	1,040,218	189,131
			Jul 28	3	1,947,681	13	0.319	0.113	3.13	117,479	68,014	1,687,990	74,197
			Jul 28	4	2,250,654	18	0.385	0.0904	5.48	123,662	49,465	1,929,132	123,662
			Jul 28	5	1,607,610	17	0.576	0.139	2.59	166,120	16,076	1,205,707	208,989
			Aug 28	-	632,996	22	0.866	0.339	1.04	383,817	78,371	72,342	58,276

Notes: "-" = only one sample (replicate) collected. Displayed data were collected using depth-integrated (DI) sampling methods. Sampling methods employed in 2019 included both surface (S) and DI methods. See Minnow (2019a, 2020a) for results of surface phytoplankton sampling completed in 2018 and 2019. See Minnow 2020a for a comparison of results from the S and DI sampling methodologies, and for rationale regarding the selection of DI methods for ongoing phytoplankton monitoring.

[a] Phytoplankton data for areas QUL-18, QUL-58S, QUL-2A, QUL-120A, and QUL-ZOO-8 collected in June 2019 are not displayed. These data were presented in Minnow (2020a

Table C.3.5: Phytoplankton Community Metrics for Quesnel Lake at QUL-ZOO-1 (Exposed) and QUL-ZOO-7 (Reference) Areas, 2019 to 2022[a]

Year	Area	Type	Date	Replicate	Cyanobacteria (cells/L)	Dinoflagellates (cells/L)	Diatoms (%)	Chlorophytes (%)	Chrysophytes (%)	Cryptomonads (%)	Cyanobacteria (%)	Dinoflagellates (%)
2019	QUL-ZOO-7	Reference	Jun 25	-	0	0	50.8	13.9	9.57	25.7	0	0
			Jul 30	1	0	8,038	38.6	10.9	32.6	16.7	0	1.15
			Jul 30	2	96,457	2,010	34.8	14.2	26.0	12.8	12.0	0.250
			Jul 30	3	48,927	5,242	35.5	9.04	22.6	23.5	8.43	0.904
			Jul 30	4	0	18,086	39.7	5.30	33.4	18.5	0	2.98
			Jul 30	5	13,979	10,484	31.4	14.2	29.5	20.6	2.46	1.85
			Aug 29	-	128,609	2,679	32.2	6.35	41.0	9.30	10.9	0.227
	QUL-ZOO-1	Exposed	Jun 25	-	12,057	2,010	56.0	11.1	7.38	23.4	1.85	0.308
			Jul 30	1	42,200	12,057	40.4	8.47	26.8	16.7	5.93	1.69
			Jul 30	2	0	16,549	31.7	18.3	35.3	12.5	0	2.24
			Jul 30	3	42,554	26,005	27.6	6.13	41.4	15.9	5.52	3.37
			Jul 30	4	44,209	16,076	27.9	8.82	37.1	17.4	6.47	2.35
			Jul 30	5	7,092	7,092	32.4	10.8	35.1	19.8	0.901	0.901
			Aug 29	-	18,755	5,359	19.5	3.14	65.1	9.43	2.20	0.629
2020	QUL-ZOO-7	Reference	Jun 23	-	190,467	22,716	9.03	6.61	33.9	23.6	24.0	2.86
			Jul 28	1	54,375	0	16.1	13.0	23.7	40.7	6.50	0
			Jul 28	2	160,761	2,364	8.44	12.5	24.0	37.3	17.4	0.256
			Jul 28	3	164,780	8,038	10.8	8.77	16.0	42.9	20.6	1.00
			Jul 28	4	10,717	2,679	16.0	13.0	29.0	40.5	1.21	0.302
			Jul 28	5	58,740	12,366	12.1	17.0	39.0	24.8	5.88	1.24
			Aug 27	-	0	0	9.31	6.01	75.4	9.31	0	0
	QUL-ZOO-1	Exposed	Jun 23	-	64,654	15,727	14.9	7.02	41.9	23.3	10.4	2.53
			Jul 28	1	92,612	6,990	29.6	15.9	31.0	7.95	14.5	1.10
			Jul 28	2	58,740	12,366	12.1	17.0	39.0	24.8	5.88	1.24
			Jul 28	3	66,196	4,728	21.0	15.6	32.9	21.9	8.07	0.576
			Jul 28	4	531,748	15,458	14.7	9.35	27.1	15.1	32.8	0.954
			Jul 28	5	359,033	21,435	11.1	8.32	29.0	21.3	28.6	1.71
			Aug 27	-	432,818	0	14.5	9.33	38.2	7.59	30.4	0
2021	QUL-ZOO-7	Reference	Jun 23	-	345,636	1,608	12.1	8.28	24.0	9.77	45.6	0.212
			Jul 28	1	0	3,215	55.0	11.9	27.3	5.14	0	0.643
			Jul 28	2	72,342	2,010	47.4	7.47	16.7	17.8	10.3	0.287
			Jul 28	3	26,794	0	35.3	8.59	39.0	11.7	5.52	0
			Jul 28	4	229,659	0	30.7	6.26	20.9	4.17	38.0	0
			Jul 28	5	0	7,729	36.1	13.0	23.1	26.1	0	1.67
			Aug 29	-	255,878	5,359	32.5	7.66	4.68	13.6	40.6	0.851
	QUL-ZOO-1	Exposed	Jun 23	-	233,103	0	10.9	10.9	23.8	16.8	37.6	0
			Jul 28	1	0	10,484	40.6	15.4	34.6	7.55	0	1.89
			Jul 28	2	6,183	6,183	40.6	8.31	31.8	16.9	1.19	1.19
			Jul 28	3	0	12,232	35.1	10.9	37.1	14.6	0	2.32
			Jul 28	4	18,549	3,092	48.0	5.11	28.8	13.8	3.60	0.601
			Jul 28	5	347,933	8,038	13.9	6.89	21.0	6.05	50.9	1.18
			Aug 29	-	0	1,340	40.6	11.9	23.2	23.9	0	0.323
2022	QUL-ZOO-7	Reference	Jun 22	-	29,856	34,449	12.3	5.83	45.0	27.8	4.21	4.85
			Jul 27	1	32,152	0	5.85	5.05	77.7	9.31	2.13	0
			Jul 27	2	3,495	10,484	12.6	3.79	63.1	19.2	0.315	0.946
			Jul 27	3	4,019	0	12.1	5.57	63.3	18.7	0.328	0
			Jul 27	4	16,076	0	15.1	7.86	55.0	20.8	1.26	0
			Jul 27	5	13,979	6,990	14.6	8.41	57.0	18.1	1.29	0.647
			Aug 28	-	25,454	2,679	52.8	9.20	9.51	22.1	5.83	0.613
	QUL-ZOO-1	Exposed	Jun 22	-	43,167	1,489	24.3	12.0	27.1	27.1	9.15	0.315
			Jul 27	1	68,014	6,183	10.5	2.99	68.6	14.4	3.29	0.299
			Jul 27	2	0	0	15.1	2.84	69.4	12.6	0	0
			Jul 28	3	0	0	6.03	3.49	86.7	3.81	0	0
			Jul 28	4	18,549	6,183	5.49	2.20	85.7	5.49	0.824	0.275
			Jul 28	5	0	10,717	10.3	1.00	75.0	13.0	0	0.667
			Aug 28	-	32,152	8,038	60.6	12.4	11.4	9.21	5.08	1.27

Notes: "-" = only one sample (replicate) collected. Displayed data were collected using depth-integrated (DI) sampling methods. Sampling methods employed in 2019 included both surface (S) and DI methods. See Minnow (2019a, 2020a) for results of surface phytoplankton sampling completed in 2018 and 2019. See Minnow 2020a for a comparison of results from the S and DI sampling methodologies, and for rationale regarding the selection of DI methods for ongoing phytoplankton monitoring.

[a] Phytoplankton data for areas QUL-18, QUL-58S, QUL-2A, QUL-120A, and QUL-ZOO-8 collected in June 2019 are not displayed. These data were presented in Minnow (2020*a*

Table C.3.6: Summary Statistics for Phytoplankton Community Metrics for Quesnel Lake at QUL-ZOO-1 (Exposed) and QUL-ZOO-7 (Reference) Areas in July, 2019 to 2022[a]

Endpoint	Year	Area	Type	n	Mean	Standard Deviation	Minimum	Median	Maximum
Density (cells/L)	2019	QUL-ZOO-7	Reference	5	651,204	99,205	567,906	606,873	803,805
		QUL-ZOO-1	Exposed	5	738,035	42,440	683,234	737,609	787,256
	2020	QUL-ZOO-7	Reference	5	889,702	76,777	801,795	886,865	998,573
		QUL-ZOO-1	Exposed	5	1,066,664	384,533	637,802	998,573	1,619,976
	2021	QUL-ZOO-7	Reference	5	550,375	99,674	462,188	499,967	699,310
		QUL-ZOO-1	Exposed	5	560,459	70,394	514,744	527,715	683,234
	2022	QUL-ZOO-7	Reference	5	1,240,551	171,951	1,079,895	1,225,803	1,511,153
		QUL-ZOO-1	Exposed	5	1,873,993	314,457	1,498,860	1,947,681	2,250,654
Richness (# of Taxa)	2019	QUL-ZOO-7	Reference	5	21.0	2.00	19.0	20.0	24.0
		QUL-ZOO-1	Exposed	5	22.0	3.24	19.0	20.0	26.0
	2020	QUL-ZOO-7	Reference	5	22.0	2.92	18.0	23.0	25.0
		QUL-ZOO-1	Exposed	5	22.8	2.28	20.0	23.0	25.0
	2021	QUL-ZOO-7	Reference	5	21.8	2.77	19.0	22.0	25.0
		QUL-ZOO-1	Exposed	5	24.6	2.30	23.0	23.0	28.0
	2022	QUL-ZOO-7	Reference	5	22.4	2.07	20.0	22.0	25.0
		QUL-ZOO-1	Exposed	5	16.6	2.07	13.0	17.0	18.0
Simpson's Diversity	2019	QUL-ZOO-7	Reference	5	0.882	0.0233	0.854	0.876	0.910
		QUL-ZOO-1	Exposed	5	0.865	0.0124	0.853	0.863	0.882
	2020	QUL-ZOO-7	Reference	5	0.833	0.0352	0.797	0.824	0.890
		QUL-ZOO-1	Exposed	5	0.886	0.0207	0.857	0.890	0.907
	2021	QUL-ZOO-7	Reference	5	0.886	0.0242	0.846	0.894	0.907
		QUL-ZOO-1	Exposed	5	0.903	0.0263	0.857	0.910	0.922
	2022	QUL-ZOO-7	Reference	5	0.672	0.113	0.480	0.702	0.759
		QUL-ZOO-1	Exposed	5	0.487	0.126	0.319	0.572	0.585
Simpson's Evenness	2019	QUL-ZOO-7	Reference	5	0.416	0.0605	0.343	0.425	0.505
		QUL-ZOO-1	Exposed	5	0.341	0.0214	0.313	0.342	0.364
	2020	QUL-ZOO-7	Reference	5	0.285	0.0667	0.237	0.246	0.395
		QUL-ZOO-1	Exposed	5	0.391	0.0356	0.334	0.395	0.430
	2021	QUL-ZOO-7	Reference	5	0.412	0.0406	0.341	0.429	0.442
		QUL-ZOO-1	Exposed	5	0.447	0.115	0.250	0.476	0.555
	2022	QUL-ZOO-7	Reference	5	0.146	0.0359	0.0962	0.138	0.188
		QUL-ZOO-1	Exposed	5	0.123	0.0208	0.0904	0.134	0.139
Chlorophyll-a (µg/L)	2019	QUL-ZOO-7	Reference	5	1.77	0.462	0.974	1.97	2.08
		QUL-ZOO-1	Exposed	5	2.04	0.143	1.90	1.99	2.21
	2020	QUL-ZOO-7	Reference	5	1.51	0.140	1.28	1.53	1.63
		QUL-ZOO-1	Exposed	5	1.59	0.124	1.46	1.64	1.75
	2021	QUL-ZOO-7	Reference	5	1.12	0.0986	1.04	1.11	1.29
		QUL-ZOO-1	Exposed	5	1.05	0.0720	0.969	1.06	1.14
	2022	QUL-ZOO-7	Reference	5	3.22	0.877	2.26	3.15	4.24
		QUL-ZOO-1	Exposed	5	3.29	1.25	2.50	2.76	5.48
Diatom (cells/L)	2019	QUL-ZOO-7	Reference	5	234,833	42,511	178,235	241,142	279,322
		QUL-ZOO-1	Exposed	5	236,082	37,378	190,904	234,049	287,360
	2020	QUL-ZOO-7	Reference	5	112,351	28,726	78,016	120,571	142,006
		QUL-ZOO-1	Exposed	5	171,850	45,703	120,571	172,582	238,050
	2021	QUL-ZOO-7	Reference	5	226,124	73,531	166,944	186,023	331,570
		QUL-ZOO-1	Exposed	5	193,009	59,073	95,308	211,772	247,325
	2022	QUL-ZOO-7	Reference	5	145,419	37,708	88,419	148,704	192,913
		QUL-ZOO-1	Exposed	5	170,125	50,790	117,479	166,120	226,957
Chlorophyte (cells/L)	2019	QUL-ZOO-7	Reference	5	71,172	31,092	32,152	76,361	114,542
		QUL-ZOO-1	Exposed	5	77,544	34,792	47,283	60,285	134,756
	2020	QUL-ZOO-7	Reference	5	116,035	35,562	70,333	115,212	170,036
		QUL-ZOO-1	Exposed	5	131,006	29,733	101,349	127,663	170,036
	2021	QUL-ZOO-7	Reference	5	50,317	10,199	37,894	52,247	60,285
		QUL-ZOO-1	Exposed	5	51,985	21,934	26,278	47,080	85,623
	2022	QUL-ZOO-7	Reference	5	75,593	22,575	41,938	76,361	100,476
		QUL-ZOO-1	Exposed	5	47,588	20,261	16,076	49,465	68,014
Chrysophyte (cells/L)	2019	QUL-ZOO-7	Reference	5	187,566	38,220	131,055	202,961	227,075
		QUL-ZOO-1	Exposed	5	259,984	46,357	190,904	260,055	319,158
	2020	QUL-ZOO-7	Reference	5	239,236	96,298	128,609	222,228	389,536
		QUL-ZOO-1	Exposed	5	331,979	97,231	197,456	364,392	439,001
	2021	QUL-ZOO-7	Reference	5	135,043	32,181	106,659	126,312	189,043
		QUL-ZOO-1	Exposed	5	169,051	24,177	143,537	165,398	195,709
	2022	QUL-ZOO-7	Reference	5	793,321	220,034	615,086	703,329	1,173,555
		QUL-ZOO-1	Exposed	5	1,455,796	358,748	1,040,218	1,415,933	1,929,132
Cryptomonad (cells/L)	2019	QUL-ZOO-7	Reference	5	116,989	12,280	102,485	116,552	136,297
		QUL-ZOO-1	Exposed	5	121,658	22,749	92,201	118,561	156,033
	2020	QUL-ZOO-7	Reference	5	327,117	45,169	247,325	343,627	359,033
		QUL-ZOO-1	Exposed	5	197,968	88,744	50,675	244,233	267,935
	2021	QUL-ZOO-7	Reference	5	70,542	49,190	25,262	56,564	124,590
		QUL-ZOO-1	Exposed	5	63,875	21,201	41,339	71,106	88,109
	2022	QUL-ZOO-7	Reference	5	208,780	45,912	140,666	213,183	265,256
		QUL-ZOO-1	Exposed	5	178,554	85,031	74,197	189,131	296,790
Cyanobacteria (cells/L)	2019	QUL-ZOO-7	Reference	5	31,873	41,273	0	13,979	96,457
		QUL-ZOO-1	Exposed	5	27,211	21,761	0	42,200	44,209
	2020	QUL-ZOO-7	Reference	5	89,875	69,158	10,717	58,740	164,780
		QUL-ZOO-1	Exposed	5	221,666	213,536	58,740	92,612	531,748
	2021	QUL-ZOO-7	Reference	5	65,759	96,272	0	26,794	229,659
		QUL-ZOO-1	Exposed	5	74,533	153,023	0	6,183	347,933
	2022	QUL-ZOO-7	Reference	5	13,944	11,660	3,495	13,979	32,152
		QUL-ZOO-1	Exposed	5	17,313	29,459	0	0	68,014
Dinoflagellates (cells/L)	2019	QUL-ZOO-7	Reference	5	8,772	6,091	2,010	8,038	18,086
		QUL-ZOO-1	Exposed	5	15,556	6,970	7,092	16,076	26,005
	2020	QUL-ZOO-7	Reference	5	5,090	5,020	0	2,679	12,366
		QUL-ZOO-1	Exposed	5	12,195	6,688	4,728	12,366	21,435
	2021	QUL-ZOO-7	Reference	5	2,591	3,184	0	2,010	7,729
		QUL-ZOO-1	Exposed	5	8,006	3,587	3,092	8,038	12,232
	2022	QUL-ZOO-7	Reference	5	3,495	4,942	0	0	10,484
		QUL-ZOO-1	Exposed	5	4,617	4,603	0	6,183	10,717
Euglenophytes (cells/L)	2019	QUL-ZOO-7	Reference	5	0	0	0	0	0
		QUL-ZOO-1	Exposed	5	0	0	0	0	0
	2020	QUL-ZOO-7	Reference	5	0	0	0	0	0
		QUL-ZOO-1	Exposed	5	0	0	0	0	0
	2021	QUL-ZOO-7	Reference	5	0	0	0	0	0
		QUL-ZOO-1	Exposed	5	0	0	0	0	0
	2022	QUL-ZOO-7	Reference	5	0	0	0	0	0
		QUL-ZOO-1	Exposed	5	0	0	0	0	0

Notes: Cell/L = cells per litre. µg/L = micrograms per litre. Displayed data were collected using depth-integrated (DI) sampling methods. Sampling methods employed in 2019 included both surface (S) and DI methods. See Minnow (2019a, 2020a) for results of surface phytoplankton sampling completed in 2018 and 2019. See Minnow 2020a for a comparison of results from the S and DI sampling methodologies, and for rationale regarding the selection of DI methods for ongoing phytoplankton monitoring.

[a] Summary statistics are displayed for replicated data collected in July 2019 to 2022. For results without replicates collected in June and August 2019 to 2022, see Appendix Table C.3.5.

Table C.3.6: Summary Statistics for Phytoplankton Community Metrics for Quesnel Lake at QUL-ZOO-1 (Exposed) and QUL-ZOO-7 (Reference) Areas in July, 2019 to 2022[a]

Endpoint	Year	Area	Type	n	Mean	Standard Deviation	Minimum	Median	Maximum
Diatoms (%)	2019	QUL-ZOO-7	Reference	5	36.0	3.31	31.4	35.5	39.7
		QUL-ZOO-1	Exposed	5	32.0	5.16	27.6	31.7	40.4
	2020	QUL-ZOO-7	Reference	5	12.7	3.35	8.44	12.1	16.1
		QUL-ZOO-1	Exposed	5	17.7	7.70	11.1	14.7	29.6
	2021	QUL-ZOO-7	Reference	5	40.9	9.98	30.7	36.1	55.0
		QUL-ZOO-1	Exposed	5	35.7	13.0	13.9	40.6	48.0
	2022	QUL-ZOO-7	Reference	5	12.1	3.69	5.85	12.6	15.1
		QUL-ZOO-1	Exposed	5	9.50	3.92	5.49	10.3	15.1
Chlorophytes (%)	2019	QUL-ZOO-7	Reference	5	10.7	3.76	5.30	10.9	14.2
		QUL-ZOO-1	Exposed	5	10.5	4.65	6.13	8.82	18.3
	2020	QUL-ZOO-7	Reference	5	12.9	2.93	8.77	13.0	17.0
		QUL-ZOO-1	Exposed	5	13.2	4.07	8.32	15.6	17.0
	2021	QUL-ZOO-7	Reference	5	9.45	2.90	6.26	8.59	13.0
		QUL-ZOO-1	Exposed	5	9.33	4.01	5.11	8.31	15.4
	2022	QUL-ZOO-7	Reference	5	6.14	1.95	3.79	5.57	8.41
		QUL-ZOO-1	Exposed	5	2.50	0.960	1.00	2.84	3.49
Chrysophytes (%)	2019	QUL-ZOO-7	Reference	5	28.8	4.55	22.6	29.5	33.4
		QUL-ZOO-1	Exposed	5	35.1	5.29	26.8	35.3	41.4
	2020	QUL-ZOO-7	Reference	5	26.4	8.45	16.0	24.0	39.0
		QUL-ZOO-1	Exposed	5	31.8	4.58	27.1	31.0	39.0
	2021	QUL-ZOO-7	Reference	5	25.4	8.51	16.7	23.1	39.0
		QUL-ZOO-1	Exposed	5	30.6	6.21	21.0	31.8	37.1
	2022	QUL-ZOO-7	Reference	5	63.2	8.87	55.0	63.1	77.7
		QUL-ZOO-1	Exposed	5	77.1	8.69	68.6	75.0	86.7
Cryptomonads (%)	2019	QUL-ZOO-7	Reference	5	18.4	4.05	12.8	18.5	23.5
		QUL-ZOO-1	Exposed	5	16.5	2.65	12.5	16.7	19.8
	2020	QUL-ZOO-7	Reference	5	37.2	7.24	24.8	40.5	42.9
		QUL-ZOO-1	Exposed	5	18.2	6.74	7.95	21.3	24.8
	2021	QUL-ZOO-7	Reference	5	13.0	9.16	4.17	11.7	26.1
		QUL-ZOO-1	Exposed	5	11.8	4.72	6.05	13.8	16.9
	2022	QUL-ZOO-7	Reference	5	17.2	4.53	9.31	18.7	20.8
		QUL-ZOO-1	Exposed	5	9.86	4.83	3.81	12.6	14.4
Cyanobacteria (%)	2019	QUL-ZOO-7	Reference	5	4.58	5.39	0	2.46	12.0
		QUL-ZOO-1	Exposed	5	3.77	3.06	0	5.52	6.47
	2020	QUL-ZOO-7	Reference	5	10.3	8.25	1.21	6.50	20.6
		QUL-ZOO-1	Exposed	5	18.0	12.1	5.88	14.5	32.8
	2021	QUL-ZOO-7	Reference	5	10.8	15.8	0	5.52	38.0
		QUL-ZOO-1	Exposed	5	11.1	22.3	0	1.19	50.9
	2022	QUL-ZOO-7	Reference	5	1.06	0.762	0.315	1.26	2.13
		QUL-ZOO-1	Exposed	5	0.824	1.43	0	0	3.29
Dinoflagellates (%)	2019	QUL-ZOO-7	Reference	5	1.43	1.04	0.250	1.15	2.98
		QUL-ZOO-1	Exposed	5	2.11	0.910	0.901	2.24	3.37
	2020	QUL-ZOO-7	Reference	5	0.560	0.531	0	0.302	1.24
		QUL-ZOO-1	Exposed	5	1.11	0.412	0.576	1.10	1.71
	2021	QUL-ZOO-7	Reference	5	0.521	0.696	0	0.287	1.67
		QUL-ZOO-1	Exposed	5	1.43	0.672	0.601	1.19	2.32
	2022	QUL-ZOO-7	Reference	5	0.319	0.449	0	0	0.946
		QUL-ZOO-1	Exposed	5	0.248	0.275	0	0.275	0.667
Euglenophytes (%)	2019	QUL-ZOO-7	Reference	5	0	0	0	0	0
		QUL-ZOO-1	Exposed	5	0	0	0	0	0
	2020	QUL-ZOO-7	Reference	5	0	0	0	0	0
		QUL-ZOO-1	Exposed	5	0	0	0	0	0
	2021	QUL-ZOO-7	Reference	5	0	0	0	0	0
		QUL-ZOO-1	Exposed	5	0	0	0	0	0
	2022	QUL-ZOO-7	Reference	5	0	0	0	0	0
		QUL-ZOO-1	Exposed	5	0	0	0	0	0

Notes: Cell/L = cells per litre. µg/L = micrograms per litre. Displayed data were collected using depth-integrated (DI) sampling methods. Sampling methods employed in 2019 included both surface (S) and DI methods. See Minnow (2019a, 2020a) for results of surface phytoplankton sampling completed in 2018 and 2019. See Minnow 2020a for a comparison of results from the S and DI sampling methodologies, and for rationale regarding the selection of DI methods for ongoing phytoplankton monitoring.

[a] Summary statistics are displayed for replicated data collected in July 2019 to 2022. For results without replicates collected in June and August 2019 to 2022, see Appendix Table C.3.5.

Table C.3.7: Zooplankton Community Metrics for Quesnel Lake at QUL-ZOO-1 (Exposed) and QUL-ZOO-7 (Reference) Areas, 2019 to 2022[a]

Year	Area	Type	Date	Replicate	Density (organisms/L)	Richness (# of Taxa)	Simpson's Diversity	Simpson's Evenness	Wet Weight Biomass (mg/L)	Dry Weight Biomass (mg/L)	Calanoida (#/L)	Cladocera (#/L)
2019	QUL-ZOO-7	Reference	Jun 25	1	7.60	10	0.760	0.417	0.0767	0.0153	0.821	0.297
			Jul 30	1	3.47	10	0.802	0.504	0.0269	0.00532	0.274	0.205
			Jul 30	2	2.86	8	0.766	0.534	0.0214	0.00424	0.169	0.146
			Jul 30	3	3.65	9	0.743	0.432	0.0277	0.00548	0.292	0.178
			Jul 30	4	2.70	9	0.747	0.440	0.0195	0.00387	0.132	0.183
			Jul 30	5	3.35	10	0.738	0.382	0.0243	0.00481	0.224	0.187
			Aug 29	1	1.47	10	0.804	0.511	0.0110	0.00219	0.123	0.0844
	QUL-ZOO-1	Exposed	Jun 25	1	5.90	7	0.743	0.555	0.0520	0.0104	0.513	0.0799
			Jul 30	1	2.87	10	0.730	0.370	0.0154	0.00305	0.180	0.116
			Jul 30	2	3.08	10	0.717	0.353	0.0142	0.00277	0.155	0.116
			Jul 30	3	3.67	10	0.788	0.471	0.0253	0.00501	0.292	0.173
			Jul 30	4	4.17	11	0.751	0.365	0.0238	0.00470	0.292	0.164
			Jul 30	5	2.56	10	0.812	0.531	0.0200	0.00396	0.196	0.151
			Aug 29	1	1.26	9	0.811	0.589	0.00632	0.00125	0.0426	0.0700
2020	QUL-ZOO-7	Reference	Jun 23	-	8.72	8	0.761	0.524	0.107	0.0214	1.89	0.123
			Jul 28	1	9.87	11	0.730	0.337	0.0492	0.00955	0.616	0.189
			Jul 28	2	11.3	12	0.720	0.298	0.0268	0.00500	0.296	0.0641
			Jul 28	3	7.79	10	0.708	0.342	0.0301	0.00578	0.409	0.0986
			Jul 28	4	11.4	11	0.681	0.285	0.0368	0.00698	0.414	0.246
			Jul 28	5	25.0	9	0.578	0.264	0.0442	0.00784	0.419	0.279
			Aug 27	-	7.69	13	0.817	0.421	0.153	0.0306	1.43	2.91
	QUL-ZOO-1	Exposed	Jun 23	-	10.9	11	0.771	0.397	0.164	0.0327	3.48	0.0657
			Jul 28	1	13.2	11	0.811	0.480	0.0532	0.0104	0.634	0.176
			Jul 28	2	6.35	12	0.814	0.447	0.0317	0.00619	0.401	0.232
			Jul 28	3	11.8	12	0.758	0.344	0.0346	0.00655	0.511	0.166
			Jul 28	4	7.23	12	0.771	0.363	0.0313	0.00605	0.527	0.133
			Jul 28	5	16.1	11	0.760	0.378	0.0379	0.00705	0.468	0.242
			Aug 27	-	5.36	10	0.770	0.434	0.0284	0.00554	0.246	0.240
2021	QUL-ZOO-7	Reference	Jun 23	-	18.1	12	0.814	0.447	0.177	0.0352	4.23	0.534
			Jul 28	1	9.59	11	0.798	0.450	0.0324	0.00604	0.442	0.524
			Jul 28	2	8.28	13	0.735	0.290	0.0259	0.00479	0.370	0.518
			Jul 28	3	7.22	13	0.679	0.240	0.0187	0.00342	0.178	0.308
			Jul 28	4	9.36	14	0.704	0.241	0.0228	0.00406	0.288	0.364
			Jul 28	5	6.88	12	0.720	0.298	0.0133	0.00232	0.181	0.195
			Aug 29	-	3.23	16	0.804	0.319	0.00535	0.000975	0.109	0.198
	QUL-ZOO-1	Exposed	Jun 23	-	14.7	10	0.797	0.493	0.0658	0.0129	1.36	0.151
			Jul 28	1	11.2	14	0.726	0.261	0.0249	0.00458	0.271	0.592
			Jul 28	2	5.10	13	0.722	0.277	0.0117	0.00213	0.0904	0.152
			Jul 28	3	6.28	14	0.805	0.366	0.0145	0.00265	0.146	0.178
			Jul 28	4	10.1	11	0.796	0.446	0.0233	0.00421	0.263	0.435
			Jul 28	5	6.54	11	0.732	0.339	0.0152	0.00279	0.160	0.177
			Aug 29	-	4.43	12	0.781	0.381	0.00873	0.00162	0.108	0.210
2022	QUL-ZOO-7	Reference	Jun 22	1	5.46	9	0.817	0.607	0.0510	0.00992	0.772	0.0154
			Jul 27	1	5.29	11	0.797	0.449	0.0226	0.00418	0.154	0.0803
			Jul 27	2	11.9	11	0.479	0.175	0.0360	0.00503	0.0782	0.0761
			Jul 27	3	3.10	9	0.725	0.404	0.0135	0.00234	0.0759	0.0537
			Jul 27	4	4.03	9	0.817	0.608	0.0212	0.00403	0.163	0.163
			Jul 27	5	5.53	10	0.774	0.442	0.0203	0.00350	0.102	0.157
			Aug 28	1	2.31	11	0.793	0.439	0.0127	0.00246	0.0597	0.144
	QUL-ZOO-1	Exposed	Jun 22	-	2.88	10	0.828	0.581	0.0261	0.00508	0.384	0.0340
			Jul 27	1	6.77	9	0.811	0.587	0.0254	0.00458	0.133	0.136
			Jul 27	2	7.76	10	0.805	0.514	0.0287	0.00518	0.163	0.153
			Jul 28	3	11.7	12	0.774	0.368	0.0352	0.00585	0.139	0.139
			Jul 28	4	3.72	10	0.823	0.564	0.0196	0.00369	0.0988	0.121
			Jul 28	5	4.65	11	0.813	0.485	0.0191	0.00347	0.0926	0.0895
			Aug 28	-	3.65	12	0.799	0.415	0.0205	0.00401	0.0833	0.262

Notes: "-" = only one sample (replicate) collected. Organisms/L = number of organisms per litre. mg/L = milligrams per litre.

[a] Zooplankton data for area QUL-ZOO-8 collected in June 2019 are not displayed. These data were presented in Minnow (2020a)

Table C.3.7: Zooplankton Community Metrics for Quesnel Lake at QUL-ZOO-1 (Exposed) and QUL-ZOO-7 (Reference) Areas, 2019 to 2022[a]

Year	Area	Type	Date	Replicate	Copepod Nauplii (#/L)	Cyclopoida (#/L)	Rotifera (#/L)	Calanoida (%)	Cladocera (%)	Copepod Nauplii (%)	Cyclopoida (%)	Rotifera (%)
2019	QUL-ZOO-7	Reference	Jun 25	1	0.662	2.56	3.26	10.8	3.90	8.71	33.6	42.9
			Jul 30	1	0.205	0.712	2.08	7.88	5.91	5.91	20.5	59.8
			Jul 30	2	0.0913	0.689	1.76	5.90	5.11	3.19	24.1	61.7
			Jul 30	3	0.0913	0.808	2.28	8.00	4.88	2.50	22.1	62.5
			Jul 30	4	0.0913	0.589	1.70	4.90	6.76	3.38	21.8	63.1
			Jul 30	5	0.0685	0.698	2.17	6.68	5.59	2.05	20.9	64.8
			Aug 29	1	0.0761	0.317	0.867	8.39	5.75	5.18	21.6	59.1
	QUL-ZOO-1	Exposed	Jun 25	1	1.25	2.02	2.03	8.70	1.35	21.3	34.2	34.4
			Jul 30	1	0.297	0.383	1.89	6.26	4.03	10.3	13.4	66.0
			Jul 30	2	0.205	0.347	2.26	5.03	3.75	6.66	11.2	73.3
			Jul 30	3	0.434	0.648	2.12	7.96	4.73	11.8	17.7	57.8
			Jul 30	4	0.297	0.584	2.83	7.01	3.94	7.12	14.0	67.9
			Jul 30	5	0.319	0.539	1.35	7.67	5.89	12.5	21.1	52.9
			Aug 29	1	0.167	0.186	0.791	3.39	5.57	13.3	14.8	63.0
2020	QUL-ZOO-7	Reference	Jun 23	-	2.03	3.12	1.56	21.7	1.41	23.2	35.8	17.9
			Jul 28	1	1.28	1.47	6.31	6.24	1.92	13.0	14.9	64.0
			Jul 28	2	1.48	0.838	8.67	2.61	0.564	13.0	7.38	76.4
			Jul 28	3	0.789	0.877	5.62	5.25	1.27	10.1	11.3	72.1
			Jul 28	4	1.28	1.30	8.13	3.64	2.17	11.3	11.4	71.5
			Jul 28	5	1.15	1.15	22.0	1.67	1.12	4.60	4.60	88.0
			Aug 27	-	0.715	0.690	1.95	18.6	37.8	9.29	8.97	25.3
	QUL-ZOO-1	Exposed	Jun 23	-	0.712	3.15	3.45	32.1	0.605	6.55	29.0	31.8
			Jul 28	1	3.37	1.75	7.31	4.79	1.33	25.4	13.2	55.2
			Jul 28	2	0.986	0.838	3.89	6.32	3.66	15.5	13.2	61.3
			Jul 28	3	1.28	0.622	9.22	4.33	1.41	10.9	5.27	78.1
			Jul 28	4	0.542	0.606	5.42	7.29	1.84	7.50	8.38	75.0
			Jul 28	5	1.87	0.818	12.7	2.91	1.50	11.6	5.08	78.9
			Aug 27	-	0.912	0.758	3.20	4.60	4.48	17.0	14.1	59.8
2021	QUL-ZOO-7	Reference	Jun 23	-	6.00	3.90	3.45	23.4	2.95	33.1	21.5	19.1
			Jul 28	1	1.44	1.27	5.91	4.61	5.46	15.0	13.3	61.7
			Jul 28	2	0.575	0.986	5.83	4.47	6.25	6.94	11.9	70.4
			Jul 28	3	0.329	0.904	5.50	2.47	4.27	4.55	12.5	76.2
			Jul 28	4	0.780	0.786	7.15	3.07	3.88	8.33	8.40	76.3
			Jul 28	5	0.575	0.387	5.54	2.64	2.83	8.35	5.62	80.6
			Aug 29	-	0.460	0.391	2.07	3.38	6.13	14.2	12.1	64.1
	QUL-ZOO-1	Exposed	Jun 23	-	7.31	1.71	4.19	9.21	1.02	49.7	11.6	28.5
			Jul 28	1	1.38	1.09	7.82	2.43	5.30	12.4	9.79	70.1
			Jul 28	2	0.493	0.587	3.78	1.77	2.98	9.66	11.5	74.1
			Jul 28	3	0.986	0.662	4.31	2.32	2.83	15.7	10.5	68.6
			Jul 28	4	1.81	0.986	6.61	2.60	4.31	17.9	9.76	65.5
			Jul 28	5	0.945	0.698	4.56	2.45	2.70	14.4	10.7	69.7
			Aug 29	-	0.986	0.682	2.44	2.44	4.73	22.3	15.4	55.2
2022	QUL-ZOO-7	Reference	Jun 22	1	1.34	1.31	2.02	14.1	0.282	24.6	24.0	37.0
			Jul 27	1	1.42	0.549	3.09	2.92	1.52	26.8	10.4	58.3
			Jul 27	2	0.648	0.434	10.7	0.654	0.637	5.43	3.63	89.7
			Jul 27	3	0.574	0.289	2.11	2.45	1.73	18.5	9.31	68.0
			Jul 27	4	0.722	0.496	2.48	4.05	4.05	17.9	12.3	61.6
			Jul 27	5	0.741	0.423	4.11	1.84	2.84	13.4	7.64	74.3
			Aug 28	1	0.545	0.296	1.27	2.58	6.24	23.6	12.8	54.8
	QUL-ZOO-1	Exposed	Jun 22	-	0.815	0.676	0.973	13.3	1.18	28.3	23.4	33.8
			Jul 27	1	1.39	0.602	4.51	1.96	2.01	20.5	8.90	66.6
			Jul 27	2	2.07	0.689	4.69	2.10	1.97	26.7	8.88	60.4
			Jul 28	3	1.54	0.692	9.18	1.19	1.19	13.2	5.92	78.5
			Jul 28	4	0.633	0.509	2.36	2.65	3.24	17.0	13.7	63.4
			Jul 28	5	0.895	0.460	3.12	1.99	1.92	19.2	9.88	67.0
			Aug 28	-	0.772	0.407	2.13	2.28	7.18	21.1	11.2	58.3

Note: "-" = only one sample (replicate) collected. Cells/L = cells per litre. mg/l = milligrams per litre.

[a] Zooplankton data for area QUL-ZOO-8 collected in June 2019 are not displayed. These data were presented in Minnow (2020a)

Table C.3.8: Summary Statistics for Zooplankton Community Metrics for Quesnel Lake at QUL-ZOO-1 (Exposed) and QUL-ZOO-7 (Reference) Areas in July, 2019 to 2022[a]

Endpoint	Year	Area	Type	n	Mean	Standard Deviation	Minimum	Median	Maximum
Density (#/L)	2019	QUL-ZOO-7	Reference	5	3.21	0.408	2.70	3.35	3.65
		QUL-ZOO-1	Exposed	5	3.27	0.645	2.56	3.08	4.17
	2020	QUL-ZOO-7	Reference	5	13.1	6.83	7.79	11.3	25.0
		QUL-ZOO-1	Exposed	5	10.9	4.11	6.35	11.8	16.1
	2021	QUL-ZOO-7	Reference	5	8.27	1.22	6.88	8.28	9.59
		QUL-ZOO-1	Exposed	5	7.84	2.63	5.10	6.54	11.2
	2022	QUL-ZOO-7	Reference	5	5.98	3.48	3.10	5.29	11.9
		QUL-ZOO-1	Exposed	5	6.92	3.12	3.72	6.77	11.7
Richness (# of Taxa)	2019	QUL-ZOO-7	Reference	5	9.20	0.837	8	9	10
		QUL-ZOO-1	Exposed	5	10.2	0.447	10	10	11
	2020	QUL-ZOO-7	Reference	5	10.6	1.14	9	11	12
		QUL-ZOO-1	Exposed	5	11.6	0.548	11	12	12
	2021	QUL-ZOO-7	Reference	5	12.6	1.14	11	13	14
		QUL-ZOO-1	Exposed	5	12.6	1.52	11	13	14
	2022	QUL-ZOO-7	Reference	5	10.0	1.00	9	10	11
		QUL-ZOO-1	Exposed	5	10.4	1.14	9	10	12
Simpson's Diversity	2019	QUL-ZOO-7	Reference	5	0.759	0.0259	0.738	0.747	0.802
		QUL-ZOO-1	Exposed	5	0.759	0.0395	0.717	0.751	0.812
	2020	QUL-ZOO-7	Reference	5	0.684	0.0616	0.578	0.708	0.730
		QUL-ZOO-1	Exposed	5	0.782	0.0275	0.758	0.771	0.814
	2021	QUL-ZOO-7	Reference	5	0.727	0.0445	0.679	0.720	0.798
		QUL-ZOO-1	Exposed	5	0.756	0.0407	0.722	0.732	0.805
	2022	QUL-ZOO-7	Reference	5	0.719	0.138	0.479	0.774	0.817
		QUL-ZOO-1	Exposed	5	0.805	0.0186	0.774	0.811	0.823
Simpson's Evenness	2019	QUL-ZOO-7	Reference	5	0.459	0.0606	0.382	0.440	0.534
		QUL-ZOO-1	Exposed	5	0.418	0.0787	0.353	0.370	0.531
	2020	QUL-ZOO-7	Reference	5	0.305	0.0338	0.264	0.298	0.342
		QUL-ZOO-1	Exposed	5	0.403	0.0582	0.344	0.378	0.480
	2021	QUL-ZOO-7	Reference	5	0.304	0.0860	0.240	0.290	0.450
		QUL-ZOO-1	Exposed	5	0.338	0.0744	0.261	0.339	0.446
	2022	QUL-ZOO-7	Reference	5	0.416	0.156	0.175	0.442	0.608
		QUL-ZOO-1	Exposed	5	0.504	0.0857	0.368	0.514	0.587
Wet Weight Biomass (mg/L)	2019	QUL-ZOO-7	Reference	5	0.0240	0.00348	0.0195	0.0243	0.0277
		QUL-ZOO-1	Exposed	5	0.0197	0.00491	0.0142	0.0200	0.0253
	2020	QUL-ZOO-7	Reference	5	0.0374	0.00938	0.0268	0.0368	0.0492
		QUL-ZOO-1	Exposed	5	0.0377	0.00904	0.0313	0.0346	0.0532
	2021	QUL-ZOO-7	Reference	5	0.0226	0.00720	0.0133	0.0228	0.0324
		QUL-ZOO-1	Exposed	5	0.0180	0.00583	0.0117	0.0152	0.0249
	2022	QUL-ZOO-7	Reference	5	0.0227	0.00821	0.0135	0.0212	0.0360
		QUL-ZOO-1	Exposed	5	0.0256	0.00670	0.0191	0.0254	0.0352
Dry Weight Biomass (mg/L)	2019	QUL-ZOO-7	Reference	5	0.00474	0.000690	0.00387	0.00481	0.00548
		QUL-ZOO-1	Exposed	5	0.00390	0.000983	0.00277	0.00396	0.00501
	2020	QUL-ZOO-7	Reference	5	0.00703	0.00178	0.00500	0.00698	0.00955
		QUL-ZOO-1	Exposed	5	0.00724	0.00179	0.00605	0.00655	0.0104
	2021	QUL-ZOO-7	Reference	5	0.00412	0.00140	0.00232	0.00406	0.00604
		QUL-ZOO-1	Exposed	5	0.00327	0.00106	0.00213	0.00279	0.00458
	2022	QUL-ZOO-7	Reference	5	0.00382	0.000989	0.00234	0.00403	0.00503
		QUL-ZOO-1	Exposed	5	0.00455	0.00100	0.00347	0.00458	0.00585
Calanoida (#/L)	2019	QUL-ZOO-7	Reference	5	0.218	0.0678	0.132	0.224	0.292
		QUL-ZOO-1	Exposed	5	0.223	0.0647	0.155	0.196	0.292
	2020	QUL-ZOO-7	Reference	5	0.431	0.116	0.296	0.414	0.616
		QUL-ZOO-1	Exposed	5	0.508	0.0854	0.401	0.511	0.634
	2021	QUL-ZOO-7	Reference	5	0.292	0.116	0.178	0.288	0.442
		QUL-ZOO-1	Exposed	5	0.186	0.0784	0.0904	0.160	0.271
	2022	QUL-ZOO-7	Reference	5	0.115	0.0415	0.0759	0.102	0.163
		QUL-ZOO-1	Exposed	5	0.125	0.0293	0.0926	0.133	0.163
Cladocera (#/L)	2019	QUL-ZOO-7	Reference	5	0.180	0.0216	0.146	0.183	0.205
		QUL-ZOO-1	Exposed	5	0.144	0.0271	0.116	0.151	0.173
	2020	QUL-ZOO-7	Reference	5	0.175	0.0926	0.0641	0.189	0.279
		QUL-ZOO-1	Exposed	5	0.190	0.0459	0.133	0.176	0.242
	2021	QUL-ZOO-7	Reference	5	0.382	0.141	0.195	0.364	0.524
		QUL-ZOO-1	Exposed	5	0.307	0.197	0.152	0.178	0.592
	2022	QUL-ZOO-7	Reference	5	0.106	0.0504	0.0537	0.0803	0.163
		QUL-ZOO-1	Exposed	5	0.128	0.0241	0.0895	0.136	0.153
Copepod Nauplii (#/L)	2019	QUL-ZOO-7	Reference	5	0.110	0.0545	0.0685	0.0913	0.205
		QUL-ZOO-1	Exposed	5	0.310	0.0816	0.205	0.297	0.434
	2020	QUL-ZOO-7	Reference	5	1.20	0.256	0.789	1.28	1.48
		QUL-ZOO-1	Exposed	5	1.61	1.10	0.542	1.28	3.37
	2021	QUL-ZOO-7	Reference	5	0.739	0.422	0.329	0.575	1.44
		QUL-ZOO-1	Exposed	5	1.12	0.495	0.493	0.986	1.81
	2022	QUL-ZOO-7	Reference	5	0.821	0.341	0.574	0.722	1.42
		QUL-ZOO-1	Exposed	5	1.31	0.564	0.633	1.39	2.07
Cyclopoida (#/L)	2019	QUL-ZOO-7	Reference	5	0.699	0.0779	0.589	0.698	0.808
		QUL-ZOO-1	Exposed	5	0.500	0.130	0.347	0.539	0.648
	2020	QUL-ZOO-7	Reference	5	1.13	0.271	0.838	1.15	1.47
		QUL-ZOO-1	Exposed	5	0.927	0.472	0.606	0.818	1.75
	2021	QUL-ZOO-7	Reference	5	0.867	0.323	0.387	0.904	1.27
		QUL-ZOO-1	Exposed	5	0.805	0.221	0.587	0.698	1.09
	2022	QUL-ZOO-7	Reference	5	0.438	0.0978	0.289	0.434	0.549
		QUL-ZOO-1	Exposed	5	0.590	0.105	0.460	0.602	0.692
Rotifera (#/L)	2019	QUL-ZOO-7	Reference	5	2.00	0.253	1.70	2.08	2.28
		QUL-ZOO-1	Exposed	5	2.09	0.538	1.35	2.12	2.83
	2020	QUL-ZOO-7	Reference	5	10.2	6.75	5.62	8.13	22.0
		QUL-ZOO-1	Exposed	5	7.71	3.44	3.89	7.31	12.7
	2021	QUL-ZOO-7	Reference	5	5.99	0.671	5.50	5.83	7.15
		QUL-ZOO-1	Exposed	5	5.42	1.72	3.78	4.56	7.82
	2022	QUL-ZOO-7	Reference	5	4.50	3.55	2.11	3.09	10.7
		QUL-ZOO-1	Exposed	5	4.77	2.65	2.36	4.51	9.18

Notes: #/L = organisms per litre. mg/L = milligrams per litre.

[a] Summary statistics are displayed for replicated data collected in July 2019 to 2022. For results without replicates collected in June and August 2019 to 2022, see Appendix Table C.3.7.

Table C.3.8: Summary Statistics for Zooplankton Community Metrics for Quesnel Lake at QUL-ZOO-1 (Exposed) and QUL-ZOO-7 (Reference) Areas in July, 2019 to 2022[a]

Endpoint	Year	Area	Type	n	Mean	Standard Deviation	Minimum	Median	Maximum
Calanoida (%)	2019	QUL-ZOO-7	Reference	5	6.68	1.32	4.90	6.68	8.00
		QUL-ZOO-1	Exposed	5	6.79	1.18	5.03	7.01	7.96
	2020	QUL-ZOO-7	Reference	5	3.88	1.87	1.67	3.64	6.24
		QUL-ZOO-1	Exposed	5	5.13	1.72	2.91	4.79	7.29
	2021	QUL-ZOO-7	Reference	5	3.45	1.02	2.47	3.07	4.61
		QUL-ZOO-1	Exposed	5	2.32	0.320	1.77	2.43	2.60
	2022	QUL-ZOO-7	Reference	5	2.38	1.26	0.654	2.45	4.05
		QUL-ZOO-1	Exposed	5	1.98	0.523	1.19	1.99	2.65
Cladocera (%)	2019	QUL-ZOO-7	Reference	5	5.65	0.743	4.88	5.59	6.76
		QUL-ZOO-1	Exposed	5	4.47	0.874	3.75	4.03	5.89
	2020	QUL-ZOO-7	Reference	5	1.41	0.642	0.564	1.27	2.17
		QUL-ZOO-1	Exposed	5	1.95	0.976	1.33	1.50	3.66
	2021	QUL-ZOO-7	Reference	5	4.54	1.34	2.83	4.27	6.25
		QUL-ZOO-1	Exposed	5	3.62	1.14	2.70	2.98	5.30
	2022	QUL-ZOO-7	Reference	5	2.16	1.32	0.637	1.73	4.05
		QUL-ZOO-1	Exposed	5	2.06	0.738	1.19	1.97	3.24
Copepod Nauplii (%)	2019	QUL-ZOO-7	Reference	5	3.41	1.50	2.05	3.19	5.91
		QUL-ZOO-1	Exposed	5	9.68	2.67	6.66	10.3	12.5
	2020	QUL-ZOO-7	Reference	5	10.4	3.47	4.60	11.3	13.0
		QUL-ZOO-1	Exposed	5	14.2	6.91	7.50	11.6	25.4
	2021	QUL-ZOO-7	Reference	5	8.63	3.88	4.55	8.33	15.0
		QUL-ZOO-1	Exposed	5	14.0	3.15	9.66	14.4	17.9
	2022	QUL-ZOO-7	Reference	5	16.4	7.83	5.43	17.9	26.8
		QUL-ZOO-1	Exposed	5	19.3	4.96	13.2	19.2	26.7
Cyclopoida (%)	2019	QUL-ZOO-7	Reference	5	21.9	1.40	20.5	21.8	24.1
		QUL-ZOO-1	Exposed	5	15.5	3.88	11.2	14.0	21.1
	2020	QUL-ZOO-7	Reference	5	9.92	3.99	4.60	11.3	14.9
		QUL-ZOO-1	Exposed	5	9.03	4.03	5.08	8.38	13.2
	2021	QUL-ZOO-7	Reference	5	10.3	3.23	5.62	11.9	13.3
		QUL-ZOO-1	Exposed	5	10.4	0.725	9.76	10.5	11.5
	2022	QUL-ZOO-7	Reference	5	8.66	3.28	3.63	9.31	12.3
		QUL-ZOO-1	Exposed	5	9.45	2.79	5.92	8.90	13.7
Rotifera (%)	2019	QUL-ZOO-7	Reference	5	62.4	1.85	59.8	62.5	64.8
		QUL-ZOO-1	Exposed	5	63.6	8.15	52.9	66.0	73.3
	2020	QUL-ZOO-7	Reference	5	74.4	8.84	64.0	72.1	88.0
		QUL-ZOO-1	Exposed	5	69.7	10.8	55.2	75.0	78.9
	2021	QUL-ZOO-7	Reference	5	73.0	7.30	61.7	76.2	80.6
		QUL-ZOO-1	Exposed	5	69.6	3.10	65.5	69.7	74.1
	2022	QUL-ZOO-7	Reference	5	70.4	12.4	58.3	68.0	89.7
		QUL-ZOO-1	Exposed	5	67.2	6.88	60.4	66.6	78.5

Notes: #/L = organisms per litre. mg/L = milligrams per litre.

[a] Summary statistics are displayed for replicated data collected in July 2019 to 2022. For results without replicates collected in June and August 2019 to 2022, see Appendix Table C.3.7.

APPENDIX C.4
ZOOPLANKTON TISSUE QUALITY

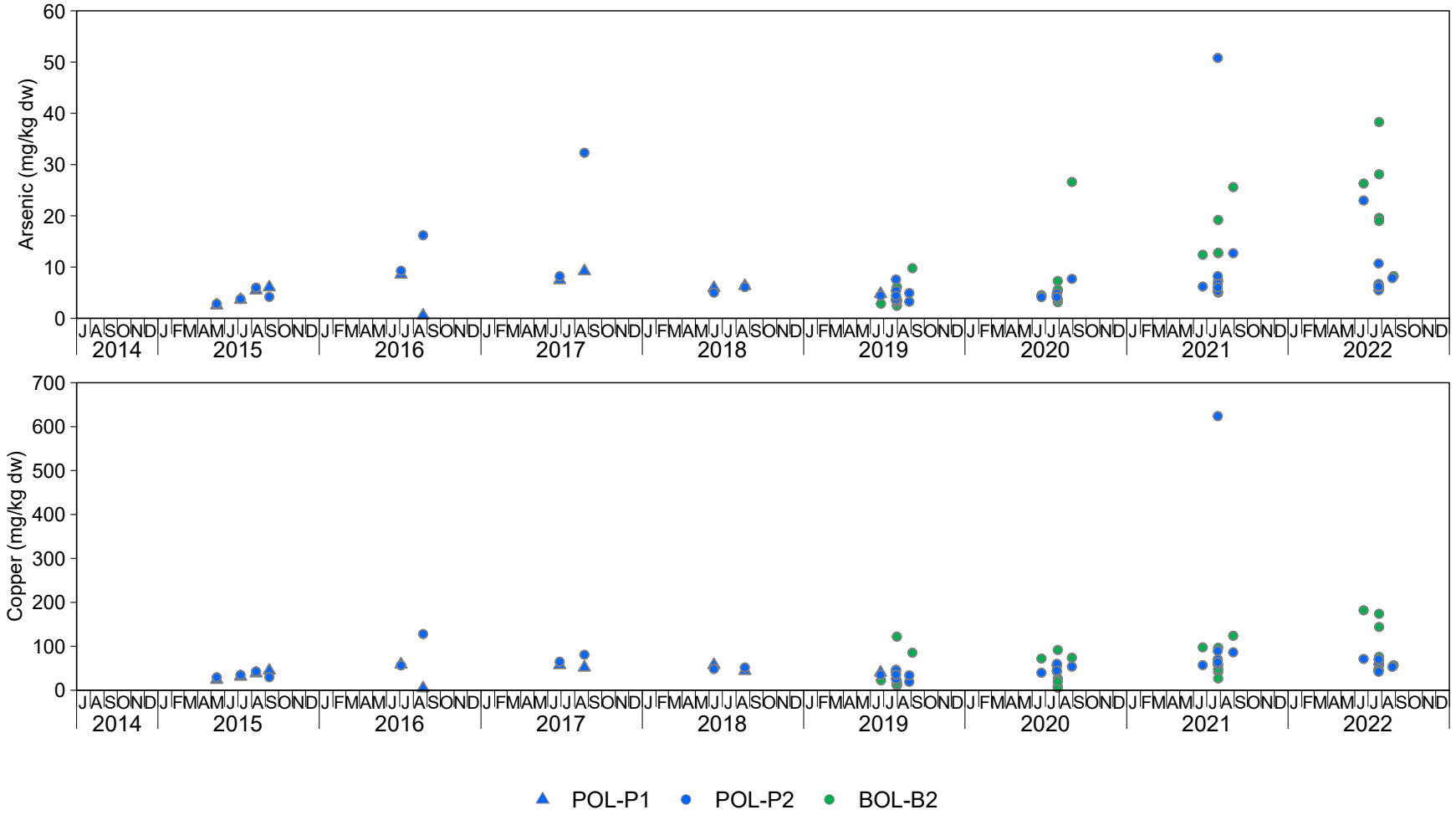
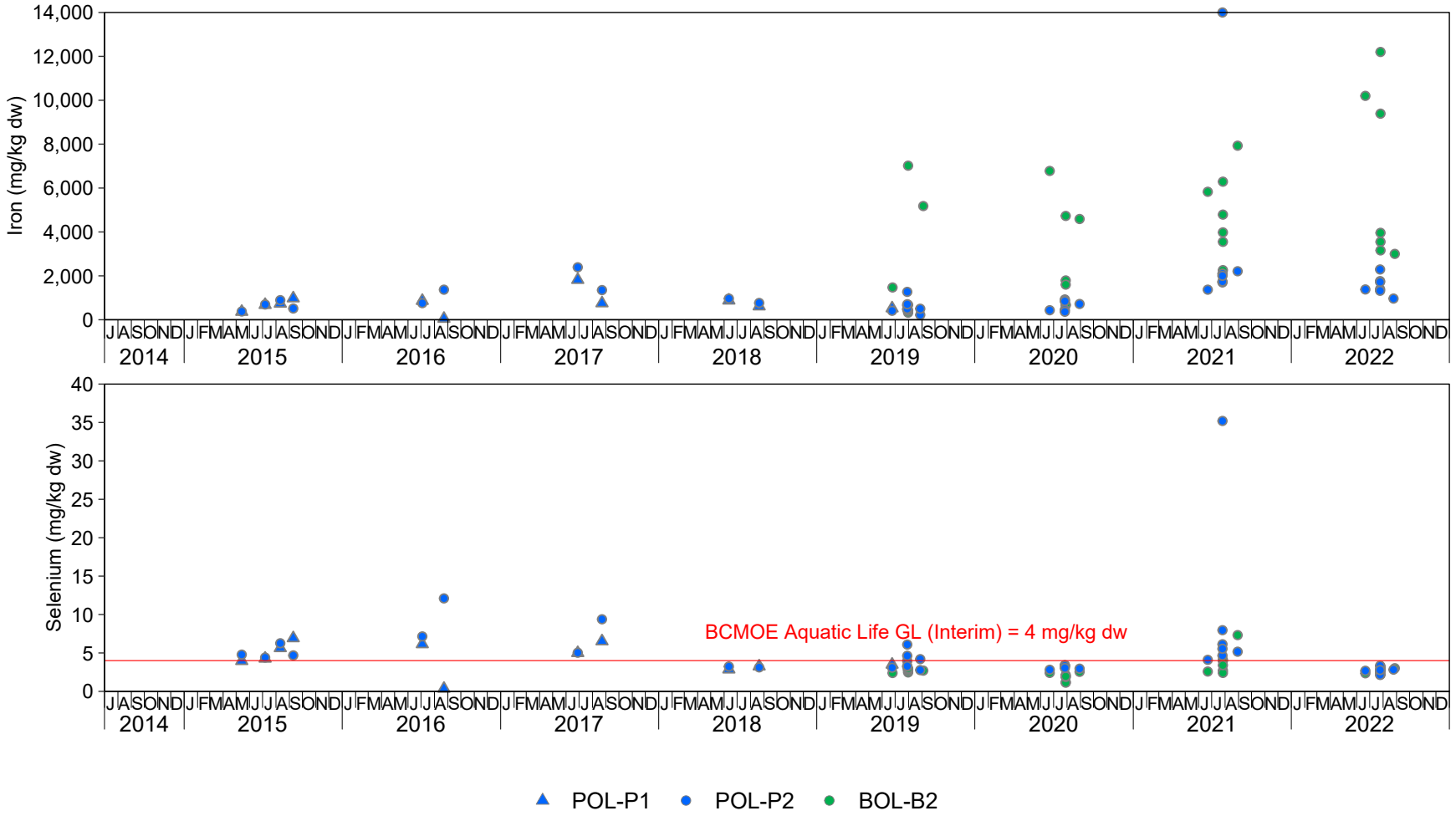


Figure C.4.1: Zooplankton Tissue Primary and Secondary Analyte Concentrations for Polley Lake (POL-P1, POL-P2; Exposed) and Bootjack Lake (BOL-B2; Reference) Areas, 2014 to 2022

Notes: mg/kg dw = milligrams per kilogram dry weight. Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Red horizontal line represents British Columbia interim long-term guideline for selenium in invertebrate tissue (4 mg/kg dw; BCMOE 2014). Green symbols indicate reference while blue symbols indicate exposed. Sampling at POL-P1 was discontinued after 2019.



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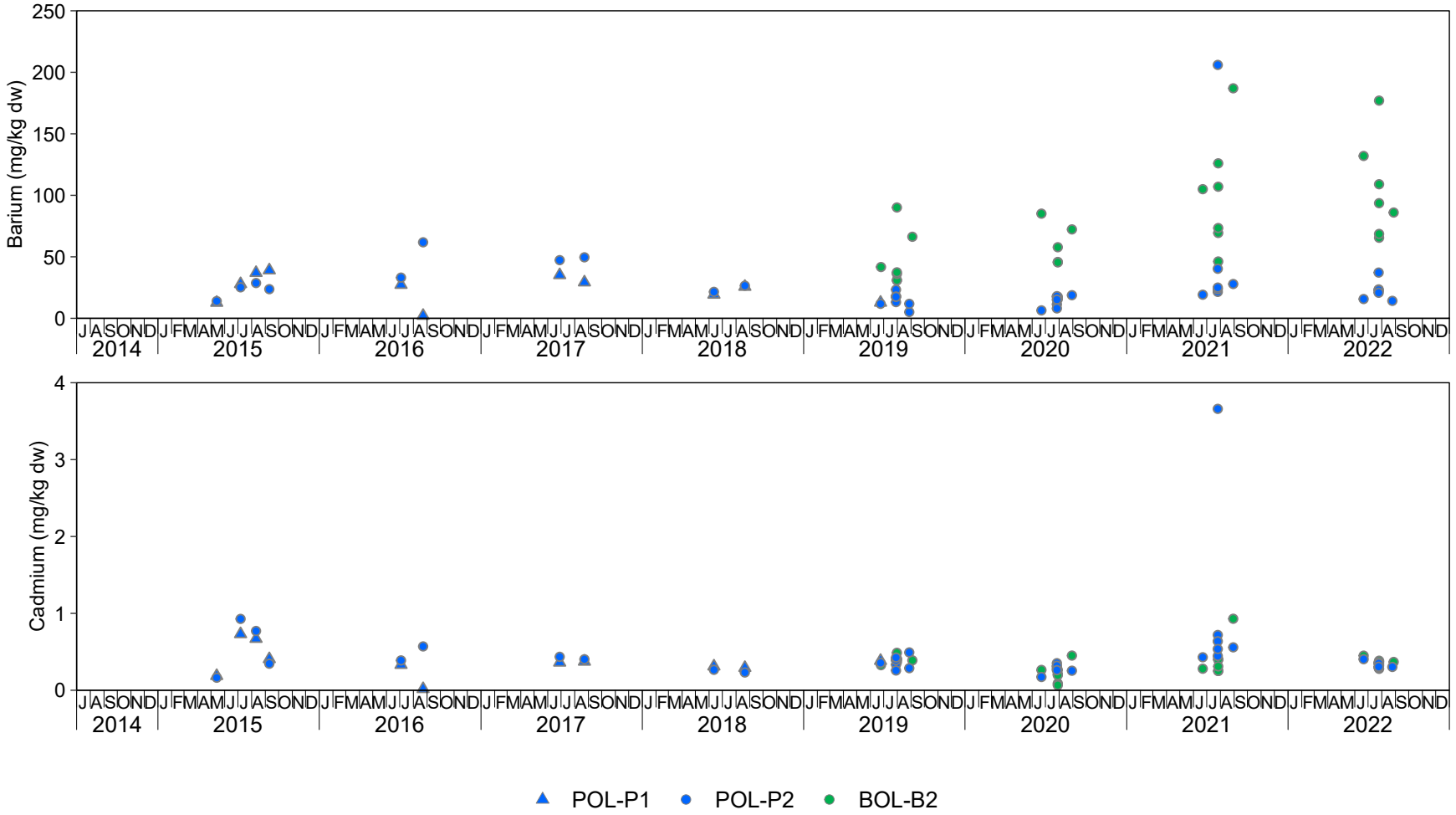

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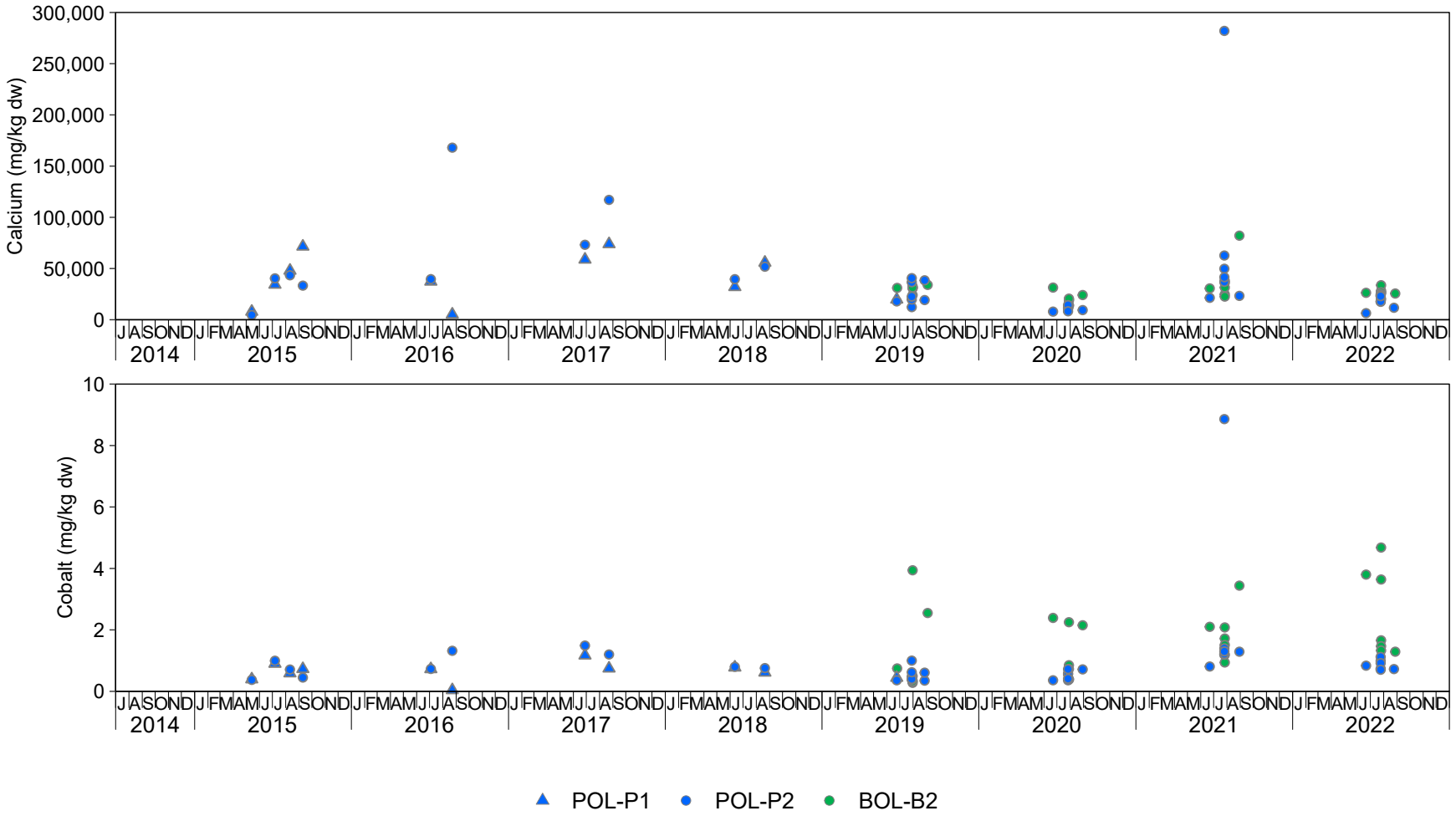

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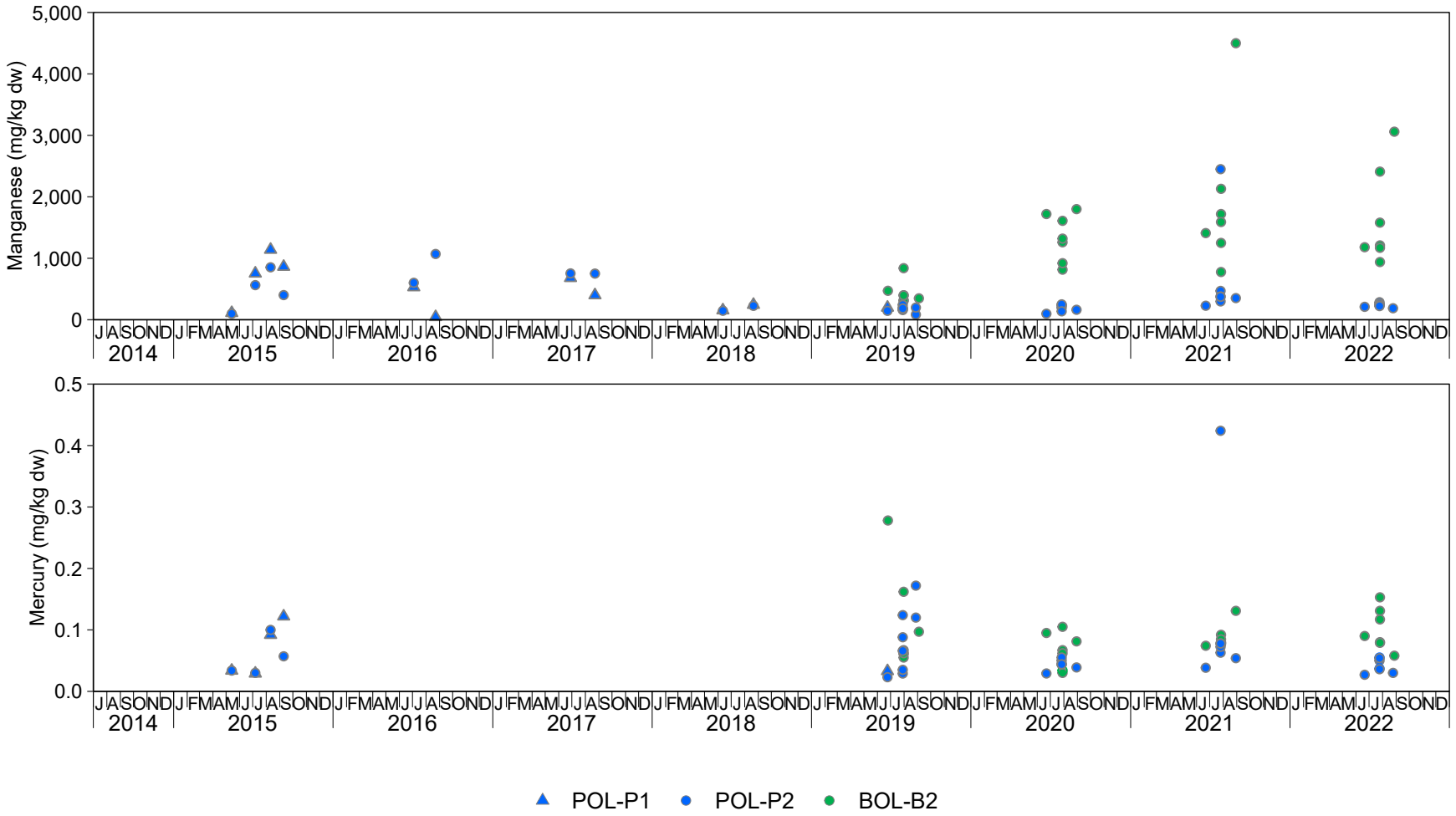

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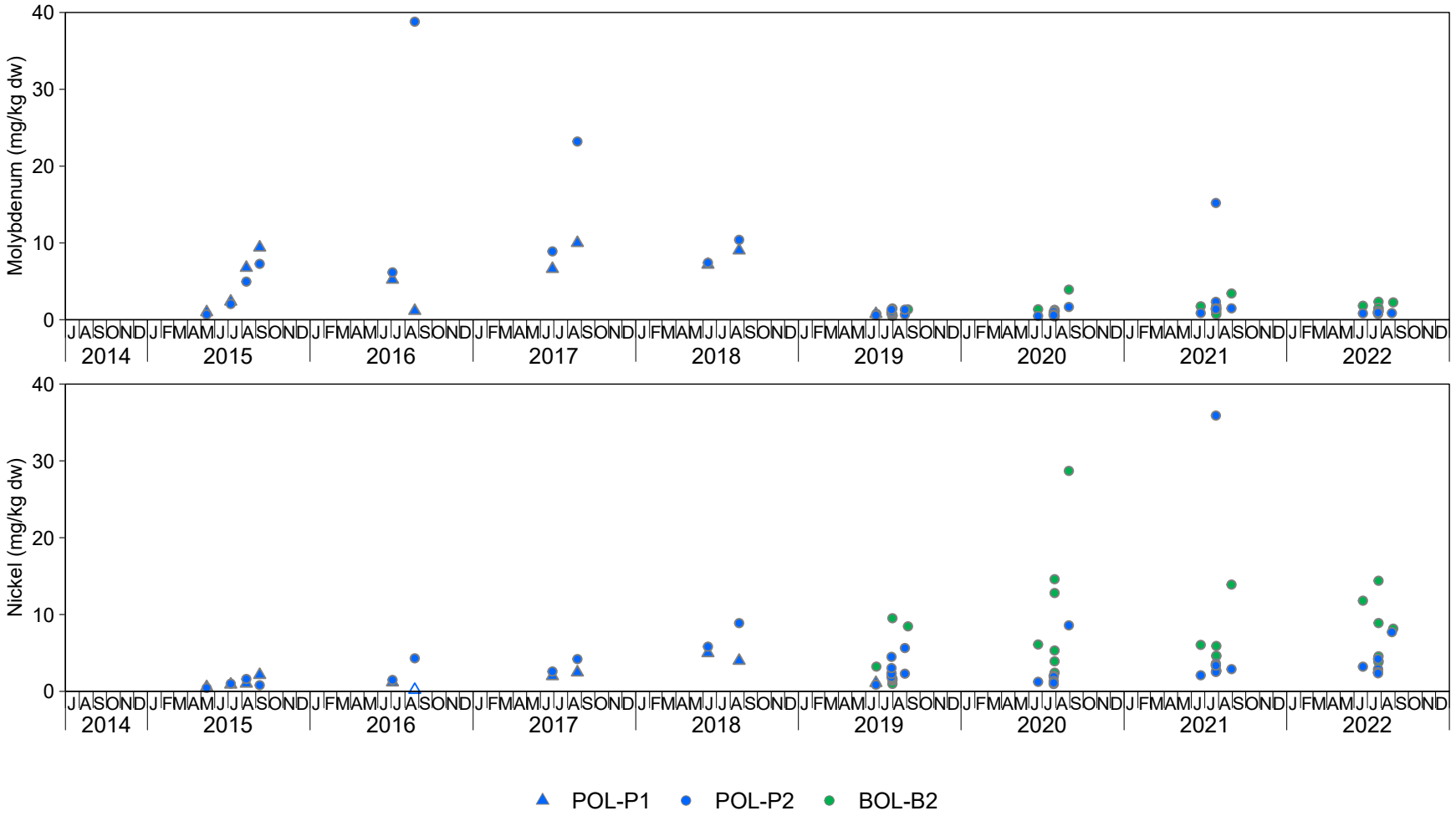

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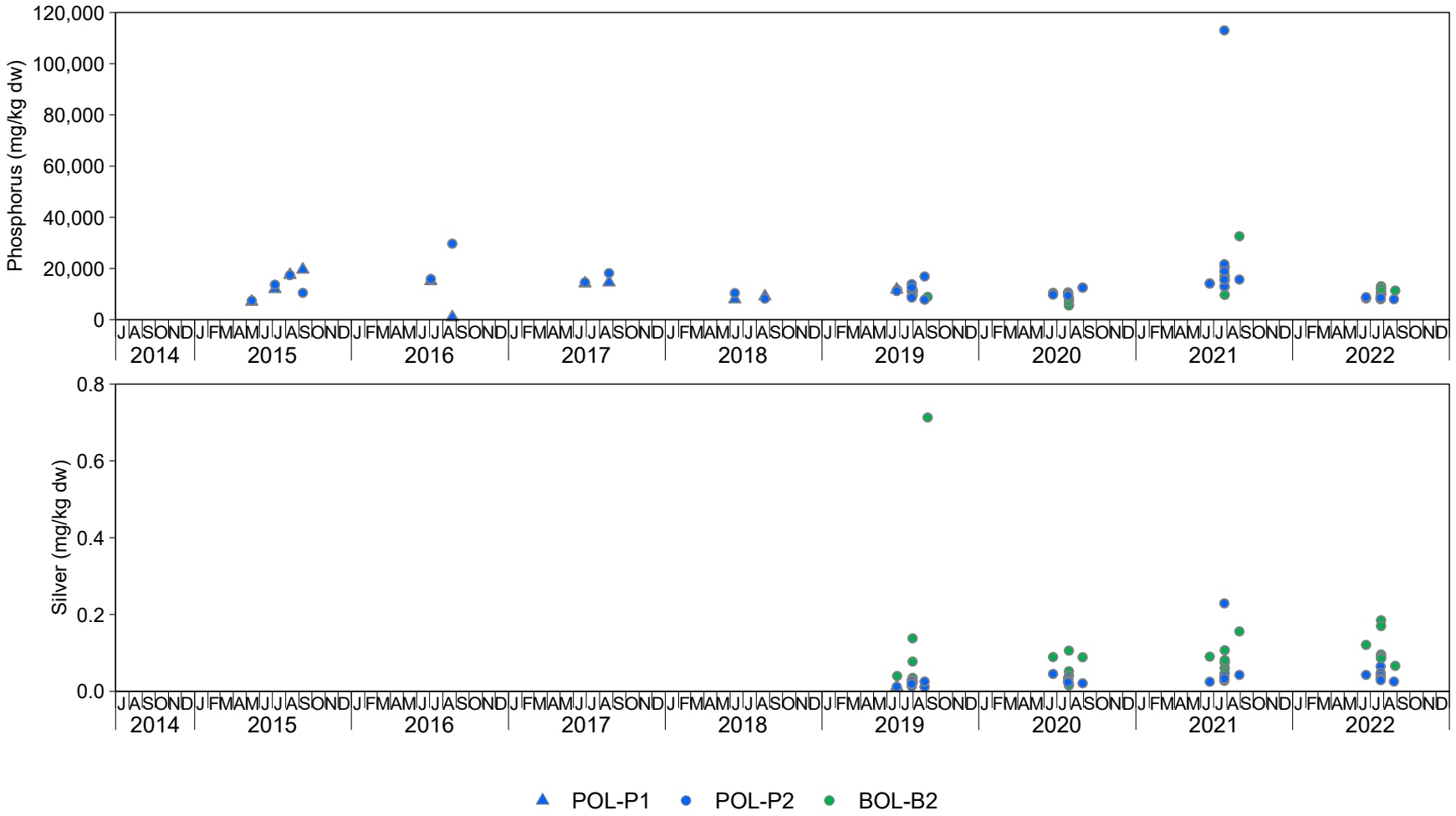

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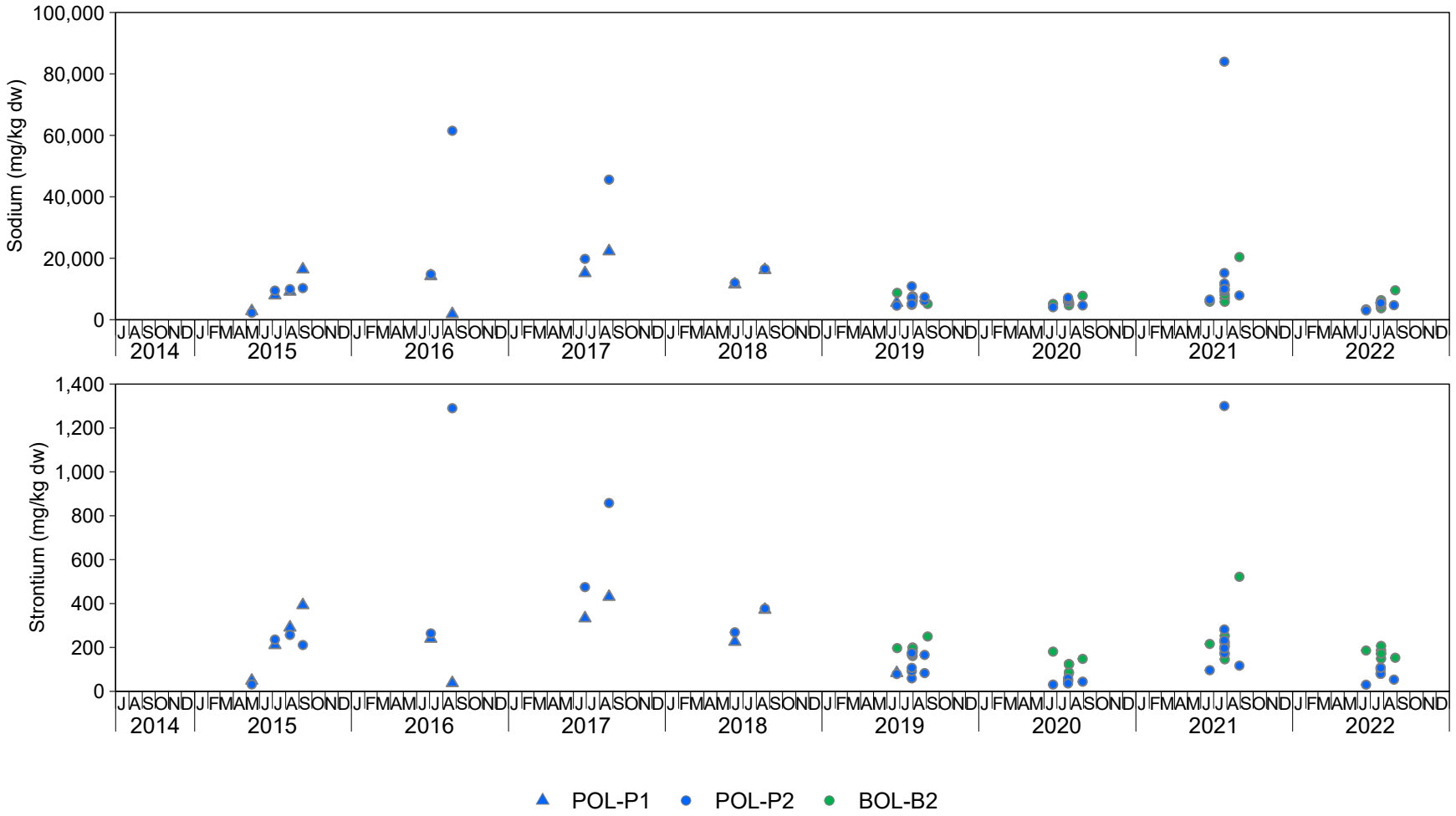

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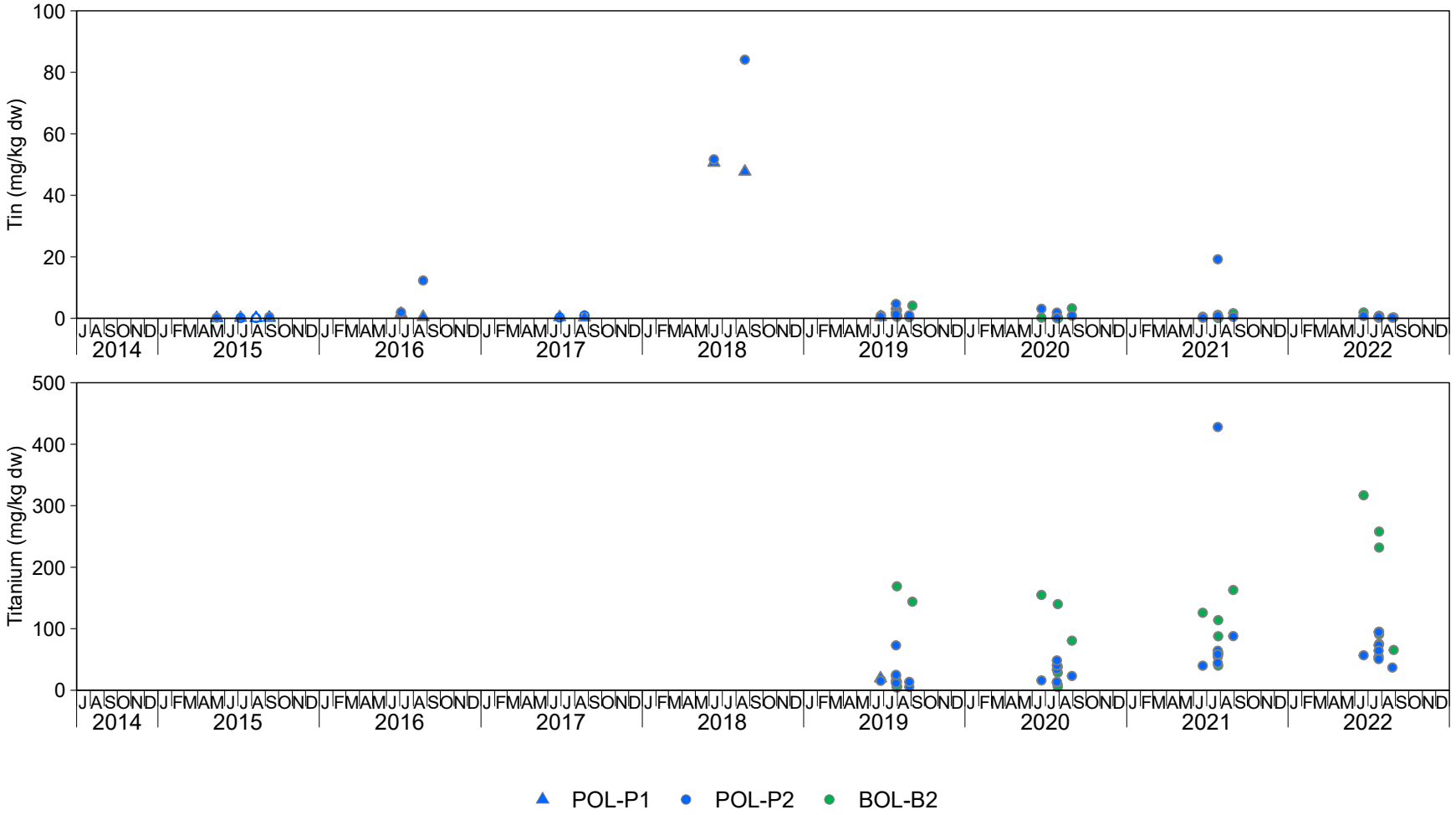

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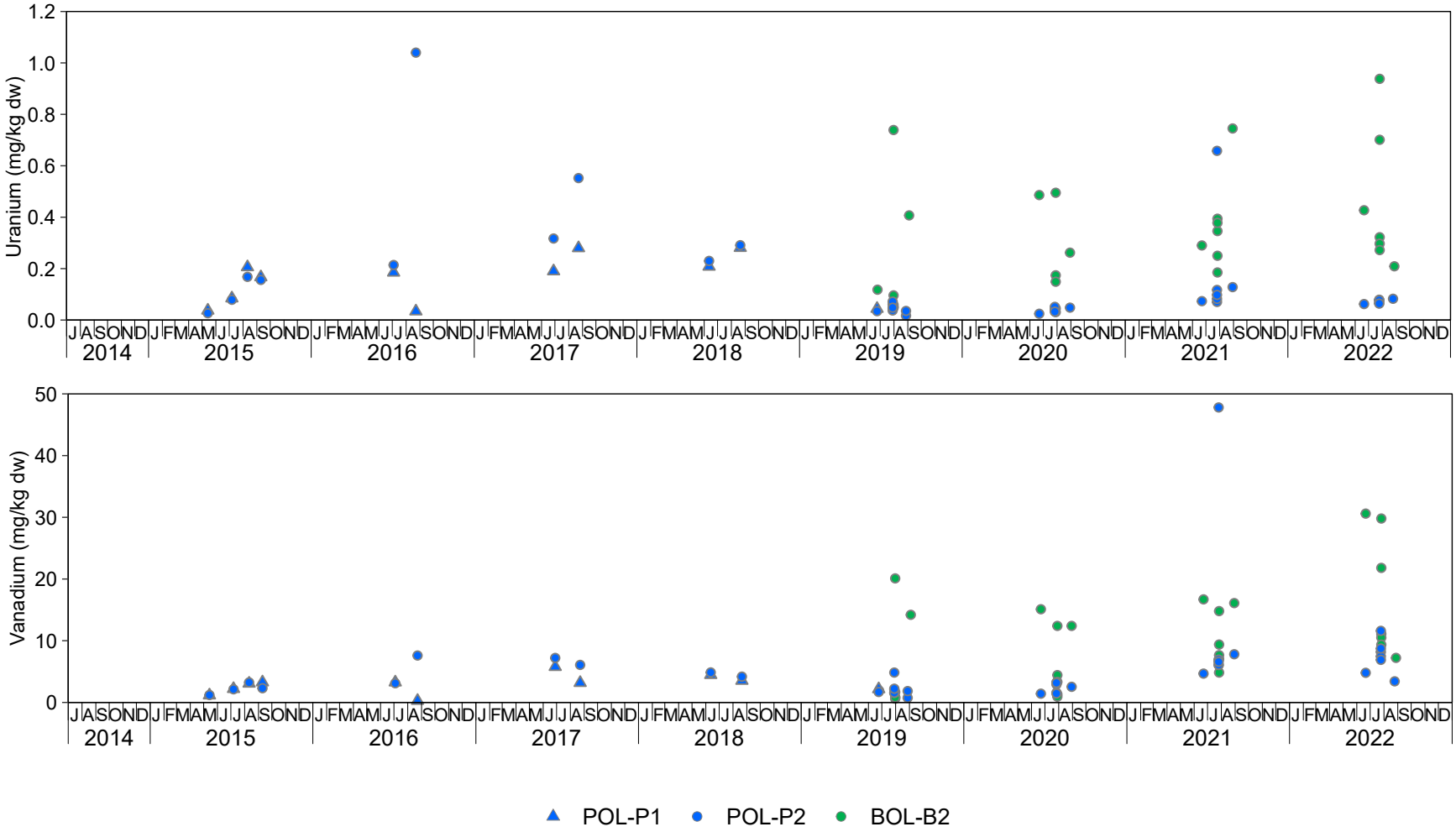

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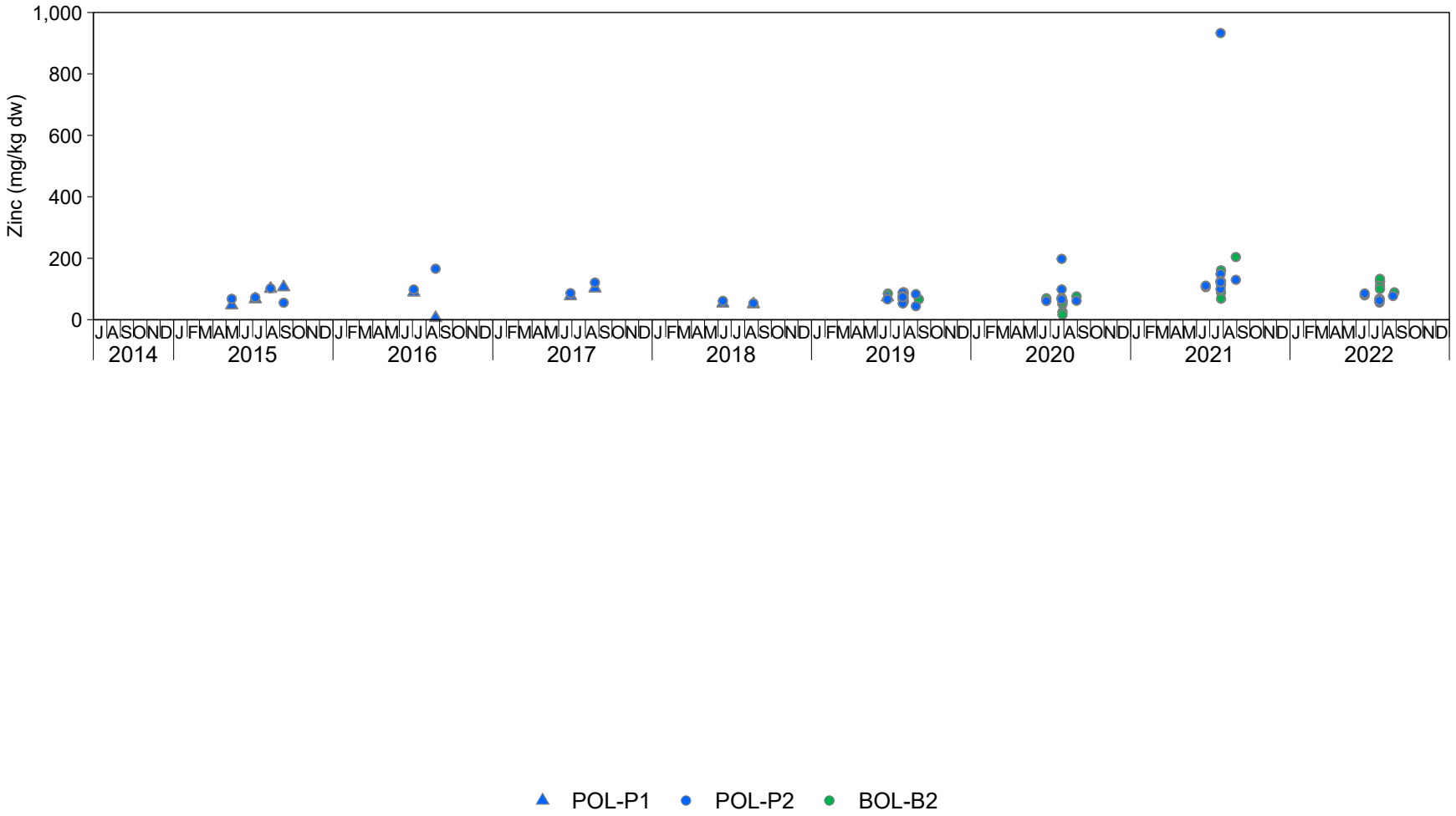

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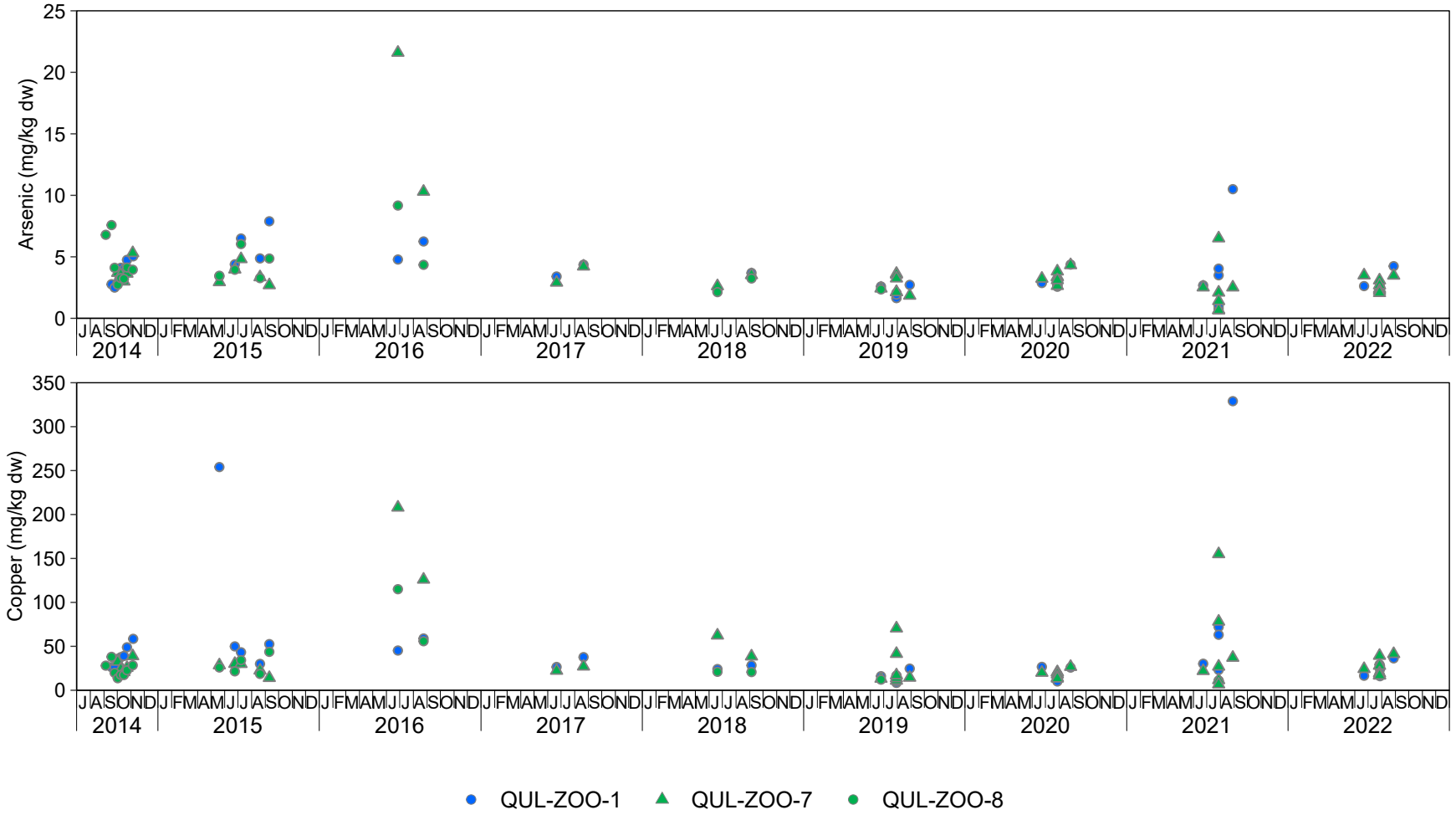

Figure C.4.2: Zooplankton Tissue Primary and Secondary Analyte Concentrations for Quesnel Lake at QUL-ZOO-1 (Exposed) and QUL-ZOO-7 (Reference) Areas, 2014 to 2022

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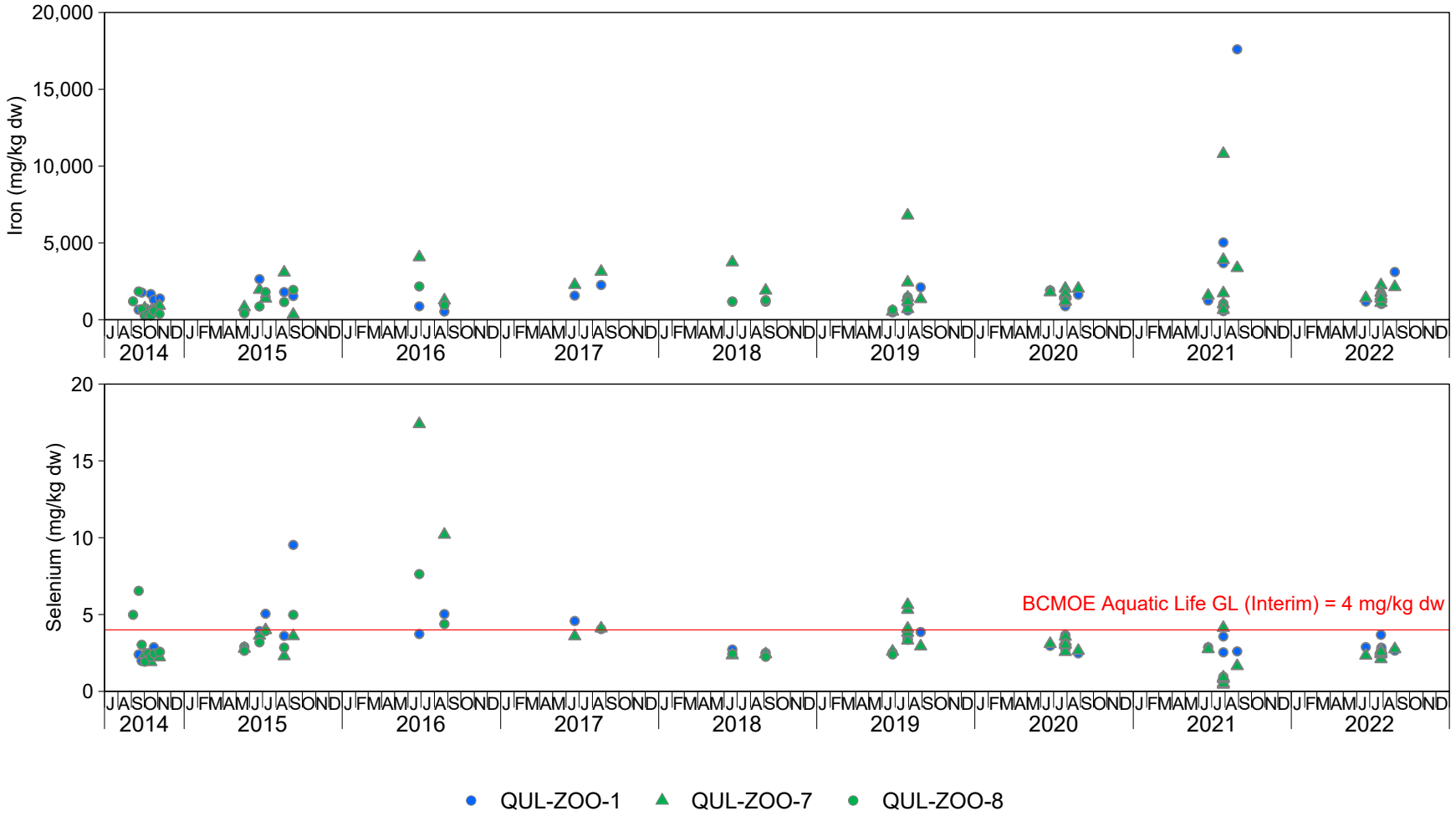

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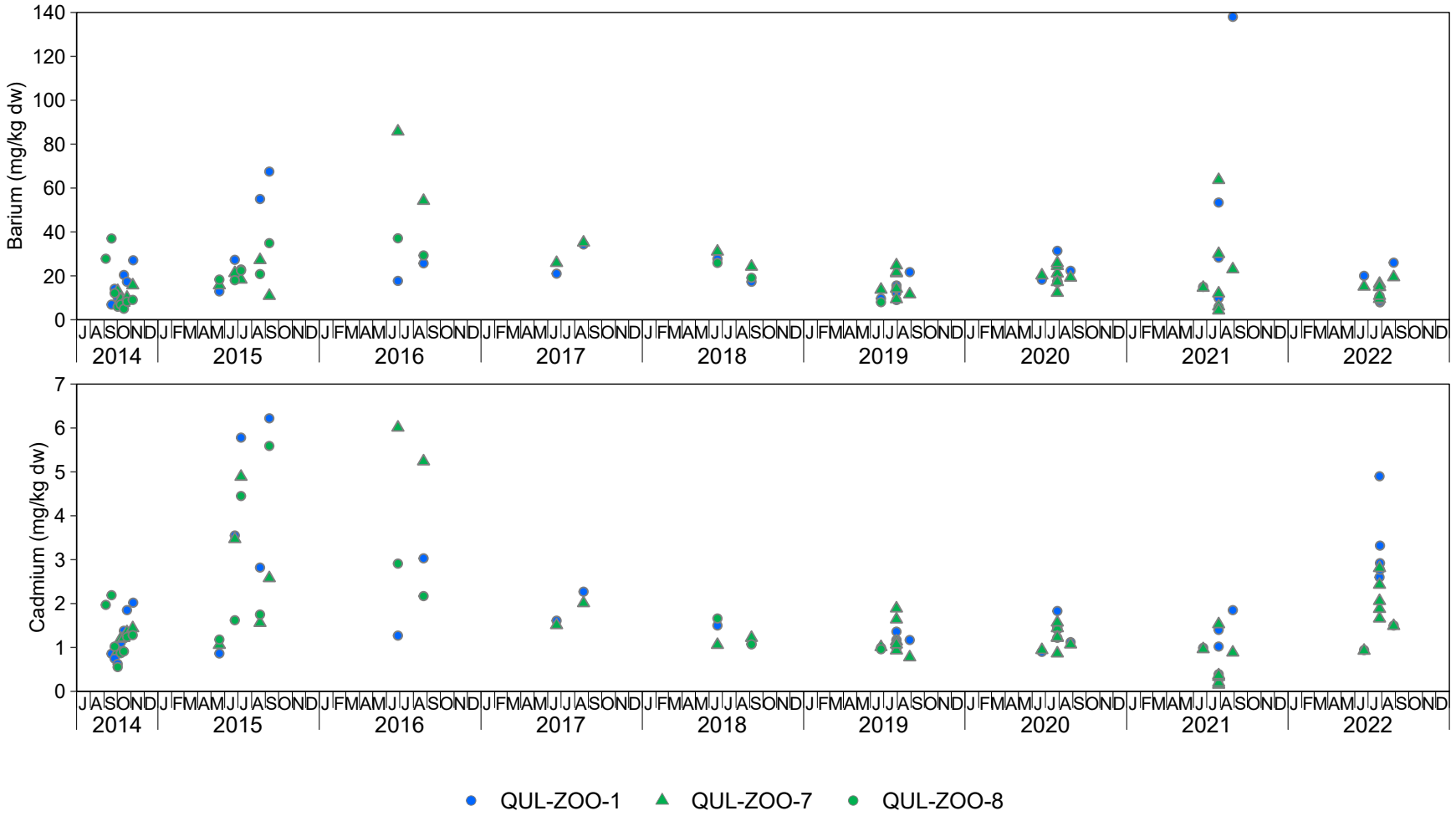

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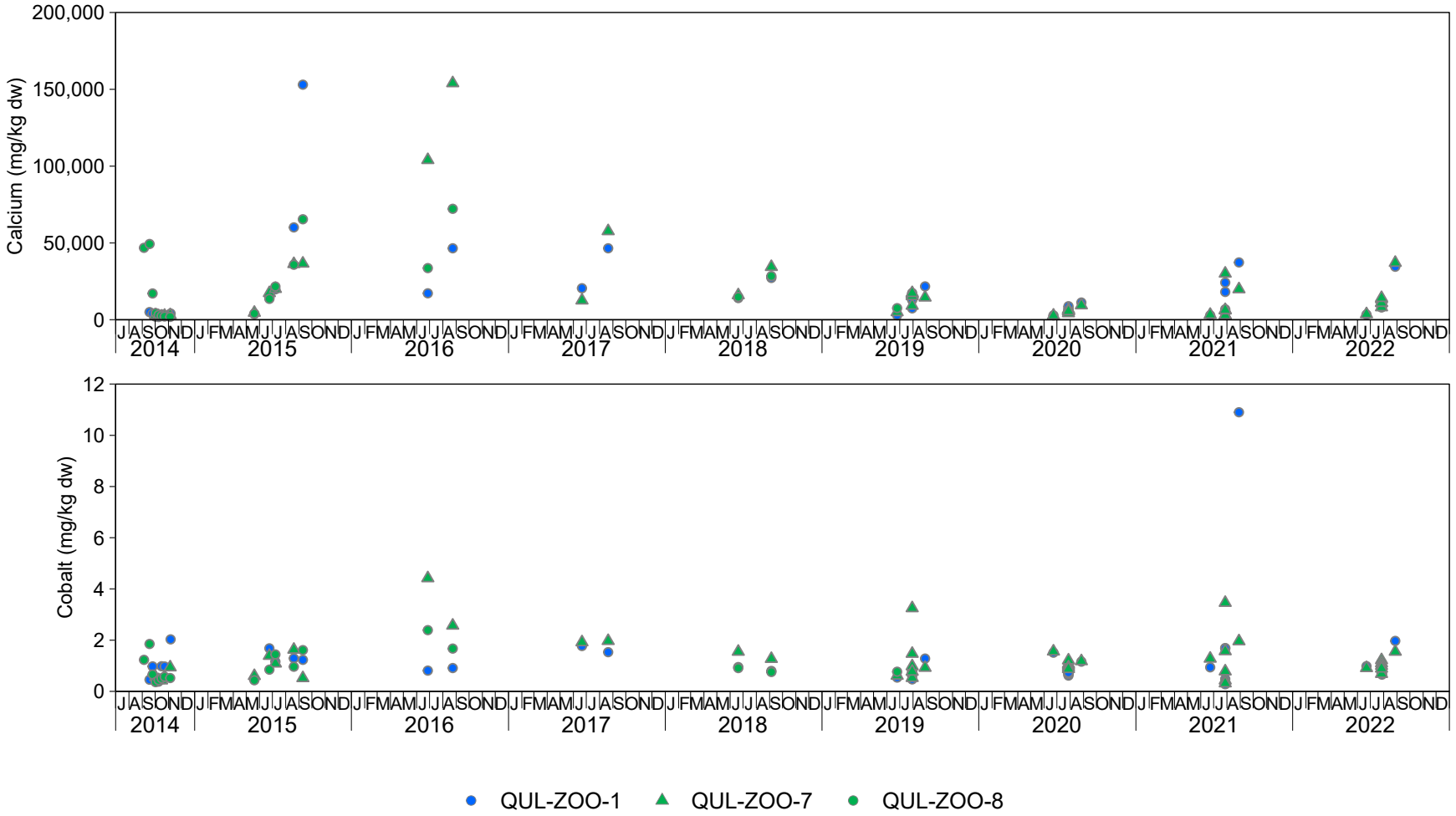

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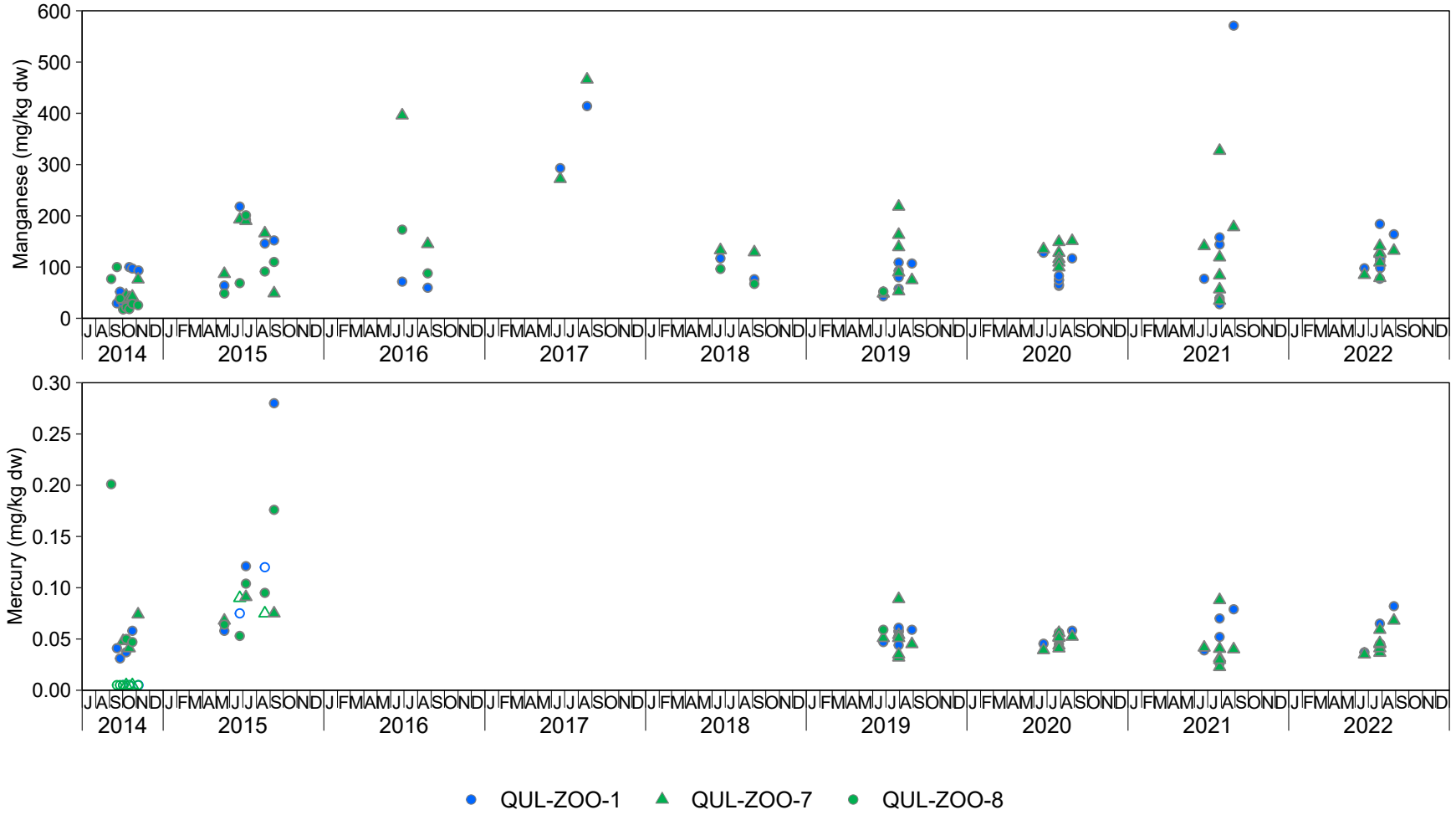

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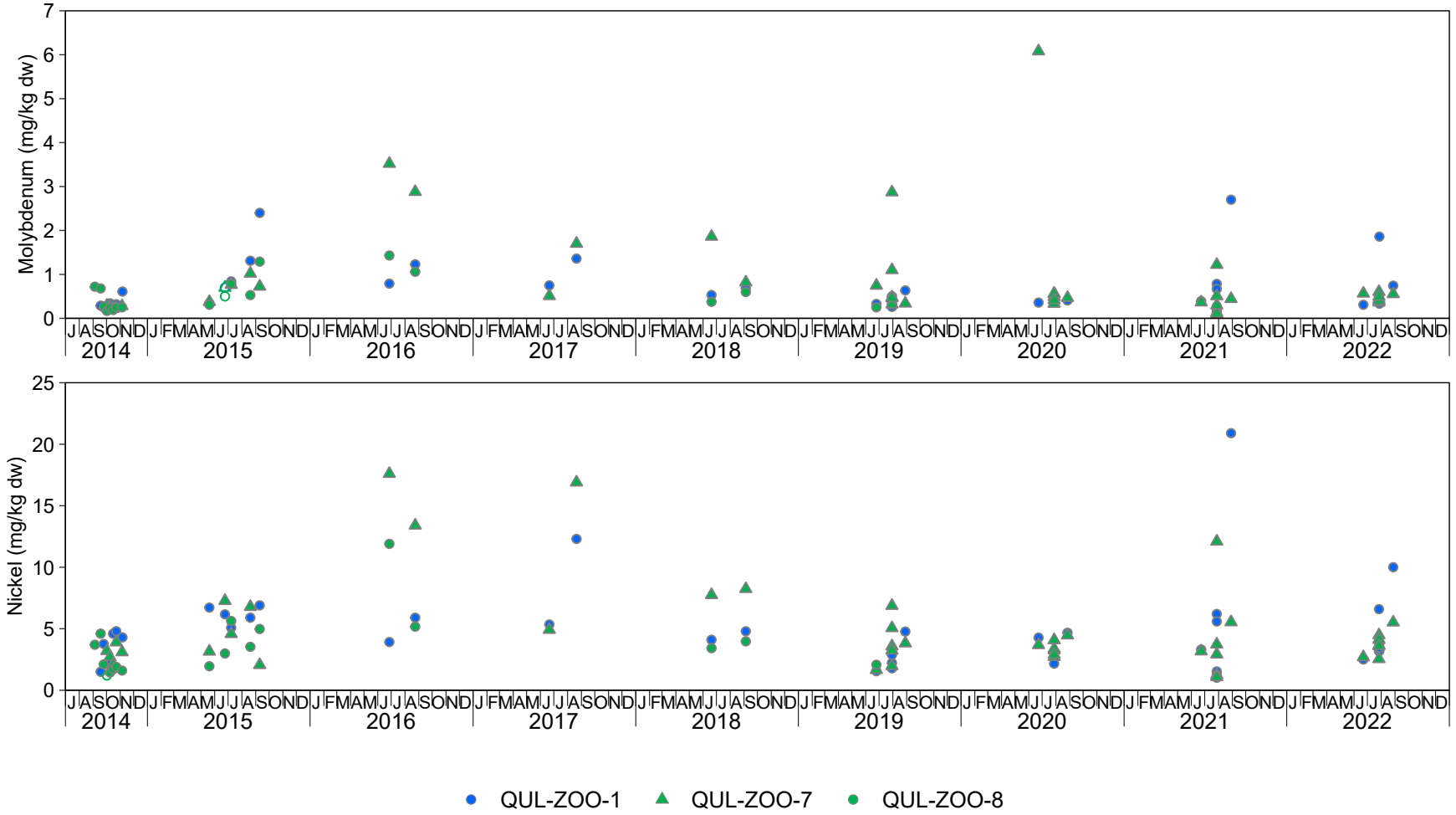

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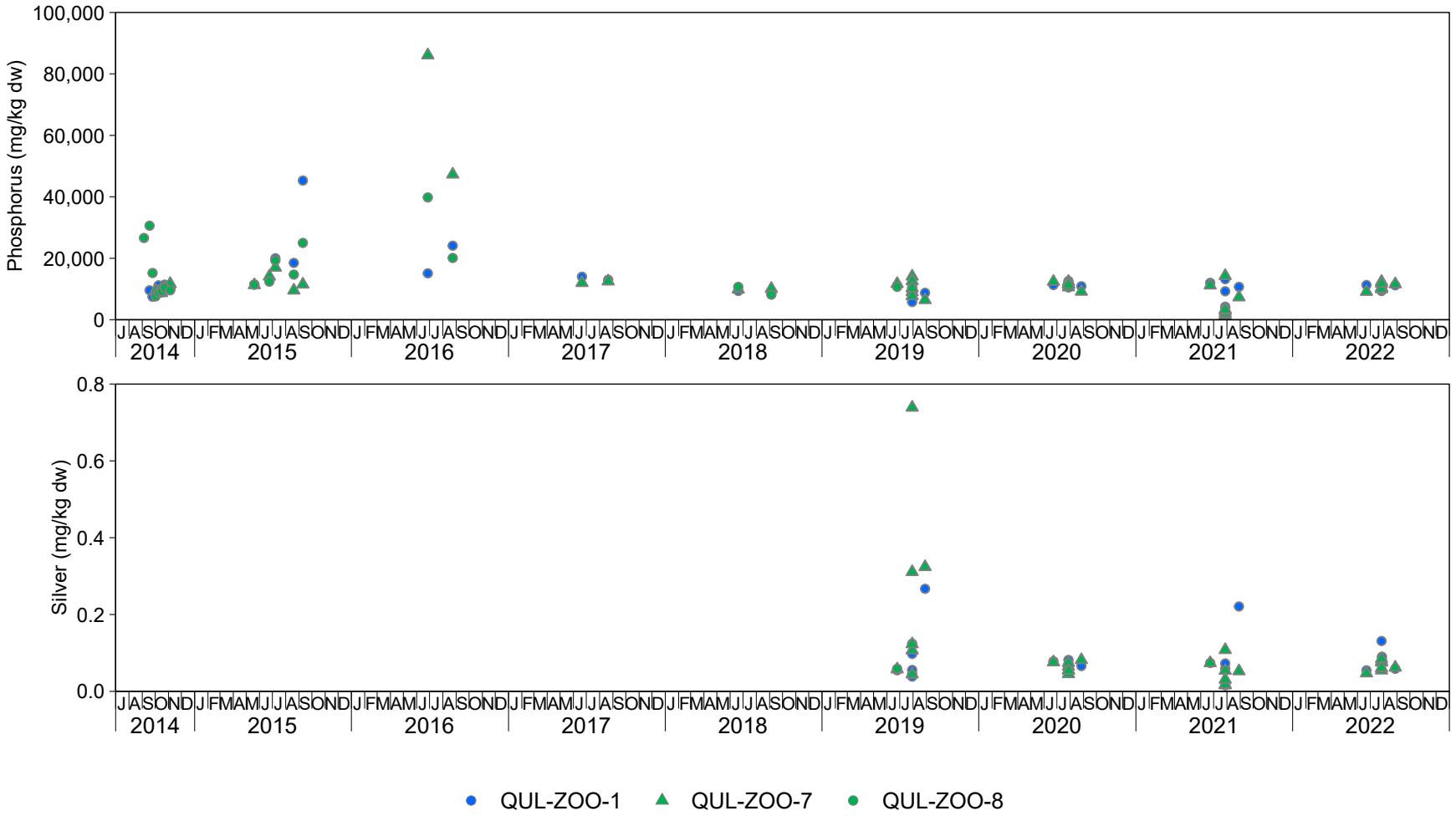

Figure C.4.2: Zooplankton Tissue Primary and Secondary Analyte Concentrations for Quesnel Lake at QUL-ZOO-1 (Exposed) and QUL-ZOO-7 (Reference) Areas, 2014 to 2022

Notes: mg/kg dw = milligrams per kilogram dry weight. Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Red horizontal line represents British Columbia interim long-term guideline for selenium in invertebrate tissue (4 mg/kg dw; BCMOE 2014). Green symbols indicate reference while blue symbols indicate exposed. Sampling at QUL-ZOO-8 was discontinued after 2019.

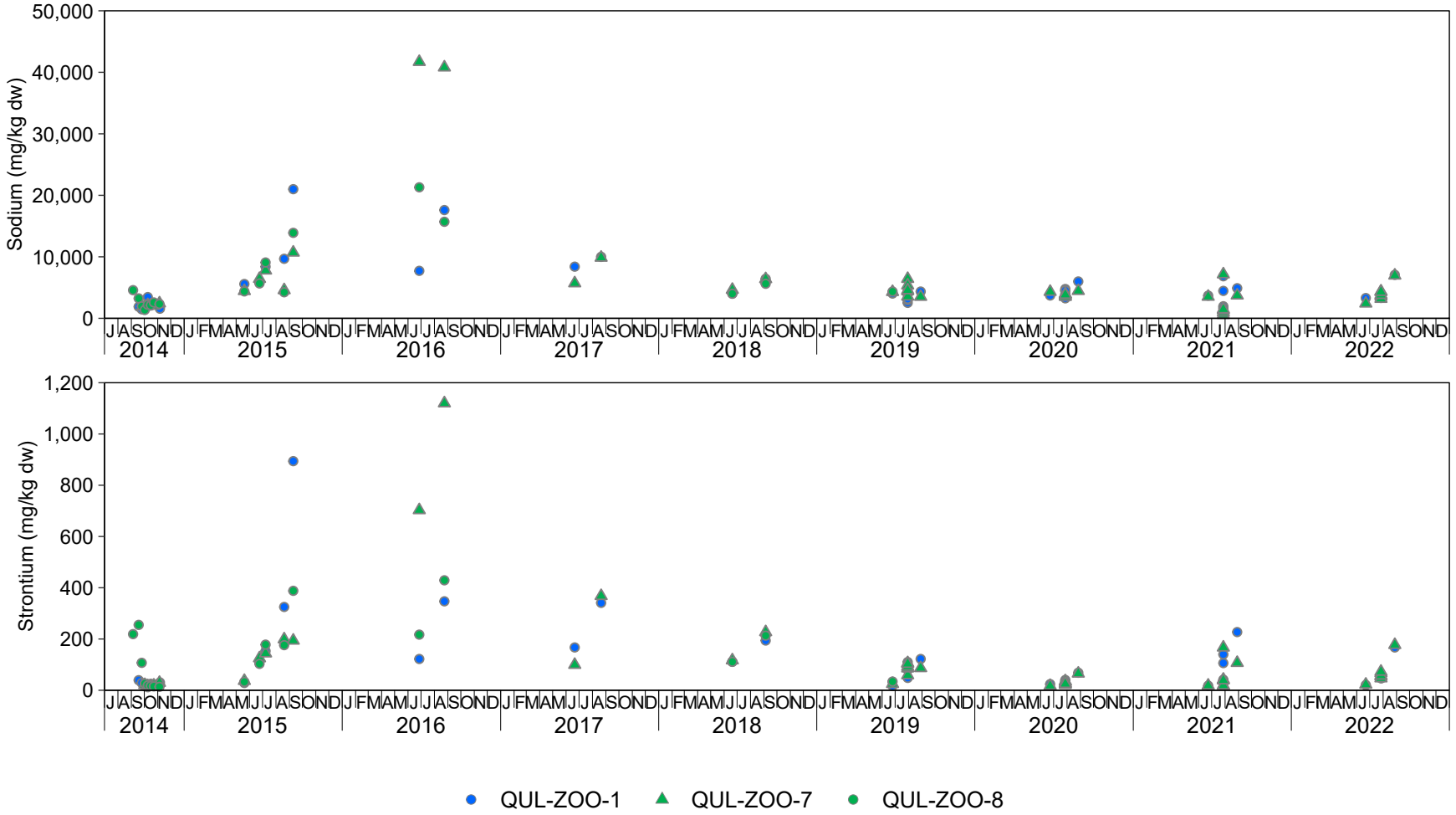

Figure C.4.2: Zooplankton Tissue Primary and Secondary Analyte Concentrations for Quesnel Lake at QUL-ZOO-1 (Exposed) and QUL-ZOO-7 (Reference) Areas, 2014 to 2022

Notes: mg/kg dw = milligrams per kilogram dry weight. Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Red horizontal line represents British Columbia interim long-term guideline for selenium in invertebrate tissue (4 mg/kg dw; BCMOE 2014). Green symbols indicate reference while blue symbols indicate exposed. Sampling at QUL-ZOO-8 was discontinued after 2019.

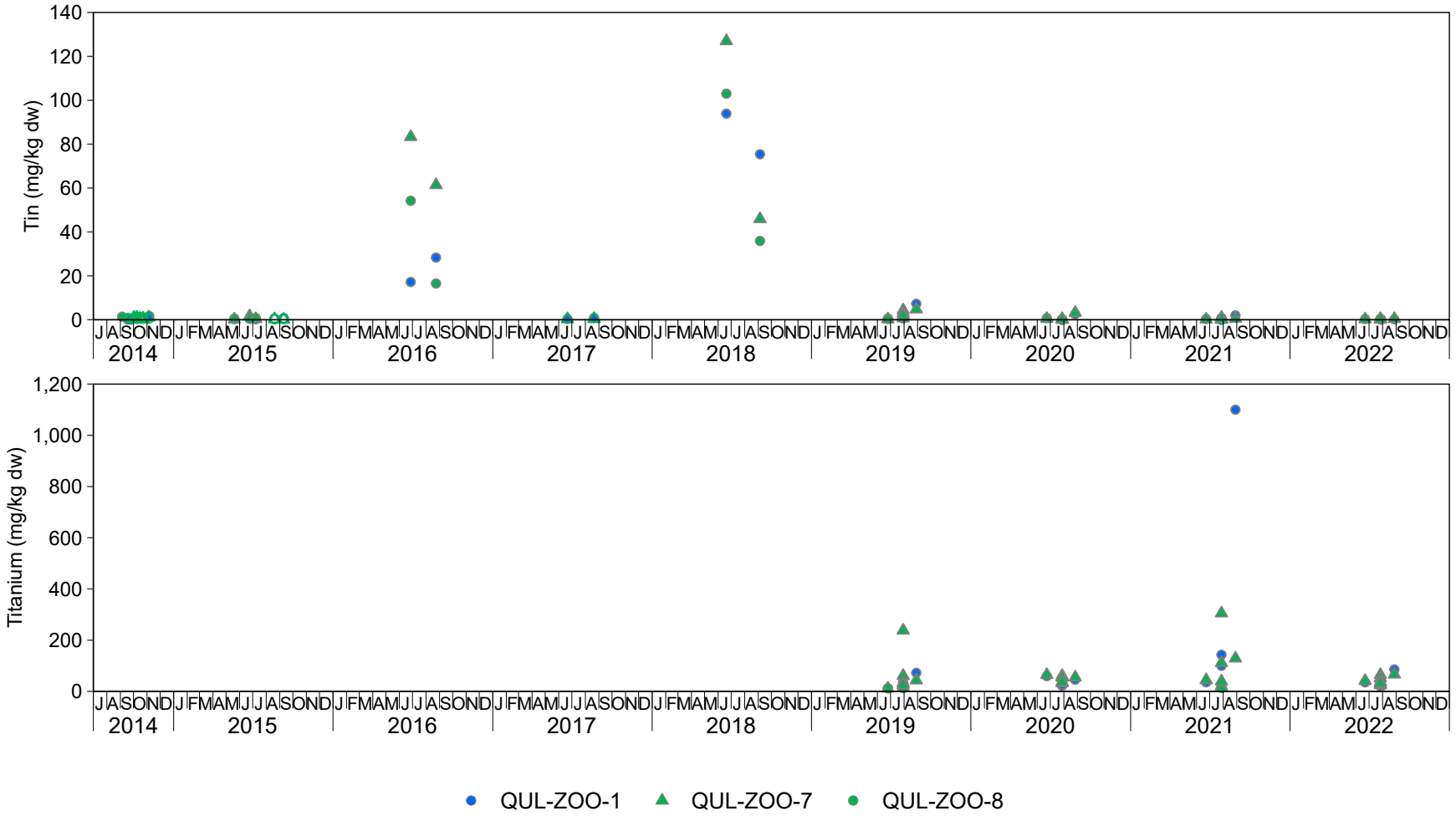

Figure C.4.2: Zooplankton Tissue Primary and Secondary Analyte Concentrations for Quesnel Lake at QUL-ZOO-1 (Exposed) and QUL-ZOO-7 (Reference) Areas, 2014 to 2022

Notes: mg/kg dw = milligrams per kilogram dry weight. Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Red horizontal line represents British Columbia interim long-term guideline for selenium in invertebrate tissue (4 mg/kg dw; BCMOE 2014). Green symbols indicate reference while blue symbols indicate exposed. Sampling at QUL-ZOO-8 was discontinued after 2019.

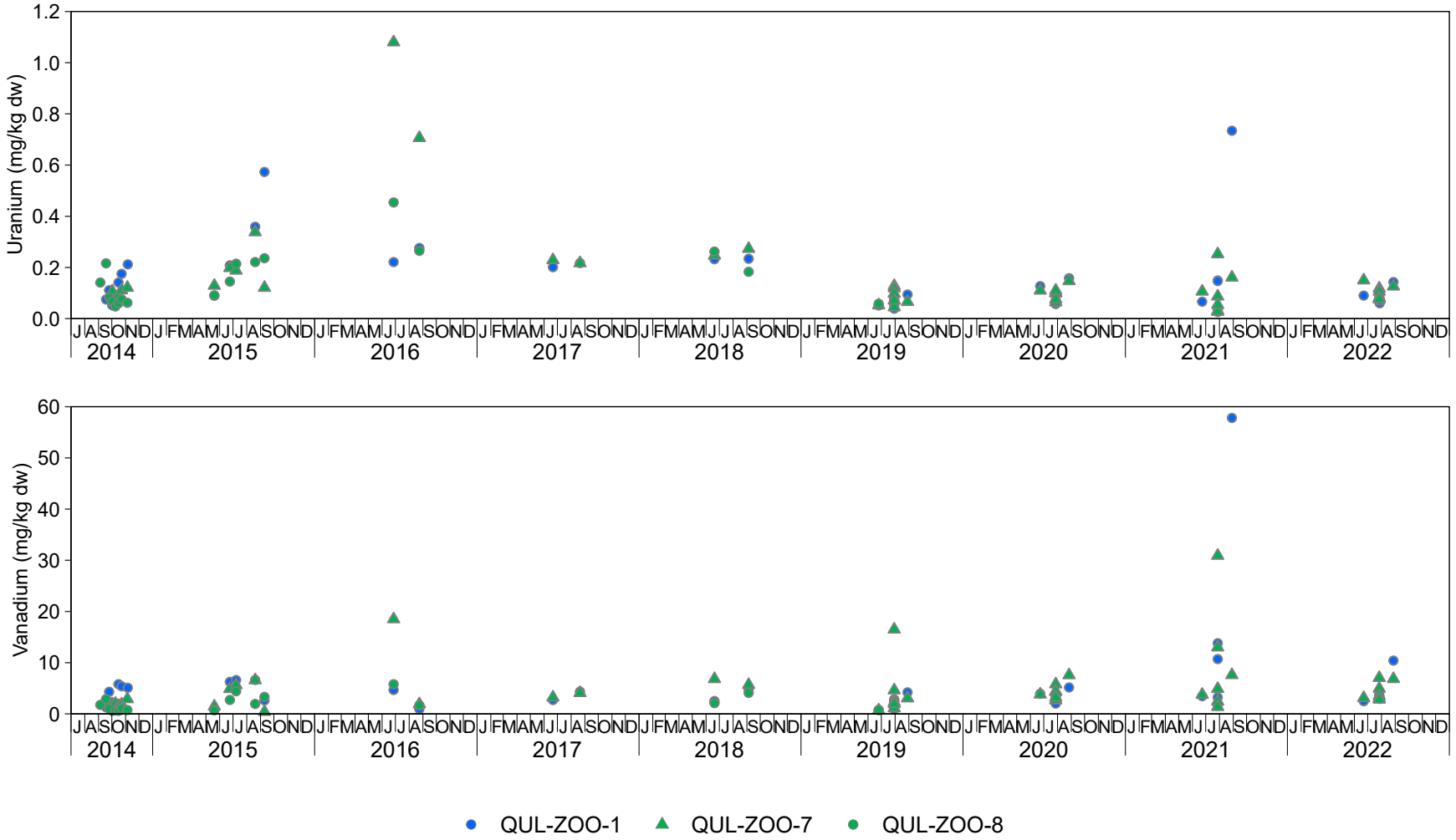

Figure C.4.2: Zooplankton Tissue Primary and Secondary Analyte Concentrations for Quesnel Lake at QUL-ZOO-1 (Exposed) and QUL-ZOO-7 (Reference) Areas, 2014 to 2022

Notes: mg/kg dw = milligrams per kilogram dry weight. Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Red horizontal line represents British Columbia interim long-term guideline for selenium in invertebrate tissue (4 mg/kg dw; BCMOE 2014). Green symbols indicate reference while blue symbols indicate exposed. Sampling at QUL-ZOO-8 was discontinued after 2019.

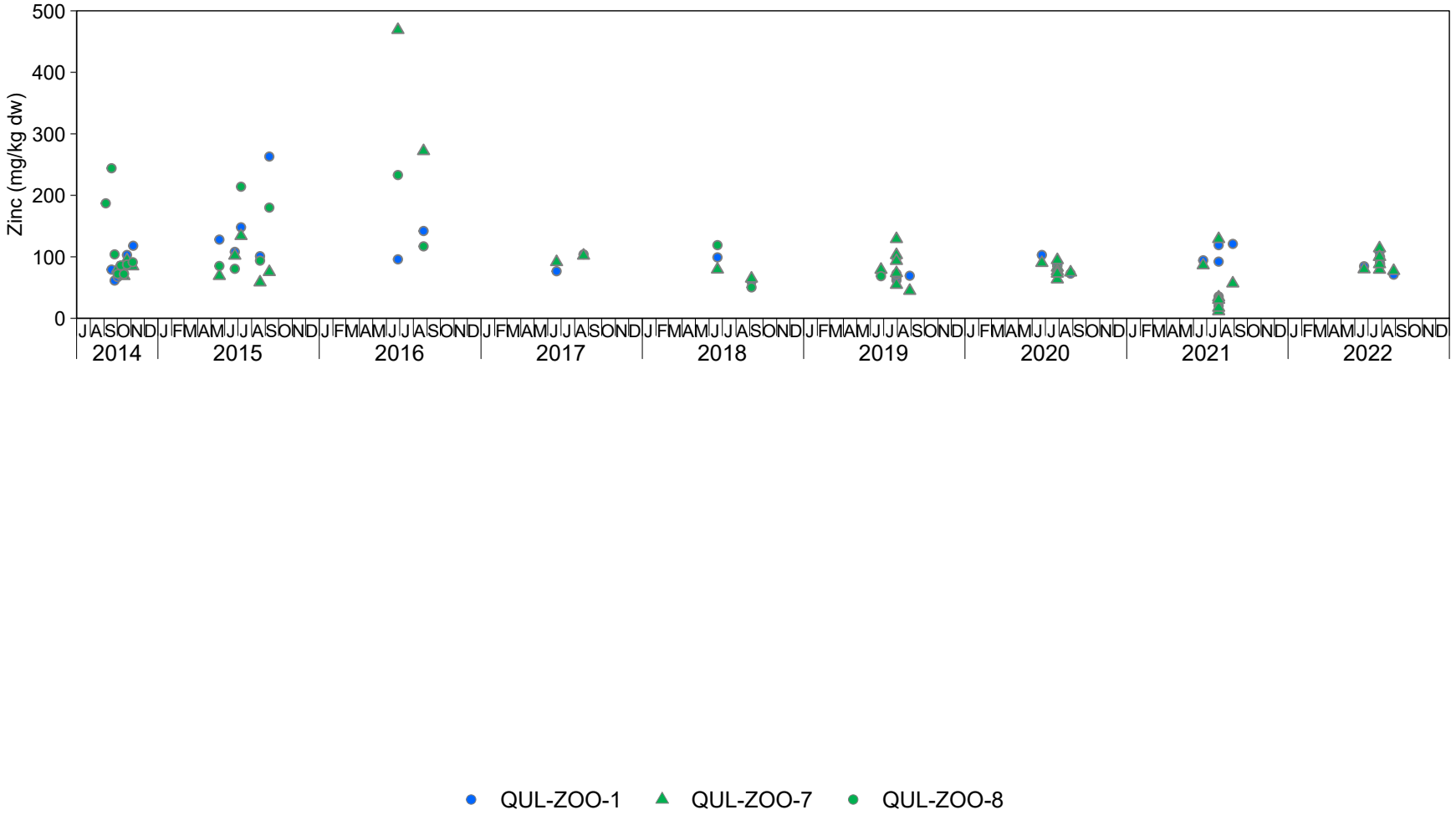

Figure C.4.2: Zooplankton Tissue Primary and Secondary Analyte Concentrations for Quesnel Lake at QUL-ZOO-1 (Exposed) and QUL-ZOO-7 (Reference) Areas, 2014 to 2022

Notes: mg/kg dw = milligrams per kilogram dry weight. Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Red horizontal line represents British Columbia interim long-term guideline for selenium in invertebrate tissue (4 mg/kg dw; BCMOE 2014). Green symbols indicate reference while blue symbols indicate exposed. Sampling at QUL-ZOO-8 was discontinued after 2019.

Table C.4.1: Zooplankton Tissue Chemistry Data for Polley Lake (POL-P2; Exposed) and Bootjack Lake (BOL-B2; Reference), 2022

Analyte	Units	Reference											
		BOL-B2											
		21-Jun-22	26-Jul-22	28-Aug-22	26-Jul-22	26-Jul-22	26-Jul-22	26-Jul-22	Mean	Standard Deviation	Minimum	Median	Maximum
Moisture	%	99.1	95.9	98.4	97.7	97.4	97.7	97.8	97.7	0.982	95.9	97.7	99.1
Aluminum	mg/kg dw	5,240	7,530	1,150	2,100	5,430	1,920	1,520	3,556	2,479	1,150	2,100	7,530
Antimony	mg/kg dw	0.603	0.194	0.249	0.176	0.237	0.162	0.180	0.257	0.156	0.162	0.194	0.603
Arsenic	mg/kg dw	26.3	5.74	8.24	19.6	38.3	28.1	19.0	20.8	11.4	5.74	19.6	38.3
Barium	mg/kg dw	132	177	86.0	93.6	109	65.5	68.6	105	39.4	65.5	93.6	177
Beryllium	mg/kg dw	0.202	0.293	0.0440	0.0800	0.196	0.0740	0.0640	0.136	0.0942	0.0440	0.0800	0.293
Bismuth	mg/kg dw	0.0410	0.0500	0.0100	0.0170	0.0370	0.0160	0.0130	0.0263	0.0160	0.0100	0.0170	0.0500
Boron	mg/kg dw	12.9	11.0	9.50	6.90	10.2	6.90	6.10	9.07	2.52	6.10	9.50	12.9
Cadmium	mg/kg dw	0.450	0.371	0.368	0.349	0.384	0.322	0.279	0.360	0.0532	0.279	0.368	0.450
Calcium	mg/kg dw	26,300	20,200	25,600	28,300	25,900	33,700	26,800	26,686	3,996	20,200	26,300	33,700
Cesium	mg/kg dw	0.579	0.904	0.149	0.280	0.664	0.257	0.199	0.433	0.285	0.149	0.280	0.904
Chromium	mg/kg dw	49.9	23.6	16.2	23.8	52.8	35.8	21.7	32.0	14.5	16.2	23.8	52.8
Cobalt	mg/kg dw	3.80	4.68	1.29	1.66	3.64	1.47	1.33	2.55	1.43	1.29	1.66	4.68
Copper	mg/kg dw	182	144	57.0	76.1	174	67.3	58.5	108	56.1	57.0	76.1	182
Iron	mg/kg dw	10,200	12,200	3,000	3,960	9,390	3,550	3,160	6,494	3,939	3,000	3,960	12,200
Lead	mg/kg dw	4.27	4.33	5.72	3.13	4.45	2.44	2.19	3.79	1.26	2.19	4.27	5.72
Lithium	mg/kg dw	3.54	4.97	0.840	1.40	3.68	1.36	1.08	2.41	1.62	0.840	1.40	4.97
Magnesium	mg/kg dw	2,960	2,960	2,090	2,240	2,920	2,150	1,870	2,456	473	1,870	2,240	2,960
Manganese	mg/kg dw	1,180	2,410	3,060	1,580	1,210	939	1,170	1,650	788	939	1,210	3,060
Mercury	mg/kg dw	0.0900	0.153	0.0580	0.0800	0.131	0.0790	0.117	0.101	0.0336	0.0580	0.0900	0.153
	mg/kg ww	<0.0020	0.00620	<0.0020	<0.0020	0.00340	<0.0020	0.00250	0.00287	0.00157	<0.0020	<0.0020	0.00620
Molybdenum	mg/kg dw	1.82	2.34	2.26	1.41	1.55	1.07	1.15	1.66	0.505	1.07	1.55	2.34
Nickel	mg/kg dw	11.8	14.4	8.16	4.56	8.89	3.95	3.80	7.94	4.12	3.80	8.16	14.4
Phosphorus	mg/kg dw	8,300	9,900	11,400	13,100	10,200	12,200	11,000	10,871	1,583	8,300	11,000	13,100
Potassium	mg/kg dw	6,570	6,360	9,800	9,410	6,860	8,090	7,430	7,789	1,371	6,360	7,430	9,800
Rubidium	mg/kg dw	8.70	10.0	9.11	10.8	10.0	9.23	8.15	9.43	0.898	8.15	9.23	10.8
Selenium	mg/kg dw	2.35	2.62	3.01	3.24	2.99	2.88	2.17	2.75	0.386	2.17	2.88	3.24
Silver	mg/kg dw	0.121	0.185	0.0664	0.0960	0.170	0.0898	0.0858	0.116	0.0450	0.0664	0.0960	0.185
Sodium	mg/kg dw	3,380	3,730	9,580	6,370	3,870	5,470	4,940	5,334	2,153	3,380	4,940	9,580
Strontium	mg/kg dw	186	149	153	188	173	207	172	175	20.4	149	173	207
Tellurium	mg/kg dw	0.0230	<0.023	<0.020	<0.020	<0.020	<0.020	<0.020	0.0204	-	<0.020	<0.020	0.0230
Thallium	mg/kg dw	0.0283	0.0726	0.0475	0.0328	0.0641	0.0352	0.0275	0.0440	0.0181	0.0275	0.0352	0.0726
Tin	mg/kg dw	1.92	0.490	0.290	0.660	0.730	0.720	0.760	0.796	0.523	0.290	0.720	1.92
Titanium	mg/kg dw	317	258	65.5	95.2	232	90.9	75.4	162	104	65.5	95.2	317
Uranium	mg/kg dw	0.427	0.938	0.209	0.322	0.701	0.297	0.272	0.452	0.268	0.209	0.322	0.938
Vanadium	mg/kg dw	30.6	29.8	7.22	11.1	21.8	10.5	9.36	17.2	10.0	7.22	11.1	30.6
Zinc	mg/kg dw	79.5	125	89.1	125	133	110	100	109	20.1	79.5	110	133
Zirconium	mg/kg dw	2.74	5.71	1.92	2.58	4.98	2.38	2.09	3.20	1.51	1.92	2.58	5.71

Value exceeds interim long-term benthic invertebrate tissue guideline for selenium (4 mg/kg dw; BCMOE 2014).

Notes:"-" = standard deviation not calculated as all results were below laboratory reporting limit. mg/kg = milligrams per kilogram. dw = dry weight. ww = wet weight. All summary statistics are reported to three significant digits for display purposes. All summary statistics were calculated using the Kaplan-Meier method.

Table C.4.1: Zooplankton Tissue Chemistry Data for Polley Lake (POL-P2; Exposed) and Bootjack Lake (BOL-B2; Reference), 2022

Analyte	Units	Exposed											
		POL-P2											
		21-Jun-22	25-Jul-22	25-Aug-22	25-Jul-22	25-Jul-22	25-Jul-22	25-Jul-22	Mean	Standard Deviation	Minimum	Median	Maximum
Moisture	%	94.8	97.6	96.5	97.9	98.2	98.0	98.4	97.3	1.28	94.8	97.9	98.4
Aluminum	mg/kg dw	895	1,150	576	1,450	948	1,200	888	1,015	280	576	948	1,450
Antimony	mg/kg dw	0.167	0.108	0.0860	0.0740	0.0650	0.0330	0.0780	0.0873	0.0418	0.0330	0.0780	0.167
Arsenic	mg/kg dw	23.0	6.70	7.85	5.46	10.7	6.12	6.20	9.43	6.23	5.46	6.70	23.0
Barium	mg/kg dw	15.7	22.3	14.2	37.2	23.5	23.1	20.8	22.4	7.48	14.2	22.3	37.2
Beryllium	mg/kg dw	0.0360	0.0490	0.0190	0.0710	0.0490	0.0540	0.0440	0.0460	0.0160	0.0190	0.0490	0.0710
Bismuth	mg/kg dw	0.0110	0.0170	<0.014	<0.012	<0.011	<0.010	<0.012	0.0113	0.00297	<0.010	<0.011	0.0170
Boron	mg/kg dw	3.40	5.50	4.50	5.60	5.20	4.80	5.10	4.87	0.752	3.40	5.10	5.60
Cadmium	mg/kg dw	0.404	0.349	0.303	0.362	0.349	0.292	0.306	0.338	0.0399	0.292	0.349	0.404
Calcium	mg/kg dw	6,430	17,500	11,700	24,900	23,600	17,900	23,000	17,861	6,803	6,430	17,900	24,900
Cesium	mg/kg dw	0.0982	0.119	0.0789	0.128	0.0962	0.124	0.0880	0.105	0.0191	0.0789	0.0982	0.128
Chromium	mg/kg dw	27.9	7.21	19.0	3.23	9.71	3.54	3.96	10.6	9.40	3.23	7.21	27.9
Cobalt	mg/kg dw	0.836	0.989	0.725	1.12	0.740	0.919	0.703	0.862	0.156	0.703	0.836	1.12
Copper	mg/kg dw	71.2	59.5	53.3	70.2	48.8	44.1	42.1	55.6	11.8	42.1	53.3	71.2
Iron	mg/kg dw	1,380	1,760	964	2,290	1,390	1,720	1,320	1,546	423	964	1,390	2,290
Lead	mg/kg dw	1.44	1.18	0.649	0.982	0.981	2.72	0.820	1.25	0.694	0.649	0.982	2.72
Lithium	mg/kg dw	0.760	0.920	<0.71	1.13	0.750	0.970	0.700	0.847	0.166	0.700	0.760	1.13
Magnesium	mg/kg dw	1,340	1,560	1,160	1,870	1,570	1,630	1,560	1,527	224	1,160	1,560	1,870
Manganese	mg/kg dw	210	285	187	252	257	232	222	235	32.6	187	232	285
Mercury	mg/kg dw	0.0270	<0.055	0.0300	0.0500	<0.037	0.0360	0.0540	0.0380	0.0128	0.0270	0.0360	<0.055
	mg/kg ww	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	-	<0.0020	<0.0020	<0.0020
Molybdenum	mg/kg dw	0.827	1.00	0.867	1.04	0.878	0.757	0.924	0.899	0.0979	0.757	0.878	1.04
Nickel	mg/kg dw	3.21	4.22	7.71	2.90	2.46	2.50	2.35	3.62	1.91	2.35	2.90	7.71
Phosphorus	mg/kg dw	8,820	8,120	8,000	8,730	9,120	8,040	8,560	8,484	437	8,000	8,560	9,120
Potassium	mg/kg dw	6,660	6,220	6,360	6,860	6,360	7,060	6,640	6,594	301	6,220	6,640	7,060
Rubidium	mg/kg dw	6.77	5.86	5.67	6.34	6.07	7.30	6.36	6.34	0.557	5.67	6.34	7.30
Selenium	mg/kg dw	2.68	2.50	2.83	3.34	2.27	2.14	2.77	2.65	0.398	2.14	2.68	3.34
Silver	mg/kg dw	0.0429	0.0648	0.0255	0.0478	0.0409	0.0333	0.0291	0.0406	0.0133	0.0255	0.0409	0.0648
Sodium	mg/kg dw	3,020	4,800	4,730	5,600	5,460	5,650	5,460	4,960	933.4	3,020	5,460	5,650
Strontium	mg/kg dw	30.2	79.8	53.4	108	101	80.1	107	79.9	29.3	30.2	80.1	108
Tellurium	mg/kg dw	<0.020	<0.033	<0.028	<0.024	<0.022	<0.020	<0.024	<0.020	-	<0.020	<0.024	<0.033
Thallium	mg/kg dw	0.00690	0.00780	0.00750	0.00760	0.00590	0.00640	0.00740	0.00707	0.000702	0.00590	0.00740	0.00780
Tin	mg/kg dw	0.710	0.590	0.210	0.400	0.320	0.210	0.500	0.420	0.191	0.210	0.400	0.710
Titanium	mg/kg dw	56.8	73.3	36.9	94.6	54.6	64.4	50.7	61.6	18.4	36.9	56.8	94.6
Uranium	mg/kg dw	0.0622	0.0789	0.0827	0.0761	0.0661	0.0773	0.0638	0.0724	0.00820	0.0622	0.0761	0.0827
Vanadium	mg/kg dw	4.80	8.18	3.42	11.6	7.47	8.73	6.90	7.30	2.67	3.42	7.47	11.6
Zinc	mg/kg dw	85.6	68.6	77.3	66.0	67.5	55.9	62.4	69.0	9.76	55.9	67.5	85.6
Zirconium	mg/kg dw	0.970	1.70	1.04	1.41	1.24	1.15	0.980	1.21	0.266	0.970	1.15	1.70

Value exceeds interim long-term benthic invertebrate tissue guideline for selenium (4 mg/kg dw; BCMOE 2014).

Notes:"-" = standard deviation not calculated as all results were below laboratory reporting limit. mg/kg = milligrams per kilogram. dw = dry weight. ww = wet weight. All summary statistics are reported to three significant digits for display purposes. All summary statistics were calculated using the Kaplan-Meier method.

Table C.4.2: Zooplankton Tissue Chemistry Data for Quesnel Lake at QUL-ZOO-1 (Exposed) and QUL-ZOO-7 (Reference) Areas, 2022

Analyte	Units	Reference											
		QUL-ZOO-7											
		22-Jun-22	27-Jul-22	28-Aug-22	27-Jul-22	27-Jul-22	27-Jul-22	27-Jul-22	Mean	Standard Deviation	Minimum	Median	Maximum
Moisture	%	94.0	97.1	97.8	97.8	98.3	98.7	95.6	97.0	1.67	94.0	97.8	98.7
Aluminum	mg/kg dw	2,290	618	1,190	1,250	911	671	584	1,073	600	584	911	2,290
Antimony	mg/kg dw	0.0490	0.0230	0.0530	0.0430	0.0540	0.0430	0.0460	0.0444	0.0104	0.0230	0.0460	0.0540
Arsenic	mg/kg dw	3.50	2.40	3.48	3.09	2.69	2.25	2.07	2.78	0.583	2.07	2.69	3.50
Barium	mg/kg dw	15.1	9.50	19.4	16.4	14.9	15.1	10.9	14.5	3.33	9.50	15.1	19.4
Beryllium	mg/kg dw	0.162	0.0330	0.0440	0.0530	0.0360	0.0330	0.0230	0.0549	0.0482	0.0230	0.0360	0.162
Bismuth	mg/kg dw	<0.010	<0.013	0.0200	0.0130	0.0120	0.0130	0.0140	0.0133	0.00297	<0.010	0.0130	0.0200
Boron	mg/kg dw	<1.0	<1.3	4.60	1.90	1.40	1.10	<1.8	1.74	1.37	<1.0	1.10	4.60
Cadmium	mg/kg dw	0.927	1.66	1.49	1.88	2.43	2.81	2.06	1.89	0.620	0.927	1.88	2.81
Calcium	mg/kg dw	3,650	11,000	37,100	13,400	8,160	11,000	14,200	14,073	10,749	3,650	11,000	37,100
Cesium	mg/kg dw	0.0870	0.0789	0.147	0.141	0.114	0.0929	0.0971	0.108	0.0267	0.0789	0.0971	0.147
Chromium	mg/kg dw	4.11	2.08	7.31	5.26	2.60	2.02	4.39	3.97	1.93	2.02	4.11	7.31
Cobalt	mg/kg dw	0.912	0.685	1.55	1.22	1.10	1.00	0.893	1.05	0.277	0.685	1.00	1.55
Copper	mg/kg dw	24.3	17.3	41.3	39.3	28.0	19.4	16.8	26.6	10.2	16.8	24.3	41.3
Iron	mg/kg dw	1,410	1,100	2,130	2,250	1,770	1,540	1,380	1,654	418	1,100	1,540	2,250
Lead	mg/kg dw	0.580	0.635	0.892	0.846	0.928	0.945	0.579	0.772	0.167	0.579	0.846	0.945
Lithium	mg/kg dw	0.720	<0.65	1.17	0.970	0.800	0.700	<0.68	0.809	0.188	<0.65	0.720	1.17
Magnesium	mg/kg dw	1,470	1,130	1,770	1,650	1,420	1,330	1,210	1,426	229	1,130	1,420	1,770
Manganese	mg/kg dw	84.9	78.8	132	128	126	141	109	114	24.2	78.8	126	141
Mercury	mg/kg dw	0.0350	0.0366	0.0680	0.0410	0.0450	0.0590	0.0460	0.0472	0.0121	0.0350	0.0450	0.0680
	mg/kg ww	0.00210	0.00110	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	0.00124	0.000495	0.00110	0.00110	0.00210
Molybdenum	mg/kg dw	0.566	0.364	0.554	0.604	0.431	0.392	0.494	0.486	0.0929	0.364	0.494	0.604
Nickel	mg/kg dw	2.70	2.54	5.52	4.48	3.66	4.12	3.60	3.80	1.03	2.54	3.66	5.52
Phosphorus	mg/kg dw	9,130	10,500	11,600	12,400	10,200	10,000	11,800	10,804	1,160	9,130	10,500	12,400
Potassium	mg/kg dw	7,590	7,150	8,690	8,360	6,970	7,340	7,350	7,636	644	6,970	7,350	8,690
Rubidium	mg/kg dw	12.1	11.8	13.5	13.0	11.6	11.9	11.5	12.2	0.757	11.5	11.9	13.5
Selenium	mg/kg dw	2.33	2.10	2.75	2.42	2.46	2.69	2.56	2.47	0.221	2.10	2.46	2.75
Silver	mg/kg dw	0.0472	0.0547	0.0622	0.0779	0.0754	0.0843	0.0607	0.0661	0.0135	0.0472	0.0622	0.0843
Sodium	mg/kg dw	2,420	3,570	6,970	4,370	3,180	3,810	4,310	4,090	1,437	2,420	3,810	6,970
Strontium	mg/kg dw	22.2	54.1	177	66.9	46.7	57.2	72.6	71.0	49.5	22.2	57.2	177
Tellurium	mg/kg dw	<0.020	<0.026	<0.020	<0.020	<0.020	<0.020	<0.027	<0.020	-	<0.020	<0.020	<0.027
Thallium	mg/kg dw	0.0269	0.0288	0.0209	0.0308	0.0221	0.0263	0.0252	0.0259	0.00350	0.0209	0.0263	0.0308
Tin	mg/kg dw	0.240	0.130	0.430	0.320	0.250	0.330	0.180	0.269	0.101	0.130	0.250	0.430
Titanium	mg/kg dw	41.1	24.5	66.2	64.2	51.1	36.5	30.9	44.9	16.1	24.5	41.1	66.2
Uranium	mg/kg dw	0.150	0.0766	0.126	0.118	0.106	0.0820	0.0761	0.105	0.0283	0.0761	0.106	0.150
Vanadium	mg/kg dw	3.11	2.98	6.83	7.04	4.94	3.51	2.81	4.46	1.83	2.81	3.51	7.04
Zinc	mg/kg dw	79.8	79.2	77.2	100	114	88.1	99.9	91.2	13.9	77.2	88.1	114
Zirconium	mg/kg dw	0.770	0.540	1.43	1.07	0.950	0.750	0.600	0.873	0.307	0.540	0.770	1.43

Value exceeds interim long-term benthic invertebrate tissue guideline for selenium (4 mg/kg dw; BCMOE 2014).

Notes:"-" = standard deviation not calculated as all results were below laboratory reporting limit. mg/kg = milligrams per kilogram. dw = dry weight. ww = wet weight. All summary statistics are reported to three significant digits for display purposes. All summary statistics were calculated using the Kaplan-Meier method.

Table C.4.2: Zooplankton Tissue Chemistry Data for Quesnel Lake at QUL-ZOO-1 (Exposed) and QUL-ZOO-7 (Reference) Areas, 2022

Analyte	Units	Exposed											
		QUL-ZOO-1											
		22-Jun-22	27-Jul-22	28-Aug-22	27-Jul-22	28-Jul-22	28-Jul-22	28-Jul-22	Mean	Standard Deviation	Minimum	Median	Maximum
Moisture	%	94.6	99.2	97.9	98.3	98.5	98.6	98.9	98.0	1.56	94.6	98.5	99.2
Aluminum	mg/kg dw	1,220	604	1,450	530	512	602	631	793	379	512	604	1,450
Antimony	mg/kg dw	0.0790	0.0600	0.170	0.0480	0.436	0.0370	0.0440	0.125	0.145	0.0370	0.0600	0.436
Arsenic	mg/kg dw	2.62	2.37	4.24	2.49	2.58	2.30	2.44	2.72	0.679	2.30	2.49	4.24
Barium	mg/kg dw	20.0	10.8	26.0	9.44	7.93	8.40	9.33	13.1	7.02	7.93	9.44	26.0
Beryllium	mg/kg dw	0.0560	0.0260	0.0520	0.0240	0.0260	0.0320	0.0330	0.0356	0.0131	0.0240	0.0320	0.0560
Bismuth	mg/kg dw	<0.010	0.0120	0.0140	<0.010	<0.010	<0.010	<0.010	0.0109	0.000990	<0.010	<0.010	0.0140
Boron	mg/kg dw	1.20	1.40	3.30	1.20	<1.0	1.20	1.20	1.50	0.796	<1.0	1.20	3.30
Cadmium	mg/kg dw	0.940	4.90	1.50	2.60	2.77	2.92	3.32	2.71	1.28	0.940	2.77	4.90
Calcium	mg/kg dw	3,360	8,760	34,500	8,000	9,200	8,420	9,180	11,631	10,288	3,360	8,760	34,500
Cesium	mg/kg dw	0.103	0.0808	0.177	0.0788	0.0631	0.0656	0.0703	0.0912	0.0401	0.0631	0.0788	0.177
Chromium	mg/kg dw	2.69	2.67	21.3	2.02	1.84	1.68	1.31	4.79	7.30	1.31	2.02	21.3
Cobalt	mg/kg dw	0.983	1.13	1.97	0.701	0.652	0.715	0.806	0.994	0.463	0.652	0.806	1.97
Copper	mg/kg dw	16.5	29.2	36.3	18.1	16.0	23.9	27.5	23.9	7.59	16.0	23.9	36.3
Iron	mg/kg dw	1,180	1,720	3,110	1,060	1,030	1,130	1,220	1,493	750	1,030	1,180	3,110
Lead	mg/kg dw	0.464	0.966	0.933	0.662	0.559	0.545	0.612	0.677	0.196	0.464	0.612	0.966
Lithium	mg/kg dw	0.900	0.660	1.63	0.590	<0.50	0.550	0.550	0.769	0.403	<0.50	0.590	1.63
Magnesium	mg/kg dw	1,300	1,530	2,330	1,270	1,220	1,260	1,350	1,466	394	1,220	1,300	2,330
Manganese	mg/kg dw	97.7	184	164	77.2	98.2	112	117	121	38.5	77.2	112	184
Mercury	mg/kg dw	0.0370	0.0650	0.0820	0.0450	0.0440	0.0430	0.0450	0.0516	0.0160	0.0370	0.0450	0.0820
	mg/kg ww	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	-	<0.0020	<0.0020	<0.0020
Molybdenum	mg/kg dw	0.308	0.512	0.744	0.405	0.334	1.86	0.426	0.656	0.551	0.308	0.426	1.86
Nickel	mg/kg dw	2.50	6.59	10.0	3.17	3.21	3.45	3.80	4.67	2.69	2.50	3.45	10.0
Phosphorus	mg/kg dw	11,300	9,350	11,200	10,700	10,200	9,710	10,300	10,394	727	9,350	10,300	11,300
Potassium	mg/kg dw	9,280	7,760	8,840	7,770	7,410	7,420	7,850	8,047	724	7,410	7,770	9,280
Rubidium	mg/kg dw	15.4	13.4	13.7	13.1	12.4	12.7	13.4	13.4	0.971	12.4	13.4	15.4
Selenium	mg/kg dw	2.88	3.68	2.65	2.63	2.64	2.64	2.84	2.85	0.380	2.63	2.65	3.68
Silver	mg/kg dw	0.0547	0.131	0.0587	0.0723	0.0720	0.0813	0.0900	0.0800	0.0256	0.0547	0.0723	0.131
Sodium	mg/kg dw	3,300	3,320	7,070	3,680	3,480	3,560	3,700	4,016	1,356	3,300	3,560	7,070
Strontium	mg/kg dw	20.4	53.2	167	46.8	50.9	47.0	50.9	62.3	47.5	20.4	50.9	167
Tellurium	mg/kg dw	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	-	<0.020	<0.020	<0.020
Thallium	mg/kg dw	0.0307	0.0198	0.0192	0.0192	0.0229	0.0204	0.0195	0.0217	0.00418	0.0192	0.0198	0.0307
Tin	mg/kg dw	0.300	0.270	0.210	0.270	0.160	0.160	0.180	0.221	0.0581	0.160	0.210	0.300
Titanium	mg/kg dw	35.1	32.3	85.7	25.7	18.2	22.0	21.2	34.3	23.5	18.2	25.7	85.7
Uranium	mg/kg dw	0.0901	0.0824	0.143	0.0708	0.0600	0.0706	0.0788	0.0851	0.0273	0.0600	0.0788	0.143
Vanadium	mg/kg dw	2.48	3.79	10.4	3.15	2.93	3.19	3.10	4.15	2.78	2.48	3.15	10.4
Zinc	mg/kg dw	84.6	108	71.0	96.0	87.3	89.5	100	90.9	11.9	71.0	89.5	108
Zirconium	mg/kg dw	0.610	0.630	1.50	0.860	0.380	0.550	0.720	0.750	0.362	0.380	0.630	1.50

Value exceeds interim long-term benthic invertebrate tissue guideline for selenium (4 mg/kg dw; BCMOE 2014).

Notes:"-" = standard deviation not calculated as all results were below laboratory reporting limit. mg/kg = milligrams per kilogram. dw = dry weight. ww = wet weight. All summary statistics are reported to three significant digits for display purposes. All summary statistics were calculated using the Kaplan-Meier method.

APPENDIX C.5
BENTHIC COMMUNITY

Table C.5.1: **Benthic Invertebrate Community Metrics for Quesnel Lake at QUL-PNF (Exposed) and QUL-PREF1 (Reference) Deep Areas, 2014 to 2022**

Year	Area	Type	Replicate	Density (#/m²)	Richness (# of Taxa)	Simpson's Evenness	Simpson's Diversity	EPT (#/m²)	Arachnida (#/m²)	Chironomidae (#/m²)	Oligochaeta (#/m²)	EPT (%)	Arachnida (%)	Chironomidae (%)	Oligochaeta (%)	CA1 (24.4%)	CA2 (16.7%)	CA3 (9.1%)
2014	QUL-PNF	Exposed	1	0	0	-	-	0	0	0	0	0	0	0	0	-	-	-
			2	17.3	1	1.00	0	0	0	17.3	0	0	0	100	0	-2.26	-0.298	0.635
			3	60.6	4	0.817	0.694	0	8.66	34.6	17.3	0	14.3	57.1	28.6	0.587	-0.204	1.50
			4	8.66	1	1.00	0	0	0	0	8.66	0	0	0	100	1.17	-0.295	1.13
			5	95.2	5	0.810	0.753	0	17.3	69.2	0	0	18.2	72.7	0	-0.672	-0.412	-2.77
	QUL-PREF1	Reference	1	5,783	7	0.259	0.448	17.3	17.3	4,553	1,177	0.299	0.299	78.7	20.4	0.876	-0.347	0.287
			2	7,808	6	0.176	0.0523	0	17.3	7,635	104	0	0.222	97.8	1.33	0.875	-0.894	0.415
			3	7,064	9	0.207	0.462	0	17.3	5,038	1,922	0	0.245	71.3	27.2	0.743	-0.720	0.587
			4	4,649	9	0.185	0.400	8.66	8.66	3,428	1,160	0.186	0.186	73.7	24.9	0.589	-0.616	-0.0112
			5	3,913	8	0.270	0.537	0	11.5	1,754	2,089	0	0.295	44.8	53.4	0.936	-0.788	0.596
2015	QUL-PNF	Exposed	1	43.3	4	0.893	0.720	0	0	26.0	8.66	0	0	60.0	20.0	0.112	-0.519	-0.391
			2	51.9	6	1.00	0.833	8.66	8.66	26.0	8.66	16.7	16.7	50.0	16.7	0.0714	-0.611	-1.81
			3	104	3	0.889	0.625	0	0	104	0	0	0	100	0	-1.54	-0.200	0.213
			4	139	5	0.545	0.633	0	17.3	121	0	0	12.5	87.5	0	-1.33	-0.236	0.293
			5	744	5	0.432	0.537	0	8.66	718	17.3	0	1.16	96.5	2.33	-0.495	-0.683	-0.501
	QUL-PREF1	Reference	1	11,600	4	0.416	0.399	0	0	2,805	8,795	0	0	24.2	75.8	0.625	-0.543	-0.138
			2	7,802	6	0.271	0.386	0	0	1,708	6,094	0	0	21.9	78.1	0.640	-0.537	-0.130
			3	23,061	6	0.223	0.253	0	0	2,874	20,187	0	0	12.5	87.5	0.601	-0.505	-0.120
			4	33,726	3	0.371	0.101	0	0	1,801	31,925	0	0	5.34	94.7	0.483	-0.539	-0.474
			5	10,630	4	0.340	0.264	0	0	1,489	9,003	0	0	14.0	84.7	0.674	-0.737	-0.0237
2016	QUL-PNF	Exposed	1	667	7	0.244	0.414	0	0	571	77.9	0	0	85.7	11.7	0.0256	1.37	-0.242
			2	1,333	10	0.201	0.503	0	866	424	34.6	0	64.9	31.8	2.60	-0.163	0.712	-1.88
			3	580	6	0.332	0.498	0	0	580	0	0	0	100	0	-1.38	0.586	-0.282
			4	199	3	0.435	0.234	0	0	190	0	0	0	95.7	0	-0.0111	2.48	-0.609
			5	173	5	0.435	0.540	0	0	147	26.0	0	0	85.0	15.0	0.175	1.00	-0.208
	QUL-PREF1	Reference	1	7,064	7	0.249	0.426	23.1	23.1	2,008	5,009	0.327	0.327	28.4	70.9	0.457	1.09	0.0511
			2	2,268	13	0.212	0.637	0	139	1,359	770	0	6.11	59.9	34.0	0.532	0.427	-0.320
			3	8,195	8	0.236	0.470	23.1	23.1	2,378	5,771	0.282	0.282	29.0	70.4	0.506	0.980	0.195
			4	8,708	12	0.128	0.350	0	0	1,575	7,116	0	0	18.1	81.7	0.683	0.906	0.0737
			5	2,320	12	0.206	0.596	0	0	822	1,437	0	0	35.5	61.9	0.624	0.423	0.567
2018	QUL-PNF	Exposed	1	1,281	11	0.318	0.714	51.9	0	589	589	4.05	0	46.0	46.0	-0.584	-0.460	-0.339
			2	1,376	9	0.280	0.603	0	0	1,229	113	0	0	89.3	8.18	-0.830	-0.425	-0.209
			3	1,065	4	0.375	0.333	0	0	1,047	0	0	0	98.4	0	-1.68	-0.220	0.298
			4	1,056	6	0.652	0.744	8.66	0	718	329	0.820	0	68.0	31.1	-0.621	-0.474	-0.270
			5	528	5	0.463	0.568	0	8.66	519	0	0	1.64	98.4	0	-1.38	-0.517	-0.297
	QUL-PREF1	Reference	1	3,012	11	0.149	0.390	8.66	8.66	2,355	623	0.287	0.287	78.2	20.7	0.517	-0.529	-0.753
			2	5,938	6	0.245	0.319	0	0	4,882	1,004	0	0	82.2	16.9	0.558	-0.529	0.210
			3	7,289	8	0.167	0.253	0	0	6,510	779	0	0	89.3	10.7	0.823	-0.702	0.319
			4	4,952	14	0.123	0.420	0	8.66	3,965	961	0	0.175	80.1	19.4	0.823	-0.528	0.641
			5	5,436	14	0.155	0.540	0	0	3,878	1,489	0	0	71.3	27.4	0.861	-0.471	0.626

Notes: " - " indicates no data, EPT = Ephemeroptera, Plecoptera, Trichoptera, CA = Correspondence Analysis.

Table C.5.1: **Benthic Invertebrate Community Metrics for Quesnel Lake at QUL-PNF (Exposed) and QUL-PREF1 (Reference) Deep Areas, 2014 to 2022**

Year	Area	Type	Replicate	Density (#/m²)	Richness (# of Taxa)	Simpson's Evenness	Simpson's Diversity	EPT (#/m²)	Arachnida (#/m²)	Chironomidae (#/m²)	Oligochaeta (#/m²)	EPT (%)	Arachnida (%)	Chironomidae (%)	Oligochaeta (%)	CA1 (24.4%)	CA2 (16.7%)	CA3 (9.1%)
2019	QUL-PNF	Exposed	1	3,437	5	0.215	0.0688	0	0	121	3,315	0	0	3.53	96.5	-0.182	0.698	-0.297
			2	2,476	9	0.276	0.597	26.0	0	1,636	796	1.05	0	66.1	32.2	-0.794	0.515	0.643
			3	926	10	0.154	0.349	77.9	8.66	814	17.3	8.41	0.935	87.8	1.87	-1.19	-0.202	1.16
			4	1,212	9	0.228	0.512	60.6	0	1,117	0	5.00	0	92.1	0	-1.48	0.106	1.25
			5	1,446	8	0.196	0.361	60.6	0	1,324	8.66	4.19	0	91.6	0.599	-1.11	0.0838	0.818
	QUL-PREF1	Reference	1	7,127	7	0.267	0.465	40.3	0	4,711	2,315	0.565	0	66.1	32.5	0.331	1.62	0.0585
			2	11,357	3	0.427	0.219	0	0	9,938	1,385	0	0	87.5	12.2	0.585	2.28	-0.700
			3	7,860	7	0.236	0.395	17.3	34.6	5,834	1,956	0.220	0.441	74.2	24.9	0.538	1.42	0.331
			4	10,388	6	0.232	0.283	72.1	0	8,681	1,563	0.694	0	83.6	15.1	0.509	1.92	0.0513
			5	13,591	9	0.215	0.483	43.3	0	9,262	4,198	0.318	0	68.2	30.9	0.120	1.60	-0.0528
2020	QUL-PNF	Exposed	1	689	10	0.347	0.711	25.8	0	327	336	3.75	0	47.5	48.8	-0.575	0.748	-0.400
			2	784	8	0.322	0.612	0	17.2	741	17.2	0	2.20	94.5	2.20	-1.18	-0.265	-0.567
			3	818	9	0.244	0.544	8.61	17.2	784	0	1.05	2.11	95.8	0	-1.21	-0.336	-0.672
			4	1,240	8	0.292	0.573	0	43.1	1,137	43.1	0	3.47	91.7	3.47	-1.04	0.0147	0.449
			5	1,042	6	0.278	0.400	0	25.8	999	0	0	2.48	95.9	0	-1.44	0.113	0.725
2021	QUL-PNF	Exposed	1	1,266	8	0.590	0.788	17.2	379	577	293	1.36	29.9	45.6	23.1	-0.336	-0.415	-1.25
			2	1,705	5	0.304	0.342	0	17.2	319	1,369	0	1.01	18.7	80.3	-0.318	-0.337	0.0915
			3	1,309	6	0.274	0.391	0	25.8	1,283	0	0	1.97	98.0	0	-1.21	-0.0452	1.08
			4	1,550	7	0.276	0.483	0	25.8	1,473	43.1	0	1.67	95.0	2.78	-1.23	-0.124	0.689
			5	1,533	7	0.288	0.504	0	112	1,386	25.8	0	7.30	90.5	1.69	-1.04	-0.231	-0.0697
	QUL-PREF1	Reference	1	2,833	5	0.394	0.492	0	0	1,757	1,068	0	0	62.0	37.7	0.545	-0.506	-0.320
			2	10,781	8	0.266	0.531	0	172	4,891	5,718	0	1.60	45.4	53.0	0.834	-0.572	-0.776
			3	6,768	13	0.151	0.492	0	138	4,461	2,118	0	2.04	65.9	31.3	0.620	-0.583	-0.802
			4	4,641	8	0.259	0.517	8.61	25.8	2,118	2,454	0.186	0.557	45.6	52.9	0.515	-0.765	-0.957
			5	10,299	15	0.159	0.579	17.2	0	6,992	3,255	0.167	0	67.9	31.6	0.658	-0.227	0.883
2022	QUL-PNF	Exposed	1	818	5	0.396	0.495	0	34.4	749	17.2	0	4.21	91.6	2.11	-1.42	0.123	0.725
			2	603	9	0.337	0.671	0	86.1	456	60.3	0	14.3	75.7	10.0	-0.763	-0.331	-1.12
			3	1,016	5	0.361	0.446	0	0	999	17.2	0	0	98.3	1.69	-1.80	-0.286	-0.0611
			4	1,180	6	0.282	0.410	8.61	0	1,111	60.3	0.730	0	94.2	5.11	-1.19	-0.504	0.117
			5	1,361	6	0.281	0.407	0	68.9	1,283	8.61	0	5.06	94.3	0.633	-1.51	-0.247	0.332

Notes: " - " indicates no data, EPT = Ephemeroptera, Plecoptera, Trichoptera, CA = Correspondence Analysis.

Table C.5.2: Summary Statistics for Benthic Invertebrate Community Metrics for Quesnel Lake at QUL-PNF (Exposed) and QUL-PREF1 (Reference) Deep Areas, 2014 to 2022

Endpoint	Year	Area	Type	n	Mean	Standard Deviation	Minimum	Median	Maximum
Density (#/m²)	2014	QUL-PREF1	Reference	5	5,843	1,621	3,913	5,783	7,808
		QUL-PNF	Exposed	5	36.4	40.3	0	17.3	95.2
	2015	QUL-PREF1	Reference	5	17,364	10,842	7,802	11,600	33,726
		QUL-PNF	Exposed	5	216	298	43.3	104	744
	2016	QUL-PREF1	Reference	5	5,711	3,176	2,268	7,064	8,708
		QUL-PNF	Exposed	5	590	470	173	580	1,333
	2018	QUL-PREF1	Reference	5	5,325	1,560	3,012	5,436	7,289
		QUL-PNF	Exposed	5	1,061	329	528	1,065	1,376
	2019	QUL-PREF1	Reference	5	10,065	2,632	7,127	10,388	13,591
		QUL-PNF	Exposed	5	1,899	1,039	926	1,446	3,437
	2020	QUL-PNF	Exposed	5	915	223	689	818	1,240
	2021	QUL-PREF1	Reference	5	7,065	3,469	2,833	6,768	10,781
		QUL-PNF	Exposed	5	1,473	182	1,266	1,533	1,705
	2022	QUL-PNF	Exposed	5	995	297	603	1,016	1,361
Richness (# of Taxa)	2014	QUL-PREF1	Reference	5	7.80	1.30	6	8	9
		QUL-PNF	Exposed	5	2.20	2.17	0	1	5
	2015	QUL-PREF1	Reference	5	4.60	1.34	3	4	6
		QUL-PNF	Exposed	5	4.60	1.14	3	5	6
	2016	QUL-PREF1	Reference	5	10.4	2.70	7	12	13
		QUL-PNF	Exposed	5	6.20	2.59	3	6	10
	2018	QUL-PREF1	Reference	5	10.6	3.58	6	11	14
		QUL-PNF	Exposed	5	7.00	2.92	4	6	11
	2019	QUL-PREF1	Reference	5	6.40	2.19	3	7	9
		QUL-PNF	Exposed	5	8.20	1.92	5	9	10
	2020	QUL-PNF	Exposed	5	8.20	1.48	6	8	10
	2021	QUL-PREF1	Reference	5	9.80	4.09	5	8	15
		QUL-PNF	Exposed	5	6.60	1.14	5	7	8
	2022	QUL-PNF	Exposed	5	6.20	1.64	5	6	9
Simpson's Evenness	2014	QUL-PREF1	Reference	5	0.219	0.0428	0.176	0.207	0.270
		QUL-PNF	Exposed	5	0.907	0.108	0.810	0.908	1.00
	2015	QUL-PREF1	Reference	5	0.324	0.0771	0.223	0.340	0.416
		QUL-PNF	Exposed	5	0.752	0.248	0.432	0.889	1.00
	2016	QUL-PREF1	Reference	5	0.206	0.0470	0.128	0.212	0.249
		QUL-PNF	Exposed	5	0.329	0.107	0.201	0.332	0.435
	2018	QUL-PREF1	Reference	5	0.168	0.0460	0.123	0.155	0.245
		QUL-PNF	Exposed	5	0.417	0.148	0.280	0.375	0.652
	2019	QUL-PREF1	Reference	5	0.275	0.0868	0.215	0.236	0.427
		QUL-PNF	Exposed	5	0.213	0.0446	0.154	0.215	0.276
	2020	QUL-PNF	Exposed	5	0.297	0.0397	0.244	0.292	0.347
	2021	QUL-PREF1	Reference	5	0.246	0.0987	0.151	0.259	0.394
		QUL-PNF	Exposed	5	0.347	0.137	0.274	0.288	0.590
	2022	QUL-PNF	Exposed	5	0.332	0.0501	0.281	0.337	0.396
Simpson's Diversity	2014	QUL-PREF1	Reference	5	0.380	0.190	0.0523	0.448	0.537
		QUL-PNF	Exposed	5	0.362	0.418	0	0.347	0.753
	2015	QUL-PREF1	Reference	5	0.281	0.121	0.101	0.264	0.399
		QUL-PNF	Exposed	5	0.670	0.112	0.537	0.633	0.833
	2016	QUL-PREF1	Reference	5	0.496	0.119	0.350	0.470	0.637
		QUL-PNF	Exposed	5	0.438	0.123	0.234	0.498	0.540
	2018	QUL-PREF1	Reference	5	0.384	0.108	0.253	0.390	0.540
		QUL-PNF	Exposed	5	0.592	0.163	0.333	0.603	0.744
	2019	QUL-PREF1	Reference	5	0.369	0.115	0.219	0.395	0.483
		QUL-PNF	Exposed	5	0.378	0.202	0.0688	0.361	0.597
	2020	QUL-PNF	Exposed	5	0.568	0.113	0.400	0.573	0.711
	2021	QUL-PREF1	Reference	5	0.522	0.0361	0.492	0.517	0.579
		QUL-PNF	Exposed	5	0.502	0.173	0.342	0.483	0.788
	2022	QUL-PNF	Exposed	5	0.486	0.109	0.407	0.446	0.671
EPT (#/m²)	2014	QUL-PREF1	Reference	5	5.19	7.74	0	0	17.3
		QUL-PNF	Exposed	5	0	0	0	0	0
	2015	QUL-PREF1	Reference	5	0	0	0	0	0
		QUL-PNF	Exposed	5	1.73	3.87	0	0	8.66
	2016	QUL-PREF1	Reference	5	9.23	12.6	0	0	23.1
		QUL-PNF	Exposed	5	0	0	0	0	0
	2018	QUL-PREF1	Reference	5	1.73	3.87	0	0	8.66
		QUL-PNF	Exposed	5	12.1	22.6	0	0	51.9
	2019	QUL-PREF1	Reference	5	34.6	27.4	0	40.3	72.1
		QUL-PNF	Exposed	5	45.0	31.4	0	60.6	77.9
	2020	QUL-PNF	Exposed	5	6.89	11.2	0	0	25.8
	2021	QUL-PREF1	Reference	5	5.17	7.70	0	0	17.2
		QUL-PNF	Exposed	5	3.44	7.70	0	0	17.2
	2022	QUL-PNF	Exposed	5	1.72	3.85	0	0	8.61
Arachnida (#/m²)	2014	QUL-PREF1	Reference	5	14.4	4.08	8.66	17.3	17.3
		QUL-PNF	Exposed	5	5.19	7.74	0	0	17.3
	2015	QUL-PREF1	Reference	5	0	0	0	0	0
		QUL-PNF	Exposed	5	6.93	7.24	0	8.66	17.3
	2016	QUL-PREF1	Reference	5	36.9	57.9	0	23.1	139
		QUL-PNF	Exposed	5	173	387	0	0	866
	2018	QUL-PREF1	Reference	5	3.46	4.74	0	0	8.66
		QUL-PNF	Exposed	5	1.73	3.87	0	0	8.66
	2019	QUL-PREF1	Reference	5	6.93	15.5	0	0	34.6
		QUL-PNF	Exposed	5	1.73	3.87	0	0	8.66
	2020	QUL-PNF	Exposed	5	20.7	15.6	0	17.2	43.1
	2021	QUL-PREF1	Reference	5	67.2	81.8	0	25.8	172
		QUL-PNF	Exposed	5	112	154	17.2	25.8	379
	2022	QUL-PNF	Exposed	5	37.9	39.3	0	34.4	86.1
Chironomidae (#/m²)	2014	QUL-PREF1	Reference	5	4,482	2,168	1,754	4,553	7,635
	2015	QUL-PREF1	Reference	5	2,135	653	1,489	1,801	2,874
		QUL-PNF	Exposed	5	199	294	26.0	104	718
	2016	QUL-PREF1	Reference	5	1,629	598	822	1,575	2,378
		QUL-PNF	Exposed	5	383	205	147	424	580
	2018	QUL-PREF1	Reference	5	4,318	1,524	2,355	3,965	6,510
		QUL-PNF	Exposed	5	821	306	519	718	1,229
	2019	QUL-PREF1	Reference	5	7,685	2,282	4,711	8,681	9,938
		QUL-PNF	Exposed	5	1,002	577	121	1,117	1,636
	2020	QUL-PNF	Exposed	5	797	308	327	784	1,137
	2021	QUL-PREF1	Reference	5	4,044	2,152	1,757	4,461	6,992
		QUL-PNF	Exposed	5	1,008	523	319	1,283	1,473
	2022	QUL-PNF	Exposed	5	920	323	456	999	1,283

Notes: " - " indicates no data. EPT = Ephemeroptera, Plecoptera, Trichoptera. CA = Correspondence Analysis.

Table C.5.2: Summary Statistics for Benthic Invertebrate Community Metrics for Quesnel Lake at QUL-PNF (Exposed) and QUL-PREF1 (Reference) Deep Areas, 2014 to 2022

Endpoint	Year	Area	Type	n	Mean	Standard Deviation	Minimum	Median	Maximum
Oligochaeta (#/m²)	2014	QUL-PREF1	Reference	5	1,290	786	104	1,177	2,089
		QUL-PNF	Exposed	5	5.19	7.74	0	0	17.3
	2015	QUL-PREF1	Reference	5	15,201	10,804	6,094	9,003	31,925
		QUL-PNF	Exposed	5	6.93	7.24	0	8.66	17.3
	2016	QUL-PREF1	Reference	5	4,021	2,778	770	5,009	7,116
		QUL-PNF	Exposed	5	27.7	32.0	0	26.0	77.9
	2018	QUL-PREF1	Reference	5	971	327	623	961	1,489
		QUL-PNF	Exposed	5	206	253	0	113	589
	2019	QUL-PREF1	Reference	5	2,284	1,129	1,385	1,956	4,198
		QUL-PNF	Exposed	5	828	1,432	0	17.3	3,315
	2020	QUL-PNF	Exposed	5	79.2	145	0	17.2	336
	2021	QUL-PREF1	Reference	5	2,923	1,749	1,068	2,454	5,718
		QUL-PNF	Exposed	5	346	584	0	43.1	1,369
	2022	QUL-PNF	Exposed	5	32.7	25.4	8.61	17.2	60.3
EPT (%)	2014	QUL-PREF1	Reference	5	0.0971	0.139	0	0	0.299
		QUL-PNF	Exposed	5	0	0	0	0	0
	2015	QUL-PREF1	Reference	5	0	0	0	0	0
		QUL-PNF	Exposed	5	3.33	7.45	0	0	16.7
	2016	QUL-PREF1	Reference	5	0.122	0.167	0	0	0.327
		QUL-PNF	Exposed	5	0	0	0	0	0
	2018	QUL-PREF1	Reference	5	0.0575	0.129	0	0	0.287
		QUL-PNF	Exposed	5	0.975	1.76	0	0	4.05
	2019	QUL-PREF1	Reference	5	0.360	0.276	0	0.318	0.694
		QUL-PNF	Exposed	5	3.73	3.35	0	4.19	8.41
	2020	QUL-PNF	Exposed	5	0.961	1.62	0	0	3.75
	2021	QUL-PREF1	Reference	5	0.0706	0.0968	0	0	0.186
		QUL-PNF	Exposed	5	0.272	0.608	0	0	1.36
	2022	QUL-PNF	Exposed	5	0.146	0.326	0	0	0.730
Arachnida (%)	2014	QUL-PREF1	Reference	5	0.249	0.0484	0.186	0.245	0.299
		QUL-PNF	Exposed	5	6.49	9.00	0	0	18.2
	2015	QUL-PREF1	Reference	5	0	0	0	0	0
		QUL-PNF	Exposed	5	6.07	7.93	0	1.16	16.7
	2016	QUL-PREF1	Reference	5	1.34	2.67	0	0.282	6.11
		QUL-PNF	Exposed	5	13.0	29.0	0	0	64.9
	2018	QUL-PREF1	Reference	5	0.0924	0.133	0	0	0.287
		QUL-PNF	Exposed	5	0.328	0.733	0	0	1.64
	2019	QUL-PREF1	Reference	5	0.0881	0.197	0	0	0.441
		QUL-PNF	Exposed	5	0.187	0.418	0	0	0.935
	2020	QUL-PNF	Exposed	5	2.05	1.27	0	2.20	3.47
	2021	QUL-PREF1	Reference	5	0.838	0.935	0	0.557	2.04
		QUL-PNF	Exposed	5	8.38	12.3	1.01	1.97	29.9
	2022	QUL-PNF	Exposed	5	4.71	5.84	0	4.21	14.3
Chironomidae (%)	2014	QUL-PREF1	Reference	5	73.3	19.0	44.8	73.7	97.8
		QUL-PNF	Exposed	5	46.0	44.7	0	57.1	100
	2015	QUL-PREF1	Reference	5	15.6	7.60	5.34	14.0	24.2
		QUL-PNF	Exposed	5	78.8	22.5	50.0	87.5	100
	2016	QUL-PREF1	Reference	5	34.2	15.7	18.1	29.0	59.9
		QUL-PNF	Exposed	5	79.6	27.5	31.8	85.7	100
	2018	QUL-PREF1	Reference	5	80.2	6.52	71.3	80.1	89.3
		QUL-PNF	Exposed	5	80.0	22.7	46.0	89.3	98.4
	2019	QUL-PREF1	Reference	5	75.9	9.38	66.1	74.2	87.5
		QUL-PNF	Exposed	5	68.2	37.7	3.53	87.8	92.1
	2020	QUL-PNF	Exposed	5	85.1	21.1	47.5	94.5	95.9
	2021	QUL-PREF1	Reference	5	57.4	11.0	45.4	62.0	67.9
		QUL-PNF	Exposed	5	69.5	35.6	18.7	90.5	98.0
	2022	QUL-PNF	Exposed	5	90.8	8.78	75.7	94.2	98.3
Oligochaeta (%)	2014	QUL-PREF1	Reference	5	25.4	18.6	1.33	24.9	53.4
		QUL-PNF	Exposed	5	25.7	43.3	0	0	100
	2015	QUL-PREF1	Reference	5	84.2	7.55	75.8	84.7	94.7
		QUL-PNF	Exposed	5	7.80	9.74	0	2.33	20.0
	2016	QUL-PREF1	Reference	5	63.8	18.1	34.0	70.4	81.7
		QUL-PNF	Exposed	5	5.86	7.01	0	2.60	15.0
	2018	QUL-PREF1	Reference	5	19.0	6.06	10.7	19.4	27.4
		QUL-PNF	Exposed	5	17.1	20.6	0	8.18	46.0
	2019	QUL-PREF1	Reference	5	23.1	9.16	12.2	24.9	32.5
		QUL-PNF	Exposed	5	26.2	41.6	0	1.87	96.5
	2020	QUL-PNF	Exposed	5	10.9	21.2	0	2.20	48.8
	2021	QUL-PREF1	Reference	5	41.3	10.9	31.3	37.7	53.0
		QUL-PNF	Exposed	5	21.6	34.1	0	2.78	80.3
	2022	QUL-PNF	Exposed	5	3.91	3.79	0.633	2.11	10.0
CA1 (24.4%)	2014	QUL-PREF1	Reference	5	0.804	0.139	0.589	0.875	0.936
		QUL-PNF	Exposed	5	-0.294	1.52	-2.26	-0.0427	1.17
	2015	QUL-PREF1	Reference	5	0.605	0.0729	0.483	0.625	0.674
		QUL-PNF	Exposed	5	-0.636	0.771	-1.54	-0.495	0.112
	2016	QUL-PREF1	Reference	5	0.560	0.0914	0.457	0.532	0.683
		QUL-PNF	Exposed	5	-0.271	0.633	-1.38	-0.0111	0.175
	2018	QUL-PREF1	Reference	5	0.716	0.165	0.517	0.823	0.861
		QUL-PNF	Exposed	5	-1.02	0.488	-1.68	-0.830	-0.584
	2019	QUL-PREF1	Reference	5	0.416	0.192	0.120	0.509	0.585
		QUL-PNF	Exposed	5	-0.950	0.494	-1.48	-1.11	-0.182
	2020	QUL-PNF	Exposed	5	-1.09	0.322	-1.44	-1.18	-0.575
	2021	QUL-PREF1	Reference	5	0.634	0.126	0.515	0.620	0.834
		QUL-PNF	Exposed	5	-0.827	0.462	-1.23	-1.04	-0.318
	2022	QUL-PNF	Exposed	5	-1.34	0.390	-1.80	-1.42	-0.763
CA2 (16.7%)	2014	QUL-PREF1	Reference	5	-0.673	0.209	-0.894	-0.720	-0.347
		QUL-PNF	Exposed	5	-0.302	0.0851	-0.412	-0.297	-0.204
	2015	QUL-PREF1	Reference	5	-0.572	0.0931	-0.737	-0.539	-0.505
		QUL-PNF	Exposed	5	-0.449	0.220	-0.683	-0.519	-0.200
	2016	QUL-PREF1	Reference	5	0.765	0.317	0.423	0.906	1.09
		QUL-PNF	Exposed	5	1.23	0.760	0.586	1.00	2.48
	2018	QUL-PREF1	Reference	5	-0.552	0.0875	-0.702	-0.529	-0.471
		QUL-PNF	Exposed	5	-0.419	0.116	-0.517	-0.460	-0.220
	2019	QUL-PREF1	Reference	5	1.77	0.339	1.42	1.62	2.28
		QUL-PNF	Exposed	5	0.240	0.362	-0.202	0.106	0.698
	2020	QUL-PNF	Exposed	5	0.0551	0.430	-0.336	0.0147	0.748
	2021	QUL-PREF1	Reference	5	-0.531	0.195	-0.765	-0.572	-0.227
		QUL-PNF	Exposed	5	-0.230	0.151	-0.415	-0.231	-0.0452
	2022	QUL-PNF	Exposed	5	-0.249	0.230	-0.504	-0.286	0.123
CA3 (9.1%)	2014	QUL-PREF1	Reference	5	0.375	0.251	-0.0112	0.415	0.596
		QUL-PNF	Exposed	5	0.125	1.96	-2.77	0.883	1.50
	2015	QUL-PREF1	Reference	5	-0.177	0.172	-0.474	-0.130	-0.0237
		QUL-PNF	Exposed	5	-0.440	0.844	-1.81	-0.391	0.293
	2016	QUL-PREF1	Reference	5	0.113	0.319	-0.320	0.0737	0.567
		QUL-PNF	Exposed	5	-0.645	0.711	-1.88	-0.282	-0.208
	2018	QUL-PREF1	Reference	5	0.209	0.570	-0.753	0.319	0.641
		QUL-PNF	Exposed	5	-0.164	0.262	-0.339	-0.270	0.298
	2019	QUL-PREF1	Reference	5	-0.0626	0.384	-0.700	0.0513	0.331
		QUL-PNF	Exposed	5	0.715	0.617	-0.297	0.818	1.25
	2020	QUL-PNF	Exposed	5	-0.0931	0.636	-0.672	-0.400	0.725
	2021	QUL-PREF1	Reference	5	-0.394	0.753	-0.957	-0.776	0.883
		QUL-PNF	Exposed	5	0.109	0.891	-1.25	0.0915	1.08
	2022	QUL-PNF	Exposed	5	-0.000921	0.690	-1.12	0.117	0.725

Notes: " - " indicates no data. EPT = Ephemeroptera, Plecoptera, Trichoptera. CA = Correspondence Analysis.

Table C.5.3: Benthic Invertebrate Community Supporting Measures for Quesnel Lake at QUL-PNF (Exposed) Deep Area, 2014 to 2022

Year	Area Code	Type	Station	Station Depth (m)	Bottom Water Quality					Sediment Parameters							
					Temperature (°C)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (%)	Specific Conductance (µS/cm)	pH	% Fines	% TOC	PC Axis 1 (76 %)	PC Axis 2 (15 %)	Arsenic (mg/kg)	Copper (mg/kg)	Iron (mg/kg)	Manganese (mg/kg)
2014	QUL-PREF1	Reference	QUL-PREF1-1	115	4.61	10.8	83.8	116	7.71	69.5	1.62	5.02	-0.488	7.15	46.7	29,200	456
			QUL-PREF1-2	108	4.61	2.14	14.9	119	7.71	68.3	1.70	5.93	0.393	6.95	39.1	26,900	421
			QUL-PREF1-3	117	4.48	10.8	83.8	117	7.48	78.6	1.72	5.04	-0.352	8.60	44.0	29,900	484
			QUL-PREF1-4	107	4.63	10.5	81.3	118	7.52	83.3	1.64	5.19	-0.0945	8.15	42.2	29,500	494
			QUL-PREF1-5	103	4.57	10.8	83.5	115	7.61	82.9	1.71	5.92	0.935	7.89	38.8	27,400	496
	QUL-PNF	Exposed	QUL-PNF-1	106	6.72	6.42	52.5	169	8.00	95.8	0.120	-2.37	4.02	15.5	766	27,900	863
			QUL-PNF-2	109	6.86	6.12	50.3	167	8.06	99.6	0.120	-3.96	1.74	18.6	865	31,100	948
			QUL-PNF-3	104	7.04	5.24	43.8	172	8.06	99.7	0.270	-2.17	4.48	15.4	690	25,500	811
			QUL-PNF-4	104	7.09	5.13	42.7	176	8.09	96.0	0.170	-1.08	6.44	14.4	566	33,700	650
			QUL-PNF-5	107	6.99	7.21	59.2	156	8.15	69.9	0.150	-1.44	5.55	13.2	681	68,000	711
2015	QUL-PREF1	Reference	QUL-PREF1-1	115	3.80	11.1	84.5	110	7.51	78.9	1.76	3.86	-2.23	8.64	59.4	32,300	477
			QUL-PREF1-2	103	3.83	11.0	83.4	110	7.35	71.8	-	-	-	-	-	-	-
			QUL-PREF1-3	120	4.45	10.4	81.0	110	7.50	84.8	1.71	4.20	-1.10	8.98	55.8	32,700	479
			QUL-PREF1-4	102	4.12	10.3	80.0	113	7.66	81.3	-	-	-	-	-	-	-
			QUL-PREF1-5	103	4.26	10.4	79.8	112	7.40	85.7	1.98	4.89	-0.262	9.02	50.0	28,900	516
	QUL-PNF	Exposed	QUL-PNF-1	112	4.42	11.0	83.4	115	7.46	98.6	0.420	-5.02	-1.09	16.2	1,110	38,700	1,250
			QUL-PNF-2	111	4.40	10.3	79.4	146	7.41	98.4	0.520	-5.61	-1.67	17.0	1,190	41,200	1,310
			QUL-PNF-3	104	4.31	10.3	79.1	146	7.46	98.2	0.250	-3.82	0.597	16.1	904	38,600	1,090
			QUL-PNF-4	97.3	4.32	10.1	77.8	147	7.51	98.1	<0.1	-0.208	5.93	13.4	536	35,100	716
			QUL-PNF-5	106	4.32	10.2	78.2	151	7.57	71.8	0.180	-1.47	4.95	14.1	557	49,500	801
2016	QUL-PREF1	Reference	QUL-PREF1-1	116	3.82	10.4	78.8	118	7.60	70.9	2.02	3.89	-1.71	9.89	61.1	30,900	469
			QUL-PREF1-2	103	3.80	10.5	79.7	116	7.76	76.5	2.01	4.60	-1.15	9.57	56.4	29,000	457
			QUL-PREF1-3	119	3.81	10.5	79.5	116	7.25	79.8	2.03	3.90	-1.95	11.0	59.4	32,100	495
			QUL-PREF1-4	100	3.79	10.3	78.0	117	7.41	86.5	1.67	4.50	-0.960	9.05	56.3	30,700	451
			QUL-PREF1-5	98.8	3.88	10.2	77.6	118	7.29	87.3	1.89	5.24	-0.232	8.37	47.5	29,400	480
	QUL-PNF	Exposed	QUL-PNF-1	109	4.51	10.6	82.2	115	7.38	99.0	0.390	-5.55	-1.82	17.9	1,230	38,500	1,360
			QUL-PNF-2	112	4.51	10.6	81.8	115	7.04	97.7	0.410	-5.70	-1.64	18.4	1,250	38,300	1,350
			QUL-PNF-3	105	4.50	10.3	79.4	116	7.18	96.1	0.200	-5.40	-0.916	19.4	1,180	39,400	1,330
			QUL-PNF-4	112	4.76	10.1	78.7	118	7.02	99.0	0.380	-5.83	-2.17	18.9	1,260	39,900	1,450
			QUL-PNF-5	113	4.60	10.5	81.5	119	7.18	99.5	0.350	-5.24	-1.08	17.9	1,130	37,000	1,250
2018	QUL-PREF1	Reference	QUL-PREF1-1	112	3.73	11.8	89.1	113	7.57	84.9	2.07	5.34	-0.632	8.47	48.9	29,500	416
			QUL-PREF1-2	105	3.78	11.8	89.3	113	7.52	82.2	2.22	5.38	-0.300	8.47	46.8	29,200	397
			QUL-PREF1-3	112	3.76	11.8	89.4	113	7.43	86.5	2.13	5.57	0.295	7.99	45.3	28,400	425
			QUL-PREF1-4	107	3.97	11.4	87.2	113	7.50	84.7	2.26	5.70	0.0492	7.50	46.7	28,100	405
			QUL-PREF1-5	97.0	3.75	11.7	88.9	113	7.50	85.9	1.92	5.85	0.360	7.39	43.2	28,300	449
	QUL-PNF	Exposed	QUL-PNF-1	108	4.46	11.5	88.8	121	7.19	97.6	0.370	-3.44	-0.491	15.6	881	43,200	1,420
			QUL-PNF-2	112	4.39	11.0	84.5	114	7.17	98.5	0.420	-4.32	-0.363	16.7	1,000	38,300	1,280
			QUL-PNF-3	105	4.40	11.5	88.6	120	7.52	92.1	0.200	-3.59	1.54	15.6	850	44,800	1,170
			QUL-PNF-4	113	4.47	10.9	84.5	114	7.57	76.5	1.44	-1.11	-0.927	12.9	533	38,100	1,070
			QUL-PNF-5	113	4.47	11.0	84.6	115	7.52	99.4	0.410	-3.91	-1.18	16.0	964	39,900	1,510

Notes: "-" indicates no data, TOC = Total Organic Carbon, PC Axis = Principal Components Axis, mg/kg = milligrams per kilogram.

Table C.5.3: Benthic Invertebrate Community Supporting Measures for Quesnel Lake at QUL-PNF (Exposed) Deep Area, 2014 to 2022

Year	Area Code	Type	Station	Station Depth (m)	Bottom Water Quality					Sediment Parameters							
					Temperature (°C)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (%)	Specific Conductance (µS/cm)	pH	% Fines	% TOC	PC Axis 1 (76 %)	PC Axis 2 (15 %)	Arsenic (mg/kg)	Copper (mg/kg)	Iron (mg/kg)	Manganese (mg/kg)
2019	QUL-PREF1	Reference	QUL-PREF1-1	115	3.74	11.2	84.8	112	7.61	89.9	2.07	4.90	-1.09	8.49	49.7	30,700	401
			QUL-PREF1-2	99.0	3.84	11.0	84	111	7.73	80.2	1.78	4.84	-0.977	8.18	50.2	30,700	413
			QUL-PREF1-3	117	3.77	11.0	83.7	112	7.75	88.5	1.56	5.16	-0.456	7.74	48.8	29,300	399
			QUL-PREF1-4	97.0	3.84	11.1	84.4	111	7.63	86.1	1.71	5.11	-0.501	7.86	49.4	30,600	408
			QUL-PREF1-5	97.0	3.82	11.1	84.6	111	7.66	88.2	1.88	5.30	-0.123	7.23	46.9	28,900	445
	QUL-PNF	Exposed	QUL-PNF-1	110	4.27	11.8	90.8	119	7.77	97.7	0.550	-5.63	-1.64	17.0	1,200	42,500	1,390
			QUL-PNF-2	108	4.26	11.8	90.6	120	7.71	98.7	0.600	-5.45	-2.19	17.3	1,140	42,500	1,460
			QUL-PNF-3	105	4.22	11.1	85.1	136	7.55	93.7	0.360	-2.18	2.55	14.7	706	38,300	1,030
			QUL-PNF-4	101	4.32	11.8	90.5	118	7.79	93.6	0.650	-5.65	-2.63	17.5	1,150	44,300	1,540
			QUL-PNF-5	110	4.30	11.8	90.7	119	7.71	99.6	0.430	-4.63	-1.27	15.9	1,100	38,500	1,370
2020	QUL-PNF	Exposed	QUL-PNF-1	112	4.51	11.2	86.2	122	7.20	96.9	0.0680	-1.56	2.98	14.6	700	32,100	1,110
			QUL-PNF-2	113	4.51	11.1	86.1	122	7.38	96.2	0.0890	-3.19	-0.999	15.6	854	38,400	1,250
			QUL-PNF-3	108	4.51	11.2	86.9	122	7.52	95.5	0.0610	-2.23	-0.301	14.3	735	39,400	1,400
			QUL-PNF-4	113	4.51	11.2	86.5	122	7.46	89.1	0.0780	-2.95	-0.941	14.8	743	49,800	1,430
			QUL-PNF-5	112	4.52	11.2	86.4	122	7.42	99.1	0.0750	-3.25	-1.61	15.3	888	36,600	1,530
2021	QUL-PREF1	Reference	QUL-PREF1-1	116	3.75	11.4	86.3	99.9	7.32	80.0	2.13	4.40	-0.858	8.00	50.0	30,400	416
			QUL-PREF1-2	107	3.85	11.2	85.4	100	7.28	77.2	2.07	4.93	0.249	9.50	44.4	30,500	441
			QUL-PREF1-3	120	3.76	11.3	85.5	100	7.35	79.9	2.03	4.26	-0.933	9.66	46.3	31,000	485
			QUL-PREF1-4	100	3.88	10.7	81.5	102	7.31	82.1	2.08	4.98	0.0689	8.55	43.5	29,600	440
			QUL-PREF1-5	105	3.79	11.2	85.0	100	7.34	80.5	2.17	4.28	-0.362	9.38	42.4	30,800	572
	QUL-PNF	Exposed	QUL-PNF-1	110	4.63	11.6	90.3	115	7.41	96.4	0.599	-4.04	-1.31	16.3	906	43,300	1,880
			QUL-PNF-2	111	4.63	11.5	89.5	114	7.43	92.4	0.830	-3.55	-0.377	16.8	857	42,200	1,270
			QUL-PNF-3	106	4.63	11.5	89.2	114	7.42	98.0	0.309	-2.88	1.70	14.6	865	33,400	1,200
			QUL-PNF-4	96.0	4.64	11.5	89.4	114	7.44	93.9	0.562	-2.09	1.56	15.8	621	34,000	1,220
			QUL-PNF-5	105	4.63	11.5	89.1	115	7.40	92.5	0.534	-2.52	-0.326	15.1	780	41,000	1,420
2022	QUL-PNF	Exposed	QUL-PNF-1	113	4.54	11.2	86.9	103	7.69	87.2	0.622	-3.55	-0.484	15.8	925	46,100	1,190
			QUL-PNF-2	112	4.54	11.2	86.9	103	7.69	96.9	0.695	-2.69	-0.519	15.3	794	43,100	1,360
			QUL-PNF-3	110	4.70	11.2	86.9	106	7.68	77.0	0.456	-2.41	0.572	15.1	745	50,600	1,220
			QUL-PNF-4	112	4.56	11.2	86.8	104	7.69	92.5	0.736	-2.78	-1.19	15.5	797	42,000	1,320
			QUL-PNF-5	110	4.55	11.2	86.7	103	7.70	95.3	0.559	-3.69	-1.05	16.3	915	43,700	1,370

Notes: "-" indicates no data, TOC = Total Organic Carbon, PC Axis = Principal Components Axis, mg/kg = milligrams per kilogram.

APPENDIX C.6
FISH CATCH & MERISTICS

Table C.6.1: **Hoop Net Catch Data for Polley Lake (POL; Exposed) and Bootjack Lake (BOL; Reference), May 2022**

Area	Station ID	Net Size	UTM (NAD83, 10U)		Set Date	Lift Date	Set Time	Removal Time	Depth Range (m)		Effort (Fishing days)	Largescale Sucker					Longnose Sucker					Rainbow Trout					Redside Shiner				
			Easting	Northing								Catch	Sacrificed	Released Alive	Mortalities	CPUE[a]	Catch	Sacrificed	Released Alive	Mortalities	CPUE[a]	Catch	Sacrificed	Released Alive	Mortalities	CPUE[a]	Catch	Sacrificed	Released Alive	Mortalities	CPUE[a]
Polley Lake	POL_HN-1_2022-05	2.5	595698	5821073	26-May-22	28-May-22	16:07	9:32	2.1	2.3	1.73	0	0	0	0	0	60	8	52	0	34.8	14	3	6	2	8.11	3	0	2	1	1.74
	POL_HN-2_2022-05	2.5	595695	5820981	26-May-22	29-May-22	16:40	9:31	1.2	1.2	2.70	0	0	0	0	0	77	0	77	0	28.5	70	5	65	0	25.9	16	0	14	2	6
	POL_HN-3_2022-05	2.5	595383	5820933	26-May-22	29-May-22	17:14	12:36	0.8	1.3	2.81	0	0	0	0	0	58	0	58	0	20.7	116	0	116	0	41.3	2	0	2	0	0.713
	POL_HN-4_2022-05	2.5	595514	5820906	26-May-22	29-May-22	17:47	13:10	3.9	4.4	2.81	0	0	0	0	0	42	0	42	0	15.0	7	0	7	0	2.49	6	0	6	0	2.14
	POL_HN-5_2022-05	2.5	595698	5821073	28-May-22	29-May-22	16:27	15:22	2.1	2.3	0.955	0	0	0	0	0	92	0	92	0	96.3	0	0	0	0	0	0	0	0	0	0
										Total	**11.0**	**0**	**0**	**0**	**0**	**0**	**329**	**8**	**321**	**0**	**29.9**	**207**	**8**	**194**	**2**	**18.8**	**27**	**0**	**24**	**3**	**2.46**
Bootjack Lake	BOL_HN-1_2022-05	2.5	591173	5821307	27-May-22	30-May-22	12:23	15:30	2.4	3.4	3.13	0	0	0	0	0	123	0	123	0	39.3	45	0	39	6	14.4	0	0	0	0	0
	BOL_HN-2_2022-05	2.5	591091	5821382	27-May-22	30-May-22	12:50	16:25	1.7	1.8	3.15	0	0	0	0	0	38	0	38	0	12.1	55	0	55	0	17.5	0	0	0	0	0
	BOL_HN-3_2022-05	2.5	589873	5823897	27-May-22	30-May-22	15:30	8:57	1.0	1.0	2.73	1	0	1	0	0	67	8	59	0	24.6	94	8	74	12	34.5	0	0	0	0	0
	BOL_HN-4_2022-05	2.5	589845	5823770	27-May-22	30-May-22	16:08	13:12	1.3	1.6	2.88	1	0	1	0	0	111	0	111	0	38.6	30	0	30	0	10.4	0	0	0	0	0
										Total	**11.9**	**2**	**0**	**2**	**0**	**0.168**	**339**	**8**	**331**	**0**	**28.5**	**224**	**8**	**198**	**18**	**18.8**	**0**	**0**	**0**	**0**	**0**

Notes: ID = identifier. UTM = Universal Transverse Mercator. NAD = North American Datum. CPUE = catch-per-unit-effort. HN = hoop net.

[a] CPUE is calculated as the number of fish per days of fishing effort. Total CPUE is calculated as the total catch of a single species over the total effort for all the hoop net sets in one area.

Table C.6.2: Hoop Net Catch Data from Polley Lake (POL; Exposed), September 2022

Net ID	Net Size (hoop diameter, ft)	UTM (NAD83, Zone 10U)		Set Date	Lift Date	Set Time	Lift Time	Depth Range (m)		Effort (days)	Rainbow Trout			Longnose Sucker			Redside Shiner		
		Easting	Northing								Catch	Mortalities	CPUE [a]	Catch	Mortalities	CPUE [a]	Catch	Mortalities	CPUE [a]
POL_HN-1_2022-09	2.0	593496	5824505	21-Sep-22	22-Sep-22	15:53	11:25	1.0	2.0	0.814	0	0	0	0	0	0	0	0	0
POL_HN-2_2022-09	2.0	592769	5825978			14:30	8:15	-	-	0.740	2	0	2.70	2	0	2.70	114	1	154
POL_HN-3_2022-09	2.0	595393	5822445			16:39	13:55	1.0	1.5	0.886	2	0	2.26	0	0	0	52	3	58.7
POL_HN-4_2022-09	2.5	595643	5822021			16:56	14:45	1.5	2.0	0.909	0	0	0	8	0	8.80	0	0	0
POL_HN-5_2022-09	2.5	593020	5825529			15:00	10:40	-	-	0.819	1	0	1.22	8	0	9.76	0	0	0
POL_HN-6_2022-09	2.5	594324	5824464			15:20	12:05	1.5	3.0	0.865	0	0	0	4	0	4.63	0	0	0
POL_HN-7_2022-09	2.5	594979	5823310			16:23	12:55	1.0	2.0	0.856	1	0	1.17	7	0	8.18	0	0	0
POL_HN-8_2022-09	2.5	593385	5824789	22-Sep-22	23-Sep-22	11:06	11:32	2.5	3.0	1.02	2	0	1.96	3	0	2.95	0	0	0
POL_HN-9_2022-09	2.0	593964	5824927			11:32	12:05	1.5	2.0	1.02	1	0	0.978	0	0	0	30	1	29.3
POL_HN-10_2022-09	2.5	594523	5824196			12:15	11:00	1.0	2.5	0.948	0	0	0	0	0	0	0	0	0
POL_HN-11_2022-09	2.0	594402	5822978			13:45	10:35	1.5	2.0	0.868	0	0	0	2	0	2.30	40	0	46.1
POL_HN-12_2022-09	2.5	594600	5822602			13:20	10:00	2.0	3.0	0.861	5	0	5.81	10	0	11.6	3	2	3.48
POL_HN-13_2022-09	2.0	595187	5822847			14:18	9:30	0.5	1.0	0.800	0	0	0	0	0	0	1	0	1.25
POL_HN-14_2022-09	2.5	595643	5822021			14:54	8:40	1.0	2.5	0.740	17	1	23.0	4	0	5.40	2	1	2.70
POL_HN-15_2022-09	2.5	593314	5826074	23-Sep-22	24-Sep-22	9:10	8:00	0.5	1.0	0.951	4	0	4.20	3	0	3.15	0	0	0
POL_HN-16_2022-09	2.0	595056	5823163			9:45	13:50	0.5	1.0	1.17	0	0	0	0	0	0	0	0	0
POL_HN-17_2022-09	2.0	594788	5823667			10:50	8:39	0.8	1.5	0.909	2	0	2.20	0	0	0	9	0	9.90
POL_HN-18_2022-09	2.5	594370	5824495			11:20	9:00	2.0	3.0	0.903	9	0	9.97	19	0	21.0	0	0	0
POL_HN-19_2022-09	2.5	592889	5825758			12:45	12:15	2.0	3.0	0.98	27	0	27.6	27	0	27.6	0	0	0
POL_HN-20_2022-09	2.5	593313	5826064			13:00	11:00	1.5	3.0	0.917	11	0	12.0	26	0	28.36	0	0	0
POL_HN-21_2022-09	2.0	592631	5826091			12:30	10:45	-	-	0.927	0	0	0	0	0	0	1	0	1.08
POL_HN-22_2022-09	2.5	594858	5822183	24-Sep-22	25-Sep-22	8:20	8:40	1.0	2.0	1.01	38	0	37.5	5	0	4.93	1	0	0.986
POL_HN-23_2022-09	2.5	594481	5824309			10:02	10:20	0.8	1.0	1.01	0	0	0	0	0	0	0	0	0
POL_HN-24_2022-09	2.0	593672	5824275			10:15	11:00	1.5	2.0	1.03	2	0	1.94	0	0	0	20	0	19.4
POL_HN-25_2022-09	2.0	593351	5826042			11:00	11:30	0.5	1.0	1.02	2	0	1.96	1	0	0.980	52	0	50.9
POL_HN-26_2022-09	2.5	594991	5823288			13:30	9:40	1.0	1.8	0.840	30	0	35.7	4	0	4.76	0	0	0
POL_HN-27_2022-09	2.0	595011	5821797			14:10	12:00	1.0	1.3	0.910	0	0	0	0	0	0	2	0	2.20
POL_HN-28_2022-09	2.5	595772	5821089			14:20	7:50	1.0	1.5	0.729	17	0	23.3	7	0	9.60	3	0	4.11
POL_HN-29_2022-09	2.5	594442	5822907	25-Sep-22	26-Sep-22	9:00	10:20	1.0	2.5	1.06	1	0	0.947	2	1	1.89	1	0	0.947
POL_HN-30_2022-09	2.5	594992	5823275			10:00	9:05	1.0	1.8	0.962	5	0	5.20	3	0	3.12	2	0	2.08
POL_HN-31_2022-09	2.5	594791	5823644			10:10	9:30	1.0	2.0	0.972	25	0	25.7	11	0	11.3	0	0	0
POL_HN-32_2022-09	2.5	594415	5824406			10:30	8:25	2.5	3.0	0.913	2	0	2.19	2	0	2.19	0	0	0
POL_HN-33_2022-09	2.0	593496	5824505			11:20	8:10	1.0	1.5	0.868	3	0	3.46	1	0	1.15	13	0	15.0
POL_HN-34_2022-09	2.0	593468	5825719			11:40	7:45	0.8	1.0	0.837	4	0	4.78	2	0	2.39	21	0	25.1
POL_HN-35_2022-09	2.0	595293	5821122			12:30	10:20	1.0	1.8	0.910	0	0	0	39	0	42.9	96	0	106
									Total	**32.0**	**213**	**1**	**6.66**	**200**	**1**	**6.25**	**463**	**8**	**14.5**

Notes: ID = identifier. UTM = Universal Transverse Mercator. NAD = North American Datum. CPUE = catch-per-unit-effort. HN =

[a] CPUE = number of fish caught per trap day.

Table C.6.3: Non-Destructive Physical Measurements of Rainbow Trout Caught by Hoop Netting in Polley Lake (POL; Exposed), May 2022

Processing Date	Fish ID	Total Length (cm)	Fork Length (cm)	Weight (g)	Abnormalities	Fate	Comments
28-May-22	POL_RB-1_2022-05	30.7	29.1	248	Ligula	M	Adult; sacrificed
	POL_RB-10_2022-05	35.3	33.4	345	None	R	Adult; sacrificed
	POL_RB-11_2022-05	22.9	20.8	95	None	R	Adult; sacrificed
	POL_RB-12_2022-05	33.3	31.3	260	Red spots on cheeks, scar behind dorsal fin	R	Adult; sacrificed
	POL_RB-13_2022-05	33.1	30.9	274	None	M	Adult; sacrificed
	POL_RB-14_2022-05	18.2	16.9	45	None	M	Adult; sacrificed
	POL_RB-15_2022-05	24.4	22.9	128	None	M	Adult; sacrificed
	POL_RB-16_2022-05	32.5	30.6	290	None	M	Adult; sacrificed
	POL_RB-17_2022-05	32.6	30.8	295	None	R	Unknown
	POL_RB-18_2022-05	24.7	23.0	124	None	R	Unknown
	POL_RB-9_2022-05	36.9	34.7	405	None	R	Juvenile (parr)
29-May-22	POL_RB-19_2022-05	22.1	20.3	82	None	R	Unknown
	POL_RB-2_2022-05	34.0	33.1	305	None	M	Unknown
	POL_RB-20_2022-05	19.9	18.0	62	None	R	Juvenile (parr)
	POL_RB-21_2022-05	20.6	19.1	64	None	R	Juvenile (parr)
	POL_RB-22_2022-05	18.5	17.1	46	None	R	Unknown
	POL_RB-23_2022-05	21.4	19.8	76	None	R	Unknown
	POL_RB-24_2022-05	19.2	17.8	61	None	R	Juvenile (parr)
	POL_RB-25_2022-05	27.4	25.7	158	None	R	Juvenile (parr)
	POL_RB-26_2022-05	33.3	31.1	270	None	R	Juvenile (parr)
	POL_RB-27_2022-05	27.8	26.1	186	None	R	Juvenile (parr)
	POL_RB-28_2022-05	30.9	29.1	224	None	R	Juvenile (parr)
	POL_RB-29_2022-05	31.6	29.6	256	Pale gills	R	Juvenile (parr)
	POL_RB-3_2022-05	32.3	30.9	250	Ligula	M	Juvenile (parr)
	POL_RB-30_2022-05	31.6	29.4	252	None	R	Unknown
	POL_RB-31_2022-05	31.7	29.7	264	None	R	Unknown
	POL_RB-32_2022-05	29.1	27.2	188	Compressed gills	R	Unknown
	POL_RB-33_2022-05	34.6	32.3	325	None	R	Unknown
	POL_RB-34_2022-05	35.3	33.0	330	Cut lip, pale gills, split dorsal fin	R	Unknown
	POL_RB-35_2022-05	32.9	30.8	265	Gill lice	R	Unknown
	POL_RB-36_2022-05	37.2	35.2	400	Split pectoral fin with lice	R	Unknown
	POL_RB-37_2022-05	26.4	24.6	154	Gill lice	R	Unknown
	POL_RB-38_2022-05	20.7	19.2	65	None	R	Unknown
	POL_RB-39_2022-05	21.8	20.3	87	None	R	Unknown
	POL_RB-4_2022-05	32.3	30.6	284	Ligula, white lesions on intestines	M	Unknown
	POL_RB-40_2022-05	23.5	21.8	99	None	R	Unknown
	POL_RB-41_2022-05	19.4	18.0	49	None	R	Unknown
	POL_RB-42_2022-05	20.2	18.6	63	Cut on dorsal fin	R	Juvenile (parr)
	POL_RB-43_2022-05	26.0	24.2	148	None	R	Juvenile (parr)
	POL_RB-44_2022-05	20.9	20.0	62	None	R	Juvenile (parr)
	POL_RB-45_2022-05	27.6	25.6	162	Compressed gills	R	Juvenile (parr)
	POL_RB-46_2022-05	32.5	30.4	285	Lice on mouth and caudal fin	R	Juvenile (parr)
	POL_RB-47_2022-05	31.7	29.6	250	Gill lice	R	Unknown
	POL_RB-48_2022-05	29.5	27.7	220	Eroded gills, gill lice	R	Juvenile (parr)
	POL_RB-49_2022-05	21.0	19.5	69	None	R	Unknown
	POL_RB-5_2022-05	26.2	24.8	160	None	M	Unknown
	POL_RB-50_2022-05	21.5	19.9	96	None	R	Unknown
	POL_RB-51_2022-05	23.2	21.8	102	None	R	Unknown
	POL_RB-52_2022-05	18.4	17.2	48	None	R	Juvenile (parr)
	POL_RB-53_2022-05	19.3	17.9	55	None	R	Juvenile (parr)
	POL_RB-54_2022-05	20.0	18.8	54	Gill lice	R	Juvenile (parr)
	POL_RB-55_2022-05	19.2	17.9	52	Gill lice	R	Juvenile (parr)
	POL_RB-56_2022-05	21.3	20.0	74	Gill lice	R	Juvenile (parr)
	POL_RB-57_2022-05	21.5	19.8	76	Gill lice	R	Juvenile (parr)
	POL_RB-58_2022-05	32.3	30.5	262	Gill lice, split dorsal fin	R	Juvenile (parr)
	POL_RB-59_2022-05	29.6	27.7	232	Gill lice	R	Juvenile (parr)
	POL_RB-6_2022-05	36.0	34.1	355	Ligula	M	Juvenile (parr)
	POL_RB-60_2022-05	35.1	33.2	340	None	R	Unknown
	POL_RB-61_2022-05	26.3	24.5	154	None	R	Unknown
	POL_RB-62_2022-05	28.1	26.2	174	Gill lice	R	Unknown
	POL_RB-63_2022-05	29.5	27.4	208	Gill lice	R	Unknown
	POL_RB-64_2022-05	18.6	17.4	54	None	R	Unknown
	POL_RB-65_2022-05	17.9	16.6	43	None	R	Unknown
	POL_RB-66_2022-05	22.4	20.8	98	None	R	Juvenile (parr)
	POL_RB-67_2022-05	19.8	18.4	60	None	R	Juvenile (parr)
	POL_RB-68_2022-05	16.4	15.3	34	Lice on dorsal fin	R	Juvenile (parr)
	POL_RB-7_2022-05	34.3	33.1	325	Ligula	M	Juvenile (parr)
	POL_RB-8_2022-05	32.5	30.8	300	Ligula	M	Juvenile (parr)
Sample Size (n)		**68**	**68**	**68**	-	-	-
Average		**26.7**	**25.1**	**175**			
Median		**26.9**	**25.2**	**159**			
Standard Deviation		**6.1**	**5.9**	**107.7**			
Minimum		**16.4**	**15.3**	**34**			
Maximum		**37.2**	**35.2**	**405**			

Notes: "-" = data not available or no comment, M = mortality, R = released.

Table C.6.4: Non-Destructive Physical Measurements of Longnose Sucker Caught by Hoop Netting in Polley Lake (POL; Exposed), May 2022

Processing Date	Fish ID	Total Length (cm)	Fork Length (cm)	Weight (g)	Abnormalities	Fate	Comments
28-May-22	POL_LSU-1_2022-05	39.6	37.2	670	None	M	Adult; sacrificed
	POL_LSU-2_2022-05	47.2	44.0	940	None	M	Adult; sacrificed
	POL_LSU-3_2022-05	45.4	42.1	960	Lump on caudal fin	M	Adult; sacrificed
	POL_LSU-4_2022-05	44.5	41.9	930	Missing top of caudal fin, white lesion on liver	M	Adult; sacrificed
	POL_LSU-5_2022-05	30.0	27.7	262	Scars on body	M	Adult; sacrificed
	POL_LSU-6_2022-05	37.4	35.5	510	Scars on body	M	Adult; sacrificed
	POL_LSU-7_2022-05	43.6	40.9	955	None	M	Adult; sacrificed
	POL_LSU-8_2022-05	40.1	37.6	640	None	M	Adult; sacrificed
	POL_LSU-9_2022-05	39.8	37.5	640	Hole in snout, missing scales[a]	R	-
	POL_LSU-10_2022-05	35.6	33.4	400	None	R	Adult (male)
	POL_LSU-11_2022-05	29.5	27.5	265	None	R	Adult (male)
	POL_LSU-12_2022-05	30.9	28.9	256	None	R	-
	POL_LSU-13_2022-05	34.3	31.6	365	None	R	Adult (male)
	POL_LSU-14_2022-05	30.9	29.2	270	None	R	-
	POL_LSU-15_2022-05	40.7	38.0	690	None	R	-
	POL_LSU-16_2022-05	30.2	28.3	254	None	R	Adult (male)
	POL_LSU-17_2022-05	37.1	34.4	520	None	R	-
	POL_LSU-18_2022-05	33.0	30.6	320	None	R	-
	POL_LSU-19_2022-05	43.0	40.0	880	None	R	-
	POL_LSU-20_2022-05	42.9	39.8	850	None	R	-
	POL_LSU-21_2022-05	42.0	39.2	670	Hole in snout[a]	R	-
	POL_LSU-22_2022-05	37.1	34.4	460	None	R	Adult (male)
	POL_LSU-23_2022-05	26.7	25.2	196	Yellow and black spots on ventral side	R	-
	POL_LSU-24_2022-05	31.6	29.0	305	Yellow and black spots on ventral side	R	-
	POL_LSU-25_2022-05	31.0	28.4	270	Yellow and black spots on ventral side	R	-
	POL_LSU-26_2022-05	37.9	35.6	590	None	R	-
	POL_LSU-27_2022-05	32.6	31.9	325	None	R	-
	POL_LSU-28_2022-05	34.6	32.5	375	None	R	-
	POL_LSU-29_2022-05	27.6	25.4	176	None	R	Adult (male)
	POL_LSU-30_2022-05	30.2	28.4	258	None	R	-
	POL_LSU-31_2022-05	28.8	26.9	196	None	R	-
	POL_LSU-32_2022-05	30.6	28.5	270	None	R	Adult (male)
	POL_LSU-33_2022-05	29.2	27.2	218	None	R	Adult (male)
	POL_LSU-34_2022-05	25.3	23.4	150	None	R	-
	POL_LSU-35_2022-05	41.0	38.4	810	None	R	-
	POL_LSU-36_2022-05	39.8	36.8	570	None	R	-
	POL_LSU-37_2022-05	35.8	33.5	445	None	R	-
	POL_LSU-38_2022-05	29.6	27.7	248	None	R	Adult (male)
Sample Size (n)		**38**	**38**	**38**	-	-	-
Average		**35.5**	**33.1**	**477**			
Median		**35.1**	**33.0**	**388**			
Standard Deviation		**5.9**	**5.5**	**257**			
Standard Error		**0.96**	**0.90**	**41.7**			
Minimum		**25.3**	**23.4**	**150**			
Maximum		**47.2**	**44.0**	**960**			

Notes: "-" = data not available or no comment, M = mortality, R = released.

[a] Injuries / deformities were possibly a result of predation by muskrats that were present in hoop net.

Table C.6.5: Non-Destructive Physical Measurements of Rainbow Trout Caught by Hoop Netting in Bootjack Lake (BOL; Reference), May 2022

Processing Date	Fish ID	Total Length (cm)	Fork Length (cm)	Weight (g)	Abnormalities	Fate	Comments
30-May-22	BOL_RB-1_2022-05	35.3	33.8	315	Ligula	M	Adult; sacrificed
	BOL_RB-2_2022-05	37.1	35.0	360	Ligula	M	Adult; sacrificed
	BOL_RB-3_2022-05	27.5	26.2	218	Ligula	M	Adult; sacrificed
	BOL_RB-4_2022-05	25.5	24.1	156	Ligula	M	Adult; sacrificed
	BOL_RB-5_2022-05	29.5	28.0	204	Ligula	M	Adult; sacrificed
	BOL_RB-6_2022-05	33.0	31.2	294	Ligula	M	Adult; sacrificed
	BOL_RB-7_2022-05	30.5	28.8	212	Ligula	M	Adult; sacrificed
	BOL_RB-8_2022-05	33.4	31.5	300	Ligula	M	Adult; sacrificed
	BOL_RB-9_2022-05	27.5	25.9	172	None	R	Unknown
	BOL_RB-10_2022-05	31.3	29.2	258	None	R	Unknown
	BOL_RB-11_2022-05	23.3	22.0	114	None	R	Juvenile (parr)
	BOL_RB-12_2022-05	35.0	33.5	320	Lice on caudal fin	R	Unknown
	BOL_RB-13_2022-05	27.1	25.6	174	Gill lice	R	Juvenile (parr)
	BOL_RB-14_2022-05	28.3	26.5	190	Lice on caudal fin	R	Unknown
	BOL_RB-15_2022-05	32.1	29.9	282	None	R	Unknown
	BOL_RB-16_2022-05	26.2	24.4	132	Gill lice	R	Unknown
	BOL_RB-17_2022-05	27.7	26.0	202	Lice on caudal fin	R	Unknown
	BOL_RB-18_2022-05	26.4	24.9	166	None	R	Unknown
	BOL_RB-19_2022-05	32.7	31.0	290	None	R	Unknown
	BOL_RB-20_2022-05	29.5	27.7	208	Lice on pectoral fin	R	Unknown
	BOL_RB-21_2022-05	24.8	23.4	128	None	R	Unknown
	BOL_RB-22_2022-05	26.0	24.3	140	None	R	Juvenile (parr)
	BOL_RB-23_2022-05	27.9	26.3	178	None	R	Juvenile (parr)
	BOL_RB-24_2022-05	31.0	28.8	235	None	R	Unknown
	BOL_RB-25_2022-05	34.5	32.6	355	Lice on gills and caudal fin	R	Unknown
	BOL_RB-26_2022-05	32.3	30.9	252	Lice on gills and pectoral fin	R	Unknown
	BOL_RB-27_2022-05	26.5	25.3	164	None	R	Unknown
	BOL_RB-28_2022-05	28.4	26.6	208	None	R	Unknown
	BOL_RB-29_2022-05	26.9	25.4	180	None	R	Unknown
	BOL_RB-30_2022-05	31.1	29.4	232	Gill lice	R	Unknown
	BOL_RB-31_2022-05	26.0	24.4	156	None	R	Unknown
	BOL_RB-32_2022-05	24.7	22.8	128	None	M	Unknown
	BOL_RB-33_2022-05	18.1	16.5	47	None	M	Juvenile (parr)
	BOL_RB-34_2022-05	21.4	20.1	86	None	M	Juvenile (parr)
	BOL_RB-35_2022-05	17.5	16.4	43	None	M	Juvenile (parr)
	BOL_RB-36_2022-05	17.5	16.4	45	None	M	Juvenile (parr)
	BOL_RB-37_2022-05	17.8	16.7	47	None	M	Juvenile (parr)
	BOL_RB-38_2022-05	20.2	19.0	70	None	M	Juvenile (parr)
Sample Size (n)		**38**	**38**	**38**	-	-	-
Average		**27.7**	**26.1**	**191**			
Median		**27.6**	**26.1**	**185**			
Standard Deviation		**5.1**	**4.9**	**86.5**			
Minimum		**17.5**	**16.4**	**43**			
Maximum		**37.1**	**35.0**	**360**			

Notes: "-" = data not available or no comment, M = mortality, R = released.

Table C.6.6: Non-Destructive Physical Measurements of Longnose Sucker Caught by Hoop Netting in Bootjack Lake (BOL; Reference), May 2022

Processing Date	Fish ID	Total Length (cm)	Fork Length (cm)	Weight (g)	Abnormalities	Fate	Comments
30-May-22	BOL_LSU-1_2022-05	44.0	41.2	1,075	None	M	Adult; sacrificed
	BOL_LSU-2_2022-05	47.0	43.9	1,175	None	M	Adult; sacrificed
	BOL_LSU-3_2022-05	37.0	35.1	625	Scars on body surface	M	Adult; sacrificed
	BOL_LSU-4_2022-05	44.4	41.5	1,050	None	M	Adult; sacrificed
31-May-22	BOL_LSU-5_2022-05	47.7	44.6	1,360	None	M	Adult; sacrificed
	BOL_LSU-6_2022-05	44.8	42.1	1,180	None	M	Adult; sacrificed
	BOL_LSU-7_2022-05	34.8	32.8	550	None	M	Adult; sacrificed
	BOL_LSU-8_2022-05	43.5	41.0	1,120	None	M	Adult; sacrificed
30-May-22	BOL_LSU-9_2022-05	42.6	39.6	870	None	R	Adult (male)
	BOL_LSU-10_2022-05	42.5	39.5	810	None	R	Adult (male)
	BOL_LSU-11_2022-05	32.5	30.5	385	None	R	Adult (male)
	BOL_LSU-12_2022-05	42.3	39.4	840	Deformed operculum	R	Adult (male)
	BOL_LSU-13_2022-05	40.5	39.4	910	None	R	Adult (male)
	BOL_LSU-14_2022-05	42.5	39.6	830	None	R	Adult (male)
	BOL_LSU-15_2022-05	29.3	27.2	250	None	R	Adult (male)
	BOL_LSU-16_2022-05	43.4	40.8	930	None	R	Adult (male)
	BOL_LSU-17_2022-05	43.2	40.5	880	Scar near pelvic fin	R	Adult (male)
	BOL_LSU-18_2022-05	36.1	33.8	515	Scars around lateral line	R	Adult (male)
	BOL_LSU-19_2022-05	40.9	38.6	740	None	R	Adult (male)
	BOL_LSU-20_2022-05	38.8	36.6	700	None	R	Adult (male)
	BOL_LSU-21_2022-05	42.0	40.2	790	None	R	Adult (male)
	BOL_LSU-22_2022-05	28.4	26.7	248	None	R	Adult (male)
	BOL_LSU-23_2022-05	26.4	24.6	194	Deformed operculum	R	Adult (male)
	BOL_LSU-24_2022-05	43.0	40.8	1,000	None	R	Adult (female)
	BOL_LSU-25_2022-05	31.0	28.9	305	None	R	Adult (male)
	BOL_LSU-26_2022-05	33.7	31.8	380	None	R	Adult (male)
	BOL_LSU-27_2022-05	43.4	40.0	820	None	R	Adult (male)
	BOL_LSU-28_2022-05	45.6	42.5	1,200	None	R	Adult (female)
	BOL_LSU-29_2022-05	22.5	21.0	102	None	R	Unknown
	BOL_LSU-30_2022-05	27.7	26.1	244	None	R	Adult (male)
	BOL_LSU-31_2022-05	29.9	28.1	292	None	R	Adult (male)
	BOL_LSU-32_2022-05	29.8	28.2	290	Split caudal fin	R	Adult (male)
	BOL_LSU-33_2022-05	42.1	39.5	840	Deformed operculum	R	Adult (male)
	BOL_LSU-34_2022-05	34.0	32.5	435	None	R	Adult (male)
	BOL_LSU-35_2022-05	41.7	38.9	790	None	R	Adult (male)
	BOL_LSU-36_2022-05	44.9	41.2	901	None	R	Adult (male)
	BOL_LSU-37_2022-05	43.1	39.2	760	None	R	Adult (male)
	BOL_LSU-38_2022-05	47.6	44.6	1,150	None	R	Adult (female)
Sample Size (n)		**38**	**38**	**38**	-	-	-
Average		**38.8**	**36.4**	**725**			
Median		**42.1**	**39.4**	**800**			
Standard Deviation		**6.8**	**6.3**	**337**			
Minimum		**22.5**	**21.0**	**102**			
Maximum		**47.7**	**44.6**	**1,360**			

Note: "-" = data not available or no comment; M = mortality, R = released.

Table C.6.7: Non-Destructive Physical Measurements of Rainbow Trout Caught by Hoop Netting in Polley Lake (POL; Exposed), September 2022

Processing Date	Fish ID	Total Length (cm)	Fork Length (cm)	Weight (g)	Abnormalities	Fate
22-Sep-22	POL_RB-1_2022-09	33.5	31.5	230	-	R
	POL_RB-2_2022-09	6.8	6.5	3	-	R
	POL_RB-3_2022-09	17.9	16.8	51	-	R
	POL_RB-4_2022-09	34.7	33.0	320	Hatchery (clipped adipose)	R
	POL_RB-5_2022-09	30.1	28.4	220	-	R
	POL_RB-6_2022-09	8.0	7.5	3	-	R
	POL_RB-7_2022-09	6.5	6.0	2	-	R
23-Sep-22	POL_RB-8_2022-09	20.4	19.2	60	-	R
	POL_RB-9_2022-09	26.9	26.0	140	-	R
	POL_RB-10_2022-09	28.8	27.0	180	-	R
	POL_RB-11_2022-09	27.8	26.4	95	-	R
	POL_RB-12_2022-09	25.0	23.5	130	Gill lice	R
	POL_RB-13_2022-09	22.4	20.6	100	-	R
	POL_RB-14_2022-09	28.7	27.2	170	-	R
	POL_RB-15_2022-09	29.3	27.6	195	-	R
	POL_RB-16_2022-09	29.8	28.2	185	-	R
	POL_RB-17_2022-09	35.5	33.5	310	Hatchery (clipped adipose)	R
	POL_RB-18_2022-09	36.0	34.6	375	Gill lice	R
	POL_RB-19_2022-09	31.5	30.0	220	Gill lice	R
	POL_RB-20_2022-09	23.5	22.1	112	-	R
	POL_RB-21_2022-09	32.5	31.0	260	Hatchery (clipped adipose)	R
	POL_RB-22_2022-09	30.0	28.8	210.0	Gill lice	R
	POL_RB-23_2022-09	15.0	14.0	32	-	M
	POL_RB-24_2022-09	34.5	32.5	310.0	Hatchery (clipped adipose)	R
	POL_RB-25_2022-09	30.2	29.5	290	-	R
	POL_RB-26_2022-09	34.0	32.5	300	Gill lice	R
	POL_RB-27_2022-09	28.5	26.7	175	-	R
	POL_RB-28_2022-09	23.2	21.5	95	-	R
	POL_RB-29_2022-09	29.4	27.5	195	-	R
	POL_RB-30_2022-09	19.8	18.5	65	-	R
	POL_RB-31_2022-09	28.3	26.6	175	-	R
	POL_RB-32_2022-09	32.0	30.2	220.0	Hatchery (clipped adipose)	R
24-Sep-22	POL_RB-33_2022-09	31.1	29.5	240.0	-	R
	POL_RB-34_2022-09	32.8	30.9	270	-	R
	POL_RB-35_2022-09	33.0	31.3	260	-	R
	POL_RB-36_2022-09	22.5	20.9	95	Ripped dorsal	R
	POL_RB-37_2022-09	18.5	17.0	60	-	R
	POL_RB-38_2022-09	10.2	9.4	8	-	R
	POL_RB-39_2022-09	33.8	32.2	330	-	R
	POL_RB-40_2022-09	19.3	18.0	60	-	R
	POL_RB-41_2022-09	29.4	27.6	210.0	-	R
	POL_RB-42_2022-09	34.4	32.5	290.0	-	R
	POL_RB-43_2022-09	31.4	29.4	250.0	-	R
	POL_RB-44_2022-09	28.6	27.0	180.0	-	R
	POL_RB-45_2022-09	32.5	31.5	280.0	-	R
	POL_RB-46_2022-09	29.2	27.5	200	-	R
	POL_RB-47_2022-09	21.6	20.2	90.0	-	R
	POL_RB-48_2022-09	32.8	31.0	300.0	Hatchery (clipped adipose)	R
	POL_RB-49_2022-09	31.5	30.0	250.0	-	R
	POL_RB-50_2022-09	32.8	31.0	310	-	R
	POL_RB-51_2022-09	33.5	31.7	300.0	-	R
	POL_RB-52_2022-09	33.2	31.4	310.0	-	R
	POL_RB-53_2022-09	32.5	29.7	265.0	-	R
	POL_RB-54_2022-09	26.5	24.9	170.0	-	R
	POL_RB-55_2022-09	29.0	27.4	170.0	-	R
	POL_RB-56_2022-09	36.0	33.4	340.0	Hatchery (clipped adipose)	R
	POL_RB-57_2022-09	24.4	22.7	120.0	-	R
	POL_RB-58_2022-09	24.0	22.6	115	-	R
	POL_RB-59_2022-09	35.0	33.0	320	Gill lice	R
	POL_RB-60_2022-09	29.6	27.9	220.0	-	R
	POL_RB-61_2022-09	33.2	31.6	290	Gill lice	R
	POL_RB-62_2022-09	32.5	30.8	245	Hatchery (clipped adipose)	R
	POL_RB-63_2022-09	33.1	31.0	255	-	R
	POL_RB-64_2022-09	30.8	28.6	245	-	R
	POL_RB-65_2022-09	25.1	23.4	135	-	R
	POL_RB-66_2022-09	21.6	20.2	85	-	R
	POL_RB-67_2022-09	22.2	20.5	97	-	R
	POL_RB-68_2022-09	24.5	22.9	140	-	R
	POL_RB-69_2022-09	32.5	30.8	260	Hatchery (clipped adipose)	R
	POL_RB-70_2022-09	22.3	21.0	90	-	R
	POL_RB-71_2022-09	36.0	34.0	325	Hatchery (clipped adipose)	R
	POL_RB-72_2022-09	31.7	29.7	275	Gill lice	R
	POL_RB-73_2022-09	23.6	21.9	90	-	R
	POL_RB-74_2022-09	32.2	29.7	255	Gill lice	R
	POL_RB-75_2022-09	30.6	29.1	235	-	R
	POL_RB-76_2022-09	24.7	23.6	130	-	R
	POL_RB-77_2022-09	30.2	28.2	220.0	-	R
	POL_RB-78_2022-09	25.8	24.5	145	-	R
	POL_RB-79_2022-09	23.5	21.2	95	-	R
	POL_RB-80_2022-09	31.8	30.3	195	-	R
	POL_RB-81_2022-09	30.0	28.4	230	-	R
	POL_RB-82_2022-09	29.2	27.0	195	-	R
	POL_RB-83_2022-09	29.0	27.3	210	Gill lice	R
	POL_RB-84_2022-09	20.3	18.9	72	-	R
	POL_RB-85_2022-09	23.2	21.8	95	-	R

Notes: RB = rainbow trout, R = released, M = mortality, "-" = data not available or no comment.

Table C.6.7: Non-Destructive Physical Measurements of Rainbow Trout Caught by Hoop Netting in Polley Lake (POL; Exposed), September 2022

Processing Date	Fish ID	Total Length (cm)	Fork Length (cm)	Weight (g)	Abnormalities	Fate
25-Sep-22	POL_RB-86_2022-09	25.9	24.0	137	-	R
	POL_RB-87_2022-09	32.6	30.8	205	-	R
	POL_RB-88_2022-09	28.2	26.4	187	Gill lice	R
	POL_RB-89_2022-09	31.8	30.0	250	Gill lice	R
	POL_RB-90_2022-09	34.2	32.2	315	-	R
	POL_RB-91_2022-09	19.1	17.8	62	-	R
	POL_RB-92_2022-09	33.6	31.4	310	-	R
	POL_RB-93_2022-09	16.8	15.6	40	-	R
	POL_RB-94_2022-09	25.5	23.8	130	-	R
	POL_RB-95_2022-09	31.3	29.2	250	-	R
	POL_RB-96_2022-09	24.5	23.3	140	-	R
	POL_RB-97_2022-09	24.0	22.7	115	-	R
	POL_RB-98_2022-09	29.4	27.7	275	-	R
	POL_RB-99_2022-09	22.8	21.0	95	-	R
	POL_RB-100_2022-09	33.0	31.2	290	Gill lice	R
	POL_RB-101_2022-09	31.4	29.7	230	-	R
	POL_RB-102_2022-09	34.8	32.8	335	Gill lice	R
	POL_RB-103_2022-09	18.2	17.2	55	-	R
	POL_RB-104_2022-09	17.6	16.3	48	-	R
	POL_RB-105_2022-09	26.3	24.6	145	-	R
	POL_RB-106_2022-09	31.3	29.4	230	-	R
	POL_RB-107_2022-09	32.0	30.4	190	-	R
	POL_RB-108_2022-09	16.2	15.3	37	-	R
26-Sep-22	POL_RB-109_2022-09	28.8	27.2	175	-	R
	POL_RB-110_2022-09	35.3	33.3	350	-	R
	POL_RB-111_2022-09	33.8	32.2	290	Gill lice	R
	POL_RB-112_2022-09	32.7	30.6	285	Gill lice	R
	POL_RB-113_2022-09	22.5	21.0	90	-	R
	POL_RB-114_2022-09	22.0	20.6	70	-	R
	POL_RB-115_2022-09	33.0	31.2	255	-	R
	POL_RB-116_2022-09	29.2	27.4	205	-	R
	POL_RB-117_2022-09	23.6	22.3	110	-	R
	POL_RB-118_2022-09	19.7	18.4	69	-	R
	POL_RB-119_2022-09	28.2	26.5	160	-	R
	POL_RB-120_2022-09	24.4	22.6	150	-	R
	POL_RB-121_2022-09	31.7	29.9	245	Gill lice	R
	POL_RB-122_2022-09	30.8	29.2	230	-	R
	POL_RB-123_2022-09	15.9	14.8	32	-	R
Sample Size (n)		**123**	**123**	**123**	-	-
Average		**27.5**	**25.9**	**186**		
Median		**29.2**	**27.5**	**195**		
Standard Deviation		**6.4**	**6.1**	**93**		
Minimum		**6.5**	**6.0**	**2**		
Maximum		**36.0**	**34.6**	**375**		

Notes: RB = rainbow trout, R = released, M = mortality, "-" = data not available or no comment.

[a] Fish mortalities due to predation.

Table C.6.8: Non-Destructive Physical Measurements of Longnose Sucker Caught by Hoop Netting in Polley Lake (POL; Exposed), September 2022

Processing Date	Fish ID	Total Length (cm)	Fork Length (cm)	Weight (g)	Abnormalities	Fate
22-Sep-22	POL_LSU-1_2022-09	23.2	21.1	115	Black spot	R
	POL_LSU-2_2022-09	5.0	4.7	1	-	R
	POL_LSU-3_2022-09	32.6	30.6	295	-	R
	POL_LSU-4_2022-09	36.5	34.5	460	Black spot	R
	POL_LSU-5_2022-09	26.6	24.6	180	Black spot	R
	POL_LSU-6_2022-09	22.0	20.6	80	Black spot	R
	POL_LSU-7_2022-09	21.0	19.6	50	-	R
	POL_LSU-8_2022-09	19.8	18.4	66	Black spot	R
	POL_LSU-9_2022-09	26.0	24.1	150	Black spot	R
	POL_LSU-10_2022-09	18.3	17.1	56	-	R
	POL_LSU-11_2022-09	23.0	21.5	110	Black spot	R
	POL_LSU-12_2022-09	20.6	19.0	70	-	R
	POL_LSU-13_2022-09	24.8	23.4	150	Black spot	R
	POL_LSU-14_2022-09	25.5	23.5	160	Black spot	R
	POL_LSU-15_2022-09	22.2	21.5	110	Black spot	R
	POL_LSU-16_2022-09	26.0	24.2	180	Black spot	R
	POL_LSU-17_2022-09	18.5	17.3	65	-	R
	POL_LSU-18_2022-09	30.0	28.0	250	Black spot	R
	POL_LSU-19_2022-09	32.0	30.0	300	-	R
	POL_LSU-20_2022-09	28.0	26.0	200	Black spot	R
	POL_LSU-21_2022-09	19.5	18.0	72	Black spot	R
	POL_LSU-22_2022-09	20.0	18.7	90	Black spot	R
	POL_LSU-23_2022-09	18.5	17.1	55	Black spot	R
	POL_LSU-24_2022-09	18.8	17.5	65	Black spot	R
	POL_LSU-25_2022-09	24.3	22.6	120	Black spot	R
23-Sep-22	POL_LSU-26_2022-09	15.2	14.2	35	Black spot	R
	POL_LSU-27_2022-09	29.0	27.0	260	Black spot	R
	POL_LSU-28_2022-09	27.8	26.3	210	Black spot	R
	POL_LSU-29_2022-09	20.5	19.0	80	Black spot	R
	POL_LSU-30_2022-09	20.8	19.2	73	Black spot	R
	POL_LSU-31_2022-09	26.3	24.5	155	Black spot	R
	POL_LSU-32_2022-09	30.2	28.2	250	Black spot	R
	POL_LSU-33_2022-09	29.1	26.9	220	Black spot	R
	POL_LSU-34_2022-09	32.8	30.6	310	-	R
	POL_LSU-35_2022-09	28.5	26.6	220	-	R
	POL_LSU-36_2022-09	21.7	19.9	105	Black spot	R
	POL_LSU-37_2022-09	20.7	19.3	90	-	R
	POL_LSU-38_2022-09	19.5	18.0	80	Black spot	R
	POL_LSU-39_2022-09	19.6	18.0	70	Black spot	R
	POL_LSU-40_2022-09	15.5	14.5	35	Black spot	R
	POL_LSU-41_2022-09	21.2	20.0	100	Black spot	R
	POL_LSU-42_2022-09	21.5	19.8	90	Black spot	R
	POL_LSU-43_2022-09	40.0	37.2	580	Black spot	R
	POL_LSU-44_2022-09	20.5	19.2	75	Black spot	R
	POL_LSU-45_2022-09	17.8	16.2	45	Black spot	R
24-Sep-22	POL_LSU-46_2022-09	21.2	19.5	82	-	R
	POL_LSU-47_2022-09	20.1	18.7	75	Black spot	R
	POL_LSU-48_2022-09	20.0	18.5	70	Black spot	R
	POL_LSU-49_2022-09	32.6	30.3	320	Black spot	R
	POL_LSU-50_2022-09	27.8	25.6	240	-	R
	POL_LSU-51_2022-09	29.5	27.3	225	Black spot	R
	POL_LSU-52_2022-09	23.5	22.0	115	Black spot	R
	POL_LSU-53_2022-09	27.8	26.2	190	-	R
	POL_LSU-54_2022-09	20.8	19.2	85	Black spot	R
	POL_LSU-55_2022-09	26.5	25.0	160	Black spot	R
	POL_LSU-56_2022-09	20.8	19.2	87	-	R
	POL_LSU-57_2022-09	24.5	23.0	140	Black spot	R
	POL_LSU-58_2022-09	23.0	20.2	100	Black spot	R
	POL_LSU-59_2022-09	27.5	25.5	190	Black spot	R
	POL_LSU-60_2022-09	21.0	19.5	75	-	R
	POL_LSU-61_2022-09	20.0	18.5	85	Black spot	R
	POL_LSU-62_2022-09	21.5	20.0	90	Black spot	R
	POL_LSU-63_2022-09	22.4	21.0	105	Black spot	R
	POL_LSU-64_2022-09	20.0	18.4	75	Black spot	R
	POL_LSU-65_2022-09	19.6	18.5	80	Black spot	R
	POL_LSU-66_2022-09	16.8	15.8	45	Black spot	R
	POL_LSU-67_2022-09	19.2	17.9	74	-	R
	POL_LSU-68_2022-09	27.6	26.0	200	Black spot	R
	POL_LSU-69_2022-09	34.0	31.8	380	-	R
	POL_LSU-70_2022-09	29.0	27.0	230	Black spot	R

Notes: "-" = no comment, LSU = longnose sucker, R = released.

Table C.6.8: Non-Destructive Physical Measurements of Longnose Sucker Caught by Hoop Netting in Polley Lake (POL; Exposed), September 2022

Processing Date	Fish ID	Total Length (cm)	Fork Length (cm)	Weight (g)	Abnormalities	Fate
24-Sep-22	POL_LSU-71_2022-09	30.0	28.0	240	Black spot	R
	POL_LSU-72_2022-09	29.0	27.0	220	Black spot	R
	POL_LSU-73_2022-09	33.0	30.8	310	Black spot	R
	POL_LSU-74_2022-09	18.5	17.1	60	Black spot	R
	POL_LSU-75_2022-09	18.5	17.0	63	-	R
	POL_LSU-76_2022-09	21.5	20.0	92	Black spot	R
	POL_LSU-77_2022-09	28.5	27.2	250	Black spot	R
	POL_LSU-78_2022-09	22.0	21.2	100	-	R
	POL_LSU-79_2022-09	19.5	18.0	68	Black spot	R
	POL_LSU-80_2022-09	16.0	15.3	38	Black spot	R
	POL_LSU-81_2022-09	15.0	13.8	34	Black spot	R
	POL_LSU-82_2022-09	32.5	30.8	330	Black spot	R
	POL_LSU-83_2022-09	32.6	30.5	315	Black spot	R
	POL_LSU-84_2022-09	31.5	29.4	280	Black spot	R
	POL_LSU-85_2022-09	31.8	29.8	290	Black spot	R
	POL_LSU-86_2022-09	31.3	29.2	290	Black spot	R
	POL_LSU-87_2022-09	33.7	31.5	350	Black spot	R
	POL_LSU-88_2022-09	32.0	30.4	290	Black spot	R
	POL_LSU-89_2022-09	34.0	31.8	390	Black spot	R
	POL_LSU-90_2022-09	37.8	35.2	500	-	R
	POL_LSU-91_2022-09	30.4	28.6	270	Black spot	R
	POL_LSU-92_2022-09	27.0	25.2	155	-	R
	POL_LSU-93_2022-09	17.0	16.0	48	Black spot	R
25-Sep-22	POL_LSU-94_2022-09	14.7	13.7	28	Black spot	R
	POL_LSU-95_2022-09	26.5	24.8	165	Black spot	R
	POL_LSU-96_2022-09	24.3	22.1	118	Black spot	R
	POL_LSU-97_2022-09	18.2	16.8	68	Black spot	R
	POL_LSU-98_2022-09	20.2	18.7	70	Black spot	R
	POL_LSU-99_2022-09	20.2	18.8	78	Black spot	R
	POL_LSU-100_2022-09	15.8	14.6	33	Black spot	R
	POL_LSU-101_2022-09	21.2	19.8	80	-	R
	POL_LSU-102_2022-09	21.2	19.4	93	Black spot	R
	POL_LSU-103_2022-09	22.2	20.5	100	Black spot	R
	POL_LSU-104_2022-09	15.5	14.4	42	-	R
	POL_LSU-105_2022-09	29.2	27.2	240	Black spot	R
Sample Size (n)		**105**	**105**	**105**	-	-
Average		**24.1**	**22.5**	**154**		
Median		**22.2**	**21.0**	**105**		
Standard Deviation		**6.0**	**5.7**	**112**		
Minimum		**5.0**	**4.7**	**1.0**		
Maximum		**40.0**	**37.2**	**580**		

Notes: "-" = no comment, LSU = longnose sucker, R = released.

Table C.6.9: Non-Destructive Physical Measurements of Redside Shiner Caught by Hoop Netting in Polley Lake (POL; Exposed), September 2022

Processing Date	Fish ID	Total Length (cm)	Fork Length (cm)	Weight (g)	Abnormalities	Fate
22-Sep-22	POL_RSC-1_2022-09	11.6	10.4	15.0	Black spot	R
	POL_RSC-2_2022-09	7.5	6.4	4.0	Black spot	R
	POL_RSC-3_2022-09	10.5	9.2	10.0	Black spot	R
	POL_RSC-4_2022-09	5.5	5.1	1.0	-	R
	POL_RSC-5_2022-09	8.4	6.8	6.0	Black spot	R
	POL_RSC-6_2022-09	9.3	8.2	6.0	Black spot	R
	POL_RSC-7_2022-09	5.6	5.0	1.0	Black spot	R
	POL_RSC-8_2022-09	8.7	7.8	7.0	Black spot	R
	POL_RSC-9_2022-09	10.4	9.0	11.0	Black spot	R
	POL_RSC-10_2022-09	10.1	8.7	10.0	Black spot	R
	POL_RSC-11_2022-09	7.6	6.7	4.0	Black spot	R
	POL_RSC-12_2022-09	10.8	9.5	14.0	Black spot	R
	POL_RSC-13_2022-09	9.7	8.6	9.0	Black spot	R
	POL_RSC-14_2022-09	6.1	5.2	2.0	Black spot	R
	POL_RSC-15_2022-09	11.5	10.2	15.0	Black spot	R
	POL_RSC-16_2022-09	5.3	4.5	1.0	-	R
	POL_RSC-17_2022-09	5.5	4.7	1.0	-	R
	POL_RSC-18_2022-09	3.7	3.4	<1.0	-	R
	POL_RSC-19_2022-09	5.9	5.1	2.0	-	R
	POL_RSC-20_2022-09	8.2	7.1	5.0	Black spot	R
	POL_RSC-21_2022-09	5.1	4.5	1.0	-	R
	POL_RSC-22_2022-09	5.0	4.4	1.0	Black spot	R
	POL_RSC-23_2022-09	10.2	9.0	12.0	Black spot	R
	POL_RSC-24_2022-09	7.1	6.2	4.0	-	R
	POL_RSC-25_2022-09	10.3	9.4	10.0	Black spot	R
	POL_RSC-26_2022-09	6.0	5.4	2.0	Black spot	R
	POL_RSC-27_2022-09	9.0	8.3	8.0	Black spot	R
	POL_RSC-28_2022-09	6.3	5.5	2.0	-	R
	POL_RSC-29_2022-09	9.1	8.0	7.0	-	R
	POL_RSC-30_2022-09	12.0	10.7	20.0	Black spot	R
	POL_RSC-31_2022-09	5.9	5.6	1.0	-	R
	POL_RSC-32_2022-09	6.5	5.8	2.0	Black spot	R
	POL_RSC-33_2022-09	8.4	7.5	5.0	Black spot	R
	POL_RSC-34_2022-09	5.0	4.5	1.0	-	R
	POL_RSC-35_2022-09	8.5	7.5	6.0	Black spot	R
	POL_RSC-36_2022-09	10.0	8.8	9.0	Black spot	R
	POL_RSC-37_2022-09	8.7	7.5	5.0	Black spot	R
	POL_RSC-38_2022-09	9.2	8.7	7.0	Black spot	R
	POL_RSC-39_2022-09	5.1	4.5	1.0	-	R
	POL_RSC-40_2022-09	5.5	5.0	1.0	Black spot	R
	POL_RSC-41_2022-09	7.1	6.3	3.0	Black spot	R
	POL_RSC-42_2022-09	6.4	5.5	2.0	Black spot	R
	POL_RSC-43_2022-09	5.4	4.6	1.0	-	R
	POL_RSC-44_2022-09	3.7	3.3	<1.0	-	R
	POL_RSC-45_2022-09	5.6	4.9	1.0	-	R
	POL_RSC-46_2022-09	5.4	4.6	1.0	-	R
	POL_RSC-47_2022-09	5.4	4.7	1.0	-	R
	POL_RSC-48_2022-09	10.2	9.0	10.0	Black spot	R
	POL_RSC-49_2022-09	10.2	9.0	10.0	Black spot	R
	POL_RSC-50_2022-09	3.7	3.3	<1.0	-	R
	POL_RSC-51_2022-09	5.2	4.5	1.0	-	R
	POL_RSC-52_2022-09	6.9	6.0	3.0	Black spot	R
	POL_RSC-53_2022-09	9.8	8.5	9.0	Black spot	R
	POL_RSC-54_2022-09	9.5	8.4	9.0	Black spot	R
	POL_RSC-55_2022-09	9.3	8.2	7.0	Black spot	R
	POL_RSC-56_2022-09	7.6	6.7	4.0	Black spot	R
	POL_RSC-57_2022-09	9.9	8.7	8.0	Black spot	R
	POL_RSC-58_2022-09	8.3	7.3	5.0	-	R
	POL_RSC-59_2022-09	4.7	4.1	1.0	-	R

Notes: RSC = redside shiner; R = released; "-" = data not available or no comment.

Table C.6.9: Non-Destructive Physical Measurements of Redside Shiner Caught by Hoop Netting in Polley Lake (POL; Exposed), September 2022

Processing Date	Fish ID	Total Length (cm)	Fork Length (cm)	Weight (g)	Abnormalities	Fate
22-Sep-22	POL_RSC-60_2022-09	3.8	3.4	<1.0	-	R
	POL_RSC-61_2022-09	11.0	9.6	12.0	-	R
	POL_RSC-62_2022-09	12.4	10.9	19.0	Black spot	R
	POL_RSC-63_2022-09	8.0	7.0	4.0	-	R
	POL_RSC-64_2022-09	5.7	5.0	2.0	Black spot	R
	POL_RSC-65_2022-09	8.5	7.5	5.0	Black spot	R
	POL_RSC-66_2022-09	11.3	9.9	15.0	Black spot	R
	POL_RSC-67_2022-09	11.9	10.5	17.0	Black spot	R
	POL_RSC-68_2022-09	11.6	10.2	15.0	-	R
	POL_RSC-69_2022-09	6.9	6.5	3.0	-	R
	POL_RSC-70_2022-09	10.5	9.2	11.0	Black spot	R
	POL_RSC-71_2022-09	8.6	7.5	5.0	Black spot	R
	POL_RSC-72_2022-09	10.8	9.4	13.0	Black spot	R
	POL_RSC-73_2022-09	5.2	4.5	1.0	-	R
	POL_RSC-74_2022-09	11.5	10.1	16.0	Black spot	R
	POL_RSC-75_2022-09	4.7	4.1	1.0	-	R
	POL_RSC-76_2022-09	7.6	6.6	4.0	Black spot	R
	POL_RSC-77_2022-09	10.2	8.9	12.0	-	R
	POL_RSC-78_2022-09	5.1	4.5	1.0	-	M
	POL_RSC-79_2022-09	8.6	7.5	6.0	Black spot	R
	POL_RSC-80_2022-09	7.1	6.2	4.0	-	-
	POL_RSC-81_2022-09	7.0	6.0	3.0	-	R
	POL_RSC-82_2022-09	5.1	4.5	1.0	-	R
	POL_RSC-83_2022-09	9.0	7.9	8.0	Black spot	R
	POL_RSC-84_2022-09	5.3	4.6	1.0	Black spot	R
	POL_RSC-85_2022-09	8.0	6.9	4.0	Black spot	R
	POL_RSC-86_2022-09	4.7	4.1	1.0	-	R
	POL_RSC-87_2022-09	5.0	4.4	1.0	-	R
	POL_RSC-88_2022-09	8.1	7.1	4.0	Black spot	R
	POL_RSC-89_2022-09	6.9	6.0	3.0	-	R
	POL_RSC-90_2022-09	9.5	8.5	8.0	Black spot	R
	POL_RSC-91_2022-09	4.7	4.1	1.0	-	R
	POL_RSC-92_2022-09	8.9	7.8	9.0	Black spot	R
	POL_RSC-93_2022-09	9.5	8.3	7.0	Black spot	R
	POL_RSC-94_2022-09	5.2	4.5	1.0	-	R
	POL_RSC-95_2022-09	6.6	5.8	3.0	Black spot	R
	POL_RSC-96_2022-09	5.9	5.1	2.0	-	R
	POL_RSC-97_2022-09	7.0	6.0	3.0	Black spot	R
	POL_RSC-98_2022-09	12.1	10.1	17.0	Black spot	R
	POL_RSC-99_2022-09	10.5	9.3	11.0	-	R
	POL_RSC-100_2022-09	10.5	9.2	14.0	Black spot	R
	POL_RSC-101_2022-09	10.3	9.2	13.0	Black spot	R
	POL_RSC-102_2022-09	6.7	5.8	3.0	-	R
	POL_RSC-103_2022-09	10.2	9.0	10.0	Black spot	R
	POL_RSC-104_2022-09	9.6	8.0	7.0	Black spot	R
	POL_RSC-105_2022-09	5.5	4.7	1.0	-	R
	POL_RSC-106_2022-09	5.4	4.6	1.0	-	R
	POL_RSC-107_2022-09	5.6	4.8	1.0	-	R
	POL_RSC-108_2022-09	3.4	2.9	<1.0	-	R
	POL_RSC-109_2022-09	3.5	3.3	<1.0	-	R
	POL_RSC-110_2022-09	7.7	6.7	4.0	-	R
	POL_RSC-111_2022-09	5.5	4.8	1.0	-	R
	POL_RSC-112_2022-09	6.9	6.0	3.0	Black spot	R
	POL_RSC-113_2022-09	4.5	3.9	<1.0	-	R
Sample Size (n)		**113**	**113**	**113**	-	-
Average		**7.6**	**6.7**	**5.8**		
Median		**7.6**	**6.6**	**4.0**		
Standard Deviation		**2.4**	**2.1**	**5.0**		
Minimum		**3.4**	**2.9**	**1.0**		
Maximum		**12.4**	**10.9**	**20.0**		

Notes: RSC = redside shiner; R = released; "-" = data not available or no comment.

Table C.6.10: Destructive Physical Measurements of Longnose Sucker Caught by Hoop Netting in Polley Lake (POL; Exposed) and Bootjack Lake (BOL; Reference), May 2022

Area	Processing Date	Fish ID	Total Length (cm)	Fork Length (cm)	Weight (g)	Age Structure Collected[a]	Age (years)	Sex	Liver Weight (g)	Gonad Weight (g)	Kidney Weight (g)	Tissue Collected[b]	Abnormalities
Bootjack Lake	30-May-22	BOL_LSU-1_2022-05	44.0	41.2	1,075	PF, SC	7	F	18.555	161.543	4.000	M, L, K, O	-
		BOL_LSU-2_2022-05	47.0	43.9	1,175	PF, SC	12	F	19.259	185.308	5.816	M, L, K, O	-
		BOL_LSU-3_2022-05	37.0	35.1	625	PF, SC	6	F	10.548	56.560	5.499	M, L, K, O	Scars on body surface
		BOL_LSU-4_2022-05	44.4	41.5	1,050	PF, SC	10	F	26.652	146.478	5.528	M, L, K, O	-
	31-May-22	BOL_LSU-5_2022-05	47.7	44.6	1,360	PF, SC	12	F	27.620	184.439	8.326	M, L, K, O	-
		BOL_LSU-6_2022-05	44.8	42.1	1,180	PF, SC	9	F	29.749	197.434	9.569	M, L, K, O	-
		BOL_LSU-7_2022-05	34.8	32.8	550	PF, SC	6	F	13.273	59.349	4.512	M, L, K, O	-
		BOL_LSU-8_2022-05	43.5	41.0	1,120	PF, SC	9	F	28.155	194.415	7.273	M, L, K, O	-
	Sample Size (n)		**8**	**8**	**8**	-	**8**	-	**8**	**8**	**8**	-	-
	Average		**42.9**	**40.3**	**1,017**		**9**		**21.726**	**148.191**	**6.315**		
	Median		**44.2**	**41.4**	**1,098**		**9**		**22.956**	**172.991**	**5.672**		
	Standard Deviation		**4.59**	**4.15**	**282**		**2.4**		**7.34**	**58.2**	**1.92**		
	Minimum		**34.8**	**32.8**	**550**		**6**		**10.548**	**56.560**	**4.000**		
	Maximum		**47.7**	**44.6**	**1,360**		**12**		**29.749**	**197.434**	**9.569**		
Polley Lake	28-May-22	POL_LSU-1_2022-05	39.6	37.2	670	PF, SC	7	F	8.649	120.245	2.907	M,L,K,O	-
		POL_LSU-2_2022-05	47.2	44.0	940	PF, SC	13	F	11.774	196.800	4.009	M,L,K,O	-
		POL_LSU-3_2022-05	45.4	42.1	960	PF, SC	8	F	14.615	182.956	3.722	M,L,K,O	Lesion on caudal fin
		POL_LSU-4_2022-05	44.5	41.9	930	PF, SC	9	F	12.287	169.287	2.873	M,L,K,O	Tip of caudal fin absent, white lesion on liver
		POL_LSU-5_2022-05	30.0	27.7	262	PF, SC	5	F	4.850	30.893	0.898	M,L,K,O	Scars on body
		POL_LSU-6_2022-05	37.4	35.5	510	PF, SC	5	F	8.688	56.742	0.570	M,L,K,O	Scars on body
		POL_LSU-7_2022-05	43.6	40.9	955	PF, SC	7	F	11.531	154.643	1.916	M,L,K,O	-
		POL_LSU-8_2022-05	40.1	37.6	640	PF, SC	7	F	11.211	83.123	2.572	M,L,K,O	-
	Sample Size (n)		**8**	**8**	**8**	-	**8**	-	**8**	**8**	**8**	-	-
	Average		**41.0**	**38.4**	**733**		**8**		**10.451**	**124.336**	**2.433**		
	Median		**41.9**	**39.3**	**800**		**7**		**11.371**	**137.444**	**2.723**		
	Standard Deviation		**5.5**	**5.2**	**258**		**2.6**		**3.0**	**61.7**	**1.2**		
	Minimum		**30.0**	**27.7**	**262**		**5**		**4.850**	**30.893**	**0.570**		
	Maximum		**47.2**	**44.0**	**960**		**13**		**14.615**	**196.800**	**4.009**		

Notes: "-" = data not available. M = Male. F = female.

[a] Age structures collected: PF = pectoral fin, SC = scales.

[b] Tissues collected: M = muscle, L = liver, K = kidney, O = ovary.

Table C.6.11: Destructive Physical Measurements of Rainbow Trout Caught by Hoop Netting in Polley Lake (POL; Exposed) and Bootjack Lake (BOL; Reference), May 2022

Area	Processing Date	Fish ID	Total Length (cm)	Fork Length (cm)	Weight (g)	Age Structure Collected[a]	Age (years)	Sex	Liver Weight (g)	Gonad Weight (g)	Kidney Weight (g)	Tissue Collected[b]	Abnormalities
Bootjack Lake	30-May-22	BOL_RB-1_2022-05	35.3	33.8	315	OTO, SC	5	F	6.316	29.765	5.287	M,L,K,O	Ligula
		BOL_RB-2_2022-05	37.1	35.0	360	SC	6	F	5.714	49.312	2.994	M,L,K,O	Ligula
		BOL_RB-3_2022-05	27.5	26.2	218	OTO, SC	3	F	3.197	38.049	1.663	M,L,K,O	Ligula
		BOL_RB-4_2022-05	25.5	24.1	156	OTO, SC	4	F	1.829	27.230	1.327	M,L,K,O	Ligula
		BOL_RB-5_2022-05[c]	29.5	28.0	204	OTO, SC	4	F	3.191	2.314	1.825	M,L,K,O	Ligula
		BOL_RB-6_2022-05	33.0	31.2	294	OTO, SC	3	F	4.106	6.908	2.274	M,L,K,O	Ligula
		BOL_RB-7_2022-05[c]	30.5	28.8	212	OTO, SC	3	F	2.818	2.176	1.821	M,L,K,O	Ligula
		BOL_RB-8_2022-05	33.4	31.5	300	OTO, SC	5	F	3.950	34.043	2.382	M,L,K,O	Ligula
		Sample Size (n)	**8**	**8**	**8**	-	**8**	-	**8**	**8**	**8**	-	-
		Average	**31.5**	**29.8**	**257**		**4**		**3.890**	**23.725**	**2.447**		
		Median	**31.8**	**30.0**	**256**		**4**		**3.574**	**28.498**	**2.050**		
		Standard Deviation	**3.9**	**3.7**	**69.4**		**1.1**		**1.5**	**17.8**	**1.3**		
		Minimum	**25.5**	**24.1**	**156**		**3**		**1.829**	**2.176**	**1.327**		
		Maximum	**37.1**	**35.0**	**360**		**6**		**6.316**	**49.312**	**5.287**		
Polley Lake	28-May-22	POL_RB-1_2022-05	30.7	29.1	248	OTO, SC	4	F	2.944	11.100	2.317	M,L,K,O	Ligula
	29-May-22	POL_RB-2_2022-05	34.0	33.1	305	OTO, SC	4	F	3.508	5.692	1.408	M,L,K,O	-
		POL_RB-3_2022-05	32.3	30.9	250	OTO, SC	4	F	2.719	7.690	3.173	M,L,K,O	Ligula
		POL_RB-4_2022-05	32.3	30.6	284	OTO, SC	4	F	3.200	10.394	2.106	M,L,K,O	Ligula, white lesions on intestines
		POL_RB-5_2022-05	26.2	24.8	160	OTO, SC	3	F	1.610	0.492	1.434	M,L,K,O	-
		POL_RB-6_2022-05	36.0	34.1	355	OTO, SC	4	F	3.583	9.846	3.366	M,L,K,O	Ligula
		POL_RB-7_2022-05	34.3	33.1	325	OTO, SC	3	F	3.024	65.678	3.152	M,L,K,O	Ligula
		POL_RB-8_2022-05	32.5	30.8	300	OTO, SC	4	F	2.792	51.793	2.276	M,L,K,O	Ligula
		Sample Size (n)	**8**	**8**	**8**	-	**8**	-	**8**	**8**	**8**	-	-
		Average	**32.3**	**30.8**	**278**		**3.75**		**2.923**	**20.336**	**2.404**		
		Median	**32.4**	**30.9**	**292**		**4**		**2.984**	**10.120**	**2.297**		
		Standard Deviation	**2.9**	**2.9**	**59.8**		**0.5**		**0.6**	**24.2**	**0.8**		
		Minimum	**26.2**	**24.8**	**160**		**3**		**1.610**	**0.492**	**1.408**		
		Maximum	**36.0**	**34.1**	**355**		**4**		**3.583**	**65.678**	**3.366**		

Notes: "-" = data not available. M = Male. F = female.

[a] Age structures collected: OTO = otoliths, SC = scales.

[b] Tissues collected: M = muscle, L = liver, K = kidney, O = ovary.

[c] Though there was sufficient ovary tissue for tissue quality analysis, ovary weights were much lower as the fish were spent

Table C.6.12: Hoop Net Catch Data near Grain Creek (QUL-NGC; Reference) and Hazeltine Creek (QUL-NHC; Exposed) in Quesnel Lake, October 2022

Area	Net ID	Net Size[a]	UTM (NAD83, Zone 10U)		Set Date	Lift Date	Set Time	Lift Time	Depth Range (m)		Effort (days)	Burbot				Kokanee				Largescale Sucker				Longnose Sucker				Northern Pikeminnow				Peamouth Chub				Rainbow Trout				Redside Shiner				Sockeye Salmon			
			Easting	Northing								Catch	Sacrificed	Mortalities	CPUE[b]	Catch	Sacrificed	Mortalities	CPUE[b]	Catch	Sacrificed	Mortalities	CPUE[b]	Catch	Sacrificed	Mortalities	CPUE[b]	Catch	Sacrificed	Mortalities	CPUE[b]	Catch	Sacrificed	Mortalities	CPUE[b]	Catch	Sacrificed	Mortalities	CPUE[b]	Catch	Mortalities	Sacrificed	CPUE[b]	Catch	Sacrificed	Mortalities	CPUE[b]
Reference (near Grain Creek)	QUL-NGC_HN-1_2022-10	2.5	633132	5828731	4-Oct-22	6-Oct-22	16:15	14:39	0	1.0	1.93	1	0	0	0.517	0	0	0	0	0	0	0	0	1	0	0	0.517	1	0	0	0.517	2	1	1	1.03	1	0	0	0.517	0	0	0	0	2	0	1	1.03
	QUL-NGC_HN-2_2022-10	2.5	633096	5828687	4-Oct-22	6-Oct-22	16:30	14:13	0	1.3	1.90	2	0	0	1.05	0	0	0	0	1	0	0	0.525	12	0	0	6.30	23	8	0	12.1	5	0	5	2.62	0	0	0	0	1	0	0	0.525	1	0	0	0.525
	QUL-NGC_HN-3_2022-10	2.5	633259	5828879	4-Oct-22	6-Oct-22	16:50	15:08	0	1.2	1.93	1	0	0	0.518	2	0	0	1.04	4	0	0	2.07	5	0	0	2.59	19	0	2	9.85	30	7	0	15.6	0	0	0	0	0	0	0	0	2	0	1	1.04
								Total			**5.77**	**4**	**0**	**0**	**0.694**	**2**	**0**	**0**	**0.347**	**5**	**0**	**0**	**0.867**	**18**	**0**	**0**	**3.12**	**43**	**8**	**2**	**7.46**	**37**	**8**	**6**	**6.42**	**1**	**0**	**0**	**0.173**	**1**	**0**	**0**	**0.173**	**5**	**0**	**2**	**0.867**
Exposed (near Hazeltine Creek)	QUL-NHC_HN-1_2022-10	2.5	602231	5817500	3-Oct-22	4-Oct-22	16:20	14:51	0	3.0	0.938	0	0	0	0	1	0	0	1.07	26	0	0	27.7	0	0	0	0	9	8	0	9.59	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	QUL-NHC_HN-2_2022-10	2.5	602295	5817479	3-Oct-22	4-Oct-22	17:00	15:30	0	1.5	0.938	6	0	0	6.40	4	0	0	4.27	5	0	0	5.33	0	0	0	0	8	0	5	8.53	17	8	0	18.1	0	0	0	0	0	0	0	0	0	0	0	0
	QUL-NHC_HN-3_2022-10	2.5	602384	5817446	3-Oct-22	4-Oct-22	17:21	16:10	0	3.0	0.951	0	0	0	0	69	0	3	72.6	79	0	5	83.1	0	0	0	0	6	0	3	6.31	6	0	0	6.31	0	0	0	0	0	0	0	0	1	0	1	1.05
								Total			**2.83**	**6**	**0**	**0**	**2.12**	**74**	**0**	**3**	**26.2**	**110**	**0**	**5**	**38.9**	**0**	**0**	**0**	**0**	**23**	**8**	**8**	**8.14**	**23**	**8**	**0**	**8.14**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**1**	**0.354**

Notes: ID = identifier. UTM = Universal Transverse Mercator. NAD = North American Datu. CPUE = catch-per-unit-effort.

[a] Net size represents diameter in feet.

[b] CPUE = number of fish caught per trap day.

Table C.6.13: Gill Net Catch Data from the East Arm (QUL-EAA; Reference) and near Cedar Point Park (QUL-NCP; Exposed) of Quesnel Lake, October 2022

Area	Net ID	UTM (NAD83, Zone 10U)		Depth Range (m)		Set Date	Lift Date	Set Time	Lift Time	Effort (Hrs)	Mesh (inches)	Burbot					Bull Trout					Sockeye Salmon					Lake Trout				
		Easting	Northing									Catch	Mortalities	Sacrificed	Released	CPUE[a]	Catch	Mortalities	Sacrificed	Released	CPUE[a]	Catch	Mortalities	Sacrificed	Released	CPUE[a]	Catch	Mortalities	Sacrificed	Released	CPUE[a]
Reference (East Arm)	QUL-EAA_GN-1_2022-10	677524	5832619	8.4	32	4-Oct-22	4-Oct-22	10:13	11:05	0.867	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0.0414
											4	16	3	0	13	0.662	0	0	0	0	0	1	1	0	0	0.0414	0	0	0	0	0
											5	3	0	0	3	0.124	0	0	0	0	0	0	0	0	0	0	4	0	4	0	0.166
	QUL-EAA_GN-2_2022-10	677107	5832498	9.6	26.7	4-Oct-22	4-Oct-22	10:30	11:45	1.25	3	0	0	0	0	0	1	0	0	1	0.0287	1	0	0	1	0.0287	0	0	0	0	0
											4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	QUL-EAA_GN-3_2022-10	677560	5832652	7.8	27.2	4-Oct-22	4-Oct-22	12:00	12:44	0.733	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											4	1	0	0	1	0.0489	0	0	0	0	0	5	0	0	5	0.245	1	0	1	0	0.0489
											5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	QUL-EAA_GN-4_2022-10	677107	5832498	30.7	36.5	4-Oct-22	4-Oct-22	13:01	13:45	0.733	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	QUL-EAA_GN-5_2022-10	677107	5832498	17.9	34.5	4-Oct-22	4-Oct-22	13:08	13:55	0.783	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											4	2	1	0	1	0.0916	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0.0458
											5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	QUL-EAA_GN-6_2022-10	676905	5832470	18.1	27.4	4-Oct-22	4-Oct-22	14:08	14:42	0.567	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0.0633
											5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
									Total	**4.93**	-	**22**	**4**	**0**	**18**	**0.00889**	**1**	**0**	**0**	**1**	**0.000404**	**7**	**1**	**0**	**6**	**0.00283**	**8**	**0**	**8**	**0**	**0.00323**
Exposed (near Cedar Point)	QUL-NCP_GN-1_2022-10	598832	5827205	9	20	3-Oct-22	3-Oct-22	8:26	9:40	1.23	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0.0291
											4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											5	0	0	0	0	0	0	0	0	0	0	2	0	0	2	0.0582	0	0	0	0	0
	QUL-NCP_GN-2_2022-10	598599	5827484	5	21	3-Oct-22	3-Oct-22	8:40	9:55	1.25	3	0	0	0	0	0	1	0	0	1	0.0287	2	0	0	2	0.0574	0	0	0	0	0
											4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	QUL-NCP_GN-3_2022-10	598820	5827206	5	21	3-Oct-22	3-Oct-22	9:45	10:45	1.00	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											4	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0.0287	0	0	0	0	0
											5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	QUL-NCP_GN-4_2022-10	598599	5827484	4	22	3-Oct-22	3-Oct-22	10:05	11:03	0.967	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											5	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0.0371	0	0	0	0	0
	QUL-NCP_GN-5_2022-10	598742	5827350	6	26	3-Oct-22	3-Oct-22	10:37	11:30	0.883	3	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0.0406	0	0	0	0	0
											4	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0.0406	0	0	0	0	0
											5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	QUL-NCP_GN-6_2022-10	598820	5827206	6	17	3-Oct-22	3-Oct-22	10:50	11:41	0.850	3	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0.0406	1	0	1	0	0.0406
											4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	QUL-NCP_GN-7_2022-10	598599	5827484	3	22	3-Oct-22	3-Oct-22	11:11	12:30	1.32	3	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0.0273	0	0	0	0	0
											4	0	0	0	0	0	0	0	0	0	0	2	0	0	2	0.0545	0	0	0	0	0
											5	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0.0273	1	0	1	0	0.0273
	QUL-NCP_GN-8_2022-10	598747	5827359	4	24	3-Oct-22	3-Oct-22	11:36	12:40	0.750	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	QUL-NCP_GN-9_2022-10	598796	5827241	6	20	3-Oct-22	3-Oct-22	11:58	12:58	1.00	3	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0.0359	1	0	1	0	0.0359
											4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	QUL-NCP_GN-10_2022-10	598578	5827465	3	21	3-Oct-22	3-Oct-22	12:35	13:37	1.03	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	QUL-NCP_GN-11_2022-10	598730	5827358	5	23	3-Oct-22	3-Oct-22	12:47	13:53	0.750	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Notes: UTM = Universal Transverse Mercator; NAD = North American Datum; CPUE = catch-per-unit-effort; QUL = Quesnel; GN = gill net.
[a] CPUE = number of fish per m^2 per hour (# fish/[m^2 x hour]).

Table C.6.13: **Gill Net Catch Data from the East Arm (QUL-EAA; Reference) and near Cedar Point Park (QUL-NCP; Exposed) of Quesnel Lake, October 2022**

Area	Net ID	UTM (NAD83, Zone 10U)		Depth Range (m)		Set Date	Lift Date	Set Time	Lift Time	Effort (Hrs)	Mesh (inches)	Burbot					Bull Trout					Sockeye Salmon					Lake Trout				
		Easting	Northing									Catch	Mortalities	Sacrificed	Released	CPUE[a]	Catch	Mortalities	Sacrificed	Released	CPUE[a]	Catch	Mortalities	Sacrificed	Released	CPUE[a]	Catch	Mortalities	Sacrificed	Released	CPUE[a]
Exposed (near Cedar Point)	QUL-NCP_GN-12_2022-10	598813	5827286	7	18	3-Oct-22	3-Oct-22	13:06	14:10	1.07	3	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0.0336	0	0	0	0	0
											4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	QUL-NCP_GN-13_2022-10	598812	5827146	12	22	3-Oct-22	3-Oct-22	13:46	14:46	1.00	3	0	0	0	0	0	1	1	0	0	0.0359	1	0	0	1	0.0359	0	0	0	0	0
											4	0	0	0	0	0	0	0	0	0	0	3	1	0	2	0.108	0	0	0	0	0
											5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	QUL-NCP_GN-14_2022-10	598709	5827373	4	24	3-Oct-22	3-Oct-22	14:00	15:05	0.750	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	QUL-NCP_GN-15_2022-10	598763	5827310	9	23	3-Oct-22	3-Oct-22	14:16	15:15	0.983	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	QUL-NCP_GN-16_2022-10	598845	5827177	6	21	4-Oct-22	4-Oct-22	10:40	11:30	0.833	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	QUL-NCP_GN-17_2022-10	598789	5827323	7	21	4-Oct-22	4-Oct-22	10:52	11:52	1.00	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	QUL-NCP_GN-18_2022-10	598692	5827413	7	20	4-Oct-22	4-Oct-22	11:04	12:06	1.03	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	QUL-NCP_GN-19_2022-10	598839	5827133	9	23	4-Oct-22	4-Oct-22	11:37	12:38	1.02	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0.0353
											4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	QUL-NCP_GN-20_2022-10	598775	5827304	8	20	4-Oct-22	4-Oct-22	12:00	13:02	1.03	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	QUL-NCP_GN-21_2022-10	598695	5827424	5	20	4-Oct-22	4-Oct-22	12:10	13:34	1.40	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	QUL-NCP_GN-22_2022-10	598839	5827133	8	21	4-Oct-22	4-Oct-22	12:45	13:47	1.03	3	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0.0347	0	0	0	0	0
											4	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0.0347	0	0	0	0	0
											5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	QUL-NCP_GN-23_2022-10	598749	5827026	5	20	4-Oct-22	4-Oct-22	13:20	14:22	1.03	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	QUL-NCP_GN-24_2022-10	598841	5827142	19	20	5-Oct-22	5-Oct-22	8:17	9:20	1.05	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	QUL-NCP_GN-25_2022-10	598808	5827053	18	27	5-Oct-22	5-Oct-22	8:26	9:25	0.983	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	QUL-NCP_GN-26_2022-10	598816	5827295	9	17	5-Oct-22	5-Oct-22	9:30	10:35	1.08	3	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0.0331	0	0	0	0	0
											4	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0.0331	0	0	0	0	0
											5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	QUL-NCP_GN-27_2022-10	598817	5827137	12	20	5-Oct-22	5-Oct-22	9:42	10:50	1.13	3	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0.0317	0	0	0	0	0
											4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	QUL-NCP_GN-28_2022-10	598745	5827423	7	21	5-Oct-22	5-Oct-22	10:57	11:58	1.02	3	0	0	0	0	0	0	0	0	0	0	3	0	0	3	0.106	0	0	0	0	0
											4	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0.0353	0	0	0	0	0
											5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	QUL-NCP_GN-29_2022-10	598761	5827759	8	17	5-Oct-22	5-Oct-22	11:04	12:08	1.07	3	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0.0336	0	0	0	0	0
											4	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0.0336	0	0	0	0	0
											5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	QUL-NCP_GN-30_2022-10	598762	5826947	13	25	5-Oct-22	5-Oct-22	12:29	13:28	0.983	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	QUL-NCP_GN-31_2022-10	598683	5826723	15	19	5-Oct-22	5-Oct-22	13:36	14:37	0.750	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Notes: UTM = Universal Transverse Mercator; NAD = North American Datum; CPUE = catch-per-unit-effort; QUL = Quesnel; GN = gill net.
[a] CPUE = number of fish per m^2 per hour (# fish/[m^2 x hour]).

Table C.6.13: **Gill Net Catch Data from the East Arm (QUL-EAA; Reference) and near Cedar Point Park (QUL-NCP; Exposed) of Quesnel Lake, October 2022**

Area	Net ID	UTM (NAD83, Zone 10U)		Depth Range (m)		Set Date	Lift Date	Set Time	Lift Time	Effort (Hrs)	Mesh (inches)	Burbot					Bull Trout					Sockeye Salmon					Lake Trout				
		Easting	Northing									Catch	Mortalities	Sacrificed	Released	CPUE[a]	Catch	Mortalities	Sacrificed	Released	CPUE[a]	Catch	Mortalities	Sacrificed	Released	CPUE[a]	Catch	Mortalities	Sacrificed	Released	CPUE[a]
Exposed (near Cedar Point)	QUL-NCP_GN-32_2022-10	598926	5825436	14	16	5-Oct-22	5-Oct-22	13:55	15:00	1.08	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	QUL-NCP_GN-33_2022-10	599068	5824173	17	29	5-Oct-22	5-Oct-22	14:05	15:15	1.17	3	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0.0308	0	0	0	0	0
											4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	QUL-NCP_GN-34_2022-10	598845	5827274	15	21	5-Oct-22	5-Oct-22	15:28	16:31	1.05	3	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0.0342	0	0	0	0	0
											4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	QUL-NCP_GN-35_2022-10	598861	5827119	17	16	5-Oct-22	5-Oct-22	15:33	16:37	1.07	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	QUL-NCP_GN-36_2022-10	598800	5827166	9	19	5-Oct-22	5-Oct-22	16:47	17:49	1.03	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0.0347
											5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	QUL-NCP_GN-37_2022-10	598775	5827377	8	24	5-Oct-22	5-Oct-22	17:00	17:59	0.983	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	QUL-NCP_GN-38_2022-10	598851	5827189	11	20	5-Oct-22	5-Oct-22	18:12	18:46	0.567	3	0	0	0	0	0	0	0	0	0	0	3	0	0	3	0.190	0	0	0	0	0
											4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	QUL-NCP_GN-39_2022-10	598789	5827082	13	26	5-Oct-22	5-Oct-22	18:19	18:56	0.617	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	QUL-NCP_GN-40_2022-10	598822	5827150	8	20	6-Oct-22	6-Oct-22	7:15	8:17	1.03	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											4	0	0	0	0	0	0	0	0	0	0	2	0	0	2	0.0694	0	0	0	0	0
											5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	QUL-NCP_GN-41_2022-10	598746	5827357	10	23	6-Oct-22	6-Oct-22	7:25	8:32	1.12	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											4	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0.0321	1	0	1	0	0.0321
											5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	QUL-NCP_GN-42_2022-10	598770	5827300	10	23	6-Oct-22	6-Oct-22	7:35	8:42	1.12	3	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0.0321	1	0	1	0	0.0321
											4	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0.0321	0	0	0	0	0
											5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	QUL-NCP_GN-43_2022-10	598746	5827357	10	22	6-Oct-22	6-Oct-22	8:37	8:55	0.300	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
									Total	**42.4**	-	**0**	**0**	**0**	**0**	**0**	**2**	**1**	**0**	**1**	**0.0000144**	**40**	**2**	**0**	**38**	**0.000288**	**8**	**0**	**8**	**0**	**0.0000577**

Notes: UTM = Universal Transverse Mercator; NAD = North American Datum; CPUE = catch-per-unit-effort; QUL = Quesnel; GN = gill net.

[a] CPUE = number of fish per m^2 per hour (# fish/[m^2 x hour]).

Table C.6.13: **Gill Net Catch Data from the East Arm (QUL-EAA; Reference) and near Cedar Point Park (QUL-NCP; Exposed) of Quesnel Lake, October 2022**

Area	Net ID	UTM (NAD83, Zone 10U)		Depth Range (m)		Set Date	Lift Date	Set Time	Lift Time	Effort (Hrs)	Mesh (inches)	Kokanee					Mountain Whitefish					Rainbow Trout				
		Easting	Northing									Catch	Mortalities	Sacrificed	Released	CPUE[a]	Catch	Mortalities	Sacrificed	Released	CPUE[a]	Catch	Mortalities	Sacrificed	Released	CPUE[a]
Reference (East Arm)	QUL-EAA_GN-1_2022-10	677524	5832619	8.4	32	4-Oct-22	4-Oct-22	10:13	11:05	0.867	3	0	0	0	0	0	2	0	0	2	0.0828	0	0	0	0	0
											4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	QUL-EAA_GN-2_2022-10	677107	5832498	9.6	26.7	4-Oct-22	4-Oct-22	10:30	11:45	1.25	3	1	0	0	1	0.0287	1	0	0	1	0.0287	0	0	0	0	0
											4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	QUL-EAA_GN-3_2022-10	677560	5832652	7.8	27.2	4-Oct-22	4-Oct-22	12:00	12:44	0.733	3	0	0	0	0	0	1	0	0	1	0.0489	0	0	0	0	0
											4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	QUL-EAA_GN-4_2022-10	677107	5832498	30.7	36.5	4-Oct-22	4-Oct-22	13:01	13:45	0.733	3	0	0	0	0	0	1	0	0	1	0.0489	0	0	0	0	0
											4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	QUL-EAA_GN-5_2022-10	677107	5832498	17.9	34.5	4-Oct-22	4-Oct-22	13:08	13:55	0.783	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	QUL-EAA_GN-6_2022-10	676905	5832470	18.1	27.4	4-Oct-22	4-Oct-22	14:08	14:42	0.567	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
									Total	**4.93**	-	**1**	**0**	**0**	**1**	**0.000404**	**5**	**0**	**0**	**5**	**0.00202**	**0**	**0**	**0**	**0**	**0**
Exposed (near Cedar Point)	QUL-NCP_GN-1_2022-10	598832	5827205	9	20	3-Oct-22	3-Oct-22	8:26	9:40	1.23	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	QUL-NCP_GN-2_2022-10	598599	5827484	5	21	3-Oct-22	3-Oct-22	8:40	9:55	1.25	3	2	0	0	2	0.0574	0	0	0	0	0	0	0	0	0	0
											4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	QUL-NCP_GN-3_2022-10	598820	5827206	5	21	3-Oct-22	3-Oct-22	9:45	10:45	1.00	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	QUL-NCP_GN-4_2022-10	598599	5827484	4	22	3-Oct-22	3-Oct-22	10:05	11:03	0.967	3	3	0	0	3	0.111	0	0	0	0	0	0	0	0	0	0
											4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	QUL-NCP_GN-5_2022-10	598742	5827350	6	26	3-Oct-22	3-Oct-22	10:37	11:30	0.883	3	1	0	0	1	0.0406	0	0	0	0	0	0	0	0	0	0
											4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	QUL-NCP_GN-6_2022-10	598820	5827206	6	17	3-Oct-22	3-Oct-22	10:50	11:41	0.850	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	QUL-NCP_GN-7_2022-10	598599	5827484	3	22	3-Oct-22	3-Oct-22	11:11	12:30	1.32	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	QUL-NCP_GN-8_2022-10	598747	5827359	4	24	3-Oct-22	3-Oct-22	11:36	12:40	0.750	3	2	0	0	2	0.0957	0	0	0	0	0	0	0	0	0	0
											4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	QUL-NCP_GN-9_2022-10	598796	5827241	6	20	3-Oct-22	3-Oct-22	11:58	12:58	1.00	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	QUL-NCP_GN-10_2022-10	598578	5827465	3	21	3-Oct-22	3-Oct-22	12:35	13:37	1.03	3	1	0	0	1	0.0347	0	0	0	0	0	1	0	0	1	0.0347
											4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	QUL-NCP_GN-11_2022-10	598730	5827358	5	23	3-Oct-22	3-Oct-22	12:47	13:53	0.750	3	5	0	0	5	0.239	0	0	0	0	0	2	0	0	2	0.0957
											4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Notes: UTM = Universal Transverse Mercator; NAD = North American Datum; CPUE = catch-per-unit-effort; QUL = Quesnel; GN = gill net.

[a] CPUE = number of fish per m^2 per hour (# fish/[m^2 x hour]).

Table C.6.13: **Gill Net Catch Data from the East Arm (QUL-EAA; Reference) and near Cedar Point Park (QUL-NCP; Exposed) of Quesnel Lake, October 2022**

Area	Net ID	UTM (NAD83, Zone 10U)		Depth Range (m)		Set Date	Lift Date	Set Time	Lift Time	Effort (Hrs)	Mesh (inches)	Kokanee					Mountain Whitefish					Rainbow Trout				
		Easting	Northing									Catch	Mortalities	Sacrificed	Released	CPUE[a]	Catch	Mortalities	Sacrificed	Released	CPUE[a]	Catch	Mortalities	Sacrificed	Released	CPUE[a]
Exposed (near Cedar Point)	QUL-NCP_GN-12_2022-10	598813	5827286	7	18	3-Oct-22	3-Oct-22	13:06	14:10	1.07	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	QUL-NCP_GN-13_2022-10	598812	5827146	12	22	3-Oct-22	3-Oct-22	13:46	14:46	1.00	3	8	1	0	7	0.287	0	0	0	0	0	0	0	0	0	0
											4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	QUL-NCP_GN-14_2022-10	598709	5827373	4	24	3-Oct-22	3-Oct-22	14:00	15:05	0.750	3	1	0	0	1	0.0478	0	0	0	0	0	0	0	0	0	0
											4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	QUL-NCP_GN-15_2022-10	598763	5827310	9	23	3-Oct-22	3-Oct-22	14:16	15:15	0.983	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	QUL-NCP_GN-16_2022-10	598845	5827177	6	21	4-Oct-22	4-Oct-22	10:40	11:30	0.833	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	QUL-NCP_GN-17_2022-10	598789	5827323	7	21	4-Oct-22	4-Oct-22	10:52	11:52	1.00	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	QUL-NCP_GN-18_2022-10	598692	5827413	7	20	4-Oct-22	4-Oct-22	11:04	12:06	1.03	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	QUL-NCP_GN-19_2022-10	598839	5827133	9	23	4-Oct-22	4-Oct-22	11:37	12:38	1.02	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	QUL-NCP_GN-20_2022-10	598775	5827304	8	20	4-Oct-22	4-Oct-22	12:00	13:02	1.03	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	QUL-NCP_GN-21_2022-10	598695	5827424	5	20	4-Oct-22	4-Oct-22	12:10	13:34	1.40	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	QUL-NCP_GN-22_2022-10	598839	5827133	8	21	4-Oct-22	4-Oct-22	12:45	13:47	1.03	3	3	0	0	3	0.104	0	0	0	0	0	0	0	0	0	0
											4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	QUL-NCP_GN-23_2022-10	598749	5827026	5	20	4-Oct-22	4-Oct-22	13:20	14:22	1.03	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	QUL-NCP_GN-24_2022-10	598841	5827142	19	20	5-Oct-22	5-Oct-22	8:17	9:20	1.05	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	QUL-NCP_GN-25_2022-10	598808	5827053	18	27	5-Oct-22	5-Oct-22	8:26	9:25	0.983	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	QUL-NCP_GN-26_2022-10	598816	5827295	9	17	5-Oct-22	5-Oct-22	9:30	10:35	1.08	3	1	0	0	1	0.0331	0	0	0	0	0	0	0	0	0	0
											4	1	0	0	1	0.0331	0	0	0	0	0	0	0	0	0	0
											5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	QUL-NCP_GN-27_2022-10	598817	5827137	12	20	5-Oct-22	5-Oct-22	9:42	10:50	1.13	3	1	0	0	1	0.0317	0	0	0	0	0	0	0	0	0	0
											4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	QUL-NCP_GN-28_2022-10	598745	5827423	7	21	5-Oct-22	5-Oct-22	10:57	11:58	1.02	3	1	0	0	1	0.0353	0	0	0	0	0	0	0	0	0	0
											4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	QUL-NCP_GN-29_2022-10	598761	5827759	8	17	5-Oct-22	5-Oct-22	11:04	12:08	1.07	3	4	0	0	4	0.135	0	0	0	0	0	0	0	0	0	0
											4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	QUL-NCP_GN-30_2022-10	598762	5826947	13	25	5-Oct-22	5-Oct-22	12:29	13:28	0.983	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	QUL-NCP_GN-31_2022-10	598683	5826723	15	19	5-Oct-22	5-Oct-22	13:36	14:37	0.750	3	1	0	0	1	0.0478	0	0	0	0	0	0	0	0	0	0
											4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Notes: UTM = Universal Transverse Mercator; NAD = North American Datum; CPUE = catch-per-unit-effort; QUL = Quesnel; GN = gill net.
[a] CPUE = number of fish per m^2 per hour (# fish/[m^2 x hour]).

Table C.6.13: Gill Net Catch Data from the East Arm (QUL-EAA; Reference) and near Cedar Point Park (QUL-NCP; Exposed) of Quesnel Lake, October 2022

Area	Net ID	UTM (NAD83, Zone 10U)		Depth Range (m)		Set Date	Lift Date	Set Time	Lift Time	Effort (Hrs)	Mesh (inches)	Kokanee					Mountain Whitefish					Rainbow Trout				
		Easting	Northing									Catch	Mortalities	Sacrificed	Released	CPUE[a]	Catch	Mortalities	Sacrificed	Released	CPUE[a]	Catch	Mortalities	Sacrificed	Released	CPUE[a]
Exposed (near Cedar Point)	QUL-NCP_GN-32_2022-10	598926	5825436	14	16	5-Oct-22	5-Oct-22	13:55	15:00	1.08	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	QUL-NCP_GN-33_2022-10	599068	5824173	17	29	5-Oct-22	5-Oct-22	14:05	15:15	1.17	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	QUL-NCP_GN-34_2022-10	598845	5827274	15	21	5-Oct-22	5-Oct-22	15:28	16:31	1.05	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	QUL-NCP_GN-35_2022-10	598861	5827119	17	16	5-Oct-22	5-Oct-22	15:33	16:37	1.07	3	2	0	0	2	0.0673	0	0	0	0	0	0	0	0	0	0
											4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	QUL-NCP_GN-36_2022-10	598800	5827166	9	19	5-Oct-22	5-Oct-22	16:47	17:49	1.03	3	2	0	0	2	0.0694	0	0	0	0	0	0	0	0	0	0
											4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	QUL-NCP_GN-37_2022-10	598775	5827377	8	24	5-Oct-22	5-Oct-22	17:00	17:59	0.983	3	10	0	0	10	0.365	0	0	0	0	0	0	0	0	0	0
											4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	QUL-NCP_GN-38_2022-10	598851	5827189	11	20	5-Oct-22	5-Oct-22	18:12	18:46	0.567	3	1	0	0	1	0.0633	0	0	0	0	0	0	0	0	0	0
											4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	QUL-NCP_GN-39_2022-10	598789	5827082	13	26	5-Oct-22	5-Oct-22	18:19	18:56	0.617	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	QUL-NCP_GN-40_2022-10	598822	5827150	8	20	6-Oct-22	6-Oct-22	7:15	8:17	1.03	3	7	0	0	7	0.243	1	0	0	1	0.0347	0	0	0	0	0
											4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	QUL-NCP_GN-41_2022-10	598746	5827357	10	23	6-Oct-22	6-Oct-22	7:25	8:32	1.12	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	QUL-NCP_GN-42_2022-10	598770	5827300	10	23	6-Oct-22	6-Oct-22	7:35	8:42	1.12	3	2	0	0	2	0.0643	0	0	0	0	0	0	0	0	0	0
											4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	QUL-NCP_GN-43_2022-10	598746	5827357	10	22	6-Oct-22	6-Oct-22	8:37	8:55	0.300	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
											5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
									Total	**42.4**	-	**59**	**1**	**0**	**58**	**0.000425**	**1**	**0**	**0**	**1**	**0.00000721**	**3**	**0**	**0**	**3**	**0.0000216**

Notes: UTM = Universal Transverse Mercator; NAD = North American Datum; CPUE = catch-per-unit-effort; QUL = Quesnel; GN = gill net.
[a] CPUE = number of fish per m^2 per hour (# fish/[m^2 x hour]).

Table C.6.14: Angling Catch Data for Quesnel River (QUR; Exposed), October 2022

Area	Station ID	UTM (NAD83, Zone 10U)		Date	Start Time	End Time	Angling Hours (hrs)	# of Lines	Effort (angler days)	Bull Trout				Rainbow Trout			
		Easting	Northing							Catch	Mortalities	Sacrificed	CPUE [a]	Catch	Mortalities	Sacrificed	CPUE [a]
Quesnel River	QUR_AG-1_2022-10	596537	5830512	1-Oct-22	13:00	14:50	1.83	1	0.0764	0	0	0	0	4	0	4	52.4
	QUR_AG-2_2022-10	596537	5830512	2-Oct-22	12:00	13:40	1.67	1	0.0694	1	0	0	14.4	4	0	4	57.6
								Total	**0.146**	**1**	**0**	**0**	**6.86**	**8**	**0**	**8**	**54.9**

Notes: ID = identifier. UTM = Universal Transverse Mercator. NAD = North American Datum. CPUE = catch-per-unit-effort.

[a] CPUE is calculated as the number of fish captured per angler day.

Table C.6.15: Destructive Physical Measurements of Lake Trout Caught by Gill Netting in the East Arm (QUL-EAA Reference) and near Cedar Point Park (QUL-NCP; Exposed) of Quesnel Lake, October 2022

Area	Processing Date	Fish ID	Total Length (cm)	Fork Length (cm)	Weight (g)	Age Structure Collected[a]	Age (years)	Sex[b]	Liver Weight (g)	Gonad Weight (g)	Kidney Weight (g)	Tissue Collected[c]	Abnormalities
Reference (East Arm)	4-Oct-22	QUL-EAA_LT-1_2022-10	66.5	61.5	2,500	OTO, SC	11	M	22.042	-	19.875	M, L, K	None
		QUL-EAA_LT-2_2022-10	70.5	65.0	3,100	OTO, SC	19	M	33.447	-	45.186	M, L, K	None
		QUL-EAA_LT-3_2022-10	58.7	53.9	1,562	OTO, SC	10	M	14.317	-	10.397	M, L, K	None
		QUL-EAA_LT-4_2022-10	64.3	59.1	2,500	OTO, SC	8	F	26.790	126.979	18.502	M, L, K, O	None
		QUL-EAA_LT-5_2022-10	65.5	60.0	2,600	OTO, SC	12	M	27.446	-	27.749	M, L, K	None
		QUL-EAA_LT-6_2022-10	66.2	60.1	2,450	OTO, SC	18	M	31.087	-	25.200	M, L, K	None
		QUL-EAA_LT-7_2022-10	54.2	50.0	1,440	OTO, SC	7	M	19.738	-	10.565	M, L, K	None
		QUL-EAA_LT-8_2022-10	68.0	62.8	2,650	OTO, SC	14	M	35.409	-	42.975	M, L, K	None
		Sample Size (n)	**8**	**8**	**8**	-	**8**	-	**8**	-	**8**	-	-
		Average	**64.2**	**59.1**	**2,350**		**12**		**26.285**		**25.056**		
		Median	**65.9**	**60.1**	**2,500**		**12**		**27.118**		**22.538**		
		Standard Deviation	**5.3**	**4.9**	**563**		**4.4**		**7.20**		**13.2**		
		Minimum	**54.2**	**50.0**	**1,440**		**7**		**14.317**		**10.397**		
		Maximum	**70.5**	**65.0**	**3,100**		**19**		**35.409**		**45.186**		
Exposed (near Cedar Point)	3-Oct-22	QUL-NCP_LT-1_2022-10	69.5	64.5	3,100	OTO, SC	10	F	79.057	427.853	28.288	M, L, K, O	None
		QUL-NCP_LT-2_2022-10	53.0	48.3	1,200	OTO, SC	3	M	14.655	-	7.921	M, L, K	None
		QUL-NCP_LT-3_2022-10	70.0	64.0	3,400	OTO, SC	11	F	90.039	340.478	34.411	M, L, K, O	None
		QUL-NCP_LT-4_2022-10	57.6	52.5	1,550	OTO, SC	4	F	18.389	10.837	14.409	M, L, K, O	None
	4-Oct-22	QUL-NCP_LT-5_2022-10	47.0	42.5	760	SC	3	F	10.285	4.610	5.028	M, L, K, O	None
	5-Oct-22	QUL-NCP_LT-6_2022-10	67.0	61.5	2,600	OTO, SC	15	M	28.817	-	35.750	M, L, K	None
	6-Oct-22	QUL-NCP_LT-7_2022-10	64.0	58.5	2,090	OTO, SC	5	M	69.430	-	18.658	M, L, K	None
		QUL-NCP_LT-8_2022-10	56.5	51.0	1,150	SC	2	F	15.319	7.536	8.079	M, L, K, O	None
		Sample Size (n)	**8**	**8**	**8**	-	**8**	-	**8**	**5**	**8**	-	-
		Average	**60.6**	**55.4**	**1,981**		**7**		**40.749**	**158.263**	**19.068**		
		Median	**60.8**	**55.5**	**1,820**		**5**		**23.603**	**10.837**	**16.534**		
		Standard Deviation	**8.4**	**8.0**	**974**		**4.7**		**33.0**	**209**	**12.3**		
		Minimum	**47.0**	**42.5**	**760**		**2**		**10.285**	**4.610**	**5.028**		
		Maximum	**70.0**	**64.5**	**3,400**		**15**		**90.039**	**427.853**	**35.750**		

Notes: "-" = data not available or no ovary weight available. QUL = Quesnel Lake. LT = lake trout.

[a] Age structures collected: OTO = otoliths, SC = scales.

[b] F = female, M = male, U = unknown.

[c] Tissues collected: M = muscle; L = liver; K = kidney; O = ovary.

Table C.6.16: Destructive Physical Measurements of Northern Pikeminnow Caught by Hoop Netting near Grain Creek (QUL-NGC; Reference) and Hazeltine Creek (QUL-NHC; Exposed) in Quesnel Lake, October 2022

Area	Processing Date	Fish ID	Total Length (cm)	Fork Length (cm)	Weight (g)	Age Structure Collected[a]	Age (years)	Sex[b]	Tissue Collected[c]	Abnormalities
Reference (near Grain Creek)	6-Oct-22	QUL-NGC_NSC-1_2022-10	16.0	14.0	37	OTO, SC	3	Unknown	WB	None
		QUL-NGC_NSC-2_2022-10	15.5	13.8	36	OTO, SC	2	Unknown	WB	None
		QUL-NGC_NSC-3_2022-10	15.1	13.5	37	OTO, SC	3	Unknown	WB	None
		QUL-NGC_NSC-4_2022-10	16.4	14.8	36	OTO, SC	2	Unknown	WB	None
		QUL-NGC_NSC-5_2022-10	18.5	16.6	57	OTO, SC	2	Unknown	WB	None
		QUL-NGC_NSC-6_2022-10	16.9	15.3	40	OTO, SC	3	Unknown	WB	None
		QUL-NGC_NSC-7_2022-10	16.7	15.3	42	OTO, SC	4	Unknown	WB	None
		QUL-NGC_NSC-8_2022-10	16.8	15.2	40	OTO, SC	2	Unknown	WB	None
		Sample Size (n)	**8**	**8**	**8**	-	**8**	-	-	-
		Average	**16.5**	**14.8**	**40.6**		**3**			
		Median	**16.6**	**15.0**	**38.5**		**3**			
		Standard Deviation	**1**	**1**	**7**		**0.7**			
		Minimum	**15.1**	**13.5**	**36.0**		**2**			
		Maximum	**18.5**	**16.6**	**57.0**		**4**			
Exposed (near Hazeltine Creek)	4-Oct-22	QUL-NHC_NSC-1_2022-10	24.0	21.8	130	OTO, SC	6	Unknown	WB	None
		QUL-NHC_NSC-2_2022-10	20.2	18.5	70	OTO, SC	5	Unknown	WB	None
		QUL-NHC_NSC-3_2022-10	20.0	18.0	76	OTO, SC	4	Unknown	WB	None
		QUL-NHC_NSC-4_2022-10	18.0	16.3	50	OTO, SC	3	Unknown	WB	None
		QUL-NHC_NSC-5_2022-10	20.5	18.6	69	OTO, SC	3	Unknown	WB	None
		QUL-NHC_NSC-6_2022-10	18.1	16.3	51	OTO, SC	5	Unknown	WB	None
		QUL-NHC_NSC-7_2022-10	16.5	15.1	40	OTO, SC	2	Unknown	WB	None
		QUL-NHC_NSC-8_2022-10	15.4	13.6	33	OTO, SC	2	Unknown	WB	None
		Sample Size (n)	**8**	**8**	**8**	-	**8**	-	-	-
		Average	**19.1**	**17.3**	**64.9**		**4**			
		Median	**19.1**	**17.2**	**60.0**		**4**			
		Standard Deviation	**2.7**	**2.5**	**30.4**		**1.5**			
		Minimum	**15.4**	**13.6**	**33.0**		**2**			
		Maximum	**24.0**	**21.8**	**130**		**6**			

Notes: "-" = data not available or no ovary weight available. QUL = Quesnel Lake. NSC = Northern Pikeminnow.

[a] Age structures collected: OTO = otoliths, SC = scales.

[b] Unknown/undetermined as fish were submitted as whole body sample.

[c] Tissues collected: WB = whole body.

Table C.6.17: Destructive Physical Measurements of Peamouth Chub Caught by Hoop Netting near Grain Creek (QUL-NGC; Reference) and Hazeltine Creek (QUL-NHC; Exposed) in Quesnel Lake, October 2022

Area	Processing Date	Fish ID	Total Length (cm)	Fork Length (cm)	Weight (g)	Age Structure Collected[a]	Age (years)	Sex[b]	Liver Weight (g)	Gonad Weight (g)	Kidney Weight (g)	Tissue Collected[c]	Abnormalities
Reference (near Grain Creek)	6-Oct-22	QUL-NGC_PCC-1_2022-10	19.0	17.1	66	OTO, SC	3	U	0.957	-	0.308	M, L, K	None
		QUL-NGC_PCC-2_2022-10	25.2	22.8	110	SC	4	F	1.671	8.848	2.452	M, L, K, O	None
		QUL-NGC_PCC-3_2022-10	24.1	21.6	135	SC	4	F	1.585	8.491	1.067	M, L, K, O	None
		QUL-NGC_PCC-4_2022-10	22.0	20.0	100	OTO, SC	6	M	1.697	-	1.525	M, L, K	None
		QUL-NGC_PCC-5_2022-10	24.1	21.6	110	OTO, SC	14	F	1.574	5.192	0.919	M, L, K, O	None
		QUL-NGC_PCC-6_2022-10	21.6	19.6	85	OTO, SC	5	F	0.805	3.255	0.822	M, L, K, O	None
		QUL-NGC_PCC-7_2022-10	23.5	21.2	130	OTO, SC	9	F	1.799	7.139	1.401	M, L, K, O	None
		QUL-NGC_PCC-8_2022-10	19.6	17.7	71	OTO, SC	5	F	0.469	2.601	0.450	M, L, K,O	None
		Sample Size (n)	**8**	**8**	**8**	-	**8**	-	**8**	**6**	**8**	-	-
		Average	**22.4**	**20.2**	**101**		**6**		**1.320**	**5.921**	**1.118**		
		Median	**22.8**	**20.6**	**105**		**5**		**1.580**	**6.166**	**0.993**		
		Standard Deviation	**2.2**	**2.0**	**25.5**		**3.6**		**0.5**	**2.7**	**0.7**		
		Minimum	**19.0**	**17.1**	**66.0**		**3**		**0.469**	**2.601**	**0.308**		
		Maximum	**25.2**	**22.8**	**135**		**14**		**1.799**	**8.848**	**2.452**		
Exposed (near Hazeltine Creek)	4-Oct-22	QUL-NHC_PCC-1_2022-10	25.2	22.9	170	OTO, SC	9	F	2.899	7.927	1.559	M, L, K,O	None
		QUL-NHC_PCC-2_2022-10	24.5	22.4	130	OTO, SC	8	F	1.855	2.872	1.403	M, L, K, O	Parasite in ovary
		QUL-NHC_PCC-3_2022-10	23.9	21.5	130	OTO, SC	9	F	1.620	9.607	0.816	M, L, K, O	None
		QUL-NHC_PCC-4_2022-10	23.7	21.8	140	OTO, SC	7	F	1.652	11.573	1.192	M, L, K, O	None
		QUL-NHC_PCC-5_2022-10	24.1	21.5	145	OTO, SC	8	F	2.010	8.703	1.655	M, L, K, O	None
		QUL-NHC_PCC-6_2022-10	24.5	22.3	160	OTO, SC	10	F	4.923	11.300	1.301	M, L, K, O	None
		QUL-NHC_PCC-7_2022-10	22.8	20.7	115	OTO, SC	6	F	1.830	6.880	1.216	M, L, K, O	None
		QUL-NHC_PCC-8_2022-10	22.4	20.0	115	OTO, SC	8	M	2.194	-	1.290	M, L, K	None
		Sample Size (n)	**8**	**8**	**8**	-	**8**	-	**8**	**7**	**8**	-	-
		Average	**23.9**	**21.6**	**138**		**8**		**2.373**	**8.409**	**1.304**		
		Median	**24.0**	**21.7**	**135**		**8**		**1.933**	**8.703**	**1.296**		
		Standard Deviation	**0.9**	**0.9**	**19.8**		**1.2**		**1.1**	**3.0**	**0.3**		
		Minimum	**22.4**	**20.0**	**115**		**6**		**1.620**	**2.872**	**0.816**		
		Maximum	**25.2**	**22.9**	**170**		**10**		**4.923**	**11.573**	**1.655**		

Notes: "-" = data not available or no ovary weight available. QUL = Quesnel Lake. PCC = peamouth chub.

[a] Age structures collected: OTO = otoliths, SC = scales.

[b] F = female, M = male, U = unknown.

[c] Tissues collected: M = muscle; L = liver; K = kidney; O = ovary.

Table C.6.18: Destructive Physical Measurements of Rainbow Trout Caught by Angling in Quesnel River (QUR; Exposed), October 2022

Processing Date	Fish ID	Total Length (cm)	Fork Length (cm)	Body Weight (g)	Age Structure Collected[a]	Age (years)	Sex[b]	Liver Weight (g)	Gonad Weight (g)	Kidney Weight (g)	Tissue Collected[c]	Abnormalities
1-Oct-22	QUR_RB-1_2022-10	35.5	33.6	450	OTO, SC	5	F	3.897	0.897	5.140	M, L, K, O	None
	QUR_RB-2_2022-10	28.4	26.5	230	OTO, SC	3	F	1.834	0.365	2.235	M, L, K, O	None
	QUR_RB-3_2022-10	20.8	19.4	110	SC	2	M	0.639	-	0.885	M, L, K	None
	QUR_RB-4_2022-10	32.8	30.9	310	OTO, SC	3	F	2.195	-	2.487	M, L, K, O	None
2-Oct-22	QUR_RB-5_2022-10	35.1	33.2	390	OTO, SC	5	F	3.861	5.427	4.385	M, L, K, O	None
	QUR_RB-6_2022-10	24.5	23.0	150	OTO, SC	2	F	1.265	0.241	1.522	M, L, K, O	None
	QUR_RB-7_2022-10	34.1	32.4	300	OTO, SC	5	M	3.512	-	4.140	M, L, K	None
	QUR_RB-8_2022-10	21.6	20.1	120	OTO, SC	2	M	0.973	-	1.063	M, L, K	None
Sample Size (n)		**8**	**8**	**8**	-	**8**	-	**8**	**4**	**8**	-	-
Average		**29.1**	**27.4**	**258**		**3**		**2.272**	**1.733**	**2.732**		
Median		**30.6**	**28.7**	**265**		**3**		**2.015**	**0.631**	**2.361**		
Standard Deviation		**6.1**	**5.9**	**127**		**1.4**		**1.3**	**2.5**	**1.6**		
Minimum		**20.8**	**19.4**	**110**		**2**		**0.639**	**0.241**	**0.885**		
Maximum		**35.5**	**33.6**	**450**		**5**		**3.897**	**5.427**	**5.140**		

Notes: "-" = data not available or no comment. QUR = Quesnel River. RB = rainbow trout.

[a] Age structures collected: OTO = otoliths, SC = scales.

[b] F = female, M = male.

[c] Tissues collected: M = muscle; L = liver; K = kidney; O = ovary.

APPENDIX C.7
FISH TISSUE QUALITY

Table C.7.1: Rainbow Trout Tissue Chemistry Data for Polley Lake (POL; Exposed), May 2022 [a]

Analyte	Units	Muscle														
		POL-RB-1	POL-RB-2	POL-RB-3	POL-RB-4	POL-RB-5	POL-RB-6	POL-RB-7	POL-RB-8	n	% < LRL	Mean	Standard Deviation	Minimum	Median	Maximum
Moisture	%	79.7	81.1	82.4	82.0	77.4	80.6	79.5	76.9	8	0%	80	2.00	76.9	80.2	82.4
Aluminum	mg/kg dw	<5.0	<5.0	<5.0	5.70	<5.0	8.50	<5.0	<5.0	8	75%	5.52	1.98	<5.0	5.00	8.50
Antimony	mg/kg dw	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	8	100%	<0.010	-	<0.010	<0.010	<0.010
Arsenic	mg/kg dw	0.0400	<0.030	0.0440	0.0690	0.0390	0.0530	0.0650	0.0320	8	13%	0.0465	0.0139	<0.030	0.0420	0.0690
Barium	mg/kg dw	0.787	0.582	0.729	1.03	0.790	1.04	0.480	0.557	8	0%	0.749	0.208	0.480	0.758	1.04
Beryllium	mg/kg dw	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	8	100%	<0.010	-	<0.010	<0.010	<0.010
Bismuth	mg/kg dw	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	8	100%	<0.010	-	<0.010	<0.010	<0.010
Boron	mg/kg dw	<1.0	<1.0	1.00	<1.0	<1.0	<1.0	<1.0	<1.0	8	88%	1.00	-	<1.0	1.00	1.00
Cadmium	mg/kg dw	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	8	100%	<0.010	-	<0.010	<0.010	<0.010
Calcium	mg/kg dw	835	1,470	459	628	1,020	432	711	1,870	8	0%	928	507	1,020	773	835
Cesium	mg/kg dw	0.0698	0.112	0.0654	0.0593	0.0531	0.0715	0.0619	0.0620	8	0%	0.0694	0.0182	0.0531	0.0637	0.112
Chromium	mg/kg dw	<0.20	<0.20	0.320	0.430	0.290	<0.20	0.520	0.230	8	38%	0.299	0.116	<0.20	0.260	0.520
Cobalt	mg/kg dw	0.0200	0.0200	0.0280	0.0300	<0.020	0.0200	0.0320	0.0200	8	13%	0.0238	0.00547	<0.020	0.0200	0.0320
Copper	mg/kg dw	2.64	1.84	3.71	3.48	1.30	1.63	2.67	1.96	8	0%	2.40	0.872	1.30	2.30	3.71
Iron	mg/kg dw	37.7	48.2	59.3	61.2	32.2	42.9	54.9	44.9	8	0%	47.7	10.3	32.2	46.5	61.2
Lead	mg/kg dw	<0.050	<0.050	<0.050	<0.050	0.0600	<0.050	<0.050	<0.050	8	88%	0.0512	-	<0.050	0.0500	0.0600
Lithium	mg/kg dw	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	8	100%	<0.50	-	<0.50	<0.50	<0.50
Magnesium	mg/kg dw	1,410	1,300	1,270	1,430	1,290	1,580	1,350	874	8	0%	1,313	204	1,270	1,325	874
Manganese	mg/kg dw	0.516	1.24	0.771	0.931	0.863	1.24	0.761	1.30	8	0%	0.953	0.281	0.516	0.897	1.30
Mercury	mg/kg dw	0.523	0.991	1.01	0.759	0.335	1.05	0.537	0.512	8	0%	0.715	0.276	0.335	0.648	1.05
	mg/kg ww	0.106	0.188	0.178	0.136	0.0760	0.205	0.110	0.118	8	0%	0.140	0.0457	0.0760	0.127	0.205
Molybdenum	mg/kg dw	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	8	100%	<0.040	-	<0.040	<0.040	<0.040
Nickel	mg/kg dw	<0.20	<0.20	<0.20	0.210	<0.20	<0.20	0.260	<0.20	8	75%	0.209	0.0354	<0.20	0.200	0.260
Phosphorus	mg/kg dw	12,600	15,200	14,500	14,200	12,800	14,200	12,800	11,800	8	0%	13,512	1,168	11,800	13,500	15,200
Potassium	mg/kg dw	21,300	26,700	26,100	23,900	21,000	24,700	20,900	19,600	8	0%	23,025	2,669	19,600	22,600	26,700
Rubidium	mg/kg dw	10.2	18.5	12.1	8.97	8.86	11.2	10.6	9.43	8	0%	11.2	3.14	10.2	10.4	9.43
Selenium	mg/kg dw	3.65	7.41	4.52	3.72	3.50	5.10	3.89	4.33	8	0%	4.51	1.29	3.50	4.11	7.41
Silver	mg/kg dw	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	8	100%	<0.0050	-	<0.0050	<0.0050	<0.0050
Sodium	mg/kg dw	1,840	1,550	3,360	1,380	866	1,110	2,060	2,440	8	0%	1,826	801	1,110	1,695	866
Strontium	mg/kg dw	1.04	1.71	0.400	0.760	1.43	0.560	0.820	2.36	8	0%	1.14	0.659	0.400	0.930	2.36
Tellurium	mg/kg dw	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	8	100%	<0.020	-	<0.020	<0.020	<0.020
Thallium	mg/kg dw	0.0103	0.00360	0.00780	0.00590	0.00630	0.00560	0.00680	0.00360	8	0%	0.00624	0.00219	0.00360	0.00610	0.0103
Tin	mg/kg dw	0.750	0.950	0.670	1.66	0.650	1.07	0.930	0.590	8	0%	0.909	0.347	0.590	0.840	1.66
Titanium	mg/kg dw	<0.50	<0.50	<0.50	<0.50	<0.50	0.550	<0.50	<0.50	8	88%	0.506	-	<0.50	0.500	0.550
Uranium	mg/kg dw	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	8	100%	<0.0020	-	<0.0020	<0.0020	<0.0020
Vanadium	mg/kg dw	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	8	100%	<0.10	-	<0.10	<0.10	<0.10
Zinc	mg/kg dw	14.4	21.3	24.6	23.9	20.5	22.3	24.3	19.4	8	0%	21.3	3.37	14.4	21.8	24.6
Zirconium	mg/kg dw	<0.20	<0.20	0.240	0.430	0.200	<0.20	0.380	<0.20	8	50%	0.256	0.110	<0.20	0.200	0.430

Value exceeds Se Guideline for Aquatic Life, fish muscle or whole body tissue (4 mg/kg dw; BCMOE 2014).

Value exceeds Se Guideline for Human Health, general population, high consumption (7.3 mg/kg dw; BCMOE 2014).

Value exceeds Se Guideline for Human Health, general population, moderate consumption (14.5 mg/kg dw; BCMOE 2014).

Value exceeds Hg Guideline for Human Health (0.5 mg/kg ww; CFIA 2015).

Notes: "-" = no data available or standard deviation not calculated. mg/kg = milligrams per kilogram. dw = dry weight. ww = wet weight. LRL = laboratory reporting limit.

[a] All summary statistics are reported to three significant digits for display purposes. All summary statistics were calculated using the Kaplan-Meier method.

Table C.7.1: Rainbow Trout Tissue Chemistry Data for Polley Lake (POL; Exposed), May 2022 [a]

Analyte	Units	Ovary														
		POL-RB-1	POL-RB-2	POL-RB-3	POL-RB-4	POL-RB-5	POL-RB-6	POL-RB-7	POL-RB-8	n	% < LRL	Mean	Standard Deviation	Minimum	Median	Maximum
Moisture	%	72.1	71.1	88.6	65.9	73.0	68.6	66.5	64.2	8	0%	71.2	7.68	64.2	69.8	88.6
Aluminum	mg/kg dw	<2.0	<5.0	18.1	<5.0	12.8	<2.0	<2.0	<2.0	8	75%	5.36	3.75	<2.0	5.00	18.1
Antimony	mg/kg dw	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	8	100%	<0.010	-	<0.010	<0.010	<0.010
Arsenic	mg/kg dw	0.0350	<0.030	0.0780	0.0340	0.0920	0.0600	0.0420	0.0280	8	13%	0.0496	0.0246	<0.030	0.0385	0.0920
Barium	mg/kg dw	0.524	0.704	1.23	0.631	0.338	0.525	0.265	0.261	8	0%	0.560	0.317	0.261	0.524	1.23
Beryllium	mg/kg dw	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	8	100%	<0.010	-	<0.010	<0.010	<0.010
Bismuth	mg/kg dw	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	8	100%	<0.010	-	<0.010	<0.010	<0.010
Boron	mg/kg dw	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	8	100%	<1.0	-	<1.0	<1.0	<1.0
Cadmium	mg/kg dw	0.00550	<0.010	0.0106	<0.010	0.0240	0.00760	<0.0050	<0.0050	8	50%	0.00866	0.00832	<0.0050	0.00550	0.0240
Calcium	mg/kg dw	1,120	886	1,070	1,210	756	1,270	1,150	1,140	8	0%	1,075	171	1,070	1,130	886
Cesium	mg/kg dw	0.0258	0.0470	0.0317	0.0143	0.0429	0.0191	0.0228	0.0170	8	0%	0.0276	0.0120	0.0143	0.0243	0.0470
Chromium	mg/kg dw	<0.050	<0.20	0.629	<0.20	<0.20	<0.050	0.0550	<0.050	8	75%	0.123	0.406	<0.050	0.200	0.629
Cobalt	mg/kg dw	0.118	0.124	0.175	0.0730	0.168	0.115	0.110	0.0660	8	0%	0.119	0.0389	0.0660	0.116	0.175
Copper	mg/kg dw	7.25	8.44	8.47	6.62	17.5	8.25	8.28	8.29	8	0%	9.14	3.44	17.5	8.28	8.47
Iron	mg/kg dw	111	101	305	76.2	303	86.1	64.1	56.6	8	0%	138	104	101	93.5	86.1
Lead	mg/kg dw	0.0300	<0.050	0.0320	<0.050	<0.050	<0.020	<0.020	<0.020	8	75%	0.0244	0.00141	<0.020	0.0320	0.0320
Lithium	mg/kg dw	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	8	100%	<0.50	-	<0.50	<0.50	<0.50
Magnesium	mg/kg dw	1,480	1,680	1,030	1,400	735	1,720	1,520	1,710	8	0%	1,409	354	1,030	1,500	735
Manganese	mg/kg dw	3.23	6.57	4.63	4.23	22.8	4.54	3.09	3.57	8	0%	6.58	6.64	22.8	4.38	6.57
Mercury	mg/kg dw	0.0358	0.0499	0.247	0.0224	0.0685	0.0654	0.0130	0.0113	8	0%	0.0642	0.0771	0.0113	0.0428	0.247
	mg/kg ww	0.0100	0.0144	0.0282	0.00760	0.0185	0.0205	0.00440	0.00400	8	0%	0.0134	0.00854	0.00400	0.0122	0.0282
Molybdenum	mg/kg dw	0.0570	0.0990	0.105	0.0560	0.0840	0.0600	0.0500	0.0400	8	0%	0.0689	0.0240	0.0400	0.0585	0.105
Nickel	mg/kg dw	<0.20	<0.20	0.300	<0.20	<0.20	<0.20	<0.20	<0.20	8	88%	0.212	-	<0.20	0.200	0.300
Phosphorus	mg/kg dw	12,000	11,800	10,600	11,300	11,400	12,500	12,200	12,100	8	0%	11,738	609	10,600	11,900	12,500
Potassium	mg/kg dw	8,670	8,080	10,400	7,560	13,700	8,170	7,660	7,780	8	0%	9,002	2,106	10,400	8,125	8,670
Rubidium	mg/kg dw	4.95	7.14	5.45	3.28	8.15	4.54	4.60	4.31	8	0%	5.30	1.59	3.28	4.78	8.15
Selenium	mg/kg dw	7.30	10.6	6.95	6.49	11.1	8.05	7.64	8.03	8	0%	8.27	1.68	10.6	7.84	8.05
Silver	mg/kg dw	<0.0050	<0.0050	0.00510	<0.0050	<0.0050	0.00640	<0.0050	<0.0050	8	75%	0.00519	0.000919	<0.0050	0.00500	0.00640
Sodium	mg/kg dw	5,030	3,300	23,700	2,350	3,120	3,270	3,150	2,630	8	0%	5,819	7,268	2,350	3,210	5,030
Strontium	mg/kg dw	3.27	2.45	2.36	3.50	1.28	3.27	3.10	3.59	8	0%	2.85	0.779	1.28	3.18	3.59
Tellurium	mg/kg dw	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	8	100%	<0.020	-	<0.020	<0.020	<0.020
Thallium	mg/kg dw	0.00270	<0.0020	0.00400	<0.0020	0.0111	<0.0020	<0.0020	<0.0020	8	63%	0.00348	0.00452	<0.0020	0.00200	0.0111
Tin	mg/kg dw	0.320	0.480	1.33	0.370	0.100	0.280	0.120	<0.10	8	13%	0.388	0.419	<0.10	0.300	1.33
Titanium	mg/kg dw	<0.25	<0.50	1.48	<0.50	1.01	<0.25	<0.25	<0.25	8	75%	0.499	0.332	<0.25	0.500	1.48
Uranium	mg/kg dw	<0.0020	0.00440	0.00480	<0.0020	0.00250	0.00260	<0.0020	<0.0020	8	50%	0.00279	0.00120	<0.0020	0.00225	0.00480
Vanadium	mg/kg dw	<0.10	0.230	0.320	<0.10	0.160	<0.10	<0.10	<0.10	8	63%	0.151	0.0802	<0.10	0.100	0.320
Zinc	mg/kg dw	103	82.5	184	85.9	250	77.1	66.2	67.8	8	0%	115	66.6	103	84.2	85.9
Zirconium	mg/kg dw	<0.20	<0.20	0.550	<0.20	<0.20	<0.20	<0.20	<0.20	8	88%	0.244	-	<0.20	0.200	0.550

Value exceeds Se Guideline for Aquatic Life, fish ovary tissue (11 mg/kg dw; BCMOE 2014).

Value exceeds Se Threshold for Effects, fish ovary tissue (20 mg/kg dw; DeForest et al 2012).

Notes: "-" = no data available or standard deviation not calculated. mg/kg = milligrams per kilogram. dw = dry weight. ww = wet weight. LRL = laboratory reporting limit.

[a] All summary statistics are reported to three significant digits for display purposes. All summary statistics were calculated using the Kaplan-Meier method.

Table C.7.1: Rainbow Trout Tissue Chemistry Data for Polley Lake (POL; Exposed), May 2022 [a]

Analyte	Units	Liver														
		POL-RB-1	POL-RB-2	POL-RB-3	POL-RB-4	POL-RB-5	POL-RB-6	POL-RB-7	POL-RB-8	n	% < LRL	Mean	Standard Deviation	Minimum	Median	Maximum
Moisture	%	80.7	78.7	77.6	75.6	74.3	76.7	81.0	80.8	8	0%	78.2	2.55	74.3	78.2	81.0
Aluminum	mg/kg dw	<5.0	8.80	<5.0	<5.0	6.70	25.4	<5.0	<5.0	8	63%	8.24	10.2	<5.0	5.00	8.80
Antimony	mg/kg dw	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	8	100%	<0.010	-	<0.010	<0.010	<0.010
Arsenic	mg/kg dw	0.0610	0.0530	0.0740	0.0750	0.0980	0.139	0.0740	0.0600	8	0%	0.0792	0.0277	0.0530	0.0740	0.139
Barium	mg/kg dw	0.663	0.762	0.785	0.786	1.37	1.57	1.30	1.08	8	0%	1.04	0.340	0.663	0.933	1.57
Beryllium	mg/kg dw	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	8	100%	<0.010	-	<0.010	<0.010	<0.010
Bismuth	mg/kg dw	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	8	100%	<0.010	-	<0.010	<0.010	<0.010
Boron	mg/kg dw	<1.0	<1.0	<1.0	<1.0	1.20	1.40	<1.0	<1.0	8	75%	1.08	0.141	<1.0	1.00	1.40
Cadmium	mg/kg dw	0.181	0.212	0.131	0.109	0.200	0.248	0.204	0.193	8	0%	0.185	0.0448	0.109	0.196	0.248
Calcium	mg/kg dw	410	335	290	337	528	469	424	394	8	0%	398	77.6	290	402	528
Cesium	mg/kg dw	0.0561	0.0828	0.0549	0.0432	0.0292	0.0574	0.0618	0.0396	8	0%	0.0531	0.0162	0.0292	0.0555	0.0828
Chromium	mg/kg dw	0.280	0.270	<0.20	0.320	0.370	0.240	0.240	<0.20	8	25%	0.265	0.0505	<0.20	0.255	0.370
Cobalt	mg/kg dw	0.137	0.181	0.104	0.120	0.126	0.145	0.218	0.183	8	0%	0.152	0.0386	0.104	0.141	0.218
Copper	mg/kg dw	31.7	198	132	18.2	115	153	59.8	28.2	8	0%	92	66.8	115	87.4	59.8
Iron	mg/kg dw	2,200	2,200	2,030	1,880	1,470	1,990	2,300	2,040	8	0%	2,014	258	1,470	2,035	2,300
Lead	mg/kg dw	0.0530	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	8	88%	0.0504	-	<0.050	0.0500	0.0530
Lithium	mg/kg dw	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	8	100%	<0.50	-	<0.50	<0.50	<0.50
Magnesium	mg/kg dw	660	1,050	868	859	892	856	690	705	8	0%	822	130	1,050	858	892
Manganese	mg/kg dw	5.89	8.10	11.3	12.3	7.86	12.2	12.8	6.96	8	0%	9.68	2.76	11.3	9.70	8.10
Mercury	mg/kg dw	0.498	0.653	0.909	0.536	0.198	1.07	0.435	0.435	8	0%	0.592	0.280	0.198	0.517	1.07
	mg/kg ww	0.0963	0.139	0.203	0.130	0.0509	0.249	0.0826	0.0836	8	0%	0.129	0.0669	0.0509	0.113	0.249
Molybdenum	mg/kg dw	0.941	1.14	1.42	0.934	1.17	1.30	1.08	1.15	8	0%	1.14	0.165	0.934	1.14	1.42
Nickel	mg/kg dw	<0.20	<0.20	<0.20	0.390	0.210	<0.20	<0.20	<0.20	8	75%	0.225	0.127	<0.20	0.200	0.390
Phosphorus	mg/kg dw	14,300	17,300	15,000	14,600	16,500	14,900	13,800	14,300	8	0%	15,088	1,199	13,800	14,750	17,300
Potassium	mg/kg dw	12,400	14,100	13,300	11,600	13,300	12,000	13,300	12,500	8	0%	12,812	825	11,600	12,900	14,100
Rubidium	mg/kg dw	7.69	14.7	11.2	7.21	10.7	8.54	9.18	6.95	8	0%	9.52	2.60	10.7	8.86	9.18
Selenium	mg/kg dw	14.8	34.8	31.6	15.6	45.9	38.9	23.6	18.3	8	0%	27.9	11.6	14.8	27.6	45.9
Silver	mg/kg dw	0.0725	0.184	0.623	0.0492	0.360	0.599	0.263	0.168	8	0%	0.290	0.221	0.0492	0.224	0.623
Sodium	mg/kg dw	9,130	4,070	6,510	3,780	3,440	4,940	9,300	9,420	8	0%	6,324	2,622	3,440	5,725	9,420
Strontium	mg/kg dw	0.780	0.530	0.480	0.500	0.990	0.740	0.710	0.650	8	0%	0.672	0.172	0.480	0.680	0.990
Tellurium	mg/kg dw	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	8	100%	<0.020	-	<0.020	<0.020	<0.020
Thallium	mg/kg dw	0.142	0.0494	0.0851	0.0751	0.0391	0.0337	0.105	0.0916	8	0%	0.0776	0.0366	0.0337	0.0801	0.142
Tin	mg/kg dw	1.18	1.08	1.60	1.89	1.58	1.29	1.46	1.69	8	0%	1.47	0.273	1.08	1.52	1.89
Titanium	mg/kg dw	<0.50	<0.50	<0.50	<0.50	<0.50	1.67	<0.50	<0.50	8	88%	0.646	-	<0.50	0.500	1.67
Uranium	mg/kg dw	0.00240	0.0189	0.00840	0.00270	0.00340	0.0127	0.00620	0.0101	8	0%	0.00810	0.00572	0.00240	0.00730	0.0189
Vanadium	mg/kg dw	0.360	1.76	0.970	0.400	0.190	0.980	0.360	0.770	8	0%	0.724	0.515	0.190	0.585	1.76
Zinc	mg/kg dw	189	263	202	178	124	183	205	151	8	0%	187	40.9	124	186	263
Zirconium	mg/kg dw	0.280	0.300	0.240	0.300	0.250	0.250	0.310	0.340	8	0%	0.284	0.0350	0.240	0.290	0.340

Notes: "-" = no data available or standard deviation not calculated. mg/kg = milligrams per kilogram. dw = dry weight. ww = wet weight. LRL = laboratory reporting limit.

[a] All summary statistics are reported to three significant digits for display purposes. All summary statistics were calculated using the Kaplan-Meier method.

Table C.7.1: Rainbow Trout Tissue Chemistry Data for Polley Lake (POL; Exposed), May 2022 [a]

Analyte	Units	Kidney														
		POL-RB-1	POL-RB-2	POL-RB-3	POL-RB-4	POL-RB-5	POL-RB-6	POL-RB-7	POL-RB-8	n	% < LRL	Mean	Standard Deviation	Minimum	Median	Maximum
Moisture	%	79.8	80.2	81.8	81.1	77.9	80.8	83.3	78.3	8	0%	80.4	1.78	77.9	80.5	83.3
Aluminum	mg/kg dw	10.0	41.4	6.20	6.50	5.00	12.3	6.60	7.80	8	0%	12.0	12.1	10.0	7.20	7.80
Antimony	mg/kg dw	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	8	100%	<0.010	-	<0.010	<0.010	<0.010
Arsenic	mg/kg dw	0.662	0.288	0.460	0.405	0.320	0.762	0.400	0.555	8	0%	0.482	0.166	0.288	0.432	0.762
Barium	mg/kg dw	0.320	2.55	1.35	0.253	1.46	2.22	1.21	0.375	8	0%	1.22	0.870	0.253	1.28	2.55
Beryllium	mg/kg dw	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	8	100%	<0.010	-	<0.010	<0.010	<0.010
Bismuth	mg/kg dw	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	8	100%	<0.010	-	<0.010	<0.010	<0.010
Boron	mg/kg dw	<1.0	<1.0	<1.0	<1.0	1.50	<1.0	<1.0	<1.0	8	88%	1.06	-	<1.0	1.00	1.50
Cadmium	mg/kg dw	0.847	0.307	0.894	0.819	0.588	0.761	0.496	0.824	8	0%	0.692	0.207	0.307	0.790	0.894
Calcium	mg/kg dw	638	20,500	542	490	587	638	623	926	8	0%	3,118	7,025	20,500	630	926
Cesium	mg/kg dw	0.0438	0.0963	0.0417	0.0384	0.0349	0.0548	0.0568	0.0452	8	0%	0.0515	0.0196	0.0349	0.0445	0.0963
Chromium	mg/kg dw	0.290	1.13	0.270	0.580	0.210	0.260	0.310	0.200	8	0%	0.406	0.316	0.200	0.280	1.13
Cobalt	mg/kg dw	2.35	1.80	1.82	0.999	2.76	1.34	1.97	0.754	8	0%	1.72	0.671	0.754	1.81	2.76
Copper	mg/kg dw	8.16	15.3	8.92	9.23	6.07	9.49	4.75	7.45	8	0%	8.67	3.14	15.3	8.54	9.49
Iron	mg/kg dw	788	742	1,010	786	866	1,030	1,250	962	8	0%	929	169	1,010	914	962
Lead	mg/kg dw	0.0780	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	8	88%	0.0535	-	<0.050	0.0500	0.0780
Lithium	mg/kg dw	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	8	100%	<0.50	-	<0.50	<0.50	<0.50
Magnesium	mg/kg dw	661	1,160	765	864	817	718	611	688	8	0%	786	172	1,160	742	864
Manganese	mg/kg dw	3.40	17.6	5.59	5.14	3.41	12.8	2.02	4.18	8	0%	6.77	5.47	12.8	4.66	5.59
Mercury	mg/kg dw	0.405	0.517	0.871	0.609	0.229	1.19	0.553	0.545	8	0%	0.615	0.295	0.229	0.549	1.19
	mg/kg ww	0.0818	0.102	0.158	0.115	0.0505	0.230	0.0921	0.118	8	0%	0.118	0.0547	0.0505	0.108	0.230
Molybdenum	mg/kg dw	0.499	0.538	0.432	0.445	0.434	0.586	0.272	0.517	8	0%	0.465	0.0953	0.272	0.472	0.586
Nickel	mg/kg dw	0.450	0.970	0.330	0.450	0.640	0.470	0.390	0.330	8	0%	0.504	0.213	0.330	0.450	0.970
Phosphorus	mg/kg dw	10,900	27,100	14,100	14,300	12,300	13,900	11,700	11,600	8	0%	14,488	5,256	10,900	13,100	27,100
Potassium	mg/kg dw	10,800	15,200	13,600	12,800	12,600	13,200	13,800	11,800	8	0%	12,975	1,329	10,800	13,000	15,200
Rubidium	mg/kg dw	6.24	13.2	7.17	6.13	7.18	8.03	8.72	7.30	8	0%	8.00	2.27	13.2	7.24	8.72
Selenium	mg/kg dw	13.8	15.5	13.3	10.3	10.2	16.1	11.8	14.4	8	0%	13.2	2.23	10.2	13.6	16.1
Silver	mg/kg dw	<0.0050	0.00530	0.0143	0.00590	<0.0050	0.00740	<0.0050	<0.0050	8	50%	0.00661	0.00415	<0.0050	0.00515	0.0143
Sodium	mg/kg dw	8,850	6,530	9,050	6,980	4,530	7,130	13,800	7,970	8	0%	8,105	2,709	13,800	7,550	9,050
Strontium	mg/kg dw	2.26	42.2	1.51	1.21	1.84	1.80	1.72	2.48	8	0%	6.88	14.3	1.21	1.82	42.2
Tellurium	mg/kg dw	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	8	100%	<0.020	-	<0.020	<0.020	<0.020
Thallium	mg/kg dw	0.0780	0.0210	0.0385	0.0464	0.0556	0.0378	0.0348	0.0488	8	0%	0.0451	0.0169	0.0210	0.0424	0.0780
Tin	mg/kg dw	<0.10	<0.10	2.69	<0.10	2.65	1.43	2.63	<0.10	8	50%	1.23	0.614	<0.10	0.765	2.69
Titanium	mg/kg dw	0.680	3.46	<0.50	0.580	<0.50	0.970	<0.50	0.580	8	38%	0.971	1.24	<0.50	0.580	3.46
Uranium	mg/kg dw	0.00420	0.0328	0.0101	0.00360	0.00500	0.0174	0.00570	0.0128	8	0%	0.0114	0.00988	0.00360	0.00790	0.0328
Vanadium	mg/kg dw	0.500	2.47	0.840	0.450	0.330	0.920	0.320	0.970	8	0%	0.850	0.705	0.320	0.670	2.47
Zinc	mg/kg dw	195	361	266	265	174	214	148	209	8	0%	229	67.0	148	212	361
Zirconium	mg/kg dw	<0.20	<0.20	0.300	<0.20	0.200	0.240	0.340	<0.20	8	50%	0.235	0.0622	<0.20	0.200	0.340

Notes: "-" = no data available or standard deviation not calculated. mg/kg = milligrams per kilogram. dw = dry weight. ww = wet weight. LRL = laboratory reporting limit.

[a] All summary statistics are reported to three significant digits for display purposes. All summary statistics were calculated using the Kaplan-Meier method.

Table C.7.2: Rainbow Trout Tissue Chemistry Data for Bootjack Lake (BOL; Reference), May 2022 [a]

Analyte	Units	Muscle														
		BOL-RB-1	BOL-RB-2	BOL-RB-3	BOL-RB-4	BOL-RB-5	BOL-RB-6	BOL-RB-7	BOL-RB-8	n	% < LRL	Mean	Standard Deviation	Minimum	Median	Maximum
Moisture	%	82.7	77.9	77.3	79.7	76.6	80.6	79.5	80.8	8	0%	79.4	2.03	76.6	79.6	82.7
Aluminum	mg/kg dw	<5.0	<5.0	<5.0	5.70	<5.0	<5.0	<5.0	<2.0	8	88%	2.46	-	<2.0	5.00	5.70
Antimony	mg/kg dw	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	8	100%	<0.010	-	<0.010	<0.010	<0.010
Arsenic	mg/kg dw	<0.030	<0.030	<0.030	0.0320	<0.030	0.0340	0.0310	0.0250	8	50%	0.0278	0.00387	<0.030	0.0250	0.0340
Barium	mg/kg dw	1.00	0.508	0.630	0.826	0.816	0.758	0.622	0.890	8	0%	0.756	0.161	0.508	0.787	1.00
Beryllium	mg/kg dw	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	8	100%	<0.010	-	<0.010	<0.010	<0.010
Bismuth	mg/kg dw	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	8	100%	<0.010	-	<0.010	<0.010	<0.010
Boron	mg/kg dw	<1.0	<1.0	<1.0	<1.0	1.30	<1.0	<1.0	<1.0	8	88%	1.04	-	<1.0	1.00	1.30
Cadmium	mg/kg dw	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.0050	8	100%	<0.0050	-	<0.0050	<0.0050	<0.010
Calcium	mg/kg dw	564	477	988	845	836	1,310	516	1,790	8	0%	916	449	1,310	840	988
Cesium	mg/kg dw	0.0665	0.0413	0.0624	0.0875	0.0594	0.0624	0.0611	0.0721	8	0%	0.0641	0.0130	0.0413	0.0624	0.0875
Chromium	mg/kg dw	0.250	<0.20	<0.20	<0.20	0.300	0.570	<0.20	0.150	8	50%	0.234	0.180	<0.20	0.150	0.570
Cobalt	mg/kg dw	<0.020	<0.020	<0.020	<0.020	<0.020	0.0240	<0.020	<0.020	8	88%	0.0205	-	<0.020	0.0200	0.0240
Copper	mg/kg dw	1.97	1.53	2.39	2.53	2.12	2.86	2.14	1.19	8	0%	2.09	0.537	1.19	2.13	2.86
Iron	mg/kg dw	49.2	43.7	21.0	26.1	28.8	38.6	30.4	30.1	8	0%	33.5	9.49	21.0	30.2	49.2
Lead	mg/kg dw	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.020	8	100%	<0.020	-	<0.020	<0.020	<0.050
Lithium	mg/kg dw	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	8	100%	<0.50	-	<0.50	<0.50	<0.50
Magnesium	mg/kg dw	1,400	958	1,310	1,300	1,420	1,160	1,390	1,390	8	0%	1,291	159	1,160	1,350	958
Manganese	mg/kg dw	0.799	0.525	0.798	1.03	0.850	0.954	0.714	0.789	8	0%	0.807	0.152	0.525	0.798	1.03
Mercury	mg/kg dw	0.584	0.734	0.359	0.389	0.474	0.471	0.343	0.574	8	0%	0.491	0.134	0.343	0.472	0.734
	mg/kg ww	0.101	0.162	0.0814	0.0790	0.111	0.0911	0.0703	0.110	8	0%	0.101	0.0288	0.0703	0.0960	0.162
Molybdenum	mg/kg dw	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.020	8	100%	<0.020	-	<0.020	<0.020	<0.040
Nickel	mg/kg dw	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	8	100%	<0.20	-	<0.20	<0.20	<0.20
Phosphorus	mg/kg dw	14,700	11,200	12,100	11,900	13,600	13,000	14,100	15,700	8	0%	13,288	1,528	11,200	13,300	15,700
Potassium	mg/kg dw	23,200	18,500	20,000	18,700	21,600	21,500	23,700	25,500	8	0%	21,588	2,472	18,500	21,550	25,500
Rubidium	mg/kg dw	12.8	8.15	11.8	13.1	9.70	11.0	11.9	13.6	8	0%	11.5	1.84	11.0	11.8	9.70
Selenium	mg/kg dw	2.05	2.11	2.53	2.78	2.24	2.06	2.28	2.41	8	0%	2.31	0.255	2.05	2.26	2.78
Silver	mg/kg dw	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	8	100%	<0.0050	-	<0.0050	<0.0050	<0.0050
Sodium	mg/kg dw	3,230	2,020	1,430	2,100	2,220	3,130	2,190	1,760	8	0%	2,260	624	1,430	2,145	3,230
Strontium	mg/kg dw	0.660	0.630	1.50	1.09	1.23	2.11	0.670	2.74	8	0%	1.33	0.762	0.630	1.16	2.74
Tellurium	mg/kg dw	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	8	100%	<0.020	-	<0.020	<0.020	<0.020
Thallium	mg/kg dw	0.00750	0.00770	0.0109	0.00650	0.0106	0.0102	0.0129	0.0155	8	0%	0.0102	0.00301	0.00650	0.0104	0.0155
Tin	mg/kg dw	1.24	0.610	0.610	0.730	1.08	1.11	1.34	1.14	8	0%	0.982	0.289	0.610	1.10	1.34
Titanium	mg/kg dw	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.25	8	100%	<0.25	-	<0.25	<0.25	<0.50
Uranium	mg/kg dw	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	8	100%	<0.0020	-	<0.0020	<0.0020	<0.0020
Vanadium	mg/kg dw	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	8	100%	<0.10	-	<0.10	<0.10	<0.10
Zinc	mg/kg dw	23.2	23.2	16.7	24.7	17.4	24.8	18.3	19.0	8	0%	20.9	3.39	16.7	21.1	24.8
Zirconium	mg/kg dw	0.630	0.350	0.380	<0.20	<0.20	0.330	0.250	0.430	8	25%	0.346	0.130	<0.20	0.340	0.630

Value exceeds Se Guideline for Aquatic Life, fish muscle or whole body tissue (4 mg/kg dw; BCMOE 2014).

Value exceeds Se Guideline for Human Health, general population, high consumption (7.3 mg/kg dw; BCMOE 2014).

Value exceeds Se Guideline for Human Health, general population, moderate consumption (14.5 mg/kg dw; BCMOE 2014).

Value exceeds Hg Guideline for Human Health (0.5 mg/kg ww; CFIA 2015).

Notes: "-" = no data available or standard deviation not calculated. mg/kg = milligrams per kilogram. dw = dry weight. ww = wet weight. LRL = laboratory reporting limit.

[a] All summary statistics are reported to three significant digits for display purposes. All summary statistics were calculated using the Kaplan-Meier method.

Table C.7.2: Rainbow Trout Tissue Chemistry Data for Bootjack Lake (BOL; Reference), May 2022 [a]

Analyte	Units	Ovary														
		BOL-RB-1	BOL-RB-2	BOL-RB-3	BOL-RB-4	BOL-RB-5	BOL-RB-6	BOL-RB-7	BOL-RB-8	n	% < LRL	Mean	Standard Deviation	Minimum	Median	Maximum
Moisture	%	67.7	68.4	64.0	63.4	83.5	74.0	82.6	68.5	8	0%	71.5	7.82	63.4	68.5	83.5
Aluminum	mg/kg dw	<2.0	<2.0	<2.0	<2.0	<5.0	<2.0	<5.0	<2.0	8	100%	<2.0	-	<2.0	<2.0	<5.0
Antimony	mg/kg dw	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	8	100%	<0.010	-	<0.010	<0.010	<0.010
Arsenic	mg/kg dw	<0.020	0.0320	0.0210	<0.020	0.0430	0.0340	0.0350	0.0240	8	25%	0.0286	0.00797	<0.020	0.0280	0.0430
Barium	mg/kg dw	0.548	0.599	0.502	0.738	0.188	0.632	0.378	1.12	8	0%	0.588	0.273	0.188	0.574	1.12
Beryllium	mg/kg dw	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	8	100%	<0.010	-	<0.010	<0.010	<0.010
Bismuth	mg/kg dw	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	8	100%	<0.010	-	<0.010	<0.010	<0.010
Boron	mg/kg dw	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	8	100%	<1.0	-	<1.0	<1.0	<1.0
Cadmium	mg/kg dw	<0.0050	<0.0050	<0.0050	<0.0050	0.0180	0.0128	0.0120	<0.0050	8	63%	0.00848	0.00326	<0.0050	0.00500	0.0180
Calcium	mg/kg dw	1,360	1,490	1,460	1,190	581	1,110	637	1,440	8	0%	1,158	364	1,110	1,275	637
Cesium	mg/kg dw	0.0186	0.0150	0.0161	0.0258	0.0319	0.0211	0.0444	0.0174	8	0%	0.0238	0.0100	0.0150	0.0198	0.0444
Chromium	mg/kg dw	<0.050	<0.050	<0.050	<0.050	0.220	0.0780	<0.20	<0.050	8	75%	0.0753	0.100	<0.050	0.0500	0.220
Cobalt	mg/kg dw	0.0840	0.101	0.0550	0.0710	0.113	0.0970	0.143	0.0800	8	0%	0.0930	0.0271	0.0550	0.0905	0.143
Copper	mg/kg dw	7.06	10.1	11.3	7.20	4.68	6.50	6.32	10.3	8	0%	7.93	2.34	10.1	7.13	7.20
Iron	mg/kg dw	55.4	96.3	55.2	57.6	283	142	291	61.9	8	0%	130	101	142	79.1	96.3
Lead	mg/kg dw	<0.020	<0.020	<0.020	<0.020	<0.050	<0.020	<0.050	<0.020	8	100%	<0.020	-	<0.020	<0.020	<0.050
Lithium	mg/kg dw	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	8	100%	<0.50	-	<0.50	<0.50	<0.50
Magnesium	mg/kg dw	1,880	1,550	1,690	1,690	638	1,550	668	1,650	8	0%	1,414	481	1,550	1,600	668
Manganese	mg/kg dw	7.70	7.67	4.10	7.82	6.45	5.48	5.44	12.9	8	0%	7.20	2.66	12.9	7.06	7.82
Mercury	mg/kg dw	0.0201	0.0345	0.00800	0.0124	0.154	0.0597	0.108	0.0192	8	0%	0.0520	0.0528	0.00800	0.0273	0.154
	mg/kg ww	0.00650	0.0109	0.00290	0.00460	0.0254	0.0155	0.0189	0.00600	8	0%	0.0113	0.00794	0.00290	0.00870	0.0254
Molybdenum	mg/kg dw	<0.020	0.0390	0.0430	0.0480	0.0800	0.0510	0.0730	0.0450	8	13%	0.0499	0.0159	<0.020	0.0465	0.0800
Nickel	mg/kg dw	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	8	100%	<0.20	-	<0.20	<0.20	<0.20
Phosphorus	mg/kg dw	12,500	12,000	12,400	12,100	9,980	12,000	10,300	12,800	8	0%	11,760	1,040	10,300	12,050	9,980
Potassium	mg/kg dw	8,170	8,320	7,330	7,290	11,000	9,470	11,700	8,440	8	0%	8,965	1,634	11,000	8,380	9,470
Rubidium	mg/kg dw	5.05	3.99	4.63	6.24	6.15	5.91	7.82	5.12	8	0%	5.61	1.18	3.99	5.52	7.82
Selenium	mg/kg dw	3.92	5.97	5.92	4.98	3.72	4.15	3.99	6.35	8	0%	4.88	1.07	3.72	4.57	6.35
Silver	mg/kg dw	<0.0050	0.0125	0.0105	0.00620	0.00700	0.0135	<0.0050	0.00590	8	25%	0.00820	0.00334	<0.0050	0.00660	0.0135
Sodium	mg/kg dw	3,280	3,490	2,790	2,200	11,000	5,820	9,200	3,860	8	0%	5,205	3,235	11,000	3,675	9,200
Strontium	mg/kg dw	3.58	3.97	4.75	3.57	1.53	3.66	1.70	4.16	8	0%	3.36	1.15	1.53	3.62	4.75
Tellurium	mg/kg dw	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	8	100%	<0.020	-	<0.020	<0.020	<0.020
Thallium	mg/kg dw	<0.0020	<0.0020	<0.0020	<0.0020	0.00970	0.00320	0.0108	<0.0020	8	63%	0.00421	0.00411	<0.0020	0.00200	0.0108
Tin	mg/kg dw	<0.10	0.130	0.190	<0.10	<0.10	0.360	0.120	<0.10	8	50%	0.150	0.111	<0.10	0.110	0.360
Titanium	mg/kg dw	<0.25	<0.25	<0.25	<0.25	<0.50	<0.25	<0.50	<0.25	8	100%	<0.25	-	<0.25	<0.25	<0.50
Uranium	mg/kg dw	<0.0020	<0.0020	<0.0020	<0.0020	0.00220	<0.0020	0.00200	<0.0020	8	75%	0.00202	0.000141	<0.0020	0.00200	0.00220
Vanadium	mg/kg dw	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	8	100%	<0.10	-	<0.10	<0.10	<0.10
Zinc	mg/kg dw	88.3	95.5	70.5	65.6	190	79.1	182	104	8	0%	109	49	104	91.9	95.5
Zirconium	mg/kg dw	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	8	100%	<0.20	-	<0.20	<0.20	<0.20

Value exceeds Se Guideline for Aquatic Life, fish ovary tissue (11 mg/kg dw; BCMOE 2014).

Value exceeds Se Threshold for Effects, fish ovary tissue (20 mg/kg dw; DeForest et al 2012).

Notes: "-" = no data available or standard deviation not calculated. mg/kg = milligrams per kilogram. dw = dry weight. ww = wet weight. LRL = laboratory reporting limit.

[a] All summary statistics are reported to three significant digits for display purposes. All summary statistics were calculated using the Kaplan-Meier method.

Table C.7.2: Rainbow Trout Tissue Chemistry Data for Bootjack Lake (BOL; Reference), May 2022 [a]

Analyte	Units	Liver														
		BOL-RB-1	BOL-RB-2	BOL-RB-3	BOL-RB-4	BOL-RB-5	BOL-RB-6	BOL-RB-7	BOL-RB-8	n	% < LRL	Mean	Standard Deviation	Minimum	Median	Maximum
Moisture	%	82.8	82.5	76.9	78.8	79.6	79.1	74.5	82.5	8	0%	79.6	2.96	74.5	79.3	82.8
Aluminum	mg/kg dw	5.40	2.60	<5.0	6.40	<5.0	<5.0	<5.0	7.10	8	50%	3.99	1.98	<5.0	2.60	7.10
Antimony	mg/kg dw	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	8	100%	<0.010	-	<0.010	<0.010	<0.010
Arsenic	mg/kg dw	0.0300	0.0540	<0.030	0.0390	0.0640	0.0420	0.0490	0.0530	8	13%	0.0451	0.0112	<0.030	0.0455	0.0640
Barium	mg/kg dw	0.526	0.804	1.18	1.51	0.791	0.822	0.0850	0.905	8	0%	0.828	0.421	0.0850	0.813	1.51
Beryllium	mg/kg dw	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	8	100%	<0.010	-	<0.010	<0.010	<0.010
Bismuth	mg/kg dw	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	8	100%	<0.010	-	<0.010	<0.010	<0.010
Boron	mg/kg dw	<1.0	<1.0	<1.0	1.50	<1.0	<1.0	<1.0	<1.0	8	88%	1.06	-	<1.0	1.00	1.50
Cadmium	mg/kg dw	0.158	0.232	0.123	0.317	0.118	0.142	0.135	0.233	8	0%	0.182	0.0710	0.118	0.150	0.317
Calcium	mg/kg dw	418	596	446	368	365	322	279	543	8	0%	417	108	279	393	596
Cesium	mg/kg dw	0.0483	0.0350	0.0299	0.0666	0.0292	0.0295	0.0336	0.0412	8	0%	0.0392	0.0129	0.0292	0.0343	0.0666
Chromium	mg/kg dw	0.257	0.0870	0.320	0.280	<0.20	0.220	<0.20	0.175	8	25%	0.200	0.0832	<0.20	0.198	0.320
Cobalt	mg/kg dw	0.0940	0.130	0.0750	0.161	0.107	0.112	0.112	0.134	8	0%	0.116	0.0262	0.0750	0.112	0.161
Copper	mg/kg dw	175	111	66.9	69.7	86.9	22.1	137	148	8	0%	102	50.2	111	99	86.9
Iron	mg/kg dw	1,710	2,490	900	477	1,250	1,820	1,290	2,270	8	0%	1,526	679	1,250	1,500	900
Lead	mg/kg dw	<0.020	<0.020	<0.050	<0.050	<0.050	<0.050	<0.050	<0.020	8	100%	<0.020	-	<0.020	<0.020	<0.050
Lithium	mg/kg dw	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	8	100%	<0.50	-	<0.50	<0.50	<0.50
Magnesium	mg/kg dw	966	901	704	721	749	834	706	868	8	0%	806	100	704	792	966
Manganese	mg/kg dw	8.89	6.90	4.80	6.57	8.74	6.15	6.14	7.58	8	0%	6.97	1.38	4.80	6.74	8.89
Mercury	mg/kg dw	0.485	0.686	0.329	0.380	0.308	0.264	0.242	0.520	8	0%	0.402	0.152	0.242	0.354	0.686
	mg/kg ww	0.0834	0.120	0.0761	0.0805	0.0627	0.0552	0.0616	0.0910	8	0%	0.0788	0.0207	0.0552	0.0783	0.120
Molybdenum	mg/kg dw	1.11	1.33	0.657	0.631	0.680	0.866	0.871	1.03	8	0%	0.897	0.247	0.631	0.868	1.33
Nickel	mg/kg dw	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	8	100%	<0.20	-	<0.20	<0.20	<0.20
Phosphorus	mg/kg dw	18,300	18,400	14,400	14,500	14,600	16,300	15,900	17,500	8	0%	16,238	1,678	14,400	16,100	18,400
Potassium	mg/kg dw	16,000	15,400	12,700	13,600	13,300	14,400	11,800	14,700	8	0%	13,988	1,404	11,800	14,000	16,000
Rubidium	mg/kg dw	10.2	7.35	8.53	11.5	7.47	9.74	7.75	9.77	8	0%	9.04	1.50	10.2	9.14	9.77
Selenium	mg/kg dw	10.2	13.9	13.0	14.1	13.8	9.16	16.6	18.5	8	0%	13.7	3.05	10.2	13.8	9.16
Silver	mg/kg dw	1.57	1.17	0.793	0.969	0.941	0.283	1.16	1.26	8	0%	1.02	0.379	0.283	1.06	1.57
Sodium	mg/kg dw	10,000	11,100	6,370	6,120	8,230	7,200	5,170	8,220	8	0%	7,801	2,008	10,000	7,710	8,230
Strontium	mg/kg dw	0.704	1.07	0.990	0.930	0.730	0.600	0.560	1.08	8	0%	0.833	0.210	0.560	0.830	1.08
Tellurium	mg/kg dw	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	8	100%	<0.020	-	<0.020	<0.020	<0.020
Thallium	mg/kg dw	0.124	0.321	0.124	0.169	0.175	0.149	0.127	0.224	8	0%	0.177	0.0675	0.124	0.159	0.321
Tin	mg/kg dw	0.570	0.710	0.900	0.950	0.790	1.18	<0.10	1.04	8	13%	0.780	0.206	<0.10	0.845	1.18
Titanium	mg/kg dw	<0.25	<0.25	<0.50	<0.50	<0.50	<0.50	<0.50	<0.25	8	100%	<0.25	-	<0.25	<0.25	<0.50
Uranium	mg/kg dw	0.00630	0.00850	<0.0020	0.00640	0.00360	0.00520	0.00400	0.0117	8	13%	0.00596	0.00281	<0.0020	0.00575	0.0117
Vanadium	mg/kg dw	0.250	0.340	0.110	0.210	0.140	0.200	0.200	0.500	8	0%	0.244	0.125	0.110	0.205	0.500
Zinc	mg/kg dw	224	158	152	133	226	186	188	176	8	0%	180	33.0	133	181	226
Zirconium	mg/kg dw	<0.20	<0.20	0.290	0.310	0.250	0.470	<0.20	<0.20	8	50%	0.265	0.0966	<0.20	0.225	0.470

Notes: "-" = no data available or standard deviation not calculated. mg/kg = milligrams per kilogram. dw = dry weight. ww = wet weight. LRL = laboratory reporting limit.

[a] All summary statistics are reported to three significant digits for display purposes. All summary statistics were calculated using the Kaplan-Meier method.

Table C.7.2: Rainbow Trout Tissue Chemistry Data for Bootjack Lake (BOL; Reference), May 2022 [a]

Analyte	Units	Kidney														
		BOL-RB-1	BOL-RB-2	BOL-RB-3	BOL-RB-4	BOL-RB-5	BOL-RB-6	BOL-RB-7	BOL-RB-8	n	% < LRL	Mean	Standard Deviation	Minimum	Median	Maximum
Moisture	%	83.7	81.5	80.6	81.1	80.2	81.4	78.2	82.3	8	0%	81.1	1.60	78.2	81.2	83.7
Aluminum	mg/kg dw	4.00	7.30	<5.0	5.70	<5.0	6.50	<5.0	11.1	8	38%	5.82	2.64	<5.0	4.85	7.30
Antimony	mg/kg dw	0.0120	0.0220	<0.010	<0.010	<0.010	<0.010	<0.010	0.0120	8	63%	0.0120	0.00577	<0.010	0.0100	0.0220
Arsenic	mg/kg dw	0.189	0.457	0.152	0.288	0.237	0.208	0.211	0.283	8	0%	0.253	0.0942	0.152	0.224	0.457
Barium	mg/kg dw	1.22	2.16	0.388	1.21	0.488	0.683	0.911	1.88	8	0%	1.12	0.638	0.388	1.06	2.16
Beryllium	mg/kg dw	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	8	100%	<0.010	-	<0.010	<0.010	<0.010
Bismuth	mg/kg dw	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	8	100%	<0.010	-	<0.010	<0.010	<0.010
Boron	mg/kg dw	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	8	100%	<1.0	-	<1.0	<1.0	<1.0
Cadmium	mg/kg dw	0.268	0.717	0.470	0.710	0.618	0.643	0.587	0.729	8	0%	0.593	0.157	0.268	0.630	0.729
Calcium	mg/kg dw	533	904	723	931	611	490	510	604	8	0%	663	173	490	608	931
Cesium	mg/kg dw	0.0568	0.0344	0.0412	0.0747	0.0359	0.0402	0.0394	0.0420	8	0%	0.0456	0.0136	0.0344	0.0407	0.0747
Chromium	mg/kg dw	0.297	0.300	<0.20	0.480	0.250	0.340	<0.20	0.530	8	25%	0.325	0.112	<0.20	0.298	0.530
Cobalt	mg/kg dw	0.411	0.664	0.448	0.508	0.423	1.69	0.818	0.709	8	0%	0.709	0.423	0.411	0.586	1.69
Copper	mg/kg dw	7.20	7.83	6.16	5.54	8.08	8.02	7.24	7.54	8	0%	7.20	0.910	5.54	7.39	8.08
Iron	mg/kg dw	682	763	613	537	721	689	749	634	8	0%	674	75.7	537	686	763
Lead	mg/kg dw	<0.020	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	8	100%	<0.020	-	<0.020	<0.020	<0.050
Lithium	mg/kg dw	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	8	100%	<0.50	-	<0.50	<0.50	<0.50
Magnesium	mg/kg dw	894	726	641	771	776	839	689	752	8	0%	761	80.2	641	762	894
Manganese	mg/kg dw	3.60	2.83	2.62	2.91	4.58	3.98	4.77	3.05	8	0%	3.54	0.826	2.62	3.32	4.77
Mercury	mg/kg dw	0.445	0.695	0.304	0.328	0.466	0.422	0.370	0.445	8	0%	0.434	0.121	0.304	0.434	0.695
	mg/kg ww	0.0726	0.129	0.0591	0.0619	0.0923	0.0785	0.0806	0.0787	8	0%	0.0816	0.0219	0.0591	0.0786	0.129
Molybdenum	mg/kg dw	0.522	0.641	0.367	0.454	0.390	0.500	0.400	0.680	8	0%	0.494	0.116	0.367	0.477	0.680
Nickel	mg/kg dw	0.250	0.380	0.290	0.450	0.220	0.410	0.220	0.510	8	0%	0.341	0.111	0.220	0.335	0.510
Phosphorus	mg/kg dw	16,700	11,500	13,300	13,600	13,600	14,700	12,700	12,900	8	0%	13,625	1,541	11,500	13,450	16,700
Potassium	mg/kg dw	15,900	11,500	12,000	14,000	14,200	14,600	12,600	13,100	8	0%	13,488	1,460	11,500	13,550	15,900
Rubidium	mg/kg dw	10.0	6.04	9.04	12.2	7.91	9.45	8.05	8.99	8	0%	8.96	1.78	10.0	9.02	9.45
Selenium	mg/kg dw	9.95	12.9	7.60	10.1	7.82	8.88	8.29	10.8	8	0%	9.54	1.78	10.1	9.41	9.95
Silver	mg/kg dw	0.00920	0.0146	0.00560	<0.0050	0.0279	0.0184	0.00660	0.00660	8	13%	0.0117	0.00821	<0.0050	0.00790	0.0279
Sodium	mg/kg dw	12,300	12,700	9,520	8,880	9,500	9,790	6,940	10,200	8	0%	9,979	1,842	10,200	9,655	9,790
Strontium	mg/kg dw	1.56	3.76	2.03	3.10	2.11	1.74	1.69	2.26	8	0%	2.28	0.767	1.56	2.07	3.76
Tellurium	mg/kg dw	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	8	100%	<0.020	-	<0.020	<0.020	<0.020
Thallium	mg/kg dw	0.0226	0.0556	0.0434	0.0356	0.0636	0.0710	0.0628	0.0578	8	0%	0.0516	0.0163	0.0226	0.0567	0.0710
Tin	mg/kg dw	1.06	1.50	<0.10	<0.10	<0.10	<0.10	<0.10	0.870	8	63%	0.491	0.323	<0.10	0.100	1.50
Titanium	mg/kg dw	0.250	<0.50	<0.50	0.500	<0.50	0.640	<0.50	0.570	8	50%	0.370	0.170	<0.50	0.250	0.640
Uranium	mg/kg dw	0.00780	0.0116	0.00480	0.0135	0.00640	0.00830	0.00740	0.0156	8	0%	0.00942	0.00374	0.00480	0.00805	0.0156
Vanadium	mg/kg dw	0.310	0.410	0.210	0.320	0.160	0.260	0.280	0.630	8	0%	0.322	0.145	0.160	0.295	0.630
Zinc	mg/kg dw	109	103	146	108	272	321	164	136	8	0%	170	82	103	141	321
Zirconium	mg/kg dw	0.210	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	8	88%	0.201	-	<0.20	0.200	0.210

Notes: "-" = no data available or standard deviation not calculated. mg/kg = milligrams per kilogram. dw = dry weight. ww = wet weight. LRL = laboratory reporting limit.

[a] All summary statistics are reported to three significant digits for display purposes. All summary statistics were calculated using the Kaplan-Meier method.

Table C.7.3: Longnose Sucker Tissue Chemistry Data for Polley Lake (POL; Exposed), May 2022 [a]

Analyte	Units	Muscle														
		POL-LSU-1	POL-LSU-2	POL-LSU-3	POL-LSU-4	POL-LSU-5	POL-LSU-6	POL-LSU-7	POL-LSU-8	n	% < LRL	Mean	Standard Deviation	Minimum	Median	Maximum
Moisture	%	78.7	74.1	79.2	77.9	78.5	77.0	77.7	76.0	8	0%	77.4	1.67	74.1	77.8	79.2
Aluminum	mg/kg dw	<2.0	2.40	<2.0	<2.0	3.50	4.00	<2.0	7.20	8	50%	3.14	2.06	<2.0	2.20	7.20
Antimony	mg/kg dw	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	8	100%	<0.010	-	<0.010	<0.010	<0.010
Arsenic	mg/kg dw	0.156	0.145	0.0920	0.110	0.144	0.184	0.105	0.101	8	0%	0.130	0.0323	0.0920	0.127	0.184
Barium	mg/kg dw	0.804	0.976	0.922	0.804	1.01	0.725	0.836	0.654	8	0%	0.841	0.122	0.654	0.820	1.01
Beryllium	mg/kg dw	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	8	100%	<0.010	-	<0.010	<0.010	<0.010
Bismuth	mg/kg dw	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	8	100%	<0.010	-	<0.010	<0.010	<0.010
Boron	mg/kg dw	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	8	100%	<1.0	-	<1.0	<1.0	<1.0
Cadmium	mg/kg dw	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	8	100%	<0.0050	-	<0.0050	<0.0050	<0.0050
Calcium	mg/kg dw	601	238	433	913	844	698	1,060	528	8	0%	664	270	1,060	650	913
Cesium	mg/kg dw	0.161	0.0446	0.162	0.148	0.0937	0.136	0.100	0.0821	8	0%	0.116	0.0424	0.0446	0.118	0.162
Chromium	mg/kg dw	0.0580	0.0950	0.0750	<0.050	0.116	0.210	0.0680	0.234	8	13%	0.113	0.0710	<0.050	0.0850	0.234
Cobalt	mg/kg dw	<0.020	0.0460	0.0220	<0.020	<0.020	<0.020	<0.020	<0.020	8	75%	0.0235	0.0170	<0.020	0.0200	0.0460
Copper	mg/kg dw	1.42	7.48	5.91	2.48	2.27	3.17	3.39	3.01	8	0%	3.64	2.03	1.42	3.09	7.48
Iron	mg/kg dw	17.4	90.4	64.7	31.5	22.2	30.5	33.9	37.7	8	0%	41.0	24.4	17.4	32.7	90.4
Lead	mg/kg dw	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	8	100%	<0.020	-	<0.020	<0.020	<0.020
Lithium	mg/kg dw	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	8	100%	<0.50	-	<0.50	<0.50	<0.50
Magnesium	mg/kg dw	1,800	775	1,240	1,500	1,550	1,430	1,370	1,350	8	0%	1,377	295	1,240	1,400	775
Manganese	mg/kg dw	0.726	1.11	0.832	1.38	1.49	1.37	1.50	0.985	8	0%	1.17	0.303	0.726	1.24	1.50
Mercury	mg/kg dw	0.286	0.291	0.315	0.327	0.283	0.237	0.258	0.231	8	0%	0.278	0.0345	0.231	0.284	0.327
	mg/kg ww	0.0610	0.0755	0.0656	0.0723	0.0610	0.0546	0.0576	0.0556	8	0%	0.0629	0.00767	0.0546	0.0610	0.0755
Molybdenum	mg/kg dw	<0.020	0.0730	0.0450	0.0460	0.0220	0.0200	0.0270	0.0230	8	13%	0.0345	0.0194	<0.020	0.0250	0.0730
Nickel	mg/kg dw	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	8	100%	<0.20	-	<0.20	<0.20	<0.20
Phosphorus	mg/kg dw	13,400	9,630	12,200	12,700	12,800	11,600	12,700	11,200	8	0%	12,029	1,197	11,200	12,450	9,630
Potassium	mg/kg dw	23,800	11,800	19,700	22,600	21,600	20,200	22,700	19,200	8	0%	20,200	3,756	11,800	20,900	23,800
Rubidium	mg/kg dw	15.8	10.0	14.0	16.9	11.9	13.0	16.1	13.8	8	0%	13.9	2.31	10.0	13.9	16.9
Selenium	mg/kg dw	6.79	5.80	9.59	8.68	8.02	8.33	6.78	8.74	8	0%	7.84	1.27	5.80	8.18	9.59
Silver	mg/kg dw	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	8	100%	<0.0050	-	<0.0050	<0.0050	<0.0050
Sodium	mg/kg dw	1,420	2,050	1,920	1,660	1,790	1,420	1,870	1,740	8	0%	1,734	226	1,420	1,765	2,050
Strontium	mg/kg dw	0.484	0.278	0.413	1.15	0.950	0.744	1.53	0.555	8	0%	0.763	0.423	0.278	0.650	1.53
Tellurium	mg/kg dw	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	8	100%	<0.020	-	<0.020	<0.020	<0.020
Thallium	mg/kg dw	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	8	100%	<0.0020	-	<0.0020	<0.0020	<0.0020
Tin	mg/kg dw	0.230	0.470	0.320	0.210	0.510	0.700	0.250	0.730	8	0%	0.428	0.208	0.210	0.395	0.730
Titanium	mg/kg dw	<0.25	<0.25	<0.25	<0.25	<0.25	0.270	<0.25	<0.25	8	88%	0.252	-	<0.25	0.250	0.270
Uranium	mg/kg dw	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	8	100%	<0.0020	-	<0.0020	<0.0020	<0.0020
Vanadium	mg/kg dw	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	8	100%	<0.10	-	<0.10	<0.10	<0.10
Zinc	mg/kg dw	38.5	123	71.2	40.3	52.3	51.8	47.3	34.4	8	0%	57.4	28.9	123	49.5	71.2
Zirconium	mg/kg dw	<0.20	<0.20	<0.20	<0.20	<0.20	0.280	<0.20	0.260	8	75%	0.218	0.0141	<0.20	0.200	0.280

Value exceeds Se Guideline for Aquatic Life, fish muscle or whole body tissue (4 mg/kg dw; BCMOE 2014).

Value exceeds Se Guideline for Human Health, general population, high consumption (7.3 mg/kg dw; BCMOE 2014).

Value exceeds Se Guideline for Human Health, general population, moderate consumption (14.5 mg/kg dw; BCMOE 2014).

Value exceeds Hg Guideline for Human Health (0.5 mg/kg ww; CFIA 2015).

Notes: "-" = no data available or standard deviation not calculated. mg/kg = milligrams per kilogram. dw = dry weight. ww = wet weight. LRL = laboratory reporting limit.

[a] All summary statistics are reported to three significant digits for display purposes. All summary statistics were calculated using the Kaplan-Meier method.

Table C.7.3: Longnose Sucker Tissue Chemistry Data for Polley Lake (POL; Exposed), May 2022 [a]

Analyte	Units	Ovary														
		POL-LSU-1	POL-LSU-2	POL-LSU-3	POL-LSU-4	POL-LSU-5	POL-LSU-6	POL-LSU-7	POL-LSU-8	n	% < LRL	Mean	Standard Deviation	Minimum	Median	Maximum
Moisture	%	64.3	68.3	62.5	63.8	63.7	63.0	63.0	63.7	8	0%	64.0	1.81	62.5	63.7	68.3
Aluminum	mg/kg dw	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	8	100%	<2.0	-	<2.0	<2.0	<2.0
Antimony	mg/kg dw	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	8	100%	<0.010	-	<0.010	<0.010	<0.010
Arsenic	mg/kg dw	0.0780	0.0630	0.0420	0.0470	0.0470	0.0710	0.0540	0.0430	8	0%	0.0556	0.0136	0.0420	0.0505	0.0780
Barium	mg/kg dw	0.152	0.0950	0.146	0.177	0.160	0.165	0.327	0.134	8	0%	0.170	0.0683	0.0950	0.156	0.327
Beryllium	mg/kg dw	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	8	100%	<0.010	-	<0.010	<0.010	<0.010
Bismuth	mg/kg dw	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	8	100%	<0.010	-	<0.010	<0.010	<0.010
Boron	mg/kg dw	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	8	100%	<1.0	-	<1.0	<1.0	<1.0
Cadmium	mg/kg dw	<0.0050	<0.0050	0.00580	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	8	88%	0.00510	-	<0.0050	0.00500	0.00580
Calcium	mg/kg dw	537	546	421	525	414	442	464	445	8	0%	474	53.6	414	454	546
Cesium	mg/kg dw	0.0162	0.0126	0.0145	0.0168	0.0115	0.0206	0.0103	0.0113	8	0%	0.0142	0.00349	0.0103	0.0136	0.0206
Chromium	mg/kg dw	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	8	100%	<0.050	-	<0.050	<0.050	<0.050
Cobalt	mg/kg dw	0.0470	0.0570	0.0460	0.0450	0.0810	0.128	0.0490	0.0570	8	0%	0.0638	0.0285	0.0450	0.0530	0.128
Copper	mg/kg dw	3.07	3.22	3.54	3.45	4.12	4.02	3.50	4.00	8	0%	3.62	0.390	3.07	3.52	4.12
Iron	mg/kg dw	44.4	38.5	31.2	39.4	36.2	40.1	47.2	53.3	8	0%	41.3	6.86	31.2	39.8	53.3
Lead	mg/kg dw	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	8	100%	<0.020	-	<0.020	<0.020	<0.020
Lithium	mg/kg dw	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	8	100%	<0.50	-	<0.50	<0.50	<0.50
Magnesium	mg/kg dw	660	770	672	668	755	693	679	756	8	0%	707	45.7	660	686	770
Manganese	mg/kg dw	12.2	10.0	12.2	16.6	24.2	18.4	14.1	23.4	8	0%	16.4	5.28	10.0	15.4	24.2
Mercury	mg/kg dw	0.00520	0.0119	0.00790	0.00700	0.0118	0.00520	0.00700	0.00520	8	0%	0.00765	0.00278	0.00520	0.00700	0.0119
	mg/kg ww	0.00180	0.00380	0.00300	0.00250	0.00430	0.00190	0.00260	0.00190	8	0%	0.00272	0.000925	0.00180	0.00255	0.00430
Molybdenum	mg/kg dw	0.0670	0.104	0.0800	0.116	0.0660	0.0720	0.0670	0.0900	8	0%	0.0828	0.0189	0.0660	0.0760	0.116
Nickel	mg/kg dw	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	8	100%	<0.20	-	<0.20	<0.20	<0.20
Phosphorus	mg/kg dw	11,600	12,000	12,400	12,300	11,700	12,300	12,200	12,400	8	0%	12,112	314	11,600	12,250	12,400
Potassium	mg/kg dw	6,400	7,190	6,360	6,590	5,980	6,400	5,990	6,400	8	0%	6,414	379	5,980	6,400	7,190
Rubidium	mg/kg dw	5.53	6.37	6.06	6.34	4.61	5.33	5.66	6.08	8	0%	5.75	0.594	4.61	5.86	6.37
Selenium	mg/kg dw	8.25	8.14	8.83	8.96	8.90	9.11	7.86	9.43	8	0%	8.68	0.541	7.86	8.86	9.43
Silver	mg/kg dw	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	8	100%	<0.0050	-	<0.0050	<0.0050	<0.0050
Sodium	mg/kg dw	2,060	2,580	1,580	1,780	1,550	1,790	1,700	1,590	8	0%	1,829	345	1,550	1,740	2,580
Strontium	mg/kg dw	0.603	0.402	0.351	0.551	0.477	0.505	0.616	0.559	8	0%	0.508	0.0941	0.351	0.528	0.616
Tellurium	mg/kg dw	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	8	100%	<0.020	-	<0.020	<0.020	<0.020
Thallium	mg/kg dw	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	8	100%	<0.0020	-	<0.0020	<0.0020	<0.0020
Tin	mg/kg dw	<0.10	<0.10	<0.10	0.100	<0.10	<0.10	0.130	0.130	8	63%	0.108	0.0173	<0.10	0.100	0.130
Titanium	mg/kg dw	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	8	100%	<0.25	-	<0.25	<0.25	<0.25
Uranium	mg/kg dw	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	8	100%	<0.0020	-	<0.0020	<0.0020	<0.0020
Vanadium	mg/kg dw	<0.10	0.140	0.140	<0.10	<0.10	<0.10	<0.10	<0.10	8	75%	0.110	0	<0.10	0.100	0.140
Zinc	mg/kg dw	96.4	91.9	90.1	86.8	83.3	82.2	80.4	91.0	8	0%	87.8	5.52	80.4	88.5	96.4
Zirconium	mg/kg dw	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	8	100%	<0.20	-	<0.20	<0.20	<0.20

Value exceeds Se Guideline for Aquatic Life, fish ovary tissue (11 mg/kg dw; BCMOE 2014).

Value exceeds Se Threshold for Effects, fish ovary tissue (20 mg/kg dw; DeForest et al 2012).

Notes: "-" = no data available or standard deviation not calculated. mg/kg = milligrams per kilogram. dw = dry weight. ww = wet weight. LRL = laboratory reporting limit.

[a] All summary statistics are reported to three significant digits for display purposes. All summary statistics were calculated using the Kaplan-Meier method.

Table C.7.3: Longnose Sucker Tissue Chemistry Data for Polley Lake (POL; Exposed), May 2022 [a]

Analyte	Units	Liver														
		POL-LSU-1	POL-LSU-2	POL-LSU-3	POL-LSU-4	POL-LSU-5	POL-LSU-6	POL-LSU-7	POL-LSU-8	n	% < LRL	Mean	Standard Deviation	Minimum	Median	Maximum
Moisture	%	76.7	76.8	77.4	77.3	78.4	77.1	77.0	78.8	8	0%	77.4	0.761	76.7	77.2	78.8
Aluminum	mg/kg dw	3.00	2.30	<2.0	7.70	14.9	<2.0	<5.0	<2.0	8	50%	4.52	5.80	<2.0	2.30	7.70
Antimony	mg/kg dw	0.0320	0.0450	0.0350	0.0300	0.0160	0.0120	0.0170	0.0150	8	0%	0.0253	0.0119	0.0120	0.0235	0.0450
Arsenic	mg/kg dw	0.353	0.426	0.244	0.323	0.188	0.208	0.234	0.209	8	0%	0.273	0.0847	0.188	0.239	0.426
Barium	mg/kg dw	0.311	0.152	0.427	0.624	1.25	0.654	0.659	0.455	8	0%	0.566	0.329	0.152	0.540	1.25
Beryllium	mg/kg dw	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	8	100%	<0.010	-	<0.010	<0.010	<0.010
Bismuth	mg/kg dw	<0.010	<0.010	<0.010	<0.010	<0.010	0.0150	<0.010	<0.010	8	88%	0.0106	-	<0.010	0.0100	0.0150
Boron	mg/kg dw	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	8	100%	<1.0	-	<1.0	<1.0	<1.0
Cadmium	mg/kg dw	0.394	0.715	0.630	0.233	0.114	0.212	0.253	0.311	8	0%	0.358	0.211	0.114	0.282	0.715
Calcium	mg/kg dw	190	165	209	329	319	162	218	251	8	0%	230	64.6	162	214	329
Cesium	mg/kg dw	0.0327	0.0234	0.0309	0.0356	0.0223	0.0216	0.0226	0.0251	8	0%	0.0268	0.00546	0.0216	0.0242	0.0356
Chromium	mg/kg dw	0.115	0.0920	0.0730	0.129	0.620	0.255	<0.20	0.0720	8	13%	0.182	0.198	<0.20	0.115	0.620
Cobalt	mg/kg dw	0.124	0.133	0.109	0.127	0.108	0.121	0.112	0.131	8	0%	0.121	0.00987	0.108	0.122	0.133
Copper	mg/kg dw	71.8	79.5	56.0	43.6	56.0	110	56.9	58.3	8	0%	66.5	20.7	110	57.6	79.5
Iron	mg/kg dw	232	430	230	221	160	503	389	308	8	0%	309	120	160	270	503
Lead	mg/kg dw	<0.020	<0.020	<0.020	0.0280	<0.050	<0.020	<0.050	<0.020	8	88%	0.0213	-	<0.020	0.0200	0.0280
Lithium	mg/kg dw	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	8	100%	<0.50	-	<0.50	<0.50	<0.50
Magnesium	mg/kg dw	1,230	1,010	1,270	1,170	920	873	1,040	1,050	8	0%	1,070	142	1,010	1,045	920
Manganese	mg/kg dw	15.0	9.90	11.1	15.1	12.0	11.5	10.8	13.5	8	0%	12.4	1.95	10.8	11.8	9.90
Mercury	mg/kg dw	0.0708	0.172	0.0971	0.0848	0.0728	0.0633	0.0762	0.0571	8	0%	0.0868	0.0366	0.0571	0.0745	0.172
	mg/kg ww	0.0165	0.0400	0.0220	0.0192	0.0157	0.0145	0.0175	0.0121	8	0%	0.0197	0.00873	0.0121	0.0170	0.0400
Molybdenum	mg/kg dw	2.35	2.44	1.90	1.94	1.39	1.36	2.15	1.76	8	0%	1.91	0.402	1.36	1.92	2.44
Nickel	mg/kg dw	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	8	100%	<0.20	-	<0.20	<0.20	<0.20
Phosphorus	mg/kg dw	21,000	18,300	20,200	19,000	17,200	14,300	18,500	18,100	8	0%	18,325	2,024	14,300	18,400	21,000
Potassium	mg/kg dw	17,800	13,900	16,400	14,000	13,400	12,900	14,200	14,800	8	0%	14,675	1,639	12,900	14,100	17,800
Rubidium	mg/kg dw	14.2	11.4	15.0	12.6	9.41	9.72	12.7	12.3	8	0%	12.2	1.96	11.4	12.4	9.72
Selenium	mg/kg dw	13.1	17.0	14.2	12.8	11.0	11.0	12.2	12.0	8	0%	12.9	1.97	11.0	12.5	17.0
Silver	mg/kg dw	0.0223	0.0851	0.0224	0.0172	0.0209	0.0359	0.0226	0.0262	8	0%	0.0316	0.0223	0.0172	0.0225	0.0851
Sodium	mg/kg dw	4,100	3,520	4,520	5,040	5,320	4,600	4,110	5,560	8	0%	4,596	686	3,520	4,560	5,560
Strontium	mg/kg dw	0.288	0.223	0.291	0.698	1.03	0.310	0.420	0.456	8	0%	0.464	0.273	0.223	0.365	1.03
Tellurium	mg/kg dw	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	8	100%	<0.020	-	<0.020	<0.020	<0.020
Thallium	mg/kg dw	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	8	100%	<0.0020	-	<0.0020	<0.0020	<0.0020
Tin	mg/kg dw	0.770	0.520	0.590	0.490	0.590	0.570	1.10	0.530	8	0%	0.645	0.203	0.490	0.580	1.10
Titanium	mg/kg dw	<0.25	<0.25	<0.25	0.480	0.890	<0.25	<0.50	<0.25	8	75%	0.364	0.290	<0.25	0.250	0.890
Uranium	mg/kg dw	<0.0020	0.00290	<0.0020	0.00240	<0.0020	<0.0020	<0.0020	<0.0020	8	75%	0.00216	0.000354	<0.0020	0.00200	0.00290
Vanadium	mg/kg dw	0.280	1.10	0.880	0.360	0.300	0.250	0.320	0.420	8	0%	0.489	0.319	0.250	0.340	1.10
Zinc	mg/kg dw	165	127	123	146	116	125	127	118	8	0%	131	16.5	116	126	165
Zirconium	mg/kg dw	<0.20	<0.20	0.260	<0.20	<0.20	0.210	0.290	0.280	8	50%	0.230	0.0356	<0.20	0.205	0.290

Notes: "-" = no data available or standard deviation not calculated. mg/kg = milligrams per kilogram. dw = dry weight. ww = wet weight. LRL = laboratory reporting limit.

[a] All summary statistics are reported to three significant digits for display purposes. All summary statistics were calculated using the Kaplan-Meier method.

Table C.7.3: Longnose Sucker Tissue Chemistry Data for Polley Lake (POL; Exposed), May 2022 [a]

Analyte	Units	Kidney														
		POL-LSU-1	POL-LSU-2	POL-LSU-3	POL-LSU-4	POL-LSU-5	POL-LSU-6	POL-LSU-7	POL-LSU-8	n	% < LRL	Mean	Standard Deviation	Minimum	Median	Maximum
Moisture	%	79.9	78.9	78.2	78.6	81.5	78.8	79.3	80.3	8	0%	79.4	1.08	78.2	79.1	81.5
Aluminum	mg/kg dw	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	8	100%	<5.0	-	<5.0	<5.0	<5.0
Antimony	mg/kg dw	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	8	100%	<0.010	-	<0.010	<0.010	<0.010
Arsenic	mg/kg dw	0.210	0.146	0.156	0.144	0.156	0.318	0.126	0.137	8	0%	0.174	0.0633	0.126	0.151	0.318
Barium	mg/kg dw	2.48	0.968	1.38	2.04	0.634	0.270	1.02	0.753	8	0%	1.19	0.741	0.270	0.994	2.48
Beryllium	mg/kg dw	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	8	100%	<0.010	-	<0.010	<0.010	<0.010
Bismuth	mg/kg dw	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	8	100%	<0.010	-	<0.010	<0.010	<0.010
Boron	mg/kg dw	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	8	100%	<1.0	-	<1.0	<1.0	<1.0
Cadmium	mg/kg dw	1.89	2.80	4.61	1.02	1.37	0.133	2.00	2.52	8	0%	2.04	1.34	0.133	1.94	4.61
Calcium	mg/kg dw	386	417	534	361	481	411	352	530	8	0%	434	72.3	352	414	534
Cesium	mg/kg dw	0.0409	0.0250	0.0423	0.0337	0.0441	0.0202	0.0358	0.0309	8	0%	0.0341	0.00848	0.0202	0.0348	0.0441
Chromium	mg/kg dw	0.230	<0.20	<0.20	0.840	1.15	2.16	<0.20	<0.20	8	50%	0.648	0.806	<0.20	0.215	2.16
Cobalt	mg/kg dw	0.530	0.374	0.520	0.272	0.650	0.165	0.308	0.416	8	0%	0.404	0.158	0.165	0.395	0.650
Copper	mg/kg dw	6.59	5.93	7.70	5.53	7.27	3.72	6.57	6.36	8	0%	6.21	1.22	3.72	6.46	7.70
Iron	mg/kg dw	600	453	317	571	415	1,560	472	574	8	0%	620	391	1,560	522	600
Lead	mg/kg dw	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	8	100%	<0.050	-	<0.050	<0.050	<0.050
Lithium	mg/kg dw	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	8	100%	<0.50	-	<0.50	<0.50	<0.50
Magnesium	mg/kg dw	639	571	642	527	750	377	638	669	8	0%	602	112	377	638	750
Manganese	mg/kg dw	3.94	3.44	4.30	3.93	9.00	1.66	4.47	7.18	8	0%	4.74	2.29	1.66	4.12	9.00
Mercury	mg/kg dw	0.0701	0.265	0.197	0.104	0.0930	0.0210	0.109	0.0721	8	0%	0.116	0.0780	0.0210	0.0985	0.265
	mg/kg ww	0.0141	0.0561	0.0430	0.0222	0.0172	0.00440	0.0224	0.0142	8	0%	0.0242	0.0170	0.00440	0.0197	0.0561
Molybdenum	mg/kg dw	1.36	1.46	1.86	1.29	1.36	0.242	1.52	1.10	8	0%	1.27	0.470	0.242	1.36	1.86
Nickel	mg/kg dw	0.500	0.370	0.580	0.460	0.840	1.12	0.330	0.490	8	0%	0.586	0.266	0.330	0.495	1.12
Phosphorus	mg/kg dw	12,900	12,300	14,000	11,300	16,900	7,880	13,600	14,700	8	0%	12,948	2,647	11,300	13,250	7,880
Potassium	mg/kg dw	12,300	10,500	11,600	10,100	14,700	12,100	12,300	14,000	8	0%	12,200	1,567	10,100	12,200	14,700
Rubidium	mg/kg dw	11.1	9.68	12.0	10.5	12.0	8.34	13.9	14.5	8	0%	11.5	2.06	10.5	11.6	9.68
Selenium	mg/kg dw	10.4	10.7	12.9	9.28	11.8	9.33	9.57	12.0	8	0%	10.7	1.36	10.4	10.6	9.57
Silver	mg/kg dw	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	8	100%	<0.0050	-	<0.0050	<0.0050	<0.0050
Sodium	mg/kg dw	6,900	6,010	6,560	6,960	8,360	8,510	5,790	7,040	8	0%	7,016	984	5,790	6,930	8,510
Strontium	mg/kg dw	0.710	0.630	0.770	0.600	0.960	0.770	0.710	0.980	8	0%	0.766	0.139	0.600	0.740	0.980
Tellurium	mg/kg dw	0.0210	0.0690	0.0570	0.0290	0.0220	<0.020	0.0230	<0.020	8	25%	0.0326	0.0208	<0.020	0.0225	0.0690
Thallium	mg/kg dw	0.00780	0.00280	0.00250	0.00590	0.00340	<0.0020	0.00430	0.00480	8	13%	0.00419	0.00187	<0.0020	0.00385	0.00780
Tin	mg/kg dw	1.31	0.700	0.770	1.30	<0.10	0.160	<0.10	<0.10	8	38%	0.568	0.479	<0.10	0.430	1.31
Titanium	mg/kg dw	<0.50	<0.50	<0.50	<0.50	<0.50	0.710	<0.50	<0.50	8	88%	0.526	-	<0.50	0.500	0.710
Uranium	mg/kg dw	0.00330	0.00550	0.00590	0.00310	0.00250	<0.0020	0.00520	0.00310	8	13%	0.00382	0.00139	<0.0020	0.00320	0.00590
Vanadium	mg/kg dw	1.23	3.53	4.24	1.48	1.15	0.120	1.88	1.68	8	0%	1.91	1.34	0.120	1.58	4.24
Zinc	mg/kg dw	258	148	220	167	170	56.2	156	158	8	0%	167	58.5	148	162	56.2
Zirconium	mg/kg dw	0.260	<0.20	0.260	0.320	<0.20	<0.20	<0.20	<0.20	8	63%	0.230	0.0346	<0.20	0.200	0.320

Notes: "-" = no data available or standard deviation not calculated. mg/kg = milligrams per kilogram. dw = dry weight. ww = wet weight. LRL = laboratory reporting limit.

[a] All summary statistics are reported to three significant digits for display purposes. All summary statistics were calculated using the Kaplan-Meier method.

Table C.7.4: Chemistry Data and Guideline Screening for Tissues from Longnose Sucker Collected from Bootjack Lake (BOL; Reference), May 2022 [a]

Analyte	Units	Muscle														
		BOL-LSU-1	BOL-LSU-2	BOL-LSU-3	BOL-LSU-4	BOL-LSU-5	BOL-LSU-6	BOL-LSU-7	BOL-LSU-8	n	% < LRL	Mean	Standard Deviation	Minimum	Median	Maximum
Moisture	%	75.5	77.4	74.2	75.4	79.3	73.1	71.3	77.1	8	0%	75.4	2.55	71.3	75.5	79.3
Aluminum	mg/kg dw	<2.0	3.20	<5.0	<2.0	4.00	6.30	7.30	<2.0	8	50%	3.68	1.92	<2.0	3.20	7.30
Antimony	mg/kg dw	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	8	100%	<0.010	-	<0.010	<0.010	<0.010
Arsenic	mg/kg dw	0.175	0.0370	0.433	0.0480	0.0360	0.0790	0.139	0.0980	8	0%	0.131	0.132	0.0360	0.0885	0.433
Barium	mg/kg dw	0.682	1.34	0.558	0.887	0.948	1.22	1.16	0.862	8	0%	0.957	0.269	0.558	0.918	1.34
Beryllium	mg/kg dw	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	8	100%	<0.010	-	<0.010	<0.010	<0.010
Bismuth	mg/kg dw	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	8	100%	<0.010	-	<0.010	<0.010	<0.010
Boron	mg/kg dw	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	8	100%	<1.0	-	<1.0	<1.0	<1.0
Cadmium	mg/kg dw	<0.0050	<0.0050	<0.010	<0.0050	<0.0050	<0.0050	<0.010	<0.0050	8	100%	<0.0050	-	<0.0050	<0.0050	<0.010
Calcium	mg/kg dw	586	503	500	536	721	1,200	913	932	8	0%	736	256	1,200	654	932
Cesium	mg/kg dw	0.123	0.115	0.226	0.108	0.137	0.0863	0.0910	0.235	8	0%	0.140	0.0581	0.0863	0.119	0.235
Chromium	mg/kg dw	0.0900	0.206	<0.20	0.103	0.0940	0.165	<0.20	0.111	8	25%	0.124	0.0468	<0.20	0.103	0.206
Cobalt	mg/kg dw	<0.020	0.0220	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	8	88%	0.0202	-	<0.020	0.0200	0.0220
Copper	mg/kg dw	2.04	2.57	1.13	1.58	1.87	2.17	4.00	1.56	8	0%	2.12	0.878	1.13	1.96	4.00
Iron	mg/kg dw	26.5	46.0	15.1	19.7	40.0	38.7	30.2	19.4	8	0%	29.4	11.2	15.1	28.4	46.0
Lead	mg/kg dw	<0.020	<0.020	<0.050	<0.020	<0.020	<0.020	<0.050	<0.020	8	100%	<0.020	-	<0.020	<0.020	<0.050
Lithium	mg/kg dw	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	8	100%	<0.50	-	<0.50	<0.50	<0.50
Magnesium	mg/kg dw	1,200	1,390	1,310	1,410	1,370	1,260	1,010	1,520	8	0%	1,309	155	1,010	1,340	1,520
Manganese	mg/kg dw	1.02	1.46	0.866	0.881	1.29	3.39	2.45	1.90	8	0%	1.66	0.886	0.866	1.38	3.39
Mercury	mg/kg dw	0.355	0.614	0.330	0.764	0.595	0.623	0.170	0.608	8	0%	0.507	0.199	0.170	0.602	0.764
	mg/kg ww	0.0871	0.139	0.0850	0.188	0.123	0.168	0.0490	0.139	8	0%	0.122	0.0462	0.0490	0.131	0.188
Molybdenum	mg/kg dw	<0.020	0.0220	<0.040	<0.020	<0.020	<0.020	<0.040	<0.020	8	88%	0.0203	-	<0.020	0.0200	0.0220
Nickel	mg/kg dw	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	8	100%	<0.20	-	<0.20	<0.20	<0.20
Phosphorus	mg/kg dw	9,980	11,800	10,700	12,400	11,400	10,400	8,220	12,800	8	0%	10,962	1,474	10,400	11,050	9,980
Potassium	mg/kg dw	16,800	20,800	19,000	20,200	19,100	15,000	12,400	21,600	8	0%	18,113	3,152	12,400	19,050	21,600
Rubidium	mg/kg dw	11.0	9.79	14.3	9.36	7.77	6.64	8.21	11.9	8	0%	9.87	2.48	11.0	9.57	9.79
Selenium	mg/kg dw	2.74	2.62	2.99	2.46	2.13	2.59	2.63	2.74	8	0%	2.61	0.248	2.13	2.62	2.99
Silver	mg/kg dw	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	8	100%	<0.0050	-	<0.0050	<0.0050	<0.0050
Sodium	mg/kg dw	1,250	1,430	1,180	1,280	2,560	1,270	1,320	1,400	8	0%	1,461	451	1,180	1,300	2,560
Strontium	mg/kg dw	0.928	0.694	0.760	0.770	1.17	2.73	1.93	1.53	8	0%	1.31	0.716	0.694	1.05	2.73
Tellurium	mg/kg dw	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	8	100%	<0.020	-	<0.020	<0.020	<0.020
Thallium	mg/kg dw	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	8	100%	<0.0020	-	<0.0020	<0.0020	<0.0020
Tin	mg/kg dw	0.550	0.820	0.450	0.580	0.830	0.480	0.600	0.910	8	0%	0.652	0.175	0.450	0.590	0.910
Titanium	mg/kg dw	<0.25	0.260	<0.50	<0.25	0.360	0.640	1.47	<0.25	8	50%	0.469	0.549	<0.25	0.260	1.47
Uranium	mg/kg dw	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	8	100%	<0.0020	-	<0.0020	<0.0020	<0.0020
Vanadium	mg/kg dw	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	8	100%	<0.10	-	<0.10	<0.10	<0.10
Zinc	mg/kg dw	23.1	34.5	22.1	29.4	23.8	26.8	20.2	17.4	8	0%	24.7	5.43	17.4	23.4	34.5
Zirconium	mg/kg dw	0.400	0.430	0.230	0.360	0.370	0.330	0.250	0.330	8	0%	0.338	0.0690	0.230	0.345	0.430

Value exceeds Se Guideline for Aquatic Life, fish muscle or whole body tissue (4 mg/kg dw; BCMOE 2014).

Value exceeds Se Guideline for Human Health, general population, high consumption (7.3 mg/kg dw; BCMOE 2014).

Value exceeds Se Guideline for Human Health, general population, moderate consumption (14.5 mg/kg dw; BCMOE 2014).

Value exceeds Hg Guideline for Human Health (0.5 mg/kg ww; CFIA 2015).

Notes: "-" = no data available or standard deviation not calculated. mg/kg = milligrams per kilogram. dw = dry weight. ww = wet weight. LRL = laboratory reporting limit.

[a] All summary statistics are reported to three significant digits for display purposes. All summary statistics were calculated using the Kaplan-Meier method.

Table C.7.4: Chemistry Data and Guideline Screening for Tissues from Longnose Sucker Collected from Bootjack Lake (BOL; Reference), May 2022 [a]

Analyte	Units	Ovary														
		BOL-LSU-1	BOL-LSU-2	BOL-LSU-3	BOL-LSU-4	BOL-LSU-5	BOL-LSU-6	BOL-LSU-7	BOL-LSU-8	n	% < LRL	Mean	Standard Deviation	Minimum	Median	Maximum
Moisture	%	63.2	65.9	67.2	65.4	67.0	66.7	64.6	64.2	8	0%	65.5	1.44	63.2	65.7	67.2
Aluminum	mg/kg dw	<2.0	<2.0	<2.0	<2.0	2.60	<2.0	<2.0	<2.0	8	88%	2.08	-	<2.0	2.00	2.60
Antimony	mg/kg dw	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	8	100%	<0.010	-	<0.010	<0.010	<0.010
Arsenic	mg/kg dw	0.0910	0.0260	0.133	0.0340	0.0260	0.0410	0.0690	0.0560	8	0%	0.0595	0.0373	0.0260	0.0485	0.133
Barium	mg/kg dw	0.364	0.232	0.290	0.307	0.280	0.264	0.195	0.264	8	0%	0.274	0.0503	0.195	0.272	0.364
Beryllium	mg/kg dw	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	8	100%	<0.010	-	<0.010	<0.010	<0.010
Bismuth	mg/kg dw	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	8	100%	<0.010	-	<0.010	<0.010	<0.010
Boron	mg/kg dw	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	8	100%	<1.0	-	<1.0	<1.0	<1.0
Cadmium	mg/kg dw	<0.0050	<0.0050	0.00720	<0.0050	0.00540	<0.0050	<0.0050	0.00510	8	63%	0.00534	0.00114	<0.0050	0.00500	0.00720
Calcium	mg/kg dw	511	606	590	508	510	532	448	574	8	0%	535	52.2	448	522	606
Cesium	mg/kg dw	0.0191	0.0164	0.0395	0.0113	0.0182	0.0179	0.0314	0.0311	8	0%	0.0231	0.00966	0.0113	0.0186	0.0395
Chromium	mg/kg dw	<0.050	0.0680	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	8	88%	0.0522	-	<0.050	0.0500	0.0680
Cobalt	mg/kg dw	0.0440	0.0530	0.0630	0.0480	0.0400	0.0500	0.0320	0.0360	8	0%	0.0458	0.00995	0.0320	0.0460	0.0630
Copper	mg/kg dw	4.07	3.80	5.31	3.54	3.74	3.98	3.49	3.70	8	0%	3.95	0.582	3.49	3.77	5.31
Iron	mg/kg dw	54.8	57.3	29.6	55.9	79.0	64.8	45.0	48.8	8	0%	54.4	14.4	29.6	55.4	79.0
Lead	mg/kg dw	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	8	100%	<0.020	-	<0.020	<0.020	<0.020
Lithium	mg/kg dw	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	8	100%	<0.50	-	<0.50	<0.50	<0.50
Magnesium	mg/kg dw	726	747	913	761	758	792	726	780	8	0%	775	60.3	726	760	913
Manganese	mg/kg dw	16.3	12.6	12.2	5.48	6.11	16.5	13.6	16.0	8	0%	12.3	4.37	12.2	13.1	6.11
Mercury	mg/kg dw	0.0142	0.0160	0.0128	0.0184	0.0178	0.0170	0.00910	0.0170	8	0%	0.0153	0.00312	0.00910	0.0165	0.0184
	mg/kg ww	0.00520	0.00550	0.00420	0.00640	0.00590	0.00570	0.00320	0.00610	8	0%	0.00528	0.00107	0.00320	0.00560	0.00640
Molybdenum	mg/kg dw	0.0650	0.0680	0.0780	0.0590	0.0650	0.0660	0.0510	0.0600	8	0%	0.0640	0.00782	0.0510	0.0650	0.0780
Nickel	mg/kg dw	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	8	100%	<0.20	-	<0.20	<0.20	<0.20
Phosphorus	mg/kg dw	11,800	11,100	12,300	11,700	11,800	12,100	11,300	11,900	8	0%	11,750	393	11,100	11,800	12,300
Potassium	mg/kg dw	6,290	6,770	7,760	7,000	6,940	7,100	6,760	6,870	8	0%	6,936	412	6,290	6,905	7,760
Rubidium	mg/kg dw	5.28	3.97	8.20	4.26	3.43	4.07	5.98	5.19	8	0%	5.05	1.52	3.43	4.72	8.20
Selenium	mg/kg dw	4.83	5.00	4.94	4.32	3.78	4.38	5.21	4.58	8	0%	4.63	0.462	3.78	4.70	5.21
Silver	mg/kg dw	<0.0050	0.00570	<0.0050	0.00640	0.00640	0.00810	<0.0050	<0.0050	8	50%	0.00582	0.00102	<0.0050	0.00535	0.00810
Sodium	mg/kg dw	1,640	2,520	1,990	1,920	2,260	2,150	1,710	1,630	8	0%	1,978	319	1,630	1,955	2,520
Strontium	mg/kg dw	0.687	0.632	0.924	0.672	0.733	0.757	0.537	0.691	8	0%	0.704	0.111	0.537	0.689	0.924
Tellurium	mg/kg dw	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	8	100%	<0.020	-	<0.020	<0.020	<0.020
Thallium	mg/kg dw	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	8	100%	<0.0020	-	<0.0020	<0.0020	<0.0020
Tin	mg/kg dw	<0.10	<0.10	0.160	<0.10	0.100	<0.10	0.130	0.130	8	50%	0.115	0.0245	<0.10	0.100	0.160
Titanium	mg/kg dw	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	8	100%	<0.25	-	<0.25	<0.25	<0.25
Uranium	mg/kg dw	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	8	100%	<0.0020	-	<0.0020	<0.0020	<0.0020
Vanadium	mg/kg dw	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	8	100%	<0.10	-	<0.10	<0.10	<0.10
Zinc	mg/kg dw	67.2	84.1	86.8	75.2	76.8	75.2	73.1	77.4	8	0%	77	6.15	67.2	76.0	86.8
Zirconium	mg/kg dw	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	8	100%	<0.20	-	<0.20	<0.20	<0.20

Value exceeds Se Guideline for Aquatic Life, fish ovary tissue (11 mg/kg dw; BCMOE 2014).

Value exceeds Se Threshold for Effects, fish ovary tissue (20 mg/kg dw; DeForest et al 2012).

Notes: "-" = no data available or standard deviation not calculated. mg/kg = milligrams per kilogram. dw = dry weight. ww = wet weight. LRL = laboratory reporting limit.

[a] All summary statistics are reported to three significant digits for display purposes. All summary statistics were calculated using the Kaplan-Meier method.

Table C.7.4: Chemistry Data and Guideline Screening for Tissues from Longnose Sucker Collected from Bootjack Lake (BOL; Reference), May 2022 [a]

Analyte	Units	Liver														
		BOL-LSU-1	BOL-LSU-2	BOL-LSU-3	BOL-LSU-4	BOL-LSU-5	BOL-LSU-6	BOL-LSU-7	BOL-LSU-8	n	% < LRL	Mean	Standard Deviation	Minimum	Median	Maximum
Moisture	%	80.3	80.4	81.5	82.1	82.3	81.7	80.7	79.7	8	0%	81.1	0.942	79.7	81.1	82.3
Aluminum	mg/kg dw	2.50	<5.0	5.90	<2.0	14.6	3.70	2.30	3.20	8	25%	4.62	4.70	<2.0	3.20	5.90
Antimony	mg/kg dw	0.0120	0.0220	0.0100	0.0200	0.0410	0.0170	0.0100	0.0150	8	0%	0.0184	0.0102	0.0100	0.0160	0.0410
Arsenic	mg/kg dw	0.158	0.152	0.150	0.125	0.182	0.124	0.107	0.133	8	0%	0.141	0.0237	0.107	0.142	0.182
Barium	mg/kg dw	0.300	0.454	0.678	0.119	0.439	0.195	0.343	0.311	8	0%	0.355	0.172	0.119	0.327	0.678
Beryllium	mg/kg dw	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	8	100%	<0.010	-	<0.010	<0.010	<0.010
Bismuth	mg/kg dw	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	8	100%	<0.010	-	<0.010	<0.010	<0.010
Boron	mg/kg dw	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	8	100%	<1.0	-	<1.0	<1.0	<1.0
Cadmium	mg/kg dw	0.209	0.469	0.221	0.411	0.313	0.318	0.0803	0.352	8	0%	0.297	0.124	0.0803	0.316	0.469
Calcium	mg/kg dw	362	285	386	354	396	334	319	483	8	0%	365	59.7	285	358	483
Cesium	mg/kg dw	0.0246	0.0216	0.0449	0.0164	0.0353	0.0361	0.0397	0.0575	8	0%	0.0345	0.0134	0.0164	0.0357	0.0575
Chromium	mg/kg dw	0.0730	<0.20	0.0980	<0.050	0.144	0.0900	0.109	0.0700	8	25%	0.0906	0.0272	<0.050	0.0900	0.144
Cobalt	mg/kg dw	0.0860	0.120	0.0980	0.102	0.135	0.126	0.102	0.106	8	0%	0.109	0.0162	0.0860	0.104	0.135
Copper	mg/kg dw	15.2	23.0	86.7	9.52	17.7	19.9	17.9	21.2	8	0%	26.4	24.7	15.2	18.9	9.52
Iron	mg/kg dw	158	424	84.5	147	503	584	261	313	8	0%	309	181	147	287	84.5
Lead	mg/kg dw	<0.020	<0.050	<0.020	<0.020	0.0270	<0.020	<0.020	<0.020	8	88%	0.0210	-	<0.020	0.0200	0.0270
Lithium	mg/kg dw	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	8	100%	<0.50	-	<0.50	<0.50	<0.50
Magnesium	mg/kg dw	1,040	1,030	1,220	930	1,260	1,200	994	1,150	8	0%	1,103	120	1,030	1,095	994
Manganese	mg/kg dw	11.4	14.2	21.2	9.72	30.8	12.6	9.69	16.8	8	0%	15.8	7.19	11.4	13.4	9.72
Mercury	mg/kg dw	0.138	0.192	0.137	0.200	0.215	0.166	0.0966	0.139	8	0%	0.160	0.0399	0.0966	0.152	0.215
	mg/kg ww	0.0272	0.0376	0.0254	0.0358	0.0381	0.0303	0.0187	0.0283	8	0%	0.0302	0.00672	0.0187	0.0293	0.0381
Molybdenum	mg/kg dw	1.26	1.13	1.59	0.939	1.38	1.19	1.42	1.16	8	0%	1.26	0.201	0.939	1.23	1.59
Nickel	mg/kg dw	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	8	100%	<0.20	-	<0.20	<0.20	<0.20
Phosphorus	mg/kg dw	16,400	15,900	17,500	14,800	19,100	18,100	15,900	17,600	8	0%	16,913	1,404	14,800	16,950	19,100
Potassium	mg/kg dw	13,600	11,300	15,600	12,800	13,800	14,900	13,500	14,200	8	0%	13,712	1,305	11,300	13,700	15,600
Rubidium	mg/kg dw	10.5	6.43	15.5	7.77	7.93	8.39	10.2	10.6	8	0%	9.66	2.79	10.2	9.30	8.39
Selenium	mg/kg dw	6.19	6.89	6.79	6.92	7.51	6.26	7.28	6.60	8	0%	6.80	0.457	6.19	6.84	7.51
Silver	mg/kg dw	0.0181	0.0284	0.110	0.00910	0.0184	0.0261	0.0230	0.0280	8	0%	0.0326	0.0319	0.00910	0.0246	0.110
Sodium	mg/kg dw	6,780	6,940	7,090	8,080	8,240	7,610	7,100	6,870	8	0%	7,339	566	6,780	7,095	8,240
Strontium	mg/kg dw	0.883	0.640	1.37	0.864	1.55	0.782	0.705	1.97	8	0%	1.10	0.479	0.640	0.874	1.97
Tellurium	mg/kg dw	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	8	100%	<0.020	-	<0.020	<0.020	<0.020
Thallium	mg/kg dw	<0.0020	0.00210	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	8	88%	0.00201	-	<0.0020	0.00200	0.00210
Tin	mg/kg dw	0.310	0.500	0.540	0.390	0.440	<0.10	<0.10	<0.10	8	38%	0.310	0.0907	<0.10	0.350	0.540
Titanium	mg/kg dw	<0.25	<0.50	0.310	<0.25	0.750	<0.25	<0.25	<0.25	8	75%	0.321	0.311	<0.25	0.250	0.750
Uranium	mg/kg dw	0.00290	0.00510	0.00320	0.00400	0.0102	0.00490	<0.0020	0.00320	8	13%	0.00444	0.00254	<0.0020	0.00360	0.0102
Vanadium	mg/kg dw	0.240	0.300	0.140	0.220	0.760	0.270	0.130	0.160	8	0%	0.278	0.204	0.130	0.230	0.760
Zinc	mg/kg dw	80.0	79.9	118	70.0	88.8	87.9	86.5	78.0	8	0%	86.1	14.3	118	83.2	88.8
Zirconium	mg/kg dw	<0.20	0.240	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	8	88%	0.205	-	<0.20	0.200	0.240

Notes: "-" = no data available or standard deviation not calculated. mg/kg = milligrams per kilogram. dw = dry weight. ww = wet weight. LRL = laboratory reporting limit.

[a] All summary statistics are reported to three significant digits for display purposes. All summary statistics were calculated using the Kaplan-Meier method.

Table C.7.4: Chemistry Data and Guideline Screening for Tissues from Longnose Sucker Collected from Bootjack Lake (BOL; Reference), May 2022 [a]

Analyte	Units	Kidney														
		BOL-LSU-1	BOL-LSU-2	BOL-LSU-3	BOL-LSU-4	BOL-LSU-5	BOL-LSU-6	BOL-LSU-7	BOL-LSU-8	n	% < LRL	Mean	Standard Deviation	Minimum	Median	Maximum
Moisture	%	79.3	81.4	79.2	78.4	83.1	79.0	78.4	80.1	8	0%	79.9	1.63	78.4	79.2	83.1
Aluminum	mg/kg dw	<5.0	<5.0	6.30	<5.0	7.80	<5.0	<5.0	<2.0	8	75%	3.26	1.06	<2.0	5.00	7.80
Antimony	mg/kg dw	<0.010	<0.010	<0.010	<0.010	0.0120	<0.010	<0.010	<0.010	8	88%	0.0102	-	<0.010	0.0100	0.0120
Arsenic	mg/kg dw	0.148	0.0940	0.230	0.0920	0.0920	0.0930	0.122	0.111	8	0%	0.123	0.0476	0.0920	0.102	0.230
Barium	mg/kg dw	1.06	2.82	1.61	2.17	3.27	3.15	1.70	2.20	8	0%	2.25	0.785	1.06	2.18	3.27
Beryllium	mg/kg dw	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	8	100%	<0.010	-	<0.010	<0.010	<0.010
Bismuth	mg/kg dw	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	8	100%	<0.010	-	<0.010	<0.010	<0.010
Boron	mg/kg dw	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	8	100%	<1.0	-	<1.0	<1.0	<1.0
Cadmium	mg/kg dw	1.11	1.89	1.08	2.49	1.76	1.75	0.448	2.23	8	0%	1.59	0.672	0.448	1.76	2.49
Calcium	mg/kg dw	670	856	633	968	1,380	2,520	794	1,300	8	0%	1,140	621	1,300	912	968
Cesium	mg/kg dw	0.0281	0.0350	0.0734	0.0188	0.0553	0.0459	0.0481	0.100	8	0%	0.0506	0.0261	0.0188	0.0470	0.100
Chromium	mg/kg dw	<0.20	<0.20	<0.20	<0.20	0.0990	<0.20	<0.20	0.0630	8	75%	0.0810	0.0255	<0.20	0.0810	0.0990
Cobalt	mg/kg dw	0.134	0.283	0.266	0.294	0.181	0.452	0.299	0.214	8	0%	0.265	0.0957	0.134	0.274	0.452
Copper	mg/kg dw	4.55	5.97	6.08	4.38	6.10	4.24	4.26	5.15	8	0%	5.09	0.844	4.24	4.85	6.10
Iron	mg/kg dw	486	276	157	340	502	338	448	523	8	0%	384	128	157	394	523
Lead	mg/kg dw	<0.050	<0.050	<0.050	<0.050	<0.020	<0.050	<0.050	<0.020	8	100%	<0.020	-	<0.020	<0.020	<0.050
Lithium	mg/kg dw	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	8	100%	<0.50	-	<0.50	<0.50	<0.50
Magnesium	mg/kg dw	516	612	609	448	680	692	556	698	8	0%	601	90.1	448	610	698
Manganese	mg/kg dw	11.7	20.4	22.7	12.2	25.2	66.1	10.0	12.0	8	0%	22.5	18.5	10.0	16.3	66.1
Mercury	mg/kg dw	0.128	0.277	0.108	0.266	0.340	0.306	0.0822	0.217	8	0%	0.216	0.0978	0.0822	0.242	0.340
	mg/kg ww	0.0265	0.0514	0.0224	0.0572	0.0575	0.0641	0.0178	0.0431	8	0%	0.0425	0.0180	0.0178	0.0472	0.0641
Molybdenum	mg/kg dw	0.575	0.719	0.913	0.706	0.777	0.595	0.610	0.751	8	0%	0.706	0.113	0.575	0.712	0.913
Nickel	mg/kg dw	0.290	0.580	0.410	0.660	0.510	0.610	0.290	0.420	8	0%	0.471	0.142	0.290	0.465	0.660
Phosphorus	mg/kg dw	11,600	13,600	13,200	10,000	14,500	14,500	11,900	13,900	8	0%	12,900	1,595	10,000	13,400	14,500
Potassium	mg/kg dw	9,540	10,800	10,200	8,230	13,800	12,600	10,700	14,200	8	0%	11,259	2,093	10,200	10,750	9,540
Rubidium	mg/kg dw	7.70	7.06	11.4	5.50	6.82	6.44	8.31	9.39	8	0%	7.83	1.87	11.4	7.38	9.39
Selenium	mg/kg dw	5.38	6.32	5.59	5.75	6.17	6.11	5.79	5.87	8	0%	5.87	0.314	5.38	5.83	6.32
Silver	mg/kg dw	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	8	100%	<0.0050	-	<0.0050	<0.0050	<0.0050
Sodium	mg/kg dw	8,280	9,340	7,870	7,290	11,400	6,460	7,020	7,900	8	0%	8,195	1,558	11,400	7,885	9,340
Strontium	mg/kg dw	1.55	1.72	1.59	2.26	3.09	6.84	1.46	2.83	8	0%	2.67	1.79	1.46	1.99	6.84
Tellurium	mg/kg dw	<0.020	0.0440	<0.020	0.0300	0.0600	0.0240	<0.020	0.0250	8	38%	0.0304	0.0153	<0.020	0.0245	0.0600
Thallium	mg/kg dw	0.0174	0.0161	0.0143	0.0158	0.00630	0.0125	0.00630	0.00920	8	0%	0.0122	0.00445	0.00630	0.0134	0.0174
Tin	mg/kg dw	<0.10	<0.10	0.910	0.630	0.660	0.660	0.650	0.530	8	25%	0.530	0.126	<0.10	0.640	0.910
Titanium	mg/kg dw	<0.50	<0.50	0.670	<0.50	0.630	<0.50	<0.50	<0.25	8	75%	0.350	0.0283	<0.25	0.500	0.670
Uranium	mg/kg dw	0.00780	0.0157	0.00860	0.0141	0.0215	0.0186	0.00440	0.00910	8	0%	0.0125	0.00592	0.00440	0.0116	0.0215
Vanadium	mg/kg dw	0.630	1.05	0.300	0.970	2.06	0.970	0.400	0.480	8	0%	0.858	0.564	0.300	0.800	2.06
Zinc	mg/kg dw	95.8	156	122	106	104	105	113	87.8	8	0%	111	20.8	104	106	95.8
Zirconium	mg/kg dw	<0.20	<0.20	0.230	0.220	<0.20	0.200	<0.20	<0.20	8	63%	0.206	0.0153	<0.20	0.200	0.230

Notes: "-" = no data available or standard deviation not calculated. mg/kg = milligrams per kilogram. dw = dry weight. ww = wet weight. LRL = laboratory reporting limit.

[a] All summary statistics are reported to three significant digits for display purposes. All summary statistics were calculated using the Kaplan-Meier method.

Table C.7.5: Lake Trout Tissue Chemistry Data for Quesnel Lake near Cedar Point (QUL-NCP; Exposed), October 2022[a]

Analyte	Units	Quesnel Lake near Cedar Point (QUL-NCP)														
		Muscle														
		QUL-NCP-LT-1	QUL-NCP-LT-2	QUL-NCP-LT-3	QUL-NCP-LT-4	QUL-NCP-LT-5	QUL-NCP-LT-6	QUL-NCP-LT-7	QUL-NCP-LT-8	n	% < LRL	Mean	Standard Deviation	Minimum	Median	Maximum
Moisture	%	76.9	76.4	76.4	79.8	75.0	78.4	74.9	76.4	8	0%	76.8	1.64	74.9	76.4	79.8
Aluminum	mg/kg dw	<2.0	3.20	<2.0	<2.0	9.00	<2.0	<2.0	2.30	8	63%	3.06	3.64	<2.0	2.00	9.00
Antimony	mg/kg dw	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	8	100%	<0.010	-	<0.010	<0.010	<0.010
Arsenic	mg/kg dw	0.0900	0.589	0.108	0.144	0.120	0.0740	0.0540	0.431	8	0%	0.201	0.197	0.0540	0.114	0.589
Barium	mg/kg dw	<0.050	0.101	<0.050	0.206	0.199	<0.050	<0.050	0.0850	8	50%	0.0989	0.0636	<0.050	0.0675	0.206
Beryllium	mg/kg dw	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	8	100%	<0.010	-	<0.010	<0.010	<0.010
Bismuth	mg/kg dw	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	8	100%	<0.010	-	<0.010	<0.010	<0.010
Boron	mg/kg dw	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	8	100%	<1.0	-	<1.0	<1.0	<1.0
Cadmium	mg/kg dw	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.00510	<0.0050	8	88%	0.00501	-	<0.0050	0.00500	0.00510
Calcium	mg/kg dw	826	415	220	741	374	248	210	290	8	0%	416	239	210	332	826
Cesium	mg/kg dw	0.309	0.182	0.270	0.257	0.198	0.314	0.281	0.217	8	0%	0.254	0.0497	0.182	0.264	0.314
Chromium	mg/kg dw	<0.050	0.0530	0.0530	0.264	0.0660	<0.050	<0.050	0.0570	8	38%	0.0804	0.0926	<0.050	0.0530	0.264
Cobalt	mg/kg dw	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	8	100%	<0.020	-	<0.020	<0.020	<0.020
Copper	mg/kg dw	0.710	2.92	1.14	0.950	1.67	1.06	1.23	1.41	8	0%	1.39	0.684	0.710	1.18	2.92
Iron	mg/kg dw	8.60	32.4	8.80	11.3	30.4	11.6	10.6	12.5	8	0%	15.8	9.75	10.6	11.4	8.80
Lead	mg/kg dw	<0.020	0.0220	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	8	88%	0.0202	-	<0.020	0.0200	0.0220
Lithium	mg/kg dw	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	8	100%	<0.50	-	<0.50	<0.50	<0.50
Magnesium	mg/kg dw	1,110	1,080	1,110	1,690	1,320	1,240	1,160	1,420	8	0%	1,266	208	1,080	1,200	1,690
Manganese	mg/kg dw	0.272	0.448	0.284	0.435	0.573	0.287	0.268	0.397	8	0%	0.370	0.111	0.268	0.342	0.573
Mercury	mg/kg dw	2.23	0.672	2.40	0.987	0.734	1.82	1.17	0.929	8	0%	1.37	0.684	0.672	1.08	2.40
	mg/kg ww	0.515	0.159	0.568	0.199	0.183	0.394	0.293	0.219	8	0%	0.316	0.158	0.159	0.256	0.568
Molybdenum	mg/kg dw	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	8	100%	<0.020	-	<0.020	<0.020	<0.020
Nickel	mg/kg dw	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	8	100%	<0.20	-	<0.20	<0.20	<0.20
Phosphorus	mg/kg dw	11,100	11,500	11,600	14,200	12,500	12,700	10,500	13,000	8	0%	12,138	1,189	10,500	12,050	14,200
Potassium	mg/kg dw	19,600	17,200	19,900	24,900	21,600	24,000	18,900	22,500	8	0%	21,075	2,640	17,200	20,750	24,900
Rubidium	mg/kg dw	40.5	33.1	36.0	46.5	40.8	39.3	33.7	41.2	8	0%	38.9	4.45	33.1	39.9	46.5
Selenium	mg/kg dw	1.88	2.04	2.04	2.46	2.14	2.15	1.84	2.21	8	0%	2.10	0.196	1.84	2.09	2.46
Silver	mg/kg dw	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	8	100%	<0.0050	-	<0.0050	<0.0050	<0.0050
Sodium	mg/kg dw	1,090	1,060	1,030	1,660	1,140	1,330	992	976	8	0%	1,160	231	1,030	1,075	992
Strontium	mg/kg dw	1.02	0.461	0.153	0.855	0.354	0.150	0.141	0.194	8	0%	0.416	0.344	0.141	0.274	1.02
Tellurium	mg/kg dw	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	8	100%	<0.020	-	<0.020	<0.020	<0.020
Thallium	mg/kg dw	0.0254	0.0493	0.0293	0.0436	0.0403	0.0283	0.0288	0.0270	8	0%	0.0340	0.00903	0.0254	0.0290	0.0493
Tin	mg/kg dw	0.220	0.220	0.490	0.710	0.240	0.240	0.370	0.280	8	0%	0.346	0.174	0.220	0.260	0.710
Titanium	mg/kg dw	<0.25	<0.25	<0.25	<0.25	0.910	<0.25	<0.25	<0.25	8	88%	0.332	-	<0.25	0.250	0.910
Uranium	mg/kg dw	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	8	100%	<0.0020	-	<0.0020	<0.0020	<0.0020
Vanadium	mg/kg dw	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	8	100%	<0.10	-	<0.10	<0.10	<0.10
Zinc	mg/kg dw	11.5	20.9	11.8	14.7	13.6	13.4	11.9	13.2	8	0%	13.9	3.04	11.5	13.3	20.9
Zirconium	mg/kg dw	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	8	100%	<0.20	-	<0.20	<0.20	<0.20

Value exceeds Se Guideline for Aquatic Life, fish muscle or whole body tissue (4 mg/kg dw; BCMOE 2014).
Value exceeds Se Guideline for Human Health, general population, high consumption (7.3 mg/kg dw; BCMOE 2014).
Value exceeds Se Guideline for Human Health, general population, moderate consumption (14.5 mg/kg dw; BCMOE 2014).
Value exceeds Hg Guideline for Human Health (0.5 mg/kg ww; CFIA 2015).

Notes: "-" = no data available or standard deviation not calculated. mg/kg = milligrams per kilogram. dw = dry weight. ww = wet weight. LRL = laboratory reporting limit.

[a] All summary statistics are reported to three significant digits for display purposes. All summary statistics were calculated using the Kaplan-Meier method.

Table C.7.5: Lake Trout Tissue Chemistry Data for Quesnel Lake near Cedar Point (QUL-NCP; Exposed), October 2022[a]

Analyte	Units	Quesnel Lake near Cedar Point (QUL-NCP)											
		Ovary											
		QUL-NCP-LT-1	QUL-NCP-LT-3	QUL-NCP-LT-4	QUL-NCP-LT-5	QUL-NCP-LT-8	n	% < LRL	Mean	Standard Deviation	Minimum	Median	Maximum
Moisture	%	64.8	70.0	78.5	79.4	79.4	5	0%	74.4	6.68	64.8	78.5	79.4
Aluminum	mg/kg dw	<2.0	<2.0	<2.0	2.70	3.20	5	60%	2.38	0.354	<2.0	2.00	3.20
Antimony	mg/kg dw	<0.010	<0.010	<0.010	<0.010	<0.010	5	100%	<0.010	-	<0.010	<0.010	<0.010
Arsenic	mg/kg dw	0.0460	0.0750	0.105	0.143	0.169	5	0%	0.108	0.0497	0.0460	0.105	0.169
Barium	mg/kg dw	<0.050	<0.050	0.0950	0.156	0.0880	5	40%	0.0878	0.0374	<0.050	0.0880	0.156
Beryllium	mg/kg dw	<0.010	<0.010	<0.010	<0.010	<0.010	5	100%	<0.010	-	<0.010	<0.010	<0.010
Bismuth	mg/kg dw	<0.010	<0.010	<0.010	<0.010	<0.010	5	100%	<0.010	-	<0.010	<0.010	<0.010
Boron	mg/kg dw	<1.0	<1.0	<1.0	<1.0	<1.0	5	100%	<1.0	-	<1.0	<1.0	<1.0
Cadmium	mg/kg dw	<0.0050	<0.0050	0.0108	0.0116	0.0118	5	40%	0.00884	0.000529	<0.0050	0.0108	0.0118
Calcium	mg/kg dw	1,060	958	1,150	1,480	1,410	5	0%	1,212	225	1,060	1,150	958
Cesium	mg/kg dw	0.0725	0.0805	0.192	0.195	0.206	5	0%	0.149	0.0666	0.0725	0.192	0.206
Chromium	mg/kg dw	0.0530	<0.050	0.0850	0.194	0.0720	5	20%	0.0908	0.0634	<0.050	0.0720	0.194
Cobalt	mg/kg dw	0.0450	0.0640	0.341	0.518	0.321	5	0%	0.258	0.201	0.0450	0.321	0.518
Copper	mg/kg dw	12.8	11.5	48.8	63.5	58.3	5	0%	39.0	25.1	11.5	48.8	63.5
Iron	mg/kg dw	53.7	81.7	321	375	264	5	0%	219	144	264	264	81.7
Lead	mg/kg dw	<0.020	<0.020	<0.020	<0.020	<0.020	5	100%	<0.020	-	<0.020	<0.020	<0.020
Lithium	mg/kg dw	<0.5	<0.5	<0.5	<0.5	<0.5	5	100%	<0.50	-	<0.50	<0.50	<0.50
Magnesium	mg/kg dw	1,330	1,260	543	645	718	5	0%	899	367	1,260	718	718
Manganese	mg/kg dw	0.799	2.39	7.66	9.72	10.3	5	0%	6.17	4.33	0.799	7.66	9.72
Mercury	mg/kg dw	0.271	0.247	0.243	0.256	0.225	5	0%	0.248	0.0169	0.225	0.247	0.271
	mg/kg ww	0.0955	0.0742	0.0523	0.0529	0.0462	5	0%	0.0642	0.0205	0.0462	0.0529	0.0955
Molybdenum	mg/kg dw	<0.020	0.0200	0.0680	0.0870	0.0890	5	20%	0.0568	0.0321	<0.020	0.0680	0.0890
Nickel	mg/kg dw	<0.20	<0.20	<0.20	<0.20	<0.20	5	100%	<0.20	-	<0.20	<0.20	<0.20
Phosphorus	mg/kg dw	11,200	11,300	8,660	11,300	12,000	5	0%	10,892	1,288	11,200	11,300	8,660
Potassium	mg/kg dw	6,430	6,830	12,800	15,100	15,400	5	0%	11,312	4,393	12,800	12,800	6,830
Rubidium	mg/kg dw	11.9	13.7	33.4	39.8	43.3	5	0%	28.4	14.7	11.9	33.4	43.3
Selenium	mg/kg dw	4.21	4.57	5.91	9.38	8.06	5	0%	6.43	2.24	4.21	5.91	9.38
Silver	mg/kg dw	0.0400	0.0214	0.0487	0.0746	0.0451	5	0%	0.0460	0.0192	0.0214	0.0451	0.0746
Sodium	mg/kg dw	3,320	5,230	9,160	8,060	8,400	5	0%	6,834	2,464	3,320	8,060	9,160
Strontium	mg/kg dw	2.56	1.95	1.44	1.20	1.26	5	0%	1.68	0.573	1.20	1.44	2.56
Tellurium	mg/kg dw	<0.020	<0.020	<0.020	<0.020	<0.020	5	100%	<0.020	-	<0.020	<0.020	<0.020
Thallium	mg/kg dw	0.0202	0.0194	0.0494	0.0995	0.0574	5	0%	0.0492	0.0329	0.0194	0.0494	0.0995
Tin	mg/kg dw	0.110	0.100	0.400	0.580	0.700	5	0%	0.378	0.271	0.100	0.400	0.700
Titanium	mg/kg dw	<0.25	<0.25	<0.25	0.270	<0.25	5	80%	0.254	-	<0.25	0.250	0.270
Uranium	mg/kg dw	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	5	100%	<0.0020	-	<0.0020	<0.0020	<0.0020
Vanadium	mg/kg dw	<0.10	<0.10	<0.10	<0.10	<0.10	5	100%	<0.10	-	<0.10	<0.10	<0.10
Zinc	mg/kg dw	75.4	98.7	183	215	225	5	0%	159	68.4	183	183	98.7
Zirconium	mg/kg dw	<0.20	<0.20	<0.20	<0.20	<0.20	5	100%	<0.20	-	<0.20	<0.20	<0.20

Value exceeds Se Guideline for Aquatic Life, fish ovary tissue (11 mg/kg dw; BCMOE 2014).

Value exceeds Se Threshold for Effects, fish ovary tissue (20 mg/kg dw; DeForest et al 2012).

Notes: "-" = no data available or standard deviation not calculated. mg/kg = milligrams per kilogram. dw = dry weight. ww = wet weight. LRL = laboratory reporting limit.

[a] All summary statistics are reported to three significant digits for display purposes. All summary statistics were calculated using the Kaplan-Meier method.

Table C.7.5: Lake Trout Tissue Chemistry Data for Quesnel Lake near Cedar Point (QUL-NCP; Exposed), October 2022[a]

Analyte	Units	Quesnel Lake near Cedar Point (QUL-NCP)														
		Liver														
		QUL-NCP-LT-1	QUL-NCP-LT-2	QUL-NCP-LT-3	QUL-NCP-LT-4	QUL-NCP-LT-5	QUL-NCP-LT-6	QUL-NCP-LT-7	QUL-NCP-LT-8	n	% < LRL	Mean	Standard Deviation	Minimum	Median	Maximum
Moisture	%	79.7	68.1	80.1	74.8	67.0	76.7	63.6	65.8	8	0%	72	6.59	63.6	71.5	80.1
Aluminum	mg/kg dw	3.30	<2.0	3.60	<2.0	5.60	4.00	<2.0	<2.0	8	50%	3.06	1.02	<2.0	2.65	5.60
Antimony	mg/kg dw	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	8	100%	<0.010	-	<0.010	<0.010	<0.010
Arsenic	mg/kg dw	0.265	0.630	0.452	0.298	0.329	0.485	0.233	0.281	8	0%	0.372	0.137	0.233	0.314	0.630
Barium	mg/kg dw	<0.050	0.0610	0.0580	<0.050	0.136	<0.050	<0.050	<0.050	8	63%	0.0631	0.0442	<0.050	0.0500	0.136
Beryllium	mg/kg dw	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	8	100%	<0.010	-	<0.010	<0.010	<0.010
Bismuth	mg/kg dw	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	8	100%	<0.010	-	<0.010	<0.010	<0.010
Boron	mg/kg dw	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	8	100%	<1.0	-	<1.0	<1.0	<1.0
Cadmium	mg/kg dw	0.519	0.167	0.459	0.179	0.216	0.589	0.126	0.193	8	0%	0.306	0.184	0.126	0.204	0.589
Calcium	mg/kg dw	345	198	448	324	180	212	137	110	8	0%	244	116	110	205	448
Cesium	mg/kg dw	0.296	0.0526	0.195	0.0873	0.0440	0.193	0.0736	0.0589	8	0%	0.125	0.0918	0.0440	0.0804	0.296
Chromium	mg/kg dw	0.280	0.0780	0.325	0.106	0.0970	0.223	0.0530	0.0820	8	0%	0.156	0.105	0.0530	0.102	0.325
Cobalt	mg/kg dw	0.0980	0.0980	0.121	0.117	0.220	0.140	0.207	0.194	8	0%	0.149	0.0500	0.0980	0.130	0.220
Copper	mg/kg dw	12.6	107	17.5	55.2	38.8	131	61.6	38.9	8	0%	57.8	41.7	107	47.0	61.6
Iron	mg/kg dw	354	569	369	409	209	1,010	379	210	8	0%	439	258	1,010	374	569
Lead	mg/kg dw	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	8	100%	<0.020	-	<0.020	<0.020	<0.020
Lithium	mg/kg dw	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	8	100%	<0.50	-	<0.50	<0.50	<0.50
Magnesium	mg/kg dw	1,070	434	981	550	435	597	398	452	8	0%	615	263	1,070	501	981
Manganese	mg/kg dw	6.53	3.41	9.00	4.48	3.48	5.62	3.60	3.53	8	0%	4.96	2.00	3.41	4.04	9.00
Mercury	mg/kg dw	3.08	0.689	2.39	1.05	0.488	2.34	0.661	0.580	8	0%	1.41	1.03	0.488	0.870	3.08
	mg/kg ww	0.624	0.220	0.477	0.265	0.161	0.546	0.241	0.198	8	0%	0.342	0.179	0.161	0.253	0.624
Molybdenum	mg/kg dw	0.336	0.463	0.360	0.550	0.376	0.650	0.382	0.485	8	0%	0.450	0.109	0.336	0.422	0.650
Nickel	mg/kg dw	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	8	100%	<0.20	-	<0.20	<0.20	<0.20
Phosphorus	mg/kg dw	21,400	9,860	20,000	12,300	10,100	13,300	8,880	10,400	8	0%	13,280	4,804	10,100	11,350	9,860
Potassium	mg/kg dw	21,300	8,320	19,200	10,300	8,670	12,300	7,310	8,440	8	0%	11,980	5,353	10,300	9,485	8,670
Rubidium	mg/kg dw	89.8	19.8	62.6	22.8	21.0	35.3	15.4	19.3	8	0%	35.8	26.6	15.4	21.9	89.8
Selenium	mg/kg dw	6.12	6.56	6.33	9.21	5.57	16.2	5.89	6.09	8	0%	7.75	3.60	16.2	6.22	9.21
Silver	mg/kg dw	0.0718	0.791	0.0912	0.331	0.274	1.21	0.347	0.232	8	0%	0.418	0.389	0.0718	0.302	1.21
Sodium	mg/kg dw	5,570	4,740	7,540	6,450	4,370	6,730	3,350	2,900	8	0%	5,206	1,653	2,900	5,155	7,540
Strontium	mg/kg dw	0.366	0.345	0.560	0.624	0.341	0.308	0.261	0.190	8	0%	0.374	0.146	0.190	0.343	0.624
Tellurium	mg/kg dw	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	8	100%	<0.020	-	<0.020	<0.020	<0.020
Thallium	mg/kg dw	0.695	0.234	0.327	0.205	0.116	0.204	0.138	0.151	8	0%	0.259	0.188	0.116	0.204	0.695
Tin	mg/kg dw	0.220	0.270	0.430	0.460	0.290	0.230	0.220	0.210	8	0%	0.291	0.0991	0.210	0.250	0.460
Titanium	mg/kg dw	<0.25	<0.25	<0.25	<0.25	0.480	<0.25	<0.25	<0.25	8	88%	0.279	-	<0.25	0.250	0.480
Uranium	mg/kg dw	<0.0020	<0.0020	0.00200	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	8	88%	0.00200	-	<0.0020	0.00200	0.00200
Vanadium	mg/kg dw	0.100	<0.10	0.350	<0.10	<0.10	0.140	<0.10	<0.10	8	63%	0.136	0.134	<0.10	0.100	0.350
Zinc	mg/kg dw	110	114	106	126	78.8	136	90.9	104	8	0%	108	18.2	104	108	90.9
Zirconium	mg/kg dw	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	8	100%	<0.20	-	<0.20	<0.20	<0.20

Notes: "-" = no data available or standard deviation not calculated. mg/kg = milligrams per kilogram. dw = dry weight. ww = wet weight. LRL = laboratory reporting limit.

[a] All summary statistics are reported to three significant digits for display purposes. All summary statistics were calculated using the Kaplan-Meier method.

Table C.7.5: Lake Trout Tissue Chemistry Data for Quesnel Lake near Cedar Point (QUL-NCP; Exposed), October 2022[a]

Analyte	Units	Quesnel Lake near Cedar Point (QUL-NCP)														
		Kidney														
		QUL-NCP-LT-1	QUL-NCP-LT-2	QUL-NCP-LT-3	QUL-NCP-LT-4	QUL-NCP-LT-5	QUL-NCP-LT-6	QUL-NCP-LT-7	QUL-NCP-LT-8	n	% < LRL	Mean	Standard Deviation	Minimum	Median	Maximum
Moisture	%	84.1	81.0	82.5	84.2	80.4	83.5	79.2	81.1	8	0%	82.0	1.85	79.2	81.8	84.2
Aluminum	mg/kg dw	15.9	13.6	31.2	7.90	14.0	55.6	4.00	4.30	8	0%	18.3	17.4	13.6	13.8	7.90
Antimony	mg/kg dw	<0.010	<0.010	<0.010	<0.010	<0.010	0.0100	<0.010	<0.010	8	88%	0.0100	-	<0.010	0.0100	0.0100
Arsenic	mg/kg dw	0.239	0.339	0.294	0.198	0.381	0.260	0.130	0.185	8	0%	0.253	0.0832	0.130	0.250	0.381
Barium	mg/kg dw	0.195	0.291	0.203	0.171	0.236	0.300	0.231	0.140	8	0%	0.221	0.0555	0.140	0.217	0.300
Beryllium	mg/kg dw	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	8	100%	<0.010	-	<0.010	<0.010	<0.010
Bismuth	mg/kg dw	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	8	100%	<0.010	-	<0.010	<0.010	<0.010
Boron	mg/kg dw	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	8	100%	<1.0	-	<1.0	<1.0	<1.0
Cadmium	mg/kg dw	3.54	0.964	2.10	0.624	1.36	2.22	0.512	1.19	8	0%	1.56	1.01	0.512	1.27	3.54
Calcium	mg/kg dw	830	881	668	799	561	655	442	515	8	0%	669	158	442	662	881
Cesium	mg/kg dw	0.246	0.142	0.142	0.164	0.141	0.175	0.164	0.156	8	0%	0.166	0.0346	0.141	0.160	0.246
Chromium	mg/kg dw	1.16	0.363	0.966	0.490	0.371	0.620	0.135	0.247	8	0%	0.544	0.355	0.135	0.430	1.16
Cobalt	mg/kg dw	0.217	0.739	0.202	0.309	0.349	0.447	0.358	0.558	8	0%	0.397	0.180	0.202	0.354	0.739
Copper	mg/kg dw	3.56	5.34	3.75	4.65	5.13	4.89	3.00	3.86	8	0%	4.27	0.843	3.00	4.26	5.34
Iron	mg/kg dw	718	787	1,000	829	537	1,380	693	550	8	0%	812	274	1,000	752	829
Lead	mg/kg dw	0.0320	0.0430	0.0220	0.0240	0.0310	0.0270	<0.020	<0.020	8	25%	0.0274	0.00752	<0.020	0.0255	0.0430
Lithium	mg/kg dw	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	8	100%	<0.50	-	<0.50	<0.50	<0.50
Magnesium	mg/kg dw	719	679	648	744	556	745	611	762	8	0%	683	73.3	556	699	762
Manganese	mg/kg dw	1.39	2.40	1.75	1.91	1.68	1.70	1.19	1.96	8	0%	1.75	0.367	1.19	1.72	2.40
Mercury	mg/kg dw	7.89	1.95	6.27	1.58	1.72	5.39	1.94	1.75	8	0%	3.56	2.54	1.58	1.94	7.89
	mg/kg ww	1.26	0.369	1.10	0.249	0.338	0.889	0.403	0.330	8	0%	0.617	0.401	0.249	0.386	1.26
Molybdenum	mg/kg dw	0.276	0.203	0.171	0.158	0.252	0.223	0.129	0.216	8	0%	0.204	0.0490	0.129	0.210	0.276
Nickel	mg/kg dw	0.700	0.360	0.510	0.420	0.250	0.640	<0.20	0.240	8	13%	0.415	0.180	<0.20	0.390	0.700
Phosphorus	mg/kg dw	15,100	14,800	12,800	14,600	14,800	14,100	12,500	16,100	8	0%	14,350	1,194	12,500	14,700	16,100
Potassium	mg/kg dw	14,200	14,200	12,600	15,100	14,900	13,500	12,200	15,000	8	0%	13,962	1,104	12,200	14,200	15,100
Rubidium	mg/kg dw	36.9	34.9	28.5	33.0	35.3	27.1	28.0	37.4	8	0%	32.6	4.18	27.1	34.0	37.4
Selenium	mg/kg dw	13.1	7.07	10.6	7.63	7.71	14.1	5.36	7.13	8	0%	9.09	3.15	10.6	7.67	7.71
Silver	mg/kg dw	0.0179	0.00740	0.0307	0.00720	0.00510	0.0141	<0.0050	0.00520	8	13%	0.0116	0.00936	<0.0050	0.00730	0.0307
Sodium	mg/kg dw	14,900	11,200	13,100	13,700	9,380	13,700	11,000	10,600	8	0%	12,198	1,911	10,600	12,150	9,380
Strontium	mg/kg dw	1.90	1.55	1.26	2.15	1.08	1.91	1.01	0.994	8	0%	1.48	0.460	0.994	1.40	2.15
Tellurium	mg/kg dw	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	8	100%	<0.020	-	<0.020	<0.020	<0.020
Thallium	mg/kg dw	0.120	0.136	0.0866	0.0833	0.149	0.0967	0.0792	0.110	8	0%	0.108	0.0257	0.0792	0.103	0.149
Tin	mg/kg dw	1.30	0.920	0.220	1.02	1.95	0.260	0.320	1.67	8	0%	0.958	0.660	0.220	0.970	1.95
Titanium	mg/kg dw	0.840	0.920	1.64	0.490	0.830	2.47	0.340	<0.25	8	13%	0.972	0.740	<0.25	0.835	2.47
Uranium	mg/kg dw	0.0105	<0.0020	0.0124	0.00210	0.00210	0.00800	<0.0020	<0.0020	8	38%	0.00514	0.00475	<0.0020	0.00210	0.0124
Vanadium	mg/kg dw	0.220	<0.10	0.500	<0.10	<0.10	0.200	<0.10	<0.10	8	63%	0.178	0.168	<0.10	0.100	0.500
Zinc	mg/kg dw	98.4	102	81.4	111	110	114	94.5	110	8	0%	103	11.0	102	106	98.4
Zirconium	mg/kg dw	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	8	100%	<0.20	-	<0.20	<0.20	<0.20

Notes: "-" = no data available or standard deviation not calculated. mg/kg = milligrams per kilogram. dw = dry weight. ww = wet weight. LRL = laboratory reporting limit.

[a] All summary statistics are reported to three significant digits for display purposes. All summary statistics were calculated using the Kaplan-Meier method.

Table C.7.6: Lake Trout Tissue Chemistry Data for Quesnel Lake East Arm (QUL-EAA; Reference), October 2022[a]

Analyte	Units	Quesnel Lake East Arm (QUL-EAA)														
		Muscle														
		QUL-EAA-LT-1	QUL-EAA-LT-2	QUL-EAA-LT-3	QUL-EAA-LT-4	QUL-EAA-LT-5	QUL-EAA-LT-6	QUL-EAA-LT-7	QUL-EAA-LT-8	n	% < LRL	Mean	Standard Deviation	Minimum	Median	Maximum
Moisture	%	70.9	76.1	74.5	72.2	76.1	76.5	72.4	79.5	8	0%	74.8	2.83	70.9	75.3	79.5
Aluminum	mg/kg dw	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	8	100%	<2.0	-	<2.0	<2.0	<2.0
Antimony	mg/kg dw	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	8	100%	<0.010	-	<0.010	<0.010	<0.010
Arsenic	mg/kg dw	0.121	0.0930	0.225	0.168	0.0630	0.297	0.155	0.286	8	0%	0.176	0.0865	0.0630	0.162	0.297
Barium	mg/kg dw	<0.050	<0.050	<0.050	<0.050	<0.050	0.0870	<0.050	<0.050	8	88%	0.0546	-	<0.050	0.0500	0.0870
Beryllium	mg/kg dw	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	8	100%	<0.010	-	<0.010	<0.010	<0.010
Bismuth	mg/kg dw	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	8	100%	<0.010	-	<0.010	<0.010	<0.010
Boron	mg/kg dw	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	8	100%	<1.0	-	<1.0	<1.0	<1.0
Cadmium	mg/kg dw	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	8	100%	<0.0050	-	<0.0050	<0.0050	<0.0050
Calcium	mg/kg dw	371	478	544	462	196	1,390	313	263	8	0%	502	377	1,390	416	544
Cesium	mg/kg dw	0.295	0.283	0.317	0.289	0.276	0.273	0.249	0.264	8	0%	0.281	0.0206	0.249	0.280	0.317
Chromium	mg/kg dw	<0.050	<0.050	<0.050	0.0580	0.0730	0.0710	<0.050	<0.050	8	63%	0.0565	0.00814	<0.050	0.0500	0.0730
Cobalt	mg/kg dw	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	8	100%	<0.020	-	<0.020	<0.020	<0.020
Copper	mg/kg dw	0.870	0.970	0.860	1.13	1.18	2.62	0.880	0.680	8	0%	1.15	0.615	0.680	0.925	2.62
Iron	mg/kg dw	13.7	11.0	9.30	16.5	14.9	43.8	9.00	21.9	8	0%	17.5	11.4	11.0	14.3	9.30
Lead	mg/kg dw	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	8	100%	<0.020	-	<0.020	<0.020	<0.020
Lithium	mg/kg dw	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	8	100%	<0.50	-	<0.50	<0.50	<0.50
Magnesium	mg/kg dw	957	1,080	1,120	902	1,080	1,030	1,000	1,160	8	0%	1,041	85.9	1,000	1,055	957
Manganese	mg/kg dw	0.266	0.219	0.316	0.311	0.216	0.256	0.225	0.152	8	0%	0.245	0.0541	0.152	0.240	0.316
Mercury	mg/kg dw	1.66	2.62	1.29	1.24	2.05	2.12	1.04	4.35	8	0%	2.05	1.07	1.04	1.86	4.35
	mg/kg ww	0.483	0.628	0.329	0.346	0.490	0.498	0.289	0.893	8	0%	0.494	0.196	0.289	0.486	0.893
Molybdenum	mg/kg dw	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	8	100%	<0.020	-	<0.020	<0.020	<0.020
Nickel	mg/kg dw	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	8	100%	<0.20	-	<0.20	<0.20	<0.20
Phosphorus	mg/kg dw	8,620	9,110	9,350	8,130	9,840	9,980	8,350	11,500	8	0%	9,360	1,091	11,500	9,230	9,980
Potassium	mg/kg dw	16,000	16,600	17,300	14,900	18,100	16,900	15,400	20,100	8	0%	16,913	1,647	14,900	16,750	20,100
Rubidium	mg/kg dw	32.1	30.2	33.8	35.0	31.9	32.5	30.9	25.7	8	0%	31.5	2.80	25.7	32.0	35.0
Selenium	mg/kg dw	1.47	2.04	1.76	1.37	1.81	2.33	1.48	2.97	8	0%	1.90	0.537	1.37	1.78	2.97
Silver	mg/kg dw	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	8	100%	<0.0050	-	<0.0050	<0.0050	<0.0050
Sodium	mg/kg dw	941	1,010	962	1,090	1,220	1,570	826	2,140	8	0%	1,220	436	1,010	1,050	962
Strontium	mg/kg dw	0.254	0.526	0.550	0.448	0.115	1.68	0.196	0.148	8	0%	0.490	0.510	0.115	0.351	1.68
Tellurium	mg/kg dw	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	8	100%	<0.020	-	<0.020	<0.020	<0.020
Thallium	mg/kg dw	0.0233	0.0229	0.0203	0.0288	0.0221	0.0275	0.0235	0.0263	8	0%	0.0243	0.00290	0.0203	0.0234	0.0288
Tin	mg/kg dw	0.110	0.170	0.180	0.160	0.310	0.180	0.170	0.370	8	0%	0.206	0.0870	0.110	0.175	0.370
Titanium	mg/kg dw	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	8	100%	<0.25	-	<0.25	<0.25	<0.25
Uranium	mg/kg dw	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	8	100%	<0.0020	-	<0.0020	<0.0020	<0.0020
Vanadium	mg/kg dw	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	8	100%	<0.10	-	<0.10	<0.10	<0.10
Zinc	mg/kg dw	9.30	12.2	10.6	9.88	11.3	17.9	9.17	17.7	8	0%	12.3	3.57	10.6	11.0	9.88
Zirconium	mg/kg dw	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	8	100%	<0.20	-	<0.20	<0.20	<0.20

Value exceeds Se Guideline for Aquatic Life, fish muscle or whole body tissue (4 mg/kg dw; BCMOE 2014).
Value exceeds Se Guideline for Human Health, general population, high consumption (7.3 mg/kg dw; BCMOE 2014).
Value exceeds Se Guideline for Human Health, general population, moderate consumption (14.5 mg/kg dw; BCMOE 2014).
Value exceeds Hg Guideline for Human Health (0.5 mg/kg ww; CFIA 2015).

Notes: "-" = no data available or standard deviation not calculated. mg/kg = milligrams per kilogram. dw = dry weight. ww = wet weight. LRL = laboratory reporting limit.

[a] All summary statistics are reported to three significant digits for display purposes. All summary statistics were calculated using the Kaplan-Meier method.

Table C.7.6: Lake Trout Tissue Chemistry Data for Quesnel Lake East Arm (QUL-EAA; Reference), October 2022[a]

Analyte	Units	Quesnel Lake East Arm (QUL-EAA)						
		Ovary						
		QUL-EAA-LT-4	% < LRL	Mean	Standard Deviation	Minimum	Median	Maximum
Moisture	%	87.2		87.2	-	87.2	87.2	87.2
Aluminum	mg/kg dw	<2.0	100%	<2.0	-	<2.0	<2.0	<2.0
Antimony	mg/kg dw	<0.010	100%	<0.010	-	<0.010	<0.010	<0.010
Arsenic	mg/kg dw	0.0920	0%	0.0920	-	0.0920	0.0920	0.0920
Barium	mg/kg dw	0.104	0%	0.104	-	0.104	0.104	0.104
Beryllium	mg/kg dw	<0.010	100%	<0.010	-	<0.010	<0.010	<0.010
Bismuth	mg/kg dw	<0.010	100%	<0.010	-	<0.010	<0.010	<0.010
Boron	mg/kg dw	<1.0	100%	<1.0	-	<1.0	<1.0	<1.0
Cadmium	mg/kg dw	0.0132	0%	0.0132	-	0.0132	0.0132	0.0132
Calcium	mg/kg dw	1,130	0%	1,130	-	1,130	1,130	1,130
Cesium	mg/kg dw	0.381	0%	0.381	-	0.381	0.381	0.381
Chromium	mg/kg dw	0.0840	0%	0.0840	-	0.0840	0.0840	0.0840
Cobalt	mg/kg dw	0.0960	0%	0.0960	-	0.0960	0.0960	0.0960
Copper	mg/kg dw	9.22	0%	9.22	-	9.22	9.22	9.22
Iron	mg/kg dw	276	0%	276	-	276	276	276
Lead	mg/kg dw	<0.020	100%	<0.020	-	<0.020	<0.020	<0.020
Lithium	mg/kg dw	<0.5	100%	<0.50	-	<0.50	<0.50	<0.50
Magnesium	mg/kg dw	835	0%	835	-	835	835	835
Manganese	mg/kg dw	5.04	0%	5.04	-	5.04	5.04	5.04
Mercury	mg/kg dw	1.44	0%	1.44	-	1.44	1.44	1.44
	mg/kg ww	0.184	0%	0.184	-	0.184	0.184	0.184
Molybdenum	mg/kg dw	0.0830	0%	0.0830	-	0.0830	0.0830	0.0830
Nickel	mg/kg dw	<0.20	100%	<0.20	-	<0.20	<0.20	<0.20
Phosphorus	mg/kg dw	12,500	0%	12,500	-	12,500	12,500	12,500
Potassium	mg/kg dw	15,300	0%	15,300	-	15,300	15,300	15,300
Rubidium	mg/kg dw	47.1	0%	47.1	-	47.1	47.1	47.1
Selenium	mg/kg dw	4.16	0%	4.16	-	4.16	4.16	4.16
Silver	mg/kg dw	0.0156	0%	0.0156	-	0.0156	0.0156	0.0156
Sodium	mg/kg dw	16,300	0%	16,300	-	16,300	16,300	16,300
Strontium	mg/kg dw	1.36	0%	1.36	-	1.36	1.36	1.36
Tellurium	mg/kg dw	<0.020	100%	<0.020	-	<0.020	<0.020	<0.020
Thallium	mg/kg dw	0.0966	0%	0.0966	-	0.0966	0.0966	0.0966
Tin	mg/kg dw	0.320	0%	0.320	-	0.320	0.320	0.320
Titanium	mg/kg dw	<0.25	100%	<0.25	-	<0.25	<0.25	<0.25
Uranium	mg/kg dw	<0.0020	100%	<0.0020	-	<0.0020	<0.0020	<0.0020
Vanadium	mg/kg dw	<0.10	100%	<0.10	-	<0.10	<0.10	<0.10
Zinc	mg/kg dw	152	0%	152	-	152	152	152
Zirconium	mg/kg dw	<0.20	100%	<0.20	-	<0.20	<0.20	<0.20

Value exceeds Se Guideline for Aquatic Life, fish ovary tissue (11 mg/kg dw; BCMOE 2014).
Value exceeds Se Threshold for Effects, fish ovary tissue (20 mg/kg dw; DeForest et al 2012).

Notes: "-" = no data available or standard deviation not calculated. mg/kg = milligrams per kilogram. dw = dry weight. ww = wet weight. LRL = laboratory reporting limit.

[a] All summary statistics are reported to three significant digits for display purposes. All summary statistics were calculated using the Kaplan-Meier method.

Table C.7.6: Lake Trout Tissue Chemistry Data for Quesnel Lake East Arm (QUL-EAA; Reference), October 2022[a]

Analyte	Units	Quesnel Lake East Arm (QUL-EAA)														
		Liver														
		QUL-EAA-LT-1	QUL-EAA-LT-2	QUL-EAA-LT-3	QUL-EAA-LT-4	QUL-EAA-LT-5	QUL-EAA-LT-6	QUL-EAA-LT-7	QUL-EAA-LT-8	n	% < LRL	Mean	Standard Deviation	Minimum	Median	Maximum
Moisture	%	70.7	74.3	71.6	80.2	68.2	79.9	63.4	75.4	8	0%	73	5.72	63.4	73	80.2
Aluminum	mg/kg dw	<2.0	<2.0	<2.0	<2.0	<2.0	3.60	<2.0	2.40	8	75%	2.25	0.849	<2.0	2.00	3.60
Antimony	mg/kg dw	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	8	100%	<0.010	-	<0.010	<0.010	<0.010
Arsenic	mg/kg dw	0.384	0.387	0.955	0.360	0.352	0.663	0.242	0.220	8	0%	0.445	0.246	0.220	0.372	0.955
Barium	mg/kg dw	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	8	100%	<0.050	-	<0.050	<0.050	<0.050
Beryllium	mg/kg dw	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	8	100%	<0.010	-	<0.010	<0.010	<0.010
Bismuth	mg/kg dw	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	8	100%	<0.010	-	<0.010	<0.010	<0.010
Boron	mg/kg dw	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	8	100%	<1.0	-	<1.0	<1.0	<1.0
Cadmium	mg/kg dw	0.219	0.245	0.168	0.251	0.146	0.438	0.0920	0.223	8	0%	0.223	0.103	0.0920	0.221	0.438
Calcium	mg/kg dw	213	381	257	537	217	506	182	1,130	8	0%	428	315	1,130	319	537
Cesium	mg/kg dw	0.120	0.100	0.118	0.203	0.0866	0.148	0.0819	0.0663	8	0%	0.115	0.0437	0.0663	0.109	0.203
Chromium	mg/kg dw	0.165	0.266	0.119	0.291	0.127	0.429	0.0750	0.316	8	0%	0.224	0.121	0.0750	0.216	0.429
Cobalt	mg/kg dw	0.165	0.158	0.130	0.132	0.124	0.134	0.0850	0.234	8	0%	0.145	0.0432	0.0850	0.133	0.234
Copper	mg/kg dw	244	223	151	144	80.2	93.9	132	46.5	8	0%	139	68	132	138	93.9
Iron	mg/kg dw	947	978	760	609	860	1,860	312	2,270	8	0%	1,074	656	1,860	904	978
Lead	mg/kg dw	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	8	100%	<0.020	-	<0.020	<0.020	<0.020
Lithium	mg/kg dw	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	8	100%	<0.50	-	<0.50	<0.50	<0.50
Magnesium	mg/kg dw	483	491	562	795	403	581	350	511	8	0%	522	134	350	501	795
Manganese	mg/kg dw	4.41	3.48	5.84	3.51	3.84	4.55	3.27	2.82	8	0%	3.96	0.949	2.82	3.68	5.84
Mercury	mg/kg dw	3.07	3.55	1.56	3.37	2.22	4.90	0.928	6.35	8	0%	3.24	1.76	0.928	3.22	6.35
	mg/kg ww	0.898	0.912	0.444	0.668	0.707	0.984	0.339	1.56	8	0%	0.814	0.377	0.339	0.802	1.56
Molybdenum	mg/kg dw	0.423	0.570	0.403	0.276	0.472	0.568	0.297	0.665	8	0%	0.459	0.137	0.276	0.448	0.665
Nickel	mg/kg dw	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	8	100%	<0.20	-	<0.20	<0.20	<0.20
Phosphorus	mg/kg dw	10,100	9,570	12,900	14,600	8,360	11,600	7,250	10,100	8	0%	10,560	2,393	10,100	10,100	9,570
Potassium	mg/kg dw	7,540	7,470	7,750	12,100	6,150	8,770	5,310	9,250	8	0%	8,042	2,076	12,100	7,645	9,250
Rubidium	mg/kg dw	18.3	15.3	18.4	30.8	13.1	20.5	13.8	14.5	8	0%	18.1	5.75	13.1	16.8	30.8
Selenium	mg/kg dw	14.7	7.56	9.16	6.12	5.70	11.8	5.36	13.6	8	0%	9.25	3.69	11.8	8.36	9.16
Silver	mg/kg dw	1.43	1.16	1.33	1.36	0.504	0.950	0.749	0.373	8	0%	0.982	0.406	0.373	1.06	1.43
Sodium	mg/kg dw	5,370	7,900	5,750	9,480	4,910	9,000	3,700	5,990	8	0%	6,512	2,055	3,700	5,870	9,480
Strontium	mg/kg dw	0.346	0.710	0.441	0.774	0.362	0.985	0.328	1.59	8	0%	0.692	0.435	0.328	0.576	1.59
Tellurium	mg/kg dw	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	8	100%	<0.020	-	<0.020	<0.020	<0.020
Thallium	mg/kg dw	0.307	0.168	0.316	0.401	0.212	0.326	0.187	0.102	8	0%	0.252	0.100	0.102	0.260	0.401
Tin	mg/kg dw	0.310	0.240	0.570	0.670	0.130	0.190	0.160	0.160	8	0%	0.304	0.205	0.130	0.215	0.670
Titanium	mg/kg dw	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	8	100%	<0.25	-	<0.25	<0.25	<0.25
Uranium	mg/kg dw	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	8	100%	<0.0020	-	<0.0020	<0.0020	<0.0020
Vanadium	mg/kg dw	<0.10	<0.10	<0.10	<0.10	<0.10	0.120	<0.10	0.140	8	75%	0.108	0.0141	<0.10	0.100	0.140
Zinc	mg/kg dw	160	148	145	157	106	152	108	106	8	0%	135	24.1	106	146	160
Zirconium	mg/kg dw	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	8	100%	<0.20	-	<0.20	<0.20	<0.20

Notes: "-" = no data available or standard deviation not calculated. mg/kg = milligrams per kilogram. dw = dry weight. ww = wet weight. LRL = laboratory reporting limit.
[a] All summary statistics are reported to three significant digits for display purposes. All summary statistics were calculated using the Kaplan-Meier method.

Table C.7.6: Lake Trout Tissue Chemistry Data for Quesnel Lake East Arm (QUL-EAA; Reference), October 2022[a]

Analyte	Units	Quesnel Lake East Arm (QUL-EAA)														
		Kidney														
		QUL-EAA-LT-1	QUL-EAA-LT-2	QUL-EAA-LT-3	QUL-EAA-LT-4	QUL-EAA-LT-5	QUL-EAA-LT-6	QUL-EAA-LT-7	QUL-EAA-LT-8	n	% < LRL	Mean	Standard Deviation	Minimum	Median	Maximum
Moisture	%	77.0	67.0	77.1	71.5	69.6	82.2	78.3	83.8	8	0%	75.8	5.96	67.0	77.0	83.8
Aluminum	mg/kg dw	6.60	3.10	6.50	3.70	3.70	12.5	3.50	16.4	8	0%	7.00	4.90	12.5	5.10	6.60
Antimony	mg/kg dw	<0.010	<0.010	<0.010	<0.010	<0.010	0.0140	<0.010	0.0140	8	75%	0.0110	0	<0.010	0.0100	0.0140
Arsenic	mg/kg dw	0.250	0.214	0.370	0.168	0.181	0.207	0.124	0.217	8	0%	0.216	0.0727	0.124	0.210	0.370
Barium	mg/kg dw	0.100	0.0540	0.127	0.0690	0.0760	0.144	0.0960	0.112	8	0%	0.0972	0.0303	0.0540	0.0980	0.144
Beryllium	mg/kg dw	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	8	100%	<0.010	-	<0.010	<0.010	<0.010
Bismuth	mg/kg dw	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	8	100%	<0.010	-	<0.010	<0.010	<0.010
Boron	mg/kg dw	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	8	100%	<1.0	-	<1.0	<1.0	<1.0
Cadmium	mg/kg dw	0.706	0.346	0.685	0.398	0.424	1.56	0.605	1.59	8	0%	0.789	0.503	0.346	0.645	1.59
Calcium	mg/kg dw	484	259	457	417	292	787	315	1,090	8	0%	513	286	1,090	437	787
Cesium	mg/kg dw	0.209	0.0764	0.198	0.137	0.111	0.208	0.206	0.139	8	0%	0.161	0.0516	0.0764	0.168	0.209
Chromium	mg/kg dw	0.240	0.175	0.174	0.193	0.205	0.739	0.147	1.25	8	0%	0.390	0.398	0.147	0.199	1.25
Cobalt	mg/kg dw	0.385	0.155	0.529	0.0740	0.267	0.370	0.553	0.394	8	0%	0.341	0.168	0.0740	0.378	0.553
Copper	mg/kg dw	3.07	1.44	3.26	4.56	2.05	3.94	3.26	3.92	8	0%	3.19	1.03	1.44	3.26	4.56
Iron	mg/kg dw	994	722	542	513	751	1,230	611	2,650	8	0%	1,002	708	1,230	736	994
Lead	mg/kg dw	<0.020	<0.020	<0.020	<0.020	<0.020	0.0430	<0.020	0.0250	8	75%	0.0235	0.0127	<0.020	0.0200	0.0430
Lithium	mg/kg dw	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	8	100%	<0.50	-	<0.50	<0.50	<0.50
Magnesium	mg/kg dw	516	272	561	469	389	703	649	728	8	0%	536	158	272	538	728
Manganese	mg/kg dw	0.772	0.412	1.03	0.906	0.584	0.946	1.20	1.41	8	0%	0.908	0.321	0.412	0.926	1.41
Mercury	mg/kg dw	4.26	2.65	1.77	2.45	2.31	5.23	1.78	10.9	8	0%	3.92	3.07	1.77	2.55	5.23
	mg/kg ww	0.980	0.874	0.405	0.698	0.703	0.928	0.385	1.76	8	0%	0.842	0.433	0.385	0.788	1.76
Molybdenum	mg/kg dw	0.202	0.0830	0.157	0.0970	0.115	0.214	0.208	0.464	8	0%	0.192	0.121	0.0830	0.180	0.464
Nickel	mg/kg dw	0.410	<0.20	0.250	<0.20	<0.20	0.680	0.230	0.670	8	38%	0.355	0.219	<0.20	0.240	0.680
Phosphorus	mg/kg dw	8,690	4,990	10,100	6,970	6,970	12,100	11,700	11,500	8	0%	9,128	2,636	10,100	9,395	8,690
Potassium	mg/kg dw	8,560	5,310	9,270	6,390	7,080	12,300	11,500	12,100	8	0%	9,064	2,702	11,500	8,915	9,270
Rubidium	mg/kg dw	26.5	12.3	23.9	18.3	16.7	29.6	32.0	17.5	8	0%	22.1	6.95	12.3	21.1	32.0
Selenium	mg/kg dw	10.4	4.05	7.13	3.95	5.78	14.1	5.40	21.8	8	0%	9.08	6.19	10.4	6.46	7.13
Silver	mg/kg dw	<0.0050	<0.0050	<0.0050	0.0164	<0.0050	0.00860	<0.0050	0.0127	8	63%	0.00784	0.00390	<0.0050	0.00500	0.0164
Sodium	mg/kg dw	9,660	5,330	9,440	7,120	6,770	11,100	9,500	14,500	8	0%	9,178	2,860	11,100	9,470	9,660
Strontium	mg/kg dw	1.80	0.745	1.51	1.13	1.15	1.90	0.844	4.06	8	0%	1.64	1.06	0.745	1.33	4.06
Tellurium	mg/kg dw	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	8	100%	<0.020	-	<0.020	<0.020	<0.020
Thallium	mg/kg dw	0.101	0.0341	0.0803	0.0617	0.0572	0.106	0.0925	0.0965	8	0%	0.0787	0.0253	0.0341	0.0864	0.106
Tin	mg/kg dw	0.230	<0.10	0.470	0.330	0.130	0.620	0.730	0.230	8	13%	0.355	0.223	<0.10	0.280	0.730
Titanium	mg/kg dw	<0.25	<0.25	0.460	0.380	<0.25	0.500	0.280	0.390	8	38%	0.345	0.0844	<0.25	0.330	0.500
Uranium	mg/kg dw	0.00210	<0.0020	<0.0020	<0.0020	<0.0020	0.00330	<0.0020	0.0103	8	63%	0.00321	0.00443	<0.0020	0.00200	0.0103
Vanadium	mg/kg dw	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.170	8	88%	0.109	-	<0.10	0.100	0.170
Zinc	mg/kg dw	93.7	42.4	84.2	48.2	58.6	119	88.7	101	8	0%	79.5	27.1	101	86.5	93.7
Zirconium	mg/kg dw	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	8	100%	<0.20	-	<0.20	<0.20	<0.20

Notes: "-" = no data available or standard deviation not calculated. mg/kg = milligrams per kilogram. dw = dry weight. ww = wet weight. LRL = laboratory reporting limit.

[a] All summary statistics are reported to three significant digits for display purposes. All summary statistics were calculated using the Kaplan-Meier method.

Table C.7.7: Northern Pikeminnow Tissue Chemistry Data for Quesnel Lake near Hazeltine Creek (QUL-NHC; Exposed), October 2022[a]

Analyte	Units	Quesnel Lake near Hazeltine Creek (QUL-NHC)														
		Wholebody														
		QUL-NHC-NSC-1	QUL-NHC-NSC-2	QUL-NHC-NSC-3	QUL-NHC-NSC-4	QUL-NHC-NSC-5	QUL-NHC-NSC-6	QUL-NHC-NSC-7	QUL-NHC-NSC-8	n	% < LRL	Mean	Standard Deviation	Minimum	Median	Maximum
Moisture	%	72.8	69.6	75.3	71.3	70.0	74.6	77.0	74.0	8	0%	73.1	2.63	69.6	73.4	77.0
Aluminum	mg/kg dw	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	333	<2.0	8	88%	43.4	-	<2.0	2.00	333
Antimony	mg/kg dw	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	8	100%	<0.010	-	<0.010	<0.010	<0.010
Arsenic	mg/kg dw	0.108	0.130	0.0500	0.246	0.187	0.0820	0.358	0.0820	8	0%	0.155	0.104	0.0500	0.119	0.358
Barium	mg/kg dw	0.610	1.15	1.44	1.03	0.646	0.918	4.30	0.905	8	0%	1.37	1.21	0.610	0.974	4.30
Beryllium	mg/kg dw	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	8	100%	<0.010	-	<0.010	<0.010	<0.010
Bismuth	mg/kg dw	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	8	100%	<0.010	-	<0.010	<0.010	<0.010
Boron	mg/kg dw	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	8	100%	<1.0	-	<1.0	<1.0	<1.0
Cadmium	mg/kg dw	0.0487	0.0940	0.0545	0.0583	0.0388	0.0321	0.200	0.0307	8	0%	0.0696	0.0564	0.0307	0.0516	0.200
Calcium	mg/kg dw	13,700	15,400	41,800	22,400	18,400	20,600	25,200	20,800	8	0%	22,288	8,706	13,700	20,700	41,800
Cesium	mg/kg dw	0.0866	0.0770	0.103	0.0366	0.0806	0.0668	0.102	0.0761	8	0%	0.0786	0.0211	0.0366	0.0788	0.103
Chromium	mg/kg dw	<0.050	<0.050	<0.050	<0.050	0.0640	0.0590	0.714	0.0520	8	50%	0.136	0.328	<0.050	0.0510	0.714
Cobalt	mg/kg dw	0.0380	0.0240	0.0490	<0.020	<0.020	0.0370	0.474	0.0220	8	25%	0.0855	0.180	<0.020	0.0305	0.474
Copper	mg/kg dw	2.19	2.14	2.47	2.34	1.90	2.03	7.11	2.42	8	0%	2.82	1.74	1.90	2.26	7.11
Iron	mg/kg dw	29.2	19.4	20.7	27.1	17.3	37.4	567	20.8	8	0%	92.4	192	17.3	24.0	567
Lead	mg/kg dw	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.164	<0.020	8	88%	0.0380	-	<0.020	0.0200	0.164
Lithium	mg/kg dw	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	8	100%	<0.50	-	<0.50	<0.50	<0.50
Magnesium	mg/kg dw	1,650	1,290	2,050	1,340	1,310	1,400	1,800	1,390	8	0%	1,529	277	1,290	1,395	2,050
Manganese	mg/kg dw	3.30	3.51	7.39	4.04	3.98	7.95	24.6	4.26	8	0%	7.38	7.18	24.6	4.15	7.95
Mercury	mg/kg dw	0.509	0.282	0.398	0.376	0.308	0.272	0.423	0.352	8	0%	0.365	0.0795	0.272	0.364	0.509
	mg/kg ww	0.138	0.0856	0.0980	0.108	0.0927	0.0691	0.0972	0.0915	8	0%	0.0975	0.0198	0.0691	0.0950	0.138
Molybdenum	mg/kg dw	0.0280	<0.020	0.0340	0.0240	<0.020	0.0250	0.0810	<0.020	8	38%	0.0315	0.0241	<0.020	0.0245	0.0810
Nickel	mg/kg dw	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	0.810	<0.20	8	88%	0.276	-	<0.20	0.200	0.810
Phosphorus	mg/kg dw	17,500	16,800	35,200	21,600	18,600	20,900	23,600	19,600	8	0%	21,725	5,882	16,800	20,250	35,200
Potassium	mg/kg dw	14,100	13,800	15,700	14,800	12,600	15,300	14,500	11,900	8	0%	14,088	1,300	11,900	14,300	15,700
Rubidium	mg/kg dw	29.2	18.0	27.7	16.3	26.7	22.4	21.1	20.6	8	0%	22.8	4.68	16.3	21.8	29.2
Selenium	mg/kg dw	3.30	5.37	3.38	5.99	2.37	3.05	3.09	2.41	8	0%	3.62	1.33	2.37	3.20	5.99
Silver	mg/kg dw	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0114	<0.0050	8	88%	0.00580	-	<0.0050	0.00500	0.0114
Sodium	mg/kg dw	2,060	1,980	2,310	2,190	1,770	1,970	2,070	1,480	8	0%	1,979	257	1,480	2,020	2,310
Strontium	mg/kg dw	18.8	21.5	51.9	24.7	25.6	25.6	50.1	31.1	8	0%	31.2	12.8	18.8	25.6	51.9
Tellurium	mg/kg dw	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	8	100%	<0.020	-	<0.020	<0.020	<0.020
Thallium	mg/kg dw	0.00440	0.00400	0.0126	0.00480	0.00580	0.00310	0.0199	0.00640	8	0%	0.00762	0.00576	0.00310	0.00530	0.0199
Tin	mg/kg dw	0.230	0.130	0.310	0.330	0.220	0.340	0.350	0.460	8	0%	0.296	0.101	0.130	0.320	0.460
Titanium	mg/kg dw	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	17.6	<0.25	8	88%	2.42	-	<0.25	0.250	17.6
Uranium	mg/kg dw	0.00230	<0.0020	0.00320	<0.0020	<0.0020	0.00520	0.0321	0.00460	8	38%	0.00668	0.0127	<0.0020	0.00275	0.0321
Vanadium	mg/kg dw	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	1.12	<0.10	8	88%	0.228	-	<0.10	0.100	1.12
Zinc	mg/kg dw	70.2	82.9	98.2	80.3	72.2	70.7	97.7	96.4	8	0%	83.6	12.3	70.2	81.6	98.2
Zirconium	mg/kg dw	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	0.210	<0.20	8	88%	0.201	-	<0.20	0.200	0.210

Value exceeds Se Guideline for Aquatic Life, fish muscle or whole body tissue (4 mg/kg dw; BCMOE 2014).
Value exceeds Se Guideline for Human Health, general population, high consumption (7.3 mg/kg dw; BCMOE 2014).
Value exceeds Se Guideline for Human Health, general population, moderate consumption (14.5 mg/kg dw; BCMOE 2014).
Value exceeds Hg Guideline for Human Health (0.5 mg/kg ww; CFIA 2015).

Notes: "-" = no data available or standard deviation not calculated. mg/kg = milligrams per kilogram. dw = dry weight. ww = wet weight. LRL = laboratory reporting limit.

[a] All summary statistics are reported to three significant digits for display purposes. All summary statistics were calculated using the Kaplan-Meier method.

Table C.7.8: Northern Pikeminnow Tissue Chemistry Data for Quesnel Lake near Grain Creek (QUL-NGC; Reference), October 2022[a]

Analyte	Units	Quesnel Lake near Grain Creek (QUL-NGC)														
		Wholebody														
		QUL-NGC-NSC-1	QUL-NGC-NSC-2	QUL-NGC-NSC-3	QUL-NGC-NSC-4	QUL-NGC-NSC-5	QUL-NGC-NSC-6	QUL-NGC-NSC-7	QUL-NGC-NSC-8	n	% < LRL	Mean	Standard Deviation	Minimum	Median	Maximum
Moisture	%	68.3	70.1	73.0	77.3	73.1	74.3	74.2	74.7	8	0%	73.1	2.80	68.3	73.7	77.3
Aluminum	mg/kg dw	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	2.60	8	88%	2.08	-	<2.0	2.00	2.60
Antimony	mg/kg dw	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	8	100%	<0.010	-	<0.010	<0.010	<0.010
Arsenic	mg/kg dw	0.0360	0.0430	0.0310	0.335	0.105	0.0760	0.0790	0.0380	8	0%	0.0929	0.101	0.0310	0.0595	0.335
Barium	mg/kg dw	0.497	1.07	0.211	0.882	0.723	0.504	0.925	0.331	8	0%	0.643	0.305	0.211	0.614	1.07
Beryllium	mg/kg dw	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	8	100%	<0.010	-	<0.010	<0.010	<0.010
Bismuth	mg/kg dw	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	8	100%	<0.010	-	<0.010	<0.010	<0.010
Boron	mg/kg dw	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	8	100%	<1.0	-	<1.0	<1.0	<1.0
Cadmium	mg/kg dw	0.0173	0.0312	0.00980	0.0314	0.0441	0.0217	0.0240	0.0170	8	0%	0.0246	0.0107	0.00980	0.0228	0.0441
Calcium	mg/kg dw	18,800	30,700	5,620	22,800	27,300	18,200	32,900	12,800	8	0%	21,140	9,219	12,800	20,800	5,620
Cesium	mg/kg dw	0.190	0.0770	0.118	0.0867	0.271	0.163	0.158	0.148	8	0%	0.151	0.0619	0.0770	0.153	0.271
Chromium	mg/kg dw	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.0700	8	88%	0.0525	-	<0.050	0.0500	0.0700
Cobalt	mg/kg dw	0.0460	0.134	0.146	0.0490	0.0450	0.0430	0.0550	0.0960	8	0%	0.0768	0.0427	0.0430	0.0520	0.146
Copper	mg/kg dw	2.23	2.45	2.67	2.26	2.20	2.23	2.14	3.39	8	0%	2.45	0.418	2.14	2.24	3.39
Iron	mg/kg dw	21.7	24.3	27.1	43.1	18.2	25.0	28.1	70.7	8	0%	32.3	17.2	18.2	26.0	70.7
Lead	mg/kg dw	0.0250	0.0240	<0.020	0.0210	0.0270	<0.020	0.0210	0.0240	8	25%	0.0228	0.00234	<0.020	0.0225	0.0270
Lithium	mg/kg dw	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	8	100%	<0.50	-	<0.50	<0.50	<0.50
Magnesium	mg/kg dw	1,420	2,290	1,990	1,590	1,640	1,370	1,770	1,050	8	0%	1,640	384	1,050	1,615	2,290
Manganese	mg/kg dw	5.23	7.39	3.40	7.57	3.98	3.87	9.32	2.69	8	0%	5.43	2.38	2.69	4.61	9.32
Mercury	mg/kg dw	0.372	0.202	0.380	0.594	0.517	0.606	0.299	0.342	8	0%	0.414	0.144	0.202	0.376	0.606
	mg/kg ww	0.118	0.0606	0.103	0.135	0.139	0.156	0.0770	0.0865	8	0%	0.109	0.0333	0.0606	0.110	0.156
Molybdenum	mg/kg dw	0.0330	0.0220	0.0260	0.0370	0.0210	0.0240	0.0310	0.0600	8	0%	0.0318	0.0127	0.0210	0.0285	0.0600
Nickel	mg/kg dw	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	8	100%	<0.20	-	<0.20	<0.20	<0.20
Phosphorus	mg/kg dw	19,000	25,300	11,000	22,400	25,200	19,600	29,400	15,500	8	0%	20,925	5,914	11,000	21,000	29,400
Potassium	mg/kg dw	12,100	11,400	13,000	16,800	14,100	15,600	15,100	15,700	8	0%	14,225	1,908	11,400	14,600	16,800
Rubidium	mg/kg dw	32.0	16.7	26.7	21.0	38.0	30.8	29.8	26.4	8	0%	27.7	6.62	16.7	28.2	38.0
Selenium	mg/kg dw	1.41	2.31	1.52	2.33	1.64	1.78	1.86	1.82	8	0%	1.83	0.336	1.41	1.80	2.33
Silver	mg/kg dw	<0.0050	0.00930	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.00670	8	75%	0.00575	0.00184	<0.0050	0.00500	0.00930
Sodium	mg/kg dw	1,620	2,040	2,350	2,610	2,280	2,360	2,450	2,520	8	0%	2,279	316	1,620	2,355	2,610
Strontium	mg/kg dw	33.8	56.6	9.20	37.7	42.0	32.9	55.3	19.5	8	0%	35.9	16.2	19.5	35.8	9.20
Tellurium	mg/kg dw	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	8	100%	<0.020	-	<0.020	<0.020	<0.020
Thallium	mg/kg dw	0.00770	0.00630	0.00670	0.00530	0.00670	0.00380	0.00750	0.00560	8	0%	0.00620	0.00128	0.00380	0.00650	0.00770
Tin	mg/kg dw	0.280	0.520	0.580	0.300	0.330	0.280	0.220	0.410	8	0%	0.365	0.127	0.220	0.315	0.580
Titanium	mg/kg dw	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	8	100%	<0.25	-	<0.25	<0.25	<0.25
Uranium	mg/kg dw	<0.0020	0.00390	<0.0020	0.00910	0.00350	0.00250	0.00620	0.00360	8	25%	0.00410	0.00244	<0.0020	0.00355	0.00910
Vanadium	mg/kg dw	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	8	100%	<0.10	-	<0.10	<0.10	<0.10
Zinc	mg/kg dw	88.7	111	64.8	103	86.0	67.4	80.5	63.1	8	0%	83.1	17.7	103	83.2	88.7
Zirconium	mg/kg dw	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	8	100%	<0.20	-	<0.20	<0.20	<0.20

Value exceeds Se Guideline for Aquatic Life, fish muscle or whole body tissue (4 mg/kg dw; BCMOE 2014).
Value exceeds Se Guideline for Human Health, general population, high consumption (7.3 mg/kg dw; BCMOE 2014).
Value exceeds Se Guideline for Human Health, general population, moderate consumption (14.5 mg/kg dw; BCMOE 2014).
Value exceeds Hg Guideline for Human Health (0.5 mg/kg ww; CFIA 2015).

Notes: "-" = no data available or standard deviation not calculated. mg/kg = milligrams per kilogram. dw = dry weight. ww = wet weight. LRL = laboratory reporting limit.

[a] All summary statistics are reported to three significant digits for display purposes. All summary statistics were calculated using the Kaplan-Meier method.

Table C.7.9: Peamouth Chub Tissue Chemistry Data for Quesnel Lake near Hazeltine Creek (QUL-NHC; Exposed), October 2022[a]

Analyte	Units	Quesnel Lake near Hazeltine Creek (QUL-NHC)														
		Muscle														
		QUL-NHC-PCC-1	QUL-NHC-PCC-2	QUL-NHC-PCC-3	QUL-NHC-PCC-4	QUL-NHC-PCC-5	QUL-NHC-PCC-6	QUL-NHC-PCC-7	QUL-NHC-PCC-8	n	% < LRL	Mean	Standard Deviation	Minimum	Median	Maximum
Moisture	%	76.5	76.7	75.7	73.5	77.2	80.5	78.2	77.2	8	0%	76.9	2.00	73.5	77	80.5
Aluminum	mg/kg dw	4.50	2.30	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	8	75%	2.35	1.56	<2.0	2.00	4.50
Antimony	mg/kg dw	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	8	100%	<0.010	-	<0.010	<0.010	<0.010
Arsenic	mg/kg dw	0.433	0.379	0.194	0.208	0.365	0.384	0.775	0.352	8	0%	0.386	0.179	0.194	0.372	0.775
Barium	mg/kg dw	0.935	0.888	0.583	0.686	1.49	1.06	0.622	0.979	8	0%	0.905	0.294	0.583	0.912	1.49
Beryllium	mg/kg dw	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	8	100%	<0.010	-	<0.010	<0.010	<0.010
Bismuth	mg/kg dw	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	8	100%	<0.010	-	<0.010	<0.010	<0.010
Boron	mg/kg dw	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	8	100%	<1.0	-	<1.0	<1.0	<1.0
Cadmium	mg/kg dw	0.0124	0.0176	0.0322	0.0125	0.00910	0.0210	0.00620	0.0119	8	0%	0.0154	0.00822	0.00620	0.0124	0.0322
Calcium	mg/kg dw	3,390	4,000	4,800	1,880	5,720	3,400	3,880	3,860	8	0%	3,866	1,116	1,880	3,870	5,720
Cesium	mg/kg dw	0.0881	0.0860	0.108	0.0825	0.0821	0.103	0.0932	0.0794	8	0%	0.0903	0.0104	0.0794	0.0870	0.108
Chromium	mg/kg dw	0.914	0.182	0.0870	0.0550	0.486	0.129	0.0740	0.0870	8	0%	0.252	0.302	0.0550	0.108	0.914
Cobalt	mg/kg dw	0.0330	0.0270	0.0300	0.0320	0.0300	0.0460	0.0300	0.0260	8	0%	0.0318	0.00620	0.0260	0.0300	0.0460
Copper	mg/kg dw	2.38	1.57	1.12	1.60	2.57	2.75	1.76	2.20	8	0%	1.99	0.567	1.12	1.98	2.75
Iron	mg/kg dw	33.6	23.4	13.5	15.9	30.4	31.5	19.2	23.3	8	0%	23.8	7.45	13.5	23.4	33.6
Lead	mg/kg dw	0.0220	<0.020	<0.020	<0.020	<0.020	0.0240	0.0220	<0.020	8	63%	0.0210	0.00115	<0.020	0.0200	0.0240
Lithium	mg/kg dw	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	8	100%	<0.50	-	<0.50	<0.50	<0.50
Magnesium	mg/kg dw	1,790	1,570	1,670	1,480	1,610	2,100	1,420	1,640	8	0%	1,660	211	1,420	1,625	2,100
Manganese	mg/kg dw	2.20	1.95	1.96	1.14	2.12	1.76	2.04	1.82	8	0%	1.87	0.330	1.14	1.96	2.20
Mercury	mg/kg dw	0.963	1.33	0.893	0.515	0.730	0.856	0.758	1.15	8	0%	0.899	0.254	0.515	0.874	1.33
	mg/kg ww	0.226	0.310	0.217	0.136	0.167	0.167	0.165	0.263	8	0%	0.206	0.0588	0.136	0.192	0.310
Molybdenum	mg/kg dw	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	8	100%	<0.020	-	<0.020	<0.020	<0.020
Nickel	mg/kg dw	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	8	100%	<0.20	-	<0.20	<0.20	<0.20
Phosphorus	mg/kg dw	13,900	13,600	13,400	11,300	13,200	16,400	14,300	14,100	8	0%	13,775	1,410	11,300	13,750	16,400
Potassium	mg/kg dw	21,800	21,900	19,700	18,500	21,400	25,600	22,500	21,100	8	0%	21,563	2,085	18,500	21,600	25,600
Rubidium	mg/kg dw	28.0	35.2	22.2	22.8	18.3	28.7	29.4	24.9	8	0%	26.2	5.24	18.3	26.4	35.2
Selenium	mg/kg dw	4.06	3.23	3.36	2.94	5.00	5.24	4.73	5.88	8	0%	4.30	1.07	2.94	4.39	5.88
Silver	mg/kg dw	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	8	100%	<0.0050	-	<0.0050	<0.0050	<0.0050
Sodium	mg/kg dw	1,140	1,490	1,250	1,050	1,260	1,400	1,100	1,380	8	0%	1,259	156	1,050	1,255	1,490
Strontium	mg/kg dw	6.26	7.40	9.15	3.45	10.9	5.79	7.25	7.14	8	0%	7.17	2.22	10.9	7.20	9.15
Tellurium	mg/kg dw	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	8	100%	<0.020	-	<0.020	<0.020	<0.020
Thallium	mg/kg dw	0.0133	0.0101	<0.0020	0.00490	0.00400	0.0104	0.00860	0.0164	8	13%	0.00871	0.00438	<0.0020	0.00935	0.0164
Tin	mg/kg dw	0.700	1.02	1.78	0.740	2.98	1.52	0.410	0.880	8	0%	1.25	0.828	0.410	0.950	2.98
Titanium	mg/kg dw	0.360	0.250	<0.25	<0.25	<0.25	0.250	<0.25	<0.25	8	63%	0.264	0.0635	<0.25	0.250	0.360
Uranium	mg/kg dw	0.00600	0.00520	0.00430	<0.0020	<0.0020	0.00540	0.00240	0.00360	8	25%	0.00386	0.00133	<0.0020	0.00395	0.00600
Vanadium	mg/kg dw	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	8	100%	<0.10	-	<0.10	<0.10	<0.10
Zinc	mg/kg dw	19.0	29.7	20.4	27.5	28.4	29.8	30.7	27.3	8	0%	26.6	4.43	19.0	28.0	30.7
Zirconium	mg/kg dw	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	8	100%	<0.20	-	<0.20	<0.20	<0.20

Value exceeds Se Guideline for Aquatic Life, fish muscle or whole body tissue (4 mg/kg dw; BCMOE 2014).
Value exceeds Se Guideline for Human Health, general population, high consumption (7.3 mg/kg dw; BCMOE 2014).
Value exceeds Se Guideline for Human Health, general population, moderate consumption (14.5 mg/kg dw; BCMOE 2014).
Value exceeds Hg Guideline for Human Health (0.5 mg/kg ww; CFIA 2015).

Notes: "-" = no data available or standard deviation not calculated. mg/kg = milligrams per kilogram. dw = dry weight. ww = wet weight. LRL = laboratory reporting limit.

[a] All summary statistics are reported to three significant digits for display purposes. All summary statistics were calculated using the Kaplan-Meier method.

Table C.7.9: Peamouth Chub Tissue Chemistry Data for Quesnel Lake near Hazeltine Creek (QUL-NHC; Exposed), October 2022[a]

Analyte	Units	Quesnel Lake near Hazeltine Creek (QUL-NHC)													
		Ovary													
		QUL-NHC-PCC-1	QUL-NHC-PCC-2	QUL-NHC-PCC-3	QUL-NHC-PCC-4	QUL-NHC-PCC-5	QUL-NHC-PCC-6	QUL-NHC-PCC-7	n	% < LRL	Mean	Standard Deviation	Minimum	Median	Maximum
Moisture	%	62.1	76.3	66.4	62.5	64.9	61.0	59.3	7	0%	64.6	5.66	59.3	62.5	76.3
Aluminum	mg/kg dw	3.00	9.10	<2.0	<2.0	<2.0	<2.0	<2.0	7	71%	3.16	4.31	<2.0	2.00	9.10
Antimony	mg/kg dw	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	7	100%	<0.010	-	<0.010	<0.010	<0.010
Arsenic	mg/kg dw	0.282	0.289	0.151	0.159	0.0500	0.166	0.126	7	0%	0.175	0.0850	0.0500	0.159	0.289
Barium	mg/kg dw	1.05	1.58	0.445	0.362	0.158	0.511	0.321	7	0%	0.632	0.503	0.158	0.445	1.58
Beryllium	mg/kg dw	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	7	100%	<0.010	-	<0.010	<0.010	<0.010
Bismuth	mg/kg dw	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	7	100%	<0.010	-	<0.010	<0.010	<0.010
Boron	mg/kg dw	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	7	100%	<1.0	-	<1.0	<1.0	<1.0
Cadmium	mg/kg dw	0.140	0.176	0.0553	0.0175	0.0237	0.0270	0.0151	7	0%	0.0649	0.0657	0.0151	0.0270	0.176
Calcium	mg/kg dw	384	616	372	277	470	272	305	7	0%	385	124	272	372	616
Cesium	mg/kg dw	0.0303	0.0502	0.0508	0.0290	0.0363	0.0298	0.0394	7	0%	0.0380	0.00935	0.0290	0.0363	0.0508
Chromium	mg/kg dw	0.210	0.263	<0.050	<0.050	0.0710	0.0820	<0.050	7	43%	0.111	0.0950	<0.050	0.0710	0.263
Cobalt	mg/kg dw	0.117	0.210	0.126	0.0970	0.101	0.106	0.0890	7	0%	0.121	0.0412	0.0890	0.106	0.210
Copper	mg/kg dw	5.02	6.80	5.35	4.11	4.52	4.33	3.74	7	0%	4.84	1.02	3.74	4.52	6.80
Iron	mg/kg dw	84.6	250	67.8	60.5	78.3	47.1	41.6	7	0%	90	72.2	250	67.8	84.6
Lead	mg/kg dw	<0.020	0.0380	<0.020	<0.020	<0.020	<0.020	<0.020	7	86%	0.0226	-	<0.020	0.0200	0.0380
Lithium	mg/kg dw	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	7	100%	<0.50	-	<0.50	<0.50	<0.50
Magnesium	mg/kg dw	635	864	715	547	706	641	540	7	0%	664	112	540	641	864
Manganese	mg/kg dw	9.57	5.64	11.0	9.67	13.2	10.1	9.76	7	0%	9.85	2.25	10.1	9.76	9.76
Mercury	mg/kg dw	0.0548	0.168	0.0448	0.0230	0.0398	0.0249	0.0281	7	0%	0.0548	0.0512	0.0230	0.0398	0.168
	mg/kg ww	0.0207	0.0398	0.0150	0.00860	0.0140	0.00970	0.0114	7	0%	0.0170	0.0108	0.00860	0.0140	0.0398
Molybdenum	mg/kg dw	0.122	0.230	0.126	0.106	0.125	0.0880	0.0860	7	0%	0.126	0.0488	0.0860	0.122	0.230
Nickel	mg/kg dw	<0.20	0.300	<0.20	<0.20	<0.20	<0.20	<0.20	7	86%	0.214	-	<0.20	0.200	0.300
Phosphorus	mg/kg dw	10,000	12,600	13,200	9,790	10,800	10,600	9,610	7	0%	10,943	1,413	10,000	10,600	9,790
Potassium	mg/kg dw	8,020	14,100	9,530	6,770	8,670	7,940	7,470	7	0%	8,929	2,441	14,100	8,020	9,530
Rubidium	mg/kg dw	12.3	26.2	13.4	10.5	8.88	10.4	12.6	7	0%	13.5	5.82	10.4	12.3	8.88
Selenium	mg/kg dw	19.7	11.1	20.4	7.47	28.3	16.6	20.3	7	0%	17.7	6.83	11.1	19.7	7.47
Silver	mg/kg dw	0.0154	0.0176	0.0138	0.0152	0.0165	0.0180	0.00970	7	0%	0.0152	0.00281	0.00970	0.0154	0.0180
Sodium	mg/kg dw	1,750	6,580	1,720	1,340	1,770	1,580	1,500	7	0%	2,320	1,885	1,340	1,720	6,580
Strontium	mg/kg dw	0.514	0.972	0.492	0.326	0.528	0.317	0.459	7	0%	0.515	0.219	0.317	0.492	0.972
Tellurium	mg/kg dw	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	7	100%	<0.020	-	<0.020	<0.020	<0.020
Thallium	mg/kg dw	0.0104	0.0215	0.00350	0.00450	0.00320	0.00540	0.00530	7	0%	0.00769	0.00654	0.00320	0.00530	0.0215
Tin	mg/kg dw	0.160	3.50	<0.10	0.210	0.220	0.220	0.370	7	14%	0.683	1.33	<0.10	0.220	3.50
Titanium	mg/kg dw	<0.25	0.520	<0.25	<0.25	<0.25	<0.25	<0.25	7	86%	0.289	-	<0.25	0.250	0.520
Uranium	mg/kg dw	0.0112	0.0182	0.00480	0.00340	0.00610	0.0103	0.00260	7	0%	0.00809	0.00553	0.00260	0.00610	0.0182
Vanadium	mg/kg dw	<0.10	0.210	<0.10	<0.10	<0.10	<0.10	<0.10	7	86%	0.116	-	<0.10	0.100	0.210
Zinc	mg/kg dw	93.3	220	116	82.8	98.0	93.0	88.2	7	0%	113	48.3	116	93.3	98.0
Zirconium	mg/kg dw	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	7	100%	<0.20	-	<0.20	<0.20	<0.20

Value exceeds Se Guideline for Aquatic Life, fish ovary tissue (11 mg/kg dw; BCMOE 2014).
Value exceeds Se Threshold for Effects, fish ovary tissue (20 mg/kg dw; DeForest et al 2012).

Notes: "-" = no data available or standard deviation not calculated. mg/kg = milligrams per kilogram. dw = dry weight. ww = wet weight. LRL = laboratory reporting limit.

[a] All summary statistics are reported to three significant digits for display purposes. All summary statistics were calculated using the Kaplan-Meier method.

Table C.7.9: Peamouth Chub Tissue Chemistry Data for Quesnel Lake near Hazeltine Creek (QUL-NHC; Exposed), October 2022[a]

Analyte	Units	Quesnel Lake near Hazeltine Creek (QUL-NHC)														
		Liver														
		QUL-NHC-PCC-1	QUL-NHC-PCC-2	QUL-NHC-PCC-3	QUL-NHC-PCC-4	QUL-NHC-PCC-5	QUL-NHC-PCC-6	QUL-NHC-PCC-7	QUL-NHC-PCC-8	n	% < LRL	Mean	Standard Deviation	Minimum	Median	Maximum
Moisture	%	53.3	69.9	61.2	55.8	62.6	61.0	57.3	60.0	8	0%	60.1	5.03	53.3	60.5	69.9
Aluminum	mg/kg dw	11.0	29.5	11.3	7.70	<5.0	15.4	<5.0	15.6	8	25%	12.6	7.66	<5.0	11.2	7.70
Antimony	mg/kg dw	<0.010	0.0190	0.0110	<0.010	0.0160	0.0160	<0.010	0.0180	8	38%	0.0138	0.00308	<0.010	0.0135	0.0190
Arsenic	mg/kg dw	0.367	0.374	0.231	0.232	0.144	0.299	0.217	0.622	8	0%	0.311	0.148	0.144	0.266	0.622
Barium	mg/kg dw	0.577	0.379	0.155	0.349	0.149	0.212	0.174	0.292	8	0%	0.286	0.147	0.149	0.252	0.577
Beryllium	mg/kg dw	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	8	100%	<0.010	-	<0.010	<0.010	<0.010
Bismuth	mg/kg dw	<0.010	0.0120	0.0550	0.0290	0.0300	0.0330	0.0200	0.0130	8	13%	0.0253	0.0147	<0.010	0.0245	0.0550
Boron	mg/kg dw	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	8	100%	<1.0	-	<1.0	<1.0	<1.0
Cadmium	mg/kg dw	0.722	1.06	1.29	0.939	0.519	1.59	0.870	0.872	8	0%	0.983	0.334	0.519	0.906	1.59
Calcium	mg/kg dw	148	223	170	210	156	170	138	166	8	0%	173	29.5	138	168	223
Cesium	mg/kg dw	0.0159	0.0307	0.0411	0.0232	0.0266	0.0224	0.0305	0.0205	8	0%	0.0264	0.00777	0.0159	0.0249	0.0411
Chromium	mg/kg dw	0.240	0.490	0.260	<0.20	<0.20	0.370	<0.20	0.280	8	38%	0.280	0.103	<0.20	0.250	0.490
Cobalt	mg/kg dw	0.152	0.297	0.217	0.232	0.136	0.250	0.168	0.169	8	0%	0.203	0.0555	0.136	0.193	0.297
Copper	mg/kg dw	7.97	17.3	18.0	13.1	10.6	24.7	20.9	18.7	8	0%	16.4	5.52	10.6	17.6	7.97
Iron	mg/kg dw	558	2,770	1,050	823	793	1,240	599	546	8	0%	1,047	738	1,050	808	823
Lead	mg/kg dw	<0.050	0.0660	<0.050	<0.050	<0.050	0.0600	<0.050	0.0670	8	63%	0.0554	0.00379	<0.050	0.0500	0.0670
Lithium	mg/kg dw	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	8	100%	<0.50	-	<0.50	<0.50	<0.50
Magnesium	mg/kg dw	432	649	698	593	615	585	616	525	8	0%	589	80.8	432	604	698
Manganese	mg/kg dw	2.77	5.44	4.25	4.66	3.85	5.15	4.08	4.05	8	0%	4.28	0.829	2.77	4.16	5.44
Mercury	mg/kg dw	0.286	0.804	0.436	0.265	0.346	0.407	0.282	0.556	8	0%	0.423	0.182	0.265	0.376	0.804
	mg/kg ww	0.133	0.242	0.169	0.117	0.129	0.159	0.120	0.222	8	0%	0.161	0.0475	0.117	0.146	0.242
Molybdenum	mg/kg dw	0.403	1.05	0.690	0.829	0.488	1.04	0.620	0.889	8	0%	0.751	0.242	0.403	0.760	1.05
Nickel	mg/kg dw	<0.20	0.380	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	8	88%	0.222	-	<0.20	0.200	0.380
Phosphorus	mg/kg dw	6,950	11,800	12,300	10,700	10,700	11,000	10,600	8,320	8	0%	10,296	1,785	10,600	10,700	8,320
Potassium	mg/kg dw	5,530	11,400	9,620	7,430	8,900	8,390	7,580	7,290	8	0%	8,268	1,760	11,400	7,985	9,620
Rubidium	mg/kg dw	7.63	18.6	12.2	10.2	8.56	9.62	10.5	8.94	8	0%	10.8	3.45	10.2	9.91	9.62
Selenium	mg/kg dw	6.35	12.8	9.61	6.45	11.6	9.62	11.7	17.6	8	0%	10.7	3.65	11.6	10.6	9.62
Silver	mg/kg dw	0.0172	0.0703	0.0422	0.0694	0.0106	0.118	0.0514	0.122	8	0%	0.0626	0.0414	0.0106	0.0604	0.122
Sodium	mg/kg dw	2,600	4,550	3,080	2,720	3,310	3,290	2,650	3,280	8	0%	3,185	627	2,600	3,180	4,550
Strontium	mg/kg dw	0.370	0.570	0.460	0.490	0.380	0.450	0.380	0.420	8	0%	0.440	0.0680	0.370	0.435	0.570
Tellurium	mg/kg dw	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	8	100%	<0.020	-	<0.020	<0.020	<0.020
Thallium	mg/kg dw	0.0190	0.0673	0.0124	0.0201	0.0111	0.0276	0.0150	0.0367	8	0%	0.0262	0.0186	0.0111	0.0196	0.0673
Tin	mg/kg dw	0.220	1.70	0.330	0.400	0.230	0.270	0.510	0.310	8	0%	0.496	0.496	0.220	0.320	1.70
Titanium	mg/kg dw	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	8	100%	<0.50	-	<0.50	<0.50	<0.50
Uranium	mg/kg dw	0.0240	0.104	0.0264	0.0174	0.0263	0.0605	0.0104	0.0145	8	0%	0.0354	0.0317	0.0104	0.0252	0.104
Vanadium	mg/kg dw	0.490	1.64	0.480	0.440	0.450	1.13	0.320	0.660	8	0%	0.701	0.453	0.320	0.485	1.64
Zinc	mg/kg dw	47.9	88.2	84.6	67.8	72.1	85.0	71.8	64.4	8	0%	72.7	13.3	47.9	72	88.2
Zirconium	mg/kg dw	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	8	100%	<0.20	-	<0.20	<0.20	<0.20

Notes: "-" = no data available or standard deviation not calculated. mg/kg = milligrams per kilogram. dw = dry weight. ww = wet weight. LRL = laboratory reporting limit.

[a] All summary statistics are reported to three significant digits for display purposes. All summary statistics were calculated using the Kaplan-Meier method.

Table C.7.9: Peamouth Chub Tissue Chemistry Data for Quesnel Lake near Hazeltine Creek (QUL-NHC; Exposed), October 2022[a]

Analyte	Units	Quesnel Lake near Hazeltine Creek (QUL-NHC)														
		Kidney														
		QUL-NHC-PCC-1	QUL-NHC-PCC-2	QUL-NHC-PCC-3	QUL-NHC-PCC-4	QUL-NHC-PCC-5	QUL-NHC-PCC-6	QUL-NHC-PCC-7	QUL-NHC-PCC-8	n	% < LRL	Mean	Standard Deviation	Minimum	Median	Maximum
Moisture	%	31.6	69.0	48.2	53.9	57.0	50.0	50.0	56.0	8	0%	52	10.5	31.6	52	69.0
Aluminum	mg/kg dw	6.60	6.80	<5.0	<5.0	<5.0	7.10	9.60	6.10	8	38%	6.40	1.37	<5.0	6.35	9.60
Antimony	mg/kg dw	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	8	100%	<0.020	-	<0.020	<0.020	<0.020
Arsenic	mg/kg dw	0.458	0.416	0.282	0.276	0.199	0.419	0.313	0.477	8	0%	0.355	0.101	0.199	0.364	0.477
Barium	mg/kg dw	2.71	1.96	1.40	1.31	1.29	2.29	1.39	2.34	8	0%	1.84	0.561	1.29	1.68	2.71
Beryllium	mg/kg dw	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	8	100%	<0.010	-	<0.010	<0.010	<0.010
Bismuth	mg/kg dw	0.0110	0.0130	0.0370	0.0210	0.0240	0.0380	0.0180	0.0180	8	0%	0.0225	0.0101	0.0110	0.0195	0.0380
Boron	mg/kg dw	<1.0	1.50	<1.0	2.00	<1.0	1.20	1.90	2.10	8	38%	1.46	0.378	<1.0	1.35	2.10
Cadmium	mg/kg dw	8.14	19.0	12.9	8.14	6.12	24.6	8.61	15.5	8	0%	12.9	6.44	12.9	10.8	8.61
Calcium	mg/kg dw	256	434	277	363	310	958	412	340	8	0%	419	226	256	352	958
Cesium	mg/kg dw	0.0276	0.0508	0.0529	0.0470	0.0470	0.0462	0.0572	0.0401	8	0%	0.0461	0.00904	0.0276	0.0470	0.0572
Chromium	mg/kg dw	0.360	0.360	0.240	<0.20	0.280	0.480	<0.20	0.310	8	25%	0.304	0.0835	<0.20	0.295	0.480
Cobalt	mg/kg dw	0.941	1.17	2.88	2.90	1.64	4.00	2.16	2.13	8	0%	2.23	1.01	0.941	2.14	4.00
Copper	mg/kg dw	3.88	8.54	5.42	5.01	4.29	7.00	5.61	5.78	8	0%	5.69	1.49	3.88	5.52	8.54
Iron	mg/kg dw	324	534	250	477	286	336	353	455	8	0%	377	100	250	344	534
Lead	mg/kg dw	0.0660	0.0520	0.107	0.0650	<0.050	0.181	0.0880	0.0780	8	13%	0.0859	0.0435	<0.050	0.0720	0.181
Lithium	mg/kg dw	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	8	100%	<0.50	-	<0.50	<0.50	<0.50
Magnesium	mg/kg dw	412	615	488	563	515	673	556	569	8	0%	549	79.3	412	560	673
Manganese	mg/kg dw	1.85	3.25	3.14	4.22	3.18	6.54	3.25	3.52	8	0%	3.62	1.35	1.85	3.25	6.54
Mercury	mg/kg dw	0.265	0.336	0.263	0.196	0.197	0.347	0.195	0.405	8	0%	0.276	0.0800	0.195	0.264	0.405
	mg/kg ww	0.181	0.104	0.136	0.0901	0.0848	0.173	0.0974	0.178	8	0%	0.131	0.0417	0.0848	0.120	0.181
Molybdenum	mg/kg dw	0.337	0.741	1.38	0.483	0.311	0.742	0.576	0.828	8	0%	0.675	0.343	0.311	0.658	1.38
Nickel	mg/kg dw	<1.0	2.29	<1.9	0.830	0.760	<2.4	<1.6	<3.6	8	63%	1.04	0.864	<1.0	0.830	2.29
Phosphorus	mg/kg dw	6,310	11,100	9,730	10,900	10,100	12,800	10,800	10,700	8	0%	10,305	1,850	10,100	10,750	9,730
Potassium	mg/kg dw	6,360	11,300	8,740	10,100	10,000	10,800	9,100	9,990	8	0%	9,549	1,529	10,000	10,000	9,990
Rubidium	mg/kg dw	9.48	21.3	12.2	15.2	10.6	14.9	15.0	14.4	8	0%	14.1	3.62	10.6	14.6	9.48
Selenium	mg/kg dw	5.52	7.22	7.49	5.77	7.23	8.99	9.04	13.0	8	0%	8.03	2.38	13.0	7.36	9.04
Silver	mg/kg dw	<0.0050	0.0168	<0.0050	<0.0050	<0.0050	0.0118	<0.0050	<0.0050	8	75%	0.00732	0.00354	<0.0050	0.00500	0.0168
Sodium	mg/kg dw	2,820	5,960	3,310	4,420	4,310	4,950	4,710	5,000	8	0%	4,435	991	2,820	4,565	5,960
Strontium	mg/kg dw	0.590	0.980	0.650	0.730	0.640	2.16	0.920	0.700	8	0%	0.921	0.519	0.590	0.715	2.16
Tellurium	mg/kg dw	<0.020	0.0210	0.0360	<0.020	0.0310	0.0450	<0.020	0.0520	8	38%	0.0306	0.0121	<0.020	0.0260	0.0520
Thallium	mg/kg dw	0.0207	0.0365	0.0325	0.0284	0.0167	0.0488	0.0319	0.0395	8	0%	0.0319	0.0102	0.0167	0.0322	0.0488
Tin	mg/kg dw	0.490	1.67	0.340	1.14	0.540	0.520	1.12	1.31	8	0%	0.891	0.481	0.340	0.830	1.67
Titanium	mg/kg dw	<0.5	0.530	<0.5	<0.5	<0.5	0.550	0.690	<0.5	8	63%	0.534	0.0872	<0.50	0.500	0.690
Uranium	mg/kg dw	0.0429	0.119	0.0597	0.0241	0.0290	0.144	0.0224	0.0431	8	0%	0.0605	0.0459	0.0224	0.0430	0.144
Vanadium	mg/kg dw	0.430	0.800	0.530	0.300	0.370	1.23	0.420	1.01	8	0%	0.636	0.339	0.300	0.480	1.23
Zinc	mg/kg dw	73.5	160	147	120	97.7	156	155	138	8	0%	131	31.4	120	142	97.7
Zirconium	mg/kg dw	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	8	100%	<0.20	-	<0.20	<0.20	<0.20

Notes: "-" = no data available or standard deviation not calculated. mg/kg = milligrams per kilogram. dw = dry weight. ww = wet weight. LRL = laboratory reporting limit.

[a] All summary statistics are reported to three significant digits for display purposes. All summary statistics were calculated using the Kaplan-Meier method.

Table C.7.10: Peamouth Chub Tissue Chemistry Data for Quesnel Lake near Grain Creek (QUL-NGC; Reference), October 2022 [a]

Analyte	Units	Quesnel Lake near Grain Creek (QUL-NGC)														
		Muscle														
		QUL-NGC-PCC-1	QUL-NGC-PCC-2	QUL-NGC-PCC-3	QUL-NGC-PCC-4	QUL-NGC-PCC-5	QUL-NGC-PCC-6	QUL-NGC-PCC-7	QUL-NGC-PCC-8	n	% < LRL	Mean	Standard Deviation	Minimum	Median	Maximum
Moisture	%	77.4	76.5	75.9	78.0	76.7	78.2	78.8	76.9	8	0%	77.3	0.977	75.9	77.2	78.8
Aluminum	mg/kg dw	7.50	3.30	3.00	3.00	2.70	2.80	2.80	4.40	8	0%	3.69	1.63	2.70	3.00	7.50
Antimony	mg/kg dw	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	8	100%	<0.010	-	<0.010	<0.010	<0.010
Arsenic	mg/kg dw	0.175	0.266	0.425	0.304	0.260	0.496	0.532	0.155	8	0%	0.327	0.142	0.155	0.285	0.532
Barium	mg/kg dw	0.340	0.501	0.558	0.832	0.918	0.245	0.625	0.670	8	0%	0.586	0.228	0.245	0.592	0.918
Beryllium	mg/kg dw	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	8	100%	<0.010	-	<0.010	<0.010	<0.010
Bismuth	mg/kg dw	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.0140	0.0120	8	75%	0.0107	0.00141	<0.010	0.0100	0.0140
Boron	mg/kg dw	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	8	100%	<1.0	-	<1.0	<1.0	<1.0
Cadmium	mg/kg dw	<0.0050	0.00780	0.00580	0.0110	0.0108	<0.0050	0.00760	<0.0050	8	38%	0.00725	0.00224	<0.0050	0.00670	0.0110
Calcium	mg/kg dw	1,660	1,760	3,270	2,120	2,160	2,440	5,190	3,060	8	0%	2,708	1,154	1,660	2,300	5,190
Cesium	mg/kg dw	0.158	0.154	0.148	0.155	0.136	0.212	0.230	0.179	8	0%	0.172	0.0331	0.136	0.156	0.230
Chromium	mg/kg dw	0.0790	0.103	<0.050	0.164	0.194	<0.050	0.0810	0.0900	8	25%	0.101	0.0486	<0.050	0.0855	0.194
Cobalt	mg/kg dw	0.0330	<0.020	0.0320	0.0230	0.0300	<0.020	0.0260	0.0380	8	25%	0.0278	0.00532	<0.020	0.0280	0.0380
Copper	mg/kg dw	1.57	2.24	1.59	2.27	1.09	1.19	1.44	1.67	8	0%	1.63	0.433	1.09	1.58	2.27
Iron	mg/kg dw	20.2	27.2	18.1	23.8	14.0	12.4	17.8	19.2	8	0%	19.1	4.82	12.4	18.6	27.2
Lead	mg/kg dw	<0.020	<0.020	<0.020	0.0200	<0.020	<0.020	<0.020	0.0230	8	75%	0.0204	0.00212	<0.020	0.0200	0.0230
Lithium	mg/kg dw	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	8	100%	<0.50	-	<0.50	<0.50	<0.50
Magnesium	mg/kg dw	1,750	1,240	1,480	1,850	1,630	1,800	2,270	1,790	8	0%	1,726	299	1,240	1,770	2,270
Manganese	mg/kg dw	0.985	0.731	1.57	1.15	0.837	1.24	1.79	1.69	8	0%	1.25	0.398	0.731	1.20	1.79
Mercury	mg/kg dw	0.428	0.716	0.508	0.492	1.03	0.838	1.15	0.629	8	0%	0.724	0.263	0.428	0.672	1.15
	mg/kg ww	0.0966	0.168	0.122	0.108	0.240	0.183	0.245	0.145	8	0%	0.163	0.0567	0.0966	0.156	0.245
Molybdenum	mg/kg dw	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	8	100%	<0.020	-	<0.020	<0.020	<0.020
Nickel	mg/kg dw	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	8	100%	<0.20	-	<0.20	<0.20	<0.20
Phosphorus	mg/kg dw	11,500	11,800	13,300	14,000	12,300	13,800	16,100	13,300	8	0%	13,262	1,467	11,500	13,300	16,100
Potassium	mg/kg dw	18,400	20,200	20,200	23,600	22,200	24,000	24,000	21,800	8	0%	21,800	2,062	18,400	22,000	24,000
Rubidium	mg/kg dw	22.2	23.8	26.4	25.8	32.5	37.2	34.0	31.9	8	0%	29.2	5.38	22.2	29.2	37.2
Selenium	mg/kg dw	2.14	2.80	2.94	3.72	1.66	1.88	2.14	1.58	8	0%	2.36	0.737	1.58	2.14	3.72
Silver	mg/kg dw	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	8	100%	<0.0050	-	<0.0050	<0.0050	<0.0050
Sodium	mg/kg dw	1,030	1,170	1,090	1,280	1,160	1,180	1,430	1,370	8	0%	1,214	137	1,030	1,175	1,430
Strontium	mg/kg dw	2.77	2.93	6.98	3.70	3.66	5.16	10.7	6.55	8	0%	5.31	2.69	10.7	4.43	6.98
Tellurium	mg/kg dw	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	8	100%	<0.020	-	<0.020	<0.020	<0.020
Thallium	mg/kg dw	0.00750	0.00410	0.00420	0.00640	0.00490	0.00440	0.0106	0.00870	8	0%	0.00635	0.00241	0.00410	0.00565	0.0106
Tin	mg/kg dw	1.45	0.760	0.450	1.99	0.740	0.910	1.22	1.36	8	0%	1.11	0.493	0.450	1.06	1.99
Titanium	mg/kg dw	0.460	0.270	<0.25	0.310	1.06	0.280	0.260	0.400	8	13%	0.411	0.286	<0.25	0.295	1.06
Uranium	mg/kg dw	<0.0020	0.00240	0.00270	<0.0020	0.00350	0.00230	0.00350	<0.0020	8	38%	0.00255	0.000585	<0.0020	0.00235	0.00350
Vanadium	mg/kg dw	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	8	100%	<0.10	-	<0.10	<0.10	<0.10
Zinc	mg/kg dw	24.1	27.6	23.0	39.9	20.2	24.3	30.3	31.2	8	0%	27.6	6.22	20.2	26.0	39.9
Zirconium	mg/kg dw	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	8	100%	<0.20	-	<0.20	<0.20	<0.20

Value exceeds Se Guideline for Aquatic Life, fish muscle or whole body tissue (4 mg/kg dw; BCMOE 2014).
Value exceeds Se Guideline for Human Health, general population, high consumption (7.3 mg/kg dw; BCMOE 2014).
Value exceeds Se Guideline for Human Health, general population, moderate consumption (14.5 mg/kg dw; BCMOE 2014).
Value exceeds Hg Guideline for Human Health (0.5 mg/kg ww; CFIA 2015).

Notes: "-" = no data available or standard deviation not calculated. mg/kg = milligrams per kilogram. dw = dry weight. ww = wet weight. LRL = laboratory reporting limit.

[a] All summary statistics are reported to three significant digits for display purposes. All summary statistics were calculated using the Kaplan-Meier method.

Table C.7.10: Peamouth Chub Tissue Chemistry Data for Quesnel Lake near Grain Creek (QUL-NGC; Reference), October 2022 [a]

Analyte	Units	Quesnel Lake near Grain Creek (QUL-NGC)												
		Ovary												
		QUL-NGC-PCC-2	QUL-NGC-PCC-3	QUL-NGC-PCC-5	QUL-NGC-PCC-6	QUL-NGC-PCC-7	QUL-NGC-PCC-8	n	% < LRL	Mean	Standard Deviation	Minimum	Median	Maximum
Moisture	%	66.2	65.1	69.0	68.8	65.8	65.8	6	0%	66.8	1.68	65.1	66.0	69.0
Aluminum	mg/kg dw	<2.0	<2.0	<2.0	3.50	<2.0	<2.0	6	83%	2.25	-	<2.0	2.00	3.50
Antimony	mg/kg dw	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	6	100%	<0.010	-	<0.010	<0.010	<0.010
Arsenic	mg/kg dw	0.0850	0.196	0.106	0.277	0.202	0.120	6	0%	0.164	0.0732	0.0850	0.158	0.277
Barium	mg/kg dw	0.323	0.331	0.415	0.320	0.311	0.249	6	0%	0.325	0.0532	0.249	0.322	0.415
Beryllium	mg/kg dw	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	6	100%	<0.010	-	<0.010	<0.010	<0.010
Bismuth	mg/kg dw	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	6	100%	<0.010	-	<0.010	<0.010	<0.010
Boron	mg/kg dw	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	6	100%	<1.0	-	<1.0	<1.0	<1.0
Cadmium	mg/kg dw	0.0121	0.0292	0.0310	0.0354	0.0315	0.0451	6	0%	0.0307	0.0108	0.0121	0.0312	0.0451
Calcium	mg/kg dw	412	386	662	622	365	507	6	0%	492	126	365	460	662
Cesium	mg/kg dw	0.0562	0.0504	0.0670	0.0879	0.0626	0.0993	6	0%	0.0706	0.0191	0.0504	0.0648	0.0993
Chromium	mg/kg dw	<0.050	0.0500	<0.050	<0.050	<0.050	0.148	6	67%	0.0663	0.0693	<0.050	0.0500	0.148
Cobalt	mg/kg dw	0.0720	0.144	0.186	0.0930	0.118	0.172	6	0%	0.131	0.0447	0.0720	0.131	0.186
Copper	mg/kg dw	4.26	5.15	4.61	5.04	4.96	5.18	6	0%	4.87	0.361	4.26	5.00	5.18
Iron	mg/kg dw	57.5	61.2	70.4	67.2	56.0	86.1	6	0%	66.4	11.1	56.0	64.2	86.1
Lead	mg/kg dw	<0.020	<0.020	<0.020	<0.020	<0.020	0.0210	6	83%	0.0202	-	<0.020	0.0200	0.0210
Lithium	mg/kg dw	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	6	100%	<0.50	-	<0.50	<0.50	<0.50
Magnesium	mg/kg dw	694	761	927	854	681	929	6	0%	808	112	681	808	929
Manganese	mg/kg dw	8.87	8.72	15.1	15.8	10.2	17.3	6	0%	12.7	3.83	10.2	12.6	8.87
Mercury	mg/kg dw	0.0454	0.0252	0.0512	0.0417	0.0568	0.0284	6	0%	0.0414	0.0125	0.0252	0.0436	0.0568
	mg/kg ww	0.0154	0.00880	0.0158	0.0130	0.0194	0.00970	6	0%	0.0137	0.00401	0.00880	0.0142	0.0194
Molybdenum	mg/kg dw	0.120	0.108	0.154	0.193	0.123	0.180	6	0%	0.146	0.0349	0.108	0.138	0.193
Nickel	mg/kg dw	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	6	100%	<0.20	-	<0.20	<0.20	<0.20
Phosphorus	mg/kg dw	10,800	12,600	10,700	10,300	12,000	11,100	6	0%	11,250	873	10,300	10,950	12,600
Potassium	mg/kg dw	8,890	9,400	10,900	10,600	8,920	10,700	6	0%	9,902	934	10,600	10,000	9,400
Rubidium	mg/kg dw	12.5	14.4	19.4	19.4	14.4	18.9	6	0%	16.5	3.08	12.5	16.6	19.4
Selenium	mg/kg dw	12.8	14.8	9.08	7.62	10.5	12.7	6	0%	11.2	2.67	10.5	11.6	9.08
Silver	mg/kg dw	0.0171	0.0164	0.0205	0.0267	0.0191	0.0250	6	0%	0.0208	0.00421	0.0164	0.0198	0.0267
Sodium	mg/kg dw	1,950	1,610	2,240	1,880	1,700	1,640	6	0%	1,837	239	1,610	1,790	2,240
Strontium	mg/kg dw	0.461	0.579	0.716	0.697	0.474	0.677	6	0%	0.601	0.114	0.461	0.628	0.716
Tellurium	mg/kg dw	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	6	100%	<0.020	-	<0.020	<0.020	<0.020
Thallium	mg/kg dw	0.00360	0.00440	0.00590	0.00600	0.00470	0.0108	6	0%	0.00590	0.00257	0.00360	0.00530	0.0108
Tin	mg/kg dw	0.240	0.320	0.520	0.380	0.120	0.440	6	0%	0.337	0.143	0.120	0.350	0.520
Titanium	mg/kg dw	<0.25	0.320	<0.25	0.300	<0.25	<0.25	6	67%	0.270	0.0141	<0.25	0.250	0.320
Uranium	mg/kg dw	0.00820	0.00790	0.0104	0.00840	0.0119	<0.0020	6	17%	0.00813	0.00173	<0.0020	0.00830	0.0119
Vanadium	mg/kg dw	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	6	100%	<0.10	-	<0.10	<0.10	<0.10
Zinc	mg/kg dw	111	114	140	139	116	148	6	0%	128	16.1	111	128	148
Zirconium	mg/kg dw	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	6	100%	<0.20	-	<0.20	<0.20	<0.20

Value exceeds Se Guideline for Aquatic Life, fish ovary tissue (11 mg/kg dw; BCMOE 2014).
Value exceeds Se Threshold for Effects, fish ovary tissue (20 mg/kg dw; DeForest et al 2012).

Notes: "-" = no data available or standard deviation not calculated. mg/kg = milligrams per kilogram. dw = dry weight. ww = wet weight. LRL = laboratory reporting limit.

[a] All summary statistics are reported to three significant digits for display purposes. All summary statistics were calculated using the Kaplan-Meier method.

Table C.7.10: Peamouth Chub Tissue Chemistry Data for Quesnel Lake near Grain Creek (QUL-NGC; Reference), October 2022 [a]

Analyte	Units	Quesnel Lake near Grain Creek (QUL-NGC)														
		Liver														
		QUL-NGC-PCC-1	QUL-NGC-PCC-2	QUL-NGC-PCC-3	QUL-NGC-PCC-4	QUL-NGC-PCC-5	QUL-NGC-PCC-6	QUL-NGC-PCC-7	QUL-NGC-PCC-8	n	% < LRL	Mean	Standard Deviation	Minimum	Median	Maximum
Moisture	%	57.0	68.2	56.0	59.0	62.2	64.4	72.3	64.9	8	0%	63.0	5.62	56.0	63.3	72.3
Aluminum	mg/kg dw	29.2	18.0	5.20	67.2	13.5	5.60	9.00	5.20	8	0%	19.1	21.1	13.5	11.2	9.00
Antimony	mg/kg dw	<0.010	0.0160	<0.010	<0.010	0.0110	<0.010	0.0110	<0.020	8	63%	0.0111	0.00289	<0.010	0.0110	0.0160
Arsenic	mg/kg dw	0.184	1.82	0.455	0.358	1.29	4.86	5.64	0.139	8	0%	1.84	2.19	0.139	0.872	5.64
Barium	mg/kg dw	0.462	0.201	0.136	0.308	0.0990	0.247	0.160	0.0730	8	0%	0.211	0.127	0.0730	0.180	0.462
Beryllium	mg/kg dw	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	8	100%	<0.010	-	<0.010	<0.010	<0.010
Bismuth	mg/kg dw	0.0330	0.112	0.0200	0.0290	0.0310	0.0170	0.0820	0.0670	8	0%	0.0489	0.0343	0.0170	0.0320	0.112
Boron	mg/kg dw	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	8	100%	<1.0	-	<1.0	<1.0	<1.0
Cadmium	mg/kg dw	0.226	0.441	0.271	0.442	1.19	0.351	1.03	0.233	8	0%	0.523	0.374	0.226	0.396	1.19
Calcium	mg/kg dw	530	233	118	154	121	321	186	131	8	0%	224	141	118	170	530
Cesium	mg/kg dw	0.0416	0.0418	0.0180	0.0326	0.0259	0.0446	0.0482	0.0483	8	0%	0.0376	0.0111	0.0180	0.0417	0.0483
Chromium	mg/kg dw	<0.20	0.300	<0.20	<0.20	0.280	<0.20	0.370	<0.20	8	63%	0.244	0.0473	<0.20	0.200	0.370
Cobalt	mg/kg dw	0.194	0.202	0.182	0.117	0.236	0.149	0.293	0.204	8	0%	0.197	0.0531	0.117	0.198	0.293
Copper	mg/kg dw	16.2	10.9	13.1	8.81	13.9	7.36	24.3	15.7	8	0%	13.8	5.28	10.9	13.5	8.81
Iron	mg/kg dw	258	914	410	483	421	650	947	572	8	0%	582	244	258	528	947
Lead	mg/kg dw	0.0500	<0.050	<0.050	0.0920	<0.050	<0.050	<0.050	<0.050	8	75%	0.0552	0.0297	<0.050	0.0500	0.0920
Lithium	mg/kg dw	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	8	100%	<0.50	-	<0.50	<0.50	<0.50
Magnesium	mg/kg dw	408	811	446	438	532	534	887	454	8	0%	564	183	408	493	887
Manganese	mg/kg dw	3.37	5.26	2.55	2.88	3.40	3.56	6.29	3.35	8	0%	3.83	1.27	2.55	3.38	6.29
Mercury	mg/kg dw	0.156	0.469	0.153	0.178	0.317	0.184	0.572	0.232	8	0%	0.283	0.158	0.153	0.208	0.572
	mg/kg ww	0.0672	0.149	0.0673	0.0730	0.120	0.0654	0.159	0.0815	8	0%	0.0978	0.0390	0.0654	0.0772	0.159
Molybdenum	mg/kg dw	0.406	0.686	0.410	0.406	0.715	0.545	0.858	0.492	8	0%	0.565	0.170	0.406	0.518	0.858
Nickel	mg/kg dw	<0.20	<0.20	<0.20	0.340	<0.20	<0.20	0.230	<0.20	8	75%	0.221	0.0778	<0.20	0.200	0.340
Phosphorus	mg/kg dw	6,470	12,500	6,940	6,750	9,360	9,050	14,100	8,560	8	0%	9,216	2,775	12,500	8,805	9,360
Potassium	mg/kg dw	4,880	10,100	5,060	6,000	7,090	7,360	11,300	7,260	8	0%	7,381	2,280	10,100	7,175	7,360
Rubidium	mg/kg dw	6.60	12.4	6.85	6.51	11.5	12.6	16.4	12.3	8	0%	10.6	3.61	11.5	11.9	6.85
Selenium	mg/kg dw	4.65	7.45	6.06	8.83	6.01	4.41	8.79	5.79	8	0%	6.50	1.70	4.41	6.04	8.83
Silver	mg/kg dw	0.0928	0.0252	0.0524	0.0248	0.0372	0.0227	0.130	0.0632	8	0%	0.0560	0.0383	0.0227	0.0448	0.130
Sodium	mg/kg dw	2,160	3,790	1,920	2,210	2,450	2,400	3,720	2,070	8	0%	2,590	739	1,920	2,305	3,790
Strontium	mg/kg dw	1.79	0.660	0.320	0.500	0.310	0.960	0.500	0.290	8	0%	0.666	0.506	0.290	0.500	1.79
Tellurium	mg/kg dw	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	8	100%	<0.020	-	<0.020	<0.020	<0.020
Thallium	mg/kg dw	0.0138	0.0151	0.0128	0.0153	0.0165	0.0210	0.0264	0.0233	8	0%	0.0180	0.00493	0.0128	0.0159	0.0264
Tin	mg/kg dw	<0.10	1.06	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	8	88%	0.220	-	<0.10	0.100	1.06
Titanium	mg/kg dw	1.48	<0.5	<0.5	0.750	<0.5	<0.5	<0.5	0.520	8	63%	0.656	0.501	<0.50	0.500	1.48
Uranium	mg/kg dw	0.00550	0.0781	0.0104	0.0260	0.0511	0.0199	0.0217	0.00500	8	0%	0.0272	0.0253	0.00500	0.0208	0.0781
Vanadium	mg/kg dw	0.100	0.430	0.180	0.340	0.310	<0.10	0.420	<0.10	8	25%	0.248	0.132	<0.10	0.245	0.430
Zinc	mg/kg dw	57.5	79.6	58.2	54.6	70.7	68.4	92.7	74.7	8	0%	69.5	12.9	54.6	69.5	92.7
Zirconium	mg/kg dw	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	8	100%	<0.20	-	<0.20	<0.20	<0.20

Notes: "-" = no data available or standard deviation not calculated. mg/kg = milligrams per kilogram. dw = dry weight. ww = wet weight. LRL = laboratory reporting limit.

[a] All summary statistics are reported to three significant digits for display purposes. All summary statistics were calculated using the Kaplan-Meier method.

Table C.7.10: Peamouth Chub Tissue Chemistry Data for Quesnel Lake near Grain Creek (QUL-NGC; Reference), October 2022 [a]

Analyte	Units	Quesnel Lake near Grain Creek (QUL-NGC)														
		Kidney														
		QUL-NGC-PCC-1	QUL-NGC-PCC-2	QUL-NGC-PCC-3	QUL-NGC-PCC-4	QUL-NGC-PCC-5	QUL-NGC-PCC-6	QUL-NGC-PCC-7	QUL-NGC-PCC-8	n	% < LRL	Mean	Standard Deviation	Minimum	Median	Maximum
Moisture	%	60.0	66.9	64.7	60.2	56.0	69.6	60.8	70.6	8	0%	63.6	5.17	56.0	62.8	70.6
Aluminum	mg/kg dw	8.30	<5.0	<5.0	<5.0	6.00	5.20	<5.0	5.10	8	50%	5.58	1.49	<5.0	5.05	8.30
Antimony	mg/kg dw	<0.026	<0.010	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	8	100%	<0.010	-	<0.010	<0.010	<0.026
Arsenic	mg/kg dw	0.201	0.229	0.357	0.303	0.208	0.638	0.351	0.186	8	0%	0.309	0.149	0.186	0.266	0.638
Barium	mg/kg dw	1.42	0.805	1.41	1.08	0.899	1.21	0.927	1.02	8	0%	1.10	0.231	0.805	1.05	1.42
Beryllium	mg/kg dw	<0.013	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	8	100%	<0.010	-	<0.010	<0.010	<0.013
Bismuth	mg/kg dw	0.0290	0.0330	0.0220	0.0150	0.0250	0.0320	0.0590	0.0550	8	0%	0.0338	0.0155	0.0150	0.0305	0.0590
Boron	mg/kg dw	2.90	<1.0	<1.0	<1.0	1.90	1.20	<1.0	1.20	8	50%	1.40	0.804	<1.0	1.10	2.90
Cadmium	mg/kg dw	2.84	4.29	9.26	3.63	6.82	4.56	6.21	2.97	8	0%	5.07	2.21	2.84	4.42	9.26
Calcium	mg/kg dw	290	412	290	225	275	404	269	627	8	0%	349	130	225	290	627
Cesium	mg/kg dw	0.0678	0.0473	0.0480	0.0362	0.0436	0.0698	0.0443	0.0972	8	0%	0.0568	0.0202	0.0362	0.0476	0.0972
Chromium	mg/kg dw	0.260	<0.20	0.220	<0.20	0.260	0.220	0.250	0.220	8	25%	0.229	0.0204	<0.20	0.220	0.260
Cobalt	mg/kg dw	3.55	1.25	1.86	0.754	1.36	1.42	1.49	2.98	8	0%	1.83	0.947	0.754	1.46	3.55
Copper	mg/kg dw	4.35	3.34	4.46	2.70	3.49	4.74	3.70	7.44	8	0%	4.28	1.44	2.70	4.03	7.44
Iron	mg/kg dw	238	390	444	269	262	207	314	265	8	0%	299	80.3	207	267	444
Lead	mg/kg dw	<0.064	<0.050	<0.050	<0.050	<0.050	0.0590	<0.050	0.0590	8	75%	0.0526	0	<0.050	0.0500	0.0590
Lithium	mg/kg dw	<0.64	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	8	100%	<0.50	-	<0.50	<0.50	<0.64
Magnesium	mg/kg dw	478	422	459	352	407	519	342	624	8	0%	450	92.4	342	440	624
Manganese	mg/kg dw	3.33	1.95	2.56	1.53	2.43	4.84	1.73	5.92	8	0%	3.04	1.58	1.53	2.50	5.92
Mercury	mg/kg dw	0.157	0.162	0.170	0.0780	0.191	0.215	0.279	0.207	8	0%	0.182	0.0576	0.0780	0.180	0.279
	mg/kg ww	0.0630	0.0538	0.0599	0.0311	0.0839	0.0654	0.109	0.0609	8	0%	0.0659	0.0227	0.0311	0.0620	0.109
Molybdenum	mg/kg dw	0.407	0.266	0.391	0.234	0.337	0.488	0.500	0.395	8	0%	0.377	0.0950	0.234	0.393	0.500
Nickel	mg/kg dw	<0.80	0.530	<0.90	0.370	<1.6	<1.3	<1.0	<0.60	8	75%	0.450	0.113	<0.6	0.450	0.530
Phosphorus	mg/kg dw	8,710	7,420	8,960	6,530	7,400	10,000	6,930	11,900	8	0%	8,481	1,804	10,000	8,065	8,960
Potassium	mg/kg dw	7,800	7,050	8,180	6,540	7,220	9,150	6,160	10,800	8	0%	7,862	1,517	10,800	7,510	9,150
Rubidium	mg/kg dw	10.4	9.79	12.6	8.11	12.5	16.3	9.61	19.6	8	0%	12.4	3.86	10.4	11.4	9.79
Selenium	mg/kg dw	4.06	4.41	6.29	4.86	3.36	4.21	4.33	5.30	8	0%	4.60	0.887	3.36	4.37	6.29
Silver	mg/kg dw	<0.0064	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.00500	8	88%	0.00500	-	<0.0050	0.00500	0.00500
Sodium	mg/kg dw	2,360	3,560	3,650	2,530	3,290	4,040	2,910	4,100	8	0%	3,305	655	2,360	3,425	4,100
Strontium	mg/kg dw	0.640	1.08	0.640	0.490	0.730	1.03	0.600	1.54	8	0%	0.844	0.350	0.490	0.685	1.54
Tellurium	mg/kg dw	<0.026	<0.020	0.0250	<0.020	<0.020	0.0350	0.0400	0.0240	8	50%	0.0257	0.00779	<0.020	0.0240	0.0400
Thallium	mg/kg dw	0.0496	0.0118	0.0237	0.0136	0.0218	0.0334	0.0268	0.0472	8	0%	0.0285	0.0141	0.0118	0.0253	0.0496
Tin	mg/kg dw	<0.13	0.130	<0.10	<0.10	1.49	<0.10	<0.10	<0.10	8	75%	0.278	0.962	<0.10	0.100	1.49
Titanium	mg/kg dw	0.960	<0.5	<0.5	0.560	0.630	0.710	0.650	0.910	8	25%	0.678	0.162	<0.50	0.640	0.960
Uranium	mg/kg dw	0.0149	0.0514	0.0274	0.0108	0.0677	0.0423	0.0303	0.0120	8	0%	0.0321	0.0204	0.0108	0.0288	0.0677
Vanadium	mg/kg dw	0.210	0.170	0.280	0.150	0.260	0.170	0.280	0.190	8	0%	0.214	0.0526	0.150	0.200	0.280
Zinc	mg/kg dw	164	87.0	113	86.9	103	182	103	172	8	0%	126	39.6	103	108	87.0
Zirconium	mg/kg dw	<0.26	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	8	100%	<0.20	-	<0.20	<0.20	<0.26

Notes: "-" = no data available or standard deviation not calculated. mg/kg = milligrams per kilogram. dw = dry weight. ww = wet weight. LRL = laboratory reporting limit.

[a] All summary statistics are reported to three significant digits for display purposes. All summary statistics were calculated using the Kaplan-Meier method.

Table C.7.11: Rainbow Trout Tissue Chemistry Data for Quesnel River (QUR; Exposed), October 2022[a]

Analyte	Units	Quesnel River (QUR)														
		Muscle														
		QUR-RB-1	QUR-RB-2	QUR-RB-3	QUR-RB-4	QUR-RB-5	QUR-RB-6	QUR-RB-7	QUR-RB-8	n	% < LRL	Mean	Standard Deviation	Minimum	Median	Maximum
Moisture	%	75.8	75.6	76.9	77.5	78.1	75.7	79.5	78.3	8	0%	77.2	1.43	75.6	77.2	79.5
Aluminum	mg/kg dw	6.10	2.20	5.40	3.90	3.40	<2.0	2.50	2.10	8	13%	3.45	1.58	<2.0	2.95	6.10
Antimony	mg/kg dw	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	8	100%	<0.010	-	<0.010	<0.010	<0.010
Arsenic	mg/kg dw	1.08	0.0540	0.240	2.20	5.27	0.136	0.175	0.142	8	0%	1.16	1.82	0.0540	0.208	5.27
Barium	mg/kg dw	0.280	0.640	0.500	0.593	0.820	0.462	0.544	0.438	8	0%	0.535	0.159	0.280	0.522	0.820
Beryllium	mg/kg dw	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	8	100%	<0.010	-	<0.010	<0.010	<0.010
Bismuth	mg/kg dw	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	8	100%	<0.010	-	<0.010	<0.010	<0.010
Boron	mg/kg dw	<1.0	<1.0	1.00	<1.0	<1.0	<1.0	<1.0	<1.0	8	88%	1.00	-	<1.0	1.00	1.00
Cadmium	mg/kg dw	<0.0050	<0.0050	<0.0050	0.00570	<0.0050	<0.0050	<0.0050	0.00680	8	75%	0.00531	0.000778	<0.0050	0.00500	0.00680
Calcium	mg/kg dw	660	1,620	1,880	2,090	644	1,070	1,190	1,530	8	0%	1,336	536	1,070	1,360	660
Cesium	mg/kg dw	0.0538	0.0875	0.0956	0.0359	0.117	0.0882	0.155	0.113	8	0%	0.0932	0.0372	0.0359	0.0919	0.155
Chromium	mg/kg dw	0.0890	0.189	0.184	0.0920	0.110	0.0930	0.0860	0.188	8	0%	0.129	0.0487	0.0860	0.102	0.189
Cobalt	mg/kg dw	0.0820	0.0450	0.0520	0.0400	0.0770	0.0700	0.0390	0.0500	8	0%	0.0569	0.0170	0.0390	0.0510	0.0820
Copper	mg/kg dw	1.06	0.980	1.71	1.00	1.59	1.77	0.850	1.23	8	0%	1.27	0.364	0.850	1.14	1.77
Iron	mg/kg dw	25.4	17.4	25.2	18.7	23.5	18.3	19.7	13.3	8	0%	20.2	4.22	13.3	19.2	25.4
Lead	mg/kg dw	<0.020	<0.020	<0.020	0.0330	<0.020	<0.020	0.0320	<0.020	8	75%	0.0231	0.000707	<0.020	0.0200	0.0330
Lithium	mg/kg dw	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	8	100%	<0.50	-	<0.50	<0.50	<0.50
Magnesium	mg/kg dw	1,360	1,560	1,590	1,580	1,520	1,820	1,620	1,710	8	0%	1,595	135	1,360	1,585	1,820
Manganese	mg/kg dw	0.590	0.951	1.20	0.979	0.648	0.907	0.569	0.963	8	0%	0.851	0.224	0.569	0.929	1.20
Mercury	mg/kg dw	0.248	0.248	0.161	0.130	0.583	0.192	0.477	0.114	8	0%	0.269	0.171	0.114	0.220	0.583
	mg/kg ww	0.0599	0.0603	0.0371	0.0292	0.128	0.0467	0.0980	0.0248	8	0%	0.0605	0.0358	0.0248	0.0533	0.128
Molybdenum	mg/kg dw	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	8	100%	<0.020	-	<0.020	<0.020	<0.020
Nickel	mg/kg dw	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	8	100%	<0.20	-	<0.20	<0.20	<0.20
Phosphorus	mg/kg dw	12,600	13,400	15,500	14,300	14,000	14,200	15,100	15,000	8	0%	14,262	953	12,600	14,250	15,500
Potassium	mg/kg dw	20,900	22,000	26,000	25,800	25,000	23,400	27,400	24,500	8	0%	24,375	2,168	20,900	24,750	27,400
Rubidium	mg/kg dw	12.8	24.8	27.4	13.9	26.4	24.4	32.8	33.4	8	0%	24.5	7.65	12.8	25.6	33.4
Selenium	mg/kg dw	3.58	2.10	2.61	5.72	2.83	2.08	2.71	2.33	8	0%	3.00	1.20	2.08	2.66	5.72
Silver	mg/kg dw	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	8	100%	<0.0050	-	<0.0050	<0.0050	<0.0050
Sodium	mg/kg dw	1,500	1,340	1,900	1,320	1,700	1,420	1,550	1,440	8	0%	1,521	195	1,320	1,470	1,900
Strontium	mg/kg dw	0.690	2.51	2.58	2.25	0.744	1.44	1.34	1.99	8	0%	1.69	0.751	0.690	1.72	2.58
Tellurium	mg/kg dw	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	8	100%	<0.020	-	<0.020	<0.020	<0.020
Thallium	mg/kg dw	0.0150	0.0243	0.0214	0.0190	0.0276	0.0232	0.0400	0.0190	8	0%	0.0237	0.00762	0.0150	0.0223	0.0400
Tin	mg/kg dw	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	8	100%	<0.10	-	<0.10	<0.10	<0.10
Titanium	mg/kg dw	<0.25	<0.25	0.510	0.350	<0.25	<0.25	<0.25	<0.25	8	75%	0.295	0.113	<0.25	0.250	0.510
Uranium	mg/kg dw	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	8	100%	<0.0020	-	<0.0020	<0.0020	<0.0020
Vanadium	mg/kg dw	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	8	100%	<0.10	-	<0.10	<0.10	<0.10
Zinc	mg/kg dw	16.1	16.3	21.0	15.9	16.0	18.8	16.8	19.8	8	0%	17.6	2.00	15.9	16.6	21.0
Zirconium	mg/kg dw	<0.20	<0.20	<0.20	<0.20	<0.20	0.380	0.520	<0.20	8	75%	0.262	0.0990	<0.20	0.200	0.520

Value exceeds Se Guideline for Aquatic Life, fish muscle or whole body tissue (4 mg/kg dw; BCMOE 2014).
Value exceeds Se Guideline for Human Health, general population, high consumption (7.3 mg/kg dw; BCMOE 2014).
Value exceeds Se Guideline for Human Health, general population, moderate consumption (14.5 mg/kg dw; BCMOE 2014).
Value exceeds Hg Guideline for Human Health (0.5 mg/kg ww; CFIA 2015).

Notes: "-" = no data available or standard deviation not calculated. mg/kg = milligrams per kilogram. dw = dry weight. ww = wet weight. LRL = laboratory reporting limit.

[a] All summary statistics are reported to three significant digits for display purposes. All summary statistics were calculated using the Kaplan-Meier method.

Table C.7.11: Rainbow Trout Tissue Chemistry Data for Quesnel River (QUR; Exposed), October 2022[a]

Analyte	Units	Quesnel River (QUR)											
		Ovary											
		QUR-RB-1	QUR-RB-2	QUR-RB-4	QUR-RB-5	QUR-RB-6	n	% < LRL	Mean	Standard Deviation	Minimum	Median	Maximum
Moisture	%	81.6	78.1	83.0	72.7	84.0	5	0%	79.9	4.59	72.7	81.6	84.0
Aluminum	mg/kg dw	20.6	14.3	10.4	12.7	23.4	5	0%	16.3	5.49	10.4	14.3	23.4
Antimony	mg/kg dw	<0.010	<0.020	0.0150	<0.010	<0.020	5	80%	0.0117	-	<0.010	0.0150	0.0150
Arsenic	mg/kg dw	0.271	0.106	0.182	0.350	0.301	5	0%	0.242	0.0976	0.106	0.271	0.350
Barium	mg/kg dw	1.37	1.25	0.374	0.704	3.63	5	0%	1.47	1.28	0.374	1.25	3.63
Beryllium	mg/kg dw	<0.010	<0.010	<0.010	<0.010	<0.010	5	100%	<0.010	-	<0.010	<0.010	<0.010
Bismuth	mg/kg dw	<0.010	<0.010	<0.010	<0.010	<0.010	5	100%	<0.010	-	<0.010	<0.010	<0.010
Boron	mg/kg dw	3.10	3.20	<1.0	1.20	10.4	5	20%	3.78	4.06	<1.0	3.10	3.20
Cadmium	mg/kg dw	0.0390	0.0260	<0.0050	0.0400	0.0940	5	20%	0.0408	0.0302	<0.0050	0.0390	0.0940
Calcium	mg/kg dw	389	455	194	845	680	5	0%	513	254	194	455	845
Cesium	mg/kg dw	0.0440	0.0974	0.0301	0.0519	0.0920	5	0%	0.0631	0.0300	0.0301	0.0519	0.0974
Chromium	mg/kg dw	0.550	0.410	0.195	<0.20	0.510	5	20%	0.372	0.159	<0.20	0.410	0.550
Cobalt	mg/kg dw	0.724	0.384	0.227	0.732	0.591	5	0%	0.532	0.221	0.227	0.591	0.732
Copper	mg/kg dw	12.2	14.9	1.68	45.3	29.1	5	0%	20.6	16.9	1.68	14.9	45.3
Iron	mg/kg dw	479	290	45.3	335	297	5	0%	289	156	290	297	479
Lead	mg/kg dw	0.0740	0.0530	<0.020	<0.050	<0.050	5	60%	0.0374	0.0148	<0.020	0.0500	0.0740
Lithium	mg/kg dw	<0.5	<0.5	<0.5	<0.5	<0.50	5	100%	<0.50	-	<0.50	<0.50	<0.50
Magnesium	mg/kg dw	928	1,160	1,530	1,220	1,290	5	0%	1,226	218	1,160	1,220	928
Manganese	mg/kg dw	5.68	16.6	2.10	19.1	25.9	5	0%	13.9	9.81	16.6	16.6	5.68
Mercury	mg/kg dw	0.101	0.114	0.0256	0.0869	0.142	5	0%	0.0939	0.0432	0.0256	0.101	0.142
	mg/kg ww	0.0187	0.0249	0.00430	0.0237	0.0227	5	0%	0.0189	0.00847	0.00430	0.0227	0.0249
Molybdenum	mg/kg dw	0.0590	0.0680	0.0240	0.0430	0.0750	5	0%	0.0538	0.0205	0.0240	0.0590	0.0750
Nickel	mg/kg dw	0.210	0.360	<0.20	<0.20	0.620	5	40%	0.318	0.207	<0.20	0.210	0.620
Phosphorus	mg/kg dw	16,000	18,200	31,600	9,860	17,100	5	0%	18,552	7,977	16,000	17,100	9,860
Potassium	mg/kg dw	21,300	24,400	31,200	8,480	24,300	5	0%	21,936	8,351	21,300	24,300	8,480
Rubidium	mg/kg dw	16.9	37.2	20.9	11.3	34.5	5	0%	24.2	11.2	11.3	20.9	37.2
Selenium	mg/kg dw	11.2	12.4	2.70	14.7	16.5	5	0%	11.5	5.33	11.2	12.4	2.70
Silver	mg/kg dw	0.0209	0.0269	<0.0050	0.120	0.0388	5	20%	0.0423	0.0462	<0.0050	0.0269	0.120
Sodium	mg/kg dw	5,100	4,330	4,120	5,490	5,570	5	0%	4,922	665	4,120	5,100	5,570
Strontium	mg/kg dw	0.890	0.970	0.345	2.13	1.09	5	0%	1.08	0.650	0.345	0.970	2.13
Tellurium	mg/kg dw	<0.020	<0.020	<0.020	<0.020	<0.020	5	100%	<0.020	-	<0.020	<0.020	<0.020
Thallium	mg/kg dw	0.0132	0.0293	0.0632	0.0114	0.0177	5	0%	0.0270	0.0214	0.0114	0.0177	0.0632
Tin	mg/kg dw	<0.10	0.170	<0.10	<0.10	0.220	5	60%	0.138	0.0354	<0.10	0.100	0.220
Titanium	mg/kg dw	1.26	1.18	0.660	<0.5	1.92	5	20%	1.10	0.517	<0.50	1.18	1.92
Uranium	mg/kg dw	0.00240	0.00340	<0.0020	0.0123	0.00780	5	20%	0.00558	0.00454	<0.0020	0.00340	0.0123
Vanadium	mg/kg dw	0.160	<0.10	<0.10	0.150	0.130	5	40%	0.128	0.0153	<0.10	0.130	0.160
Zinc	mg/kg dw	268	368	65.3	168	348	5	0%	243	127	168	268	65.3
Zirconium	mg/kg dw	1.09	1.04	0.310	0.230	1.26	5	0%	0.786	0.479	0.230	1.04	1.26

Value exceeds Se Guideline for Aquatic Life, fish ovary tissue (11 mg/kg dw; BCMOE 2014).
Value exceeds Se Threshold for Effects, fish ovary tissue (20 mg/kg dw; DeForest et al 2012).

Notes: "-" = no data available or standard deviation not calculated. mg/kg = milligrams per kilogram. dw = dry weight. ww = wet weight. LRL = laboratory reporting limit.
[a] All summary statistics are reported to three significant digits for display purposes. All summary statistics were calculated using the Kaplan-Meier method.

Table C.7.11: Rainbow Trout Tissue Chemistry Data for Quesnel River (QUR; Exposed), October 2022[a]

Analyte	Units	Quesnel River (QUR)														
		Liver														
		QUR-RB-1	QUR-RB-2	QUR-RB-3	QUR-RB-4	QUR-RB-5	QUR-RB-6	QUR-RB-7	QUR-RB-8	n	% < LRL	Mean	Standard Deviation	Minimum	Median	Maximum
Moisture	%	71.6	68.4	74.8	73.8	69.7	68.7	74.5	68.9	8	0%	71.3	2.73	68.4	70.7	74.8
Aluminum	mg/kg dw	7.20	6.60	<5.0	6.70	50.2	<5.0	8.00	<5.0	8	38%	11.7	19.3	<5.0	6.65	8.00
Antimony	mg/kg dw	<0.010	<0.010	<0.010	<0.010	0.0550	<0.010	<0.010	<0.010	8	88%	0.0156	-	<0.010	0.0100	0.0550
Arsenic	mg/kg dw	0.395	0.189	0.309	0.350	1.01	0.365	0.242	0.382	8	0%	0.405	0.255	0.189	0.358	1.01
Barium	mg/kg dw	0.547	0.671	0.968	0.520	0.690	0.389	0.481	0.525	8	0%	0.599	0.178	0.389	0.536	0.968
Beryllium	mg/kg dw	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	8	100%	<0.010	-	<0.010	<0.010	<0.010
Bismuth	mg/kg dw	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	8	100%	<0.010	-	<0.010	<0.010	<0.010
Boron	mg/kg dw	1.20	1.80	2.30	1.00	1.00	<1.0	<1.0	1.70	8	25%	1.38	0.522	<1.0	1.10	2.30
Cadmium	mg/kg dw	0.658	0.510	0.361	1.48	1.82	0.309	0.655	0.210	8	0%	0.750	0.584	0.210	0.582	1.82
Calcium	mg/kg dw	173	190	201	170	247	168	152	173	8	0%	184	29.3	152	173	247
Cesium	mg/kg dw	0.0164	0.0229	0.0462	0.0109	0.0631	0.0336	0.0217	0.0531	8	0%	0.0335	0.0188	0.0109	0.0282	0.0631
Chromium	mg/kg dw	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	8	100%	<0.20	-	<0.20	<0.20	<0.20
Cobalt	mg/kg dw	0.340	0.160	0.127	0.180	0.264	0.210	0.113	0.110	8	0%	0.188	0.0807	0.110	0.170	0.340
Copper	mg/kg dw	91.8	56.9	135	143	46.8	266	26.7	61.9	8	0%	104	77.6	135	76.8	91.8
Iron	mg/kg dw	1,440	982	374	750	2,960	476	1,070	245	8	0%	1,037	872	1,070	866	982
Lead	mg/kg dw	<0.050	<0.050	<0.050	<0.050	0.0820	<0.050	<0.050	<0.050	8	88%	0.0540	-	<0.050	0.0500	0.0820
Lithium	mg/kg dw	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	8	100%	<0.50	-	<0.50	<0.50	<0.50
Magnesium	mg/kg dw	582	639	662	642	776	556	617	596	8	0%	634	67.1	556	628	776
Manganese	mg/kg dw	4.83	6.41	6.78	5.91	11.9	5.93	6.27	6.51	8	0%	6.82	2.14	11.9	6.34	6.78
Mercury	mg/kg dw	0.184	0.204	0.101	0.125	0.251	0.124	0.237	0.0414	8	0%	0.158	0.0725	0.0414	0.154	0.251
	mg/kg ww	0.0524	0.0645	0.0254	0.0327	0.0760	0.0386	0.0604	0.0129	8	0%	0.0454	0.0215	0.0129	0.0455	0.0760
Molybdenum	mg/kg dw	0.894	1.00	0.785	1.18	1.40	0.817	0.768	0.480	8	0%	0.916	0.280	0.480	0.856	1.40
Nickel	mg/kg dw	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	0.230	8	88%	0.204	-	<0.20	0.200	0.230
Phosphorus	mg/kg dw	12,500	13,900	13,900	14,000	17,300	12,400	12,800	14,200	8	0%	13,875	1,562	12,400	13,900	17,300
Potassium	mg/kg dw	9,810	11,100	11,600	13,400	14,100	9,610	11,500	10,600	8	0%	11,465	1,593	10,600	11,300	9,810
Rubidium	mg/kg dw	6.84	15.6	16.8	8.28	18.3	11.0	14.5	17.1	8	0%	13.6	4.31	11.0	15.0	8.28
Selenium	mg/kg dw	34.9	20.2	37.6	63.3	17.0	60.0	12.6	18.6	8	0%	33.0	19.7	12.6	27.6	63.3
Silver	mg/kg dw	2.37	1.32	1.97	3.70	2.35	2.69	0.768	0.822	8	0%	2.00	1.00	0.768	2.16	3.70
Sodium	mg/kg dw	4,000	3,920	3,430	3,430	3,650	3,820	4,230	2,830	8	0%	3,664	436	2,830	3,735	4,230
Strontium	mg/kg dw	0.430	0.400	0.410	0.260	0.380	0.330	0.230	0.280	8	0%	0.340	0.0760	0.230	0.355	0.430
Tellurium	mg/kg dw	<0.020	<0.020	<0.020	0.0220	<0.020	<0.020	<0.020	<0.020	8	88%	0.0202	-	<0.020	0.0200	0.0220
Thallium	mg/kg dw	0.0504	0.0801	0.108	0.128	0.143	0.101	0.0835	0.118	8	0%	0.102	0.0296	0.0504	0.104	0.143
Tin	mg/kg dw	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	8	100%	<0.10	-	<0.10	<0.10	<0.10
Titanium	mg/kg dw	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	8	100%	<0.50	-	<0.50	<0.50	<0.50
Uranium	mg/kg dw	0.00560	0.00360	<0.0020	0.00320	0.0740	0.00260	0.00570	<0.0020	8	25%	0.0123	0.0285	<0.0020	0.00340	0.0740
Vanadium	mg/kg dw	0.160	<0.10	<0.10	0.160	0.670	<0.10	0.120	<0.10	8	50%	0.189	0.262	<0.10	0.110	0.670
Zinc	mg/kg dw	85.4	100	93.5	88.8	105	96.0	96.9	70.1	8	0%	92	10.7	100	94.8	96.9
Zirconium	mg/kg dw	<0.20	0.290	0.440	0.700	0.680	<0.20	0.240	0.960	8	25%	0.464	0.277	<0.20	0.365	0.960

Notes: "-" = no data available or standard deviation not calculated. mg/kg = milligrams per kilogram. dw = dry weight. ww = wet weight. LRL = laboratory reporting limit.

[a] All summary statistics are reported to three significant digits for display purposes. All summary statistics were calculated using the Kaplan-Meier method.

Table C.7.11: Rainbow Trout Tissue Chemistry Data for Quesnel River (QUR; Exposed), October 2022[a]

Analyte	Units	Quesnel River (QUR)														
		Kidney														
		QUR-RB-1	QUR-RB-2	QUR-RB-3	QUR-RB-4	QUR-RB-5	QUR-RB-6	QUR-RB-7	QUR-RB-8	n	% < LRL	Mean	Standard Deviation	Minimum	Median	Maximum
Moisture	%	77.0	74.4	74.6	80.3	78.4	75.1	79.4	75.8	8	0%	76.9	2.27	74.4	76.4	80.3
Aluminum	mg/kg dw	7.70	5.80	<5.0	32.3	19.2	<5.0	7.80	10.4	8	25%	11.6	10.2	<5.0	7.75	7.80
Antimony	mg/kg dw	<0.010	<0.010	<0.010	<0.010	0.0220	<0.010	<0.010	<0.010	8	88%	0.0115	-	<0.010	0.0100	0.0220
Arsenic	mg/kg dw	0.783	0.324	0.364	0.517	3.25	0.500	0.918	0.362	8	0%	0.877	0.982	0.324	0.508	3.25
Barium	mg/kg dw	1.02	1.49	1.08	1.20	1.62	1.47	2.94	1.14	8	0%	1.50	0.623	1.02	1.34	2.94
Beryllium	mg/kg dw	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	8	100%	<0.010	-	<0.010	<0.010	<0.010
Bismuth	mg/kg dw	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	8	100%	<0.010	-	<0.010	<0.010	<0.010
Boron	mg/kg dw	<1.0	1.40	1.70	1.50	1.70	2.00	1.10	1.60	8	13%	1.50	0.281	<1.0	1.55	2.00
Cadmium	mg/kg dw	1.46	0.596	0.526	2.53	3.32	0.644	1.45	0.473	8	0%	1.37	1.06	0.473	1.05	3.32
Calcium	mg/kg dw	524	997	728	521	1,330	515	1,110	865	8	0%	824	306	1,110	796	997
Cesium	mg/kg dw	0.0280	0.0377	0.0493	0.0237	0.0773	0.0380	0.0606	0.0618	8	0%	0.0470	0.0185	0.0237	0.0436	0.0773
Chromium	mg/kg dw	0.480	<0.20	<0.20	0.330	0.440	0.320	0.240	<0.20	8	38%	0.301	0.0971	<0.20	0.280	0.480
Cobalt	mg/kg dw	1.67	0.842	0.561	1.45	1.57	1.18	1.71	0.794	8	0%	1.22	0.444	0.561	1.32	1.71
Copper	mg/kg dw	4.07	3.70	5.45	4.50	8.18	7.29	5.83	7.51	8	0%	5.82	1.69	3.70	5.64	8.18
Iron	mg/kg dw	760	770	409	513	956	656	1,070	375	8	0%	689	250	1,070	708	956
Lead	mg/kg dw	0.0520	<0.050	<0.050	0.0870	0.0810	<0.050	<0.050	<0.050	8	63%	0.0588	0.0187	<0.050	0.0500	0.0870
Lithium	mg/kg dw	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	8	100%	<0.50	-	<0.50	<0.50	<0.50
Magnesium	mg/kg dw	574	564	641	698	806	549	789	663	8	0%	660	99.1	549	652	806
Manganese	mg/kg dw	1.91	2.42	2.67	2.51	3.38	3.15	3.19	5.65	8	0%	3.11	1.13	1.91	2.91	5.65
Mercury	mg/kg dw	0.324	0.345	0.235	0.264	0.708	0.391	0.609	0.147	8	0%	0.378	0.190	0.147	0.334	0.708
	mg/kg ww	0.0746	0.0883	0.0598	0.0521	0.153	0.0973	0.126	0.0355	8	0%	0.0858	0.0392	0.0355	0.0814	0.153
Molybdenum	mg/kg dw	0.234	0.268	0.325	0.237	0.684	0.348	0.461	0.379	8	0%	0.367	0.149	0.234	0.336	0.684
Nickel	mg/kg dw	0.450	0.390	<0.20	0.380	1.56	0.340	0.630	<0.20	8	25%	0.519	0.469	<0.20	0.385	1.56
Phosphorus	mg/kg dw	9,770	10,100	10,100	12,300	11,000	9,990	13,300	11,700	8	0%	11,032	1,288	10,100	10,550	9,990
Potassium	mg/kg dw	11,800	11,400	11,200	14,200	13,800	10,200	15,000	10,900	8	0%	12,312	1,764	10,200	11,600	15,000
Rubidium	mg/kg dw	8.76	14.6	13.8	9.96	16.4	12.0	18.4	16.9	8	0%	13.9	3.41	12.0	14.2	9.96
Selenium	mg/kg dw	10.9	9.21	13.3	9.77	16.2	10.9	20.6	13.6	8	0%	13.1	3.82	10.9	12.1	9.77
Silver	mg/kg dw	0.00530	0.00550	0.00680	0.00890	0.0639	0.0140	0.0118	0.0133	8	0%	0.0162	0.0196	0.00530	0.0104	0.0639
Sodium	mg/kg dw	6,760	4,960	5,340	7,220	8,970	6,260	8,040	5,760	8	0%	6,664	1,371	4,960	6,510	8,970
Strontium	mg/kg dw	1.77	2.15	1.54	1.08	5.43	1.38	2.49	1.76	8	0%	2.20	1.38	1.08	1.76	5.43
Tellurium	mg/kg dw	0.0250	<0.020	<0.020	0.0330	0.0380	<0.020	0.0260	<0.020	8	50%	0.0253	0.00614	<0.020	0.0225	0.0380
Thallium	mg/kg dw	0.0458	0.0533	0.0463	0.0556	0.109	0.0609	0.0931	0.0464	8	0%	0.0638	0.0240	0.0458	0.0544	0.109
Tin	mg/kg dw	<0.10	<0.10	<0.10	<0.10	0.100	<0.10	<0.10	<0.10	8	88%	0.100	-	<0.10	0.100	0.100
Titanium	mg/kg dw	<0.5	<0.5	<0.5	1.82	0.520	<0.5	<0.5	1.96	8	63%	0.850	0.794	<0.50	0.500	1.96
Uranium	mg/kg dw	0.00930	0.00800	0.00300	0.00860	0.0796	0.00490	0.0168	0.00340	8	0%	0.0167	0.0258	0.00300	0.00830	0.0796
Vanadium	mg/kg dw	0.270	<0.10	<0.10	0.310	0.780	<0.10	0.270	0.130	8	38%	0.258	0.249	<0.10	0.200	0.780
Zinc	mg/kg dw	83.4	88.9	113	105	117	103	124	102	8	0%	105	13.7	102	104	88.9
Zirconium	mg/kg dw	<0.20	0.210	<0.20	0.460	0.310	0.550	0.290	0.870	8	25%	0.386	0.241	<0.20	0.300	0.870

Notes: "-" = no data available or standard deviation not calculated. mg/kg = milligrams per kilogram. dw = dry weight. ww = wet weight. LRL = laboratory reporting limit.

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APPENDIX D
DATA - CREEKS

APPENDIX D.1
WATER QUALITY

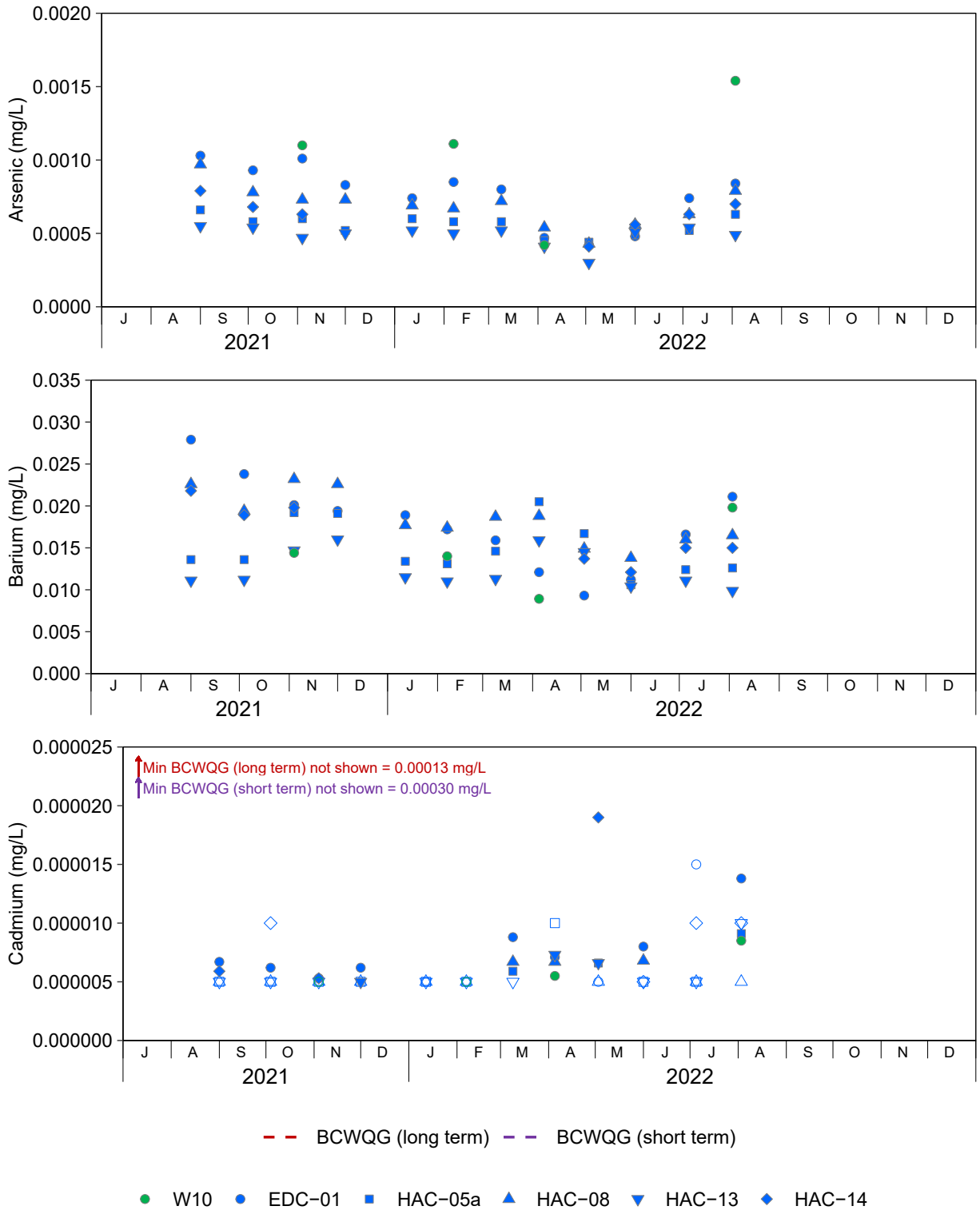

Figure D.1.1: Dissolved Aqueous Concentrations of Primary and Secondary Analytes in Surface Water Samples from Hazeltine Creek (HAC-13, HAC-05a, HAC-14, HAC-08) and Edney Creek (EDC-01a, W10), September 2021 to August 2022

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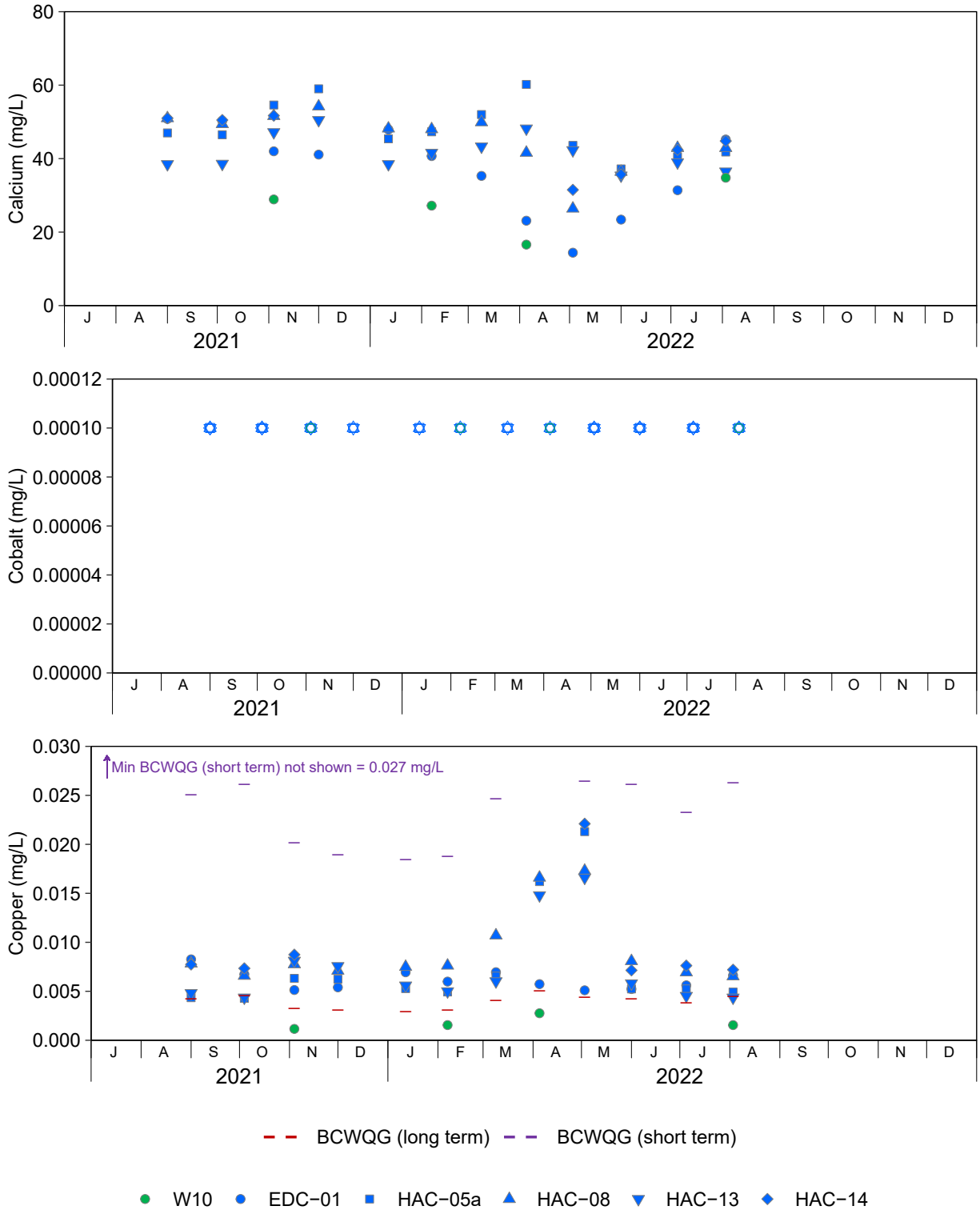

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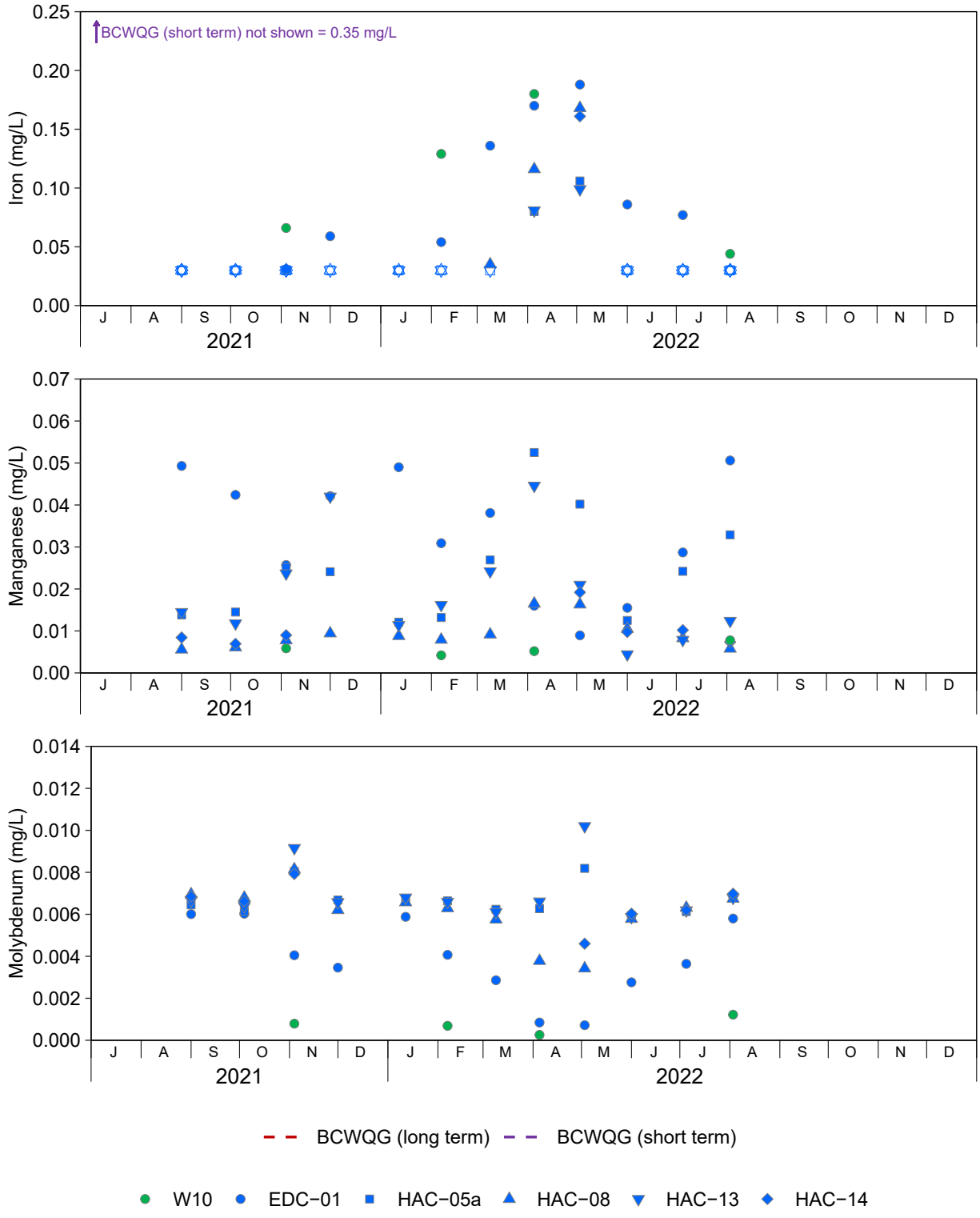

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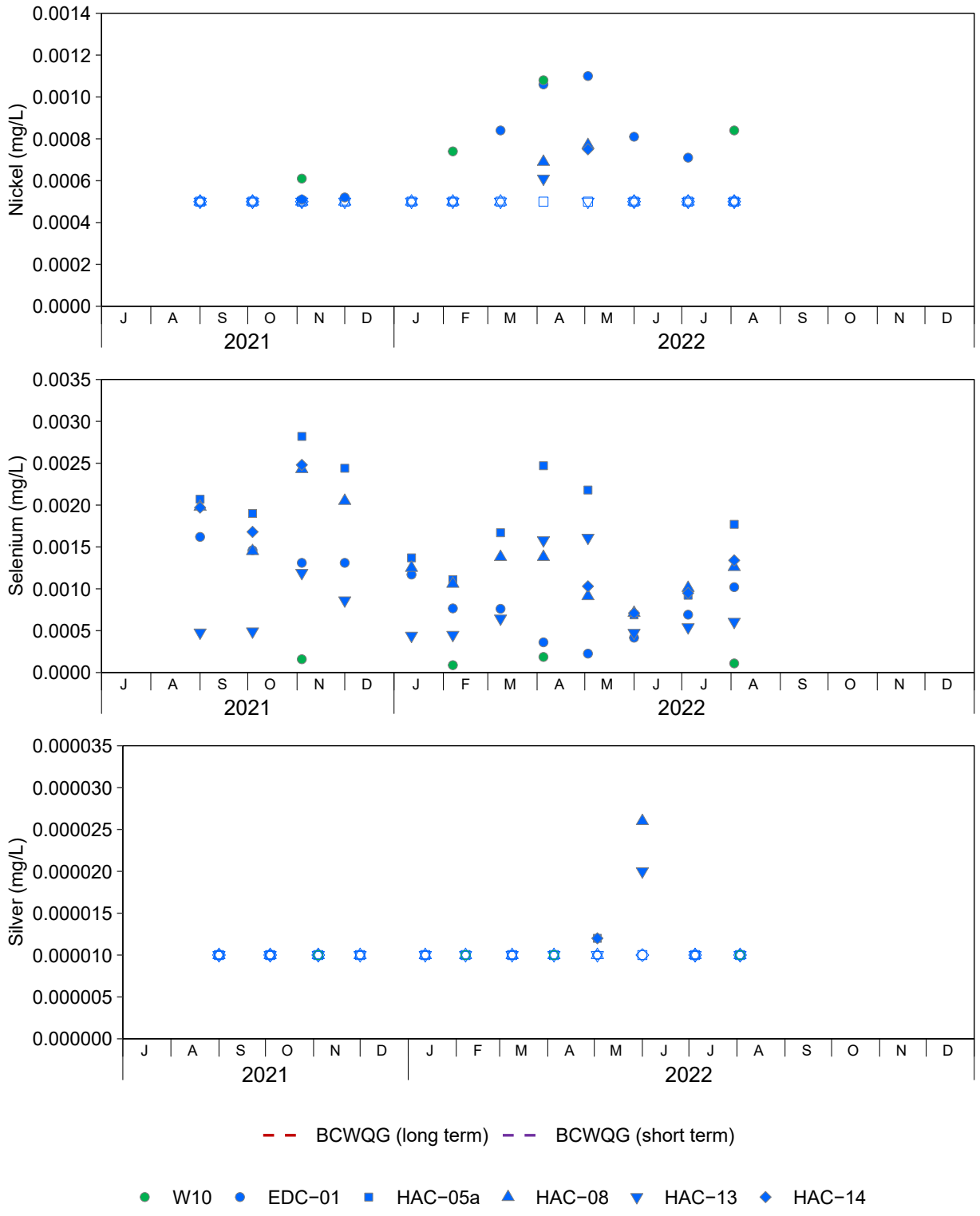

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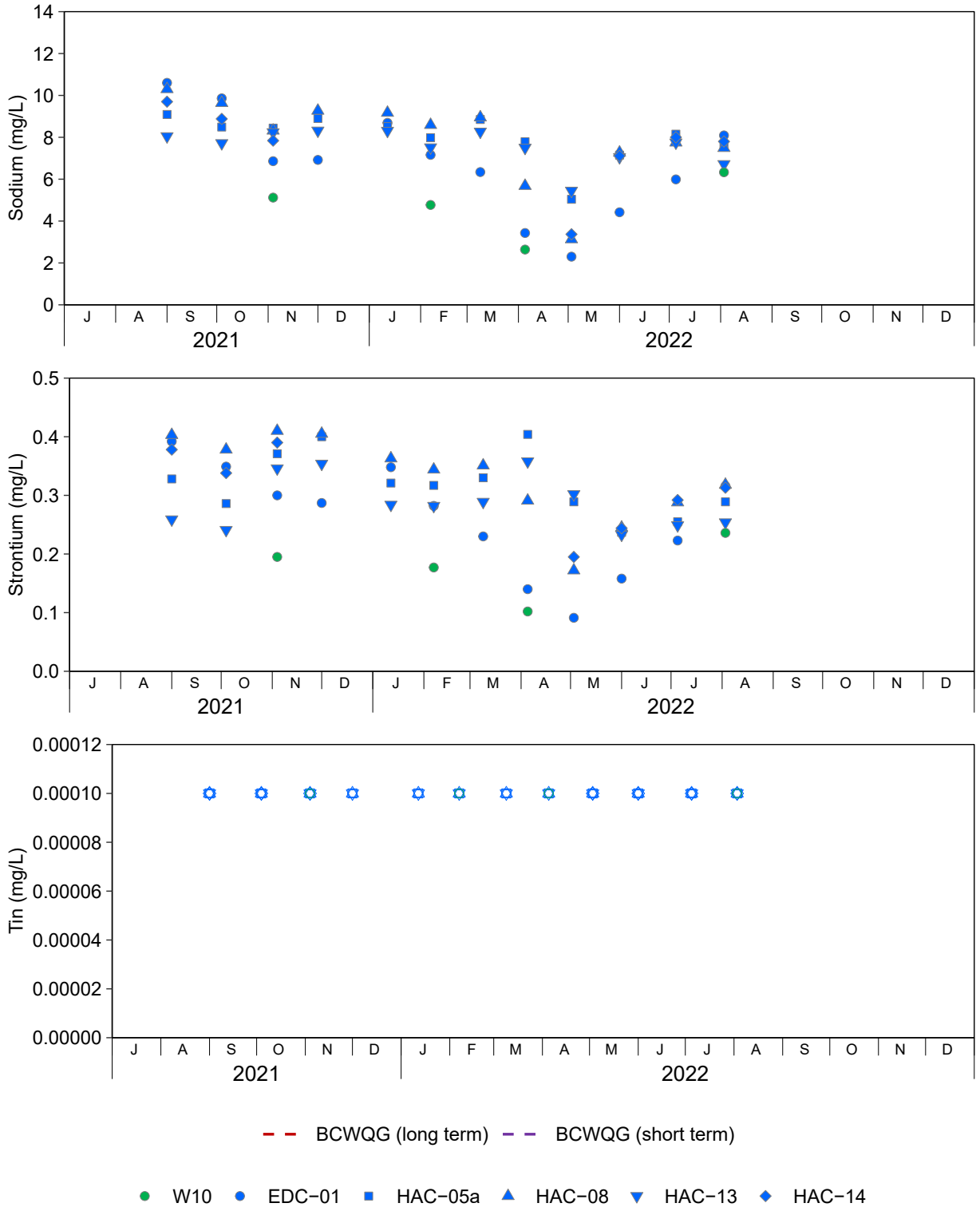

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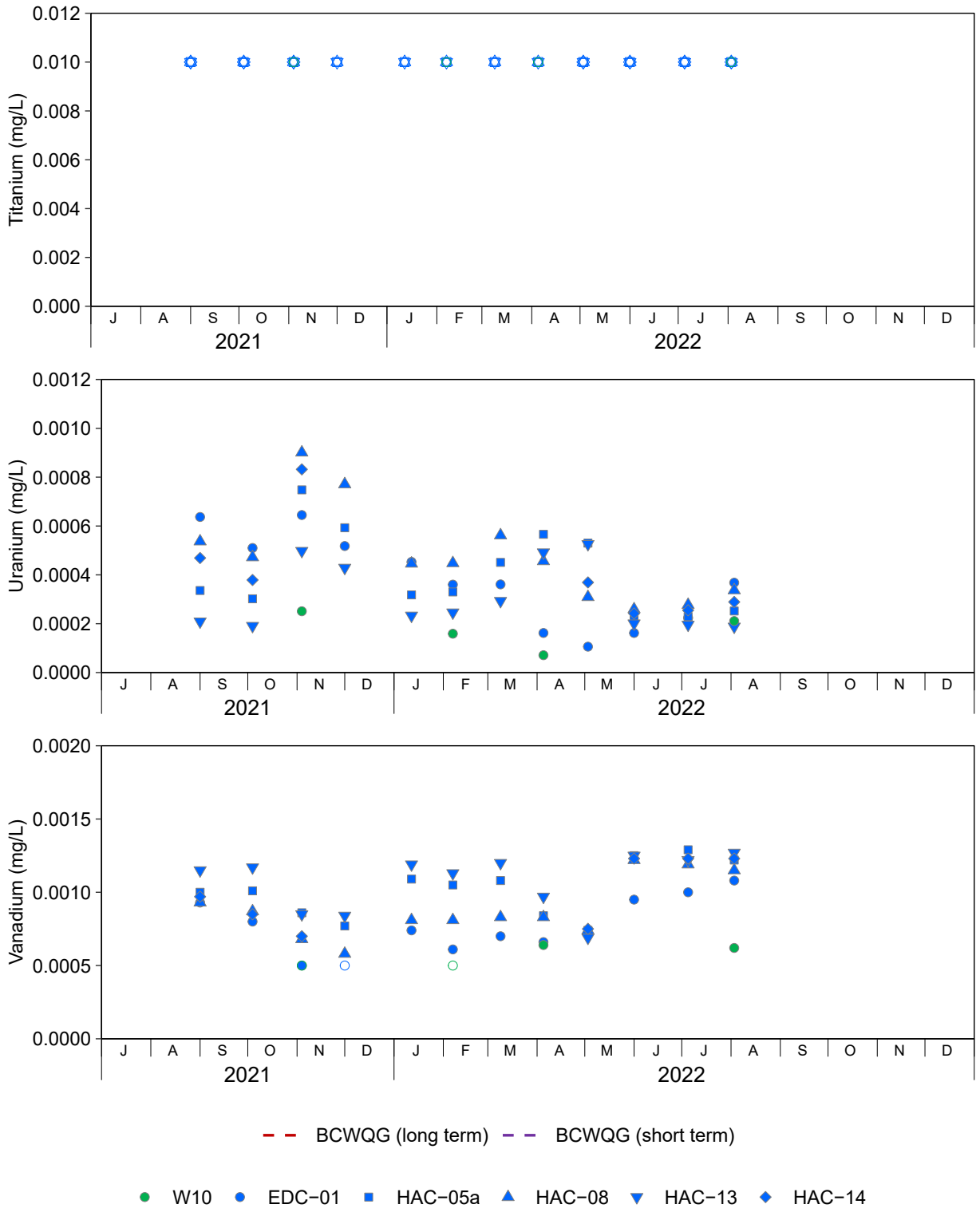

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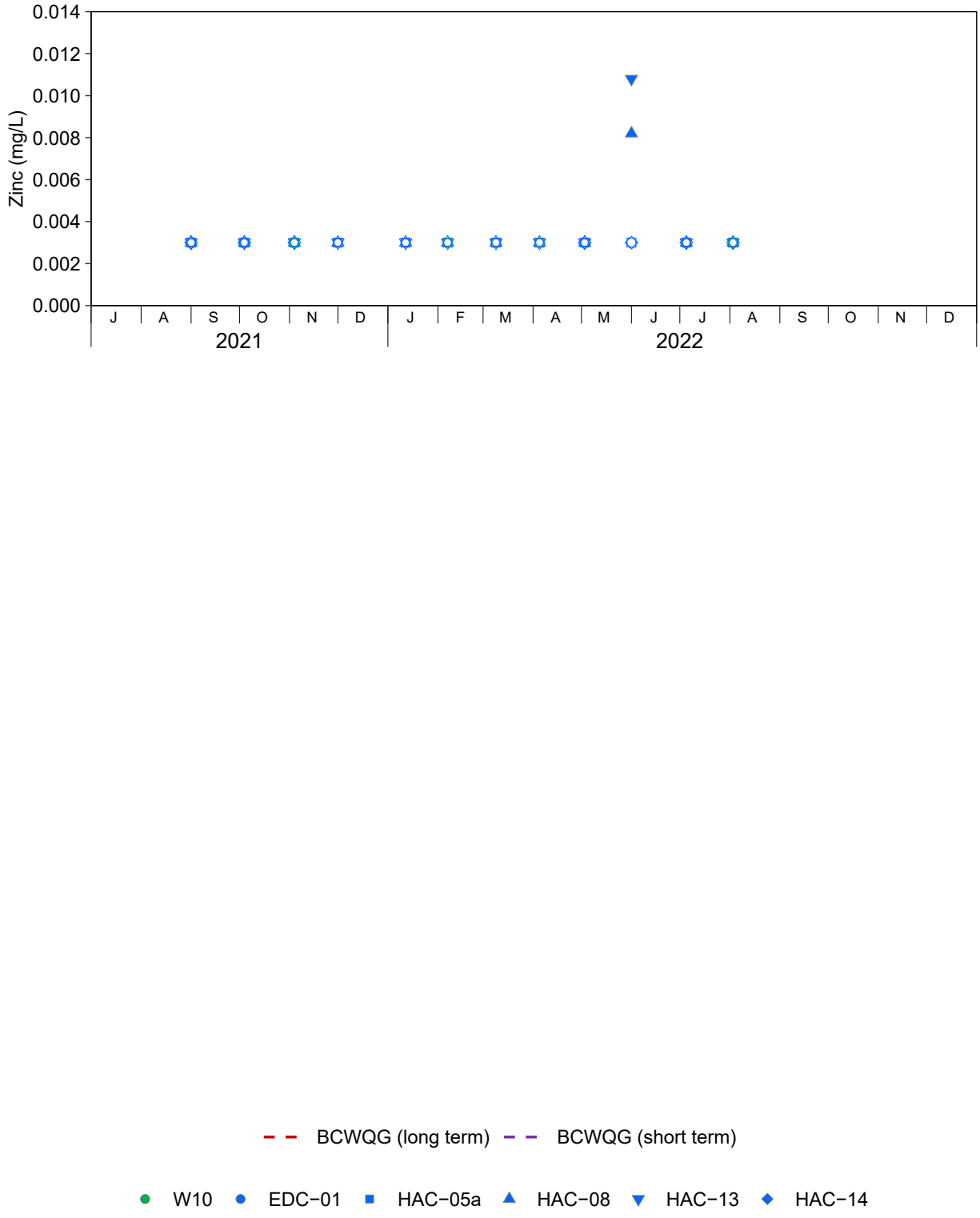

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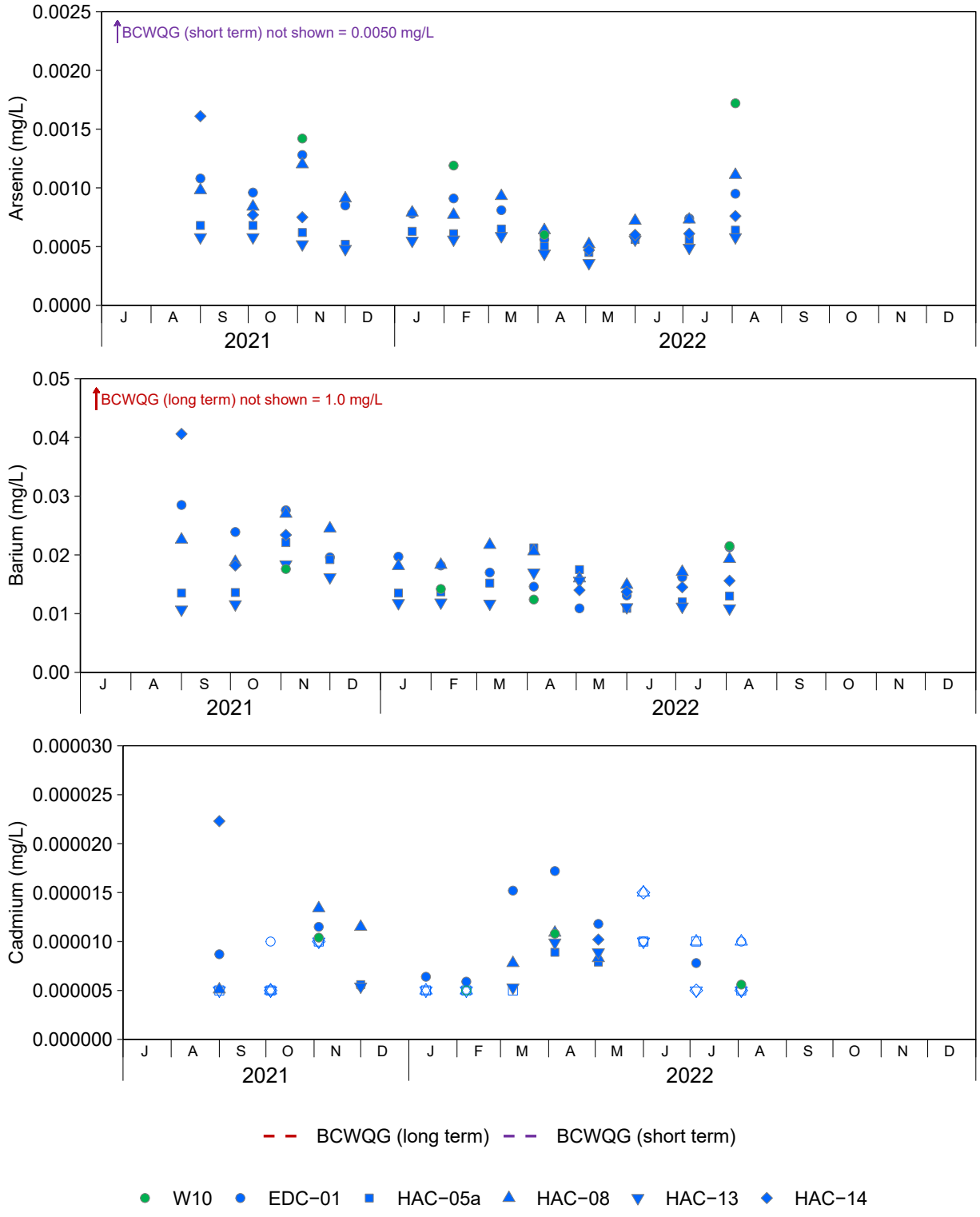

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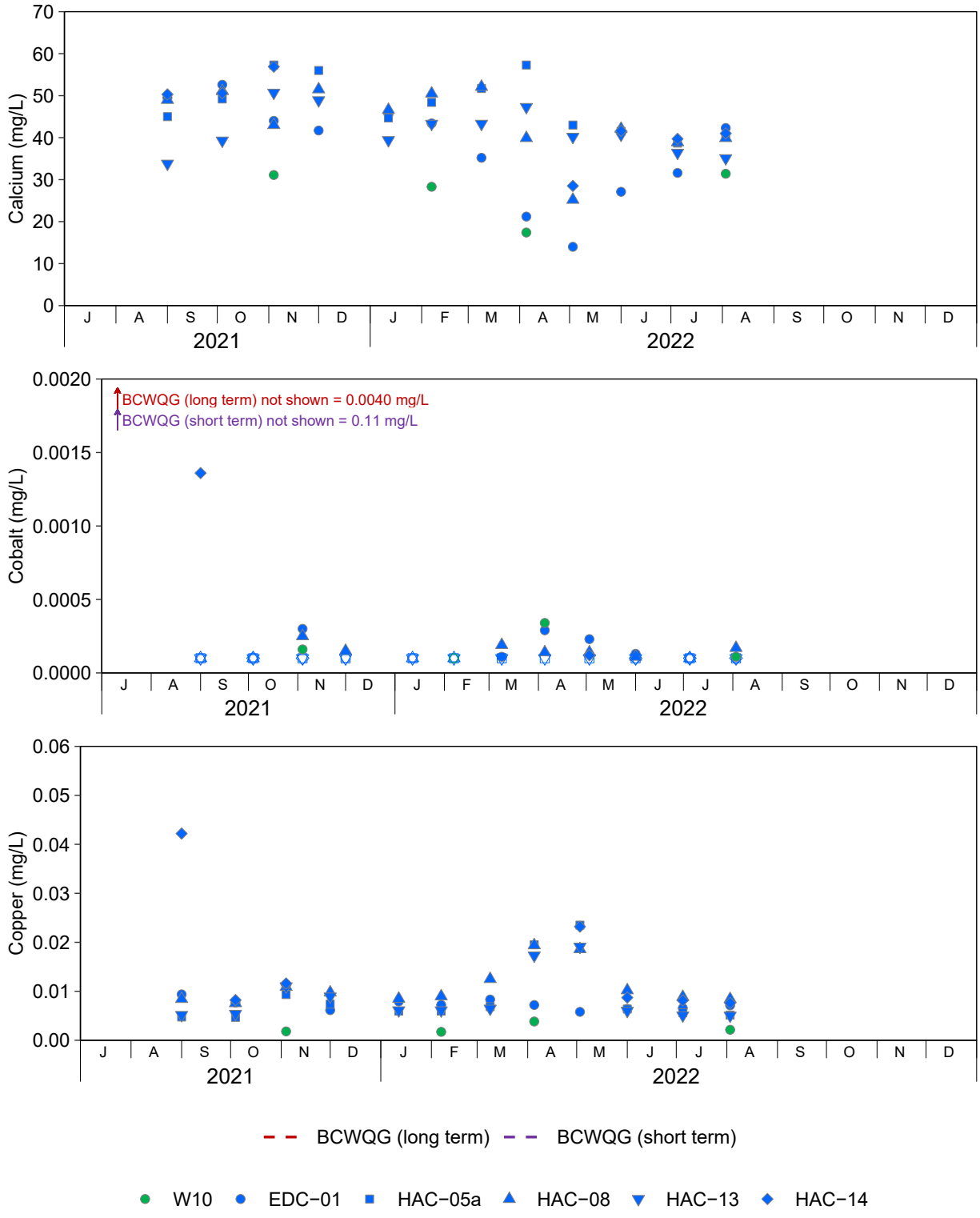

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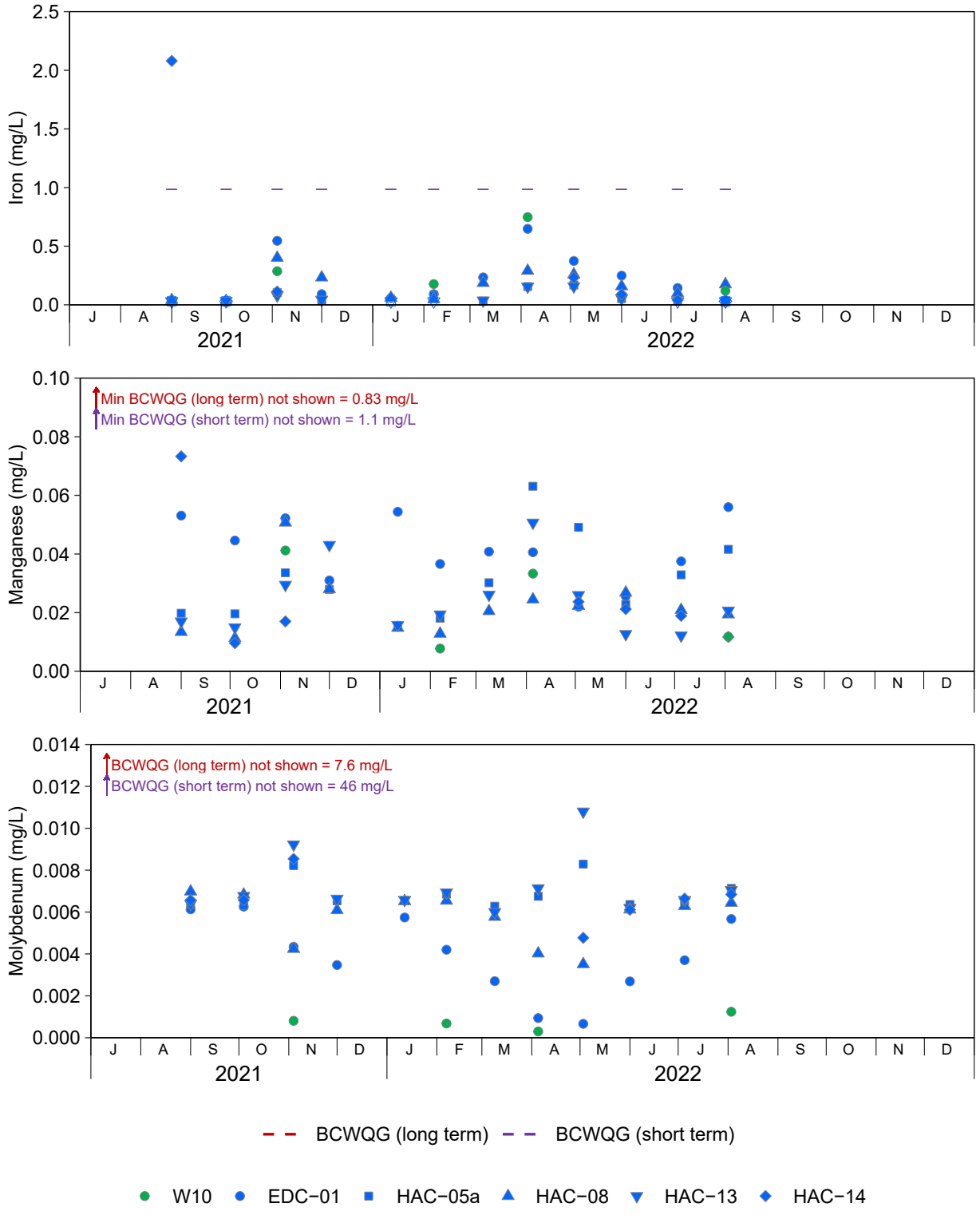

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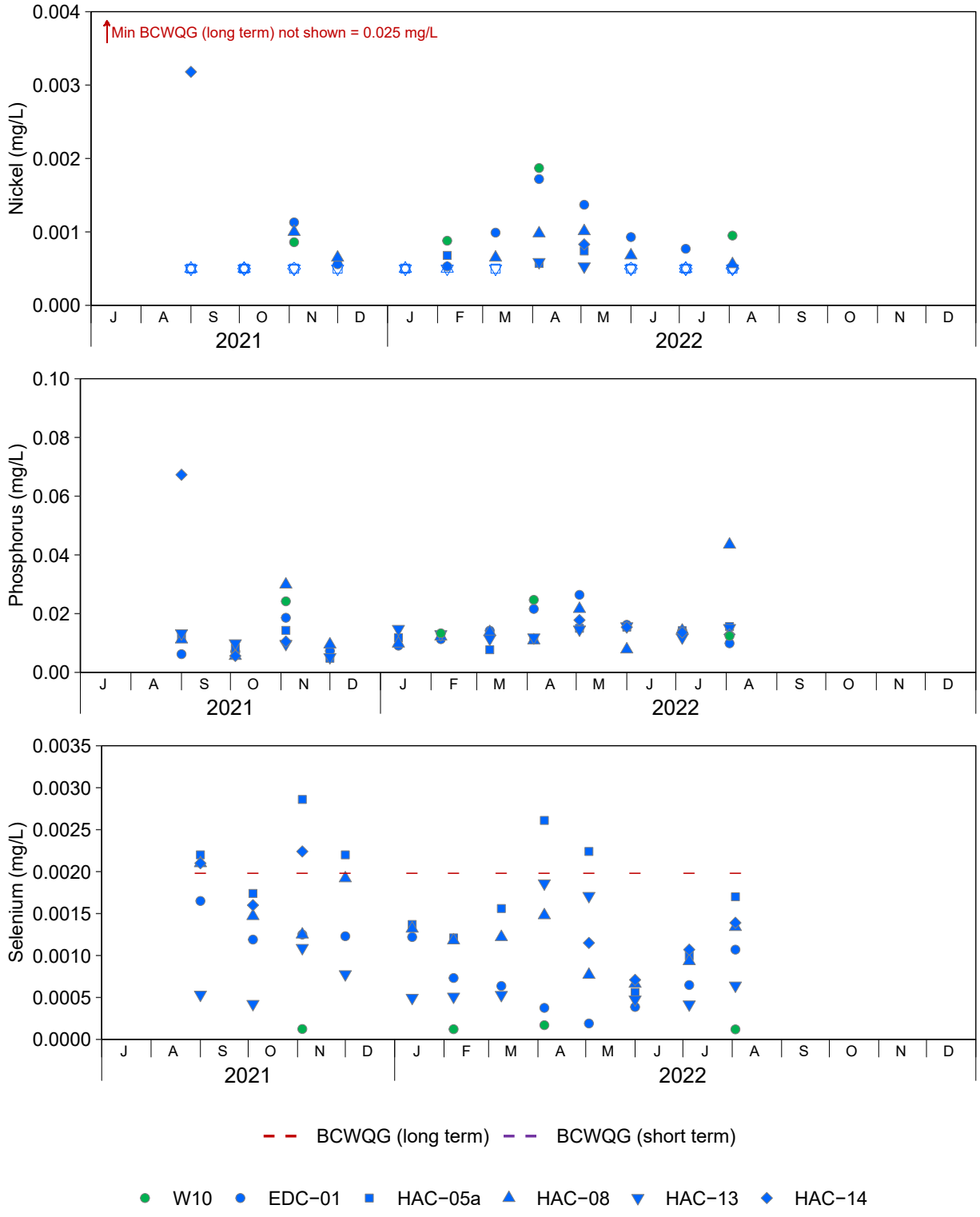

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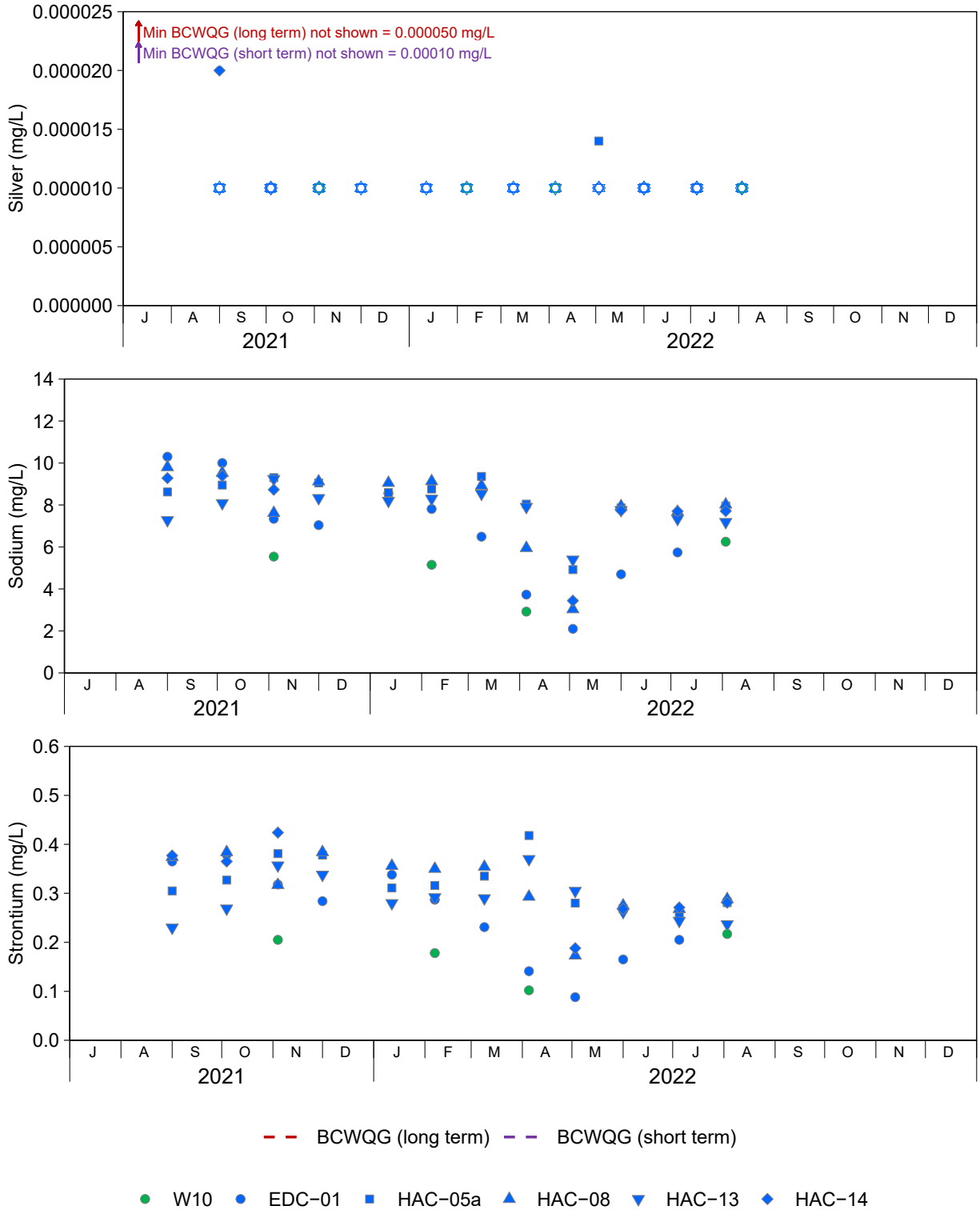

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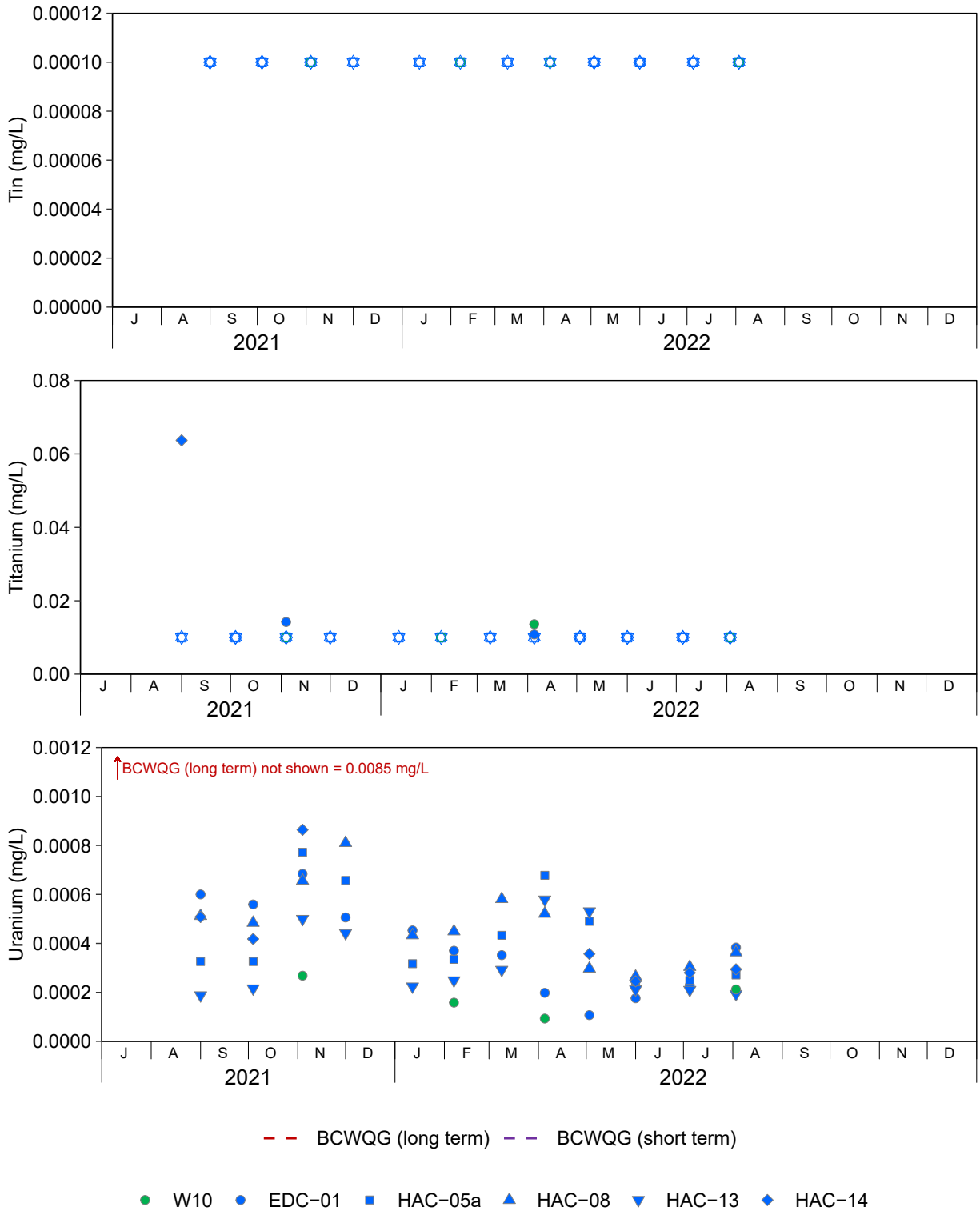

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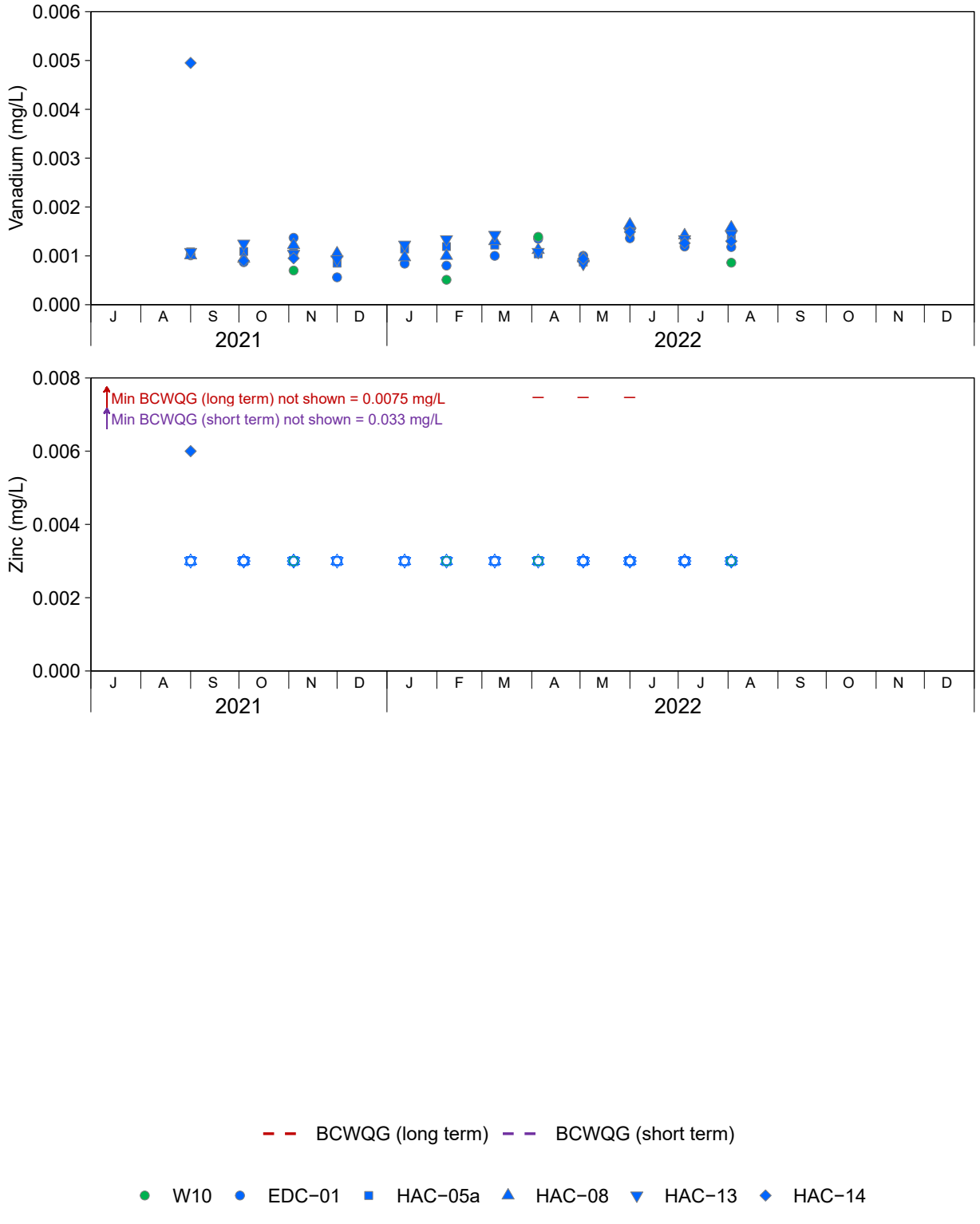

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Table D.1.1: British Columbia Water Quality Guidelines for the Protection of Aquatic Life (BCMOECCS 2019b, 2019c, 2021a, 2021b), 2022

Parameter	Units	Long-term Average	Short-term Maximum
Anions, Organics, Nutrients, and Physical Properties			
pH	pH units	6.5 - 9.0	
Temperature (*in situ*)[a]	°C	± 1	
Alkalinity ($CaCO_3$)	mg/L	> 20[b]	-
Conductivity	µS/cm	-	-
Dissolved Oxygen (*in situ*)[c]	mg/L	> 8	> 5
Dissolved Oxygen (*in situ*)[d]	mg/L	> 11	> 9
Total Suspended Solids[e]	mg/L	+ 5	+ 25
Turbidity[e]	NTU	+ 2	+ 8
Chloride	mg/L	150	600
Fluoride[f]	mg/L	-	For hardness ≤ 10 mg/L, WQG = 0.4 For hardness > 10 mg/L, WQG = [-51.73 + 92.57 × log10]×0.01 Maximum applicable hardness = 385 mg/L
Sulphate[g]	mg/L	hardness dependent	-
Ammonia (as N)[h]	mg/L	temperature and pH dependent	temperature and pH dependent
Nitrate (as N)	mg/L	3.0	32.8
Nitrite (as N)[i]	mg/L	chloride dependent	chloride dependent
Phosphorus - Total[j]	mg/L	0.005 - 0.015	
Dissolved Organic Carbon[k]	mg/L	-	± 20%[k]
Total Metals			
Antimony	µg/L	9	-
Arsenic	µg/L	-	5
Beryllium	µg/L	0.13	-
Boron	mg/L	1.2	-
Chromium[l]	µg/L	For Cr, WQG = 0.001 For Cr, WQG = 0.0089	-
Cobalt	µg/L	4	110
Iron	mg/L	-	1
Lead[f]	µg/L	For hardness ≤ 8 mg/L, none proposed For hardness 8 to 360 mg/L, WQG = 0.001×{3.31+ exp[1.273 × ln - 4.704]} Maximum applicable hardness = 360 mg/L	For hardness ≤ 8 mg/L, WQG ≤ 0.003 For hardness 8 to 360 mg/L, WQG = 0.001×{exp[1.273 × ln - 1.460]} Maximum applicable hardness = 360 mg/L
Manganese[f]	mg/L	For hardness 37 to 450 mg/L, WQG ≤ 0.004 × hardness + 0.605 Maximum applicable hardness = 450 mg/L	For hardness 25 to 259 mg/L, WQG ≤ 0.01102 × hardness + 0.54 Maximum applicable hardness = 259 mg/L
Mercury[m]	mg/L	WQG = [0.0001/] OR When MeHg = 0.5% of THg, WQG= 0.00002	-
Molybdenum	mg/L	7.6	46
Nickel[f]	µg/L	For hardness ≤60, WQG = 0.025 For hardness 60 to 180, WQG = exp{0.76[ln]+1.06} For hardness ≥180, WQG = 0.15	-
Selenium	µg/L	2	-
Silver	mg/L	For hardness ≤ 100 mg/L, WQG = 0.00005 For hardness > 100 mg/L, WQG = 0.0015	For hardness ≤ 100 mg/L, WQG = 0.0001 For hardness > 100 mg/L, WQG = 0.003
Thallium	µg/L	0.8	-
Uranium	µg/L	8.5	-
Zinc[f]	µg/L	For hardness ≤ 90 mg/L, WQG = 0.0075 For hardness 90 to 330 mg/L, WQG = [7.5 + 0.75]; Maximum applicable hardness = 330 mg/L	For hardness ≤ 90 mg/L, WQG = 0.033 For hardness 90 to 500 mg/L, WQG = [33 + 0.75]; Maximum applicable hardness = 500 mg/L
Dissolved Metals			
Aluminum	mg/L	0.05	0.1
Cadmium[f]	µg/L	For hardness = 3.4 to 285 mg/L, WQG = {exp[0.736×ln - 4.943]} Maximum applicable hardness = 285 mg/L	For hardness = 7 to 455 mg/L, WQG = {exp[1.03×ln-5.274]} Maximum applicable hardness = 455 mg/L
Copper[n]	mg/L	Biotic Ligand Model	Biotic Ligand Model
Iron	mg/L	-	0.35

Notes: "-" indicates no applicable guideline, BCMOECCS = British Columbia Ministry of Environment and Climate Change Strategy, WQG = water quality guideline.

[a] Change from optimal . No guideline applied.

[b] For waterbodies with low sensitivity to acid inputs.

[c] Minimum for all life stages other than buried embryo / alevin.

[d] Minimum for buried embryo / alevin life stages.

[e] Increase relative to background; no guideline applied.

[f] For hardness-based guidelines, concurrent hardness values were used for calculating guidelines. If hardness values exceeding the maximum applicable hardness, then guidelines were determined using the maximum applicable hardness. If hardness values are lower than the minimum hardness, then guidelines were determined using the minimum hardness.

[g] 128 mg/L at hardness 0-30 mg/L; 218 mg/L at hardness 31-75 mg/L; 309 mg/L at hardness 76-180 mg/L; 429 mg/L at hardness > 250 mg/L.

[h] Use tables in BCMOECCS 2021b.

[i] When chloride < 2 mg/L, long-term = 0.02 mg/L and short-term = 0.06 mg/L; increase with increasing chloride.

[j] Aquatic Life - Lakes; minimum guideline was applied.

[k] ±20% of the background median; no guideline applied.

[l] Chromium is the dominant oxidation state in oxygenated environments, and so its guideline was applied.

[m] Values were screened against 0.00002 mg/L which assumes MeHg = 0.5% of THg.

[n] Site specific guidelines developed using the BLM model and calculated concurrently for each sample .

Table D.1.2: Supporting Spot Water Quality Data Collected During Periphyton and Benthic Invertebrate Sampling in Hazeltine Creek, Edney Creek, and Frypan Creek, 2022

Analyte	Units	Guidelines for the Protection of Aquatic Life[a]		Upper Creek Areas					Lower Creek Areas		
				Reference		Exposed			Reference	Exposed	
				FPC-R3	EDC-U	HAC-R1	HAC-U	HAC-R3	EDC-D	E1	HAC-D
		Long-term Average	Short-term Maximum	8-Aug-22	8-Aug-22	8-Aug-22	8-Aug-22	8-Aug-22	8-Aug-22	8-Aug-22	8-Aug-22
Anions, Organics, Nutrients, and Physical Properties											
Alkalinity (as $CaCO_3$)	mg/L	>20	-	84.2	63.2	89.5	93.0	99.4	125	125	109
Ammonia (as N)	mg/L	0.26 to 1.8	1.9 to 9.5	0.0205	0.0101	0.00940	0.0227	0.00650	0.0107	0.0200	0.0122
Chloride (Cl)	mg/L	150	600	<0.50	<0.50	0.740	0.920	0.900	<0.50	<0.50	0.870
Conductivity	µS/cm	-	-	160	126	248	271	280	242	239	293
Specific Conductance (*in situ*)	µS/cm	-	-	161	125	248	273	281	237	237	281
Dissolved Organic Carbon[b]	mg/L	-	-	17.4	16.9	6.40	5.83	5.91	13.2	13.2	5.65
Dissolved Oxygen (*in situ*)	%	-	-	79.4	77.3	78.4	90.8	86.9	84.3	89.4	86.4
Dissolved Oxygen (*in situ*)	mg/L	>8	>5	8.76	8.16	7.43	8.46	7.39	8.85	9.04	7.95
Fluoride (F)	mg/L	-	1.2 to 1.5	0.0440	0.0370	0.0580	0.0620	0.0650	0.0600	0.0590	0.0710
Hardness (as $CaCO_3$)	mg/L	-	-	74.8	59.2	100	114	119	114	116	125
Hardness, from Total CaMg (as $CaCO_3$)	mg/L	-	-	81.6	66.6	113	123	123	122	118	136
Nitrate (as N)	mg/L	3.0	33	0.0915	0.0234	0.00680	0.0343	0.0351	0.00660	0.00910	0.0239
Nitrate and Nitrite (as N)	mg/L	-	-	0.0915	0.0234	0.00680	0.0343	0.0351	0.00660	0.00910	0.0239
Nitrite (as N)	mg/L	0.020	0.060	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Orthophosphate-Dissolved (as P)	mg/L	-	-	0.0306	0.00170	0.00100	0.00340	0.00490	0.00210	0.00230	0.00460
pH (*in situ*)	pH units	6.5 - 9.0	6.5 - 9.0	7.69	7.65	8.31	8.32	8.42	8.18	8.25	8.41
pH (laboratory)	pH units	-	-	8.01	7.88	8.09	8.11	8.14	8.24	8.24	8.17
Phosphorus (P) Total Dissolved	mg/L	-	-	0.0449	0.0112	0.00690	0.00940	0.00910	0.00900	0.00570	0.0121
Phosphorus (P) Total	mg/L	-	-	0.0489	0.0107	0.0127	0.0138	0.0122	0.00680	0.00680	0.00900
Sulphate	mg/L	218 to 309	-	<0.30	0.480	35.4	44.1	44.2	4.08	4.06	44.3
Temperature (*in situ*)	°C	-	-	12.0	13.0	17.9	18.3	20.0	13.1	14.9	19.3
Total Dissolved Solids	mg/L	-	-	102	114	164	191	187	158	176	203
Total Nitrogen	mg/L	-	-	0.809	0.509	0.294	0.318	0.277	0.380	0.371	0.268
Total Suspended Solids[b]	mg/L	-	-	2.50	<1.0	1.80	1.60	1.20	<1.0	<1.0	1.60
Turbidity[b]	NTU	-	-	1.53	0.670	0.580	0.580	0.540	0.230	0.260	0.470
Total Metals											
Aluminum	mg/L	-	-	0.397	0.0593	0.0386	0.0297	0.0319	0.0231	0.0272	0.0524
Antimony	mg/L	0.0090	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.000100
Arsenic	mg/L	-	0.0050	0.000840	0.000520	0.000510	0.000610	0.000690	0.00154	0.00133	0.000810
Barium	mg/L	1.0	-	0.00566	0.0108	0.0108	0.0116	0.0142	0.0180	0.0193	0.0174
Beryllium	mg/L	0.00013	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Bismuth	mg/L	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Boron	mg/L	1.2	-	<0.010	<0.010	0.0210	0.0210	0.0230	0.0140	0.0140	0.0220
Cadmium	mg/L	-	-	0.00000640	0.00000860	<0.000010	<0.0000050	<0.000010	0.00000720	<0.0000050	<0.0000050
Calcium	mg/L	-	-	24.9	17.4	36.2	38.9	38.5	33.0	31.7	42.4
Chromium	mg/L	0.0010	-	0.00123	0.000690	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Cobalt	mg/L	0.0040	0.11	0.000320	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Copper	mg/L	-	-	0.00270	0.00221	0.00477	0.00506	0.00784	0.00179	0.00306	0.00801
Iron	mg/L	-	1.0	0.719	0.140	0.0430	0.0360	0.0420	0.0830	0.0680	0.0600
Lead	mg/L	0.0052 to 0.0080	0.049 to 0.12	0.0000970	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Lithium	mg/L	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.00100	<0.0010	0.00100
Magnesium	mg/L	-	-	4.71	5.63	5.48	6.28	6.57	9.55	9.51	7.21
Manganese	mg/L	0.90 to 1.2	1.3 to 2.0	0.0408	0.0199	0.0147	0.0385	0.0201	0.00795	0.00466	0.0195
Molybdenum	mg/L	7.6	46	0.000197	0.000329	0.00685	0.00690	0.00703	0.00103	0.00105	0.00718
Nickel	mg/L	0.070 to 0.12	-	0.00107	0.00121	<0.00050	<0.00050	<0.00050	0.00116	0.000900	<0.00050
Potassium	mg/L	-	-	0.305	0.510	0.987	1.00	1.07	0.909	0.907	1.12
Selenium	mg/L	0.0020	-	0.000109	0.000129	0.000607	0.00120	0.00126	0.000128	0.000155	0.00122
Silicon	mg/L	-	-	7.43	3.34	3.13	3.45	3.82	5.42	5.18	3.90
Silver	mg/L	0.000050 to 0.0015	0.00010 to 0.0030	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium	mg/L	-	-	4.83	2.44	7.16	7.50	7.97	5.36	5.31	7.98
Strontium	mg/L	-	-	0.0936	0.113	0.251	0.271	0.271	0.223	0.220	0.302
Thallium	mg/L	0.00080	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Tin	mg/L	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium	mg/L	-	-	0.0149	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Uranium	mg/L	0.0085	-	0.0000420	0.0000600	0.000189	0.000230	0.000277	0.000166	0.000185	0.000305
Vanadium	mg/L	-	-	0.00289	0.000800	0.00148	0.00143	0.00147	0.000640	0.000770	0.00148
Zinc	mg/L	0.0075 to 0.042	0.033 to 0.068	0.00500	<0.0030	<0.0030	<0.0030	<0.0030	0.00610	<0.0030	<0.0030
Dissolved Metals											
Aluminum	mg/L	0.050	0.10	0.0392	0.0333	0.00470	0.00410	0.00560	0.0142	0.0150	0.00620
Antimony	mg/L	-	-	<0.00010	<0.00010	<0.00010	0.000100	<0.00010	<0.00010	<0.00010	0.000100
Arsenic	mg/L	-	-	0.000780	0.000410	0.000460	0.000460	0.000700	0.00150	0.00130	0.000780
Barium	mg/L	-	-	0.00274	0.00842	0.00832	0.00932	0.0130	0.0168	0.0193	0.0164
Beryllium	mg/L	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Bismuth	mg/L	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Boron	mg/L	-	-	<0.010	<0.010	0.0200	0.0200	0.0200	0.0130	0.0130	0.0200
Cadmium	mg/L	0.00016 to 0.00027	0.00039 to 0.00081	0.00000500	0.00000920	<0.0000050	<0.0000050	0.00000610	<0.0000050	0.00000510	<0.0000050
Calcium	mg/L	-	-	22.9	16.2	33.0	37.4	37.0	31.0	31.1	38.6
Chromium	mg/L	-	-	<0.00050	0.000500	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Cobalt	mg/L	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Copper	mg/L	0.0049 to 0.0094	0.028 to 0.054	0.00177	0.00181	0.00336	0.00367	0.00644	0.00150	0.00287	0.00684
Iron	mg/L	-	0.35	0.307	0.106	<0.030	<0.030	<0.030	0.0740	0.0530	<0.030
Lead	mg/L	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Lithium	mg/L	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Magnesium	mg/L	-	-	4.28	4.55	4.28	5.11	6.43	8.97	9.33	6.90
Manganese	mg/L	-	-	0.0122	0.0118	0.00504	0.0221	0.00537	0.00605	0.00356	0.00766
Molybdenum	mg/L	-	-	0.000214	0.000331	0.00673	0.00663	0.00694	0.00102	0.00106	0.00691
Nickel	mg/L	-	-	0.000700	0.00100	<0.00050	<0.00050	<0.00050	0.000860	0.000880	<0.00050
Potassium	mg/L	-	-	0.247	0.402	0.782	0.821	1.02	0.862	0.906	1.05
Selenium	mg/L	-	-	0.0000900	0.000130	0.000625	0.00126	0.00129	0.000148	0.000173	0.00120
Silicon	mg/L	-	-	6.64	3.11	2.83	3.11	3.73	5.32	5.35	3.76
Silver	mg/L	-	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium	mg/L	-	-	4.75	2.08	6.14	6.42	7.52	5.16	5.36	8.12
Strontium	mg/L	-	-	0.0903	0.110	0.242	0.252	0.275	0.211	0.214	0.289
Thallium	mg/L	-	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Tin	mg/L	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium	mg/L	-	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Uranium	mg/L	-	-	0.0000300	0.0000610	0.000194	0.000224	0.000266	0.000171	0.000188	0.000310
Vanadium	mg/L	-	-	0.00174	0.000570	0.00114	0.00110	0.00131	0.000540	0.000620	0.00128
Zinc	mg/L	-	-	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	0.00500

Indicates value greater than the long-term average British Columbia Water Quality Guideline (BCMOECCS 2019c, 2021a,b).
Indicates value greater than the short-term maximum British Columbia Water Quality Guideline (BCMOECCS 2019c, 2021a,b).
Note: "-" indicates data not available or no applicable guideline exists.

[a] Guidelines were derived from the British Columbia Water Quality Guidelines for the protection of aquatic life (BCMOECCS 2019c, 2021a,b) outlined in Table D.1.1.
[b] Guidelines for these parameters (Total Suspended Solids, Turbidity, Dissolved Organic Carbon) are narrative and were not evaluated.

Table D.1.3: Surface Water Sample Data Collected Routinely at HAC-13 in Upper Hazeltine Creek, September 2021 to August 2022

Analyte	Units	British Columbia Water Quality Guidelines[a]		Date												Sample Size	Mean	Standard Deviation	Minimum	Maximum	% <LRL	% >Chronic GL[b]	% >Acute GL[b]
		Long-term Average	Short-term Maximum	1-Sep-21	4-Oct-21	4-Nov-21	1-Dec-21	12-Jan-22	7-Feb-22	9-Mar-22	5-Apr-22	3-May-22	1-Jun-22	5-Jul-22	3-Aug-22								
Anions, Organics, Nutrients, and Physical Properties																							
Alkalinity (as $CaCO_3$)	mg/L	>20	-	96.4	99.4	112	112	105	104	106	99.2	84.3	89.8	88.5	90.4	12	99	9.2	84	112	0%	0%	-
Ammonia (as N)	mg/L	0.36 to 2.0	1.9 to 14	0.00860	0.00920	0.00760	0.00520	0.00770	<0.0050	0.00590	0.00720	0.00800	0.00960	0.00680	0.0182	12	0.0082	0.0035	<0.0050	0.018	8%	0%	0%
Chloride	mg/L	150	600	0.860	0.880	0.940	0.740	0.940	0.920	0.880	0.560	<0.50	0.800	0.750	0.770	12	0.80	0.13	<0.50	0.94	8%	0%	0%
Conductivity	µS/cm	-	-	259	262	342	301	283	277	291	315	275	252	246	254	12	280	29	246	342	0%	-	-
Specific Conductance (*in situ*)	µS/cm	-	-	259	-	342	341	286	273	281	313	268	246	252	288	11	286	33	246	342	0%	-	-
Dissolved Organic Carbon	mg/L	-	-	6.39	5.86	6.82	6.44	6.62	5.98	7.87	14.2	11.1	6.92	6.71	6.65	12	7.6	2.5	5.9	14	0%	-	-
Dissolved Oxygen (*in situ*)	%	-	-	104	-	84.1	79.8	87.6	91.6	90.9	89.5	88.0	93.1	92.4	87.4	11	90	6.0	80	104	0%	-	-
Dissolved Oxygen (*in situ*)	mg/L	>8	>5	10.4	-	10.6	11.4	12.7	12.8	12.2	12.5	11.3	10.2	9.02	7.98	11	11	1.6	8.0	13	0%	9%	0%
Fluoride	mg/L	-	1.4 to 1.5	0.0720	0.0820	0.0920	0.0600	0.0840	0.0850	0.0770	0.0920	0.113	0.0710	0.0670	0.0690	12	0.080	0.014	0.060	0.11	0%	-	0%
Hardness (as $CaCO_3$)	mg/L	-	-	119	120	148	155	120	126	134	154	129	110	118	111	12	129	16	110	155	0%	-	-
Nitrate (as N)	mg/L	3.0	33	0.00980	<0.0050	0.0190	0.0203	0.0520	0.0356	0.0213	0.0564	0.00980	<0.0050	0.00620	0.0174	12	0.021	0.018	<0.0050	0.056	17%	0%	0%
Nitrate and Nitrite (as N)	mg/L	-	-	0.00980	<0.0051	0.0190	0.0214	0.0520	0.0356	0.0213	0.0564	0.00980	<0.0051	0.00620	0.0174	12	0.022	0.018	<0.0051	0.056	17%	-	-
Nitrite (as N)	mg/L	0.020	0.060	<0.0010	<0.0010	<0.0010	0.00110	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	12	0.0010	-	<0.0010	0.0011	92%	0%	0%
Dissolved Orthophosphate	mg/L	-	-	0.00520	0.00190	0.00140	0.00320	0.00820	0.00720	0.00260	0.00120	<0.0010	0.00180	0.00140	0.00460	12	0.0033	0.0024	<0.0010	0.0082	8%	-	-
pH (*in situ*)	pH units	6.5-9.0	6.5-9.0	8.44	-	7.84	7.80	8.04	7.98	7.95	7.45	7.60	8.26	8.07	8.10	11	8.0	0.28	7.4	8.4	0%	0%	0%
pH (laboratory)	pH units	6.5-9.0	6.5-9.0	8.26	8.26	8.11	7.87	7.97	8.12	8.14	7.93	8.14	8.16	8.20	8.18	12	8.1	0.13	7.9	8.3	0%	-	-
Dissolved Phosphorus	mg/L	-	-	0.00970	0.00700	0.00730	0.00410	0.0107	0.0118	0.00840	0.00610	0.00800	0.00800	0.00910	0.0100	12	0.0084	0.0021	0.0041	0.012	0%	-	-
Total Phosphorus	mg/L	-	-	0.0133	0.00990	0.00970	0.00520	0.0148	0.0130	0.0115	0.0119	0.0146	0.0157	0.0119	0.0151	12	0.012	0.0030	0.0052	0.016	0%	-	-
Sulphate	mg/L	309	-	36.2	36.3	62.7	61.4	42.4	43.8	44.6	61.6	53.1	35.0	34.9	34.7	12	46	11	35	63	0%	0%	-
Temperature (*in situ*)	°C	-	-	15.1	-	5.59	0.825	0.273	1.53	2.90	1.60	4.86	10.9	16.5	19.8	11	7.2	7.1	0.27	20	0%	-	-
Total Dissolved Solids	mg/L	-	-	174	169	228	154	174	176	182	213	131	171	171	160	12	175	25	131	228	0%	-	-
Total Nitrogen	mg/L	-	-	0.286	0.265	0.272	0.227	0.286	0.298	0.308	0.483	0.362	0.290	0.268	0.297	12	0.30	0.065	0.23	0.48	0%	-	-
Total Suspended Solids	mg/L	-	-	<1.0	1.40	1.50	<1.0	3.30	<1.0	<1.0	<1.0	1.40	2.50	1.60	1.00	12	1.5	0.75	<1.0	3.3	42%	-	-
Turbidity (*in situ*)	NTU	-	-	0.680	-	1.21	1.02	0.200	0.370	0.800	1.39	2.08	0.630	1.97	0.900	11	1.0	0.60	0.20	2.1	0%	-	-
Turbidity	NTU	-	-	0.340	0.510	1.20	1.71	0.410	0.410	0.410	1.04	1.46	0.660	0.300	0.510	12	0.75	0.48	0.30	1.7	0%	-	-
Total Metals																							
Aluminum	mg/L	-	-	0.0104	0.0260	0.0518	0.0346	0.0163	0.0152	0.0196	0.104	0.124	0.0520	0.0203	0.0189	12	0.041	0.037	0.010	0.12	0%	-	-
Antimony	mg/L	0.0090	-	<0.00010	<0.00010	0.000100	0.000110	<0.00010	0.000100	<0.00010	<0.00010	0.000100	<0.00010	<0.00010	<0.00010	12	0.00010	0.0000032	<0.00010	0.00011	67%	0%	-
Arsenic	mg/L	-	0.0050	0.000580	0.000580	0.000520	0.000480	0.000550	0.000560	0.000590	0.000440	0.000360	0.000560	0.000490	0.000580	12	0.00052	0.000070	0.00036	0.00059	0%	-	0%
Barium	mg/L	1.0	-	0.0107	0.0116	0.0184	0.0162	0.0118	0.0119	0.0117	0.0170	0.0156	0.0111	0.0112	0.0109	12	0.013	0.0028	0.011	0.018	0%	0%	-
Beryllium	mg/L	0.00013	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	12	<0.00010	-	<0.00010	<0.00010	100%	0%	-
Bismuth	mg/L	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	12	<0.000050	-	<0.000050	<0.000050	100%	-	-
Boron	mg/L	1.2	-	0.0210	0.0210	0.0190	0.0200	0.0210	0.0220	0.0210	0.0160	0.0120	0.0190	0.0220	0.0210	12	0.020	0.0029	0.012	0.022	0%	0%	-
Cadmium	mg/L	-	-	<0.0000050	<0.0000050	<0.000010	0.00000540	<0.0000050	<0.0000050	0.00000530	0.00000990	0.00000890	<0.000010	<0.0000050	<0.0000050	12	0.0000060	0.0000021	<0.0000050	0.0000099	67%	-	-
Calcium	mg/L	-	-	33.8	39.3	50.7	48.9	39.4	43.3	43.3	47.3	40.2	40.7	36.4	35.1	12	42	5.4	34	51	0%	-	-
Chromium	mg/L	0.0010	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	12	<0.00050	-	<0.00050	<0.00050	100%	0%	-
Cobalt	mg/L	0.0040	0.11	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	12	<0.00010	-	<0.00010	<0.00010	100%	0%	0%
Copper	mg/L	-	-	0.00516	0.00540	0.0110	0.00893	0.00612	0.00611	0.00646	0.0173	0.0191	0.00601	0.00507	0.00502	12	0.0085	0.0049	0.0050	0.019	0%	-	-
Iron	mg/L	-	1.0	<0.030	0.0320	0.0800	0.0440	<0.030	<0.030	0.0370	0.155	0.158	0.0550	<0.030	<0.030	12	0.059	0.049	<0.030	0.16	42%	-	0%
Lead	mg/L	0.0069 to 0.0089	0.092 to 0.14	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	12	<0.000050	-	<0.000050	<0.000050	100%	0%	0%
Lithium	mg/L	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	12	<0.0010	-	<0.0010	<0.0010	100%	-	-
Magnesium	mg/L	-	-	5.08	5.56	7.86	7.28	5.96	5.93	6.48	8.22	5.94	5.70	5.36	5.20	12	6.2	1.0	5.1	8.2	0%	-	-
Manganese	mg/L	1.1 to 1.3	1.8 to 2.2	0.0170	0.0150	0.0295	0.0431	0.0158	0.0194	0.0261	0.0507	0.0260	0.0127	0.0122	0.0207	12	0.024	0.012	0.012	0.051	0%	0%	0%
Molybdenum	mg/L	7.6	46	0.00640	0.00677	0.00923	0.00664	0.00658	0.00694	0.00600	0.00714	0.0108	0.00620	0.00658	0.00705	12	0.0072	0.0014	0.0060	0.011	0%	0%	0%
Nickel	mg/L	0.10 to 0.13	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.000590	0.000530	<0.00050	<0.00050	<0.00050	12	0.00051	0.000023	<0.00050	0.00059	83%	0%	-
Potassium	mg/L	-	-	0.996	1.13	1.44	1.18	1.10	1.12	1.12	1.18	1.01	0.943	1.02	1.03	12	1.1	0.13	0.94	1.4	0%	-	-
Selenium	mg/L	0.0020	-	0.000533	0.000423	0.00109	0.000777	0.000496	0.000510	0.000530	0.00186	0.00171	0.000476	0.000417	0.000642	12	0.00079	0.00050	0.00042	0.0019	0%	0%	-
Silicon	mg/L	-	-	2.95	3.04	3.26	3.16	3.49	3.70	3.70	4.77	4.05	3.30	2.87	3.04	12	3.4	0.55	2.9	4.8	0%	-	-
Silver	mg/L	0.0015	0.0030	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	12	<0.000010	-	<0.000010	<0.000010	100%	0%	0%
Sodium	mg/L	-	-	7.28	8.09	9.24	8.33	8.20	8.30	8.54	7.91	5.40	7.76	7.34	7.19	12	7.8	0.95	5.4	9.2	0%	-	-
Strontium	mg/L	-	-	0.230	0.269	0.357	0.338	0.280	0.292	0.290	0.370	0.305	0.262	0.244	0.237	12	0.29	0.046	0.23	0.37	0%	-	-
Thallium	mg/L	0.00080	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	12	<0.000010	-	<0.000010	<0.000010	100%	0%	-
Tin	mg/L	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	12	<0.00010	-	<0.00010	<0.00010	100%	-	-
Titanium	mg/L	-	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	12	<0.010	-	<0.010	<0.010	100%	-	-
Uranium	mg/L	0.0085	-	0.000188	0.000216	0.000500	0.000442	0.000224	0.000249	0.000292	0.000579	0.000531	0.000212	0.000210	0.000193	12	0.00032	0.00015	0.00019	0.00058	0%	0%	-
Vanadium	mg/L	-	-	0.00108	0.00125	0.00104	0.000930	0.00123	0.00134	0.00143	0.00108	0.000840	0.00149	0.00134	0.00144	12	0.0012	0.00021	0.00084	0.0015	0%	-	-
Zinc	mg/L	0.022 to 0.056	0.048 to 0.082	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	12	<0.0030	-	<0.0030	<0.0030	100%	0%	0%

Indicates value greater than the long-term average British Columbia Water Quality Guideline (BCMOECCS 2019b,c, 2021a,b).
Indicates value greater than the short-term maximum British Columbia Water Quality Guideline (BCMOECCS 2019b,c, 2021a,b).
Percent exceedance > 0%.

Notes: "-" = data not available or no applicable guideline exists. < LRL = below laboratory reporting limit. GL = guideline. Guidelines for these parameters (Total Suspended Solids, Turbidity, Dissolved Organic Carbon) are narrative and were not evaluated.

[a] Guidelines were derived from the British Columbia Water Quality Guidelines for the protection of aquatic life (BCMOECCS 2019b,c, 2021a,b) outlined in Table D.1.1.
[b] % displayed for pH indicates results falling outside the guideline range. % displayed for dissolved oxygen indicates results below the guideline.

Table D.1.3: Surface Water Sample Data Collected Routinely at HAC-13 in Upper Hazeltine Creek, September 2021 to August 2022

Analyte	Units	British Columbia Water Quality Guidelines[a]		Date												Sample Size	Mean	Standard Deviation	Minimum	Maximum	% <LRL	% >Chronic GL[b]	% >Acute GL[b]
		Long-term Average	Short-term Maximum	1-Sep-21	4-Oct-21	4-Nov-21	1-Dec-21	12-Jan-22	7-Feb-22	9-Mar-22	5-Apr-22	3-May-22	1-Jun-22	5-Jul-22	3-Aug-22								
Dissolved Metals																							
Aluminum	mg/L	0.050	0.10	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	0.00840	0.0625	0.0618	0.0134	0.00350	0.00500	12	0.014	0.023	<0.0030	0.062	50%	17%	0%
Antimony	mg/L	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	12	<0.00010	-	<0.00010	<0.00010	100%	-	-
Arsenic	mg/L	-	-	0.000550	0.000540	0.000470	0.000500	0.000520	0.000500	0.000520	0.000410	0.000300	0.000510	0.000540	0.000490	12	0.00049	0.000070	0.00030	0.00055	0%	-	-
Barium	mg/L	-	-	0.0111	0.0112	0.0147	0.0160	0.0115	0.0110	0.0113	0.0159	0.0145	0.0104	0.0111	0.00987	12	0.012	0.0022	0.0099	0.016	0%	-	-
Beryllium	mg/L	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	12	<0.00010	-	<0.00010	<0.00010	100%	-	-
Bismuth	mg/L	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	12	<0.000050	-	<0.000050	<0.000050	100%	-	-
Boron	mg/L	-	-	0.0210	0.0180	0.0190	0.0210	0.0200	0.0210	0.0180	0.0140	0.0120	0.0190	0.0180	0.0200	12	0.018	0.0028	0.012	0.021	0%	-	-
Cadmium	mg/L	0.00023 to 0.00029	0.00065 to 0.00092	<0.0000050	<0.0000050	<0.0000050	0.00000500	<0.0000050	<0.0000050	<0.0000050	0.00000730	0.00000660	<0.0000050	<0.0000050	<0.000010	12	0.0000054	0.00000098	<0.0000050	0.0000073	75%	0%	0%
Calcium	mg/L	-	-	38.5	38.6	47.2	50.5	38.5	41.6	43.3	48.2	42.3	35.4	39.0	36.5	12	42	4.8	35	50	0%	-	-
Chromium	mg/L	-	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	12	<0.00050	-	<0.00050	<0.00050	100%	-	-
Cobalt	mg/L	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	12	<0.00010	-	<0.00010	<0.00010	100%	-	-
Copper	mg/L	0.0032 to 0.0052	0.019 to 0.031	0.00482	0.00436	0.00812	0.00757	0.00559	0.00500	0.00602	0.0148	0.0166	0.00581	0.00453	0.00436	12	0.0073	0.0041	0.0044	0.017	0%	75%	0%
Iron	mg/L	-	0.35	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	0.0810	0.0990	<0.030	<0.030	<0.030	12	0.040	0.0070	<0.030	0.099	83%	-	0%
Lead	mg/L	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	12	<0.000050	-	<0.000050	<0.000050	100%	-	-
Lithium	mg/L	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	12	<0.0010	-	<0.0010	<0.0010	100%	-	-
Magnesium	mg/L	-	-	5.46	5.72	7.26	7.09	5.88	5.40	6.36	8.27	5.72	5.18	5.14	4.81	12	6.0	1.0	4.8	8.3	0%	-	-
Manganese	mg/L	-	-	0.0145	0.0118	0.0237	0.0420	0.0114	0.0162	0.0242	0.0446	0.0210	0.00444	0.00787	0.0124	12	0.020	0.013	0.0044	0.045	0%	-	-
Molybdenum	mg/L	-	-	0.00667	0.00639	0.00916	0.00658	0.00680	0.00660	0.00611	0.00661	0.0102	0.00587	0.00619	0.00679	12	0.0070	0.0013	0.0059	0.010	0%	-	-
Nickel	mg/L	-	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.000610	<0.00050	<0.00050	<0.00050	<0.00050	12	0.00051	-	<0.00050	0.00061	92%	-	-
Potassium	mg/L	-	-	1.08	1.03	1.33	1.24	1.15	1.03	1.07	1.06	0.964	1.06	0.981	0.899	12	1.1	0.12	0.90	1.3	0%	-	-
Selenium	mg/L	-	-	0.000478	0.000491	0.00119	0.000862	0.000440	0.000450	0.000645	0.00158	0.00161	0.000474	0.000541	0.000606	12	0.00078	0.00044	0.00044	0.0016	0%	-	-
Silicon	mg/L	-	-	3.17	2.95	3.08	3.20	3.28	3.20	3.78	4.16	3.60	3.32	3.14	2.87	12	3.3	0.37	2.9	4.2	0%	-	-
Silver	mg/L	-	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	0.0000200	<0.000010	<0.000010	12	0.000011	-	<0.000010	0.000020	92%	-	-
Sodium	mg/L	-	-	8.05	7.72	8.24	8.32	8.31	7.52	8.27	7.50	5.45	7.05	7.75	6.72	12	7.6	0.84	5.4	8.3	0%	-	-
Strontium	mg/L	-	-	0.259	0.241	0.346	0.354	0.284	0.282	0.289	0.358	0.302	0.233	0.249	0.254	12	0.29	0.044	0.23	0.36	0%	-	-
Thallium	mg/L	-	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	12	<0.000010	-	<0.000010	<0.000010	100%	-	-
Tin	mg/L	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	12	<0.00010	-	<0.00010	<0.00010	100%	-	-
Titanium	mg/L	-	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	12	<0.010	-	<0.010	<0.010	100%	-	-
Uranium	mg/L	-	-	0.000209	0.000191	0.000498	0.000429	0.000233	0.000246	0.000293	0.000492	0.000526	0.000201	0.000196	0.000188	12	0.00031	0.00014	0.00019	0.00053	0%	-	-
Vanadium	mg/L	-	-	0.00115	0.00117	0.000850	0.000840	0.00119	0.00113	0.00120	0.000970	0.000690	0.00125	0.00122	0.00127	12	0.0011	0.00019	0.00069	0.0013	0%	-	-
Zinc	mg/L	-	-	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	0.0108	<0.0030	<0.0030	12	0.0036	-	<0.0030	0.011	92%	-	-

Indicates value greater than the long-term average British Columbia Water Quality Guideline (BCMOECCS 2019b,c, 2021a,b).
Indicates value greater than the short-term maximum British Columbia Water Quality Guideline (BCMOECCS 2019b,c, 2021a,b).
Percent exceedance > 0%.

Notes: "-" = data not available or no applicable guideline exists. < LRL = below laboratory reporting limit. GL = guideline. Guidelines for these parameters (Total Suspended Solids, Turbidity, Dissolved Organic Carbon) are narrative and were not evaluated.

[a] Guidelines were derived from the British Columbia Water Quality Guidelines for the protection of aquatic life (BCMOECCS 2019b,c, 2021a,b) outlined in Table D.1.1.

[b] % displayed for pH indicates results falling outside the guideline range. % displayed for dissolved oxygen indicates results below the guideline.

Table D.1.4: Surface Water Sample Data Collected Routinely at HAC-05a in Upper Hazeltine Creek, September 2021 to August 2022

Analyte	Units	British Columbia Water Quality Guidelines[a]		Date											Sample Size	Mean	Standard Deviation	Minimum	Maximum	% <LRL	% >Chronic GL[b]	% >Acute GL[b]
		Long-term Average	Short-term Maximum	1-Sep-21	4-Oct-21	4-Nov-21	1-Dec-21	12-Jan-22	7-Feb-22	9-Mar-22	5-Apr-22	3-May-22	1-Jun-22	5-Jul-22	3-Aug-22								
Anions, Organics, Nutrients, and Physical Properties																							
Alkalinity (as $CaCO_3$)	mg/L	>20	-	112	116	118	123	110	109	116	112	88.5	90.3	93.0	4.90	12	99	32	4.9	123	0%	8%	-
Ammonia (as N)	mg/L	0.24 to 1.9	1.2 to 10	0.0146	0.00590	0.00720	0.00530	0.00860	0.00650	0.00670	0.00880	0.00810	0.0100	0.0108	0.0176	12	0.0092	0.0037	0.0053	0.018	0%	0%	0%
Chloride	mg/L	150	600	1.55	1.44	1.37	1.10	1.28	1.30	1.23	0.820	0.520	0.870	0.880	1.14	12	1.1	0.30	0.52	1.6	0%	0%	0%
Conductivity	µS/cm	-	-	329	326	392	359	325	316	355	373	294	262	266	301	12	325	40	262	392	0%	-	-
Specific Conductance (*in situ*)	µS/cm	-	-	330	-	389	213	315	310	341	372	287	257	265	342	11	311	52	213	389	0%	-	-
Dissolved Organic Carbon	mg/L	-	-	6.42	5.87	5.88	5.64	6.03	6.18	8.19	13.5	12.4	7.58	5.90	6.43	12	7.5	2.7	5.6	14	0%	-	-
Dissolved Oxygen (*in situ*)	%	-	-	108	-	87.6	83.5	83.0	91.3	88.5	92.1	93.1	99.7	94.2	90.9	11	92	7.2	83	108	0%	-	-
Dissolved Oxygen (*in situ*)	mg/L	>8	>5	11.4	-	11.1	12.1	12.1	12.9	12.7	12.9	12.0	10.8	9.20	8.61	11	11	1.4	8.6	13	0%	0%	0%
Fluoride	mg/L	-	1.4 to 1.6	0.0760	0.0850	0.0960	0.0650	0.0900	0.0910	0.0810	0.0970	0.110	0.0720	0.0730	0.0750	12	0.084	0.013	0.065	0.11	0%	-	0%
Hardness (as $CaCO_3$)	mg/L	-	-	153	150	176	186	144	146	165	194	136	116	126	132	12	152	24	116	194	0%	-	-
Nitrate (as N)	mg/L	3.0	33	0.0682	0.0520	0.0944	0.0880	0.128	0.0917	0.0643	0.0847	0.0409	<0.0050	0.0241	0.0697	12	0.068	0.031	<0.0050	0.13	8%	0%	0%
Nitrate and Nitrite (as N)	mg/L	-	-	0.0695	0.0533	0.0944	0.0893	0.128	0.0929	0.0643	0.0847	0.0409	<0.0051	0.0241	0.0709	12	0.068	0.031	<0.0051	0.13	8%	-	-
Nitrite (as N)	mg/L	0.020	0.060	0.00130	0.00130	<0.0010	0.00130	<0.0010	0.00120	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.00120	12	0.0011	0.000048	<0.0010	0.0013	58%	0%	0%
Dissolved Orthophosphate	mg/L	-	-	0.00500	0.00270	0.00150	0.00240	0.00910	0.00720	0.00260	0.00190	0.00120	0.00160	0.00190	0.00670	12	0.0036	0.0027	0.0012	0.0091	0%	-	-
pH (*in situ*)	pH units	6.5-9.0	6.5-9.0	8.62	-	7.97	7.95	7.88	7.99	8.00	7.71	7.61	8.46	8.10	8.09	11	8.0	0.29	7.6	8.6	0%	0%	0%
pH (laboratory)	pH units	6.5-9.0	6.5-9.0	8.37	8.29	8.15	7.97	8.02	8.14	8.16	8.06	8.16	8.18	8.20	8.21	12	8.2	0.11	8.0	8.4	0%	-	-
Dissolved Phosphorus	mg/L	-	-	0.00960	0.0141	0.00670	0.00330	0.0110	0.0114	0.00900	0.00780	0.00780	0.00760	0.0101	0.0134	12	0.0093	0.0030	0.0033	0.014	0%	-	-
Total Phosphorus	mg/L	-	-	0.0120	0.00820	0.0143	0.00480	0.0118	0.0124	0.00770	0.0112	0.0150	0.0154	0.0142	0.0156	12	0.012	0.0034	0.0048	0.016	0%	-	-
Sulphate	mg/L	309 to 429	-	61.3	57.1	81.5	82.2	57.7	56.9	64.7	80.8	59.3	38.8	41.5	50.8	12	61	14	39	82	0%	0%	-
Temperature (*in situ*)	°C	-	-	13.2	-	5.26	0.543	1.00	1.18	0.577	1.63	4.64	11.4	16.5	17.9	11	6.7	6.7	0.54	18	0%	-	-
Total Dissolved Solids	mg/L	-	-	236	214	260	187	210	201	222	257	171	167	174	193	12	208	32	167	260	0%	-	-
Total Nitrogen	mg/L	-	-	0.317	0.278	0.303	0.291	0.333	0.339	0.339	0.470	0.384	0.371	0.294	0.324	12	0.34	0.052	0.28	0.47	0%	-	-
Total Suspended Solids	mg/L	-	-	<1.0	1.00	2.10	<1.0	<1.0	<1.0	<1.0	1.10	<1.0	1.20	1.10	<1.0	12	1.1	0.34	<1.0	2.1	58%	-	-
Turbidity (*in situ*)	NTU	-	-	0.420	-	1.93	0.830	0.0500	0.230	0.390	1.51	1.37	0.830	0.190	0.760	11	0.77	0.61	0.050	1.9	0%	-	-
Turbidity	NTU	-	-	0.270	0.320	1.62	1.32	0.280	0.240	0.320	1.20	1.55	0.750	0.390	0.490	12	0.73	0.54	0.24	1.6	0%	-	-
Total Metals																							
Aluminum	mg/L	-	-	0.00720	0.0104	0.123	0.0272	0.00880	0.00920	0.0166	0.0939	0.145	0.0481	0.0204	0.0124	12	0.044	0.049	0.0072	0.14	0%	-	-
Antimony	mg/L	0.0090	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.000100	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	12	0.00010	-	<0.00010	0.00010	92%	0%	-
Arsenic	mg/L	-	0.0050	0.000680	0.000680	0.000620	0.000520	0.000630	0.000610	0.000650	0.000500	0.000450	0.000560	0.000560	0.000640	12	0.00059	0.000074	0.00045	0.00068	0%	-	0%
Barium	mg/L	1.0	-	0.0135	0.0136	0.0221	0.0192	0.0135	0.0137	0.0152	0.0212	0.0175	0.0109	0.0120	0.0130	12	0.015	0.0037	0.011	0.022	0%	0%	-
Beryllium	mg/L	0.00013	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	12	<0.00010	-	<0.00010	<0.00010	100%	0%	-
Bismuth	mg/L	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	12	<0.000050	-	<0.000050	<0.000050	100%	-	-
Boron	mg/L	1.2	-	0.0220	0.0220	0.0180	0.0200	0.0220	0.0210	0.0220	0.0160	0.0110	0.0190	0.0210	0.0220	12	0.020	0.0033	0.011	0.022	0%	0%	-
Cadmium	mg/L	-	-	<0.0000050	<0.0000050	<0.000010	0.00000560	<0.0000050	<0.0000050	<0.0000050	0.00000890	0.00000790	<0.000010	<0.000010	<0.0000050	12	0.0000058	0.0000017	<0.0000050	0.0000089	75%	-	-
Calcium	mg/L	-	-	45.0	49.2	57.3	56.0	44.7	48.4	51.7	57.3	43.0	41.5	38.7	40.2	12	48	6.6	39	57	0%	-	-
Chromium	mg/L	0.0010	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.0110	<0.00050	<0.00050	0.000520	<0.00050	<0.00050	<0.00050	12	0.0014	0.0041	<0.00050	0.011	83%	8%	-
Cobalt	mg/L	0.0040	0.11	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	12	<0.00010	-	<0.00010	<0.00010	100%	0%	0%
Copper	mg/L	-	-	0.00475	0.00468	0.00933	0.00738	0.00594	0.00596	0.00685	0.0195	0.0235	0.00637	0.00565	0.00515	12	0.0088	0.0061	0.0047	0.024	0%	-	-
Iron	mg/L	-	1.0	<0.030	<0.030	0.105	0.0360	<0.030	0.0800	0.0320	0.156	0.169	0.0530	0.0310	<0.030	12	0.065	0.052	<0.030	0.17	33%	-	0%
Lead	mg/L	0.0072 to 0.011	0.099 to 0.19	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	12	<0.000050	-	<0.000050	<0.000050	100%	0%	0%
Lithium	mg/L	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	12	<0.0010	-	<0.0010	<0.0010	100%	-	-
Magnesium	mg/L	-	-	8.52	8.02	10.4	9.55	7.75	7.36	8.36	10.2	6.61	6.06	5.86	6.83	12	8.0	1.5	5.9	10	0%	-	-
Manganese	mg/L	1.1 to 1.5	1.8 to 2.7	0.0198	0.0196	0.0336	0.0279	0.0154	0.0181	0.0302	0.0631	0.0491	0.0228	0.0329	0.0416	12	0.031	0.014	0.015	0.063	0%	0%	0%
Molybdenum	mg/L	7.6	46	0.00638	0.00632	0.00822	0.00654	0.00655	0.00686	0.00628	0.00675	0.00829	0.00636	0.00652	0.00713	12	0.0068	0.00070	0.0063	0.0083	0%	0%	0%
Nickel	mg/L	0.11 to 0.15	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.000680	<0.00050	0.000570	0.000740	<0.00050	<0.00050	<0.00050	12	0.00054	0.000066	<0.00050	0.00074	75%	0%	-
Potassium	mg/L	-	-	1.17	1.17	1.36	1.19	1.16	1.14	1.20	1.26	1.02	0.966	1.02	1.12	12	1.1	0.11	0.97	1.4	0%	-	-
Selenium	mg/L	0.0020	-	0.00220	0.00174	0.00286	0.00220	0.00137	0.00121	0.00156	0.00261	0.00224	0.000560	0.000996	0.00170	12	0.0018	0.00068	0.00056	0.0029	0%	42%	-
Silicon	mg/L	-	-	3.53	3.56	3.88	3.63	4.07	4.00	4.07	4.94	4.47	3.18	3.20	3.68	12	3.9	0.51	3.2	4.9	0%	-	-
Silver	mg/L	0.0015	0.0030	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	0.0000140	<0.000010	<0.000010	<0.000010	12	0.000010	-	<0.000010	0.000014	92%	0%	0%
Sodium	mg/L	-	-	8.62	8.95	9.30	9.05	8.59	8.76	9.36	8.04	4.92	7.86	7.51	7.95	12	8.2	1.2	4.9	9.4	0%	-	-
Strontium	mg/L	-	-	0.305	0.327	0.381	0.378	0.311	0.316	0.335	0.418	0.280	0.269	0.253	0.281	12	0.32	0.050	0.25	0.42	0%	-	-
Thallium	mg/L	0.00080	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	12	<0.000010	-	<0.000010	<0.000010	100%	0%	-
Tin	mg/L	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	12	<0.00010	-	<0.00010	<0.00010	100%	-	-
Titanium	mg/L	-	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	12	<0.010	-	<0.010	<0.010	100%	-	-
Uranium	mg/L	0.0085	-	0.000326	0.000326	0.000772	0.000657	0.000317	0.000335	0.000433	0.000678	0.000490	0.000230	0.000249	0.000271	12	0.00042	0.00018	0.00023	0.00077	0%	0%	-
Vanadium	mg/L	-	-	0.00108	0.00109	0.00106	0.000850	0.00114	0.00119	0.00122	0.00104	0.000870	0.00151	0.00130	0.00134	12	0.0011	0.00019	0.00085	0.0015	0%	-	-
Zinc	mg/L	0.027 to 0.086	0.052 to 0.11	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	12	<0.0030	-	<0.0030	<0.0030	100%	0%	0%

Indicates value greater than the long-term average British Columbia Water Quality Guideline (BCMOECCS 2019b,c, 2021a,b).
Indicates value greater than the short-term maximum British Columbia Water Quality Guideline (BCMOECCS 2019b,c, 2021a,b).
Percent exceedance > 0%.

Notes: "-" = data not available or no applicable guideline exists. < LRL = below laboratory reporting limit. GL = guideline. Guidelines for these parameters (Total Suspended Solids, Turbidity, Dissolved Organic Carbon) are narrative and were not evaluated.

[a] Guidelines were derived from the British Columbia Water Quality Guidelines for the protection of aquatic life (BCMOECCS 2019b,c, 2021a,b) outlined in Table D.1.1.
[b] % displayed for pH indicates results falling outside the guideline range. % displayed for dissolved oxygen indicates results below the guideline.

Table D.1.4: Surface Water Sample Data Collected Routinely at HAC-05a in Upper Hazeltine Creek, September 2021 to August 2022

Analyte	Units	British Columbia Water Quality Guidelines[a]		Date											Sample Size	Mean	Standard Deviation	Minimum	Maximum	% <LRL	% >Chronic GL[b]	% >Acute GL[b]
		Long-term Average	Short-term Maximum	1-Sep-21	4-Oct-21	4-Nov-21	1-Dec-21	12-Jan-22	7-Feb-22	9-Mar-22	5-Apr-22	3-May-22	1-Jun-22	5-Jul-22	3-Aug-22							
Dissolved Metals																						
Aluminum	mg/L	0.050	0.10	<0.0030	<0.0030	0.00440	0.00320	<0.0030	<0.0030	0.00610	0.0517	0.0759	0.00780	0.00390	0.00340	12	0.014	0.024	<0.0030	0.076	33%	17%	0%
Antimony	mg/L	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.000100	<0.00010	<0.00010	<0.00010	<0.00010	12	0.00010	-	<0.00010	0.00010	92%	-	-
Arsenic	mg/L	-	-	0.000660	0.000580	0.000600	0.000520	0.000600	0.000580	0.000580	0.000450	0.000440	0.000490	0.000520	0.000630	12	0.00055	0.000070	0.00044	0.00066	0%	-	-
Barium	mg/L	-	-	0.0136	0.0136	0.0192	0.0191	0.0134	0.0131	0.0146	0.0205	0.0167	0.0106	0.0124	0.0126	12	0.015	0.0032	0.011	0.020	0%	-	-
Beryllium	mg/L	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	12	<0.00010	-	<0.00010	<0.00010	100%	-	-
Bismuth	mg/L	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	12	<0.000050	-	<0.000050	<0.000050	100%	-	-
Boron	mg/L	-	-	0.0220	0.0200	0.0180	0.0210	0.0210	0.0220	0.0190	0.0150	0.0110	0.0180	0.0180	0.0210	12	0.019	0.0032	0.011	0.022	0%	-	-
Cadmium	mg/L	0.00024 to 0.00034	0.00069 to 0.0012	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.00000590	<0.000010	0.00000660	<0.0000050	<0.0000050	0.00000910	12	0.0000056	0.0000012	<0.0000050	0.0000091	75%	0%	0%
Calcium	mg/L	-	-	47.0	46.5	54.6	59.0	45.4	47.3	52.0	60.2	43.6	37.2	40.5	41.8	12	48	7.2	37	60	0%	-	-
Chromium	mg/L	-	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	12	<0.00050	-	<0.00050	<0.00050	100%	-	-
Cobalt	mg/L	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	12	<0.00010	-	<0.00010	<0.00010	100%	-	-
Copper	mg/L	0.0031 to 0.0067	0.019 to 0.040	0.00435	0.00428	0.00632	0.00623	0.00528	0.00493	0.00655	0.0162	0.0213	0.00524	0.00524	0.00492	12	0.0076	0.0054	0.0043	0.021	0%	75%	0%
Iron	mg/L	-	0.35	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	0.0800	0.106	<0.030	<0.030	<0.030	12	0.040	0.010	<0.030	0.11	83%	-	0%
Lead	mg/L	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	12	<0.000050	-	<0.000050	<0.000050	100%	-	-
Lithium	mg/L	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	12	<0.0010	-	<0.0010	<0.0010	100%	-	-
Magnesium	mg/L	-	-	8.61	8.25	9.86	9.31	7.62	6.83	8.55	10.5	6.61	5.54	6.02	6.76	12	7.9	1.6	5.5	10	0%	-	-
Manganese	mg/L	-	-	0.0138	0.0145	0.0251	0.0241	0.0121	0.0132	0.0269	0.0525	0.0402	0.0125	0.0242	0.0329	12	0.024	0.013	0.012	0.052	0%	-	-
Molybdenum	mg/L	-	-	0.00645	0.00615	0.00804	0.00668	0.00669	0.00664	0.00624	0.00627	0.00819	0.00594	0.00613	0.00686	12	0.0067	0.00072	0.0059	0.0082	0%	-	-
Nickel	mg/L	-	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	12	<0.00050	-	<0.00050	<0.00050	100%	-	-
Potassium	mg/L	-	-	1.16	1.08	1.31	1.23	1.17	1.08	1.16	1.17	1.03	1.03	1.05	1.01	12	1.1	0.092	1.0	1.3	0%	-	-
Selenium	mg/L	-	-	0.00207	0.00190	0.00282	0.00244	0.00137	0.00111	0.00167	0.00247	0.00218	0.000689	0.000923	0.00177	12	0.0018	0.00066	0.00069	0.0028	0%	-	-
Silicon	mg/L	-	-	3.79	3.52	3.57	3.63	3.75	3.57	4.09	4.41	3.97	3.19	3.30	3.46	12	3.7	0.34	3.2	4.4	0%	-	-
Silver	mg/L	-	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	0.0000120	<0.000010	<0.000010	<0.000010	12	0.000010	-	<0.000010	0.000012	92%	-	-
Sodium	mg/L	-	-	9.09	8.49	8.44	8.90	8.51	7.98	8.85	7.79	5.04	7.15	8.15	7.64	12	8.0	1.1	5.0	9.1	0%	-	-
Strontium	mg/L	-	-	0.328	0.286	0.371	0.400	0.321	0.317	0.330	0.404	0.289	0.237	0.255	0.289	12	0.32	0.053	0.24	0.40	0%	-	-
Thallium	mg/L	-	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	12	<0.000010	-	<0.000010	<0.000010	100%	-	-
Tin	mg/L	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	12	<0.00010	-	<0.00010	<0.00010	100%	-	-
Titanium	mg/L	-	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	12	<0.010	-	<0.010	<0.010	100%	-	-
Uranium	mg/L	-	-	0.000336	0.000302	0.000748	0.000593	0.000318	0.000330	0.000451	0.000566	0.000530	0.000226	0.000229	0.000252	12	0.00041	0.00017	0.00023	0.00075	0%	-	-
Vanadium	mg/L	-	-	0.00100	0.00101	0.000860	0.000770	0.00109	0.00105	0.00108	0.000840	0.000740	0.00125	0.00129	0.00122	12	0.0010	0.00018	0.00074	0.0013	0%	-	-
Zinc	mg/L	-	-	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	12	<0.0030	-	<0.0030	<0.0030	100%	-	-

Indicates value greater than the long-term average British Columbia Water Quality Guideline (BCMOECCS 2019b,c, 2021a,b).
Indicates value greater than the short-term maximum British Columbia Water Quality Guideline (BCMOECCS 2019b,c, 2021a,b).
Percent exceedance > 0%.

Notes: "-" = data not available or no applicable guideline exists. < LRL = below laboratory reporting limit. GL = guideline. Guidelines for these parameters (Total Suspended Solids, Turbidity, Dissolved Organic Carbon) are narrative and were not evaluated.

[a] Guidelines were derived from the British Columbia Water Quality Guidelines for the protection of aquatic life (BCMOECCS 2019b,c, 2021a,b) outlined in Table D.1.1.
[b] % displayed for pH indicates results falling outside the guideline range. % displayed for dissolved oxygen indicates results below the guideline.

Table D.1.5: Surface Water Sample Data Collected Routinely at HAC-14 in Upper Hazeltine Creek, September 2021 to August 2022

Analyte	Units	British Columbia Water Quality Guidelines[a]		Date							Sample Size	Mean	Standard Deviation	Minimum	Maximum	% <LRL	% >Chronic GL[b]	% >Acute GL[b]
		Long-term Average	Short-term Maximum	1-Sep-21	4-Oct-21	4-Nov-21	3-May-22	1-Jun-22	5-Jul-22	3-Aug-22								
Anions, Organics, Nutrients, and Physical Properties																		
Alkalinity (as $CaCO_3$)	mg/L	>20	-	124	126	122	67.0	92.1	100	108	7	106	21	67	126	0%	0%	-
Ammonia (as N)	mg/L	0.24 to 1.7	1.2 to 8.8	0.00730	0.00520	0.00600	0.00720	0.00840	0.00880	0.0116	7	0.0078	0.0021	0.0052	0.012	0%	0%	0%
Chloride	mg/L	150	600	1.47	1.33	1.18	<0.50	0.840	0.850	1.05	7	1.0	0.26	<0.50	1.5	14%	0%	0%
Conductivity	µS/cm	-	-	353	347	394	202	262	273	305	7	305	65	202	394	0%	-	-
Specific Conductance (*in situ*)	µS/cm	-	-	357	-	395	197	261	272	349	6	305	74	197	395	0%	-	-
Dissolved Organic Carbon	mg/L	-	-	5.19	5.12	5.74	16.3	6.92	6.23	5.72	7	7.3	4.0	5.1	16	0%	-	-
Dissolved Oxygen (*in situ*)	%	-	-	92.4	-	88.2	91.2	95.0	94.1	90.9	6	92	2.4	88	95	0%	-	-
Dissolved Oxygen (*in situ*)	mg/L	>8	>5	9.41	-	11.3	12.0	9.73	9.04	8.63	6	10	1.3	8.6	12	0%	0%	0%
Fluoride	mg/L	-	1.3 to 1.5	0.0900	0.0970	0.0960	0.0800	0.0740	0.0770	0.0790	7	0.085	0.0094	0.074	0.097	0%	-	0%
Hardness (as $CaCO_3$)	mg/L	-	-	168	165	171	98.2	112	132	141	7	141	29	98	171	0%	-	-
Nitrate (as N)	mg/L	3.0	33	0.100	0.0380	0.112	0.0190	0.0120	0.0430	0.0721	7	0.057	0.039	0.012	0.11	0%	0%	0%
Nitrate and Nitrite (as N)	mg/L	-	-	0.100	0.0380	0.112	0.0190	0.0120	0.0430	0.0721	7	0.057	0.039	0.012	0.11	0%	-	-
Nitrite (as N)	mg/L	0.020	0.060	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	7	<0.0010	-	<0.0010	<0.0010	100%	0%	0%
Dissolved Orthophosphate	mg/L	-	-	0.00580	0.00270	0.00280	0.00220	0.00280	0.00440	0.00590	7	0.0038	0.0016	0.0022	0.0059	0%	-	-
pH (*in situ*)	pH units	6.5-9.0	6.5-9.0	8.68	-	8.13	7.73	8.26	8.15	8.24	6	8.2	0.30	7.7	8.7	0%	0%	0%
pH (laboratory)	pH units	6.5-9.0	6.5-9.0	8.26	8.31	8.18	8.01	8.17	8.21	8.26	7	8.2	0.097	8.0	8.3	0%	-	-
Dissolved Phosphorus	mg/L	-	-	0.00920	0.0160	0.00620	0.0122	0.00870	0.0102	0.0102	7	0.010	0.0031	0.0062	0.016	0%	-	-
Total Phosphorus	mg/L	-	-	0.0673	0.00560	0.0105	0.0178	0.0154	0.0136	0.0129	7	0.020	0.021	0.0056	0.067	0%	-	-
Sulphate	mg/L	309	-	63.1	57.2	80.5	32.9	38.3	41.1	48.2	7	52	17	33	80	0%	0%	-
Temperature (*in situ*)	°C	-	-	14.5	-	4.84	3.96	13.3	17.3	17.8	6	12	6.1	4.0	18	0%	-	-
Total Dissolved Solids	mg/L	-	-	252	226	252	137	189	180	206	7	206	42	137	252	0%	-	-
Total Nitrogen	mg/L	-	-	0.268	0.210	0.288	0.422	0.310	0.283	0.295	7	0.30	0.064	0.21	0.42	0%	-	-
Total Suspended Solids	mg/L	-	-	32.2	1.60	1.80	<1.0	2.30	<1.0	<1.0	7	5.8	12	<1.0	32	43%	-	-
Turbidity (*in situ*)	NTU	-	-	30.7	-	2.49	3.30	0.930	1.14	1.04	6	6.6	12	0.93	31	0%	-	-
Turbidity	NTU	-	-	43.3	0.250	1.45	3.93	0.720	0.420	0.560	7	7.2	16	0.25	43	0%	-	-
Total Metals																		
Aluminum	mg/L	-	-	1.49	0.0107	0.0811	0.237	0.0782	0.0330	0.0177	7	0.28	0.54	0.011	1.5	0%	-	-
Antimony	mg/L	0.0090	-	0.000120	<0.00010	<0.00010	<0.00010	0.000120	<0.00010	<0.00010	7	0.00011	0	<0.00010	0.00012	71%	0%	-
Arsenic	mg/L	-	0.0050	0.00161	0.000770	0.000750	0.000470	0.000600	0.000610	0.000760	7	0.00080	0.00038	0.00047	0.0016	0%	-	0%
Barium	mg/L	1.0	-	0.0406	0.0182	0.0234	0.0140	0.0137	0.0145	0.0156	7	0.020	0.0097	0.014	0.041	0%	0%	-
Beryllium	mg/L	0.00013	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	7	<0.00010	-	<0.00010	<0.00010	100%	0%	-
Bismuth	mg/L	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	7	<0.000050	-	<0.000050	<0.000050	100%	-	-
Boron	mg/L	1.2	-	0.0260	0.0240	0.0180	<0.010	0.0180	0.0220	0.0240	7	0.020	0.0035	<0.010	0.026	14%	0%	-
Cadmium	mg/L	-	-	0.0000223	<0.0000050	<0.000010	0.0000102	<0.000015	<0.0000050	<0.0000050	7	0.0000084	0.0000060	<0.0000050	0.000022	71%	-	-
Calcium	mg/L	-	-	50.3	50.6	56.9	28.5	41.6	39.7	41.0	7	44	9.3	28	57	0%	-	-
Chromium	mg/L	0.0010	-	0.00259	<0.00050	<0.00050	0.000760	<0.00050	<0.00050	<0.00050	7	0.00084	0.00091	<0.00050	0.0026	71%	14%	-
Cobalt	mg/L	0.0040	0.11	0.00136	<0.00010	<0.00010	0.000120	<0.00010	<0.00010	<0.00010	7	0.00028	0.00061	<0.00010	0.0014	71%	0%	0%
Copper	mg/L	-	-	0.0422	0.00821	0.0116	0.0232	0.00871	0.00813	0.00760	7	0.016	0.013	0.0076	0.042	0%	-	-
Iron	mg/L	-	1.0	2.08	<0.030	0.113	0.233	0.0900	0.0400	<0.030	7	0.37	0.78	<0.030	2.1	29%	-	14%
Lead	mg/L	0.0064 to 0.0096	0.080 to 0.16	0.00107	<0.000050	<0.000050	0.0000700	<0.000050	<0.000050	<0.000050	7	0.00020	0.00049	<0.000050	0.0011	71%	0%	0%
Lithium	mg/L	-	-	0.00240	0.00100	0.00100	<0.0010	<0.0010	<0.0010	<0.0010	7	0.0012	0.00060	0.0010	0.0024	57%	-	-
Magnesium	mg/L	-	-	10.5	9.13	11.0	4.76	6.22	6.31	7.02	7	7.8	2.4	4.8	11	0%	-	-
Manganese	mg/L	1.0 to 1.4	1.6 to 2.4	0.0733	0.00960	0.0170	0.0237	0.0212	0.0189	0.0117	7	0.025	0.022	0.0096	0.073	0%	0%	0%
Molybdenum	mg/L	7.6	46	0.00657	0.00657	0.00854	0.00477	0.00611	0.00664	0.00684	7	0.0066	0.0011	0.0048	0.0085	0%	0%	0%
Nickel	mg/L	0.094 to 0.14	-	0.00318	<0.00050	<0.00050	0.000830	<0.00050	<0.00050	<0.00050	7	0.00093	0.0012	<0.00050	0.0032	71%	0%	-
Potassium	mg/L	-	-	1.54	1.24	1.31	0.775	0.978	1.10	1.14	7	1.2	0.24	0.78	1.5	0%	-	-
Selenium	mg/L	0.0020	-	0.00210	0.00160	0.00224	0.00115	0.000710	0.00107	0.00139	7	0.0015	0.00056	0.00071	0.0022	0%	29%	-
Silicon	mg/L	-	-	6.73	3.89	4.03	4.41	3.37	3.32	3.95	7	4.2	1.2	3.3	6.7	0%	-	-
Silver	mg/L	0.000050 to 0.0015	0.00010 to 0.0030	0.0000200	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	7	0.000011	-	<0.000010	0.000020	86%	0%	0%
Sodium	mg/L	-	-	9.28	9.39	8.73	3.44	7.74	7.70	7.71	7	7.7	2.0	3.4	9.4	0%	-	-
Strontium	mg/L	-	-	0.377	0.365	0.424	0.188	0.268	0.271	0.281	7	0.31	0.081	0.19	0.42	0%	-	-
Thallium	mg/L	0.00080	-	0.0000110	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	7	0.000010	-	<0.000010	0.000011	86%	0%	-
Tin	mg/L	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	7	<0.00010	-	<0.00010	<0.00010	100%	-	-
Titanium	mg/L	-	-	0.0637	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	7	0.018	-	<0.010	0.064	86%	-	-
Uranium	mg/L	0.0085	-	0.000508	0.000418	0.000864	0.000357	0.000245	0.000280	0.000294	7	0.00042	0.00021	0.00024	0.00086	0%	0%	-
Vanadium	mg/L	-	-	0.00495	0.000900	0.000950	0.000940	0.00149	0.00126	0.00130	7	0.0017	0.0015	0.00090	0.0050	0%	-	-
Zinc	mg/L	0.014 to 0.068	0.039 to 0.094	0.00600	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	7	0.0034	-	<0.0030	0.0060	86%	0%	0%

Indicates value greater than the long-term average British Columbia Water Quality Guideline (BCMOECCS 2019b,c, 2021a,b).
Indicates value greater than the short-term maximum British Columbia Water Quality Guideline (BCMOECCS 2019b,c, 2021a,b).
Percent exceedance > 0%.

Notes: "-" = data not available or no applicable guideline exists. < LRL = below laboratory reporting limit. GL = guideline. Guidelines for these parameters (Total Suspended Solids, Turbidity, Dissolved Organic Carbon) are narrative and were not evaluated.

[a] Guidelines were derived from the British Columbia Water Quality Guidelines for the protection of aquatic life (BCMOECCS 2019b,c, 2021a,b) outlined in Table D.1.1.
[b] % displayed for pH indicates results falling outside the guideline range. % displayed for dissolved oxygen indicates results below the guideline.

Table D.1.5: Surface Water Sample Data Collected Routinely at HAC-14 in Upper Hazeltine Creek, September 2021 to August 2022

Analyte	Units	British Columbia Water Quality Guidelines[a]		Date							Sample Size	Mean	Standard Deviation	Minimum	Maximum	% <LRL	% >Chronic GL[b]	% >Acute GL[b]
		Long-term Average	Short-term Maximum	1-Sep-21	4-Oct-21	4-Nov-21	3-May-22	1-Jun-22	5-Jul-22	3-Aug-22								
Dissolved Metals																		
Aluminum	mg/L	0.050	0.10	0.00600	<0.0030	0.00480	0.158	0.0126	0.0119	0.00430	7	0.029	0.058	<0.0030	0.16	14%	14%	14%
Antimony	mg/L	-	-	0.000100	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	7	0.00010	-	0.00010	0.00010	86%	-	-
Arsenic	mg/L	-	-	0.000790	0.000680	0.000630	0.000410	0.000560	0.000630	0.000700	7	0.00063	0.00012	0.00041	0.00079	0%	-	-
Barium	mg/L	-	-	0.0218	0.0189	0.0198	0.0137	0.0121	0.0150	0.0150	7	0.017	0.0036	0.012	0.022	0%	-	-
Beryllium	mg/L	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	7	<0.00010	-	<0.00010	<0.00010	100%	-	-
Bismuth	mg/L	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	7	<0.000050	-	<0.000050	<0.000050	100%	-	-
Boron	mg/L	-	-	0.0250	0.0220	0.0190	<0.010	0.0180	0.0190	0.0210	7	0.019	0.0026	<0.010	0.025	14%	-	-
Cadmium	mg/L	0.00021 to 0.00031	0.00058 to 0.0010	0.00000590	<0.000010	0.00000530	0.0000190	<0.0000050	<0.000010	<0.000010	7	0.0000073	0.0000058	<0.0000050	0.000019	57%	0%	0%
Calcium	mg/L	-	-	51.0	50.5	51.7	31.5	35.7	42.4	44.8	7	44	7.9	32	52	0%	-	-
Chromium	mg/L	-	-	<0.00050	<0.00050	<0.00050	0.000580	<0.00050	<0.00050	<0.00050	7	0.00051	-	<0.00050	0.00058	86%	-	-
Cobalt	mg/L	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	7	<0.00010	-	<0.00010	<0.00010	100%	-	-
Copper	mg/L	0.0036 to 0.0068	0.021 to 0.040	0.00774	0.00734	0.00874	0.0221	0.00714	0.00762	0.00720	7	0.0097	0.0055	0.0071	0.022	0%	100%	0%
Iron	mg/L	-	0.35	<0.030	<0.030	<0.030	0.161	<0.030	<0.030	<0.030	7	0.049	-	<0.030	0.16	86%	-	0%
Lead	mg/L	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	7	<0.000050	-	<0.000050	<0.000050	100%	-	-
Lithium	mg/L	-	-	0.00110	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	7	0.0010	-	<0.0010	0.0011	86%	-	-
Magnesium	mg/L	-	-	10.0	9.49	10.1	4.74	5.51	6.49	7.17	7	7.6	2.2	4.7	10	0%	-	-
Manganese	mg/L	-	-	0.00844	0.00693	0.00899	0.0192	0.00975	0.0102	0.00736	7	0.010	0.0042	0.0069	0.019	0%	-	-
Molybdenum	mg/L	-	-	0.00685	0.00662	0.00792	0.00460	0.00603	0.00620	0.00698	7	0.0065	0.0010	0.0046	0.0079	0%	-	-
Nickel	mg/L	-	-	<0.00050	<0.00050	<0.00050	0.000750	<0.00050	<0.00050	<0.00050	7	0.00054	-	<0.00050	0.00075	86%	-	-
Potassium	mg/L	-	-	1.30	1.15	1.21	0.839	1.02	1.09	1.06	7	1.1	0.15	0.84	1.3	0%	-	-
Selenium	mg/L	-	-	0.00197	0.00168	0.00248	0.00103	0.000710	0.000949	0.00134	7	0.0015	0.00063	0.00071	0.0025	0%	-	-
Silicon	mg/L	-	-	4.20	3.79	3.74	3.94	3.30	3.53	3.77	7	3.8	0.29	3.3	4.2	0%	-	-
Silver	mg/L	-	-	<0.000010	<0.000010	<0.000010	0.0000120	<0.000010	<0.000010	<0.000010	7	0.000010	-	<0.000010	0.000012	86%	-	-
Sodium	mg/L	-	-	9.70	8.88	7.84	3.37	7.11	8.00	7.80	7	7.5	2.0	3.4	9.7	0%	-	-
Strontium	mg/L	-	-	0.378	0.338	0.390	0.195	0.244	0.292	0.313	7	0.31	0.070	0.20	0.39	0%	-	-
Thallium	mg/L	-	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	7	<0.000010	-	<0.000010	<0.000010	100%	-	-
Tin	mg/L	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	7	<0.00010	-	<0.00010	<0.00010	100%	-	-
Titanium	mg/L	-	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	7	<0.010	-	<0.010	<0.010	100%	-	-
Uranium	mg/L	-	-	0.000469	0.000379	0.000832	0.000369	0.000242	0.000255	0.000289	7	0.00040	0.00020	0.00024	0.00083	0%	-	-
Vanadium	mg/L	-	-	0.000970	0.000850	0.000700	0.000750	0.00123	0.00123	0.00123	7	0.00099	0.00024	0.00070	0.0012	0%	-	-
Zinc	mg/L	-	-	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	7	<0.0030	-	<0.0030	<0.0030	100%	-	-

Indicates value greater than the long-term average British Columbia Water Quality Guideline (BCMOECCS 2019b,c, 2021a,b).
Indicates value greater than the short-term maximum British Columbia Water Quality Guideline (BCMOECCS 2019b,c, 2021a,b).
Percent exceedance > 0%.

Notes: "-" = data not available or no applicable guideline exists. < LRL = below laboratory reporting limit. GL = guideline. Guidelines for these parameters (Total Suspended Solids, Turbidity, Dissolved Organic Carbon) are narrative and were not evaluated.

[a] Guidelines were derived from the British Columbia Water Quality Guidelines for the protection of aquatic life (BCMOECCS 2019b,c, 2021a,b) outlined in Table D.1.1.

[b] % displayed for pH indicates results falling outside the guideline range. % displayed for dissolved oxygen indicates results below the guideline.

Table D.1.6: Surface Water Sample Data Collected Routinely at HAC-08 in Lower Hazeltine Creek, September 2021 to August 2022

Analyte	Units	British Columbia Water Quality Guidelines[a]		Date												Sample Size	Mean	Standard Deviation	Minimum	Maximum	% <LRL	% >Chronic GL[b]	% >Acute GL[b]
		Long-term Average	Short-term Maximum	1-Sep-21	4-Oct-21	4-Nov-21	1-Dec-21	12-Jan-22	7-Feb-22	9-Mar-22	5-Apr-22	3-May-22	1-Jun-22	5-Jul-22	3-Aug-22								
Anions, Organics, Nutrients, and Physical Properties																							
Alkalinity (as $CaCO_3$)	mg/L	>20	-	129	131	125	128	118	116	124	88.2	64.4	94.3	105	108	12	111	20	64	131	0%	0%	-
Ammonia (as N)	mg/L	0.24 to 1.7	1.2 to 8.7	0.00720	<0.0050	0.00640	0.00590	<0.0050	<0.0050	<0.0050	0.00910	0.00500	0.00680	0.00680	0.00920	12	0.0064	0.0016	<0.0050	0.0092	33%	0%	0%
Chloride	mg/L	150	600	1.45	1.30	1.12	0.900	1.20	1.11	1.04	<0.50	<0.50	0.820	0.830	0.970	12	0.98	0.21	<0.50	1.4	17%	0%	0%
Conductivity	µS/cm	-	-	361	350	395	344	340	326	347	270	180	265	275	298	12	313	58	180	395	0%	-	-
Specific Conductance (*in situ*)	µS/cm	-	-	360	-	387	382	344	318	337	265	174	259	269	340	11	312	64	174	387	0%	-	-
Dissolved Organic Carbon	mg/L	-	-	5.04	4.72	5.35	5.23	5.57	6.35	8.33	15.0	14.5	6.88	6.29	5.77	12	7.4	3.6	4.7	15	0%	-	-
Dissolved Oxygen (*in situ*)	%	-	-	93.2	-	90.3	91.8	90.1	91.8	95.9	93.3	92.5	93.0	95.3	93.2	11	93	1.8	90	96	0%	-	-
Dissolved Oxygen (*in situ*)	mg/L	>8	>5	9.68	-	11.4	13.4	13.0	13.0	13.6	12.8	12.0	9.51	9.21	8.90	11	11	1.8	8.9	14	0%	0%	0%
Fluoride	mg/L	-	1.3 to 1.6	0.0920	0.100	0.0990	0.0600	0.0940	0.0910	0.0840	0.0770	0.0730	0.0710	0.0770	0.0780	12	0.083	0.012	0.060	0.10	0%	-	0%
Hardness (as $CaCO_3$)	mg/L	-	-	170	162	173	177	158	153	163	136	84.8	114	134	136	12	147	27	85	177	0%	-	-
Nitrate (as N)	mg/L	3.0	33	0.0551	<0.0050	0.0948	0.0766	0.132	0.0914	0.0528	0.0210	0.00680	0.00500	0.0117	0.0430	12	0.050	0.042	<0.0050	0.13	8%	0%	0%
Nitrate and Nitrite (as N)	mg/L	-	-	0.0551	<0.0051	0.0948	0.0766	0.132	0.0914	0.0528	0.0210	0.00680	<0.0051	0.0117	0.0430	12	0.050	0.042	<0.0051	0.13	17%	-	-
Nitrite (as N)	mg/L	0.020	0.060	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	12	<0.0010	-	<0.0010	<0.0010	100%	0%	0%
Dissolved Orthophosphate	mg/L	-	-	0.00320	0.00120	0.00180	0.00220	0.00770	0.00660	0.00300	0.00190	0.00160	0.00240	0.00280	0.00360	12	0.0032	0.0020	0.0012	0.0077	0%	-	-
pH (*in situ*)	pH units	6.5-9.0	6.5-9.0	8.66	-	8.28	8.25	8.18	8.17	8.11	7.97	7.78	8.31	8.46	8.41	11	8.2	0.24	7.8	8.7	0%	0%	0%
pH (laboratory)	pH units	6.5-9.0	6.5-9.0	8.45	8.39	8.24	8.07	8.07	8.23	8.23	8.14	7.99	8.18	8.24	8.29	12	8.2	0.13	8.0	8.4	0%	-	-
Dissolved Phosphorus	mg/L	-	-	0.00710	0.00390	0.00640	0.00360	0.00870	0.0104	0.00690	0.00670	0.00870	0.0183	0.00910	0.00840	12	0.0082	0.0038	0.0036	0.018	0%	-	-
Total Phosphorus	mg/L	-	-	0.0112	0.00560	0.0299	0.00950	0.00980	0.0122	0.0137	0.0109	0.0216	0.00780	0.0142	0.0435	12	0.016	0.011	0.0056	0.044	0%	-	-
Sulphate	mg/L	309	-	63.0	57.1	75.4	68.8	57.0	54.9	57.5	46.0	25.0	37.7	40.5	45.5	12	52	14	25	75	0%	0%	-
Temperature (*in situ*)	°C	-	-	13.6	-	5.51	-0.0140	0.396	0.835	1.14	1.73	4.59	14.3	17.0	17.5	11	7.0	7.1	-0.014	18	0%	-	-
Total Dissolved Solids	mg/L	-	-	246	215	246	178	230	220	222	185	111	184	178	200	12	201	38	111	246	0%	-	-
Total Nitrogen	mg/L	-	-	0.233	0.185	0.260	0.284	0.306	0.313	0.296	0.395	0.536	0.304	0.258	0.251	12	0.30	0.090	0.18	0.54	0%	-	-
Total Suspended Solids	mg/L	-	-	2.30	1.80	26.0	8.00	1.20	<1.0	8.30	<1.0	5.60	5.00	3.20	22.6	12	7.2	8.5	<1.0	26	17%	-	-
Turbidity (*in situ*)	NTU	-	-	0.680	-	16.7	4.63	0.680	0.520	1.19	2.99	6.80	1.88	1.72	6.60	11	4.0	4.8	0.52	17	0%	-	-
Turbidity	NTU	-	-	0.260	0.300	13.1	4.79	0.430	0.330	3.24	2.38	6.08	0.810	0.650	5.85	12	3.2	3.8	0.26	13	0%	-	-
Total Metals																							
Aluminum	mg/L	-	-	0.0268	0.0169	0.246	0.185	0.0333	0.0333	0.135	0.258	0.244	0.122	0.0759	0.137	12	0.13	0.091	0.017	0.26	0%	-	-
Antimony	mg/L	0.0090	-	<0.00010	<0.00010	<0.00010	0.000120	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.000100	<0.00010	<0.00010	12	0.00010	0.0000078	<0.00010	0.00012	83%	0%	-
Arsenic	mg/L	-	0.0050	0.000980	0.000840	0.00120	0.000910	0.000790	0.000770	0.000930	0.000640	0.000520	0.000720	0.000730	0.00111	12	0.00084	0.00019	0.00052	0.0012	0%	-	0%
Barium	mg/L	1.0	-	0.0226	0.0188	0.0270	0.0245	0.0181	0.0183	0.0217	0.0206	0.0160	0.0149	0.0171	0.0193	12	0.020	0.0035	0.015	0.027	0%	0%	-
Beryllium	mg/L	0.00013	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	12	<0.00010	-	<0.00010	<0.00010	100%	0%	-
Bismuth	mg/L	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	12	<0.000050	-	<0.000050	<0.000050	100%	-	-
Boron	mg/L	1.2	-	0.0240	0.0230	0.0150	0.0200	0.0230	0.0220	0.0220	0.0120	<0.010	0.0180	0.0210	0.0240	12	0.020	0.0044	<0.010	0.024	8%	0%	-
Cadmium	mg/L	-	-	0.00000510	<0.0000050	0.0000134	0.0000115	<0.0000050	<0.0000050	0.00000780	0.0000109	0.00000830	<0.000015	<0.000010	<0.000010	12	0.0000076	0.0000034	<0.0000050	0.000013	50%	-	-
Calcium	mg/L	-	-	49.0	51.1	43.0	51.5	46.6	50.5	52.1	39.9	25.2	42.1	38.9	39.9	12	44	7.8	25	52	0%	-	-
Chromium	mg/L	0.0010	-	<0.00050	<0.00050	0.000600	<0.00050	<0.00050	<0.00050	<0.00050	0.000740	0.000810	<0.00050	<0.00050	<0.00050	12	0.00055	0.000082	<0.00050	0.00081	75%	0%	-
Cobalt	mg/L	0.0040	0.11	<0.00010	<0.00010	0.000250	0.000150	<0.00010	<0.00010	0.000190	0.000140	0.000140	0.000110	<0.00010	0.000170	12	0.00014	0.000045	<0.00010	0.00025	42%	0%	0%
Copper	mg/L	-	-	0.00843	0.00757	0.0109	0.00975	0.00849	0.00897	0.0125	0.0194	0.0186	0.0102	0.00884	0.00840	12	0.011	0.0040	0.0076	0.019	0%	-	-
Iron	mg/L	-	1.0	0.0400	<0.030	0.401	0.233	0.0600	0.0470	0.186	0.290	0.259	0.158	0.0990	0.175	12	0.16	0.12	<0.030	0.40	8%	-	0%
Lead	mg/L	0.0059 to 0.0099	0.066 to 0.17	<0.000050	<0.000050	0.000171	0.000100	<0.000050	<0.000050	0.0000800	0.0000720	0.0000970	0.0000520	<0.000050	0.000118	12	0.000078	0.000038	<0.000050	0.00017	42%	0%	0%
Lithium	mg/L	-	-	0.00130	0.00120	0.00140	0.00140	0.00120	0.00110	0.00130	0.00110	<0.0010	<0.0010	<0.0010	0.00130	12	0.0012	0.00012	<0.0010	0.0014	25%	-	-
Magnesium	mg/L	-	-	10.3	9.52	11.0	10.3	8.97	8.45	9.35	7.95	4.53	6.59	6.65	7.31	12	8.4	1.9	4.5	11	0%	-	-
Manganese	mg/L	0.98 to 1.4	1.5 to 2.5	0.0134	0.0113	0.0507	0.0280	0.0148	0.0128	0.0205	0.0245	0.0223	0.0268	0.0209	0.0194	12	0.022	0.011	0.011	0.051	0%	0%	0%
Molybdenum	mg/L	7.6	46	0.00698	0.00683	0.00424	0.00609	0.00652	0.00654	0.00577	0.00402	0.00351	0.00612	0.00629	0.00644	12	0.0058	0.0012	0.0035	0.0070	0%	0%	0%
Nickel	mg/L	0.084 to 0.15	-	<0.00050	<0.00050	0.00100	0.000650	<0.00050	<0.00050	0.000650	0.000980	0.00101	0.000680	<0.00050	0.000560	12	0.00067	0.00019	<0.00050	0.0010	42%	0%	-
Potassium	mg/L	-	-	1.34	1.26	1.22	1.10	1.15	1.16	1.18	0.993	0.738	1.03	1.09	1.18	12	1.1	0.15	0.74	1.3	0%	-	-
Selenium	mg/L	0.0020	-	0.00210	0.00147	0.00125	0.00192	0.00132	0.00118	0.00122	0.00148	0.000770	0.000663	0.000933	0.00134	12	0.0013	0.00042	0.00066	0.0021	0%	8%	-
Silicon	mg/L	-	-	4.07	3.84	4.88	4.20	4.24	4.41	4.55	5.05	4.60	3.47	3.36	4.13	12	4.2	0.51	3.4	5.0	0%	-	-
Silver	mg/L	0.000050 to 0.0015	0.00010 to 0.0030	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	12	<0.000010	-	<0.000010	<0.000010	100%	0%	0%
Sodium	mg/L	-	-	9.80	9.53	7.62	9.12	9.05	9.13	8.92	5.95	3.03	7.94	7.67	8.02	12	8.0	1.9	3.0	9.8	0%	-	-
Strontium	mg/L	-	-	0.374	0.384	0.317	0.384	0.356	0.350	0.354	0.293	0.173	0.275	0.268	0.288	12	0.32	0.062	0.17	0.38	0%	-	-
Thallium	mg/L	0.00080	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	12	<0.000010	-	<0.000010	<0.000010	100%	0%	-
Tin	mg/L	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	12	<0.00010	-	<0.00010	<0.00010	100%	-	-
Titanium	mg/L	-	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	12	<0.010	-	<0.010	<0.010	100%	-	-
Uranium	mg/L	0.0085	-	0.000512	0.000484	0.000656	0.000810	0.000433	0.000449	0.000581	0.000521	0.000297	0.000264	0.000304	0.000363	12	0.00047	0.00016	0.00026	0.00081	0%	0%	-
Vanadium	mg/L	-	-	0.00101	0.000940	0.00122	0.00105	0.000970	0.00100	0.00130	0.00112	0.000950	0.00164	0.00142	0.00158	12	0.0012	0.00025	0.00094	0.0016	0%	-	-
Zinc	mg/L	0.0075 to 0.073	0.033 to 0.098	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	12	<0.0030	-	<0.0030	<0.0030	100%	0%	0%

Indicates value greater than the long-term average British Columbia Water Quality Guideline (BCMOECCS 2019b,c, 2021a,b).
Indicates value greater than the short-term maximum British Columbia Water Quality Guideline (BCMOECCS 2019b,c, 2021a,b).
Percent exceedance > 0%.

Notes: "-" = data not available or no applicable guideline exists. < LRL = below laboratory reporting limit. GL = guideline. Guidelines for these parameters (Total Suspended Solids, Turbidity, Dissolved Organic Carbon) are narrative and were not evaluated.

[a] Guidelines were derived from the British Columbia Water Quality Guidelines for the protection of aquatic life (BCMOECCS 2019b,c, 2021a,b) outlined in Table D.1.1.
[b] % displayed for pH indicates results falling outside the guideline range. % displayed for dissolved oxygen indicates results below the guideline.

Table D.1.6: Surface Water Sample Data Collected Routinely at HAC-08 in Lower Hazeltine Creek, September 2021 to August 2022

Analyte	Units	British Columbia Water Quality Guidelines[a]		Date												Sample Size	Mean	Standard Deviation	Minimum	Maximum	% <LRL	% >Chronic GL[b]	% >Acute GL[b]
		Long-term Average	Short-term Maximum	1-Sep-21	4-Oct-21	4-Nov-21	1-Dec-21	12-Jan-22	7-Feb-22	9-Mar-22	5-Apr-22	3-May-22	1-Jun-22	5-Jul-22	3-Aug-22								
Dissolved Metals																							
Aluminum	mg/L	0.050	0.10	0.00400	<0.0030	0.00450	0.00700	<0.0030	0.00640	0.0215	0.122	0.162	0.0165	0.00860	0.00500	12	0.030	0.054	<0.0030	0.16	17%	17%	17%
Antimony	mg/L	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	12	<0.00010	-	<0.00010	<0.00010	100%	-	-
Arsenic	mg/L	-	-	0.000970	0.000780	0.000730	0.000730	0.000690	0.000670	0.000720	0.000540	0.000430	0.000560	0.000630	0.000790	12	0.00069	0.00014	0.00043	0.00097	0%	-	-
Barium	mg/L	-	-	0.0226	0.0194	0.0232	0.0226	0.0177	0.0174	0.0187	0.0188	0.0149	0.0138	0.0160	0.0165	12	0.018	0.0031	0.014	0.023	0%	-	-
Beryllium	mg/L	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	12	<0.00010	-	<0.00010	<0.00010	100%	-	-
Bismuth	mg/L	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	12	<0.000050	-	<0.000050	<0.000050	100%	-	-
Boron	mg/L	-	-	0.0250	0.0210	0.0190	0.0200	0.0220	0.0220	0.0210	0.0110	<0.010	0.0180	0.0190	0.0220	12	0.019	0.0043	<0.010	0.025	8%	-	-
Cadmium	mg/L	0.00019 to 0.00032	0.00050 to 0.0011	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.00000670	0.00000670	<0.0000050	0.00000680	<0.0000050	<0.0000050	12	0.0000054	0.000000034	<0.0000050	0.0000068	75%	0%	0%
Calcium	mg/L	-	-	51.0	49.4	51.6	54.2	48.2	48.0	49.9	41.6	26.4	36.4	42.9	42.9	12	45	7.8	26	54	0%	-	-
Chromium	mg/L	-	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.000540	<0.00050	<0.00050	<0.00050	12	0.00050	-	<0.00050	0.00054	92%	-	-
Cobalt	mg/L	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	12	<0.00010	-	<0.00010	<0.00010	100%	-	-
Copper	mg/L	0.0034 to 0.0081	0.020 to 0.048	0.00783	0.00658	0.00776	0.00710	0.00749	0.00762	0.0107	0.0166	0.0173	0.00808	0.00693	0.00653	12	0.0092	0.0038	0.0065	0.017	0%	100%	0%
Iron	mg/L	-	0.35	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	0.0350	0.116	0.168	<0.030	<0.030	<0.030	12	0.049	0.051	<0.030	0.17	75%	-	0%
Lead	mg/L	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	12	<0.000050	-	<0.000050	<0.000050	100%	-	-
Lithium	mg/L	-	-	0.00140	0.00120	0.00140	0.00140	0.00120	0.00100	0.00130	<0.0010	<0.0010	<0.0010	<0.0010	0.00110	12	0.0012	0.00018	0.0010	0.0014	33%	-	-
Magnesium	mg/L	-	-	10.4	9.33	10.7	10.1	9.04	7.98	9.32	7.88	4.59	5.66	6.58	6.95	12	8.2	1.9	4.6	11	0%	-	-
Manganese	mg/L	-	-	0.00556	0.00610	0.00776	0.00941	0.00879	0.00790	0.00915	0.0165	0.0163	0.0105	0.00826	0.00577	12	0.0093	0.0036	0.0056	0.016	0%	-	-
Molybdenum	mg/L	-	-	0.00695	0.00679	0.00814	0.00620	0.00657	0.00629	0.00575	0.00378	0.00342	0.00578	0.00631	0.00674	12	0.0061	0.0013	0.0034	0.0081	0%	-	-
Nickel	mg/L	-	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.000690	0.000770	<0.00050	<0.00050	<0.00050	12	0.00054	0.000031	<0.00050	0.00077	83%	-	-
Potassium	mg/L	-	-	1.35	1.19	1.27	1.15	1.18	1.14	1.17	0.907	0.778	1.10	1.05	1.02	12	1.1	0.15	0.78	1.4	0%	-	-
Selenium	mg/L	-	-	0.00198	0.00145	0.00243	0.00205	0.00125	0.00106	0.00138	0.00138	0.000912	0.000713	0.00101	0.00126	12	0.0014	0.00051	0.00071	0.0024	0%	-	-
Silicon	mg/L	-	-	4.37	3.60	3.78	3.92	4.09	3.92	4.39	4.32	4.22	3.37	3.49	3.63	12	3.9	0.36	3.4	4.4	0%	-	-
Silver	mg/L	-	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	0.0000260	<0.000010	<0.000010	12	0.000011	-	<0.000010	0.000026	92%	-	-
Sodium	mg/L	-	-	10.3	9.64	8.32	9.27	9.17	8.59	8.95	5.68	3.13	7.27	7.75	7.49	12	8.0	2.0	3.1	10	0%	-	-
Strontium	mg/L	-	-	0.403	0.378	0.410	0.405	0.363	0.344	0.351	0.291	0.172	0.245	0.288	0.318	12	0.33	0.072	0.17	0.41	0%	-	-
Thallium	mg/L	-	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	12	<0.000010	-	<0.000010	<0.000010	100%	-	-
Tin	mg/L	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	12	<0.00010	-	<0.00010	<0.00010	100%	-	-
Titanium	mg/L	-	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	12	<0.010	-	<0.010	<0.010	100%	-	-
Uranium	mg/L	-	-	0.000537	0.000472	0.000901	0.000771	0.000446	0.000448	0.000562	0.000456	0.000309	0.000259	0.000277	0.000337	12	0.00048	0.00019	0.00026	0.00090	0%	-	-
Vanadium	mg/L	-	-	0.000930	0.000870	0.000680	0.000580	0.000810	0.000810	0.000830	0.000830	0.000740	0.00122	0.00119	0.00115	12	0.00089	0.00020	0.00058	0.0012	0%	-	-
Zinc	mg/L	-	-	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	0.00820	<0.0030	<0.0030	12	0.0034	-	<0.0030	0.0082	92%	-	-

Indicates value greater than the long-term average British Columbia Water Quality Guideline (BCMOECCS 2019b,c, 2021a,b).
Indicates value greater than the short-term maximum British Columbia Water Quality Guideline (BCMOECCS 2019b,c, 2021a,b).
Percent exceedance > 0%.

Notes: "-" = data not available or no applicable guideline exists. < LRL = below laboratory reporting limit. GL = guideline. Guidelines for these parameters (Total Suspended Solids, Turbidity, Dissolved Organic Carbon) are narrative and were not evaluated.

[a] Guidelines were derived from the British Columbia Water Quality Guidelines for the protection of aquatic life (BCMOECCS 2019b,c, 2021a,b) outlined in Table D.1.1.

[b] % displayed for pH indicates results falling outside the guideline range. % displayed for dissolved oxygen indicates results below the guideline.

Table D.1.7: Surface Water Sample Data Collected Routinely at W10 in Lower Edney Creek, September 2021 to August 2022

Analyte	Units	British Columbia Water Quality Guidelines[a]		Date				Sample Size	Mean	Standard Deviation	Minimum	Maximum	% <LRL	% >Chronic GL[b]	% >Acute GL[b]
		Long-term Average	Short-term Maximum	4-Nov-21	7-Feb-22	5-Apr-22	3-Aug-22								
Anions, Organics, Nutrients, and Physical Properties															
Alkalinity (as $CaCO_3$)	mg/L	>20	-	116	104	52.4	136	4	102	36	52	136	0%	0%	-
Ammonia (as N)	mg/L	0.70 to 1.3	3.6 to 6.5	0.00630	0.00770	0.00760	0.0347	4	0.014	0.014	0.0063	0.035	0%	0%	0%
Chloride	mg/L	150	600	1.08	0.500	<0.50	0.600	4	0.67	0.29	0.50	1.1	25%	0%	0%
Conductivity	µS/cm	-	-	239	203	113	260	4	204	65	113	260	0%	-	-
Specific Conductance (*in situ*)	µS/cm	-	-	237	199	111	296	4	211	78	111	296	0%	-	-
Dissolved Organic Carbon	mg/L	-	-	10.9	12.5	21.4	10.7	4	14	5.1	11	21	0%	-	-
Dissolved Oxygen (*in situ*)	%	-	-	89.1	88.7	91.5	88.4	4	89	1.4	88	92	0%	-	-
Dissolved Oxygen (*in situ*)	mg/L	>8	>5	12.2	12.9	13.2	9.01	4	12	1.9	9.0	13	0%	0%	0%
Fluoride	mg/L	-	1.1 to 1.4	0.0640	0.0640	0.0380	0.0750	4	0.060	0.016	0.038	0.075	0%	-	0%
Hardness (as $CaCO_3$)	mg/L	-	-	112	101	61.0	126	4	100	28	61	126	0%	-	-
Nitrate (as N)	mg/L	3.0	33	0.00790	0.0988	0.0468	0.0253	4	0.045	0.039	0.0079	0.099	0%	0%	0%
Nitrate and Nitrite (as N)	mg/L	-	-	0.00790	0.0988	0.0468	0.0253	4	0.045	0.039	0.0079	0.099	0%	-	-
Nitrite (as N)	mg/L	0.020	0.060	<0.0010	<0.0010	<0.0010	<0.0010	4	<0.0010	-	<0.0010	<0.0010	100%	0%	0%
Dissolved Orthophosphate	mg/L	-	-	0.00370	0.00590	0.00280	0.00360	4	0.0040	0.0013	0.0028	0.0059	0%	-	-
pH (*in situ*)	pH units	6.5-9.0	6.5-9.0	8.06	7.92	7.92	8.14	4	8.0	0.11	7.9	8.1	0%	0%	0%
pH	pH units	6.5-9.0	6.5-9.0	8.12	8.08	7.82	8.36	4	8.1	0.22	7.8	8.4	0%	-	-
Dissolved Phosphorus	mg/L	-	-	0.00940	0.0115	0.0111	0.00740	4	0.0098	0.0019	0.0074	0.012	0%	-	-
Total Phosphorus	mg/L	-	-	0.0242	0.0133	0.0247	0.0124	4	0.019	0.0067	0.012	0.025	0%	-	-
Sulphate	mg/L	218 to 309	-	9.89	8.81	3.11	5.90	4	6.9	3.1	3.1	9.9	0%	0%	-
Temperature (*in situ*)	°C	-	-	2.27	0.0290	0.546	14.5	4	4.3	6.8	0.029	14	0%	-	-
Total Dissolved Solids	mg/L	-	-	154	145	97.0	180	4	144	35	97	180	0%	-	-
Total Nitrogen	mg/L	-	-	0.396	0.502	0.636	0.347	4	0.47	0.13	0.35	0.64	0%	-	-
Total Suspended Solids	mg/L	-	-	7.20	<1.0	7.50	1.50	4	4.3	3.6	<1.0	7.5	25%	-	-
Turbidity (*in situ*)	NTU	-	-	2.79	0.460	4.16	0.760	4	2.0	1.8	0.46	4.2	0%	-	-
Turbidity	NTU	-	-	2.15	0.640	6.96	1.73	4	2.9	2.8	0.64	7.0	0%	-	-
Total Metals															
Aluminum	mg/L	-	-	0.116	0.0355	0.461	0.0810	4	0.17	0.19	0.036	0.46	0%	-	-
Antimony	mg/L	0.0090	-	<0.00010	<0.00010	<0.00010	<0.00010	4	<0.00010	-	<0.00010	<0.00010	100%	0%	-
Arsenic	mg/L	-	0.0050	0.00142	0.00119	0.000600	0.00172	4	0.0012	0.00047	0.00060	0.0017	0%	-	0%
Barium	mg/L	1.0	-	0.0176	0.0142	0.0124	0.0215	4	0.016	0.0040	0.012	0.022	0%	0%	-
Beryllium	mg/L	0.00013	-	<0.00010	<0.00010	<0.00010	<0.00010	4	<0.00010	-	<0.00010	<0.00010	100%	0%	-
Bismuth	mg/L	-	-	<0.000050	<0.000050	<0.000050	<0.000050	4	<0.000050	-	<0.000050	<0.000050	100%	-	-
Boron	mg/L	1.2	-	0.0100	0.0110	<0.010	0.0170	4	0.012	0.0036	0.010	0.017	25%	0%	-
Cadmium	mg/L	-	-	0.0000104	<0.0000050	0.0000108	0.00000560	4	0.0000080	0.0000031	<0.0000050	0.000011	25%	-	-
Calcium	mg/L	-	-	31.1	28.3	17.4	31.4	4	27	6.6	17	31	0%	-	-
Chromium	mg/L	0.0010	-	<0.00050	<0.00050	0.00144	<0.00050	4	0.00074	-	<0.00050	0.0014	75%	25%	-
Cobalt	mg/L	0.0040	0.11	0.000160	<0.00010	0.000340	0.000110	4	0.00018	0.00012	<0.00010	0.00034	25%	0%	0%
Copper	mg/L	-	-	0.00181	0.00172	0.00383	0.00214	4	0.0024	0.00099	0.0017	0.0038	0%	-	-
Iron	mg/L	-	1.0	0.287	0.177	0.748	0.120	4	0.33	0.29	0.12	0.75	0%	-	0%
Lead	mg/L	0.0050 to 0.0076	0.044 to 0.11	0.0000760	<0.000050	0.000177	<0.000050	4	0.000088	0.000062	<0.000050	0.00018	50%	0%	0%
Lithium	mg/L	-	-	<0.0010	<0.0010	<0.0010	<0.0010	4	<0.0010	-	<0.0010	<0.0010	100%	-	-
Magnesium	mg/L	-	-	10.1	8.61	4.96	9.96	4	8.4	2.4	5.0	10	0%	-	-
Manganese	mg/L	0.87 to 1.2	1.2 to 1.9	0.0412	0.00775	0.0333	0.0118	4	0.024	0.016	0.0078	0.041	0%	0%	0%
Molybdenum	mg/L	7.6	46	0.000808	0.000679	0.000298	0.00124	4	0.00076	0.00039	0.00030	0.0012	0%	0%	0%
Nickel	mg/L	0.066 to 0.11	-	0.000860	0.000880	0.00187	0.000950	4	0.0011	0.00049	0.00086	0.0019	0%	0%	-
Potassium	mg/L	-	-	1.10	0.781	0.649	1.04	4	0.89	0.21	0.65	1.1	0%	-	-
Selenium	mg/L	0.0020	-	0.000124	0.000122	0.000170	0.000120	4	0.00013	0.000024	0.00012	0.00017	0%	0%	-
Silicon	mg/L	-	-	5.01	5.76	5.66	5.38	4	5.5	0.34	5.0	5.8	0%	-	-
Silver	mg/L	0.000050 to 0.0015	0.00010 to 0.0030	<0.000010	<0.000010	<0.000010	<0.000010	4	<0.000010	-	<0.000010	<0.000010	100%	0%	0%
Sodium	mg/L	-	-	5.54	5.15	2.92	6.25	4	5.0	1.4	2.9	6.2	0%	-	-
Strontium	mg/L	-	-	0.205	0.178	0.102	0.217	4	0.18	0.052	0.10	0.22	0%	-	-
Thallium	mg/L	0.00080	-	<0.000010	<0.000010	<0.000010	<0.000010	4	<0.000010	-	<0.000010	<0.000010	100%	0%	-
Tin	mg/L	-	-	<0.00010	<0.00010	<0.00010	<0.00010	4	<0.00010	-	<0.00010	<0.00010	100%	-	-
Titanium	mg/L	-	-	<0.010	<0.010	0.0136	<0.010	4	0.011	-	<0.010	0.014	75%	-	-
Uranium	mg/L	0.0085	-	0.000268	0.000158	0.0000930	0.000212	4	0.00018	0.000075	0.000093	0.00027	0%	0%	-
Vanadium	mg/L	-	-	0.000700	0.000510	0.00139	0.000860	4	0.00086	0.00038	0.00051	0.0014	0%	-	-
Zinc	mg/L	0.0075 to 0.034	0.033 to 0.060	<0.0030	<0.0030	<0.0030	<0.0030	4	<0.0030	-	<0.0030	<0.0030	100%	0%	0%

Indicates value greater than the long-term average British Columbia Water Quality Guideline (BCMOECCS 2019b,c, 2021a,b).
Indicates value greater than the short-term maximum British Columbia Water Quality Guideline (BCMOECCS 2019b,c, 2021a,b).
Percent exceedance > 0%.

Notes: "-" = data not available or no applicable guideline exists. < LRL = below laboratory reporting limit. GL = guideline. Guidelines for these parameters (Total Suspended Solids, Turbidity, Dissolved Organic Carbon) are narrative and were not evaluated.

[a] Guidelines were derived from the British Columbia Water Quality Guidelines for the protection of aquatic life (BCMOECCS 2019b,c, 2021a,b) outlined in Table D.1.1.
[b] % displayed for pH indicates results falling outside the guideline range. % displayed for dissolved oxygen indicates results below the guideline.

Table D.1.7: Surface Water Sample Data Collected Routinely at W10 in Lower Edney Creek, September 2021 to August 2022

Analyte	Units	British Columbia Water Quality Guidelines[a]		Date				Sample Size	Mean	Standard Deviation	Minimum	Maximum	% <LRL	% >Chronic GL[b]	% >Acute GL[b]
		Long-term Average	Short-term Maximum	4-Nov-21	7-Feb-22	5-Apr-22	3-Aug-22								
Dissolved Metals															
Aluminum	mg/L	0.050	0.10	0.00750	0.0193	0.117	0.0134	4	0.039	0.052	0.0075	0.12	0%	25%	25%
Antimony	mg/L	-	-	<0.00010	<0.00010	<0.00010	<0.00010	4	<0.00010	-	<0.00010	<0.00010	100%	-	-
Arsenic	mg/L	-	-	0.00110	0.00111	0.000420	0.00154	4	0.0010	0.00046	0.00042	0.0015	0%	-	-
Barium	mg/L	-	-	0.0144	0.0140	0.00892	0.0198	4	0.014	0.0044	0.0089	0.020	0%	-	-
Beryllium	mg/L	-	-	<0.00010	<0.00010	<0.00010	<0.00010	4	<0.00010	-	<0.00010	<0.00010	100%	-	-
Bismuth	mg/L	-	-	<0.000050	<0.000050	<0.000050	<0.000050	4	<0.000050	-	<0.000050	<0.000050	100%	-	-
Boron	mg/L	-	-	0.0100	0.0100	<0.010	0.0180	4	0.012	0.0042	0.010	0.018	25%	-	-
Cadmium	mg/L	0.00015 to 0.00025	0.00035 to 0.00075	<0.0000050	<0.0000050	0.00000550	0.00000850	4	0.0000060	0.0000018	<0.0000050	0.0000085	50%	0%	0%
Calcium	mg/L	-	-	28.9	27.2	16.6	34.8	4	27	7.6	17	35	0%	-	-
Chromium	mg/L	-	-	<0.00050	<0.00050	0.000650	<0.00050	4	0.00054	-	<0.00050	0.00065	75%	-	-
Cobalt	mg/L	-	-	<0.00010	<0.00010	<0.00010	<0.00010	4	<0.00010	-	<0.00010	<0.00010	100%	-	-
Copper	mg/L	0.0058 to 0.0084	0.035 to 0.050	0.00116	0.00155	0.00276	0.00155	4	0.0018	0.00069	0.0012	0.0028	0%	0%	0%
Iron	mg/L	-	0.35	0.0660	0.129	0.180	0.0440	4	0.10	0.062	0.044	0.18	0%	-	0%
Lead	mg/L	-	-	<0.000050	<0.000050	<0.000050	<0.000050	4	<0.000050	-	<0.000050	<0.000050	100%	-	-
Lithium	mg/L	-	-	<0.0010	<0.0010	<0.0010	<0.0010	4	<0.0010	-	<0.0010	<0.0010	100%	-	-
Magnesium	mg/L	-	-	9.62	8.15	4.75	9.61	4	8.0	2.3	4.8	9.6	0%	-	-
Manganese	mg/L	-	-	0.00585	0.00420	0.00519	0.00777	4	0.0058	0.0015	0.0042	0.0078	0%	-	-
Molybdenum	mg/L	-	-	0.000791	0.000688	0.000257	0.00122	4	0.00074	0.00040	0.00026	0.0012	0%	-	-
Nickel	mg/L	-	-	0.000610	0.000740	0.00108	0.000840	4	0.00082	0.00020	0.00061	0.0011	0%	-	-
Potassium	mg/L	-	-	1.03	0.754	0.558	0.963	4	0.83	0.21	0.56	1.0	0%	-	-
Selenium	mg/L	-	-	0.000159	0.0000880	0.000186	0.000109	4	0.00014	0.000045	0.000088	0.00019	0%	-	-
Silicon	mg/L	-	-	4.58	5.16	4.47	5.10	4	4.8	0.35	4.5	5.2	0%	-	-
Silver	mg/L	-	-	<0.000010	<0.000010	<0.000010	<0.000010	4	<0.000010	-	<0.000010	<0.000010	100%	-	-
Sodium	mg/L	-	-	5.12	4.77	2.64	6.33	4	4.7	1.5	2.6	6.3	0%	-	-
Strontium	mg/L	-	-	0.195	0.177	0.102	0.236	4	0.18	0.056	0.10	0.24	0%	-	-
Thallium	mg/L	-	-	<0.000010	<0.000010	<0.000010	<0.000010	4	<0.000010	-	<0.000010	<0.000010	100%	-	-
Tin	mg/L	-	-	<0.00010	<0.00010	<0.00010	<0.00010	4	<0.00010	-	<0.00010	<0.00010	100%	-	-
Titanium	mg/L	-	-	<0.010	<0.010	<0.010	<0.010	4	<0.010	-	<0.010	<0.010	100%	-	-
Uranium	mg/L	-	-	0.000251	0.000159	0.0000710	0.000211	4	0.00017	0.000078	0.000071	0.00025	0%	-	-
Vanadium	mg/L	-	-	<0.00050	<0.00050	0.000640	0.000620	4	0.00056	0.000012	<0.00050	0.00064	50%	-	-
Zinc	mg/L	-	-	<0.0030	<0.0030	<0.0030	<0.0030	4	<0.0030	-	<0.0030	<0.0030	100%	-	-

Indicates value greater than the long-term average British Columbia Water Quality Guideline (BCMOECCS 2019b,c, 2021a,b).
Indicates value greater than the short-term maximum British Columbia Water Quality Guideline (BCMOECCS 2019b,c, 2021a,b).
Percent exceedance > 0%.

Notes: "-" = data not available or no applicable guideline exists. < LRL = below laboratory reporting limit. GL = guideline. Guidelines for these parameters (Total Suspended Solids, Turbidity, Dissolved Organic Carbon) are narrative and were not evaluated.

[a] Guidelines were derived from the British Columbia Water Quality Guidelines for the protection of aquatic life (BCMOECCS 2019b,c, 2021a,b) outlined in Table D.1.1.

[b] % displayed for pH indicates results falling outside the guideline range. % displayed for dissolved oxygen indicates results below the guideline.

Table D.1.8: Surface Water Sample Data Collected Routinely at EDC-01a in Lower Edney Creek, September 2021 to August 2022

Analyte	Units	British Columbia Water Quality Guidelines[a]		Date												Sample Size	Mean	Standard Deviation	Minimum	Maximum	% <LRL	% >Chronic GL[b]	% >Acute GL[b]
		Long-term Average	Short-term Maximum	1-Sep-21	4-Oct-21	4-Nov-21	1-Dec-21	12-Jan-22	7-Feb-22	9-Mar-22	5-Apr-22	3-May-22	1-Jun-22	5-Jul-22	3-Aug-22								
Anions, Organics, Nutrients, and Physical Properties																							
Alkalinity (as $CaCO_3$)	mg/L	>20	-	149	145	125	116	124	113	97.6	61.3	44.0	67.5	88.2	122	12	104	33	44	149	0%	0%	-
Ammonia (as N)	mg/L	0.37 to 2.0	1.9 to 12	0.00680	0.00540	0.00650	0.00500	0.00600	<0.0050	0.00690	0.00720	0.00810	0.00700	0.00820	0.00920	12	0.0068	0.0013	0.0050	0.0092	8%	0%	0%
Chloride	mg/L	150	600	1.47	1.34	1.09	0.710	1.10	0.850	0.580	<0.50	<0.50	<0.50	<0.50	0.870	12	0.83	0.33	<0.50	1.5	33%	0%	0%
Conductivity	µS/cm	-	-	378	360	325	270	341	288	241	146	99.3	172	221	313	12	263	89	99	378	0%	-	-
Specific Conductance (*in situ*)	µS/cm	-	-	376	-	314	301	343	281	241	146	97.2	168	219	357	11	258	92	97	376	0%	-	-
Dissolved Organic Carbon	mg/L	-	-	4.89	4.63	7.93	7.97	6.01	8.18	14.0	20.5	17.4	13.3	11.0	6.08	12	10	5.1	4.6	20	0%	-	-
Dissolved Oxygen (*in situ*)	%	-	-	103	-	90.8	90.6	87.3	91.5	94.8	92.9	92.9	90.5	97.2	95.8	11	93	4.2	87	103	0%	-	-
Dissolved Oxygen (*in situ*)	mg/L	>8	>5	10.6	-	11.7	13.2	12.6	13.0	13.3	13.1	12.6	9.44	9.10	9.17	11	12	1.7	9.1	13	0%	0%	0%
Fluoride	mg/L	-	1.1 to 1.6	0.0940	0.104	0.0830	0.0520	0.0920	0.0800	0.0620	0.0450	0.0450	0.0560	0.0640	0.0790	12	0.071	0.020	0.045	0.10	0%	-	0%
Hardness (as $CaCO_3$)	mg/L	-	-	175	170	148	141	157	135	121	82.3	51.5	77.2	103	146	12	126	39	52	175	0%	-	-
Nitrate (as N)	mg/L	3.0	33	0.0396	<0.0050	0.0506	0.0514	0.123	0.0885	0.0915	0.0434	0.00920	<0.0050	0.0106	0.0333	12	0.046	0.038	<0.0050	0.12	17%	0%	0%
Nitrate and Nitrite (as N)	mg/L	-	-	0.0396	<0.0051	0.0506	0.0514	0.123	0.0885	0.0915	0.0434	0.00920	<0.0051	0.0106	0.0333	12	0.046	0.038	<0.0051	0.12	17%	-	-
Nitrite (as N)	mg/L	0.020	0.060	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	12	<0.0010	-	<0.0010	<0.0010	100%	0%	0%
Dissolved Orthophosphate	mg/L	-	-	0.00140	0.00160	0.00180	0.00170	0.00640	0.00510	0.00220	0.00220	<0.0010	0.00170	0.00140	0.00270	12	0.0024	0.0016	<0.0010	0.0064	8%	-	-
pH (*in situ*)	pH units	6.5-9.0	6.5-9.0	8.45	-	8.14	8.06	7.99	8.03	7.71	7.74	7.51	8.06	8.17	8.20	11	8.0	0.26	7.5	8.4	0%	0%	0%
pH	pH units	6.5-9.0	6.5-9.0	8.31	8.37	8.14	7.98	8.09	8.08	8.04	7.89	7.80	7.98	8.17	8.30	12	8.1	0.17	7.8	8.4	0%	-	-
Dissolved Phosphorus	mg/L	-	-	0.00460	0.00440	0.00590	0.00320	0.00800	0.00960	0.0123	0.0102	0.00740	0.00900	0.00970	0.00770	12	0.0077	0.0027	0.0032	0.012	0%	-	-
Total Phosphorus	mg/L	-	-	0.00620	0.00710	0.0186	0.00730	0.00910	0.0113	0.0142	0.0216	0.0264	0.0162	0.0142	0.00990	12	0.014	0.0063	0.0062	0.026	0%	-	-
Sulphate	mg/L	218 to 309	-	54.0	50.8	41.0	39.0	52.4	37.6	27.4	11.3	4.85	17.8	24.2	40.4	12	33	16	4.8	54	0%	0%	-
Temperature (*in situ*)	°C	-	-	14.1	-	4.50	0.0230	0.323	0.974	1.61	1.23	2.57	13.4	17.2	17.3	11	6.7	7.2	0.023	17	0%	-	-
Total Dissolved Solids	mg/L	-	-	258	230	212	165	212	186	178	116	69.0	130	162	183	12	175	52	69	258	0%	-	-
Total Nitrogen	mg/L	-	-	0.209	0.170	0.281	0.299	0.301	0.372	0.491	0.611	0.494	0.414	0.367	0.262	12	0.36	0.13	0.17	0.61	0%	-	-
Total Suspended Solids	mg/L	-	-	<1.0	1.40	11.2	1.80	<1.0	<1.0	1.90	6.30	9.80	6.40	2.20	<1.0	12	3.8	3.7	<1.0	11	33%	-	-
Turbidity (*in situ*)	NTU	-	-	0.800	-	6.50	1.76	0.750	0.820	1.35	4.36	6.92	2.01	0.980	0.780	11	2.5	2.3	0.75	6.9	0%	-	-
Turbidity	NTU	-	-	0.410	0.300	5.56	5.06	0.510	0.420	1.51	5.89	6.99	1.54	0.840	0.500	12	2.5	2.6	0.30	7.0	0%	-	-
Total Metals																							
Aluminum	mg/L	-	-	0.0243	0.0182	0.371	0.0418	0.0293	0.0345	0.122	0.410	0.271	0.186	0.0863	0.0203	12	0.13	0.14	0.018	0.41	0%	-	-
Antimony	mg/L	0.0090	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	12	<0.00010	-	<0.00010	<0.00010	100%	0%	-
Arsenic	mg/L	-	0.0050	0.00108	0.000960	0.00128	0.000850	0.000780	0.000910	0.000810	0.000560	0.000480	0.000580	0.000740	0.000950	12	0.00083	0.00023	0.00048	0.0013	0%	-	0%
Barium	mg/L	1.0	-	0.0285	0.0239	0.0276	0.0196	0.0197	0.0182	0.0170	0.0146	0.0109	0.0131	0.0162	0.0213	12	0.019	0.0054	0.011	0.028	0%	0%	-
Beryllium	mg/L	0.00013	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	12	<0.00010	-	<0.00010	<0.00010	100%	0%	-
Bismuth	mg/L	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	12	<0.000050	-	<0.000050	<0.000050	100%	-	-
Boron	mg/L	1.2	-	0.0250	0.0240	0.0150	0.0160	0.0210	0.0180	0.0130	<0.010	<0.010	0.0120	0.0160	0.0220	12	0.017	0.0048	<0.010	0.025	17%	0%	-
Cadmium	mg/L	-	-	0.00000870	<0.000010	0.0000115	0.00000550	0.00000640	0.00000590	0.0000152	0.0000172	0.0000118	<0.000010	0.00000780	<0.000010	12	0.0000092	0.0000040	0.0000055	0.000017	25%	-	-
Calcium	mg/L	-	-	49.5	52.6	44.0	41.7	45.6	43.4	35.2	21.2	14.0	27.1	31.6	42.3	12	37	12	14	53	0%	-	-
Chromium	mg/L	0.0010	-	<0.00050	<0.00050	0.000730	<0.00050	<0.00050	<0.00050	0.000630	0.00128	0.00100	0.000640	<0.00050	<0.00050	12	0.00065	0.00022	<0.00050	0.0013	58%	8%	-
Cobalt	mg/L	0.0040	0.11	<0.00010	<0.00010	0.000300	<0.00010	<0.00010	<0.00010	0.000110	0.000290	0.000230	0.000130	<0.00010	<0.00010	12	0.00015	0.000080	<0.00010	0.00030	58%	0%	0%
Copper	mg/L	-	-	0.00937	0.00770	0.0114	0.00615	0.00792	0.00722	0.00832	0.00720	0.00580	0.00640	0.00656	0.00713	12	0.0076	0.0016	0.0058	0.011	0%	-	-
Iron	mg/L	-	1.0	0.0400	0.0320	0.546	0.0910	0.0580	0.0910	0.234	0.648	0.374	0.249	0.144	0.0380	12	0.21	0.21	0.032	0.65	0%	-	0%
Lead	mg/L	0.0047 to 0.0098	0.035 to 0.17	<0.000050	<0.000050	0.000201	<0.000050	<0.000050	<0.000050	0.0000690	0.000158	0.000148	0.0000560	<0.000050	<0.000050	12	0.000082	0.000056	<0.000050	0.00020	58%	0%	0%
Lithium	mg/L	-	-	0.00130	0.00120	0.00150	<0.0010	0.00110	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	12	0.0011	0.00014	<0.0010	0.0015	67%	-	-
Magnesium	mg/L	-	-	11.5	10.7	11.0	9.37	9.04	8.75	8.30	5.93	3.55	5.28	6.12	8.16	12	8.1	2.5	3.6	12	0%	-	-
Manganese	mg/L	0.83 to 1.4	1.1 to 2.5	0.0531	0.0446	0.0522	0.0310	0.0544	0.0366	0.0408	0.0406	0.0220	0.0256	0.0375	0.0560	12	0.041	0.011	0.022	0.056	0%	0%	0%
Molybdenum	mg/L	7.6	46	0.00613	0.00626	0.00434	0.00347	0.00574	0.00420	0.00270	0.000937	0.000664	0.00269	0.00370	0.00567	12	0.0039	0.0019	0.00066	0.0063	0%	0%	0%
Nickel	mg/L	0.025 to 0.15	-	<0.00050	<0.00050	0.00113	0.000560	<0.00050	0.000530	0.000990	0.00172	0.00137	0.000930	0.000770	<0.00050	12	0.00083	0.00041	<0.00050	0.0017	33%	0%	-
Potassium	mg/L	-	-	1.38	1.27	1.24	0.938	1.09	1.02	0.879	0.754	0.542	0.717	0.885	1.13	12	0.99	0.25	0.54	1.4	0%	-	-
Selenium	mg/L	0.0020	-	0.00165	0.00119	0.00125	0.00123	0.00122	0.000732	0.000637	0.000376	0.000190	0.000387	0.000648	0.00107	12	0.00088	0.00045	0.00019	0.0016	0%	0%	-
Silicon	mg/L	-	-	4.37	4.29	5.05	4.56	4.43	5.00	5.24	5.59	4.81	3.83	3.63	4.34	12	4.6	0.57	3.6	5.6	0%	-	-
Silver	mg/L	0.000050 to 0.0015	0.00010 to 0.0030	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	12	<0.000010	-	<0.000010	<0.000010	100%	0%	0%
Sodium	mg/L	-	-	10.3	10.0	7.34	7.04	8.56	7.81	6.49	3.73	2.10	4.70	5.74	7.78	12	6.8	2.4	2.1	10	0%	-	-
Strontium	mg/L	-	-	0.365	0.379	0.318	0.284	0.338	0.287	0.231	0.141	0.0880	0.165	0.205	0.285	12	0.26	0.092	0.088	0.38	0%	-	-
Thallium	mg/L	0.00080	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	12	<0.000010	-	<0.000010	<0.000010	100%	0%	-
Tin	mg/L	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	12	<0.00010	-	<0.00010	<0.00010	100%	-	-
Titanium	mg/L	-	-	<0.010	<0.010	0.0142	<0.010	<0.010	<0.010	<0.010	0.0108	<0.010	<0.010	<0.010	<0.010	12	0.010	0.0013	<0.010	0.014	83%	-	-
Uranium	mg/L	0.0085	-	0.000600	0.000559	0.000684	0.000506	0.000453	0.000370	0.000352	0.000198	0.000107	0.000176	0.000229	0.000383	12	0.00038	0.00018	0.00011	0.00068	0%	0%	-
Vanadium	mg/L	-	-	0.00101	0.000870	0.00137	0.000560	0.000840	0.000800	0.00100	0.00135	0.00100	0.00136	0.00119	0.00118	12	0.0010	0.00025	0.00056	0.0014	0%	-	-
Zinc	mg/L	0.0075 to 0.071	0.033 to 0.097	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	12	<0.0030	-	<0.0030	<0.0030	100%	0%	0%

Indicates value greater than the long-term average British Columbia Water Quality Guideline (BCMOECCS 2019b,c,2021a,b).
Indicates value greater than the short-term maximum British Columbia Water Quality Guideline (BCMOECCS 2019b,c, 2021a,b).
Percent exceedance > 0%.

Notes: "-" = data not available or no applicable guideline exists. < LRL = below laboratory reporting limit. GL = guideline. Guidelines for these parameters (Total Suspended Solids, Turbidity, Dissolved Organic Carbon) are narrative and were not evaluated.

[a] Guidelines were derived from the British Columbia Water Quality Guidelines for the protection of aquatic life (BCMOECCS 2019b,c, 2021a,b) outlined in Table D.1.1.
[b] % displayed for pH indicates results falling outside the guideline range. % displayed for dissolved oxygen indicates results below the guideline.

Table D.1.8: Surface Water Sample Data Collected Routinely at EDC-01a in Lower Edney Creek, September 2021 to August 2022

Analyte	Units	British Columbia Water Quality Guidelines[a]		Date												Sample Size	Mean	Standard Deviation	Minimum	Maximum	% <LRL	% >Chronic GL[b]	% >Acute GL[b]
		Long-term Average	Short-term Maximum	1-Sep-21	4-Oct-21	4-Nov-21	1-Dec-21	12-Jan-22	7-Feb-22	9-Mar-22	5-Apr-22	3-May-22	1-Jun-22	5-Jul-22	3-Aug-22								
Dissolved Metals																							
Aluminum	mg/L	0.050	0.10	0.00420	<0.0030	0.00470	0.0100	<0.0030	0.0103	0.0482	0.110	0.158	0.0558	0.0309	0.00630	12	0.037	0.050	<0.0030	0.16	17%	25%	17%
Antimony	mg/L	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	12	<0.00010	-	<0.00010	<0.00010	100%	-	-
Arsenic	mg/L	-	-	0.00103	0.000930	0.00101	0.000830	0.000740	0.000850	0.000800	0.000470	0.000420	0.000480	0.000740	0.000840	12	0.00076	0.00021	0.00042	0.0010	0%	-	-
Barium	mg/L	-	-	0.0279	0.0238	0.0201	0.0194	0.0189	0.0172	0.0159	0.0121	0.00931	0.0112	0.0166	0.0211	12	0.018	0.0053	0.0093	0.028	0%	-	-
Beryllium	mg/L	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	12	<0.00010	-	<0.00010	<0.00010	100%	-	-
Bismuth	mg/L	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	12	<0.000050	-	<0.000050	<0.000050	100%	-	-
Boron	mg/L	-	-	0.0240	0.0210	0.0160	0.0160	0.0210	0.0180	0.0130	<0.010	<0.010	0.0110	0.0140	0.0200	12	0.016	0.0045	<0.010	0.024	17%	-	-
Cadmium	mg/L	0.00013 to 0.00032	0.00030 to 0.0010	0.00000670	0.00000620	0.00000530	0.00000620	<0.0000050	<0.0000050	0.00000880	0.00000710	<0.0000050	0.00000800	<0.000015	0.0000138	12	0.0000070	0.0000027	<0.0000050	0.000014	33%	0%	0%
Calcium	mg/L	-	-	50.8	50.3	42.0	41.1	47.9	40.7	35.3	23.1	14.4	23.4	31.4	45.2	12	37	12	14	51	0%	-	-
Chromium	mg/L	-	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.000560	0.000850	<0.00050	<0.00050	<0.00050	12	0.00053	0.00011	<0.00050	0.00085	83%	-	-
Cobalt	mg/L	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	12	<0.00010	-	<0.00010	<0.00010	100%	-	-
Copper	mg/L	0.0034 to 0.0080	0.020 to 0.048	0.00826	0.00674	0.00513	0.00540	0.00694	0.00599	0.00695	0.00573	0.00510	0.00523	0.00561	0.00663	12	0.0061	0.00097	0.0051	0.0083	0%	75%	0%
Iron	mg/L	-	0.35	<0.030	<0.030	0.0310	0.0590	<0.030	0.0540	0.136	0.170	0.188	0.0860	0.0770	<0.030	12	0.077	0.059	<0.030	0.19	33%	-	0%
Lead	mg/L	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	12	<0.000050	-	<0.000050	<0.000050	100%	-	-
Lithium	mg/L	-	-	0.00130	0.00110	0.00110	<0.0010	0.00110	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	12	0.0010	0.000064	<0.0010	0.0013	67%	-	-
Magnesium	mg/L	-	-	11.6	10.8	10.5	9.36	9.00	8.04	7.96	5.97	3.78	4.56	5.97	8.09	12	8.0	2.5	3.8	12	0%	-	-
Manganese	mg/L	-	-	0.0493	0.0424	0.0257	0.0421	0.0490	0.0309	0.0381	0.0160	0.00894	0.0155	0.0287	0.0506	12	0.033	0.014	0.0089	0.051	0%	-	-
Molybdenum	mg/L	-	-	0.00601	0.00603	0.00405	0.00346	0.00588	0.00407	0.00286	0.000845	0.000718	0.00276	0.00364	0.00580	12	0.0038	0.0019	0.00072	0.0060	0%	-	-
Nickel	mg/L	-	-	<0.00050	<0.00050	0.000510	0.000520	<0.00050	<0.00050	0.000840	0.00106	0.00110	0.000810	0.000710	<0.00050	12	0.00067	0.00023	<0.00050	0.0011	42%	-	-
Potassium	mg/L	-	-	1.37	1.19	1.13	0.931	1.13	0.958	0.863	0.656	0.590	0.747	0.851	1.08	12	0.96	0.23	0.59	1.4	0%	-	-
Selenium	mg/L	-	-	0.00162	0.00146	0.00131	0.00131	0.00117	0.000766	0.000761	0.000361	0.000226	0.000416	0.000691	0.00102	12	0.00093	0.00046	0.00023	0.0016	0%	-	-
Silicon	mg/L	-	-	4.63	4.11	4.25	4.47	4.30	4.42	5.10	4.63	4.52	3.62	3.89	4.27	12	4.4	0.38	3.6	5.1	0%	-	-
Silver	mg/L	-	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	12	<0.000010	-	<0.000010	<0.000010	100%	-	-
Sodium	mg/L	-	-	10.6	9.86	6.86	6.92	8.69	7.16	6.34	3.43	2.30	4.42	5.99	8.09	12	6.7	2.5	2.3	11	0%	-	-
Strontium	mg/L	-	-	0.392	0.349	0.300	0.287	0.348	0.282	0.230	0.140	0.0912	0.158	0.223	0.316	12	0.26	0.093	0.091	0.39	0%	-	-
Thallium	mg/L	-	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	12	<0.000010	-	<0.000010	<0.000010	100%	-	-
Tin	mg/L	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	12	<0.00010	-	<0.00010	<0.00010	100%	-	-
Titanium	mg/L	-	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	12	<0.010	-	<0.010	<0.010	100%	-	-
Uranium	mg/L	-	-	0.000637	0.000510	0.000645	0.000518	0.000453	0.000360	0.000361	0.000162	0.000106	0.000162	0.000224	0.000368	12	0.00038	0.00018	0.00011	0.00064	0%	-	-
Vanadium	mg/L	-	-	0.000930	0.000800	0.000500	<0.00050	0.000740	0.000610	0.000700	0.000660	0.000720	0.000950	0.00100	0.00108	12	0.00077	0.00019	0.00050	0.0011	8%	-	-
Zinc	mg/L	-	-	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	12	<0.0030	-	<0.0030	<0.0030	100%	-	-

Indicates value greater than the long-term average British Columbia Water Quality Guideline (BCMOECCS 2019b,c, 2021a,b).
Indicates value greater than the short-term maximum British Columbia Water Quality Guideline (BCMOECCS 2019b,c, 2021a,b).
Percent exceedance > 0%.

Notes: "-" = data not available or no applicable guideline exists. < LRL = below laboratory reporting limit. GL = guideline. Guidelines for these parameters (Total Suspended Solids, Turbidity, Dissolved Organic Carbon) are narrative and were not evaluated.

[a] Guidelines were derived from the British Columbia Water Quality Guidelines for the protection of aquatic life (BCMOECCS 2019b,c, 2021a,b) outlined in Table D.1.1.

[b] % displayed for pH indicates results falling outside the guideline range. % displayed for dissolved oxygen indicates results below the guideline.

APPENDIX D.2
SEDIMENT QUALITY

Table D.2.1: **Baseline Sediment Quality Data for Upper and Lower Edney Creek, 1995, 1996, and 1999**

Analyte	Units	1995 (HKP 1996)[a]																	
		WQ8						WQ8B						WQ9					
		Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6
Physical Tests																			
Moisture	%	39.3	90.4	38.2	43.6	52	88.2	36.1	30.5	35.2	31.1	21.3	18.4	16.5	10.6	14.9	12.9	10.5	8.5
Physical Characteristics																			
Gravel (> 2mm)	%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sand (2.0 mm - 0.050 mm)	%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silt (0.050 mm - 2 µm)	%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Clay (< 2 µm)	%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Organic / Inorganic Carbon																			
Total Organic Carbon	%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Metals																			
Aluminum	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Antimony	mg/kg	0.62	<0.050	<0.050	<0.050	<0.050	<0.050	0.52	0.53	0.99	0.46	0.56	0.27	1.54	<0.050	0.35	0.30	<0.050	0.13
Arsenic	mg/kg	5.52	6.73	6.72	4.53	3.43	11.5	2.7	4.91	3.86	5.31	5.53	6.36	5.73	3.23	1.95	8.81	5.22	5.16
Barium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Beryllium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bismuth	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium	mg/kg	<0.10	8.7	<0.10	0.10	<0.10	0.60	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Calcium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	mg/kg	38	71	43	43	28	101	44	48	20	21	33	29	32	10	7	22	9	8
Cobalt	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper	mg/kg	21	55	26	23	20	69	36	27	44	118	19	22	27	26	10	17	28	9
Iron	mg/kg	30,800	39,200	29,200	28,200	24,700	56,600	37,700	30,700	20,100	24,600	23,200	32,500	27,700	23,200	9,920	27,100	25,700	11,900
Lead	mg/kg	4	13	4	4	4	10	5	4	4	4	3	4	<2.0	4	<2.0	3	2.0	3
Magnesium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Manganese	mg/kg	540	1,350	472	529	506	1,330	892	872	708	535	565	1,040	775	624	221	640	549	300
Mercury	mg/kg	0.040	0.071	0.064	0.036	0.032	0.078	0.036	0.033	0.015	0.022	0.023	0.024	0.019	0.013	0.012	0.014	0.014	0.015
Molybdenum	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nickel	mg/kg	24	52	24	25	19	61	40	26	15	16	19	19	15	13	4	14	9	6
Phosphorus	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Potassium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	mg/kg	0.20	1.3	0.10	0.20	0.20	0.90	<0.10	<0.10	<0.10	0.50	<0.10	0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Silver	mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Sodium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Strontium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphur	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tin	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Titanium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc	mg/kg	54	128	52	55	49	138	58	43	29	36	30	42	37	31	15	37	29	17

Notes: Sediment metal concentrations are based predominantly on bulk sediment samples. Concentrations reported in 1995 and 1996 were for the silt and clay (< 63 µm) fraction only. Iron concentrations in sediment in 1999 were measured using both ICP-AA (Inductively Coupled Plasma Atomic Absorption) as well as ICP-MS (Inductively Coupled Plasma Mass Spectrometry for each sample collected (Beak 2000). Iron results measured using ICP-MS are displayed herein because this method is consistent with analysis methods used for post-breach monitoring (see Section 4.1.2). "-" indicates no data available.

[a] Monitoring areas WQ8, WQ8B, WQ9, and WQ10 sampled in 1995 (HKP 1996) were considered equivalent to sampling areas W8, W8A, W9, and W10 sampled in 1996 (HKP 1997a), respectively.

[b] Some unusually high sediment metal concentrations were reported for 1996 (HKP 1997a) and are suspected errors.

Table D.2.1: **Baseline Sediment Quality Data for Upper and Lower Edney Creek, 1995, 1996, and 1999**

Analyte	Units	1995 (HKP 1996) [a]						1996 (HKP 1997a) [b]											
		WQ10						W8						W8A					
		Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6
Physical Tests																			
Moisture	%	29.4	26.1	14.6	11.2	8.1	12.6	-	-	-	-	-	-	-	-	-	-	-	-
Physical Characteristics																			
Gravel (> 2mm)	%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sand (2.0 mm - 0.050 mm)	%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silt (0.050 mm - 2 µm)	%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Clay (< 2 µm)	%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Organic / Inorganic Carbon																			
Total Organic Carbon	%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Metals																			
Aluminum	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Antimony	mg/kg	0.12	0.80	0.45	0.38	0.38	0.25	0.48	0.47	0.30	0.25	0.45	0.23	0.58	0.58	0.53	1.1	0.59	0.41
Arsenic	mg/kg	8.54	4.08	18.1	9.83	14.4	10.1	5.67	4.88	6.56	2.12	7.08	6.19	15.9	21.9	9.96	13.5	14.1	10
Barium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Beryllium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bismuth	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium	mg/kg	0.10	<0.10	0.40	0.10	0.20	0.30	0.40	0.50	0.40	0.10	0.60	<0.10	0.60	0.60	0.30	0.60	<0.10	0.40
Calcium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	mg/kg	42	8	34	24	31	29	68	83	66	52	64	64	59	44	56	56	55	66
Cobalt	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper	mg/kg	34	12	28	21	38	32	691	1,770	1,320	605	596	1,590	2,070	1,830	2,770	4,340	2,120	1,860
Iron	mg/kg	30,000	12,700	51,900	29,100	28,000	56,600	35,700	34,000	32,700	22,500	37,400	31,200	38,900	39,900	29,100	3,160	30,900	34,700
Lead	mg/kg	4	<2.0	4	4	3	4	10	13	14	7	10	11	13	8	10	31	9	12
Magnesium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Manganese	mg/kg	644	527	1,470	823	733	1,170	876	1,150	2,490	421	1,080	835	12,200	13,700	5,040	5,120	2,160	1,290
Mercury	mg/kg	0.058	<0.0050	0.035	0.048	0.015	0.101	0.015	0.065	0.094	0.047	<0.0050	0.052	0.046	0.053	0.036	0.039	0.040	0.228
Molybdenum	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nickel	mg/kg	30	10	30	20	20	42	41	48	38	16	45	42	45	38	36	35	35	35
Phosphorus	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Potassium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	mg/kg	0.20	0.10	0.30	0.10	0.40	0.70	0.50	0.60	0.60	0.20	0.70	0.60	0.40	0.10	0.20	0.40	0.10	0.30
Silver	mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.20	<0.10	<0.10	<0.10	<0.10	<0.10
Sodium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Strontium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphur	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tin	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Titanium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uranium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc	mg/kg	60	23	126	54	51	97	191	321	266	126	174	295	389	398	462	792	630	351

Notes: Sediment metal concentrations are based predominantly on bulk sediment samples. Concentrations reported in 1995 and 1996 were for the silt and clay (< 63 µm) fraction only. Iron concentrations in sediment in 1999 were measured using both ICP-AA (Inductively Coupled Plasma Atomic Absorption) as well as ICP-MS (Inductively Coupled Plasma Mass Spectrometry for each sample collected (Beak 2000). Iron results measured using ICP-MS are displayed herein because this method is consistent with analysis methods used for post-breach monitoring (see Section 4.1.2). "-" indicates no data available.

[a] Monitoring areas WQ8, WQ8B, WQ9, and WQ10 sampled in 1995 (HKP 1996) were considered equivalent to sampling areas W8, W8A, W9, and W10 sampled in 1996 (HKP 1997a), respectively.

[b] Some unusually high sediment metal concentrations were reported for 1996 (HKP 1997a) and are suspected errors.

Table D.2.1: **Baseline Sediment Quality Data for Upper and Lower Edney Creek, 1995, 1996, and 1999**

Analyte	Units	1996 (HKP 1997a)[b]												1999 (Beak 2000)					
		W9						W10						W8			W9		
		Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 1	Rep 2	Rep 3	Rep 1	Rep 2	Rep 3
Physical Tests																			
Moisture	%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Physical Characteristics																			
Gravel (> 2mm)	%	-	-	-	-	-	-	-	-	-	-	-	-		5.4		-	-	-
Sand (2.0 mm - 0.050 mm)	%	-	-	-	-	-	-	-	-	-	-	-	-		15.1		-	-	-
Silt (0.050 mm - 2 µm)	%	-	-	-	-	-	-	-	-	-	-	-	-		44		-	-	-
Clay (< 2 µm)	%	-	-	-	-	-	-	-	-	-	-	-	-		36		-	-	-
Organic / Inorganic Carbon																			
Total Organic Carbon	%	-	-	-	-	-	-	-	-	-	-	-	-		1.4		-	-	
Metals																			
Aluminum	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	21,000	20,000	22,000	9,500	9,000	12,000
Antimony	mg/kg	0.32	0.69	0.42	0.49	0.60	0.42	0.41	0.64	0.55	0.65	1.54	0.73	0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Arsenic	mg/kg	7.38	11.2	4.89	4.83	9.47	6.39	4.67	7.36	6.24	11.9	7.07	11.5	7.2	7.2	8	22	22	5.8
Barium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	150	160	160	170	180	120
Beryllium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	0.50	0.50	0.50	0.30	0.30	0.30
Bismuth	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	0.90	0.40	0.30	0.30	>0.2	0.20
Boron	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	3.1	4.2	2.7	2.1	3.5	2.6
Cadmium	mg/kg	<0.10	<0.10	0.10	0.30	0.90	0.30	0.20	0.30	0.40	<0.10	0.50	<0.10	0.40	0.60	0.40	0.30	0.30	0.30
Calcium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	11,000	9,800	17,000	7,000	8,300	7,500
Chromium	mg/kg	44	109	40	61	81	49	30	49	51	44	61	50	47	46	48	24	23	30
Cobalt	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	17	16	17	11	11	12
Copper	mg/kg	1,130	6,740	698	2,900	4,100	2,120	442	2,590	3,350	2,450	12,200	4,060	56	54	62	19	20	25
Iron	mg/kg	19,200	24,900	18,400	19,400	21,800	19,700	15,900	17,800	19,000	20,500	17,800	20,100	38,000	35,000	40,000	48,000	52,000	23,000
Lead	mg/kg	8	32	6	12	18	9	6	11	12	21	41	10	12	10	12	5.3	6.5	5.6
Magnesium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	11,000	10,000	13,000	5,800	5,800	6,000
Manganese	mg/kg	1,080	1,510	743	962	895	991	482	686	662	586	800	546	1,000	1,100	840	1,200	1,500	1,500
Mercury	mg/kg	0.0050	0.042	0.015	0.015	0.035	0.022	0.027	0.022	0.011	<0.0050	0.019	0.020	0.050	<0.040	<0.040	<0.040	<0.040	<0.040
Molybdenum	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	0.70	0.60	0.70	1.1	1.3	0.60
Nickel	mg/kg	22	53	21	32	37	25	15	27	26	22	34	35	43	40	46	18	18	22
Phosphorus	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	790	910	830	1,000	1,200	910
Potassium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	2,100	1,900	2,300	950	1,000	820
Selenium	mg/kg	0.20	0.40	0.20	0.20	0.30	0.20	0.20	0.40	0.30	0.30	0.50	0.50	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Silver	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	0.20	0.10	0.10	0.10	0.10
Sodium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	170	160	190	190	230	160
Strontium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	100	100	120	69	72	69
Sulphur	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	290	500	180	560	730	530
Thallium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	0.20	0.20	0.20	<0.20	<0.20	<0.20
Tin	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	1.2	1.2	1.1	1.0	0.60	1.0
Titanium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	460	390	440	240	290	270
Uranium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	0.80	1.0	0.80	0.80	0.90	1.0
Vanadium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	52	46	56	48	48	45
Zinc	mg/kg	284	1,810	151	442	873	362	107	573	642	476	2,680	1,120	84	84	89	43	47	58

Notes: Sediment metal concentrations are based predominantly on bulk sediment samples. Concentrations reported in 1995 and 1996 were for the silt and clay (< 63 µm) fraction only. Iron concentrations in sediment in 1999 were measured using both ICP-AA (Inductively Coupled Plasma Atomic Absorption) as well as ICP-MS (Inductively Coupled Plasma Mass Spectrometry for each sample collected (Beak 2000). Iron results measured using ICP-MS are displayed herein because this method is consistent with analysis methods used for post-breach monitoring (see Section 4.1.2). "-" indicates no data available.

[a] Monitoring areas WQ8, WQ8B, WQ9, and WQ10 sampled in 1995 (HKP 1996) were considered equivalent to sampling areas W8, W8A, W9, and W10 sampled in 1996 (HKP 1997a), respectively.

[b] Some unusually high sediment metal concentrations were reported for 1996 (HKP 1997a) and are suspected errors.

Table D.2.2: Baseline and Pre-Breach Sediment Quality Data for Upper Hazeltine Creek, 1995, 1996, 1999, 2007, 2009, 2010, 2012, and 2013

Analyte	Units	1995 (W7) HKP (1996)						1996 (W7)[a] HKP (1997)						1999 (W6)[b] Beak (2000)			2007 (W7) Minnow (2009)			2009 (W7) Minnow (2011)				
		Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 1	Rep 2	Rep 3	UHC-1	UHC-2	UHC-3	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
Physical Tests																								
Moisture	%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
pH (1:2 soil:water)	pH	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Physical Characteristics																								
Gravel (> 2mm)	%	-	-	-	-	-	-	-	-	-	-	-	-		8.90		2.00	8.00	1.00	4.00	2.00	5.00	11.0	2.00
Sand (2.0 mm - 0.063 mm)	%	-	-	-	-	-	-	-	-	-	-	-	-		49.3		38.0	35.0	46.0	45.0	50.0	***76.0***	58.0	62.0
Silt (0.063 mm - 4 µm)	%	-	-	-	-	-	-	-	-	-	-	-	-		31.0		46.0	43.0	41.0	38.0	39.0	16.0	27.0	30.0
Clay (< 4µm)	%	-	-	-	-	-	-	-	-	-	-	-	-		10.0		***15.0***	***14.0***	12.0	13.0	9.00	4.00	4.00	5.00
Organic / Inorganic Carbon																								
Total Organic Carbon	%	-	-	-	-	-	-	-	-	-	-	-	-		3.20		12.5	10.9	7.77	7.50	8.37	7.40	7.47	8.73
Anions and Nutrients																								
Total Nitrogen by LECO	%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Metals																								
Aluminum	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	12,000	13,000	10,000	14,400	14,300	16,500	-	-	-	-	-
Antimony	mg/kg	***0.810***	0.330	***0.510***	0.370	0.120	0.340	***0.720***	***0.620***	***0.610***	***1.75***	***0.870***	***0.590***	<0.20	<0.20	<0.20	***<10.0***	***<10.0***	***<10.0***	***<10.0***	***<10.0***	***<10.0***	***<10.0***	***<10.0***
Arsenic	mg/kg	***18.1***	6.87	3.69	***24.5***	***10.7***	2.67	6.77	3.17	4.12	***17.1***	5.56	5.05	2.50	3.00	3.20	<5.0	5.30	7.40	5.80	<5.0	<5.0	<5.0	<5.0
Barium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	110	110	84.0	115	104	***156***	117	127	83.2	97.5	96.6
Beryllium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	0.300	0.400	0.300	***<0.50***	***<0.50***	***<0.50***	***<0.50***	***<0.50***	***<0.50***	***<0.50***	***<0.50***
Bismuth	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	<0.20	<0.20	<0.20	<20.0	<20.0	<20.0	-	-	-	-	-
Boron	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	***5.50***	4.50	3.60	-	-	-	-	-	-	-	-
Cadmium	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	***0.400***	0.300	***0.500***	***2.60***	0.100	***0.500***	0.100	0.100	0.100	***<0.50***	***<0.50***	***<0.50***	***<0.50***	***<0.50***	***<0.50***	***<0.50***	***<0.50***
Calcium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9,470	8,910	10,600	-	-	-	-	-
Chromium	mg/kg	26.0	30.0	5.00	9.00	***45.0***	27.0	***138***	***146***	***110***	***201***	***74.0***	***131***	29.0	30.0	22.0	25.3	27.6	32.0	36.5	30.7	18.8	25.6	24.4
Cobalt	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	9.00	9.90	8.50	8.70	8.90	9.70	***10.8***	9.10	6.60	7.90	7.60
Copper	mg/kg	17.0	47.0	25.0	20.0	79.0	39.0	***5,250***	***7,670***	***7,980***	***22,000***	***2,340***	***8,420***	47.0	39.0	23.0	55.9	63.6	67.0	53.7	50.1	34.4	45.5	45.4
Iron	mg/kg	***33,000***	25,400	12,600	17,900	***57,500***	***35,100***	***31,700***	29,100	28,600	***55,500***	***31,000***	29,900	15,000	17,000	15,000	19,600	22,500	22,900	-	-	-	-	-
Lead	mg/kg	3.00	4.00	2.00	2.00	5.00	***8.00***	***35.0***	***29.0***	***21.0***	***103***	***14.0***	***26.0***	***6.70***	5.80	4.20	***<30.0***	***<30.0***	***<30.0***	***<30.0***	***<30.0***	***<30.0***	***<30.0***	***<30.0***
Lithium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12.4	12.6	***14.8***	-	-	-	-	-
Magnesium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5,520	5,780	***6,430***	-	-	-	-	-
Manganese	mg/kg	858	613	362	480	1,300	743	1,260	***1,720***	***2,010***	***10,100***	***1,420***	***2,470***	320	340	320	***2,480***	1,290	868	-	-	-	-	-
Mercury	mg/kg	0.0250	0.0460	0.0460	0.0510	0.105	0.0470	0.0880	0.0470	0.0660	0.0920	0.0700	0.0920	<0.040	<0.040	<0.040	0.113	0.118	0.130	0.0960	0.0990	0.0640	0.101	0.0870
Molybdenum	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	0.500	0.500	0.200	***<4.0***	***<4.0***	***<4.0***	***<4.0***	***<4.0***	***<4.0***	***<4.0***	***<4.0***
Nickel	mg/kg	16.0	24.0	5.00	8.00	***25.0***	18.0	***69.0***	***68.0***	***54.0***	***134***	***33.0***	***65.0***	20.0	22.0	16.0	15.7	16.4	19.2	***25.2***	19.2	12.2	16.0	15.3
Phosphorus	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Potassium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	860	970	1,160	-	-	-	-	-
Selenium	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.600	0.400	0.600	1.40	0.500	0.500	<1.0	<1.0	<1.0	<2.0	<2.0	<2.0	0.540	0.790	1.14	0.600	0.770
Silver	mg/kg	***<1.0***	***<1.0***	***<1.0***	***<1.0***	***<1.0***	***<1.0***	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	***<2.0***	***<2.0***	***<2.0***	***<2.0***	***<2.0***	***<2.0***	***<2.0***	***<2.0***
Sodium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	210	210	230	-	-	-	-	-
Strontium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	100	100	78.0	74.7	68.8	87.5	-	-	-	-	-
Sulphur	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	***<0.20***	***<0.20***	***<0.20***	***<1.0***	***<1.0***	***<1.0***	-	-	-	-	-
Tin	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	0.700	0.600	0.700	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Titanium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	390	390	380	542	568	596	-	-	-	-	-
Uranium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	0.500	0.500	0.300	-	-	-	-	-	-	-	-
Vanadium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	39.0	42.0	36.0	49.6	55.3	53.2	63.4	58.3	49.8	56.1	51.9
Zinc	mg/kg	41.0	53.0	33.0	29.0	***82.0***	51.0	***1,010***	***1,610***	***1,580***	***7,880***	***455***	***2,130***	51.0	46.0	35.0	50.7	57.6	53.8	54.6	46.6	43.8	51.6	51.2

Notes: ***Bold/Italics*** indicates value is > reference 95th percentile value (<5th percentile value for pH). Pre-breach values that were reported as < the laboratory reporting limit were not used for screening. "-" no data. Sediment metal concentrations are based predominantly on bulk sediment samples, concentrations reported in 1995 and 1996 were for the silt and clay (< 63 µm) fraction only. S = spring. F = fall.

[a] Some unusually high sediment metal concentrations were reported for 1996 (HKP 1997) and are suspected errors.

[b] Particle fractions for these samples are as follow: gravel (>2 mm), sand (2.0 mm - 0.050 mm), silt (0.050 mm - 0.002 mm), clay (<0.002 mm).

[c] 95th percentile includes all data except those from 1996 (HKP 1997) due to suspected errors.

Table D.2.2: Baseline and Pre-Breach Sediment Quality Data for Upper Hazeltine Creek, 1995, 1996, 1999, 2007, 2009, 2010, 2012, and 2013

Analyte	Units	2010 (W7) Minnow (2011)					2012 (W7 Pond) Minnow (2013a)								2013S (W7) Minnow (2013b)							
		UH SED-1	UH SED-2	UH SED-3	UH SED-4	UH SED-5	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
Physical Tests																						
Moisture	%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
pH (1:2 soil:water)	pH	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Physical Characteristics																						
Gravel (> 2mm)	%	20.0	29.9	***33.5***	29.2	***49.1***	6.40	<0.10	<0.10	<0.10	1.79	-	-	-	0.440							
Sand (2.0 mm - 0.063 mm)	%	37.8	63.2	59.0	***64.9***	49.5	39.0	11.4	19.3	14.1	22.3	-	-	-	20.4							
Silt (0.063 mm - 4 µm)	%	34.0	5.01	6.74	5.41	0.760	47.3	***76.4***	70.7	***76.4***	66.4	-	-	-	71.1							
Clay (< 4µm)	%	8.25	1.84	0.800	0.460	0.680	7.25	12.2	9.96	9.49	9.54	-	-	-	8.08							
Organic / Inorganic Carbon																						
Total Organic Carbon	%	7.36	0.580	0.520	0.490	0.540	8.32	12.0	11.2	***13.1***	12.6	9.95	***13.1***	10.4	-	-	-	-	-	-	-	-
Anions and Nutrients																						
Total Nitrogen by LECO	%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Metals																						
Aluminum	mg/kg	13,900	10,200	9,220	8,120	9,710	-	-	-	11,000	14,100	14,500	13,800	14,100	14,500	15,400	13,900	17,300	16,200	16,000	14,900	14,200
Antimony	mg/kg	0.370	0.260	0.260	0.180	0.210	-	-	-	0.250	0.260	0.220	0.220	0.230	0.260	0.290	0.290	0.300	0.310	0.320	0.310	0.290
Arsenic	mg/kg	6.28	5.20	5.42	3.43	4.19	-	-	-	3.31	3.81	3.60	3.51	3.66	4.12	4.63	3.81	5.80	4.95	4.91	4.55	4.28
Barium	mg/kg	107	67.9	54.9	46.6	67.0	-	-	-	79.9	103	107	97.0	94.9	109	121	104	133	130	123	111	114
Beryllium	mg/kg	0.380	0.260	0.250	0.200	0.220	-	-	-	0.290	0.370	0.350	0.360	0.330	0.330	0.370	0.350	0.450	0.410	0.380	0.370	0.360
Bismuth	mg/kg	<0.20	<0.20	<0.20	<0.20	<0.20	-	-	-	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Boron	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium	mg/kg	0.210	<0.10	<0.10	<0.10	<0.10	-	-	-	0.266	0.299	0.293	0.263	0.246	0.312	0.335	0.251	***0.354***	***0.432***	0.353	0.285	0.300
Calcium	mg/kg	9,000	6,070	5,290	5,140	6,180	-	-	-	11,400	11,500	11,000	12,000	9,550	10,700	***13,400***	10,600	13,300	***13,800***	12,600	11,000	11,400
Chromium	mg/kg	35.1	26.7	26.3	16.3	16.7	-	-	-	24.1	30.6	31.0	29.2	27.8	29.3	29.9	28.3	34.2	31.9	32.7	31.6	29.4
Cobalt	mg/kg	***10.5***	8.76	8.65	6.09	7.06	-	-	-	6.80	8.42	8.52	8.70	9.05	8.31	9.06	8.31	***10.5***	9.41	9.65	9.07	8.64
Copper	mg/kg	64.5	24.2	23.0	13.9	16.4	-	-	-	66.2	78.6	75.6	69.4	67.8	76.7	84.2	62.4	91.1	86.4	79.4	72.0	70.0
Iron	mg/kg	25,900	21,900	22,300	15,800	19,300	-	-	-	15,200	18,900	18,700	18,300	19,100	18,500	21,100	17,600	23,700	20,100	19,800	18,900	17,900
Lead	mg/kg	5.28	3.35	3.36	2.75	3.04	-	-	-	4.86	5.33	5.46	5.07	4.94	5.77	6.06	5.14	6.33	5.96	5.90	5.60	5.29
Lithium	mg/kg	12.0	9.80	8.90	7.20	8.40	-	-	-	9.50	11.6	11.9	11.6	12.2	10.8	12.2	12.2	14.4	14.1	12.8	12.5	12.1
Magnesium	mg/kg	6,080	***6,550***	6,270	4,490	5,380	-	-	-	3,850	4,920	5,140	5,040	5,740	4,790	5,170	4,930	5,750	5,300	5,340	5,010	5,000
Manganese	mg/kg	708	426	743	423	479	-	-	-	817	895	772	638	445	1,210	1,330	992	***1,360***	***1,580***	1,300	1,030	1,070
Mercury	mg/kg	0.0950	<0.050	0.0780	<0.050	<0.050	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Molybdenum	mg/kg	***1.56***	<0.50	<0.50	<0.50	<0.50	-	-	-	0.980	1.11	0.940	0.830	1.09	1.24	1.35	0.920	1.48	***1.57***	1.18	1.00	1.07
Nickel	mg/kg	21.0	15.9	14.9	9.47	10.9	-	-	-	15.7	19.6	19.7	18.9	19.2	19.5	20.4	17.7	23.1	21.8	21.0	19.8	18.8
Phosphorus	mg/kg	978	777	744	614	729	-	-	-	940	996	1,080	1,050	1,050	1,150	1,290	1,040	***1,470***	1,280	1,160	1,110	1,090
Potassium	mg/kg	930	470	350	290	380	-	-	-	760	930	980	880	940	870	950	820	1,300	1,070	1,070	990	850
Selenium	mg/kg	1.79	0.290	0.280	0.260	0.330	2.09	3.32	***3.51***	2.75	2.89	2.29	2.21	2.13	2.76	3.25	2.05	3.09	3.16	2.82	2.36	2.47
Silver	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10	-	-	-	0.110	0.120	0.120	0.110	0.100	0.120	0.140	0.120	0.160	0.160	0.150	0.120	0.110
Sodium	mg/kg	***440***	***490***	310	190	170	-	-	-	350	190	210	220	180	190	200	190	220	200	230	200	190
Strontium	mg/kg	91.8	47.0	45.6	35.3	59.6	-	-	-	93.4	101	101	96.6	91.1	98.8	111	98.4	***119***	***118***	113	103	107
Sulphur	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	mg/kg	0.0640	<0.050	<0.050	<0.050	<0.050	-	-	-	0.0590	0.0730	0.0740	0.0730	0.0720	0.0670	0.0750	0.0620	0.0860	0.0890	0.0760	0.0760	0.0670
Tin	mg/kg	<2.0	<2.0	<2.0	<2.0	<2.0	-	-	-	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Titanium	mg/kg	738	***785***	724	721	***819***	-	-	-	382	462	457	509	581	461	466	589	553	516	610	604	570
Uranium	mg/kg	0.755	0.376	0.346	0.335	0.372	-	-	-	0.796	0.868	0.819	0.815	0.845	1.13	1.23	0.979	1.20	***1.42***	1.20	1.04	1.10
Vanadium	mg/kg	***75.4***	***65.4***	***66.6***	47.6	57.0	-	-	-	37.6	45.7	45.1	46.5	51.9	45.7	49.3	47.4	53.4	50.0	52.8	52.1	48.6
Zinc	mg/kg	66.0	40.4	41.5	35.1	40.0	-	-	-	46.2	56.8	58.1	54.7	56.4	56.9	63.1	56.2	***70.7***	66.8	66.1	62.6	59.0

Notes: **Bold/Italics** indicates value is > reference 95th percentile value (<5th percentile value for pH). Pre-breach values that were reported as < the laboratory reporting limit were not used for screening. "-" no data. Sediment metal concentrations are based predominantly on bulk sediment samples, concentrations reported in 1995 and 1996 were for the silt and clay (< 63 µm) fraction only. S = spring. F = fall.

[a] Some unusually high sediment metal concentrations were reported for 1996 (HKP 1997) and are suspected errors.

[b] Particle fractions for these samples are as follow: gravel (>2 mm), sand (2.0 mm - 0.050 mm), silt (0.050 mm - 0.002 mm), clay (<0.002 mm).

[c] 95th percentile includes all data except those from 1996 (HKP 1997) due to suspected errors.

Table D.2.2: Baseline and Pre-Breach Sediment Quality Data for Upper Hazeltine Creek, 1995, 1996, 1999, 2007, 2009, 2010, 2012, and 2013

Analyte	Units	2013S (W7 Pond) Minnow (2013b)								2013F (USW7 Pond) Minnow (2013b)					2013F (W7 Pond) Minnow (2013b)								Pre-Breach 95th Percentile[c]
		Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	
Physical Tests																							
Moisture	%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
pH (1:2 soil:water)	pH	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Physical Characteristics																							
Gravel (> 2mm)	%	0.180								0.910					<0.10								33.1
Sand (2.0 mm - 0.063 mm)	%	22.8								24.1					12.8								64.7
Silt (0.063 mm - 4 µm)	%	68.1								63.9					74.6								76.2
Clay (< 4µm)	%	8.88								11.1					12.6								13.9
Organic / Inorganic Carbon																							
Total Organic Carbon	%	-	-	-	-	-	-	-	-	7.55	6.98	8.73	7.86	6.92	11.9	11.3	12.3	11.8	11.2	8.57	11.6	11.2	12.8
Anions and Nutrients																							
Total Nitrogen by LECO	%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Metals																							
Aluminum	mg/kg	15,100	15,500	16,600	13,700	16,300	15,400	16,500	14,700	14,400	17,400	16,100	17,200	17,500	***19,000***	17,800	17,300	16,000	***18,200***	***18,000***	17,200	17,100	17,960
Antimony	mg/kg	0.270	0.270	0.300	0.270	0.320	0.310	0.320	0.300	0.270	0.290	0.290	0.270	0.270	0.310	0.310	0.300	0.310	0.300	0.300	0.290	0.270	0.370
Arsenic	mg/kg	3.87	4.18	4.12	3.89	4.63	4.49	4.71	4.15	3.11	3.34	3.33	3.19	2.90	3.87	4.12	3.62	4.17	3.93	3.87	4.13	4.04	8.23
Barium	mg/kg	116	124	118	109	127	120	131	118	106	122	120	121	97.7	***145***	***138***	133	127	132	125	132	127	136
Beryllium	mg/kg	0.400	0.410	0.420	0.360	0.430	0.400	0.440	0.400	0.360	0.440	0.410	0.420	0.390	***0.460***	***0.460***	***0.460***	0.410	0.430	0.430	0.430	0.400	0.460
Bismuth	mg/kg	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Boron	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.40
Cadmium	mg/kg	0.334	0.341	0.352	0.279	0.319	0.317	0.319	0.290	0.208	0.224	0.200	0.213	0.193	***0.361***	0.336	0.342	0.322	0.321	0.297	0.352	0.302	0.354
Calcium	mg/kg	11,300	13,300	11,300	10,800	12,200	11,600	13,300	11,800	9,600	9,700	10,600	9,700	***34,500***	13,000	12,300	12,300	11,700	11,600	13,100	12,400	12,200	13,395
Chromium	mg/kg	31.0	32.5	34.5	28.4	33.7	31.9	34.2	30.6	35.5	***41.4***	38.6	39.8	34.8	***40.8***	37.8	36.8	34.1	38.6	36.9	36.0	36.1	40.1
Cobalt	mg/kg	8.79	9.22	9.17	7.97	9.33	8.67	9.54	8.54	9.15	9.99	9.45	9.84	10.3	10.2	9.53	9.59	9.22	9.62	9.39	9.10	8.77	10.4
Copper	mg/kg	85.7	89.2	91.8	71.5	87.2	83.6	86.2	76.6	76.9	90.5	82.3	91.4	67.4	***103***	90.9	***95.3***	94.3	***95.7***	89.4	88.0	86.5	94.6
Iron	mg/kg	18,700	19,100	20,000	16,900	20,200	18,900	20,600	18,100	20,400	24,000	22,000	24,200	26,800	23,400	22,200	22,000	19,800	22,000	21,400	21,400	20,100	29,900
Lead	mg/kg	5.95	6.08	6.21	5.02	6.06	5.69	6.26	5.62	5.65	6.45	6.22	6.63	5.24	***6.90***	6.41	6.69	6.37	6.59	6.39	6.25	5.86	6.70
Lithium	mg/kg	12.9	13.2	14.2	12.1	13.6	13.6	14.7	12.7	11.6	14.4	13.2	13.5	13.4	***15.3***	14.5	***14.8***	13.1	14.3	13.8	13.7	12.5	14.8
Magnesium	mg/kg	5,060	5,500	5,500	4,520	5,390	5,350	5,570	4,990	5,730	6,420	5,990	6,330	***6,930***	6,390	5,990	5,920	5,560	6,190	6,060	5,690	5,640	6,430
Manganese	mg/kg	873	979	662	1,050	1,190	910	1,230	1,050	343	295	361	351	355	616	716	593	458	564	552	783	605	1,345
Mercury	mg/kg	-	-	-	-	-	-	-	-	0.0921	0.102	0.0934	0.0965	0.0792	***0.154***	0.141	***0.147***	0.144	0.144	0.137	0.144	0.136	0.145
Molybdenum	mg/kg	1.26	1.49	1.32	1.02	1.25	1.24	1.22	1.09	0.930	1.04	1.12	1.03	0.890	1.11	1.09	1.11	***1.50***	0.980	0.960	1.14	1.14	1.50
Nickel	mg/kg	20.2	20.8	21.6	17.6	21.3	20.2	21.6	19.4	21.4	24.2	22.6	24.2	21.0	***25.0***	23.3	23.8	22.1	23.8	22.6	22.6	21.7	24.4
Phosphorus	mg/kg	1,140	1,310	1,120	1,000	1,260	1,070	1,250	1,160	1,150	1,370	1,290	1,250	1,040	***1,420***	1,330	1,350	1,170	1,330	1,300	1,230	1,100	1,375
Potassium	mg/kg	900	970	1,050	930	1,060	970	1,080	940	1,090	***1,450***	1,340	***1,480***	1,110	***1,470***	1,320	1,250	1,070	1,310	1,330	1,220	1,250	1,445
Selenium	mg/kg	3.08	3.04	3.15	2.67	3.24	2.85	3.07	2.74	1.73	1.85	2.23	1.96	1.24	***3.38***	2.92	***3.35***	3.27	3.00	2.88	3.28	3.05	3.32
Silver	mg/kg	0.150	0.140	0.150	0.110	0.150	0.140	***0.220***	0.140	0.110	0.120	0.110	0.120	<0.10	0.160	0.150	0.160	0.160	***0.170***	0.150	0.140	0.130	0.160
Sodium	mg/kg	190	210	190	180	200	200	220	200	240	250	280	280	350	260	240	230	210	300	290	230	310	350
Strontium	mg/kg	105	109	107	104	117	113	***125***	112	94.5	96.0	103	98.6	111	114	111	112	106	109	105	112	99.5	118
Sulphur	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	mg/kg	0.0780	0.0710	0.0800	0.0680	0.0820	0.0780	0.0800	0.0690	0.0730	0.0850	0.0750	0.0830	0.0610	***0.0980***	0.0940	0.0890	0.0830	***0.0950***	0.0930	0.0900	0.0850	0.0941
Tin	mg/kg	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Titanium	mg/kg	454	440	547	522	575	570	592	531	553	704	680	638	***962***	583	577	502	455	603	651	595	595	776
Uranium	mg/kg	1.08	1.05	1.08	1.01	***1.26***	1.12	***1.26***	1.11	0.650	0.697	0.800	0.712	0.653	1.06	1.04	1.06	1.06	0.970	1.03	1.11	1.02	1.26
Vanadium	mg/kg	47.9	49.2	51.3	45.5	53.2	51.0	54.2	49.0	51.4	58.1	56.2	55.6	65.1	55.7	55.0	52.6	50.5	54.6	55.5	51.9	52.2	65.3
Zinc	mg/kg	62.2	65.2	66.0	54.4	64.8	59.5	66.0	58.6	53.4	58.4	55.3	59.1	55.4	***70.1***	64.4	64.3	62.5	64.7	62.7	62.0	60.8	67.6

Notes: **Bold/Italics** indicates value is > reference 95th percentile value (<5th percentile value for pH). Pre-breach values that were reported as < the laboratory reporting limit were not used for screening. "-" no data. Sediment metal concentrations are based predominantly on bulk sediment samples, concentrations reported in 1995 and 1996 were for the silt and clay (< 63 µm) fraction only. S = spring. F = fall.

[a] Some unusually high sediment metal concentrations were reported for 1996 (HKP 1997) and are suspected errors.

[b] Particle fractions for these samples are as follow: gravel (>2 mm), sand (2.0 mm - 0.050 mm), silt (0.050 mm - 0.002 mm), clay (<0.002 mm).

[c] 95th percentile includes all data except those from 1996 (HKP 1997) due to suspected errors.

Table D.2.3: Sediment Quality Data for Upper Edney Creek Reference (EDC-U) Sampling Area used in Calculation of Reference 95th Percentile, 2018 to 2022

Analyte	Units	BC Working Sediment Quality Guidelines[a]		2018					2019					2020				
		Lower	Upper	EDC-U-1	EDC-U-2	EDC-U-3	EDC-U-4	EDC-U-5	EDC-U-1	EDC-U-2	EDC-U-3	EDC-U-4	EDC-U-5	EDC-U-1	EDC-U-2	EDC-U-3	EDC-U-4	EDC-U-5
				15-Aug-18	15-Aug-18	15-Aug-18	15-Aug-18	15-Aug-18	9-Aug-19	8-Aug-19	8-Aug-19	8-Aug-19	8-Aug-19	8-Aug-20	8-Aug-20	8-Aug-20	8-Aug-20	8-Aug-20
Physical Tests																		
Moisture	%	-	-	54.8	***91.7***	58.1	73.0	75.3	58.4	50.0	66.2	68.9	79.7	57.6	54.8	50.1	68.4	59.4
pH (1:2 soil:water)	pH	-	-	7.00	6.68	6.90	7.00	6.20	6.59	6.37	6.14	6.15	6.25	***5.99***	6.70	6.33	6.01	6.78
Particle Size																		
% Gravel (>2 mm)	%	-	-	<1.0	9.80	<1.0	***26.6***	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.30	<1.0	<1.0
% Sand (2.0 mm - 0.063 mm)	%	-	-	42.3	36.2	31.3	30.2	***37.20***	48.1	38.5	56.4	53.0	29.7	68.4	67.5	***77.1***	58.6	51.5
% Silt (0.063 mm - 4 µm)	%	-	-	50.5	45.2	51.5	37.7	56.40	43.1	43.6	34.9	38.6	***56.9***	26.7	26.8	17.5	35.4	37.6
% Clay (<4 µm)	%	-	-	6.80	8.80	16.4	5.60	***6.40***	8.60	***17.9***	8.70	8.30	13.4	4.90	5.70	4.10	6.00	10.5
Organic / Inorganic Carbon (<63 µm)																		
Total Organic Carbon	%	-	-	6.43	***11.1***	2.41	8.34	***6.85***	4.55	3.23	6.88	6.14	8.48	5.27	4.44	5.77	7.11	4.86
Nutrients (Bulk sediment)																		
Total Nitrogen	%	-	-	0.290	0.485	0.167	0.393	***0.44***	0.322	0.237	0.419	0.338	***0.615***	0.276	0.252	0.268	0.427	0.292
Metals (<63 µm)[c]																		
Aluminum	mg/kg	-	-	17,400	16,700	22,800	19,800	***17,200***	19,700	22,700	19,500	18,500	18,500	15,700	14,400	15,800	15,000	18,400
Antimony	mg/kg	-	-	0.300	0.320	0.320	0.310	***0.27***	0.340	0.370	0.350	0.340	0.340	0.340	0.280	0.330	0.310	0.330
Arsenic	mg/kg	5.90	17.0	9.85	***22.2***	12.0	11.4	***8.32***	10.4	11.0	10.4	11.6	10.4	8.72	7.72	9.90	9.47	8.69
Barium	mg/kg	-	-	138	200	165	157	***133.00***	140	146	147	151	148	123	113	145	138	131
Beryllium	mg/kg	-	-	0.430	0.460	***0.630***	0.490	***0.41***	0.500	0.600	0.490	0.490	0.510	0.440	0.360	0.470	0.450	0.470
Bismuth	mg/kg	-	-	0.110	0.110	0.140	0.120	<0.10	0.120	0.140	0.110	0.110	0.120	<0.10	<0.10	0.110	<0.10	0.100
Boron	mg/kg	-	-	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<5.0	<5.0	<5.0	<5.0	<5.0
Cadmium	mg/kg	0.600	3.50	0.422	***0.581***	0.247	0.579	***0.42***	0.413	0.270	0.509	0.467	0.499	0.331	0.337	0.454	0.436	0.348
Calcium	mg/kg	-	-	9,210	11,000	8,650	10,500	***8,680***	10,200	7,950	10,200	9,950	***11,200***	8,100	7,860	9,090	8,770	8,200
Chromium	mg/kg	37.3	90.0	53.1	51.0	63.6	56.0	***51.10***	60.0	75.8	63.4	61.3	64.9	52.3	48.2	54.5	51.7	54.5
Cobalt	mg/kg	-	-	13.7	15.2	14.8	16.9	***12.60***	15.4	15.8	15.9	16.3	15.3	11.9	11.8	14.6	14.0	13.0
Copper	mg/kg	35.7	197	37.5	46.8	47.0	40.4	***36.10***	39.4	45.2	40.8	39.7	40.2	32.5	28.2	33.4	32.0	35.5
Iron	mg/kg	21,200	43,766	29,300	***42,000***	34,000	31,700	***27,700***	30,100	32,500	30,700	32,500	31,500	27,100	25,300	30,600	29,400	27,200
Lead	mg/kg	35.0	91.3	6.58	6.48	***8.33***	6.45	***5.78***	7.18	7.74	6.72	6.69	6.78	6.00	5.38	6.20	5.61	6.04
Lithium	mg/kg	-	-	14.1	12.6	***18.5***	14.8	***13.10***	16.0	17.8	14.9	14.9	15.0	13.9	13.0	14.7	13.6	15.5
Magnesium	mg/kg	-	-	7,100	6,880	7,920	7,630	***6,650***	7,390	7,790	7,380	7,430	7,030	6,370	6,260	6,850	6,260	6,890
Manganese	mg/kg	460	1,100	1,320	1,420	1,100	1,980	***739.00***	1,230	1,040	1,440	1,710	1,100	717	734	845	1,160	1,070
Mercury	mg/kg	0.170	0.486	0.0972	***0.154***	0.119	0.123	***0.09***	0.0983	0.106	0.0957	0.101	0.104	0.102	0.103	0.0996	0.100	0.101
Molybdenum	mg/kg	25	23,000	0.780	1.12	0.800	0.830	***0.56***	1.29	***2.61***	1.66	1.60	2.39	0.760	0.540	0.630	0.560	0.610
Nickel	mg/kg	16.0	75.0	32.5	32.9	36.6	35.3	***29.60***	36.4	***45.7***	39.5	37.8	41.0	29.4	27.5	32.4	30.6	31.9
Phosphorus	mg/kg	-	-	1,180	1,360	1,180	1,330	***1,250***	1,250	1,190	1,350	***1,380***	1,370	1,000	1,160	1,220	1,160	1,120
Potassium	mg/kg	-	-	1,060	1,060	1,470	1,400	***1,150***	1,080	1,410	1,270	1,250	1,210	1,010	880	1,110	1,070	1,260
Selenium	mg/kg	2.00	-	0.570	0.880	0.660	0.680	***0.55***	0.590	0.670	0.610	0.610	0.630	0.540	0.330	0.530	0.530	0.510
Silver	mg/kg	0.500	-	0.158	0.192	0.194	0.188	0.21	0.173	0.196	0.167	0.171	0.198	0.128	0.118	0.148	0.146	0.154
Sodium	mg/kg	-	-	226	239	246	275	***267.00***	238	217	266	263	239	267	247	286	261	267
Strontium	mg/kg	-	-	71.6	81.4	73.8	83.5	***66.40***	75.7	64.3	79.6	76.8	82.5	62.3	58.9	66.9	66.5	69.8
Sulphur[c]	mg/kg	-	-	2,000	2,300	700	1,600	***1,600***	***3,000***	1,900	1,900	1,500	1,600	1,800	1,070	1,080	1,570	1,190
Thallium	mg/kg	-	-	0.118	0.118	***0.175***	0.135	***0.11***	0.140	0.166	0.129	0.135	0.137	0.122	0.100	0.115	0.110	0.128
Tin	mg/kg	-	-	0.360	0.390	0.460	0.390	***0.37***	0.540	0.470	0.550	0.470	0.500	0.580	0.460	0.580	0.620	0.540
Titanium	mg/kg	-	-	489	507	736	636	***633.00***	527	658	658	650	593	655	516	659	637	702
Uranium	mg/kg	-	-	1.37	1.67	2.15	1.46	***1.31***	1.60	2.07	1.51	1.43	1.56	1.31	1.05	1.27	1.32	1.45
Vanadium	mg/kg	-	-	70.6	***86.1***	84.7	75.9	***70.20***	77.6	84.5	80.1	78.6	74.9	75.0	66.6	78.4	72.2	71.4
Zinc	mg/kg	123	315	73.3	73.2	72.8	84.2	***74.80***	76.0	71.4	87.5	82.6	81.4	63.1	62.8	74.8	71.7	65.2
Zirconium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	1.20	1.20	1.10	1.00	<1.0

Value is > BC Lower Working Sediment Quality Guideline

Value is > BC Uper Working Sediment Quality Guideline

Notes: ***Bold/Italics*** : Value is > reference 95th percentile value (<5th percentile value for pH), "-" indicates no current BC Working Sediment Quality Guidelines/ no data.

Note: "-" indicates no current BC Working Sediment Quality Guideline.

[a] British Columbia Working Sediment Guidelines (BCMOECCS 2021) and approved BC Sediment Quality Guideline for Selenium (BCMOECCS 2019c)

[b] 5th percentile value for pH.

[c] Total sulphur measured in bulk sediment, not the <63 µm fraction.

Table D.2.3: Sediment Quality Data for Upper Edney Creek Reference (EDC-U) Sampling Area used in Calculation of Reference 95th Percentile, 2018 to 2022

Analyte	Units	BC Working Sediment Quality Guidelines[a]		2021					2022					95th Percentile (2018 to 2022)[b]
		Lower	Upper	EDC-U-1	EDC-U-2	EDC-U-3	EDC-U-4	EDC-U-5	EDC-U-1	EDC-U-2	EDC-U-3	EDC-U-4	EDC-U-5	
				2-Aug-21	2-Aug-21	1-Aug-21	1-Aug-21	1-Aug-21	7-Aug-22	7-Aug-22	7-Aug-22	7-Aug-22	7-Aug-22	
Physical Tests														
Moisture	%	-	-	51	60.4	52.1	59.9	52.4	63.9	70.8	64.9	64.5	45.5	79.7
pH (1:2 soil:water)	pH	-	-	6.58	7.32	6.47	6.63	7.03	6.67	6.64	6.44	7.03	6.97	6.01
Particle Size														
% Gravel (>2 mm)	%	-	-	1.2	4.6	3	2.5	11.3	2.00	<1	<1	<1	1.00	11.3
% Sand (2.0 mm - 0.063 mm)	%	-	-	65.3	50.5	64.8	37.7	66.3	44.9	37.7	60.7	55.8	76.2	76.2
% Silt (0.063 mm - 4 µm)	%	-	-	28.3	37	27	46.2	18.3	44.9	47.4	32.7	36.1	17.6	56.4
% Clay (<4 µm)	%	-	-	5.2	7.9	5.2	13.6	4.1	8.20	14.3	6.30	8.10	5.20	16.4
Organic / Inorganic Carbon (<63 µm)														
Total Organic Carbon	%	-	-	4.89	7.51	6.96	4.94	5.55	7.11	3.78	7.08	5.43	6.65	8.48
Nutrients (Bulk sediment)														
Total Nitrogen	%	-	-	0.221	0.404	0.221	0.318	0.167	0.424	0.303	0.248	0.271	0.167	0.485
Metals (<63 µm)[c]														
Aluminum	mg/kg	-	-	20,700	17,400	21,300	***26,200***	20,900	16,600	12,300	14,600	14,800	15,400	22,800
Antimony	mg/kg	-	-	***0.46***	0.27	0.31	0.42	0.3	0.340	0.240	0.310	0.300	0.310	0.420
Arsenic	mg/kg	5.90	17.0	10.5	9.99	9.9	10.4	11	8.78	5.80	9.52	8.03	8.23	12.0
Barium	mg/kg	-	-	168	194	195	***203***	185	129	79.3	116	105	111	200
Beryllium	mg/kg	-	-	0.48	0.41	0.5	0.62	0.48	0.390	0.290	0.380	0.380	0.420	0.620
Bismuth	mg/kg	-	-	0.11	<0.1	0.11	0.13	0.11	0.100	<0.1	<0.1	<0.1	<0.1	0.140
Boron	mg/kg	-	-	5.4	<5	5.4	<5	<5	5.30	<5	<5	<5	<5	5.40
Cadmium	mg/kg	0.600	3.50	0.508	0.54	0.534	0.523	0.556	0.426	0.165	0.387	0.316	0.351	0.579
Calcium	mg/kg	-	-	9,510	9,590	10,000	9,880	10,000	8,850	6,170	7,820	7,950	8,440	11,000
Chromium	mg/kg	37.3	90.0	67.1	55.1	66.2	***76.7***	69.4	49.5	37.2	47.4	47.3	53.2	75.8
Cobalt	mg/kg	-	-	15.5	15.6	15.8	14.5	***18.1***	13.0	8.18	12.5	11.9	12.2	16.9
Copper	mg/kg	35.7	197	40.1	35.3	42.3	***69.9***	40.5	32.2	20.2	28.2	25.5	27.6	47.0
Iron	mg/kg	21,200	43,766	31,500	28,800	30,900	29,700	32,400	26,400	18,400	26,800	24,700	27,200	34,000
Lead	mg/kg	35.0	91.3	7.14	5.77	6.84	7.99	6.59	8.14	5.70	6.88	5.90	6.35	8.14
Lithium	mg/kg	-	-	13.9	12.3	14.3	16.4	13.9	12.8	10.4	12.2	11.8	12.8	17.8
Magnesium	mg/kg	-	-	7,850	6,950	7,840	***8,640***	7,930	6,570	5,210	6,150	6,150	6,460	7,930
Manganese	mg/kg	460	1,100	1,530	***3,050***	1,350	1,160	2,710	560	541	852	1,080	1,010	2,710
Mercury	mg/kg	0.170	0.486	0.105	0.0767	0.112	0.125	0.0967	0.0820	0.0530	0.0794	0.0747	0.0866	0.125
Molybdenum	mg/kg	25	23,000	1.11	1.07	1.52	1.52	1.91	0.670	0.470	0.570	0.560	0.620	2.39
Nickel	mg/kg	16.0	75.0	39.5	33.8	39.3	43.2	42.3	28.2	19.0	26.2	25.6	27.2	43.2
Phosphorus	mg/kg	-	-	1,170	1,220	1,300	1,130	1,200	1,060	954	1,010	1,020	1,080	1,370
Potassium	mg/kg	-	-	1,330	1,170	1,450	***1,690***	1,390	1,240	720	1,030	1,000	1,100	1,470
Selenium	mg/kg	2.00	-	0.63	0.53	0.66	***0.93***	0.57	0.490	0.240	0.370	0.430	0.440	0.880
Silver	mg/kg	0.500	-	0.157	0.153	0.175	***0.212***	0.157	0.159	0.100	0.139	0.124	0.132	0.205
Sodium	mg/kg	-	-	340	244	***358***	247	274	289	200	255	262	269	340
Strontium	mg/kg	-	-	83.6	83.3	85.5	85.3	***87.9***	77.1	55.7	68.9	70.5	75.8	85.5
Sulphur[c]	mg/kg	-	-	<500	890	<500	620	<500	760	710	690	610	<500	2,300
Thallium	mg/kg	-	-	0.136	0.115	0.138	0.164	0.136	0.128	0.0840	0.107	0.103	0.114	0.166
Tin	mg/kg	-	-	***1***	0.33	0.38	0.43	0.36	0.460	0.250	0.330	0.340	0.430	0.620
Titanium	mg/kg	-	-	***754***	460	688	658	623	626	492	588	608	652	736
Uranium	mg/kg	-	-	1.49	1.22	1.42	***2.41***	1.38	1.48	1.15	1.23	1.19	1.33	2.15
Vanadium	mg/kg	-	-	84.4	69.1	84.5	85.7	80.2	67.1	48.4	64.7	63.6	68.2	85.7
Zinc	mg/kg	123	315	88.7	80	89.7	***94***	85.6	73.4	45.4	68.3	62.0	67.6	89.7
Zirconium	mg/kg	-	-	1.00	1.10	1.20	1.90	1.30	1.10	<1	1.00	<1	<1	1.90

Value is > BC Lower Working Sediment Quality Guideline

Value is > BC Uper Working Sediment Quality Guideline

Notes: ***Bold/Italics*** : Value is > reference 95th percentile value (<5th percentile value for pH), "-" indicates no current BC Working Sediment Quality Guidelines/ no data.

Note: "-" indicates no current BC Working Sediment Quality Guideline.

[a] British Columbia Working Sediment Guidelines (BCMOECCS 2021) and approved BC Sediment Quality Guideline for Selenium (BCMOECCS 2019c)

[b] 5th percentile value for pH.

[c] Total sulphur measured in bulk sediment, not the <63 µm fraction.

Table D.2.4: Baseline and Pre-Breach Sediment Quality Data for Lower Hazeltine Creek, 1995, 1996, 1999, 2007, 2010, and 2012

Analyte	Units	1995 (W11) HKP (1996)						1996 (W11)[a] HKP (1997a)						1999 (W11)[b] Beak (2000)		
		Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 1	Rep 2	Rep 3
Physical Tests																
Moisture	%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
pH (1:2 soil:water)	pH	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Physical Characteristics																
Gravel (>2 mm)	%	-	-	-	-	-	-	-	-	-	-	-	-		***57.0***	
Sand (2.0 mm - 0.063 mm)	%	-	-	-	-	-	-	-	-	-	-	-	-		34.0	
Silt (0.063 mm - 4 µm)	%	-	-	-	-	-	-	-	-	-	-	-	-		8.00	
Clay (<4 µm)	%	-	-	-	-	-	-	-	-	-	-	-	-		2.00	
Organic / Inorganic Carbon																
Total Organic Carbon	%	-	-	-	-	-	-	-	-	-	-	-	-		-	
Anions and Nutrients																
Total Nitrogen by LECO	%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Metals																
Aluminum	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	11,000	9,700	10,000
Antimony	mg/kg	0.610	0.650	***1.85***	1.05	0.780	0.720	0.600	0.360	0.630	0.770	***25.4***	0.740	<0.20	<0.20	<0.20
Arsenic	mg/kg	9.87	10.9	8.79	8.01	10.0	12.0	4.01	5.29	***12.6***	6.94	***17.2***	9.27	6.50	8.70	6.60
Barium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	98.0	98.0	94.0
Beryllium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	0.300	0.300	0.300
Bismuth	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	<0.20	<0.20	<0.20
Boron	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	***3.00***	2.70	2.00
Cadmium	mg/kg	0.200	<0.10	0.100	<0.10	0.200	<0.10	0.200	0.200	<0.10	<0.10	<0.10	***0.300***	***0.300***	0.200	0.200
Calcium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	mg/kg	24.0	22.0	23.0	17.0	32.0	19.0	***112***	31.0	***47.0***	***65.0***	***117***	***49.0***	24.0	21.0	22.0
Cobalt	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	10.0	10.0	10.0
Copper	mg/kg	***46.0***	28.0	28.0	26.0	41.0	32.0	***4,080***	***480***	***4,180***	***9,060***	***16,200***	***3,010***	33.0	26.0	27.0
Iron	mg/kg	29,700	31,600	34,900	31,100	***37,400***	20,800	18,500	16,900	22,000	20,400	23,100	21,200	20,000	21,000	19,000
Lead	mg/kg	4.00	5.00	3.00	3.00	4.00	3.00	***19.0***	5.00	<2.0	***16.0***	***190***	***12.0***	***5.80***	4.90	5.50
Lithium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Magnesium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Manganese	mg/kg	569	814	930	694	909	657	882	513	668	***1,390***	1,010	634	880	***1,500***	810
Mercury	mg/kg	***0.193***	0.0840	0.0330	0.0300	0.0590	0.127	0.0550	0.0290	<0.0050	0.0340	0.0330	0.0240	<0.040	<0.040	<0.040
Molybdenum	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	0.500	0.700	0.500
Nickel	mg/kg	13.0	17.0	17.0	15.0	***26.0***	13.0	***52.0***	16.0	23.0	***32.0***	***33.0***	***26.0***	22.0	20.0	21.0
Phosphorus	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Potassium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	mg/kg	0.600	0.200	0.100	0.200	0.300	<0.10	0.200	0.200	0.400	0.800	0.800	0.300	<1.0	<1.0	<1.0
Silver	mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	***0.100***	<0.10	<0.10
Sodium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Strontium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	64.0	48.0	60.0
Sulphur	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	<0.20	<0.20	<0.20
Tin	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	1.10	1.10	1.00
Titanium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	310	330	290
Uranium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	***0.800***	0.600	0.600
Vanadium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	37.0	44.0	37.0
Zinc	mg/kg	***61.0***	57.0	54.0	44.0	60.0	39.0	***785***	***109***	***1,030***	***2,280***	***4,040***	***690***	49.0	46.0	46.0

Notes: "-" no data, S = spring, F = fall. ***Bold/ Italics*** indicates value is > reference 95th percentile value (<5th percentile value for pH). Sediment metal concentrations are based predominantly on bulk sediment samples. Concentrations reported in 1995 and 1996 were for the silt and clay (< 63 µm) fraction only.

[a] Some unusually high sediment metal concentrations were reported for 1996 (HKP 1997a) and are suspected errors.

[b] Particle fractions for these samples are as follow: gravel (>2 mm), sand (2.0 mm - 0.050 mm), silt (0.050 mm - 0.002 mm), clay (<0.002 mm).

[c] 95th percentile includes all data except those from 1996 (HKP 1997a) due to suspected errors.

Table D.2.4: Baseline and Pre-Breach Sediment Quality Data for Lower Hazeltine Creek, 1995, 1996, 1999, 2007, 2010, and 2012

Analyte	Units	2007 (W11) Minnow (2009)			2010 (W11) Minnow (2011)					2012 (W11 mouth) Minnow (2013a)					Pre-Breach 95th Percentile[c]
		LHC-1	LHC-2	LHC-3	LH SED-1	LH SED-2	LH SED-3	LH SED-4	LH SED-5	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	
Physical Tests															
Moisture	%	-	-	-	-	-	-	-	-	-	-	-	-	-	-
pH (1:2 soil:water)	pH	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Physical Characteristics															
Gravel (>2 mm)	%	1.00	3.00	<1.0	4.68	2.99	17.7	46.5	47.9	-	-	-	-	-	53.4
Sand (2.0 mm - 0.063 mm)	%	72.0	50.0	68.0	***85.1***	72.0	71.0	45.3	46.5	-	-	-	-	-	79.9
Silt (0.063 mm - 4 µm)	%	20.0	***36.0***	24.0	9.31	22.7	9.34	7.58	5.13	-	-	-	-	-	31.2
Clay (<4 µm)	%	7.00	***11.0***	8.00	0.940	2.28	2.06	0.580	0.430	-	-	-	-	-	9.80
Organic / Inorganic Carbon															
Total Organic Carbon	%	3.71	3.19	1.82	0.450	1.31	0.270	0.440	0.330	8.52	***9.80***	4.92	8.39	6.62	9.03
Anions and Nutrients															
Total Nitrogen by LECO	%	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Metals															
Aluminum	mg/kg	***12,800***	12,000	12,300	9,060	9,550	8,320	8,390	8,430	-	-	-	-	-	12,550
Antimony	mg/kg	<10.0	<10.0	<10.0	0.280	0.340	0.300	0.290	0.340	-	-	-	-	-	1.33
Arsenic	mg/kg	9.20	10.0	12.0	10.9	***12.4***	8.74	8.45	11.5	-	-	-	-	-	12.1
Barium	mg/kg	100	***109***	96.7	74.4	74.5	55.5	72.6	56.1	-	-	-	-	-	104
Beryllium	mg/kg	<0.50	<0.50	<0.50	0.270	0.300	0.260	0.260	0.270	-	-	-	-	-	0.300
Bismuth	mg/kg	<20.0	<20.0	<20.0	<0.20	<0.20	<0.20	<0.20	<0.20	-	-	-	-	-	<0.20
Boron	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	2.97
Cadmium	mg/kg	<0.50	<0.50	<0.50	0.120	0.180	0.110	0.110	0.120	-	-	-	-	-	0.235
Calcium	mg/kg	6,850	***7,120***	6,390	5,270	5,780	4,980	5,440	4,780	-	-	-	-	-	7,026
Chromium	mg/kg	31.7	31.4	***35.5***	29.0	28.7	29.0	32.5	29.5	-	-	-	-	-	33.1
Cobalt	mg/kg	9.70	9.90	***11.8***	8.98	10.2	8.55	8.38	8.80	-	-	-	-	-	11.0
Copper	mg/kg	36.8	33.7	30.7	17.9	22.4	17.0	17.6	19.2	-	-	-	-	-	42.0
Iron	mg/kg	24,100	25,100	27,500	22,600	25,300	23,200	24,500	23,600	-	-	-	-	-	35,400
Lead	mg/kg	<30.0	<30.0	<30.0	4.01	4.87	4.39	4.15	4.54	-	-	-	-	-	5.61
Lithium	mg/kg	***13.0***	12.4	12.8	8.40	9.30	8.40	8.20	8.50	-	-	-	-	-	12.9
Magnesium	mg/kg	***6,190***	6,050	6,100	5,480	5,790	4,930	5,190	5,780	-	-	-	-	-	6,159
Manganese	mg/kg	385	1,020	1,010	605	633	401	537	512	-	-	-	-	-	1,116
Mercury	mg/kg	0.0688	0.108	0.0646	<0.050	0.0520	<0.050	<0.050	<0.050	-	-	-	-	-	0.140
Molybdenum	mg/kg	<4.0	<4.0	<4.0	0.620	***0.780***	0.590	0.530	0.630	-	-	-	-	-	0.752
Nickel	mg/kg	22.2	20.3	22.2	18.3	20.2	18.2	18.9	23.5	-	-	-	-	-	24.0
Phosphorus	mg/kg	-	-	-	596	***733***	579	713	654	-	-	-	-	-	729
Potassium	mg/kg	***940***	850	800	510	530	450	530	440	-	-	-	-	-	909
Selenium	mg/kg	<2.0	<5.0	<2.0	0.240	0.340	<0.20	0.280	0.280	1.28	***1.49***	0.740	1.14	0.970	1.30
Silver	mg/kg	<2.0	<2.0	<2.0	<0.10	<0.10	<0.10	<0.10	<0.10	-	-	-	-	-	0.0300
Sodium	mg/kg	240	220	240	***260***	200	170	220	210	-	-	-	-	-	253
Strontium	mg/kg	***68.1***	66.0	53.3	52.5	56.2	39.9	47.7	41.7	-	-	-	-	-	67.1
Sulphur	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	mg/kg	<1.0	<1.0	<1.0	0.0500	***0.0510***	<0.050	<0.050	<0.050	-	-	-	-	-	0.0508
Tin	mg/kg	<5.0	<5.0	<5.0	<2.0	<2.0	<2.0	<2.0	<2.0	-	-	-	-	-	1.10
Titanium	mg/kg	574	564	621	654	652	664	***737***	574	-	-	-	-	-	701
Uranium	mg/kg	-	-	-	0.356	0.570	0.412	0.400	0.375	-	-	-	-	-	0.730
Vanadium	mg/kg	61.9	64.3	71.1	65.7	70.9	67.0	***77.9***	69.7	-	-	-	-	-	74.5
Zinc	mg/kg	49.3	46.1	47.3	40.0	45.1	39.9	40.1	41.7	-	-	-	-	-	60.2

Notes: "-" no data, S = spring, F = fall. ***Bold/ Italics*** indicates value is > reference 95th percentile value (<5th percentile value for pH). Sediment metal concentrations are based predominantly on bulk sediment samples. Concentrations reported in 1995 and 1996 were for the silt and clay (< 63 µm) fraction only.

[a] Some unusually high sediment metal concentrations were reported for 1996 (HKP 1997a) and are suspected errors.

[b] Particle fractions for these samples are as follow: gravel (>2 mm), sand (2.0 mm - 0.050 mm), silt (0.050 mm - 0.002 mm), clay (<0.002 mm).

[c] 95th percentile includes all data except those from 1996 (HKP 1997a) due to suspected errors.

Table D.2.5: Sediment Quality Data for Lower Edney Creek (EDC-D; Reference), 2018 to 2022

Analyte	Units	BC Working Sediment Quality Guidelines [a]		2018					2019					2020				
				EDC-D-1	EDC-D-2	EDC-D-3	EDC-D-4	EDC-D-5	EDC-D-1	EDC-D-2	EDC-D-3	EDC-D-4	EDC-D-5	EDC-D-1	EDC-D-2	EDC-D-3	EDC-D-4	EDC-D-5
		Lower	Upper	16-Aug-18	16-Aug-18	16-Aug-18	15-Aug-18	15-Aug-18	11-Aug-19	11-Aug-19	11-Aug-19	10-Aug-19	9-Aug-19	7-Aug-20	7-Aug-20	7-Aug-20	7-Aug-20	7-Aug-20
Physical Tests																		
Moisture	%	-	-	27.2	28.7	43	48.1	54.6	***72.7***	67.7	50.5	36.4	70.6	39.2	34	34.8	30	32.9
pH (1:2 soil:water)	pH	-	-	8.15	7.9	7.88	8.14	7.56	6.74	6.99	7.48	7.52	7.16	7.53	7.67	7.76	7.88	7.52
Particle Size																		
% Gravel	%	-	-	2.40	1.90	5.60	***10.7***	6.80	<1.0	<1.0	<1.0	<1.0	<1.0	4.2	<1.0	<1.0	1.8	4.3
% Sand	%	-	-	***87.7***	83.9	57.6	51.8	62.8	31.9	57.0	46.4	65.0	49.5	66.9	78	74.6	79.3	73.8
% Silt	%	-	-	7.30	11.0	31.0	33.1	25.8	***58.3***	35.4	43.8	28.7	41.2	25.3	18.5	21.1	15.7	18.1
% Clay	%	-	-	2.60	3.20	5.80	4.30	4.70	***9.80***	7.20	9.70	5.90	8.40	3.6	3.5	4.1	3.2	3.8
Organic / Inorganic Carbon (<63 µm)																		
Total Organic Carbon	%	-	-	3.09	1.56	3.06	2.77	3.76	3.56	2.41	3.42	2.51	3.82	2.9	2.38	2.28	1.92	1.95
Nutrients (Bulk sediment)																		
Total Nitrogen	%	-	-	0.033	0.0370	0.121	0.146	0.0900	***0.284***	0.116	0.200	0.106	0.237	0.136	0.102	0.106	0.081	0.097
Metals (<63 µm)[c]																		
Aluminum	mg/kg	-	-	13,800	14,600	13,900	13,000	15,500	15,700	14,900	15,500	14,900	15,200	12,000	12,700	12,900	11,700	11,300
Antimony	mg/kg	-	-	***0.540***	0.430	0.400	0.320	0.460	0.360	0.400	0.420	0.390	0.380	0.34	0.37	0.36	0.37	0.36
Arsenic	mg/kg	5.9	17	19.5	***19.8***	15.4	7.57	6.48	11.2	12.9	15.1	12.2	13.4	9.37	12.6	11.9	12.2	12.2
Barium	mg/kg	-	-	184	***192***	127	104	120	118	129	141	113	122	111	128	119	118	112
Beryllium	mg/kg	-	-	***0.510***	0.470	0.380	0.350	0.410	0.400	0.400	0.410	0.430	0.390	0.33	0.36	0.35	0.36	0.35
Bismuth	mg/kg	-	-	0.130	0.120	0.120	0.110	0.130	0.120	0.140	0.140	0.140	0.130	0.1	0.12	0.11	0.1	0.1
Boron	mg/kg	-	-	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<5.0	<5.0	<5.0	<5.0	<5.0
Cadmium	mg/kg	0.6	3.5	0.307	0.318	0.313	0.256	0.175	0.285	0.314	0.328	0.292	0.296	0.236	0.252	0.24	0.231	0.233
Calcium	mg/kg	-	-	10,100	10,300	8,790	7,320	9,710	9,340	10,100	***11,800***	9,650	9,170	8,390	9,590	8,370	8,280	8,270
Chromium	mg/kg	37.3	90	44.0	45.5	41.5	40.0	39.6	47.1	49.0	50.6	52.3	43.2	43.2	45.6	43	45.9	44.7
Cobalt	mg/kg	-	-	12.2	13.0	11.9	10.5	10.4	13.6	14.1	15.2	13.5	13.4	11.4	12.3	12.2	11.7	12
Copper	mg/kg	35.7	197	31.8	32.7	32.3	30.2	***43.5***	36.4	35.1	36.2	33.8	33.3	24.9	27.3	27	25.7	25.6
Iron	mg/kg	21200	43,766	29,700	32,100	29,800	25,200	21,400	29,800	31,400	32,800	32,600	30,100	27,200	30,100	29,000	29,300	29,700
Lead	mg/kg	35	91.3	8.27	7.72	7.23	6.53	7.82	7.36	8.21	8.37	7.97	7.35	6	6.48	6.55	6.33	6.15
Lithium	mg/kg	-	-	15.9	15.4	15.3	14.1	***17.9***	16.3	16.7	16.5	15.8	15.0	13.2	13.4	13.5	12.9	12.8
Magnesium	mg/kg	-	-	6,580	6,850	6,810	6,140	6,820	7,150	7,140	7,630	7,160	6,920	5,880	6,360	6,410	6,120	6,060
Manganese	mg/kg	460	1,100	798	870	732	343	255	583	943	1,410	781	1,080	821	771	902	760	777
Mercury	mg/kg	0.17	0.486	***0.0891***	0.0589	0.0724	0.0633	0.0876	0.0614	0.0610	0.0576	0.0530	0.0623	0.0692	0.0545	0.0626	0.0554	0.0541
Molybdenum	mg/kg	25	23,000	1.51	1.01	0.780	0.420	0.730	1.05	1.09	1.13	0.910	0.690	0.53	0.59	0.69	0.68	0.62
Nickel	mg/kg	16	75	30.7	31.3	29.5	26.7	32.5	35.4	35.8	37.8	33.8	31.7	27.2	28.6	28.9	27.5	28.2
Phosphorus	mg/kg	-	-	1,000	1,140	1,070	1,060	915	1,120	1,070	***1,210***	1,190	1,070	959	1,050	964	1,040	1,150
Potassium	mg/kg	-	-	1,260	1,240	1,110	890	1,000	1,320	1,240	1,260	980	1,260	1,000	1,020	1,000	960	910
Selenium	mg/kg	2	-	0.760	1.05	0.680	0.510	1.06	0.620	0.550	0.800	0.480	0.600	0.39	0.51	0.47	0.41	0.33
Silver	mg/kg	0.5	-	***0.284***	0.110	0.118	0.102	0.174	0.129	0.139	0.138	0.121	0.123	0.084	0.091	0.103	0.097	0.09
Sodium	mg/kg	-	-	276	295	248	240	204	247	242	260	225	235	275	300	271	256	243
Strontium	mg/kg	-	-	***106***	86.9	80.5	72.2	84.5	71.6	74.8	82.2	72.8	80.4	68.4	73.5	71.9	74.7	71.5
Sulphur	mg/kg	-	-	500	<500	500	500	500	1,200	600	900	<500	900	***1,560***	<500	600	<500	<500
Thallium	mg/kg	-	-	***0.135***	0.109	0.107	0.095	0.118	0.111	0.116	0.110	0.109	0.107	0.082	0.087	0.089	0.088	0.079
Tin	mg/kg	-	-	0.400	0.410	0.360	0.300	0.310	0.410	0.410	0.510	***0.830***	0.540	0.32	0.43	0.32	0.45	0.36
Titanium	mg/kg	-	-	591	660	594	599	472	673	674	693	702	655	741	711	647	661	657
Uranium	mg/kg	-	-	0.915	0.803	0.839	0.766	***1.56***	0.994	0.986	0.887	1.04	0.946	0.851	0.832	0.816	0.822	0.785
Vanadium	mg/kg	-	-	70.6	75.7	65.9	59.3	53.3	60.8	63.4	66.2	75.9	61.6	66	74.2	66.8	72.4	71.5
Zinc	mg/kg	123	315	61.9	65.0	62.2	56.1	52.5	69.1	70.9	72.7	67.1	68.1	55.1	58.1	58.8	56	56.8
Zirconium	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	1.40	1.50	1.50	1.50	1.50

Value is > BC Lower Working Sediment Quality Guideline

Value is > BC Upper Working Sediment Quality Guideline

Notes: "-" indicates no current BC Working Sediment Quality Guidelines/ no data. ***Bold/ Italics*** indicates value is > reference 95th percentile value (<5th percentile value for pH).

[a] British Columbia Working Sediment Guidelines (BCMOECCS 2021a) and approved BC Sediment Quality Guideline for Selenium (BCMOECCS 2021b).

[b] 5th percentile value for pH.

[c] Total sulphur measured in bulk sediment, not the <63 µm fraction.

Table D.2.5: Sediment Quality Data for Lower Edney Creek (EDC-D; Reference), 2018 to 2022

Analyte	Units	BC Working Sediment Quality Guidelines[a]		2021					2022					95th Percentile (2018 to 2022)[b]
				EDC-D-1	EDC-D-2	EDC-D-3	EDC-D-4	EDC-D-5	EDC-D-1	EDC-D-2	EDC-D-3	EDC-D-4	EDC-D-5	
		Lower	Upper	30-Jul-21	30-Jul-21	30-Jul-21	30-Jul-21	30-Jul-21	3-Aug-22	3-Aug-22	3-Aug-22	3-Aug-22	3-Aug-22	
Physical Tests														
Moisture	%	-	-	65.3	44.9	50.5	42.5	38.7	50.0	52.8	60.6	43.8	59.8	70.6
pH (1:2 soil:water)	pH	-	-	7.37	7.55	7.83	7.33	7.41	7.30	7.71	7.87	7.69	***6.49***	6.74
Particle Size														
% Gravel	%	-	-	<1.0	<1.0	<1.0	2.70	<1.0	<1.0	1.20	<1.0	<1.0	1.10	6.80
% Sand	%	-	-	54.8	65.7	56.2	61.5	52.5	59.5	52.7	51.2	70.0	58.1	83.9
% Silt	%	-	-	38.5	28.8	38.0	29.6	41.9	33.5	38.7	40.9	24.1	34.0	43.8
% Clay	%	-	-	6.30	5.10	5.60	6.20	4.80	6.60	7.40	7.00	5.80	6.80	9.70
Organic / Inorganic Carbon (<63 µm)														
Total Organic Carbon	%	-	-	3.63	2.49	2.26	2.56	1.15	3.43	2.84	3.56	3.05	***5.29***	3.82
Nutrients (Bulk sediment)														
Total Nitrogen	%	-	-	0.203	0.113	0.139	0.142	0.111	0.189	0.158	0.210	0.0870	0.206	0.237
Metals (<63 µm)[c]														
Aluminum	mg/kg	-	-	19,000	16,500	***19,800***	16,700	12,500	13,800	14,600	14,200	13,100	13,600	19,000
Antimony	mg/kg	-	-	0.330	0.330	0.410	0.350	0.310	0.340	0.330	0.360	0.350	0.320	0.460
Arsenic	mg/kg	5.9	17	13.0	11.6	17.0	12.0	9.25	9.30	8.39	10.5	11.3	9.49	19.5
Barium	mg/kg	-	-	177	179	169	137	97.3	110	111	118	126	122	184
Beryllium	mg/kg	-	-	0.430	0.370	0.480	0.370	0.290	0.350	0.400	0.360	0.370	0.350	0.480
Bismuth	mg/kg	-	-	0.130	0.110	0.140	0.110	<0.1	0.110	0.110	0.110	0.120	0.120	0.140
Boron	mg/kg	-	-	6.40	5.50	6.50	<5.0	<5.0	<5.0	<5.0	5.00	<5.0	<5.0	6.50
Cadmium	mg/kg	0.6	3.5	***0.361***	0.292	0.329	0.310	0.190	0.264	0.213	0.265	0.278	0.288	0.329
Calcium	mg/kg	-	-	9,940	9,010	11,000	8,570	7,860	8,300	8,550	8,940	8,700	8,480	11,000
Chromium	mg/kg	37.3	90	60.4	50.9	***67.2***	51.6	47.0	42.3	44.8	45.0	43.9	41.1	60.4
Cobalt	mg/kg	-	-	15.5	12.8	***16.2***	13.4	10.1	11.4	11.2	12.3	12.1	11.7	15.5
Copper	mg/kg	35.7	197	35.8	31.6	38.1	30.7	25.4	25.8	29.2	27.3	27.6	31.5	38.1
Iron	mg/kg	21200	43,766	33,600	29,800	***38,100***	31,300	27,100	27,100	26,100	29,300	28,900	27,200	33,600
Lead	mg/kg	35	91.3	7.76	7.01	***8.62***	6.87	5.72	6.44	7.26	6.73	6.87	6.77	8.37
Lithium	mg/kg	-	-	16.0	14.0	16.8	13.9	10.0	13.3	15.0	14.0	13.4	13.9	16.8
Magnesium	mg/kg	-	-	8,140	7,060	***8,760***	7,220	5,910	6,450	6,880	7,100	6,620	6,760	8,140
Manganese	mg/kg	460	1,100	***1,460***	721	1,210	627	374	514	564	1,000	904	541	1,410
Mercury	mg/kg	0.17	0.486	0.0628	0.0635	0.0734	0.0636	0.0454	0.0530	0.0689	0.0578	0.0533	0.0661	0.0876
Molybdenum	mg/kg	25	23,000	1.27	1.11	***1.62***	0.890	0.800	0.600	0.580	0.650	0.540	0.550	1.51
Nickel	mg/kg	16	75	39.9	33.0	***41.7***	32.4	26.1	26.9	28.0	28.7	27.9	28.2	39.9
Phosphorus	mg/kg	-	-	1,180	989	1,170	1,050	1,150	930	953	1,050	960	968	1,190
Potassium	mg/kg	-	-	1,480	1,230	***1,500***	1,230	860	1,120	1,140	1,240	1,110	1,080	1,480
Selenium	mg/kg	2	-	0.620	***4.08***	0.640	0.520	0.340	0.380	0.490	0.430	0.390	0.540	1.06
Silver	mg/kg	0.5	-	0.121	0.112	0.142	0.117	0.0780	0.0940	0.116	0.107	0.103	0.107	0.174
Sodium	mg/kg	-	-	320	***359***	331	275	231	280	267	290	257	226	331
Strontium	mg/kg	-	-	87.9	76.8	105	80.7	65.0	77.8	87.4	84.9	80.5	75.8	105
Sulphur	mg/kg	-	-	540	<500	<500	<500	<500	620	530	570	<500	520	1,200
Thallium	mg/kg	-	-	0.125	0.101	0.124	0.0930	0.0680	0.0930	0.106	0.0970	0.0920	0.0900	0.125
Tin	mg/kg	-	-	0.360	0.350	0.420	0.310	0.260	0.340	0.350	0.410	0.370	0.350	0.540
Titanium	mg/kg	-	-	742	714	***900***	796	677	706	704	766	666	543	796
Uranium	mg/kg	-	-	1.02	0.961	1.20	1.08	0.830	1.06	1.06	1.03	0.965	0.894	1.20
Vanadium	mg/kg	-	-	71.7	67.7	***85.2***	71.6	67.4	63.1	62.3	67.2	68.5	59.2	75.9
Zinc	mg/kg	123	315	***82.2***	68.8	80.9	70.4	56.6	59.4	65.0	64.9	62.7	65.5	80.9
Zirconium	mg/kg	-	-	1.40	1.40	1.60	1.40	1.60	1.50	1.90	1.50	1.70	1.60	1.90

Value is > BC Lower Working Sediment Quality Guideline

Value is > BC Upper Working Sediment Quality Guideline

Notes: "-" indicates no current BC Working Sediment Quality Guidelines/ no data. ***Bold/ Italics*** indicates value is > reference 95th percentile value (<5th percentile value for pH).

[a] British Columbia Working Sediment Guidelines (BCMOECCS 2021a) and approved BC Sediment Quality Guideline for Selenium (BCMOECCS 2021b).

[b] 5th percentile value for pH.

[c] Total sulphur measured in bulk sediment, not the <63 µm fraction.

Table D.2.6: Sediment Quality Data for Upper Edney Creek (EDC-U; Reference), 2022

Parameter	Units	BC Working Sediment Quality Guidelines[a]		Reference 95th Percentile (EDC-U 2018 to 2022)[b]	Reference (Upper Edney Creek; EDC-U)									
					EDC-U-1	EDC-U-2	EDC-U-3	EDC-U-4	EDC-U-5	Mean	Median	Standard Deviation	Minimum	Maximum
		Lower	Upper		7-Aug-22	7-Aug-22	7-Aug-22	7-Aug-22	7-Aug-22					
Physical Tests														
Moisture	%	-	-	79.7	63.9	70.8	64.9	64.5	45.5	61.9	64.5	9.59	45.5	70.8
pH (1:2 soil:water)	pH	-	-	6.01	6.67	6.64	6.44	7.03	6.97	6.75	6.67	0.246	6.44	7.03
Particle Size														
% Gravel	%	-	-	11.3	2.00	<1	<1	<1	1.00	1.20	<1	0.566	<1	2.00
% Sand	%	-	-	76.2	44.9	37.7	60.7	55.8	76.2	55.1	55.8	14.9	37.7	76.2
% Silt	%	-	-	56.4	44.9	47.4	32.7	36.1	17.6	35.7	36.1	11.8	17.6	47.4
% Clay	%	-	-	16.4	8.20	14.3	6.30	8.10	5.20	8.42	8.10	3.52	5.20	14.3
Organic / Inorganic Carbon (<63 µm)														
Total Organic Carbon	%	-	-	8.48	7.11	3.78	7.08	5.43	6.65	6.01	6.65	1.42	3.78	7.11
Nutrients (Bulk sediment)														
Total Nitrogen	%	-	-	0.485	0.424	0.303	0.248	0.271	0.167	0.283	0.271	0.0937	0.167	0.424
Metals (<63 µm)[c]														
Aluminum	mg/kg	-	-	22,800	16,600	12,300	14,600	14,800	15,400	14,740	14,800	1,571	12,300	16,600
Antimony	mg/kg	-	-	0.420	0.340	0.240	0.310	0.300	0.310	0.300	0.310	0.0367	0.240	0.340
Arsenic	mg/kg	5.90	17.0	12.0	8.78	5.80	9.52	8.03	8.23	8.07	8.23	1.40	5.80	9.52
Barium	mg/kg	-	-	200	129	79.3	116	105	111	108	111	18.3	79.3	129
Beryllium	mg/kg	-	-	0.620	0.390	0.290	0.380	0.380	0.420	0.372	0.380	0.0487	0.290	0.420
Bismuth	mg/kg	-	-	0.140	0.100	<0.1	<0.1	<0.1	<0.1	0.100	<0.1	-	<0.1	0.100
Boron	mg/kg	-	-	5.40	5.30	<5	<5	<5	<5	5.06	<5	-	<5	5.30
Cadmium	mg/kg	0.600	3.50	0.579	0.426	0.165	0.387	0.316	0.351	0.329	0.351	0.100	0.165	0.426
Calcium	mg/kg	-	-	11,000	8,850	6,170	7,820	7,950	8,440	7,846	7,950	1,022	6,170	8,850
Chromium	mg/kg	37.3	90.0	75.8	49.5	37.2	47.4	47.3	53.2	46.9	47.4	5.94	37.2	53.2
Cobalt	mg/kg	-	-	16.9	13.0	8.18	12.5	11.9	12.2	11.6	12.2	1.93	8.18	13.0
Copper	mg/kg	35.7	197	47.0	32.2	20.2	28.2	25.5	27.6	26.7	27.6	4.39	20.2	32.2
Iron	mg/kg	21,200	43,766	34,000	26,400	18,400	26,800	24,700	27,200	24,700	26,400	3,648	18,400	27,200
Lead	mg/kg	35.0	91.3	8.14	8.14	5.70	6.88	5.90	6.35	6.59	6.35	0.976	5.70	8.14
Lithium	mg/kg	-	-	17.8	12.8	10.4	12.2	11.8	12.8	12.0	12.2	0.990	10.4	12.8
Magnesium	mg/kg	-	-	7,930	6,570	5,210	6,150	6,150	6,460	6,108	6,150	536	5,210	6,570
Manganese	mg/kg	460	1,100	2,710	560	541	852	1,080	1,010	809	852	250	541	1,080
Mercury	mg/kg	0.170	0.486	0.125	0.0820	0.0530	0.0794	0.0747	0.0866	0.0751	0.0794	0.0131	0.0530	0.0866
Molybdenum	mg/kg	25	23,000	2.39	0.670	0.470	0.570	0.560	0.620	0.578	0.570	0.0746	0.470	0.670
Nickel	mg/kg	16.0	75.0	43.2	28.2	19.0	26.2	25.6	27.2	25.2	26.2	3.63	19.0	28.2
Phosphorus	mg/kg	-	-	1,370	1,060	954	1,010	1,020	1,080	1,025	1,020	48.8	954	1,080
Potassium	mg/kg	-	-	1,470	1,240	720	1,030	1,000	1,100	1,018	1,030	191	720	1,240
Selenium	mg/kg	2.00	-	0.880	0.490	0.240	0.370	0.430	0.440	0.394	0.430	0.0961	0.240	0.490
Silver	mg/kg	0.500	-	0.205	0.159	0.100	0.139	0.124	0.132	0.131	0.132	0.0216	0.100	0.159
Sodium	mg/kg	-	-	340	289	200	255	262	269	255	262	33.3	200	289
Strontium	mg/kg	-	-	85.5	77.1	55.7	68.9	70.5	75.8	69.6	70.5	8.50	55.7	77.1
Sulphur	mg/kg	-	-	2,300	760	710	690	610	<500	654	690	67.6	<500	760
Thallium	mg/kg	-	-	0.166	0.128	0.0840	0.107	0.103	0.114	0.107	0.107	0.0161	0.0840	0.128
Tin	mg/kg	-	-	0.620	0.460	0.250	0.330	0.340	0.430	0.362	0.340	0.0841	0.250	0.460
Titanium	mg/kg	-	-	736	626	492	588	608	652	593	608	61.3	492	652
Uranium	mg/kg	-	-	2.15	1.48	1.15	1.23	1.19	1.33	1.28	1.23	0.132	1.15	1.48
Vanadium	mg/kg	-	-	85.7	67.1	48.4	64.7	63.6	68.2	62.4	64.7	8.04	48.4	68.2
Zinc	mg/kg	123	315	89.7	73.4	45.4	68.3	62.0	67.6	63.3	67.6	10.8	45.4	73.4
Zirconium	mg/kg	-	-	1.90	1.10	<1	1.00	<1	<1	1.02	<1	0.0566	<1	1.10

Value is > BC Lower Working Sediment Quality Guideline

Value is > BC Upper Working Sediment Quality Guideline

Notes: "-" indicates no current BC Working Sediment Guideline/ no data. ***Bold/ Italics*** indicates value is > than reference 95th percentile value (< 5th percentile value for pH).

[a] British Columbia Working Sediment Guidelines (BCMOECCS 2021a) and approved BC Sediment Quality Guideline for Selenium (BCMOECCS 2021b).

[b] For calculation of reference 95th percentile values see Appendix Table D.2.3. The 5th percentile is reported for pH.

[c] Total sulphur measured in bulk sediment, not the <63 µm fraction.

Table D.2.7: Sediment Quality Data for Upper Hazeltine Creek (HAC-U; Exposed), 2022

Parameter	Units	BC Working Sediment Quality Guidelines[a]		Reference/ Pre-Breach 95th Percentile[b]		Exposed (Upper Hazeltine Creek; HAC-U)									
						HAC-U-1	HAC-U-2	HAC-U-3	HAC-U-4	HAC-U-5	Mean	Median	Standard Deviation	Minimum	Maximum
		Lower	Upper	Reference (Upper Edney Creek; EDC-U 2018 to 2022)	Pre-Breach (HAC-U)	6-Aug-22	6-Aug-22	6-Aug-22	6-Aug-22	6-Aug-22					
Physical Tests															
Moisture	%	-	-	79.7	-	***88.4***	***85.0***	***87.1***	***85.8***	***90.3***	***87.3***	***87.1***	2.11	***85.0***	***90.3***
pH (1:2 soil:water)	pH	-	-	6.01	-	7.03	7.19	7.27	7.18	7.22	7.18	7.19	0.0898	7.03	7.27
Particle Size															
% Gravel	%	-	-	11.3	33.1	<1	<1	<1	<1	<1	<1	<1	-	<1	<1
% Sand	%	-	-	76.2	64.7	12.9	14.6	14.6	12.6	9.00	12.7	12.9	2.29	9.00	14.6
% Silt	%	-	-	56.4	76.2	72.0	69.2	70.7	70.1	73.7	71.1	70.7	1.76	69.2	73.7
% Clay	%	-	-	16.4	13.9	15.1	16.2	14.7	***17.3***	***17.3***	16.1	16.2	1.21	14.7	***17.3***
Organic / Inorganic Carbon (<63 µm)[c]															
Total Organic Carbon	%	-	-	8.48	12.8	7.45	5.80	6.29	7.21	6.96	6.74	6.96	0.682	5.80	7.45
Nutrients (Bulk sediment)															
Total Nitrogen	%	-	-	0.485	-	***0.895***	***0.629***	***0.662***	***0.818***	***0.821***	***0.765***	***0.818***	0.114	***0.629***	***0.895***
Metals (<63 µm)[c,d]															
Aluminum	mg/kg	-	-	22,800	17,960	15,700	16,500	16,400	15,400	16,600	16,120	16,400	536	15,400	16,600
Antimony	mg/kg	-	-	0.420	0.370	0.280	0.360	0.350	0.290	0.360	0.328	0.350	0.0396	0.280	0.360
Arsenic	mg/kg	5.90	17.0	12.0	8.23	7.08	7.35	7.38	7.16	7.43	7.28	7.35	0.151	7.08	7.43
Barium	mg/kg	-	-	200	136	***266***	***255***	***257***	***266***	***256***	***260***	***257***	5.52	***255***	***266***
Beryllium	mg/kg	-	-	0.620	0.460	0.520	0.550	0.540	0.510	0.550	0.534	0.540	0.0182	0.510	0.550
Bismuth	mg/kg	-	-	0.140	<0.20	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	<0.1	<0.1
Boron	mg/kg	-	-	5.40	5.40	***23.3***	***15.1***	***16.6***	***22.2***	***21.8***	***19.8***	***21.8***	3.69	***15.1***	***23.3***
Cadmium	mg/kg	0.600	3.50	0.579	0.354	0.395	0.374	0.328	0.330	0.344	0.354	0.344	0.0293	0.328	0.395
Calcium	mg/kg	-	-	11,000	13,395	***23,600***	***20,700***	***22,800***	***21,800***	***19,300***	***21,640***	***21,800***	1,701	***19,300***	***23,600***
Chromium	mg/kg	37.3	90.0	75.8	40.05	26.7	29.4	25.9	23.9	27.6	26.7	26.7	2.04	23.9	29.4
Cobalt	mg/kg	-	-	16.9	10.41	13.2	13.6	13.6	12.8	13.4	13.3	13.4	0.335	12.8	13.6
Copper	mg/kg	35.7	197	47.0	94.6	***393***	***400***	***382***	***385***	***402***	***392***	***393***	8.85	***382***	***402***
Iron	mg/kg	21,200	43,766	34,000	29,900	30,700	31,800	32,300	32,700	32,500	32,000	32,300	800	30,700	32,700
Lead	mg/kg	35.0	91.3	8.14	6.70	5.50	5.99	5.82	5.69	5.87	5.77	5.82	0.187	5.50	5.99
Lithium	mg/kg	-	-	17.8	14.8	12.4	14.0	13.4	12.6	13.0	13.1	13.0	0.642	12.4	14.0
Magnesium	mg/kg	-	-	7,930	6,430	***8,460***	***8,620***	***8,420***	***8,480***	***8,560***	***8,508***	***8,480***	80.7	***8,420***	***8,620***
Manganese	mg/kg	460	1,100	2,710	1,345	1,860	1,430	1,880	2,250	1,780	1,840	1,860	292	1,430	2,250
Mercury	mg/kg	0.170	0.486	0.125	0.145	0.108	0.112	0.105	0.103	0.107	0.107	0.107	0.00339	0.103	0.112
Molybdenum	mg/kg	25	23,000	2.39	1.50	***4.06***	***3.67***	***4.16***	***3.40***	***3.92***	***3.84***	***3.92***	0.308	***3.40***	***4.16***
Nickel	mg/kg	16.0	75.0	43.2	24.4	25.2	25.4	22.4	21.0	23.0	23.4	23.0	1.88	21.0	25.4
Phosphorus	mg/kg	-	-	1,370	1,375	***1,650***	1,340	***1,420***	***1,580***	***1,570***	***1,512***	***1,570***	128	1,340	***1,650***
Potassium	mg/kg	-	-	1,470	1445	1,420	***1,610***	1,360	1,340	1,440	1,434	1,420	107	1,340	***1,610***
Selenium	mg/kg	2.00	-	0.880	3.32	***4.43***	***3.39***	***3.36***	***4.57***	***4.52***	***4.05***	***4.43***	0.622	***3.36***	***4.57***
Silver	mg/kg	0.500	-	0.205	0.16	0.185	0.198	0.193	0.178	0.181	0.187	0.185	0.00834	0.178	0.198
Sodium	mg/kg	-	-	340	350	***496***	***458***	***476***	***465***	***468***	***473***	***468***	14.6	***458***	***496***
Strontium	mg/kg	-	-	85.5	118	***147***	***143***	***151***	***143***	***134***	***144***	***143***	6.31	***134***	***151***
Sulphur[d]	mg/kg	-	-	2,300	-	2,120	***2,610***	***2,520***	***2,920***	***3,420***	***2,718***	***2,610***	485	2,120	***3,420***
Thallium	mg/kg	-	-	0.166	0.0941	<0.05	0.0630	0.0530	<0.05	0.0540	0.0540	0.0530	0.00480	<0.05	0.0630
Tin	mg/kg	-	-	0.620	<2.0	0.740	0.680	0.710	0.620	0.770	0.704	0.710	0.0577	0.620	0.770
Titanium	mg/kg	-	-	736	776	707	727	737	678	***871***	744	727	74.5	678	***871***
Uranium	mg/kg	-	-	2.15	1.26	0.798	0.749	0.835	0.802	0.850	0.807	0.802	0.0391	0.749	0.850
Vanadium	mg/kg	-	-	85.7	65.3	***96.8***	***96.0***	***99.9***	***95.7***	***105***	***98.7***	***96.8***	3.91	***95.7***	***105***
Zinc	mg/kg	123	315	89.7	67.6	68.3	71.1	69.8	67.8	70.6	69.5	69.8	1.43	67.8	71.1
Zirconium	mg/kg	-	-	1.90	-	1.90	***2.10***	***2.00***	1.90	***2.20***	***2.02***	***2.00***	0.130	1.90	***2.20***

Value is > BC Lower Working Sediment Quality Guideline

Value is > BC Upper Working Sediment Quality Guideline

Notes: "-" indicates no current BC Working Sediment Guideline/ no data. ***Bold/ Italics*** indicates value is > than both reference and pre-breach 95th percentile value (< 5th percentile value for pH).

[a] British Columbia Working Sediment Guidelines (BCMOECCS 2021a) and approved BC Sediment Quality Guideline for Selenium (BCMOECCS 2021b).

[b] Pre-breach values that were reported as < the laboratory reporting limit were not used for screening. For calculation of pre-breach 95th percentile values see Appendix Table D.2.2. For calculation of reference 95th percentile values see Appendix Table D.2.3. Pre-breach sediment metal concentrations are based predominantly on bulk sediment rather than the fines fraction (<63 µm). The 5th percentile is reported for pH.

[c] Total Organic Carbon (TOC) and metals data are presented for the <63 µm sediment fraction for post-breach (2014 to 2022) data only. TOC and metals data presented for pre-breach results represent bulk sediment samples (see Appendix Tables D.2.2)

[d] Total sulphur measured in bulk sediment, not the <63 µm fraction.

Table D.2.8: Sediment Quality Data for Lower Edney Creek (EDC-D; Reference), 2022

Parameter	Units	BC Working Sediment Quality Guidelines[a]		Reference 95th Percentile (EDC-D 2018 to 2022)[b]	Reference (Edney Creek; EDC-D)									
					EDC-D-1	EDC-D-2	EDC-D-3	EDC-D-4	EDC-D-5	Mean	Median	Standard Deviation	Minimum	Maximum
		Lower	Upper		3-Aug-22	3-Aug-22	3-Aug-22	3-Aug-22	3-Aug-22					
Physical Tests														
Moisture	%	-	-	70.6	50.0	52.8	60.6	43.8	59.8	53.4	52.8	7.02	43.8	60.6
pH (1:2 soil:water)	pH	-	-	6.74	7.30	7.71	7.87	7.69	**6.49**	7.41	7.69	0.556	**6.49**	7.87
Particle Size														
% Gravel	%	-	-	6.80	<1	1.20	<1	<1	1.10	1.06	<1	0.0566	<1	1.20
% Sand	%	-	-	83.9	59.5	52.7	51.2	70.0	58.1	58.3	58.1	7.42	51.2	70.0
% Silt	%	-	-	43.8	33.5	38.7	40.9	24.1	34.0	34.2	34.0	6.47	24.1	40.9
% Clay	%	-	-	9.70	6.60	7.40	7.00	5.80	6.80	6.72	6.80	0.593	5.80	7.40
Organic / Inorganic Carbon (<63 µm)														
Total Organic Carbon	%	-	-	3.82	3.43	2.84	3.56	3.05	***5.29***	3.63	3.43	0.970	2.84	***5.29***
Nutrients (Bulk sediment)														
Total Nitrogen	%	-	-	0.237	0.189	0.158	0.210	0.0870	0.206	0.170	0.189	0.0507	0.0870	0.210
Metals (<63 µm)[c]														
Aluminum (Al)	mg/kg	-	-	19,000	13,800	14,600	14,200	13,100	13,600	13,860	13,800	573	13,100	14,600
Antimony (Sb)	mg/kg	-	-	0.460	0.340	0.330	0.360	0.350	0.320	0.340	0.340	0.0158	0.320	0.360
Arsenic (As)	mg/kg	5.90	17.0	19.5	9.30	8.39	10.5	11.3	9.49	9.80	9.49	1.13	8.39	11.3
Barium (Ba)	mg/kg	-	-	184	110	111	118	126	122	117	118	6.91	110	126
Beryllium (Be)	mg/kg	-	-	0.480	0.350	0.400	0.360	0.370	0.350	0.366	0.360	0.0207	0.350	0.400
Bismuth (Bi)	mg/kg	-	-	0.140	0.110	0.110	0.110	0.120	0.120	0.114	0.110	0.00548	0.110	0.120
Boron (B)	mg/kg	-	-	6.50	<5	<5	5.00	<5	<5	5.00	<5	-	<5	5.00
Cadmium (Cd)	mg/kg	0.600	3.50	0.329	0.264	0.213	0.265	0.278	0.288	0.262	0.265	0.0289	0.213	0.288
Calcium (Ca)	mg/kg	-	-	11,000	8,300	8,550	8,940	8,700	8,480	8,594	8,550	241	8,300	8,940
Chromium (Cr)	mg/kg	37.3	90.0	60.4	42.3	44.8	45.0	43.9	41.1	43.4	43.9	1.68	41.1	45.0
Cobalt (Co)	mg/kg	-	-	15.5	11.4	11.2	12.3	12.1	11.7	11.7	11.7	0.462	11.2	12.3
Copper (Cu)	mg/kg	35.7	197	38.1	25.8	29.2	27.3	27.6	31.5	28.3	27.6	2.17	25.8	31.5
Iron (Fe)	mg/kg	21,200	43,766	33,600	27,100	26,100	29,300	28,900	27,200	27,720	27,200	1,339	26,100	29,300
Lead (Pb)	mg/kg	35.0	91.3	8.37	6.44	7.26	6.73	6.87	6.77	6.81	6.77	0.296	6.44	7.26
Lithium (Li)	mg/kg	-	-	16.8	13.3	15.0	14.0	13.4	13.9	13.9	13.9	0.676	13.3	15.0
Magnesium (Mg)	mg/kg	-	-	8,140	6,450	6,880	7,100	6,620	6,760	6,762	6,760	248	6,450	7,100
Manganese (Mn)	mg/kg	460	1,100	1,410	514	564	1,000	904	541	705	564	229	514	1,000
Mercury (Hg)	mg/kg	0.170	0.486	0.0876	0.0530	0.0689	0.0578	0.0533	0.0661	0.0598	0.0578	0.00733	0.0530	0.0689
Molybdenum (Mo)	mg/kg	25	23,000	1.51	0.600	0.580	0.650	0.540	0.550	0.584	0.580	0.0439	0.540	0.650
Nickel (Ni)	mg/kg	16.0	75.0	39.9	26.9	28.0	28.7	27.9	28.2	27.9	28.0	0.658	26.9	28.7
Phosphorus (P)	mg/kg	-	-	1,190	930	953	1,050	960	968	972.2	960	45.7	930	1,050
Potassium (K)	mg/kg	-	-	1,480	1,120	1,140	1,240	1,110	1,080	1,138	1,120	61.0	1,080	1,240
Selenium (Se)	mg/kg	2.00	-	1.06	0.380	0.490	0.430	0.390	0.540	0.446	0.430	0.0680	0.380	0.540
Silver (Ag)	mg/kg	0.500	-	0.174	0.0940	0.116	0.107	0.103	0.107	0.105	0.107	0.00796	0.0940	0.116
Sodium (Na)	mg/kg	-	-	331	280	267	290	257	226	264	267	24.7	226	290
Strontium (Sr)	mg/kg	-	-	105	77.8	87.4	84.9	80.5	75.8	81.3	80.5	4.83	75.8	87.4
Sulfur (S)	mg/kg	-	-	1,200	620	530	570	<500	520	548	530	44.7	<500	620
Thallium (Tl)	mg/kg	-	-	0.125	0.0930	0.106	0.0970	0.0920	0.0900	0.0956	0.0930	0.00635	0.0900	0.106
Tin (Sn)	mg/kg	-	-	0.540	0.340	0.350	0.410	0.370	0.350	0.364	0.350	0.0279	0.340	0.410
Titanium (Ti)	mg/kg	-	-	796	706	704	766	666	543	677	704	83.0	543	766
Uranium (U)	mg/kg	-	-	1.20	1.06	1.06	1.03	0.965	0.894	1.00	1.03	0.0717	0.894	1.06
Vanadium (V)	mg/kg	-	-	75.9	63.1	62.3	67.2	68.5	59.2	64.1	63.1	3.78	59.2	68.5
Zinc (Zn)	mg/kg	123	315	80.9	59.4	65.0	64.9	62.7	65.5	63.5	64.9	2.53	59.4	65.5
Zirconium (Zr)	mg/kg	-	-	1.90	1.50	1.90	1.50	1.70	1.60	1.64	1.60	0.167	1.50	1.90

Value is > BC Lower Working Sediment Quality Guideline

Value is > BC Upper Working Sediment Quality Guideline

Notes: ***Bold/ Italics*** **=** value is > reference 95th percentile values (< 5th percentile value for pH). "-" indicates no current BC Working Sediment Guidelines/no data. All summary stats calculated to 3 significant figures. [a] British Columbia Working Sediment Guidelines (BCMOECCS 2021) and approved BC Sediment Quality Guideline for Selenium (BCMOECCS 2021b).

[b] For calculation of reference 95th percentile values see Appendix Table D.2.5. The 5th percentile is reported for pH.

[c] Total sulphur measured in bulk sediment, not the <63 µm fraction.

Table D.2.9: Sediment Quality Data for Lower Hazeltine Creek (HAC-D; Exposed), 2022

Parameter	Units	BC Working Sediment Quality Guidelines[a]		Reference/ Pre-Breach 95th Percentile[b]		Exposed (Hazeltine Creek, HAC-D)									
						HAC-D-1	HAC-D-2	HAC-D-3	HAC-D-4	HAC-D-5	Mean	Median	Standard Deviation	Minimum	Maximum
		Lower	Upper	Reference (Upper Edney Creek; EDC-D 2018 to 2022)	Pre-Breach (HAC-D)	5-Aug-22	5-Aug-22	5-Aug-22	5-Aug-22	5-Aug-22					
Physical Tests															
Moisture	%	-	-	70.6	-	59.0	50.3	51.8	46.1	69.7	56.7	55.4	8.91	46.1	69.7
pH (1:2 soil:water)	pH	-	-	6.74	-	7.66	7.65	7.36	7.60	7.22	7.48	7.49	0.182	7.22	7.66
Particle Size															
% Gravel	%	-	-	6.80	53.4	<1	<1	<1	<1	<1	<1	<1	-	<1	<1
% Sand	%	-	-	83.9	79.9	50.5	54.3	33.7	57.0	23.7	42.4	42.8	13.4	23.7	57.0
% Silt	%	-	-	43.8	31.2	42.5	38.6	***54.8***	35.5	***65.4***	***48.6***	***48.6***	11.6	35.5	***65.4***
% Clay	%	-	-	9.70	9.80	6.80	6.60	***11.5***	7.30	***10.0***	8.67	8.55	2.04	6.60	***11.5***
Organic / Inorganic Carbon (<63 µm)															
Total Organic Carbon	%	-	-	3.82	9.03	1.67	1.47	1.77	1.43	1.91	1.68	1.72	0.197	1.43	1.91
Nutrients (Bulk sediment)															
Total Nitrogen	%	-	-	0.237	-	0.133	0.115	0.140	0.117	0.226	0.152	0.136	0.0434	0.115	0.226
Metals (<63 µm)[c]															
Aluminum (Al)	mg/kg	-	-	19,000	12,550	14,900	15,600	16,400	14,200	14,500	15,150	15,100	797	14,200	16,400
Antimony (Sb)	mg/kg	-	-	0.460	1.33	0.480	0.530	0.500	0.490	0.490	0.552	0.495	0.133	0.480	0.820
Arsenic (As)	mg/kg	5.90	17.0	19.5	12.1	13.3	15.9	15.4	15.5	15.5	15.6	15.5	1.43	13.3	17.8
Barium (Ba)	mg/kg	-	-	184	104	***239***	***268***	***220***	***227***	***244***	***238***	***234***	17.1	***220***	***268***
Beryllium (Be)	mg/kg	-	-	0.480	0.300	***0.530***	***0.590***	***0.580***	***0.550***	***0.570***	***0.558***	***0.560***	0.0256	***0.530***	***0.590***
Bismuth (Bi)	mg/kg	-	-	0.140	<0.20	0.130	0.120	0.140	0.120	0.130	0.127	0.125	0.00816	0.120	0.140
Boron (B)	mg/kg	-	-	6.50	2.97	***11.5***	***13.6***	***11.1***	***11.2***	***11.3***	***11.6***	***11.2***	1.01	***10.8***	***13.6***
Cadmium (Cd)	mg/kg	0.600	3.50	0.329	0.235	0.280	0.293	0.312	0.267	0.272	0.302	0.286	0.0440	0.267	***0.385***
Calcium (Ca)	mg/kg	-	-	11,000	7,026	***22,900***	***24,200***	***22,200***	***24,000***	***23,400***	***23,100***	***23,150***	938.1	***21,900***	***24,200***
Chromium (Cr)	mg/kg	37.3	90.0	60.4	33.1	33.8	35.1	36.5	31.9	33.3	33.9	33.6	1.65	31.9	36.5
Cobalt (Co)	mg/kg	-	-	15.5	11.0	14.2	15.5	15.5	14.2	14.3	14.7	14.5	0.622	14.2	15.5
Copper (Cu)	mg/kg	35.7	197	38.1	42.0	***312***	***375***	***342***	***325***	***325***	***336***	***331***	21.8	***312***	***375***
Iron (Fe)	mg/kg	21,200	43,766	33,600	35,400	***40,900***	***46,100***	***43,600***	***43,100***	***42,800***	***43,533***	***43,350***	1,767	***40,900***	***46,100***
Lead (Pb)	mg/kg	35.0	91.3	8.37	5.61	***8.52***	***8.45***	***8.96***	8.29	***8.61***	***10.3***	***8.56***	4.22	8.29	***18.9***
Lithium (Li)	mg/kg	-	-	16.8	12.9	14.4	14.3	15.0	13.7	14.5	14.4	14.4	0.451	13.7	15.0
Magnesium (Mg)	mg/kg	-	-	8,140	6,159	7,900	***8,530***	***8,680***	8,090	7,710	***8,155***	8,055	375	7,710	***8,680***
Manganese (Mn)	mg/kg	460	1,100	1,410	1,116	1,030	***1,470***	996	1,310	1,110	1,161	1,080	188	996	***1,470***
Mercury (Hg)	mg/kg	0.170	0.486	0.0876	0.140	0.0926	0.115	0.101	0.0956	0.108	0.103	0.104	0.00831	0.0926	0.115
Molybdenum (Mo)	mg/kg	25	23,000	1.51	0.752	***1.57***	***1.70***	***1.66***	***1.91***	***1.60***	***1.70***	***1.68***	0.126	***1.57***	***1.91***
Nickel (Ni)	mg/kg	16.0	75.0	39.9	24.0	25.8	24.9	26.5	24.4	24.4	25.2	24.9	0.836	24.4	26.5
Phosphorus (P)	mg/kg	-	-	1,190	729	***1,220***	***1,370***	***1,200***	1,160	***1,220***	***1,292***	***1,220***	158	1,160	***1,580***
Potassium (K)	mg/kg	-	-	1,480	909	1,290	1,420	***1,500***	1,340	1,360	1,362	1,350	87.7	1,260	***1,500***
Selenium (Se)	mg/kg	2.00	-	1.06	1.30	1.19	1.19	1.05	1.12	1.06	1.11	1.09	0.0712	1.03	1.19
Silver (Ag)	mg/kg	0.500	-	0.174	0.0300	0.167	***0.177***	***0.201***	***0.182***	***0.292***	***0.222***	***0.192***	0.0640	0.167	***0.314***
Sodium (Na)	mg/kg	-	-	331	253	***340***	***417***	***412***	***371***	***357***	***376***	***366***	31.4	***340***	***417***
Strontium (Sr)	mg/kg	-	-	105	67.1	***176***	***192***	***171***	***174***	***171***	***172***	***172***	13.8	***149***	***192***
Sulfur (S)	mg/kg	-	-	1,200	-	1,090	740	630	770	780	813	775	156	630	1,090
Thallium (Tl)	mg/kg	-	-	0.125	0.0508	0.106	0.108	0.123	0.113	0.116	0.112	0.111	0.00628	0.106	0.123
Tin (Sn)	mg/kg	-	-	0.540	1.10	0.610	0.730	0.660	0.660	0.630	0.663	0.660	0.0427	0.610	0.730
Titanium (Ti)	mg/kg	-	-	796	701	***873***	***1,090***	***1,020***	***868***	***901***	***950.8***	***927***	88.9	***868***	***1,090***
Uranium (U)	mg/kg	-	-	1.20	0.730	0.979	1.02	1.02	0.966	0.992	0.990	0.986	0.0261	0.960	1.02
Vanadium (V)	mg/kg	-	-	75.9	74.5	***125***	***152***	***133***	***130***	***129***	***135***	***132***	9.79	***125***	***152***
Zinc (Zn)	mg/kg	123	315	80.9	60.2	74.0	76.2	75.9	72.6	75.2	76.8	75.6	5.12	72.6	***86.9***
Zirconium (Zr)	mg/kg	-	-	1.90	-	***2.30***	***3.30***	***2.90***	***2.50***	***2.70***	***2.77***	***2.80***	0.350	***2.30***	***3.30***

Value is > BC Lower Working Sediment Quality Guideline

Value is > BC Upper Working Sediment Quality Guideline

Notes: ***Bold/Italics*** - Value is > than both reference and pre-breach 95th percentile value (< 5th percentile value for pH). "-" indicates no current BC Working Sediment Guideline/parameter was not calculated.

[a] British Columbia Working Sediment Guidelines (BCMOECCS 2021) and approved BC Sediment Quality Guideline for Selenium (BCMOECCS 2021b).

[b] For calculation of pre-breach 95th percentile values see Appendix Table D.2.4. For calculation of reference 95th percentile values see Appendix Table D.2.5. Pre-breach sediment metal concentrations are based predominantly on bulk sediment rather than the fines fraction (<63 µm). The 5th percentile is reported for pH. [c] Total sulphur measured in bulk sediment, not the <63 µm fraction.

APPENDIX D.3
PERIPHYTON COMMUNITY & PRODUCTIVITY

Table D.3.1: Periphyton Community Metrics for Upper Hazeltine Creek (HAC-R1, HAC-U; Exposed) and Upper Edney Creek (EDC-U; Reference), 1995 to 2022

Year	Area	Area Type	Station	Density (cells/cm²)	Total Richness (# of Taxa)	Simpson's Evenness	Simpson's Diversity	Diatom Richness (# of Taxa)	Diatoms (cells/cm²)	Chlorophytes (cells/cm²)	Chrysophytes (cells/cm²)	Cyanobacteria (cells/cm²)	Dinoflagellates (cells/cm²)
1995	EDC-U (W9)[a]	Reference (Baseline)	W9-1	-	37	-	-	23	-	-	-	-	-
			W9-2	-	35	-	-	21	-	-	-	-	-
			W9-3	-	34	-	-	20	-	-	-	-	-
	HAC-U (W7)[a]	Exposed (Baseline)	W7-A	-	12	-	-	15	-	-	-	-	-
			W7-B	-	23	-	-	18	-	-	-	-	-
			W7-C	-	17	-	-	11	-	-	-	-	-
1996	EDC-U (W9)[a]	Reference (Baseline)	W9-A	-	40	-	-	27	-	-	-	-	-
			W9-B	-	36	-	-	27	-	-	-	-	-
			W9-C	-	45	-	-	29	-	-	-	-	-
	HAC-U (W7)[a]	Exposed (Baseline)	W7-1	-	28	-	-	23	-	-	-	-	-
			W7-2	-	32	-	-	21	-	-	-	-	-
			W7-3	-	27	-	-	20	-	-	-	-	-
2011	HAC-U (W7)[a]	Exposed (Pre-Breach)	W7	21,200,428	34	-	-	22	52,079	10,691	-	21,108,545	0
2018	EDC-U	Reference	EDC-U-1	1,055,389	27	0.247	0.850	13	112,365	28,552	-	909,867	0
			EDC-U-2	1,021,188	33	0.255	0.881	18	139,996	54,341	-	822,246	0
			EDC-U-3	889,906	28	0.194	0.816	14	93,777	20,765	-	770,005	0
			EDC-U-4	1,616,699	28	0.194	0.816	14	197,468	50,104	-	1,357,338	0
			EDC-U-5	1,108,844	28	0.148	0.759	17	109,786	13,263	-	982,110	0
	HAC-R1	Exposed	HAC-R1-1	1,107,074	23	0.214	0.797	14	383,147	112,365	-	604,193	0
			HAC-R1-2	992,498	22	0.234	0.806	14	565,879	110,523	-	309,465	0
			HAC-R1-3	915,040	29	0.263	0.869	16	419,988	40,525	-	412,159	29,473
			HAC-R1-4	990,411	29	0.265	0.870	18	486,302	27,631	-	474,636	0
			HAC-R1-5	637,877	27	0.440	0.916	16	416,830	44,209	-	176,837	0
	HAC-U		HAC-U-1	1,031,550	21	0.246	0.806	16	930,237	70,612	-	24,561	0
			HAC-U-2	908,746	19	0.287	0.816	13	692,612	58,946	-	154,732	0
			HAC-U-3	1,547,325	16	0.204	0.694	10	1,394,697	78,945	-	73,682	0
			HAC-U-4	923,483	20	0.207	0.758	14	857,169	31,929	-	34,385	0
			HAC-U-5	565,964	22	0.306	0.852	13	371,614	148,966	-	43,782	0
2019	EDC-U	Reference	EDC-U-1	1,207,383	28	0.269	0.867	14	50,640	13,598	0	1,121,577	0
			EDC-U-2	589,659	32	0.225	0.861	20	98,052	4,551	0	487,056	0
			EDC-U-3	88,329	22	0.241	0.811	13	7,207	3,821	0	68,010	0
			EDC-U-4	1,084,694	26	0.0667	0.424	16	27,216	8,256	0	1,046,164	0
			EDC-U-5	280,674	33	0.284	0.893	17	32,001	8,088	0	200,846	0
	HAC-R1	Exposed	HAC-R1-1	251,352	26	0.116	0.669	16	16,591	1,443	721	215,284	0
			HAC-R1-2	237,397	30	0.192	0.826	20	26,185	1,082	649	186,974	0
			HAC-R1-3	185,009	28	0.133	0.731	18	51,243	2,813	603	118,293	0
			HAC-R1-4	159,086	27	0.192	0.807	17	32,056	0	406	118,509	0
			HAC-R1-5	742,283	27	0.0767	0.517	14	20,439	1,803	601	683,973	0
	HAC-U		HAC-U-1	347,921	30	0.403	0.917	15	122,935	40,190	1,182	147,561	0
			HAC-U-2	1,157,479	25	0.0828	0.517	15	121,576	126,599	0	854,043	0
			HAC-U-3	1,771,522	27	0.0566	0.346	15	192,449	42,509	0	1,496,373	0
			HAC-U-4	426,184	31	0.136	0.762	16	84,902	23,612	0	317,670	0
			HAC-U-5	483,442	25	0.194	0.794	16	188,585	28,597	0	266,260	0

Notes: "-" indicates no data available. cells/cm^2 = cells per square centimetre. Periphyton community metrics that could be calculated for historical (baseline and pre-breach) data were limited due to the qualitative nature of these data. Periphyton data were classified as "Other" taxa in laboratory results issued in 2018 but the taxonomic groups contained in this category were unknown (i.e., unknown taxonomic idenification of these organisms), but suspected to include Phaeophytes, Chrysophytes, and Rhodophytes. See Minnow 2019a for detailed laboratory results for 2018. Data reported in 2018 for this "Other" category has therefore excluded from data presentation and analyses in the present report. Periphyton taxonomy results have not been reported in an "Other" category by the laboratory since 2018. See report Section 4.2.3.1 for details.

[a] W7 is the pre-breach sampling area associated with HAC-R1 and HAC-U. W9 is the pre-breach sampling area associated with EDC-U.

Table D.3.1: **Periphyton Community Metrics for Upper Hazeltine Creek (HAC-R1, HAC-U; Exposed) and Upper Edney Creek (EDC-U; Reference), 1995 to 2022**

Year	Area	Area Type	Station	Density (cells/cm²)	Total Richness (# of Taxa)	Simpson's Evenness	Simpson's Diversity	Diatom Richness (# of Taxa)	Diatoms (cells/cm²)	Chlorophytes (cells/cm²)	Chrysophytes (cells/cm²)	Cyanobacteria (cells/cm²)	Dinoflagellates (cells/cm²)
2020	EDC-U	Reference	EDC-U-1	540,622	26	0.120	0.679	14	9,785	11,009	0	512,285	0
			EDC-U-2	1,608,224	11	0.191	0.524	3	2,679	0	0	1,590,138	0
			EDC-U-3	2,082,852	9	0.202	0.450	2	4,689	11,387	0	2,060,077	0
			EDC-U-4	644,856	21	0.205	0.767	6	3,517	8,206	0	612,269	0
			EDC-U-5	250,654	11	0.199	0.544	5	4,995	204	0	244,945	0
	HAC-R1	Exposed	HAC-R1-1	1,085,911	29	0.112	0.692	19	110,774	36,925	0	859,088	0
			HAC-R1-2	1,125,327	29	0.113	0.695	19	203,966	23,913	0	728,649	0
			HAC-R1-3	1,343,828	22	0.201	0.774	13	88,620	18,287	0	1,006,230	0
			HAC-R1-4	646,960	20	0.410	0.878	11	73,850	3,517	0	421,016	0
			HAC-R1-5	1,928,410	19	0.231	0.772	9	66,113	8,440	0	1,663,958	0
	HAC-U		HAC-U-1	939,866	24	0.331	0.874	14	221,046	7,536	0	509,076	0
			HAC-U-2	353,842	17	0.270	0.782	12	146,694	0	0	142,843	0
			HAC-U-3	1,264,235	24	0.280	0.851	17	334,081	0	0	705,088	0
			HAC-U-4	662,888	26	0.343	0.888	17	276,057	70,333	0	137,149	0
			HAC-U-5	784,377	26	0.290	0.868	16	185,723	9,891	0	482,165	0
2021	EDC-U	Reference	EDC-U-1	1,486,106	24	0.160	0.740	16	77,132	2,624	0	1,406,351	0
			EDC-U-2	794,143	21	0.105	0.546	9	24,136	7,346	0	682,380	0
			EDC-U-3	103,781	41	0.167	0.854	22	13,038	10,266	0	79,862	0
			EDC-U-4	342,829	26	0.182	0.789	14	28,890	3,611	0	280,883	0
			EDC-U-5	507,750	27	0.127	0.709	16	38,057	9,167	0	455,527	0
	HAC-R1	Exposed	HAC-R1-1	1,091,336	16	0.0948	0.340	10	5,431	11,334	0	1,061,113	0
			HAC-R1-2	721,023	19	0.0973	0.459	11	8,889	23,334	0	679,355	0
			HAC-R1-3	246,090	16	0.239	0.739	7	5,833	23,334	0	177,755	0
			HAC-R1-4	305,564	22	0.144	0.684	16	23,612	19,723	0	236,673	0
			HAC-R1-5	747,243	19	0.0751	0.299	13	25,556	27,779	0	689,742	0
	HAC-U		HAC-U-1	328,354	20	0.332	0.849	13	86,576	87,364	0	89,088	0
			HAC-U-2	383,656	26	0.360	0.893	15	145,606	14,167	0	149,900	0
			HAC-U-3	474,484	13	0.404	0.810	8	194,516	61,840	0	143,919	0
			HAC-U-4	317,353	27	0.311	0.881	17	73,084	23,050	0	145,325	0
			HAC-U-5	432,704	18	0.244	0.772	8	20,070	36,992	0	335,108	0
2022	EDC-U	Reference	EDC-U-1	1,217,368	13	0.230	0.666	5	15,853	75,492	0	1,089,786	0
			EDC-U-2	3,685,304	25	0.112	0.643	13	322,152	16,759	0	3,335,220	0
			EDC-U-3	3,196,274	22	0.265	0.828	12	444,767	23,635	0	2,727,872	0
			EDC-U-4	2,063,768	24	0.139	0.700	14	95,647	5,925	0	1,954,579	0
			EDC-U-5	2,986,351	25	0.183	0.782	13	134,732	23,003	0	2,764,536	0
	HAC-R1	Exposed	HAC-R1-1	1,178,821	30	0.0965	0.654	20	176,094	25,503	0	839,991	0
			HAC-R1-2	932,045	27	0.217	0.829	18	125,296	0	0	746,096	0
			HAC-R1-3	4,021,097	26	0.0477	0.194	14	61,937	23,074	0	3,755,134	0
			HAC-R1-4	2,239,208	22	0.0596	0.238	17	127,517	6,072	0	1,962,315	0
			HAC-R1-5	1,109,121	26	0.166	0.769	21	371,334	6,572	0	593,196	0
	HAC-U		HAC-U-1	723,839	30	0.116	0.712	20	124,481	13,966	0	569,605	0
			HAC-U-2	500,918	25	0.347	0.885	17	158,283	9,311	0	219,733	0
			HAC-U-3	583,291	32	0.449	0.930	24	414,054	26,289	0	85,440	0
			HAC-U-4	1,542,775	26	0.127	0.698	17	250,060	42,563	0	1,203,598	0
			HAC-U-5	1,495,113	27	0.0814	0.545	18	128,488	61,451	0	1,225,847	0

Notes: "-" indicates no data available. cells/cm^2 = cells per square centimetre. Periphyton community metrics that could be calculated for historical (baseline and pre-breach) data were limited due to the qualitative nature of these data. Periphyton data were classified as "Other" taxa in laboratory results issued in 2018 but the taxonomic groups contained in this category were unknown (i.e., unknown taxonomic idenification of these organisms), but suspected to include Phaeophytes, Chrysophytes, and Rhodophytes. See Minnow 2019a for detailed laboratory results for 2018. Data reported in 2018 for this "Other" category has therefore excluded from data presentation and analyses in the present report. Periphyton taxonomy results have not been reported in an "Other" category by the laboratory since 2018. See report Section 4.2.3.1 for details.

[a] W7 is the pre-breach sampling area associated with HAC-R1 and HAC-U. W9 is the pre-breach sampling area associated with EDC-U.

Table D.3.1: Periphyton Community Metrics for Upper Hazeltine Creek (HAC-R1, HAC-U; Exposed) and Upper Edney Creek (EDC-U; Reference), 1995 to 2022

Year	Area	Area Type	Station	Phaeophytes (cells/cm²)	Rhodophytes (cells/cm²)	Diatoms (%)	Chlorophytes (%)	Chrysophytes (%)	Cyanobacteria (%)	Dinoflagellates (%)	Phaeophytes (%)	Rhodophytes (%)
1995	EDC-U (W9)[a]	Reference (Baseline)	W9-1	-	-	80.0	20.0	-	0	0	-	-
			W9-2	-	-	90.0	10.0	-	1.00	0	-	-
			W9-3	-	-	89.0	10.0	-	1.00	0	-	-
	HAC-U (W7)[a]	Exposed (Baseline)	W7-A	-	-	100	0	-	0	0	-	-
			W7-B	-	-	99.0	0	-	1.00	0	-	-
			W7-C	-	-	100	0	-	0	0	-	-
1996	EDC-U (W9)[a]	Reference (Baseline)	W9-A	-	-	97.0	3.00	-	0	0	-	-
			W9-B	-	-	97.0	2.00	-	1.00	0	-	-
			W9-C	-	-	97.0	1.00	-	2.00	0	-	-
	HAC-U (W7)[a]	Exposed (Baseline)	W7-1	-	-	25.0	0	-	75.0	0	-	-
			W7-2	-	-	49.0	0	-	51.0	0	-	-
			W7-3	-	-	65.0	0	-	35.0	0	-	-
2011	HAC-U (W7)[a]	Exposed (Pre-Breach)	W7	-	-	0	0	-	100	0	-	-
2018	EDC-U	Reference	EDC-U-1	-	-	10.6	2.71	-	86.2	0	-	-
			EDC-U-2	-	-	13.7	5.32	-	80.5	0	-	-
			EDC-U-3	-	-	10.5	2.33	-	86.5	0	-	-
			EDC-U-4	-	-	12.2	3.10	-	84.0	0	-	-
			EDC-U-5	-	-	9.90	1.20	-	88.6	0	-	-
	HAC-R1	Exposed	HAC-R1-1	-	-	34.6	10.2	-	54.6	0	-	-
			HAC-R1-2	-	-	57.0	11.1	-	31.2	0	-	-
			HAC-R1-3	-	-	45.9	4.43	-	45.0	3.22	-	-
			HAC-R1-4	-	-	49.1	2.79	-	47.9	0	-	-
			HAC-R1-5	-	-	65.3	6.93	-	27.7	0	-	-
	HAC-U		HAC-U-1	-	-	90.2	6.85	-	2.38	0	-	-
			HAC-U-2	-	-	76.2	6.49	-	17.0	0	-	-
			HAC-U-3	-	-	90.1	5.10	-	4.76	0	-	-
			HAC-U-4	-	-	92.8	3.46	-	3.72	0	-	-
			HAC-U-5	-	-	65.7	26.3	-	7.74	0	-	-
2019	EDC-U	Reference	EDC-U-1	0	21,569	4.19	1.13	0	92.9	0	0	1.79
			EDC-U-2	0	0	16.6	0.772	0	82.6	0	0	0
			EDC-U-3	0	9,291	8.16	4.33	0	77.0	0	0	10.5
			EDC-U-4	0	3,058	2.51	0.761	0	96.5	0	0	0.282
			EDC-U-5	0	39,738	11.4	2.88	0	71.6	0	0	14.2
	HAC-R1	Exposed	HAC-R1-1	17,313	0	6.60	0.574	0.287	85.7	0	6.89	0
			HAC-R1-2	22,507	0	11.0	0.456	0.273	78.8	0	9.48	0
			HAC-R1-3	12,057	0	27.7	1.52	0.326	63.9	0	6.52	0
			HAC-R1-4	8,115	0	20.1	0	0.255	74.5	0	5.10	0
			HAC-R1-5	35,467	0	2.75	0.243	0.0810	92.1	0	4.78	0
	HAC-U		HAC-U-1	36,053	0	35.3	11.6	0.340	42.4	0	10.4	0
			HAC-U-2	55,262	0	10.5	10.9	0	73.8	0	4.77	0
			HAC-U-3	40,190	0	10.9	2.40	0	84.5	0	2.27	0
			HAC-U-4	0	0	19.9	5.54	0	74.5	0	0	0
			HAC-U-5	0	0	39.0	5.92	0	55.1	0	0	0

Notes: "-" indicates no data available. cells/cm^2 = cells per square centimetre. Periphyton community metrics that could be calculated for historical (baseline and pre-breach) data were limited due to the qualitative nature of these data. Periphyton data were classified as "Other" taxa in laboratory results issued in 2018 but the taxonomic groups contained in this category were unknown (i.e., unknown taxonomic idenification of these organisms), but suspected to include Phaeophytes, Chrysophytes, and Rhodophytes. See Minnow 2019a for detailed laboratory results for 2018. Data reported in 2018 for this "Other" category has therefore excluded from data presentation and analyses in the present report. Periphyton taxonomy results have not been reported in an "Other" category by the laboratory since 2018. See report Section 4.2.3.1 for details.

[a] W7 is the pre-breach sampling area associated with HAC-R1 and HAC-U. W9 is the pre-breach sampling area associated with EDC-U.

Table D.3.1: Periphyton Community Metrics for Upper Hazeltine Creek (HAC-R1, HAC-U; Exposed) and Upper Edney Creek (EDC-U; Reference), 1995 to 2022

Year	Area	Area Type	Station	Phaeophytes (cells/cm²)	Rhodophytes (cells/cm²)	Diatoms (%)	Chlorophytes (%)	Chrysophytes (%)	Cyanobacteria (%)	Dinoflagellates (%)	Phaeophytes (%)	Rhodophytes (%)
2020	EDC-U	Reference	EDC-U-1	0	7,543	1.81	2.04	0	94.8	0	0	1.40
			EDC-U-2	0	15,406	0.167	0	0	98.9	0	0	0.958
			EDC-U-3	0	6,698	0.225	0.547	0	98.9	0	0	0.322
			EDC-U-4	0	20,865	0.545	1.27	0	95.0	0	0	3.24
			EDC-U-5	0	510	1.99	0.0813	0	97.7	0	0	0.203
	HAC-R1	Exposed	HAC-R1-1	79,125	0	10.2	3.40	0	79.1	0	7.29	0
			HAC-R1-2	168,799	0	18.1	2.12	0	64.8	0	15.0	0
			HAC-R1-3	230,692	0	6.59	1.36	0	74.9	0	17.2	0
			HAC-R1-4	148,578	0	11.4	0.544	0	65.1	0	23.0	0
			HAC-R1-5	189,899	0	3.43	0.438	0	86.3	0	9.85	0
	HAC-U		HAC-U-1	202,207	0	23.5	0.802	0	54.2	0	21.5	0
			HAC-U-2	64,304	0	41.5	0	0	40.4	0	18.2	0
			HAC-U-3	225,065	0	26.4	0	0	55.8	0	17.8	0
			HAC-U-4	179,349	0	41.6	10.6	0	20.7	0	27.1	0
			HAC-U-5	106,598	0	23.7	1.26	0	61.5	0	13.6	0
2021	EDC-U	Reference	EDC-U-1	0	0	5.19	0.177	0	94.6	0	0	0
			EDC-U-2	5,247	75,033	3.04	0.925	0	85.9	0	0.661	9.45
			EDC-U-3	0	616	12.6	9.89	0	77.0	0	0	0.594
			EDC-U-4	6,945	22,501	8.43	1.05	0	81.9	0	2.03	6.56
			EDC-U-5	0	5,000	7.50	1.81	0	89.7	0	0	0.985
	HAC-R1	Exposed	HAC-R1-1	13,459	0	0.498	1.04	0	97.2	0	1.23	0
			HAC-R1-2	9,445	0	1.23	3.24	0	94.2	0	1.31	0
			HAC-R1-3	39,168	0	2.37	9.48	0	72.2	0	15.9	0
			HAC-R1-4	25,556	0	7.73	6.45	0	77.5	0	8.36	0
			HAC-R1-5	4,167	0	3.42	3.72	0	92.3	0	0.558	0
	HAC-U		HAC-U-1	65,326	0	26.4	26.6	0	27.1	0	19.9	0
			HAC-U-2	73,984	0	38.0	3.69	0	39.1	0	19.3	0
			HAC-U-3	74,208	0	41.0	13.0	0	30.3	0	15.6	0
			HAC-U-4	75,895	0	23.0	7.26	0	45.8	0	23.9	0
			HAC-U-5	40,534	0	4.64	8.55	0	77.5	0	9.37	0
2022	EDC-U	Reference	EDC-U-1	0	36,236	1.30	6.20	0	89.5	0	0	2.98
			EDC-U-2	0	11,173	8.74	0.455	0	90.5	0	0	0.303
			EDC-U-3	0	0	13.9	0.739	0	85.3	0	0	0
			EDC-U-4	0	7,618	4.63	0.287	0	94.7	0	0	0.369
			EDC-U-5	0	64,080	4.51	0.770	0	92.6	0	0	2.15
	HAC-R1	Exposed	HAC-R1-1	137,232	0	14.9	2.16	0	71.3	0	11.6	0
			HAC-R1-2	60,653	0	13.4	0	0	80.0	0	6.51	0
			HAC-R1-3	180,952	0	1.54	0.574	0	93.4	0	4.50	0
			HAC-R1-4	143,304	0	5.69	0.271	0	87.6	0	6.40	0
			HAC-R1-5	138,018	0	33.5	0.593	0	53.5	0	12.4	0
	HAC-U		HAC-U-1	15,788	0	17.2	1.93	0	78.7	0	2.18	0
			HAC-U-2	113,591	0	31.6	1.86	0	43.9	0	22.7	0
			HAC-U-3	57,508	0	71.0	4.51	0	14.6	0	9.86	0
			HAC-U-4	46,554	0	16.2	2.76	0	78.0	0	3.02	0
			HAC-U-5	79,328	0	8.59	4.11	0	82.0	0	5.31	0

Notes: "-" indicates no data available. cells/cm^2 = cells per square centimetre. Periphyton community metrics that could be calculated for historical (baseline and pre-breach) data were limited due to the qualitative nature of these data. Periphyton data were classified as "Other" taxa in laboratory results issued in 2018 but the taxonomic groups contained in this category were unknown (i.e., unknown taxonomic idenification of these organisms), but suspected to include Phaeophytes, Chrysophytes, and Rhodophytes. See Minnow 2019a for detailed laboratory results for 2018. Data reported in 2018 for this "Other" category has therefore excluded from data presentation and analyses in the present report. Periphyton taxonomy results have not been reported in an "Other" category by the laboratory since 2018. See report Section 4.2.3.1 for details.

[a] W7 is the pre-breach sampling area associated with HAC-R1 and HAC-U. W9 is the pre-breach sampling area associated with EDC-U.

Table D.3.2: Summary Statistics of Periphyton Community and Productivity Metrics for Upper Hazeltine Creek (HAC-U, HAC-R1; Exposed) and Upper Edney Creek (EDC-U; Reference), 1995 to 2022

Endpoint	Year	Area	Area Type	n	Mean	Standard Deviation	Minimum	Median	Maximum
Density (cells/cm²)	2011	HAC-U (W7)[a]	Exposed (Pre-Breach)	1	21,200,428	-	21,200,428	21,200,428	21,200,428
	2018	EDC-U	Reference	5	1,138,405	279,295	889,906	1,055,389	1,616,699
		HAC-R1	Exposed	5	928,580	176,395	637,877	990,411	1,107,074
		HAC-U		5	995,413	354,621	565,964	923,483	1,547,325
	2019	EDC-U	Reference	5	650,148	488,659	88,329	589,659	1,207,383
		HAC-R1	Exposed	5	315,025	241,791	159,086	237,397	742,283
		HAC-U		5	837,310	614,208	347,921	483,442	1,771,522
	2020	EDC-U	Reference	5	1,025,442	780,696	250,654	644,856	2,082,852
		HAC-R1	Exposed	5	1,226,087	466,988	646,960	1,125,327	1,928,410
		HAC-U		5	801,041	336,590	353,842	784,377	1,264,235
	2021	EDC-U	Reference	5	646,922	532,153	103,781	507,750	1,486,106
		HAC-R1	Exposed	5	622,251	349,001	246,090	721,023	1,091,336
		HAC-U		5	387,310	67,162	317,353	383,656	474,484
	2022	EDC-U	Reference	5	2,629,813	984,564	1,217,368	2,986,351	3,685,304
		HAC-R1	Exposed	5	1,896,058	1,293,886	932,045	1,178,821	4,021,097
		HAC-U		5	969,187	508,426	500,918	723,839	1,542,775
Total Richness (# of Taxa)	1995	EDC-U (W9)[a]	Reference (Baseline)	3	35	1.53	34	35	37
		HAC-U (W7)$_a$	Exposed (Baseline)	3	17	5.51	12	17	23
	1996	EDC-U (W9)[a]	Reference (Baseline)	3	40	4.51	36	40	45
		HAC-U (W7)a	Exposed (Baseline)	3	29	2.65	27	28	32
	2011	HAC-U (W7)[a]	Exposed (Pre-Breach)	1	34	-	34	34	34
	2018	EDC-U	Reference	5	29	2.39	27	28	33
		HAC-R1	Exposed	5	26	3.32	22	27	29
		HAC-U		5	20	2.30	16	20	22
	2019	EDC-U	Reference	5	28	4.49	22	28	33
		HAC-R1	Exposed	5	28	1.52	26	27	30
		HAC-U		5	28	2.79	25	27	31
	2020	EDC-U	Reference	5	16	7.47	9	11	26
		HAC-R1	Exposed	5	24	4.87	19	22	29
		HAC-U		5	23	3.71	17	24	26
	2021	EDC-U	Reference	5	28	7.73	21	26	41
		HAC-R1	Exposed	5	18	2.51	16	19	22
		HAC-U		5	21	5.81	13	20	27
	2022	EDC-U	Reference	5	22	5.07	13	24	25
		HAC-R1	Exposed	5	26	2.86	22	26	30
		HAC-U		5	28	2.92	25	27	32
Simpson's Evenness	2018	EDC-U	Reference	5	0.208	0.0440	0.148	0.194	0.255
		HAC-R1	Exposed	5	0.283	0.0902	0.214	0.263	0.440
		HAC-U		5	0.250	0.0462	0.204	0.246	0.306
	2019	EDC-U	Reference	5	0.217	0.0872	0.0667	0.241	0.284
		HAC-R1	Exposed	5	0.142	0.0500	0.0767	0.133	0.192
		HAC-U		5	0.174	0.138	0.0566	0.136	0.403
	2020	EDC-U	Reference	5	0.183	0.0360	0.120	0.199	0.205
		HAC-R1	Exposed	5	0.213	0.122	0.112	0.201	0.410
		HAC-U		5	0.303	0.0324	0.270	0.290	0.343
	2021	EDC-U	Reference	5	0.148	0.0315	0.105	0.160	0.182
		HAC-R1	Exposed	5	0.130	0.0661	0.0751	0.0973	0.239
		HAC-U		5	0.330	0.0595	0.244	0.332	0.404
	2022	EDC-U	Reference	5	0.186	0.0628	0.112	0.183	0.265
		HAC-R1	Exposed	5	0.117	0.0723	0.0477	0.0965	0.217
		HAC-U		5	0.224	0.164	0.0814	0.127	0.449
Simpson's Diversity	2018	EDC-U	Reference	5	0.824	0.0457	0.759	0.816	0.881
		HAC-R1	Exposed	5	0.852	0.0496	0.797	0.869	0.916
		HAC-U		5	0.785	0.0611	0.694	0.806	0.852
	2019	EDC-U	Reference	5	0.771	0.197	0.424	0.861	0.893
		HAC-R1	Exposed	5	0.710	0.125	0.517	0.731	0.826
		HAC-U		5	0.667	0.231	0.346	0.762	0.917
	2020	EDC-U	Reference	5	0.593	0.128	0.450	0.544	0.767
		HAC-R1	Exposed	5	0.762	0.0759	0.692	0.772	0.878
		HAC-U		5	0.853	0.0416	0.782	0.868	0.888
	2021	EDC-U	Reference	5	0.727	0.115	0.546	0.740	0.854
		HAC-R1	Exposed	5	0.504	0.199	0.299	0.459	0.739
		HAC-U		5	0.841	0.0503	0.772	0.849	0.893
	2022	EDC-U	Reference	5	0.724	0.0786	0.643	0.700	0.828
		HAC-R1	Exposed	5	0.537	0.300	0.194	0.654	0.829
		HAC-U		5	0.754	0.155	0.545	0.712	0.930
Diatom Richness (# of Taxa)	1995	EDC-U (W9)[a]	Reference (Baseline)	3	21	1.53	20	21	23
		HAC-U (W7)[a]	Exposed (Baseline)	3	15	3.51	11	15	18
	1996	EDC-U (W9)[a]	Reference (Baseline)	3	28	1.15	27	27	29
		HAC-U (W7)[a]	Exposed (Baseline)	3	21	1.53	20	21	23
	2011	HAC-U (W7)[a]	Exposed (Pre-Breach)	1	22	-	22	22	22
	2018	EDC-U	Reference	5	15	2.17	13	14	18
		HAC-R1	Exposed	5	16	1.67	14	16	18
		HAC-U		5	13	2.17	10	13	16
	2019	EDC-U	Reference	5	16	2.74	13	16	20
		HAC-R1	Exposed	5	17	2.24	14	17	20
		HAC-U		5	15	0.548	15	15	16
	2020	EDC-U	Reference	5	6	4.74	2	5	14
		HAC-R1	Exposed	5	14	4.60	9	13	19
		HAC-U		5	15	2.17	12	16	17
	2021	EDC-U	Reference	5	15	4.67	9	16	22
		HAC-R1	Exposed	5	11	3.36	7	11	16
		HAC-U		5	12	4.09	8	13	17
	2022	EDC-U	Reference	5	11	3.65	5	13	14
		HAC-R1	Exposed	5	18	2.74	14	18	21
		HAC-U		5	19	2.95	17	18	24

Notes: "-" indicates no value. Periphyton community metrics that could be calculated for historical (baseline and pre-breach) data were limited due to the qualitative nature of these data. Periphyton data were classified as "Other" taxa in laboratory results issued in 2018 but the taxonomic groups contained in this category were unknown (i.e., unknown taxonomic idenification of these organisms), but suspected to include Phaeophytes, Chrysophytes, and Rhodophytes. See Minnow 2019a for detailed laboratory results for 2018. Data reported in 2018 for this "Other" category has therefore excluded from data presentation and analyses in the present report. Periphyton taxonomy results have not been reported in an "Other" category by the laboratory since 2018. See report Section 4.2.3.1 for details.

[a] W7 is the pre-breach sampling area associated with HAC-R1 and HAC-U. W9 is the pre-breach sampling area associated with EDC-U.

Table D.3.2: Summary Statistics of Periphyton Community and Productivity Metrics for Upper Hazeltine Creek (HAC-U, HAC-R1; Exposed) and Upper Edney Creek (EDC-U; Reference), 1995 to 2022

Endpoint	Year	Area	Area Type	n	Mean	Standard Deviation	Minimum	Median	Maximum
Diatom (cells/cm²)	2011	HAC-U (W7)[a]	Exposed (Pre-Breach)	1	52,079	-	52,079	52,079	52,079
	2018	EDC-U	Reference	5	130,679	40,869	93,777	112,365	197,468
		HAC-R1	Exposed	5	454,429	72,660	383,147	419,988	565,879
		HAC-U		5	849,266	373,097	371,614	857,169	1,394,697
	2019	EDC-U	Reference	5	43,023	34,425	7,207	32,001	98,052
		HAC-R1	Exposed	5	29,303	13,590	16,591	26,185	51,243
		HAC-U		5	142,089	46,787	84,902	122,935	192,449
	2020	EDC-U	Reference	5	5,133	2,761	2,679	4,689	9,785
		HAC-R1	Exposed	5	108,664	55,927	66,113	88,620	203,966
		HAC-U		5	232,720	73,989	146,694	221,046	334,081
	2021	EDC-U	Reference	5	36,250	24,568	13,038	28,890	77,132
		HAC-R1	Exposed	5	13,864	9,901	5,431	8,889	25,556
		HAC-U		5	103,971	67,505	20,070	86,576	194,516
	2022	EDC-U	Reference	5	202,630	175,966	15,853	134,732	444,767
		HAC-R1	Exposed	5	172,436	118,347	61,937	127,517	371,334
		HAC-U		5	215,073	122,216	124,481	158,283	414,054
Chlorophytes (cells/cm²)	2011	HAC-U (W7)[a]	Exposed (Pre-Breach)	1	10,691	-	10,691	10,691	10,691
	2018	EDC-U	Reference	5	33,405	18,071	13,263	28,552	54,341
		HAC-R1	Exposed	5	67,051	40,996	27,631	44,209	112,365
		HAC-U		5	77,880	43,524	31,929	70,612	148,966
	2019	EDC-U	Reference	5	7,663	3,880	3,821	8,088	13,598
		HAC-R1	Exposed	5	1,428	1,027	0	1,443	2,813
		HAC-U		5	52,301	42,272	23,612	40,190	126,599
	2020	EDC-U	Reference	5	6,161	5,667	0	8,206	11,387
		HAC-R1	Exposed	5	18,216	13,173	3,517	18,287	36,925
		HAC-U		5	17,552	29,837	0	7,536	70,333
	2021	EDC-U	Reference	5	6,603	3,366	2,624	7,346	10,266
		HAC-R1	Exposed	5	21,101	6,162	11,334	23,334	27,779
		HAC-U		5	44,682	29,893	14,167	36,992	87,364
	2022	EDC-U	Reference	5	28,963	26,966	5,925	23,003	75,492
		HAC-R1	Exposed	5	12,244	11,328	0	6,572	25,503
		HAC-U		5	30,716	21,467	9,311	26,289	61,451
Chrysophytes (cells/cm²)	2018	EDC-U	Reference	5	-	-	-	-	-
		HAC-R1	Exposed	5	-	-	-	-	-
		HAC-U		5	-	-	-	-	-
	2019	EDC-U	Reference	5	0	0	0	0	0
		HAC-R1	Exposed	5	596	117	406	603	721
		HAC-U		5	236	529	0	0	1,182
	2020	EDC-U	Reference	5	0	0	0	0	0
		HAC-R1	Exposed	5	0	0	0	0	0
		HAC-U		5	0	0	0	0	0
	2021	EDC-U	Reference	5	0	0	0	0	0
		HAC-R1	Exposed	5	0	0	0	0	0
		HAC-U		5	0	0	0	0	0
	2022	EDC-U	Reference	-	0	0	0	0	0
		HAC-R1	Exposed	-	0	0	0	0	0
		HAC-U		-	0	0	0	0	0
Cyanobacteria (cells/cm²)	2011	HAC-U (W7)[a]	Exposed (Pre-Breach)	1	21,108,545	-	21,108,545	21,108,545	21,108,545
	2018	EDC-U	Reference	5	968,313	232,168	770,005	909,867	1,357,338
		HAC-R1	Exposed	5	395,458	162,256	176,837	412,159	604,193
		HAC-U		5	66,228	52,779	24,561	43,782	154,732
	2019	EDC-U	Reference	5	584,730	480,893	68,010	487,056	1,121,577
		HAC-R1	Exposed	5	264,607	238,264	118,293	186,974	683,973
		HAC-U		5	616,382	561,799	147,561	317,670	1,496,373
	2020	EDC-U	Reference	5	1,003,943	779,464	244,945	612,269	2,060,077
		HAC-R1	Exposed	5	935,788	460,699	421,016	859,088	1,663,958
		HAC-U		5	395,264	248,413	137,149	482,165	705,088
	2021	EDC-U	Reference	5	581,000	511,966	79,862	455,527	1,406,351
		HAC-R1	Exposed	5	568,928	364,844	177,755	679,355	1,061,113
		HAC-U		5	172,668	94,161	89,088	145,325	335,108
	2022	EDC-U	Reference	5	2,374,398	869,886	1,089,786	2,727,872	3,335,220
		HAC-R1	Exposed	5	1,579,346	1,331,743	593,196	839,991	3,755,134
		HAC-U		5	660,845	535,678	85,440	569,605	1,225,847
Dinoflagellates (cells/cm²)	2018	EDC-U	Reference	5	0	0	0	0	0
		HAC-R1	Exposed	5	5,895	13,181	0	0	29,473
		HAC-U		5	0	0	0	0	0
	2019	EDC-U	Reference	5	0	0	0	0	0
		HAC-R1	Exposed	5	0	0	0	0	0
		HAC-U		5	0	0	0	0	0
	2020	EDC-U	Reference	5	0	0	0	0	0
		HAC-R1	Exposed	5	0	0	0	0	0
		HAC-U		5	0	0	0	0	0
	2021	EDC-U	Reference	5	0	0	0	0	0
		HAC-R1	Exposed	5	0	0	0	0	0
		HAC-U		5	0	0	0	0	0
	2022	EDC-U	Reference	5	0	0	0	0	0
		HAC-R1	Exposed	5	0	0	0	0	0
		HAC-U		5	0	0	0	0	0

Notes: "-" indicates no value. Periphyton community metrics that could be calculated for historical (baseline and pre-breach) data were limited due to the qualitative nature of these data. Periphyton data were classified as "Other" taxa in laboratory results issued in 2018 but the taxonomic groups contained in this category were unknown (i.e., unknown taxonomic idenification of these organisms), but suspected to include Phaeophytes, Chrysophytes, and Rhodophytes. See Minnow 2019a for detailed laboratory results for 2018. Data reported in 2018 for this "Other" category has therefore excluded from data presentation and analyses in the present report. Periphyton taxonomy results have not been reported in an "Other" category by the laboratory since 2018. See report Section 4.2.3.1 for details.

[a] W7 is the pre-breach sampling area associated with HAC-R1 and HAC-U. W9 is the pre-breach sampling area associated with EDC-U.

Table D.3.2: Summary Statistics of Periphyton Community and Productivity Metrics for Upper Hazeltine Creek (HAC-U, HAC-R1; Exposed) and Upper Edney Creek (EDC-U; Reference), 1995 to 2022

Endpoint	Year	Area	Area Type	n	Mean	Standard Deviation	Minimum	Median	Maximum
Phaeophytes (cells/cm²)	2018	EDC-U	Reference	5	-	-	-	-	-
		HAC-R1	Exposed	5	-	-	-	-	-
		HAC-U		5	-	-	-	-	-
	2019	EDC-U	Reference	5	0	0	0	0	0
		HAC-R1	Exposed	5	19,092	10,641	8,115	17,313	35,467
		HAC-U		5	26,301	25,051	0	36,053	55,262
	2020	EDC-U	Reference	5	0	0	0	0	0
		HAC-R1	Exposed	5	163,419	56,084	79,125	168,799	230,692
		HAC-U		5	155,505	67,634	64,304	179,349	225,065
	2021	EDC-U	Reference	5	2,438	3,392	0	0	6,945
		HAC-R1	Exposed	5	18,359	14,051	4,167	13,459	39,168
		HAC-U		5	65,989	14,816	40,534	73,984	75,895
	2022	EDC-U	Reference	-	0	0	0	0	0
		HAC-R1	Exposed	-	132,032	43,812	60,653	138,018	180,952
		HAC-U		-	62,554	36,588	15,788	57,508	113,591
Rhodophytes (cells/cm²)	2018	EDC-U	Reference	5	-	-	-	-	-
		HAC-R1	Exposed	5	-	-	-	-	-
		HAC-U		5	-	-	-	-	-
	2019	EDC-U	Reference	5	14,731	16,240	0	9,291	39,738
		HAC-R1	Exposed	5	0	0	0	0	0
		HAC-U		5	0	0	0	0	0
	2020	EDC-U	Reference	5	10,205	7,970	510	7,543	20,865
		HAC-R1	Exposed	5	0	0	0	0	0
		HAC-U		5	0	0	0	0	0
	2021	EDC-U	Reference	5	20,630	31,755	0	5,000	75,033
		HAC-R1	Exposed	5	0	0	0	0	0
		HAC-U		5	0	0	0	0	0
	2022	EDC-U	Reference	-	23,821	26,291	0	11,173	64,080
		HAC-R1	Exposed	-	0	0	0	0	0
		HAC-U		-	0	0	0	0	0
Diatoms (%)	1995	EDC-U (W9)[a]	Reference (Baseline)	3	86.3	5.51	80.0	89.0	90.0
		HAC-U (W7)[a]	Exposed (Baseline)	3	99.7	0.577	99.0	100	100
	1996	EDC-U (W9)[a]	Reference (Baseline)	3	97.0	0	97.0	97.0	97.0
		HAC-U (W7)[a]	Exposed (Baseline)	3	46.3	20.1	25.0	49.0	65.0
	2018	EDC-U	Reference	5	11.4	1.55	9.90	10.6	13.7
		HAC-R1	Exposed	5	50.4	11.6	34.6	49.1	65.3
		HAC-U		5	83.0	11.7	65.7	90.1	92.8
	2019	EDC-U	Reference	5	8.58	5.68	2.51	8.16	16.6
		HAC-R1	Exposed	5	13.6	10.2	2.75	11.0	27.7
		HAC-U		5	23.1	13.4	10.5	19.9	39.0
	2020	EDC-U	Reference	5	0.948	0.885	0.167	0.545	1.99
		HAC-R1	Exposed	5	9.95	5.54	3.43	10.2	18.1
		HAC-U		5	31.3	9.39	23.5	26.4	41.6
	2021	EDC-U	Reference	5	7.34	3.59	3.04	7.50	12.6
		HAC-R1	Exposed	5	3.05	2.84	0.498	2.37	7.73
		HAC-U		5	26.6	14.4	4.64	26.4	41.0
	2022	EDC-U	Reference	5	6.62	4.86	1.30	4.63	13.9
		HAC-R1	Exposed	5	13.8	12.3	1.54	13.4	33.5
		HAC-U		5	28.9	24.9	8.59	17.2	71.0
Chlorophytes (%)	1995	EDC-U (W9)[a]	Reference (Baseline)	3	13.3	5.77	10.0	10.0	20.0
		HAC-U (W7)[a]	Exposed (Baseline)	3	0	0	0	0	0
	1996	EDC-U (W9)[a]	Reference (Baseline)	3	2.00	1.00	1.00	2.00	3.00
		HAC-U (W7)[a]	Exposed (Baseline)	3	0	0	0	0	0
	2011	HAC-U (W7)[a]	Exposed (Pre-Breach)	1	0	-	0	0	0
	2018	EDC-U	Reference	5	2.93	1.51	1.20	2.71	5.32
		HAC-R1	Exposed	5	7.09	3.58	2.79	6.93	11.1
		HAC-U		5	9.64	9.42	3.46	6.49	26.3
	2019	EDC-U	Reference	5	1.97	1.58	0.761	1.13	4.33
		HAC-R1	Exposed	5	0.559	0.581	0	0.456	1.52
		HAC-U		5	7.27	3.88	2.40	5.92	11.6
	2020	EDC-U	Reference	5	0.787	0.862	0	0.547	2.04
		HAC-R1	Exposed	5	1.57	1.23	0.438	1.36	3.40
		HAC-U		5	2.53	4.55	0	0.802	10.6
	2021	EDC-U	Reference	5	2.77	4.02	0.177	1.05	9.89
		HAC-R1	Exposed	5	4.79	3.26	1.04	3.72	9.48
		HAC-U		5	11.8	8.91	3.69	8.55	26.6
	2022	EDC-U	Reference	5	1.69	2.53	0.287	0.739	6.20
		HAC-R1	Exposed	5	0.720	0.843	0	0.574	2.16
		HAC-U		5	3.03	1.23	1.86	2.76	4.51

Notes: "-" indicates no value. Periphyton community metrics that could be calculated for historical (baseline and pre-breach) data were limited due to the qualitative nature of these data. Periphyton data were classified as "Other" taxa in laboratory results issued in 2018 but the taxonomic groups contained in this category were unknown (i.e., unknown taxonomic idenification of these organisms), but suspected to include Phaeophytes, Chrysophytes, and Rhodophytes. See Minnow 2019a for detailed laboratory results for 2018. Data reported in 2018 for this "Other" category has therefore excluded from data presentation and analyses in the present report. Periphyton taxonomy results have not been reported in an "Other" category by the laboratory since 2018. See report Section 4.2.3.1 for details.

[a] W7 is the pre-breach sampling area associated with HAC-R1 and HAC-U. W9 is the pre-breach sampling area associated with EDC-U.

Table D.3.2: Summary Statistics of Periphyton Community and Productivity Metrics for Upper Hazeltine Creek (HAC-U, HAC-R1; Exposed) and Upper Edney Creek (EDC-U; Reference), 1995 to 2022

Endpoint	Year	Area	Area Type	n	Mean	Standard Deviation	Minimum	Median	Maximum
Chrysophytes (%)	2019	EDC-U	Reference	5	0	0	0	0	0
		HAC-R1	Exposed	5	0.244	0.0950	0.0810	0.273	0.326
		HAC-U		5	0.0680	0.152	0	0	0.340
	2020	EDC-U	Reference	5	0	0	0	0	0
		HAC-R1	Exposed	5	0	0	0	0	0
		HAC-U		5	0	0	0	0	0
	2021	EDC-U	Reference	5	0	0	0	0	0
		HAC-R1	Exposed	5	0	0	0	0	0
		HAC-U		5	0	0	0	0	0
	2022	EDC-U	Reference	5	0	0	0	0	0
		HAC-R1	Exposed	5	0	0	0	0	0
		HAC-U		5	0	0	0	0	0
Cyanobacteria (%)	1995	EDC-U (W9)[a]	Reference (Baseline)	3	0.667	0.577	0	1.00	1.00
		HAC-U (W7)[a]	Exposed (Baseline)	3	0.333	0.577	0	0	1.00
	1996	EDC-U (W9)[a]	Reference (Baseline)	3	1.00	1.00	0	1.00	2.00
		HAC-U (W7)[a]	Exposed (Baseline)	3	53.7	20.1	35.0	51.0	75.0
	2011	HAC-U (W7)[a]	Exposed (Pre-Breach)	1	100	-	100	100	100
	2018	EDC-U	Reference	5	85.2	3.07	80.5	86.2	88.6
		HAC-R1	Exposed	5	41.3	11.4	27.7	45.0	54.6
		HAC-U		5	7.13	5.88	2.38	4.76	17.0
	2019	EDC-U	Reference	5	84.1	10.5	71.6	82.6	96.5
		HAC-R1	Exposed	5	79.0	10.8	63.9	78.8	92.1
		HAC-U		5	66.1	17.0	42.4	73.8	84.5
	2020	EDC-U	Reference	5	97.0	2.06	94.8	97.7	98.9
		HAC-R1	Exposed	5	74.0	9.26	64.8	74.9	86.3
		HAC-U		5	46.5	16.4	20.7	54.2	61.5
	2021	EDC-U	Reference	5	85.8	6.83	77.0	85.9	94.6
		HAC-R1	Exposed	5	86.7	11.1	72.2	92.3	97.2
		HAC-U		5	44.0	20.1	27.1	39.1	77.5
	2022	EDC-U	Reference	5	90.5	3.52	85.3	90.5	94.7
		HAC-R1	Exposed	5	77.2	15.6	53.5	80.0	93.4
		HAC-U		5	59.4	29.5	14.6	78.0	82.0
Dinoflagellates (%)	1995	EDC-U (W9)[a]	Reference (Baseline)	3	0	0	0	0	0
		HAC-U (W7)[a]	Exposed (Baseline)	3	0	0	0	0	0
	1996	EDC-U (W9)[a]	Reference (Baseline)	3	0	0	0	0	0
		HAC-U (W7)[a]	Exposed (Baseline)	3	0	0	0	0	0
	2011	HAC-U (W7)[a]	Exposed (Pre-Breach)	1	0	-	0	0	0
	2018	EDC-U	Reference	5	0	0	0	0	0
		HAC-R1	Exposed	5	0.644	1.44	0	0	3.22
		HAC-U		5	0	0	0	0	0
	2019	EDC-U	Reference	5	0	0	0	0	0
		HAC-R1	Exposed	5	0	0	0	0	0
		HAC-U		5	0	0	0	0	0
	2020	EDC-U	Reference	5	0	0	0	0	0
		HAC-R1	Exposed	5	0	0	0	0	0
		HAC-U		5	0	0	0	0	0
	2021	EDC-U	Reference	5	0	0	0	0	0
		HAC-R1	Exposed	5	0	0	0	0	0
		HAC-U		5	0	0	0	0	0
	2022	EDC-U	Reference	5	0	0	0	0	0
		HAC-R1	Exposed	5	0	0	0	0	0
		HAC-U		5	0	0	0	0	0
Phaeophytes (%)	2018	EDC-U	Reference	5	-	-	-	-	-
		HAC-R1	Exposed	5	-	-	-	-	-
		HAC-U		5	-	-	-	-	-
	2019	EDC-U	Reference	5	0	0	0	0	0
		HAC-R1	Exposed	5	6.55	1.87	4.78	6.52	9.48
		HAC-U		5	3.48	4.32	0	2.27	10.4
	2020	EDC-U	Reference	5	0	0	0	0	0
		HAC-R1	Exposed	5	14.4	6.18	7.29	15.0	23.0
		HAC-U		5	19.6	5.02	13.6	18.2	27.1
	2021	EDC-U	Reference	5	0.537	0.880	0	0	2.03
		HAC-R1	Exposed	5	5.48	6.65	0.558	1.31	15.9
		HAC-U		5	17.6	5.47	9.37	19.3	23.9
	2022	EDC-U	Reference	-	0	0	0	0	0
		HAC-R1	Exposed	-	8.30	3.52	4.50	6.51	12.4
		HAC-U		-	8.61	8.41	2.18	5.31	22.7

Notes: "-" indicates no value. Periphyton community metrics that could be calculated for historical (baseline and pre-breach) data were limited due to the qualitative nature of these data. Periphyton data were classified as "Other" taxa in laboratory results issued in 2018 but the taxonomic groups contained in this category were unknown (i.e., unknown taxonomic idenification of these organisms), but suspected to include Phaeophytes, Chrysophytes, and Rhodophytes. See Minnow 2019a for detailed laboratory results for 2018. Data reported in 2018 for this "Other" category has therefore excluded from data presentation and analyses in the present report. Periphyton taxonomy results have not been reported in an "Other" category by the laboratory since 2018. See report Section 4.2.3.1 for details.

[a] W7 is the pre-breach sampling area associated with HAC-R1 and HAC-U. W9 is the pre-breach sampling area associated with EDC-U.

Table D.3.2: Summary Statistics of Periphyton Community and Productivity Metrics for Upper Hazeltine Creek (HAC-U, HAC-R1; Exposed) and Upper Edney Creek (EDC-U; Reference), 1995 to 2022

Endpoint	Year	Area	Area Type	n	Mean	Standard Deviation	Minimum	Median	Maximum
Rhodophytes (%)	2019	EDC-U	Reference	5	5.35	6.54	0	1.79	14.2
		HAC-R1	Exposed	5	0	0	0	0	0
		HAC-U		5	0	0	0	0	0
	2020	EDC-U	Reference	5	1.22	1.23	0.203	0.958	3.24
		HAC-R1	Exposed	5	0	0	0	0	0
		HAC-U		5	0	0	0	0	0
	2021	EDC-U	Reference	5	3.52	4.24	0	0.985	9.45
		HAC-R1	Exposed	5	0	0	0	0	0
		HAC-U		5	0	0	0	0	0
	2022	EDC-U	Reference	5	1.16	1.32	0	0.369	2.98
		HAC-R1	Exposed	5	0	0	0	0	0
		HAC-U		5	0	0	0	0	0
Chlorophyll-a (mg/m²)	1995	EDC-U (W9)[a]	Reference (Baseline)	3	9.60	1.81	7.52	10.5	10.8
		HAC-U (W7)[a]	Exposed (Baseline)	3	10.6	0.312	10.3	10.8	10.8
	1996	EDC-U (W9)[a]	Reference (Baseline)	3	16.2	3.65	12.8	15.6	20.1
		HAC-U (W7)[a]	Exposed (Baseline)	3	21.4	11.8	11.9	17.7	34.6
	2011	HAC-U (W7)[a]	Exposed (Pre-Breach)	1	14.6	-	14.6	14.6	14.6
	2017	HAC-U (W7[a)]	Exposed	5	11.8	8.12	4.08	8.70	23.4
	2018	EDC-U	Reference	5	11.5	3.16	6.40	12.1	15.0
		HAC-R1	Exposed	5	17.7	8.48	10.8	12.7	31.0
		HAC-U		5	12.6	3.67	9.55	10.9	18.0
	2019	EDC-U	Reference	5	25.0	20.3	9.80	19.1	60.0
		HAC-R1	Exposed	5	47.2	11.1	30.1	53.5	56.0
		HAC-U		5	35.7	9.77	27.0	31.9	52.0
	2020	EDC-U	Reference	5	8.46	5.61	2.46	6.80	17.4
		HAC-R1	Exposed	5	56.7	28.1	32.1	50.0	99.0
		HAC-U		5	14.9	8.96	3.49	12.4	26.6
	2021	EDC-U	Reference	5	5.44	1.93	2.05	6.20	6.75
		HAC-R1	Exposed	5	34.0	24.3	15.2	29.1	76.0
		HAC-U		5	22.9	6.61	11.6	24.8	29.1
	2022	EDC-U	Reference	5	39.5	19.1	18.4	34.3	63.5
		HAC-R1	Exposed	5	87.4	37.1	53.5	71.5	144
		HAC-U		5	26.8	7.18	14.4	28.1	32.4
Ash Free Dry Mass (g/m²)	2017	HAC-U (W7)[a]	Exposed	5	5.48	3.22	1.95	6.25	9.50
	2018	EDC-U	Reference	5	6.66	3.67	3.55	6.05	12.6
		HAC-R1	Exposed	5	15.5	14.3	4.00	10.4	38.6
		HAC-U		5	10.2	3.09	7.20	9.15	13.8
	2019	EDC-U	Reference	5	9.60	7.97	4.50	6.55	23.8
		HAC-R1	Exposed	5	58.1	21.3	34.7	57.0	88.5
		HAC-U		5	30.0	5.57	23.8	29.2	39.0
	2020	EDC-U	Reference	5	8.05	2.81	4.00	8.60	11.8
		HAC-R1	Exposed	5	126	36.7	71.0	128	172
		HAC-U		5	59.4	17.4	31.2	62.0	75.5
	2021	EDC-U	Reference	5	4.89	2.32	2.00	4.00	7.80
		HAC-R1	Exposed	5	15.9	7.68	7.55	14.4	28.4
		HAC-U		5	37.3	23.4	13.0	40.5	68.0
	2022	EDC-U	Reference	5	10.6	5.47	3.55	12.2	16.9
		HAC-R1	Exposed	5	96.7	36.9	49.9	85.5	139
		HAC-U		5	37.8	22.7	12.6	32.8	74.5

Notes: "-" indicates no value. Periphyton community metrics that could be calculated for historical (baseline and pre-breach) data were limited due to the qualitative nature of these data. Periphyton data were classified as "Other" taxa in laboratory results issued in 2018 but the taxonomic groups contained in this category were unknown (i.e., unknown taxonomic idenification of these organisms), but suspected to include Phaeophytes, Chrysophytes, and Rhodophytes. See Minnow 2019a for detailed laboratory results for 2018. Data reported in 2018 for this "Other" category has therefore excluded from data presentation and analyses in the present report. Periphyton taxonomy results have not been reported in an "Other" category by the laboratory since 2018. See report Section 4.2.3.1 for details.

[a] W7 is the pre-breach sampling area associated with HAC-R1 and HAC-U. W9 is the pre-breach sampling area associated with EDC-U.

Table D.3.3: Periphyton Productivity Metrics for Upper Hazeltine Creek (HAC-R1, HAC-U; Exposed) and Upper Edney Creek (EDC-U; Reference), 1995 to 2022

Year	Area	Area Type	Station	Chlorophyll-a (mg/m²)	Ash Free Dry Mass (g/m²)
1995	EDC-U (W9)[a]	Reference (Baseline)	W9-1	10.8	-
			W9-2	10.5	-
			W9-3	7.52	-
			W9-4	10.0	-
			W9-5	8.68	-
			W9-6	8.84	-
	HAC-U (W7)[a]	Exposed (Baseline)	W7-1	10.3	-
			W7-2	10.8	-
			W7-3	10.8	-
			W7-4	12.0	-
			W7-5	5.28	-
			W7-6	6.23	-
1996	EDC-U (W9)[a]	Reference (Baseline)	W9-1	15.6	-
			W9-2	20.1	-
			W9-3	12.8	-
	HAC-U (W7)[a]	Exposed (Baseline)	W7-1	17.7	-
			W7-2	11.9	-
			W7-3	34.6	-
2011	W7[a]	Exposed (Pre-Breach)	HAC-U-1	14.6	-
2017	HAC-R1	Exposed	HAC-R1-1	23.4	9.50
			HAC-R1-2	5.90	7.25
			HAC-R1-3	4.08	1.95
			HAC-R1-4	16.7	6.25
			HAC-R1-5	8.70	2.45
2018	EDC-U	Reference	EDC-U-1	12.6	6.05
			EDC-U-2	12.1	7.30
			EDC-U-3	6.40	3.55
			EDC-U-4	15.0	12.6
			EDC-U-5	11.4	3.80
	HAC-R1	Exposed	HAC-R1-1	21.3	38.6
			HAC-R1-2	31.0	19.2
			HAC-R1-3	12.7	10.4
			HAC-R1-4	10.8	5.10
			HAC-R1-5	12.7	4.00
	HAC-U		HAC-U-1	9.55	7.20
			HAC-U-2	10.9	13.8
			HAC-U-3	9.83	9.15
			HAC-U-4	18.0	13.2
			HAC-U-5	14.8	7.80
2019	EDC-U	Reference	EDC-U-1	19.1	5.95
			EDC-U-2	23.8	6.55
			EDC-U-3	12.4	7.25
			EDC-U-4	60.0	23.8
			EDC-U-5	9.80	4.50
	HAC-R1	Exposed	HAC-R1-1	53.5	68.0
			HAC-R1-2	56.0	88.5
			HAC-R1-3	42.1	57.0
			HAC-R1-4	30.1	42.4
			HAC-R1-5	54.5	34.7
	HAC-U		HAC-U-1	27.0	39.0
			HAC-U-2	31.9	27.8
			HAC-U-3	52.0	30.4
			HAC-U-4	36.8	29.2
			HAC-U-5	30.6	23.8
2020	EDC-U	Reference	EDC-U-1	6.05	7.15
			EDC-U-2	17.4	8.60
			EDC-U-3	6.80	8.75
			EDC-U-4	9.60	11.8
			EDC-U-5	2.46	4.00
	HAC-R1	Exposed	HAC-R1-1	32.1	140
			HAC-R1-2	69.5	172
			HAC-R1-3	99.0	71.0
			HAC-R1-4	50.0	128
			HAC-R1-5	33.0	118
	HAC-U		HAC-U-1	11.2	57.0
			HAC-U-2	3.49	31.2
			HAC-U-3	20.8	75.5
			HAC-U-4	12.4	71.5
			HAC-U-5	26.6	62.0
2021	EDC-U	Reference	EDC-U-1	6.75	6.65
			EDC-U-2	5.80	7.80
			EDC-U-3	2.05	2.00
			EDC-U-4	6.20	4.00
			EDC-U-5	6.40	4.00
	HAC-R1	Exposed	HAC-R1-1	19.9	28.4
			HAC-R1-2	29.1	7.55
			HAC-R1-3	15.2	14.4
			HAC-R1-4	29.6	15.6
			HAC-R1-5	76.0	13.3
	HAC-U		HAC-U-1	24.9	68.0
			HAC-U-2	24.1	49.8
			HAC-U-3	29.1	15.1
			HAC-U-4	24.8	40.5
			HAC-U-5	11.6	13.0
2022	EDC-U	Reference	EDC-U-1	18.4	14.1
			EDC-U-2	26.4	6.50
			EDC-U-3	63.5	12.2
			EDC-U-4	55.0	16.9
			EDC-U-5	34.3	3.55
	HAC-R1	Exposed	HAC-R1-1	53.5	85.5
			HAC-R1-2	71.5	49.9
			HAC-R1-3	106	139
			HAC-R1-4	144	129
			HAC-R1-5	62.5	80.0
	HAC-U		HAC-U-1	32.4	32.8
			HAC-U-2	14.4	38.8
			HAC-U-3	31.2	74.5
			HAC-U-4	28.1	12.6
			HAC-U-5	27.6	30.2

Notes: "-" indicates no value. mg/m²= milligrams per metre suqared. g/m^2 = grams per metre squared.
[a] W7 is the pre-breach sampling area associated with HAC-R1 and HAC-U. W9 is the pre-breach sampling area associated with EDC-U.

Table D.3.4: Periphyton Productivity Metrics for Upper Hazeltine Creek (HAC-R3; Exposed) and Frypan Creek (FPC-R3; Reference, 2017 to 2022

Year	Area	Area Type	Station	Chlorophyll-a (mg/m²)	Ash Free Dry Mass (g/m²)
2017	FPC-R3	Reference	FPC-R3-1	6.10	3.30
			FPC-R3-2	5.45	5.55
			FPC-R3-3	13.9	7.45
2018	FPC-R3	Reference	FPC-R3-1	17.1	4.20
			FPC-R3-2	18.0	6.70
			FPC-R3-3	13.7	10.1
			FPC-R3-4	15.6	3.95
			FPC-R3-5	18.7	4.50
2019	FPC-R3	Reference	FPC-R3-1	50.0	11.9
			FPC-R3-2	37.1	11.9
			FPC-R3-3	27.4	7.75
			FPC-R3-4	26.1	11.2
			FPC-R3-5	11.6	3.00
2020	FPC-R3	Reference	FPC-R3-1	31.4	16.2
			FPC-R3-2	34.0	26.6
			FPC-R3-3	6.75	19.0
			FPC-R3-4	8.30	6.95
			FPC-R3-5	20.1	9.95
	HAC-R3	Exposed	HAC-R3-1	1.50	5.95
			HAC-R3-2	3.00	3.75
			HAC-R3-3	1.74	1.95
			HAC-R3-4	1.74	3.10
			HAC-R3-5	0.324	2.60
2021	FPC-R3	Reference	FPC-R3-1	47.1	6.75
			FPC-R3-2	39.8	7.35
			FPC-R3-3	35.8	9.15
			FPC-R3-4	21.1	3.80
			FPC-R3-5	44.4	8.50
	HAC-R3	Exposed	HAC-R3-1	4.54	2.40
			HAC-R3-2	8.55	4.55
			HAC-R3-3	1.96	1.50
			HAC-R3-4	6.50	1.75
			HAC-R3-5	0.895	0.550
2022	FPC-R3	Reference	FPC-R3-1	21.4	4.00
			FPC-R3-2	112	11.2
			FPC-R3-3	46.8	4.40
			FPC-R3-4	51.0	8.15
			FPC-R3-5	15.2	6.60
	HAC-R3	Exposed	HAC-R3-1	3.54	1.90
			HAC-R3-2	12.2	3.45
			HAC-R3-3	2.43	0.550
			HAC-R3-4	0.740	3.70
			HAC-R3-5	0.930	0.500

Notes: mg/m²= milligrams per metre suqared. g/m^2 = grams per metre squared.

Table D.3.5: Summary Statistics of Periphyton Productivity Metrics for Upper Hazeltine Creek (HAC-R3; Exposed) and Frypan Creek (FPC-R3; Reference), 2017 to 2022

Endpoint	Year	Area	Area Type	n	Mean	Standard Deviation	Minimum	Median	Maximum
Chlorophyll-a (mg/m²)	2017	FPC-R3	Reference	3	8.50	4.73	5.45	6.10	13.9
	2018	FPC-R3	Reference	5	16.6	2.00	13.7	17.1	18.7
	2019	FPC-R3	Reference	5	30.4	14.2	11.6	27.4	50.0
	2020	FPC-R3	Reference	5	20.1	12.6	6.75	20.1	34.0
		HAC-R3	Exposed	5	1.66	0.951	0.324	1.74	3.00
	2021	FPC-R3	Reference	5	37.6	10.2	21.1	39.8	47.1
		HAC-R3	Exposed	5	4.49	3.16	0.895	4.54	8.55
	2022	FPC-R3	Reference	5	49.2	38.1	15.2	46.8	112
		HAC-R3	Exposed	5	3.97	4.74	0.740	2.43	12.2
Ash Free Dry Mass (g/m²)	2017	FPC-R3	Reference	3	5.43	2.08	3.30	5.55	7.45
	2018	FPC-R3	Reference	5	5.88	2.57	3.95	4.50	10.1
	2019	FPC-R3	Reference	5	9.15	3.85	3.00	11.2	11.9
	2020	FPC-R3	Reference	5	15.8	7.76	6.95	16.2	26.6
		HAC-R3	Exposed	5	3.47	1.54	1.95	3.10	5.95
	2021	FPC-R3	Reference	5	7.11	2.08	3.80	7.35	9.15
		HAC-R3	Exposed	5	2.15	1.50	0.550	1.75	4.55
	2022	FPC-R3	Reference	5	6.87	2.95	4.00	6.60	11.2
		HAC-R3	Exposed	5	2.02	1.53	0.500	1.90	3.70

Notes: mg/m² = milligrams per metre suqared. g/m ^{2} = grams per metre squared.

APPENDIX D.4
BENTHIC COMMUNITY & PRODUCTIVITY

Table D.4.1: **Benthic Invertebrate Community Metrics for Frypan Creek (FPC-R3; Reference), 2018 to 2022**

Year	Station	Density (#/m^2)	Richness (# of taxa)	Simpson's Evenness	Simpson's Diversity	Ephemeroptera (#/m^2)	Plecoptera (#/m^2)	Trichoptera (#/m^2)	EPT (#/m^2)	Arachnida (#/m^2)	Chironomidae (#/m^2)	Non-Chironomidae Diptera (#/m^2)
2018	FPC-R3-1	13,964	27	0.345	0.893	4,875	2,896	172	7,943	631	4,588	0
	FPC-R3-2	12,724	28	0.295	0.879	609	681	71.7	1,362	179	8,925	287
	FPC-R3-3	7,419	35	0.430	0.934	1,075	2,384	89.6	3,548	71.7	2,186	53.8
	FPC-R3-4	17,491	36	0.308	0.910	968	1,183	179	2,330	645	11,864	143
	FPC-R3-5	6,949	32	0.307	0.898	159	518	59.7	737	39.8	4,062	179
2019	FPC-R3-1	5,867	36	0.352	0.921	585	623	56.6	1,264	358	3,207	132
	FPC-R3-2	9,677	37	0.405	0.933	3,011	860	263	4,134	836	3,202	71.7
	FPC-R3-3	6,756	29	0.469	0.927	1,810	806	17.9	2,634	53.8	3,280	0
	FPC-R3-4	5,806	30	0.181	0.816	2,509	1,452	35.8	3,996	71.7	1,416	53.8
	FPC-R3-5	7,551	26	0.358	0.893	2,103	932	47.8	3,082	550	2,366	71.7
2020	FPC-R3-1	9,370	30	0.290	0.885	2,714	1,536	102	4,352	538	2,279	102
	FPC-R3-2	23,441	30	0.286	0.884	11,613	2,581	358	14,552	1,147	3,584	573
	FPC-R3-3	19,764	36	0.160	0.827	13,415	1,997	410	15,822	358	2,407	154
	FPC-R3-4	5,634	37	0.253	0.893	2,222	1,133	86.0	3,441	330	1,233	71.7
	FPC-R3-5	6,680	29	0.358	0.904	1,776	1,597	65.2	3,438	114	2,476	48.9
2021	FPC-R3-1	12,079	25	0.331	0.879	1,111	251	108	1,470	108	7,778	35.8
	FPC-R3-2	18,024	38	0.398	0.934	6,042	2,919	768	9,729	1,126	3,533	512
	FPC-R3-3	12,151	37	0.395	0.932	4,910	1,254	215	6,380	215	3,369	179
	FPC-R3-4	4,989	36	0.406	0.932	1,032	573	100	1,706	71.7	2,136	28.7
	FPC-R3-5	19,068	36	0.251	0.890	9,720	2,552	315	12,588	832	4,158	172
2022	FPC-R3-1	19,304	31	0.137	0.765	7,629	1,741	102	9,473	410	2,714	205
	FPC-R3-2	26,595	25	0.161	0.752	16,559	5,520	1,219	23,297	789	1,362	71.7
	FPC-R3-3	14,444	29	0.203	0.830	8,781	3,405	502	12,688	430	466	108
	FPC-R3-4	18,399	24	0.316	0.868	9,379	4,301	717	14,397	418	2,210	59.7
	FPC-R3-5	16,368	34	0.311	0.905	5,695	5,894	518	12,107	358	2,111	398

Notes: EPT = Ephemeroptera, Plecoptera, Trichoptera. DW = dry weight. WW = wet weight. #/m2 = number per square metre. g/m2 = grams per square metre.

Table D.4.1: **Benthic Invertebrate Community Metrics for Frypan Creek (FPC-R3; Reference), 2018 to 2022**

Year	Station	Oligochaeta (#/m^2)	Ephemeroptera (%)	Plecoptera (%)	Trichoptera (%)	EPT (%)	Arachnida (%)	Chironomidae (%)	Non-Chironomidae Diptera (%)	Oligochaeta (%)	Dry Weight Biomass (g/m^2 DW)	Wet Weight Biomass (g/m^2 WW)
2018	FPC-R3-1	86.0	34.9	20.7	1.23	56.9	4.52	32.9	0	0.616	1.17	22.9
	FPC-R3-2	430	4.79	5.35	0.563	10.7	1.41	70.1	2.25	3.38	0.358	1.86
	FPC-R3-3	358	14.5	32.1	1.21	47.8	0.966	29.5	0.725	4.83	3.14	13.6
	FPC-R3-4	1,039	5.53	6.76	1.02	13.3	3.69	67.8	0.820	5.94	2.55	11.6
	FPC-R3-5	677	2.29	7.45	0.860	10.6	0.573	58.5	2.58	9.74	0.434	2.13
2019	FPC-R3-1	151	9.97	10.6	0.965	21.5	6.11	54.7	2.25	2.57	1.11	5.00
	FPC-R3-2	263	31.1	8.89	2.72	42.7	8.64	33.1	0.741	2.72	5.51	28.5
	FPC-R3-3	161	26.8	11.9	0.265	39.0	0.796	48.5	0	2.39	0.201	1.05
	FPC-R3-4	143	43.2	25.0	0.617	68.8	1.23	24.4	0.926	2.47	0.186	0.953
	FPC-R3-5	430	27.9	12.3	0.633	40.8	7.28	31.3	0.949	5.70	0.992	5.22
2020	FPC-R3-1	128	29.0	16.4	1.09	46.5	5.74	24.3	1.09	1.37	0.486	2.29
	FPC-R3-2	1,505	49.5	11.0	1.53	62.1	4.89	15.3	2.45	6.42	9.23	54.8
	FPC-R3-3	154	67.9	10.1	2.07	80.0	1.81	12.2	0.777	0.777	0.696	3.84
	FPC-R3-4	143	39.4	20.1	1.53	61.1	5.85	21.9	1.27	2.54	0.737	3.61
	FPC-R3-5	228	26.6	23.9	0.976	51.5	1.71	37.1	0.732	3.41	0.199	0.621
2021	FPC-R3-1	71.7	9.20	2.08	0.890	12.2	0.890	64.4	0.297	0.593	0.441	2.76
	FPC-R3-2	2,663	33.5	16.2	4.26	54.0	6.25	19.6	2.84	14.8	1.99	11.3
	FPC-R3-3	1,398	40.4	10.3	1.77	52.5	1.77	27.7	1.47	11.5	1.32	5.58
	FPC-R3-4	430	20.7	11.5	2.01	34.2	1.44	42.8	0.575	8.62	1.29	5.22
	FPC-R3-5	258	51.0	13.4	1.65	66.0	4.36	21.8	0.902	1.35	1.04	4.16
2022	FPC-R3-1	512	39.5	9.02	0.531	49.1	2.12	14.1	1.06	2.65	5.35	24.6
	FPC-R3-2	143	62.3	20.8	4.58	87.6	2.96	5.12	0.270	0.539	0.638	4.41
	FPC-R3-3	179	60.8	23.6	3.47	87.8	2.98	3.23	0.744	1.24	4.21	19.7
	FPC-R3-4	179	51.0	23.4	3.90	78.2	2.27	12.0	0.325	0.974	1.68	10.3
	FPC-R3-5	239	34.8	36.0	3.16	74.0	2.19	12.9	2.43	1.46	2.64	15.4

Notes: EPT = Ephemeroptera, Plecoptera, Trichoptera. DW = dry weight. WW = wet weight. #/m2 = number per square metre. g/m2 = grams per square metre.

Table D.4.2: Summary Statistics of Benthic Invertebrate Community Metrics for Frypan Creek (FPC-R3; Reference), 2018 to 2022

Endpoint	Year	n	Mean	Standard Deviation	Minimum	Median	Maximum
Density (#/m²)	2018	5	11,710	4,489	6,949	12,724	17,491
	2019	5	7,132	1,593	5,806	6,756	9,677
	2020	5	12,978	8,095	5,634	9,370	23,441
	2021	5	13,262	5,645	4,989	12,151	19,068
	2022	5	19,022	4,632	14,444	18,399	26,595
Richness (# of taxa)	2018	5	31.6	4.04	27	32	36
	2019	5	31.6	4.72	26	30	37
	2020	5	32.4	3.78	29	30	37
	2021	5	34.4	5.32	25	36	38
	2022	5	28.6	4.16	24	29	34
Simpson's Evenness	2018	5	0.337	0.0552	0.295	0.308	0.430
	2019	5	0.353	0.107	0.181	0.358	0.469
	2020	5	0.269	0.0718	0.160	0.286	0.358
	2021	5	0.356	0.0660	0.251	0.395	0.406
	2022	5	0.226	0.0836	0.137	0.203	0.316
Simpson's Diversity	2018	5	0.903	0.0205	0.879	0.898	0.934
	2019	5	0.898	0.0483	0.816	0.921	0.933
	2020	5	0.878	0.0299	0.827	0.885	0.904
	2021	5	0.913	0.0266	0.879	0.932	0.934
	2022	5	0.824	0.0657	0.752	0.830	0.905
Ephemeroptera (#/m²)	2018	5	1,537	1,900	159	968	4,875
	2019	5	2,003	912	585	2,103	3,011
	2020	5	6,348	5,674	1,776	2,714	13,415
	2021	5	4,563	3,650	1,032	4,910	9,720
	2022	5	9,609	4,132	5,695	8,781	16,559
Plecoptera (#/m²)	2018	5	1,532	1,056	518	1,183	2,896
	2019	5	935	311	623	860	1,452
	2020	5	1,769	548	1,133	1,597	2,581
	2021	5	1,510	1,183	251	1,254	2,919
	2022	5	4,172	1,681	1,741	4,301	5,894
Trichoptera (#/m²)	2018	5	114	56.9	59.7	89.6	179
	2019	5	84.2	101	17.9	47.8	263
	2020	5	204	166	65.2	102	410
	2021	5	301	275	100	215	768
	2022	5	611	406	102	518	1,219
EPT (#/m²)	2018	5	3,184	2,864	737	2,330	7,943
	2019	5	3,022	1,165	1,264	3,082	4,134
	2020	5	8,321	6,295	3,438	4,352	15,822
	2021	5	6,374	4,892	1,470	6,380	12,588
	2022	5	14,392	5,283	9,473	12,688	23,297
Arachnida (#/m²)	2018	5	313	301	39.8	179	645
	2019	5	374	331	53.8	358	836
	2020	5	497	393	114	358	1,147
	2021	5	470	479	71.7	215	1,126
	2022	5	481	174	358	418	789
Chironomidae (#/m²)	2018	5	6,325	3,959	2,186	4,588	11,864
	2019	5	2,694	807	1,416	3,202	3,280
	2020	5	2,396	834	1,233	2,407	3,584
	2021	5	4,195	2,133	2,136	3,533	7,778
	2022	5	1,773	876	466	2,111	2,714
Non-Chironomidae Diptera (#/m²)	2018	5	133	112	0	143	287
	2019	5	65.8	47.3	0	71.7	132
	2020	5	190	218	48.9	102	573
	2021	5	186	196	28.7	172	512
	2022	5	168	141	59.7	108	398
Oligochaeta (#/m²)	2018	5	518	360	86.0	430	1,039
	2019	5	230	122	143	161	430
	2020	5	432	601	128	154	1,505
	2021	5	964	1,079	71.7	430	2,663
	2022	5	251	150	143	179	512
Ephemeroptera (%)	2018	5	12.4	13.4	2.29	5.53	34.9
	2019	5	27.8	11.9	9.97	27.9	43.2
	2020	5	42.5	16.9	26.6	39.4	67.9
	2021	5	31.0	16.4	9.20	33.5	51.0
	2022	5	49.7	12.3	34.8	51.0	62.3
Plecoptera (%)	2018	5	14.5	11.6	5.35	7.45	32.1
	2019	5	13.8	6.43	8.89	11.9	25.0
	2020	5	16.3	5.89	10.1	16.4	23.9
	2021	5	10.7	5.30	2.08	11.5	16.2
	2022	5	22.6	9.61	9.02	23.4	36.0
Trichoptera (%)	2018	5	0.977	0.276	0.563	1.02	1.23
	2019	5	1.04	0.969	0.265	0.633	2.72
	2020	5	1.44	0.434	0.976	1.53	2.07
	2021	5	2.12	1.27	0.890	1.77	4.26
	2022	5	3.13	1.55	0.531	3.47	4.58
EPT (%)	2018	5	27.9	22.6	10.6	13.3	56.9
	2019	5	42.6	16.9	21.5	40.8	68.8
	2020	5	60.2	12.9	46.5	61.1	80.0
	2021	5	43.8	21.0	12.2	52.5	66.0
	2022	5	75.3	15.9	49.1	78.2	87.8
Arachnida (%)	2018	5	2.23	1.76	0.573	1.41	4.52
	2019	5	4.81	3.58	0.796	6.11	8.64
	2020	5	4.00	2.08	1.71	4.89	5.85
	2021	5	2.94	2.28	0.890	1.77	6.25
	2022	5	2.51	0.429	2.12	2.27	2.98
Chironomidae (%)	2018	5	51.8	19.3	29.5	58.5	70.1
	2019	5	38.4	12.7	24.4	33.1	54.7
	2020	5	22.1	9.67	12.2	21.9	37.1
	2021	5	35.3	18.6	19.6	27.7	64.4
	2022	5	9.46	4.93	3.23	12.0	14.1
Non-Chironomidae Diptera (%)	2018	5	1.28	1.09	0	0.820	2.58
	2019	5	0.973	0.812	0	0.926	2.25
	2020	5	1.26	0.698	0.732	1.09	2.45
	2021	5	1.22	1.01	0.297	0.902	2.84
	2022	5	0.967	0.881	0.270	0.744	2.43
Oligochaeta (%)	2018	5	4.90	3.36	0.616	4.83	9.74
	2019	5	3.17	1.42	2.39	2.57	5.70
	2020	5	2.90	2.22	0.777	2.54	6.42
	2021	5	7.37	6.24	0.593	8.62	14.8
	2022	5	1.37	0.793	0.539	1.24	2.65
Dry Weight Benthic Biomass (g/m² DW)	2018	5	1.53	1.26	0.358	1.17	3.14
	2019	5	1.60	2.23	0.186	0.992	5.51
	2020	5	2.27	3.89	0.199	0.696	9.23
	2021	5	1.22	0.557	0.441	1.29	1.99
	2022	5	2.90	1.90	0.638	2.64	5.35
Wet Weight Benthic Biomass (g/m² WW)	2018	5	10.4	8.79	1.86	11.6	22.9
	2019	5	8.15	11.6	0.953	5.00	28.5
	2020	5	13.0	23.4	0.621	3.61	54.8
	2021	5	5.80	3.26	2.76	5.22	11.3
	2022	5	14.9	7.89	4.41	15.4	24.6

Notes: " - " = no value. EPT = Ephemeroptera, Plecoptera, Trichoptera. DW = dry weight. WW = wet weight. #/m ^{2} = number per square metre. g/m^2 = grams per square metre.

Table D.4.3: **Benthic Invertebrate Community Metrics for Upper Hazeltine Creek (HAC-R3; Exposed), 2020 to 2022**

Year	Station	Density (#/m^2)	Richness (# of taxa)	Simpson's Evenness	Simpson's Diversity	Ephemeroptera (#/m^2)	Plecoptera (#/m^2)	Trichoptera (#/m^2)	EPT (#/m^2)	Arachnida (#/m^2)	Chironomidae (#/m^2)	Non-Chironomidae Diptera (#/m^2)
2020	HAC-R3-1	17,460	25	0.248	0.839	5,376	307	9,524	15,207	51.2	1,741	358
	HAC-R3-2	24,301	25	0.425	0.906	7,025	287	10,681	17,993	71.7	4,875	573
	HAC-R3-3	12,832	29	0.217	0.841	4,086	215	6,201	10,502	0	1,398	143
	HAC-R3-4	11,398	26	0.241	0.840	3,405	108	6,201	9,713	71.7	1,075	179
	HAC-R3-5	12,079	19	0.368	0.857	3,262	143	3,871	7,276	35.8	824	108
2021	HAC-R3-1	26,667	28	0.187	0.809	9,533	800	14,200	24,533	0	867	333
	HAC-R3-2	20,111	20	0.221	0.774	10,056	389	7,722	18,167	0	1,500	111
	HAC-R3-3	21,733	26	0.103	0.628	3,533	400	15,067	19,000	0	2,400	200
	HAC-R3-4	16,143	22	0.438	0.896	2,810	381	5,476	8,667	0	7,429	0
	HAC-R3-5	27,400	22	0.127	0.643	3,667	333	20,200	24,200	0	2,533	200
2022	HAC-R3-1	18,278	29	0.356	0.903	11,222	111	2,722	14,056	0	2,056	389
	HAC-R3-2	18,500	23	0.161	0.730	9,000	333	6,111	15,444	0	2,000	111
	HAC-R3-3	22,800	19	0.153	0.655	5,133	133	16,933	22,200	0	467	133
	HAC-R3-4	20,889	19	0.183	0.713	5,500	0	14,611	20,111	0	667	0
	HAC-R3-5	10,933	19	0.135	0.610	1,900	33.3	8,367	10,300	33.3	333	66.7

Notes: EPT = Ephemeroptera, Plecoptera, Trichoptera. DW = dry weight. WW = wet weight. #/m^2 = number per metre squared. g/m^2 = grams per metre squared.

Table D.4.3: **Benthic Invertebrate Community Metrics for Upper Hazeltine Creek (HAC-R3; Exposed), 2020 to 2022**

Year	Station	Oligochaeta (#/m^2)	Ephemeroptera (%)	Plecoptera (%)	Trichoptera (%)	EPT (%)	Arachnida (%)	Chironomidae (%)	Non-Chironomidae Diptera (%)	Oligochaeta (%)	Dry Weight Biomass (g/m^2 DW)	Wet Weight Biomass (g/m^2 WW)
2020	HAC-R3-1	102	30.8	1.76	54.5	87.1	0.293	9.97	2.05	0.587	0.900	4.65
	HAC-R3-2	0	28.9	1.18	44.0	74.0	0.295	20.1	2.36	0	2.36	9.65
	HAC-R3-3	573	31.8	1.68	48.3	81.8	0	10.9	1.12	4.47	0.380	1.48
	HAC-R3-4	358	29.9	0.943	54.4	85.2	0.629	9.43	1.57	3.14	0.573	2.67
	HAC-R3-5	3,333	27.0	1.19	32.0	60.2	0.297	6.82	0.890	27.6	0.543	2.04
2021	HAC-R3-1	133	35.8	3.00	53.2	92.0	0	3.25	1.25	0.500	1.44	6.29
	HAC-R3-2	0	50.0	1.93	38.4	90.3	0	7.46	0.552	0	1.22	5.54
	HAC-R3-3	0	16.3	1.84	69.3	87.4	0	11.0	0.920	0	2.89	9.22
	HAC-R3-4	0	17.4	2.36	33.9	53.7	0	46.0	0	0	2.20	12.3
	HAC-R3-5	66.7	13.4	1.22	73.7	88.3	0	9.25	0.730	0.243	5.48	33.2
2022	HAC-R3-1	167	61.4	0.608	14.9	76.9	0	11.2	2.13	0.912	2.69	10.4
	HAC-R3-2	55.6	48.6	1.80	33.0	83.5	0	10.8	0.601	0.300	1.34	8.22
	HAC-R3-3	0	22.5	0.585	74.3	97.4	0	2.05	0.585	0	1.71	7.31
	HAC-R3-4	111	26.3	0	70.0	96.3	0	3.19	0	0.532	1.53	6.17
	HAC-R3-5	0	17.4	0.305	76.5	94.2	0.305	3.05	0.610	0	0.467	1.54

Notes: EPT = Ephemeroptera, Plecoptera, Trichoptera. DW = dry weight. WW = wet weight. #/m^2 = number per metre squared. g/m^2 = grams per metre squared.

Table D.4.4: Summary Statistics of Benthic Invertebrate Community Metrics for Upper Hazeltine Creek (HAC-R3; Exposed), 2020 to 2022

Endpoint	Year	n	Mean	Standard Deviation	Minimum	Median	Maximum
Density (#/m²)	2020	5	15,614	5,406	11,398	12,832	24,301
	2021	5	22,411	4,691	16,143	21,733	27,400
	2022	5	18,280	4,507	10,933	18,500	22,800
Richness (# of taxa)	2020	5	24.8	3.63	19	25	29
	2021	5	23.6	3.29	20	22	28
	2022	5	21.8	4.38	19	19	29
Simpson's Evenness	2020	5	0.300	0.0912	0.217	0.248	0.425
	2021	5	0.215	0.133	0.103	0.187	0.438
	2022	5	0.198	0.0901	0.135	0.161	0.356
Simpson's Diversity	2020	5	0.857	0.0284	0.839	0.841	0.906
	2021	5	0.750	0.114	0.628	0.774	0.896
	2022	5	0.722	0.112	0.610	0.713	0.903
Ephemeroptera (#/m²)	2020	5	4,631	1,578	3,262	4,086	7,025
	2021	5	5,920	3,557	2,810	3,667	10,056
	2022	5	6,551	3,625	1,900	5,500	11,222
Plecoptera (#/m²)	2020	5	212	87.0	108	215	307
	2021	5	461	191	333	389	800
	2022	5	122	130	0	111	333
Trichoptera (#/m²)	2020	5	7,295	2,764	3,871	6,201	10,681
	2021	5	12,533	5,936	5,476	14,200	20,200
	2022	5	9,749	5,911	2,722	8,367	16,933
EPT (#/m²)	2020	5	12,138	4,356	7,276	10,502	17,993
	2021	5	18,913	6,424	8,667	19,000	24,533
	2022	5	16,422	4,770	10,300	15,444	22,200
Arachnida (#/m²)	2020	5	46.1	29.9	0	51.2	71.7
	2021	5	0	0	0	0	0
	2022	5	6.67	14.9	0	0	33.3
Chironomidae (#/m²)	2020	5	1,983	1,653	824	1,398	4,875
	2021	5	2,946	2,597	867	2,400	7,429
	2022	5	1,104	851	333	667	2,056
Non-Chironomidae Diptera (#/m²)	2020	5	272	194	108	179	573
	2021	5	169	123	0	200	333
	2022	5	140	148	0	111	389
Oligochaeta (#/m²)	2020	5	874	1,393	0	358	3,333
	2021	5	40.0	59.6	0	0	133
	2022	5	66.7	72.4	0	55.6	167
Ephemeroptera (%)	2020	5	29.7	1.85	27.0	29.9	31.8
	2021	5	26.6	15.8	13.4	17.4	50.0
	2022	5	35.2	18.9	17.4	26.3	61.4
Plecoptera (%)	2020	5	1.35	0.352	0.943	1.19	1.76
	2021	5	2.07	0.661	1.22	1.93	3.00
	2022	5	0.660	0.684	0	0.585	1.80
Trichoptera (%)	2020	5	46.6	9.30	32.0	48.3	54.5
	2021	5	53.7	17.8	33.9	53.2	73.7
	2022	5	53.7	28.0	14.9	70.0	76.5
EPT (%)	2020	5	77.7	11.0	60.2	81.8	87.1
	2021	5	82.3	16.1	53.7	88.3	92.0
	2022	5	89.7	9.01	76.9	94.2	97.4
Arachnida (%)	2020	5	0.303	0.223	0	0.295	0.629
	2021	5	0	0	0	0	0
	2022	5	0.0610	0.136	0	0	0.305
Chironomidae (%)	2020	5	11.4	5.05	6.82	9.97	20.1
	2021	5	15.4	17.4	3.25	9.25	46.0
	2022	5	6.07	4.55	2.05	3.19	11.2
Non-Chironomidae Diptera (%)	2020	5	1.60	0.616	0.890	1.57	2.36
	2021	5	0.691	0.465	0	0.730	1.25
	2022	5	0.785	0.794	0	0.601	2.13
Oligochaeta (%)	2020	5	7.16	11.6	0	3.14	27.6
	2021	5	0.149	0.223	0	0	0.500
	2022	5	0.349	0.386	0	0.300	0.912
Dry Weight Benthic Biomass (g/m² DW)	2020	5	0.951	0.810	0.380	0.573	2.36
	2021	5	2.64	1.72	1.22	2.20	5.48
	2022	5	1.55	0.799	0.467	1.53	2.69
Wet Weight Benthic Biomass (g/m² WW)	2020	5	4.10	3.33	1.48	2.67	9.65
	2021	5	13.3	11.5	5.54	9.22	33.2
	2022	5	6.72	3.28	1.54	7.31	10.4

Notes: " - " = no value. EPT = Ephemeroptera, Plecoptera, Trichoptera. DW = dry weight. WW = wet weight. #/m ^{2} = number per square metre. g/m^2 = grams per square metre.

Table D.4.5: **Benthic Invertebrate Community Metrics for Upper Hazeltine Creek (HAC-R1, HAC-U; Exposed) and Upper Edney Creek (EDC-U; Reference), 2007 to 2022**

Year	Area	Area Type	Station	Density (#/m^2)	Richness (# of taxa)	Simpson's Evenness	Simpson's Diversity	Ephemeroptera (#/m^2)	Plecoptera (#/m^2)	Trichoptera (#/m^2)	EPT (#/m^2)	Arachnida (#/m^2)	Chironomidae (#/m^2)	Non-Chironomidae Diptera (#/m^2)
2007	EDC-U (UER)[a]	Reference (Pre- Breach)	EDC-U-1	22,075	42	0.274	0.913	11,240	1,398	1,796	14,434	1,147	4,585	247
			EDC-U-2	57,534	42	0.423	0.944	18,473	4,731	7,950	31,154	5,849	17,319	344
			EDC-U-3	40,477	41	0.245	0.900	15,140	1,649	1,957	18,746	5,219	14,265	211
			EDC-U-4	63,208	35	0.398	0.928	25,118	5,086	11,882	42,086	2,186	15,484	233
			EDC-U-5	65,222	37	0.229	0.882	37,172	7,735	3,104	48,011	3,900	9,176	237
	HAC-U (UHC)[a]	Exposed (Pre- Breach)	HAC-U-1	70,143	46	0.263	0.917	28,986	4,602	2,943	36,530	1,778	20,416	459
			HAC-U-2	33,857	42	0.224	0.894	13,878	1,964	1,491	17,333	7,914	5,219	401
			HAC-U-3	28,201	45	0.277	0.920	11,989	2,136	1,108	15,233	1,204	8,774	229
			HAC-U-4	42,297	40	0.314	0.920	17,892	5,430	2,520	25,842	6,308	6,079	516
			HAC-U-5	21,642	48	0.266	0.922	7,986	2,573	1,319	11,878	3,563	3,928	201
2018	EDC-U	Reference	EDC-U-1	18,894	26	0.178	0.784	563	973	768	2,304	7,066	8,449	205
			EDC-U-2	179	14	0.410	0.826	0	0	0	0	57.4	100	3.58
			EDC-U-3	6,989	29	0.424	0.919	591	789	71.7	1,452	573	3,011	89.6
			EDC-U-4	4,211	29	0.341	0.899	230	474	51.2	755	410	2,317	89.6
			EDC-U-5	2,018	37	0.192	0.859	100	609	21.5	731	373	674	10.8
	HAC-R1	Exposed	HAC-R1-1	14,839	22	0.238	0.809	502	35.8	2,222	2,760	1,720	8,925	0
			HAC-R1-2	18,740	19	0.193	0.727	307	0	2,919	3,226	1,280	12,545	0
			HAC-R1-3	14,775	23	0.254	0.829	358	39.8	1,673	2,071	3,465	8,005	79.7
			HAC-R1-4	25,448	22	0.262	0.826	143	0	4,588	4,731	1,935	15,484	0
			HAC-R1-5	24,946	22	0.200	0.773	358	0	3,584	3,943	717	17,204	0
	HAC-U	Exposed	HAC-U-1	55,627	19	0.365	0.856	215	0	6,953	7,168	0	35,125	573
			HAC-U-2	39,570	24	0.271	0.846	717	0	5,878	6,595	0	24,301	2,366
			HAC-U-3	29,821	24	0.273	0.847	573	0	3,656	4,229	0	19,498	860
			HAC-U-4	45,018	22	0.204	0.777	215	0	2,509	2,724	0	28,029	287
			HAC-U-5	26,595	21	0.273	0.826	573	0	3,154	3,728	0	16,272	3,297
2019	EDC-U	Reference	EDC-U-1	18,500	26	0.237	0.837	6,667	1,444	222	8,333	4,889	4,444	222
			EDC-U-2	7,500	34	0.231	0.873	3,714	429	23.8	4,167	429	2,071	214
			EDC-U-3	27,400	29	0.175	0.803	7,533	1,333	0	8,867	10,467	6,600	400
			EDC-U-4	13,292	28	0.363	0.902	4,250	875	0	5,125	1,000	5,333	83.3
			EDC-U-5	10,467	28	0.296	0.879	4,400	233	167	4,800	233	3,533	66.7
	HAC-R1	Exposed	HAC-R1-1	35,667	25	0.375	0.893	11,600	0	9,000	20,600	5,133	8,267	267
			HAC-R1-2	36,533	27	0.444	0.917	8,333	0	9,467	17,800	5,400	10,333	2,000
			HAC-R1-3	44,667	30	0.412	0.919	10,533	0	9,867	20,400	3,400	18,933	800
			HAC-R1-4	35,400	30	0.406	0.918	6,933	0	6,067	13,000	4,200	15,267	400
			HAC-R1-5	25,200	28	0.340	0.895	6,133	66.7	8,067	14,267	267	8,000	2,267
	HAC-U		HAC-U-1	38,000	31	0.361	0.911	9,200	0	10,667	19,867	200	13,600	3,533
			HAC-U-2	56,400	26	0.446	0.914	9,533	0	12,667	22,200	0	27,667	1,867
			HAC-U-3	57,933	27	0.425	0.913	9,467	0	14,200	23,667	0	27,933	2,533
			HAC-U-4	40,933	26	0.438	0.912	5,867	66.7	11,067	17,000	200	18,467	1,867
			HAC-U-5	43,133	31	0.383	0.916	5,933	0	7,600	13,533	66.7	21,067	667
2020	HAC-R1	Exposed	HAC-R1-1	38,600	25	0.182	0.780	2,200	0	5,933	8,133	16,800	9,933	600
			HAC-R1-2	49,600	29	0.115	0.699	2,133	0	1,067	3,200	26,133	11,733	267
			HAC-R1-3	27,000	26	0.246	0.843	1,533	0	3,067	4,600	9,400	10,667	333
			HAC-R1-4	26,800	31	0.234	0.862	2,733	0	2,600	5,333	8,600	10,133	600
			HAC-R1-5	42,933	29	0.158	0.782	2,067	0	3,133	5,200	18,933	14,667	400
	HAC-U		HAC-U-1	17,778	25	0.202	0.802	7,167	0	5,056	12,222	333	3,722	1,000
			HAC-U-2	21,600	23	0.232	0.812	8,267	0	2,933	11,200	333	3,800	5,800
			HAC-U-3	95,133	27	0.301	0.877	9,600	0	32,000	41,600	1,267	42,800	8,000
			HAC-U-4	42,267	31	0.216	0.851	3,600	0	17,933	21,533	867	16,467	1,733
			HAC-U-5	53,200	32	0.318	0.902	8,800	0	16,000	24,800	1,067	20,333	5,067

Notes: "-" = no data available. EPT = Ephemeroptera, Trichoptera, Plecoptera. DW = dry weight. WW = wet weight. Reference area EDC-U not sampled in 2020 due to habitat differences (in water depth and flow) relative to the remediated areas HAC-R1 and HAC-U. See Section 4.3 for details.

[a] UHC is the pre-breach sampling area associated with HAC-R1 and HAC-U. UER is the pre-breach sampling area associated with EDC-U.

Table D.4.5: **Benthic Invertebrate Community Metrics for Upper Hazeltine Creek (HAC-R1, HAC-U; Exposed) and Upper Edney Creek (EDC-U; Reference), 2007 to 2022**

Year	Area	Area Type	Station	Density (#/m^2)	Richness (# of taxa)	Simpson's Evenness	Simpson's Diversity	Ephemeroptera (#/m^2)	Plecoptera (#/m^2)	Trichoptera (#/m^2)	EPT (#/m^2)	Arachnida (#/m^2)	Chironomidae (#/m^2)	Non-Chironomidae Diptera (#/m^2)
2021	EDC-U	Reference	EDC-U-1	7,814	29	0.220	0.843	430	167	382	980	2,557	3,631	48.4
			EDC-U-2	2,452	40	0.440	0.943	480	136	108	724	251	1,104	21.5
			EDC-U-3	4,287	30	0.299	0.888	530	100	71.7	703	516	1,821	115
			EDC-U-4	4,344	29	0.424	0.919	946	115	43.0	1,104	244	2,437	71.7
			EDC-U-5	3,751	26	0.304	0.873	746	138	57.4	941	963	1,365	0
	HAC-R1	Exposed	HAC-R1-1	7,667	34	0.181	0.837	1,267	0	767	2,033	2,683	1,333	16.7
			HAC-R1-2	9,250	32	0.298	0.895	2,139	0	2,528	4,667	1,667	1,750	0
			HAC-R1-3	11,767	26	0.183	0.790	2,467	33.3	700	3,200	4,800	2,667	33.3
			HAC-R1-4	10,667	32	0.193	0.838	2,667	0	567	3,233	3,433	2,367	33.3
			HAC-R1-5	11,133	34	0.247	0.881	3,167	133	500	3,800	2,733	3,800	33.3
	HAC-U	Exposed	HAC-U-1	13,292	24	0.340	0.878	6,458	0	3,583	10,042	250	2,458	125
			HAC-U-2	16,952	20	0.381	0.869	9,714	0	4,000	13,714	143	2,571	47.6
			HAC-U-3	12,593	28	0.257	0.861	6,704	0	2,407	9,111	148	2,296	222
			HAC-U-4	22,200	27	0.214	0.827	7,600	0	10,667	18,267	200	2,533	533
			HAC-U-5	15,952	31	0.177	0.818	4,524	47.6	7,476	12,048	0	2,190	286
2022	EDC-U	Reference	EDC-U-1	27,814	26	0.161	0.761	4,086	3,441	358	7,885	12,903	4,875	143
			EDC-U-2	28,029	25	0.192	0.792	5,878	1,147	0	7,025	3,943	4,875	71.7
			EDC-U-3	39,211	31	0.255	0.873	8,961	1,434	10,538	20,932	5,806	9,749	0
			EDC-U-4	9,032	34	0.335	0.912	3,441	1,523	806	5,771	1,326	1,111	35.8
			EDC-U-5	7,860	29	0.383	0.910	1,382	794	1,126	3,303	1,357	1,920	102
	HAC-R1	Exposed	HAC-R1-1	52,067	26	0.239	0.839	3,133	0	10,067	13,200	2,733	32,467	1,333
			HAC-R1-2	52,133	25	0.195	0.795	3,000	0	13,933	16,933	1,133	31,200	1,600
			HAC-R1-3	60,933	36	0.197	0.859	3,333	0	7,733	11,067	6,333	38,800	1,267
			HAC-R1-4	28,267	30	0.384	0.913	2,667	0	5,200	7,867	1,133	15,933	267
			HAC-R1-5	28,933	29	0.331	0.896	1,533	0	4,333	5,867	933	19,867	400
			HAC-U-1	36,333	34	0.263	0.888	5,133	0	10,733	15,867	467	15,067	600
			HAC-U-2	28,267	30	0.371	0.910	3,933	66.7	7,067	11,067	1,867	10,533	200
			HAC-U-3	37,400	32	0.230	0.864	4,933	0	13,867	18,800	1,000	11,600	733
			HAC-U-4	39,200	31	0.295	0.891	4,933	0	13,467	18,400	733	15,261	1,473
			HAC-U-5	27,533	33	0.400	0.924	4,133	0	5,267	9,400	1,200	9,200	533

Notes: "-" = no data available. EPT = Ephemeroptera, Trichoptera, Plecoptera. DW = dry weight. WW = wet weight. Reference area EDC-U not sampled in 2020 due to habitat differences (in water depth and flow) relative to the remediated areas HAC-R1 and HAC-U. See Section 4.3 for details.

[a] UHC is the pre-breach sampling area associated with HAC-R1 and HAC-U. UER is the pre-breach sampling area associated with EDC-U.

Table D.4.5: **Benthic Invertebrate Community Metrics for Upper Hazeltine Creek (HAC-R1, HAC-U; Exposed) and Upper Edney Creek (EDC-U; Reference), 2007 to 2022**

Year	Area	Area Type	Station	Oligochaeta (#/m^2)	Ephemeroptera (%)	Plecoptera (%)	Trichoptera (%)	EPT (%)	Arachnida (%)	Chironomidae (%)	Non-Chironomidae Diptera (%)	Oligochaeta (%)	Dry Weight Biomass (g/m^2 DW)	Wet Weight Biomass (g/m^2 WW)
2007	EDC-U (UER)[a]	Reference (Pre- Breach)	EDC-U-1	344	50.9	6.33	8.13	65.4	5.20	20.8	1.12	1.56	-	-
			EDC-U-2	0	32.1	8.22	13.8	54.1	10.2	30.1	0.598	0	-	-
			EDC-U-3	115	37.4	4.07	4.83	46.3	12.9	35.2	0.522	0.283	-	-
			EDC-U-4	0	39.7	8.05	18.8	66.6	3.46	24.5	0.369	0	-	-
			EDC-U-5	459	57.0	11.9	4.76	73.6	5.98	14.1	0.363	0.703	-	-
	HAC-U (UHC)[a]	Exposed (Pre- Breach)	HAC-U-1	344	41.3	6.56	4.20	52.1	2.53	29.1	0.654	0.491	-	-
			HAC-U-2	746	41.0	5.80	4.40	51.2	23.4	15.4	1.19	2.20	-	-
			HAC-U-3	459	42.5	7.57	3.93	54.0	4.27	31.1	0.813	1.63	-	-
			HAC-U-4	229	42.3	12.8	5.96	61.1	14.9	14.4	1.22	0.542	-	-
			HAC-U-5	832	36.9	11.9	6.09	54.9	16.5	18.1	0.927	3.84	-	-
2018	EDC-U	Reference	EDC-U-1	256	2.98	5.15	4.07	12.2	37.4	44.7	1.08	1.36	3.03	20.2
			EDC-U-2	7.17	0	0	0	0	32.0	56.0	2.00	4.00	0.0100	0.0710
			EDC-U-3	753	8.46	11.3	1.03	20.8	8.21	43.1	1.28	10.8	3.70	14.6
			EDC-U-4	410	5.47	11.2	1.22	17.9	9.73	55.0	2.13	9.73	0.177	1.37
			EDC-U-5	93.2	4.97	30.2	1.07	36.2	18.5	33.4	0.533	4.62	0.0548	0.419
	HAC-R1	Exposed	HAC-R1-1	430	3.38	0.242	15.0	18.6	11.6	60.1	0	2.90	0.502	4.50
			HAC-R1-2	205	1.64	0	15.6	17.2	6.83	66.9	0	1.09	0.814	4.97
			HAC-R1-3	438	2.43	0.270	11.3	14.0	23.4	54.2	0.539	2.96	0.434	2.27
			HAC-R1-4	1,505	0.563	0	18.0	18.6	7.61	60.9	0	5.92	1.38	7.40
			HAC-R1-5	1,935	1.44	0	14.4	15.8	2.87	69.0	0	7.76	0.889	4.51
	HAC-U	Exposed	HAC-U-1	12,545	0.387	0	12.5	12.9	0	63.1	1.03	22.6	2.59	13.4
			HAC-U-2	6,165	1.81	0	14.9	16.7	0	61.4	5.98	15.6	1.20	9.26
			HAC-U-3	5,233	1.92	0	12.3	14.2	0	65.4	2.88	17.6	0.910	6.29
			HAC-U-4	12,545	0.478	0	5.57	6.05	0	62.3	0.637	27.9	0.824	3.89
			HAC-U-5	3,154	2.16	0	11.9	14.0	0	61.2	12.4	11.9	0.674	3.71
2019	EDC-U	Reference	EDC-U-1	55.6	36.0	7.81	1.20	45.0	26.4	24.0	1.20	0.300	1.34	13.5
			EDC-U-2	357	49.5	5.71	0.317	55.6	5.71	27.6	2.86	4.76	0.336	1.63
			EDC-U-3	400	27.5	4.87	0	32.4	38.2	24.1	1.46	1.46	3.04	17.6
			EDC-U-4	1,167	32.0	6.58	0	38.6	7.52	40.1	0.627	8.78	0.462	2.50
			EDC-U-5	1,533	42.0	2.23	1.59	45.9	2.23	33.8	0.637	14.6	0.287	1.56
	HAC-R1	Exposed	HAC-R1-1	533	32.5	0	25.2	57.8	14.4	23.2	0.748	1.50	5.53	42.3
			HAC-R1-2	133	22.8	0	25.9	48.7	14.8	28.3	5.47	0.365	5.05	30.5
			HAC-R1-3	267	23.6	0	22.1	45.7	7.61	42.4	1.79	0.597	3.07	22.5
			HAC-R1-4	1,000	19.6	0	17.1	36.7	11.9	43.1	1.13	2.82	1.93	12.1
			HAC-R1-5	267	24.3	0.265	32.0	56.6	1.06	31.8	8.99	1.06	2.37	15.6
	HAC-U		HAC-U-1	0	24.2	0	28.1	52.3	0.526	35.8	9.30	0	12.3	53.7
			HAC-U-2	4,600	16.9	0	22.5	39.4	0	49.0	3.31	8.16	3.88	29.7
			HAC-U-3	3,667	16.3	0	24.5	40.9	0	48.2	4.37	6.33	5.54	33.9
			HAC-U-4	3,200	14.3	0.163	27.0	41.5	0.489	45.1	4.56	7.82	2.99	19.7
			HAC-U-5	4,667	13.8	0	17.6	31.4	0.155	48.8	1.55	10.8	1.85	11.7
2020	HAC-R1	Exposed	HAC-R1-1	400	5.70	0	15.4	21.1	43.5	25.7	1.55	1.04	1.54	17.7
			HAC-R1-2	1,667	4.30	0	2.15	6.45	52.7	23.7	0.538	3.36	3.33	12.6
			HAC-R1-3	400	5.68	0	11.4	17.0	34.8	39.5	1.23	1.48	2.52	13.8
			HAC-R1-4	467	10.2	0	9.70	19.9	32.1	37.8	2.24	1.74	8.89	47.2
			HAC-R1-5	1,133	4.81	0	7.30	12.1	44.1	34.2	0.932	2.64	3.58	13.3
	HAC-U		HAC-U-1	0	40.3	0	28.4	68.8	1.87	20.9	5.62	0	3.97	21.2
			HAC-U-2	66.7	38.3	0	13.6	51.9	1.54	17.6	26.9	0.309	1.53	10.3
			HAC-U-3	133	10.1	0	33.6	43.7	1.33	45.0	8.41	0.140	12.6	70.4
			HAC-U-4	533	8.52	0	42.4	51.0	2.05	39.0	4.10	1.26	4.87	23.3
			HAC-U-5	667	16.5	0	30.1	46.6	2.01	38.2	9.52	1.25	3.67	18.1

Notes: "-" = no data available. EPT = Ephemeroptera, Trichoptera, Plecoptera. DW = dry weight. WW = wet weight. Reference area EDC-U not sampled in 2020 due to habitat differences (in water depth and flow) relative to the remediated areas HAC-R1 and HAC-U. See Section 4.3 for details.

[a] UHC is the pre-breach sampling area associated with HAC-R1 and HAC-U. UER is the pre-breach sampling area associated with EDC-U.

Table D.4.5: Benthic Invertebrate Community Metrics for Upper Hazeltine Creek (HAC-R1, HAC-U; Exposed) and Upper Edney Creek (EDC-U; Reference), 2007 to 2022

Year	Area	Area Type	Station	Oligochaeta (#/m^2)	Ephemeroptera (%)	Plecoptera (%)	Trichoptera (%)	EPT (%)	Arachnida (%)	Chironomidae (%)	Non-Chironomidae Diptera (%)	Oligochaeta (%)	Dry Weight Biomass (g/m^2 DW)	Wet Weight Biomass (g/m^2 WW)
2021	EDC-U	Reference	EDC-U-1	215	5.50	2.14	4.89	12.5	32.7	46.5	0.620	2.75	0.346	1.71
			EDC-U-2	151	19.6	5.56	4.39	29.5	10.2	45.0	0.877	6.14	1.27	5.84
			EDC-U-3	1,061	12.4	2.34	1.67	16.4	12.0	42.5	2.68	24.8	0.222	1.18
			EDC-U-4	330	21.8	2.64	0.990	25.4	5.61	56.1	1.65	7.59	0.376	2.36
			EDC-U-5	252	19.9	3.67	1.53	25.1	25.7	36.4	0	6.73	0.475	1.98
	HAC-R1	Exposed	HAC-R1-1	183	16.5	0	10.0	26.5	35.0	17.4	0.217	2.39	1.98	8.97
			HAC-R1-2	55.6	23.1	0	27.3	50.5	18.0	18.9	0	0.601	2.84	11.3
			HAC-R1-3	0	21.0	0.283	5.95	27.2	40.8	22.7	0.283	0	1.63	7.11
			HAC-R1-4	100	25.0	0	5.31	30.3	32.2	22.2	0.312	0.938	1.07	4.74
			HAC-R1-5	167	28.4	1.20	4.49	34.1	24.6	34.1	0.299	1.50	6.80	19.8
	HAC-U	Exposed	HAC-U-1	0	48.6	0	27.0	75.5	1.88	18.5	0.940	0	2.80	15.0
			HAC-U-2	47.6	57.3	0	23.6	80.9	0.843	15.2	0.281	0.281	1.10	6.82
			HAC-U-3	185	53.2	0	19.1	72.3	1.18	18.2	1.76	1.47	4.06	15.8
			HAC-U-4	133	34.2	0	48.0	82.3	0.901	11.4	2.40	0.601	2.41	16.4
			HAC-U-5	143	28.4	0.299	46.9	75.5	0	13.7	1.79	0.896	3.26	14.9
2022	EDC-U	Reference	EDC-U-1	1,434	14.7	12.4	1.29	28.4	46.4	17.5	0.515	5.15	21.7	77.2
			EDC-U-2	215	21.0	4.09	0	25.1	14.1	17.4	0.256	0.767	1.12	4.79
			EDC-U-3	645	22.9	3.66	26.9	53.4	14.8	24.9	0	1.65	1.55	7.18
			EDC-U-4	305	38.1	16.9	8.93	63.9	14.7	12.3	0.397	3.37	0.797	3.95
			EDC-U-5	179	17.6	10.1	14.3	42.0	17.3	24.4	1.30	2.28	0.264	1.35
	HAC-R1	Exposed	HAC-R1-1	467	6.02	0	19.3	25.4	5.25	62.4	2.56	0.896	2.47	13.9
			HAC-R1-2	0	5.75	0	26.7	32.5	2.17	59.9	3.07	0	3.05	17.0
			HAC-R1-3	267	5.47	0	12.7	18.2	10.4	63.7	2.08	0.438	1.56	8.21
			HAC-R1-4	400	9.43	0	18.4	27.8	4.01	56.4	0.943	1.42	2.43	11.1
			HAC-R1-5	333	5.30	0	15.0	20.3	3.23	68.7	1.38	1.15	1.17	6.56
			HAC-U-1	66.7	14.1	0	29.5	43.7	1.28	41.5	1.65	0.183	6.37	21.0
			HAC-U-2	133	13.9	0.236	25.0	39.1	6.60	37.3	0.708	0.472	2.75	10.4
			HAC-U-3	133	13.2	0	37.1	50.3	2.67	31.0	1.96	0.357	3.52	15.3
			HAC-U-4	66.7	12.6	0	34.4	46.9	1.87	38.9	3.76	0.170	3.12	15.8
			HAC-U-5	200	15.0	0	19.1	34.1	4.36	33.4	1.94	0.726	7.06	28.9

Notes: "-" = no data available. EPT = Ephemeroptera, Trichoptera, Plecoptera. DW = dry weight. WW = wet weight. Reference area EDC-U not sampled in 2020 due to habitat differences (in water depth and flow) relative to the remediated areas HAC-R1 and HAC-U. See Section 4.3 for details.

[a] UHC is the pre-breach sampling area associated with HAC-R1 and HAC-U. UER is the pre-breach sampling area associated with EDC-U.

Table D.4.6: Summary Statistics of Benthic Invertebrate Community Metrics for Upper Hazeltine Creek (HAC-R1, HAC-U; Exposed) and Upper Edney Creek (EDC-U; Reference), 2007 to 2022

Endpoint	Year	Area	Area Type	n	Mean	Standard Deviation	Minimum	Median	Maximum
Density (#/m²)	2007	EDC-U (UER)[a]	Reference (Pre-Breach)	5	49,703	18,255	22,075	57,534	65,222
		HAC-U (UHC)[a]	Exposed (Pre-Breach)	5	39,228	18,874	21,642	33,857	70,143
	2018	EDC-U	Reference	5	6,458	7,401	179	4,211	18,894
		HAC-R1	Exposed	5	19,750	5,229	14,775	18,740	25,448
		HAC-U	Exposed	5	39,326	11,733	26,595	39,570	55,627
	2019	EDC-U	Reference	5	15,432	7,823	7,500	13,292	27,400
		HAC-R1	Exposed	5	35,493	6,914	25,200	35,667	44,667
		HAC-U	Exposed	5	47,280	9,223	38,000	43,133	57,933
	2020	HAC-R1	Exposed	5	36,987	10,007	26,800	38,600	49,600
		HAC-U	Exposed	5	45,996	31,112	17,778	42,267	95,133
	2021	EDC-U	Reference	5	4,529	1,988	2,452	4,287	7,814
		HAC-R1	Exposed	5	10,097	1,644	7,667	10,667	11,767
		HAC-U	Exposed	6	15,597	3,713	12,593	14,622	22,200
	2022	EDC-U	Reference	5	22,389	13,544	7,860	27,814	39,211
		HAC-R1	Exposed	5	44,467	14,928	28,267	52,067	60,933
		HAC-U	Exposed	5	33,747	5,441	27,533	36,333	39,200
Richness (# of taxa)	2007	EDC-U (UER)[a]	Reference (Pre-Breach)	5	39.4	3.21	35	41.0	42
		HAC-U (UHC)[a]	Exposed (Pre-Breach)	5	44.2	3.19	40	45.0	48
	2018	EDC-U	Reference	5	27.0	8.34	14	29.0	37
		HAC-R1	Exposed	5	21.6	1.52	19	22.0	23
		HAC-U	Exposed	5	22.0	2.12	19	22.0	24
	2019	EDC-U	Reference	5	29.0	3.00	26	28.0	34
		HAC-R1	Exposed	5	28.0	2.12	25	28.0	30
		HAC-U	Exposed	5	28.2	2.59	26	27.0	31
	2020	HAC-R1	Exposed	5	28.0	2.45	25	29.0	31
		HAC-U	Exposed	5	27.6	3.85	23	27.0	32
	2021	EDC-U	Reference	5	30.8	5.36	26	29.0	40
		HAC-R1	Exposed	5	31.6	3.29	26	32.0	34
		HAC-U	Exposed	6	26.3	3.83	20	27.5	31
	2022	EDC-U	Reference	5	29.0	3.67	25	29.0	34
		HAC-R1	Exposed	5	29.2	4.32	25	29.0	36
		HAC-U	Exposed	5	32.0	1.58	30	32.0	34
Simpson's Evenness	2007	EDC-U (UER)[a]	Reference (Pre-Breach)	5	0.314	0.0900	0.229	0.274	0.423
		HAC-U (UHC)[a]	Exposed (Pre-Breach)	5	0.269	0.0323	0.224	0.266	0.314
	2018	EDC-U	Reference	5	0.309	0.117	0.178	0.341	0.424
		HAC-R1	Exposed	5	0.229	0.0314	0.193	0.238	0.262
		HAC-U	Exposed	5	0.277	0.0572	0.204	0.273	0.365
	2019	EDC-U	Reference	5	0.260	0.0716	0.175	0.237	0.363
		HAC-R1	Exposed	5	0.395	0.0397	0.340	0.406	0.444
		HAC-U	Exposed	5	0.411	0.0368	0.361	0.425	0.446
	2020	HAC-R1	Exposed	5	0.187	0.0540	0.115	0.182	0.246
		HAC-U	Exposed	5	0.254	0.0525	0.202	0.232	0.318
	2021	EDC-U	Reference	5	0.337	0.0929	0.220	0.304	0.440
		HAC-R1	Exposed	5	0.220	0.0511	0.181	0.193	0.298
		HAC-U	Exposed	6	0.271	0.0766	0.177	0.257	0.381
	2022	EDC-U	Reference	5	0.265	0.0934	0.161	0.255	0.383
		HAC-R1	Exposed	5	0.269	0.0848	0.195	0.239	0.384
		HAC-U	Exposed	5	0.312	0.0720	0.230	0.295	0.400
Simpson's Diversity	2007	EDC-U (UER)[a]	Reference (Pre-Breach)	5	0.913	0.0239	0.882	0.913	0.944
		HAC-U (UHC)[a]	Exposed (Pre-Breach)	5	0.915	0.0117	0.894	0.920	0.922
	2018	EDC-U	Reference	5	0.857	0.0545	0.784	0.859	0.919
		HAC-R1	Exposed	5	0.793	0.0432	0.727	0.809	0.829
		HAC-U	Exposed	5	0.830	0.0318	0.777	0.846	0.856
	2019	EDC-U	Reference	5	0.859	0.0387	0.803	0.873	0.902
		HAC-R1	Exposed	5	0.908	0.0131	0.893	0.917	0.919
		HAC-U	Exposed	5	0.913	0.00190	0.911	0.913	0.916
	2020	HAC-R1	Exposed	5	0.793	0.0639	0.699	0.782	0.862
		HAC-U	Exposed	5	0.849	0.0422	0.802	0.851	0.902
	2021	EDC-U	Reference	5	0.893	0.0389	0.843	0.888	0.943
		HAC-R1	Exposed	5	0.848	0.0417	0.790	0.838	0.895
		HAC-U	Exposed	6	0.852	0.0240	0.818	0.861	0.878
	2022	EDC-U	Reference	5	0.850	0.0693	0.761	0.873	0.912
		HAC-R1	Exposed	5	0.860	0.0469	0.795	0.859	0.913
		HAC-U	Exposed	5	0.895	0.0230	0.864	0.891	0.924
Ephemeroptera (#/m²)	2007	EDC-U (UER)[a]	Reference (Pre-Breach)	5	21,429	10,168	11,240	18,473	37,172
		HAC-U (UHC)[a]	Exposed (Pre-Breach)	5	16,146	8,014	7,986	13,878	28,986
	2018	EDC-U	Reference	5	297	269	0	230	591
		HAC-R1	Exposed	5	334	129	143	358	502
		HAC-U	Exposed	5	459	230	215	573	717
	2019	EDC-U	Reference	5	5,313	1,679	3,714	4,400	7,533
		HAC-R1	Exposed	5	8,707	2,325	6,133	8,333	11,600
		HAC-U	Exposed	5	8,000	1,921	5,867	9,200	9,533
	2020	HAC-R1	Exposed	5	2,133	427	1,533	2,133	2,733
		HAC-U	Exposed	5	7,487	2,346	3,600	8,267	9,600
	2021	EDC-U	Reference	5	627	215	430	530	946
		HAC-R1	Exposed	5	2,341	707	1,267	2,467	3,167
		HAC-U	Exposed	6	6,951	1,692	4,524	6,704	9,714
	2022	EDC-U	Reference	5	4,750	2,850	1,382	4,086	8,961
		HAC-R1	Exposed	5	2,733	713	1,533	3,000	3,333
		HAC-U	Exposed	5	4,613	540	3,933	4,933	5,133
Plecoptera (#/m²)	2007	EDC-U (UER)[a]	Reference (Pre-Breach)	5	4,120	2,641	1,398	4,731	7,735
		HAC-U (UHC)[a]	Exposed (Pre-Breach)	5	3,341	1,573	1,964	2,573	5,430
	2018	EDC-U	Reference	5	569	369	0	609	973
		HAC-R1	Exposed	5	15.1	20.8	0	0	39.8
		HAC-U	Exposed	5	0	0	0	0	0
	2019	EDC-U	Reference	5	863	535	233	875	1,444
		HAC-R1	Exposed	5	13.3	29.8	0	0	66.7
		HAC-U	Exposed	5	13.3	29.8	0	0	66.7
	2020	HAC-R1	Exposed	5	0	0	0	0	0
		HAC-U	Exposed	5	0	0	0	0	0
	2021	EDC-U	Reference	5	131	25.4	100	136	167
		HAC-R1	Exposed	5	33.3	57.7	0	0	133
		HAC-U	Exposed	6	7.94	19.4	0	0	47.6
	2022	EDC-U	Reference	5	1,668	1,031	794	1,434	3,441
		HAC-R1	Exposed	5	0	0	0	0	0
		HAC-U	Exposed	5	13.3	29.8	0	0	66.7

Notes: "-" = no value. EPT = Ephemeroptera, Plecoptera, Trichoptera. DW = dry weight. WW = wet weight. #/m^2 = number per metre squared. g/m^2 = grams per metre squared. EDC-U not sampled in 2020 due to habitat differences (in water depth and flow) relative to the Exposed areas HAC-R1 and HAC-U. See Section 4.3 for details.

[a] W7 is the historical sampling area associated with HAC-U and UER is the historical sampling area associated with EDC-U.

Table D.4.6: Summary Statistics of Benthic Invertebrate Community Metrics for Upper Hazeltine Creek (HAC-R1, HAC-U; Exposed) and Upper Edney Creek (EDC-U; Reference), 2007 to 2022

Endpoint	Year	Area	Area Type	n	Mean	Standard Deviation	Minimum	Median	Maximum
Trichoptera (#/m²)	2007	EDC-U (UER)[a]	Reference (Pre-Breach)	5	5,338	4,433	1,796	3,104	11,882
		HAC-U (UHC)[a]	Exposed (Pre-Breach)	5	1,876	806	1,108	1,491	2,943
	2018	EDC-U	Reference	5	182	328	0	51.2	768
		HAC-R1	Exposed	5	2,997	1,144	1,673	2,919	4,588
		HAC-U	Exposed	5	4,430	1,896	2,509	3,656	6,953
	2019	EDC-U	Reference	5	82.5	104	0	23.8	222
		HAC-R1	Exposed	5	8,493	1,513	6,067	9,000	9,867
		HAC-U	Exposed	5	11,240	2,470	7,600	11,067	14,200
	2020	HAC-R1	Exposed	5	3,160	1,760	1,067	3,067	5,933
		HAC-U	Exposed	5	14,784	11,650	2,933	16,000	32,000
	2021	EDC-U	Reference	5	132	142	43.0	71.7	382
		HAC-R1	Exposed	5	1,012	854	500	700	2,528
		HAC-U	Exposed	6	5,090	3,306	2,407	3,792	10,667
	2022	EDC-U	Reference	5	2,566	4,477	0	806	10,538
		HAC-R1	Exposed	5	8,253	3,889	4,333	7,733	13,933
		HAC-U	Exposed	5	10,080	3,824	5,267	10,733	13,867
EPT (#/m²)	2007	EDC-U (UER)[a]	Reference (Pre-Breach)	5	30,886	14,464	14,434	31,154	48,011
		HAC-U (UHC)[a]	Exposed (Pre-Breach)	5	21,363	9,923	11,878	17,333	36,530
	2018	EDC-U	Reference	5	1,048	870	0	755	2,304
		HAC-R1	Exposed	5	3,346	1,032	2,071	3,226	4,731
		HAC-U	Exposed	5	4,889	1,909	2,724	4,229	7,168
	2019	EDC-U	Reference	5	6,258	2,173	4,167	5,125	8,867
		HAC-R1	Exposed	5	17,213	3,479	13,000	17,800	20,600
		HAC-U	Exposed	5	19,253	4,072	13,533	19,867	23,667
	2020	HAC-R1	Exposed	5	5,293	1,799	3,200	5,200	8,133
		HAC-U	Exposed	5	22,271	12,289	11,200	21,533	41,600
	2021	EDC-U	Reference	5	890	173	703	941	1,104
		HAC-R1	Exposed	5	3,387	962	2,033	3,233	4,667
		HAC-U	Exposed	6	12,049	3,542	9,111	11,045	18,267
	2022	EDC-U	Reference	5	8,983	6,899	3,303	7,025	20,932
		HAC-R1	Exposed	5	10,987	4,365	5,867	11,067	16,933
		HAC-U	Exposed	5	14,707	4,276	9,400	15,867	18,800
Arachnida (#/m²)	2007	EDC-U (UER)[a]	Reference (Pre-Breach)	5	3,660	1,985	1,147	3,900	5,849
		HAC-U (UHC)[a]	Exposed (Pre-Breach)	5	4,153	2,893	1,204	3,563	7,914
	2018	EDC-U	Reference	5	1,696	3,008	57.4	410	7,066
		HAC-R1	Exposed	5	1,824	1,029	717	1,720	3,465
		HAC-U	Exposed	5	0	0	0	0	0
	2019	EDC-U	Reference	5	3,403	4,381	233	1,000	10,467
		HAC-R1	Exposed	5	3,680	2,066	267	4,200	5,400
		HAC-U	Exposed	5	93.3	101	0	66.7	200
	2020	HAC-R1	Exposed	5	15,973	7,250	8,600	16,800	26,133
		HAC-U	Exposed	5	773	426	333	867	1,267
	2021	EDC-U	Reference	5	906	968	244	516	2,557
		HAC-R1	Exposed	5	3,063	1,157	1,667	2,733	4,800
		HAC-U	Exposed	6	148	83.7	0	148	250
	2022	EDC-U	Reference	5	5,067	4,769	1,326	3,943	12,903
		HAC-R1	Exposed	5	2,453	2,287	933	1,133	6,333
		HAC-U	Exposed	5	1,053	532	467	1,000	1,867
Chironomidae (#/m²)	2007	EDC-U (UER)[a]	Reference (Pre-Breach)	5	12,166	5,205	4,585	14,265	17,319
		HAC-U (UHC)[a]	Exposed (Pre-Breach)	5	8,883	6,687	3,928	6,079	20,416
	2018	EDC-U	Reference	5	2,910	3,314	100	2,317	8,449
		HAC-R1	Exposed	5	12,432	4,000	8,005	12,545	17,204
		HAC-U	Exposed	5	24,645	7,382	16,272	24,301	35,125
	2019	EDC-U	Reference	5	4,397	1,724	2,071	4,444	6,600
		HAC-R1	Exposed	5	12,160	4,778	8,000	10,333	18,933
		HAC-U	Exposed	5	21,747	6,142	13,600	21,067	27,933
	2020	HAC-R1	Exposed	5	11,427	1,941	9,933	10,667	14,667
		HAC-U	Exposed	5	17,424	16,021	3,722	16,467	42,800
	2021	EDC-U	Reference	5	2,072	1,008	1,104	1,821	3,631
		HAC-R1	Exposed	5	2,383	948	1,333	2,367	3,800
		HAC-U	Exposed	6	2,391	152	2,190	2,377	2,571
	2022	EDC-U	Reference	5	4,506	3,390	1,111	4,875	9,749
		HAC-R1	Exposed	5	27,653	9,460	15,933	31,200	38,800
		HAC-U	Exposed	5	12,332	2,722	9,200	11,600	15,261
Non-Chironomidae Diptera (#/m²)	2007	EDC-U (UER)[a]	Reference (Pre-Breach)	5	254	51.8	211	237	344
		HAC-U (UHC)[a]	Exposed (Pre-Breach)	5	361	140	201	401	516
	2018	EDC-U	Reference	5	79.7	81.2	3.58	89.6	205
		HAC-R1	Exposed	5	15.9	35.6	0	0	79.7
		HAC-U	Exposed	5	1,477	1,296	287	860	3,297
	2019	EDC-U	Reference	5	197	134	66.7	214	400
		HAC-R1	Exposed	5	1,147	927	267	800	2,267
		HAC-U	Exposed	5	2,093	1,049	667	1,867	3,533
	2020	HAC-R1	Exposed	5	440	153	267	400	600
		HAC-U	Exposed	5	4,320	2,916	1,000	5,067	8,000
	2021	EDC-U	Reference	5	51.3	44.6	0	48.4	115
		HAC-R1	Exposed	5	23.3	14.9	0	33.3	33.3
		HAC-U	Exposed	6	239	167	47.6	222	533
	2022	EDC-U	Reference	5	70.7	55.9	0	71.7	143
		HAC-R1	Exposed	5	973	599	267	1,267	1,600
		HAC-U	Exposed	5	708	470	200	600	1,473
Oligochaeta (#/m²)	2007	EDC-U (UER)[a]	Reference (Pre-Breach)	5	184	208	0	115	459
		HAC-U (UHC)[a]	Exposed (Pre-Breach)	5	522	258	229	459	832
	2018	EDC-U	Reference	5	304	295	7.17	256	753
		HAC-R1	Exposed	5	903	767	205	438	1,935
		HAC-U	Exposed	5	7,928	4,353	3,154	6,165	12,545
	2019	EDC-U	Reference	5	703	619	55.6	400	1,533
		HAC-R1	Exposed	5	440	345	133	267	1,000
		HAC-U	Exposed	5	3,227	1,908	0	3,667	4,667
	2020	HAC-R1	Exposed	5	813	568	400	467	1,667
		HAC-U	Exposed	5	280	300	0	133	667
	2021	EDC-U	Reference	5	402	374	151	252	1,061
		HAC-R1	Exposed	5	101	76.4	0	100	183
		HAC-U	Exposed	6	116	75.8	0	138	185
	2022	EDC-U	Reference	5	556	524	179	305	1,434
		HAC-R1	Exposed	5	293	180	0	333	467
		HAC-U	Exposed	5	120	55.8	66.7	133	200

Notes: "-" = no value. EPT = Ephemeroptera, Plecoptera, Trichoptera. DW = dry weight. WW = wet weight. #/m^2 = number per metre squared. g/m^2 = grams per metre squared. EDC-U not sampled in 2020 due to habitat differences (in water depth and flow) relative to the Exposed areas HAC-R1 and HAC-U. See Section 4.3 for details.

[a] W7 is the historical sampling area associated with HAC-U and UER is the historical sampling area associated with EDC-U.

Table D.4.6: Summary Statistics of Benthic Invertebrate Community Metrics for Upper Hazeltine Creek (HAC-R1, HAC-U; Exposed) and Upper Edney Creek (EDC-U; Reference), 2007 to 2022

Endpoint	Year	Area	Area Type	n	Mean	Standard Deviation	Minimum	Median	Maximum
Ephemeroptera (%)	2007	EDC-U (UER)[a]	Reference (Pre-Breach)	5	43.4	10.2	32.1	39.7	57.0
		HAC-U (UHC)[a]	Exposed (Pre-Breach)	5	40.8	2.28	36.9	41.3	42.5
	2018	EDC-U	Reference	5	4.38	3.14	0	4.97	8.46
		HAC-R1	Exposed	5	1.89	1.07	0.563	1.64	3.38
		HAC-U	Exposed	5	1.35	0.849	0.387	1.81	2.16
	2019	EDC-U	Reference	5	37.4	8.63	27.5	36.0	49.5
		HAC-R1	Exposed	5	24.6	4.80	19.6	23.6	32.5
		HAC-U	Exposed	5	17.1	4.18	13.8	16.3	24.2
	2020	HAC-R1	Exposed	5	6.14	2.35	4.30	5.68	10.2
		HAC-U	Exposed	5	22.8	15.4	8.52	16.5	40.3
	2021	EDC-U	Reference	5	15.8	6.79	5.50	19.6	21.8
		HAC-R1	Exposed	5	22.8	4.46	16.5	23.1	28.4
		HAC-U	Exposed	6	45.8	11.7	28.4	50.9	57.3
	2022	EDC-U	Reference	5	22.8	9.09	14.7	21.0	38.1
		HAC-R1	Exposed	5	6.40	1.72	5.30	5.75	9.43
		HAC-U	Exposed	5	13.8	0.926	12.6	13.9	15.0
Plecoptera (%)	2007	EDC-U (UER)[a]	Reference (Pre-Breach)	5	7.71	2.86	4.07	8.05	11.9
		HAC-U (UHC)[a]	Exposed (Pre-Breach)	5	8.93	3.21	5.80	7.57	12.8
	2018	EDC-U	Reference	5	11.6	11.4	0	11.2	30.2
		HAC-R1	Exposed	5	0.102	0.140	0	0	0.270
		HAC-U	Exposed	5	0	0	0	0	0
	2019	EDC-U	Reference	5	5.44	2.10	2.23	5.71	7.81
		HAC-R1	Exposed	5	0.0529	0.118	0	0	0.265
		HAC-U	Exposed	5	0.0326	0.0728	0	0	0.163
	2020	HAC-R1	Exposed	5	0	0	0	0	0
		HAC-U	Exposed	5	0	0	0	0	0
	2021	EDC-U	Reference	5	3.27	1.41	2.14	2.64	5.56
		HAC-R1	Exposed	5	0.296	0.519	0	0	1.20
		HAC-U	Exposed	6	0.0498	0.122	0	0	0.299
	2022	EDC-U	Reference	5	9.42	5.62	3.66	10.1	16.9
		HAC-R1	Exposed	5	0	0	0	0	0
		HAC-U	Exposed	5	0.0472	0.105	0	0	0.236
Trichoptera (%)	2007	EDC-U (UER)[a]	Reference (Pre-Breach)	5	10.1	6.12	4.76	8.13	18.8
		HAC-U (UHC)[a]	Exposed (Pre-Breach)	5	4.92	1.03	3.93	4.40	6.09
	2018	EDC-U	Reference	5	1.47	1.53	0	1.07	4.07
		HAC-R1	Exposed	5	14.8	2.41	11.3	15.0	18.0
		HAC-U	Exposed	5	11.4	3.47	5.57	12.3	14.9
	2019	EDC-U	Reference	5	0.622	0.732	0	0.317	1.59
		HAC-R1	Exposed	5	24.5	5.45	17.1	25.2	32.0
		HAC-U	Exposed	5	23.9	4.16	17.6	24.5	28.1
	2020	HAC-R1	Exposed	5	9.18	4.91	2.15	9.70	15.4
		HAC-U	Exposed	5	29.6	10.5	13.6	30.1	42.4
	2021	EDC-U	Reference	5	2.69	1.80	0.990	1.67	4.89
		HAC-R1	Exposed	5	10.6	9.58	4.49	5.95	27.3
		HAC-U	Exposed	6	30.6	13.4	19.1	25.3	48.0
	2022	EDC-U	Reference	5	10.3	11.0	0	8.93	26.9
		HAC-R1	Exposed	5	18.4	5.35	12.7	18.4	26.7
		HAC-U	Exposed	5	29.0	7.20	19.1	29.5	37.1
EPT (%)	2007	EDC-U (UER)[a]	Reference (Pre-Breach)	5	61.2	10.9	46.3	65.4	73.6
		HAC-U (UHC)[a]	Exposed (Pre-Breach)	5	54.6	3.89	51.2	54.0	61.1
	2018	EDC-U	Reference	5	17.4	13.2	0	17.9	36.2
		HAC-R1	Exposed	5	16.8	1.96	14.0	17.2	18.6
		HAC-U	Exposed	5	12.8	4.00	6.05	14.0	16.7
	2019	EDC-U	Reference	5	43.5	8.69	32.4	45.0	55.6
		HAC-R1	Exposed	5	49.1	8.61	36.7	48.7	57.8
		HAC-U	Exposed	5	41.1	7.46	31.4	40.9	52.3
	2020	HAC-R1	Exposed	5	15.3	6.04	6.45	17.0	21.1
		HAC-U	Exposed	5	52.4	9.73	43.7	51.0	68.8
	2021	EDC-U	Reference	5	21.8	7.05	12.5	25.1	29.5
		HAC-R1	Exposed	5	33.7	9.82	26.5	30.3	50.5
		HAC-U	Exposed	6	76.5	4.22	72.3	75.5	82.3
	2022	EDC-U	Reference	5	42.5	16.4	25.1	42.0	63.9
		HAC-R1	Exposed	5	24.8	5.77	18.2	25.4	32.5
		HAC-U	Exposed	5	42.8	6.36	34.1	43.7	50.3
Arachnida (%)	2007	EDC-U (UER)[a]	Reference (Pre-Breach)	5	7.54	3.88	3.46	5.98	12.9
		HAC-U (UHC)[a]	Exposed (Pre-Breach)	5	12.3	8.76	2.53	14.9	23.4
	2018	EDC-U	Reference	5	21.2	13.1	8.21	18.5	37.4
		HAC-R1	Exposed	5	10.5	7.89	2.87	7.61	23.4
		HAC-U	Exposed	5	0	0	0	0	0
	2019	EDC-U	Reference	5	16.0	15.6	2.23	7.52	38.2
		HAC-R1	Exposed	5	9.94	5.73	1.06	11.9	14.8
		HAC-U	Exposed	5	0.234	0.258	0	0.155	0.526
	2020	HAC-R1	Exposed	5	41.4	8.20	32.1	43.5	52.7
		HAC-U	Exposed	5	1.76	0.312	1.33	1.87	2.05
	2021	EDC-U	Reference	5	17.3	11.4	5.61	12.0	32.7
		HAC-R1	Exposed	5	30.1	8.94	18.0	32.2	40.8
		HAC-U	Exposed	6	0.996	0.612	0	1.04	1.88
	2022	EDC-U	Reference	5	21.4	14.0	14.1	14.8	46.4
		HAC-R1	Exposed	5	5.01	3.21	2.17	4.01	10.4
		HAC-U	Exposed	5	3.36	2.15	1.28	2.67	6.60
Chironomidae (%)	2007	EDC-U (UER)[a]	Reference (Pre-Breach)	5	24.9	8.19	14.1	24.5	35.2
		HAC-U (UHC)[a]	Exposed (Pre-Breach)	5	21.6	7.89	14.4	18.1	31.1
	2018	EDC-U	Reference	5	46.4	9.35	33.4	44.7	56.0
		HAC-R1	Exposed	5	62.2	5.89	54.2	60.9	69.0
		HAC-U	Exposed	5	62.7	1.70	61.2	62.3	65.4
	2019	EDC-U	Reference	5	29.9	6.95	24.0	27.6	40.1
		HAC-R1	Exposed	5	33.7	8.78	23.2	31.8	43.1
		HAC-U	Exposed	5	45.4	5.60	35.8	48.2	49.0
	2020	HAC-R1	Exposed	5	32.2	7.13	23.7	34.2	39.5
		HAC-U	Exposed	5	32.1	12.1	17.6	38.2	45.0
	2021	EDC-U	Reference	5	45.3	7.17	36.4	45.0	56.1
		HAC-R1	Exposed	5	23.1	6.57	17.4	22.2	34.1
		HAC-U	Exposed	6	15.9	2.93	11.4	16.7	18.5
	2022	EDC-U	Reference	5	19.3	5.32	12.3	17.5	24.9
		HAC-R1	Exposed	5	62.2	4.57	56.4	62.4	68.7
		HAC-U	Exposed	5	36.4	4.21	31.0	37.3	41.5

Notes: "-" = no value. EPT = Ephemeroptera, Plecoptera, Trichoptera. DW = dry weight. WW = wet weight. #/m^2 = number per metre squared. g/m^2 = grams per metre squared. EDC-U not sampled in 2020 due to habitat differences (in water depth and flow) relative to the Exposed areas HAC-R1 and HAC-U. See Section 4.3 for details.

[a] W7 is the historical sampling area associated with HAC-U and UER is the historical sampling area associated with EDC-U.

Table D.4.6: Summary Statistics of Benthic Invertebrate Community Metrics for Upper Hazeltine Creek (HAC-R1, HAC-U; Exposed) and Upper Edney Creek (EDC-U; Reference), 2007 to 2022

Endpoint	Year	Area	Area Type	n	Mean	Standard Deviation	Minimum	Median	Maximum
Non-Chironomidae Diptera (%)	2007	EDC-U (UER)[a]	Reference (Pre-Breach)	5	0.594	0.310	0.363	0.522	1.12
		HAC-U (UHC)[a]	Exposed (Pre-Breach)	5	0.960	0.242	0.654	0.927	1.22
	2018	EDC-U	Reference	5	1.41	0.662	0.533	1.28	2.13
		HAC-R1	Exposed	5	0.108	0.241	0	0	0.539
		HAC-U	Exposed	5	4.59	4.85	0.637	2.88	12.4
	2019	EDC-U	Reference	5	1.36	0.913	0.627	1.20	2.86
		HAC-R1	Exposed	5	3.63	3.54	0.748	1.79	8.99
		HAC-U	Exposed	5	4.62	2.88	1.55	4.37	9.30
	2020	HAC-R1	Exposed	5	1.30	0.646	0.538	1.23	2.24
		HAC-U	Exposed	5	10.9	9.17	4.10	8.41	26.9
	2021	EDC-U	Reference	5	1.16	1.03	0	0.877	2.68
		HAC-R1	Exposed	5	0.223	0.130	0	0.283	0.312
		HAC-U	Exposed	6	1.49	0.753	0.281	1.76	2.40
	2022	EDC-U	Reference	5	0.494	0.491	0	0.397	1.30
		HAC-R1	Exposed	5	2.01	0.860	0.943	2.08	3.07
		HAC-U	Exposed	5	2.00	1.10	0.708	1.94	3.76
Oligochaeta (%)	2007	EDC-U (UER)[a]	Reference (Pre-Breach)	5	0.509	0.654	0	0.283	1.56
		HAC-U (UHC)[a]	Exposed (Pre-Breach)	5	1.74	1.38	0.491	1.63	3.84
	2018	EDC-U	Reference	5	6.09	4.00	1.36	4.62	10.8
		HAC-R1	Exposed	5	4.13	2.67	1.09	2.96	7.76
		HAC-U	Exposed	5	19.1	6.24	11.9	17.6	27.9
	2019	EDC-U	Reference	5	5.99	5.86	0.300	4.76	14.6
		HAC-R1	Exposed	5	1.27	0.973	0.365	1.06	2.82
		HAC-U	Exposed	5	6.62	4.04	0	7.82	10.8
	2020	HAC-R1	Exposed	5	2.05	0.937	1.04	1.74	3.36
		HAC-U	Exposed	5	0.593	0.617	0	0.309	1.26
	2021	EDC-U	Reference	5	9.59	8.67	2.75	6.73	24.8
		HAC-R1	Exposed	5	1.09	0.910	0	0.938	2.39
		HAC-U	Exposed	6	0.786	0.609	0	0.748	1.47
	2022	EDC-U	Reference	5	2.64	1.69	0.767	2.28	5.15
		HAC-R1	Exposed	5	0.780	0.566	0	0.896	1.42
		HAC-U	Exposed	5	0.382	0.230	0.170	0.357	0.726
Dry Weight Benthic Biomass (g/m² DW)	2007	EDC-U (UER)[a]	Reference (Pre-Breach)	5	-	-	-	-	-
		HAC-U (UHC)[a]	Exposed (Pre-Breach)	5	-	-	-	-	-
	2018	EDC-U	Reference	5	1.39	1.81	0.0100	0.177	3.70
		HAC-R1	Exposed	5	0.804	0.378	0.434	0.814	1.38
		HAC-U	Exposed	5	1.24	0.778	0.674	0.910	2.59
	2019	EDC-U	Reference	5	1.09	1.17	0.287	0.462	3.04
		HAC-R1	Exposed	5	3.59	1.62	1.93	3.07	5.53
		HAC-U	Exposed	5	5.31	4.13	1.85	3.88	12.3
	2020	HAC-R1	Exposed	5	3.97	2.86	1.54	3.33	8.89
		HAC-U	Exposed	5	5.33	4.26	1.53	3.97	12.6
	2021	EDC-U	Reference	5	0.537	0.417	0.222	0.376	1.27
		HAC-R1	Exposed	5	2.86	2.29	1.07	1.98	6.80
		HAC-U	Exposed	6	2.73	1.09	1.10	2.80	4.06
	2022	EDC-U	Reference	5	5.09	9.32	0.264	1.12	21.7
		HAC-R1	Exposed	5	2.13	0.758	1.17	2.43	3.05
		HAC-U	Exposed	5	4.57	2.00	2.75	3.52	7.06
Wet Weight Benthic Biomass (g/m² WW)	2007	EDC-U (UER)[a]	Reference (Pre-Breach)	5	-	-	-	-	-
		HAC-U (UHC)[a]	Exposed (Pre-Breach)	5	-	-	-	-	-
	2018	EDC-U	Reference	5	7.35	9.43	0.0710	1.37	20.2
		HAC-R1	Exposed	5	4.73	1.82	2.27	4.51	7.40
		HAC-U	Exposed	5	7.30	4.07	3.71	6.29	13.4
	2019	EDC-U	Reference	5	7.36	7.62	1.56	2.50	17.6
		HAC-R1	Exposed	5	24.6	12.1	12.1	22.5	42.3
		HAC-U	Exposed	5	29.7	15.9	11.7	29.7	53.7
	2020	HAC-R1	Exposed	5	20.9	14.8	12.6	13.8	47.2
		HAC-U	Exposed	5	28.7	23.9	10.3	21.2	70.4
	2021	EDC-U	Reference	5	2.61	1.86	1.18	1.98	5.84
		HAC-R1	Exposed	5	10.4	5.78	4.74	8.97	19.8
		HAC-U	Exposed	6	13.8	3.94	6.82	15.0	16.4
	2022	EDC-U	Reference	5	18.9	32.7	1.35	4.79	77.2
		HAC-R1	Exposed	5	11.4	4.22	6.56	11.1	17.0
		HAC-U	Exposed	5	18.3	7.02	10.4	15.8	28.9

Notes: "-" = no value. EPT = Ephemeroptera, Plecoptera, Trichoptera. DW = dry weight. WW = wet weight. #/m^2 = number per metre squared. g/m^2 = grams per metre squared. EDC-U not sampled in 2020 due to habitat differences (in water depth and flow) relative to the Exposed areas HAC-R1 and HAC-U. See Section 4.3 for details.

[a] UHC is the pre-breach sampling area associated with HAC-R1 and HAC-U. UER is the pre-breach sampling area associated with EDC-U.

APPENDIX D.5
PERIPHYTON AND BENTHOS
TISSUE QUALITY

Table D.5.1: Periphyton Tissue Chemistry Data from Upper Hazeltine Creek (HAC-R1, HAC-U; Exposed) and Upper Edney Creek (EDC-U; Reference), 2022

Analyte	Units	Reference												
		Upper Edney Creek (EDC-U)												
		EDC-U-1	EDC-U-2	EDC-U-3	EDC-U-4	EDC-U-5	EDC-U-6	EDC-U-7	EDC-U-8	Mean	Standard Deviation	Minimum	Median	Maximum
		8-Aug-22	7-Aug-22	7-Aug-22	7-Aug-22	7-Aug-22	7-Aug-22	7-Aug-22	7-Aug-22					
Moisture	mg/kg dw	73.8	89.1	89.5	77.9	87.2	86.8	88.9	84.3	84.7	5.81	73.8	87.0	89.5
Aluminum	mg/kg dw	1,960	13,300	10,600	6,490	14,700	10,900	8,020	8,050	9,252	4,042	1,960	9,325	14,700
Antimony	mg/kg dw	0.0940	0.0860	0.0860	0.0930	0.0710	0.0670	0.0850	0.110	0.0865	0.0135	0.0670	0.0860	0.110
Arsenic	mg/kg dw	6.75	12.8	14.4	37.9	41.0	10.8	24.5	34.0	22.8	13.4	6.75	19.4	41.0
Barium	mg/kg dw	232	229	319	824	480	225	242	1,140	461	343	225	280	1,140
Beryllium	mg/kg dw	0.206	0.447	0.374	0.392	0.629	0.339	0.336	0.422	0.393	0.120	0.206	0.383	0.629
Bismuth	mg/kg dw	0.0140	0.111	0.0840	0.0560	0.123	0.0780	0.0530	0.0560	0.0719	0.0349	0.0140	0.0670	0.123
Boron	mg/kg dw	18.6	7.80	8.80	11.9	7.40	15.1	8.40	9.90	11.0	3.99	7.40	9.35	18.6
Cadmium	mg/kg dw	1.03	0.949	1.07	2.83	1.82	0.991	1.13	4.69	1.81	1.33	0.949	1.10	4.69
Calcium	mg/kg dw	7,430	11,700	11,000	10,100	13,100	9,420	8,310	12,000	10,382	1,932	7,430	10,550	13,100
Cesium	mg/kg dw	0.0886	1.01	0.783	0.306	1.02	0.848	0.440	0.419	0.614	0.347	0.0886	0.612	1.02
Chromium	mg/kg dw	23.9	127	79.1	119	68.6	145	233	46.6	105	66.2	23.9	99.0	233
Cobalt	mg/kg dw	14.4	21.9	22.8	47.6	35.9	20.6	22.0	65.9	31.4	17.4	14.4	22.4	65.9
Copper	mg/kg dw	24.7	44.1	39.1	34.8	43.0	35.3	36.4	39.7	37.1	6.06	24.7	37.8	44.1
Iron	mg/kg dw	4,460	26,400	22,600	22,700	45,500	21,800	26,000	19,800	23,658	11,206	4,460	22,650	45,500
Lead	mg/kg dw	0.742	5.27	3.99	2.96	6.26	3.94	3.71	3.33	3.78	1.63	0.742	3.82	6.26
Lithium	mg/kg dw	1.39	12.2	9.04	4.18	12.0	9.95	6.82	5.51	7.64	3.84	1.39	7.93	12.2
Magnesium	mg/kg dw	1,910	6,170	5,340	3,540	6,250	5,040	4,330	3,640	4,528	1,476	1,910	4,685	6,250
Manganese	mg/kg dw	6,970	8,460	11,300	26,900	18,300	8,900	9,480	38,600	16,114	11,264	6,970	10,390	38,600
Mercury	mg/kg dw	0.0486	0.157	0.188	0.0972	0.176	0.122	0.0730	0.0777	0.117	0.0517	0.0486	0.110	0.188
Molybdenum	mg/kg dw	2.38	2.24	2.42	2.87	2.74	2.17	3.78	4.41	2.88	0.806	2.17	2.58	4.41
Nickel	mg/kg dw	25.2	45.0	45.3	66.3	56.0	48.1	51.1	95.6	54.1	20.4	25.2	49.6	95.6
Phosphorus	mg/kg dw	2,760	3,290	3,900	3,030	3,600	2,630	2,630	2,670	3,064	487	2,630	2,895	3,900
Potassium	mg/kg dw	6,070	4,780	5,880	4,850	4,140	3,080	4,260	3,810	4,609	1,011	3,080	4,520	6,070
Rubidium	mg/kg dw	7.02	16.7	15.1	8.09	14.7	11.5	9.40	8.27	11.3	3.71	7.02	10.4	16.7
Selenium	mg/kg dw	0.390	0.980	0.820	0.700	1.13	0.770	0.600	0.770	0.770	0.225	0.390	0.770	1.13
Silver	mg/kg dw	0.0337	0.200	0.164	0.0811	0.193	0.129	0.0847	0.100	0.123	0.0589	0.0337	0.114	0.200
Sodium	mg/kg dw	159	291	289	147	291	214	224	151	221	64.0	147	219	291
Strontium	mg/kg dw	65.4	98.2	94.0	114	125	94.2	74.0	140	101	25.0	65.4	96.2	140
Tellurium	mg/kg dw	<0.026	<0.038	<0.025	0.0340	<0.060	<0.062	<0.050	<0.068	0.0280	NaN	<0.025	0.0500	0.0340
Thallium	mg/kg dw	0.0419	0.116	0.116	0.200	0.152	0.105	0.0929	0.404	0.153	0.111	0.0419	0.116	0.404
Tin	mg/kg dw	<0.13	0.270	0.190	<0.15	<0.30	<0.31	<0.25	<0.34	0.174	0.0572	<0.13	0.270	0.270
Titanium	mg/kg dw	116	458	353	200	487	385	417	289	338	129	116	369	487
Uranium	mg/kg dw	0.388	0.809	0.658	0.612	1.00	0.704	0.660	0.851	0.710	0.182	0.388	0.682	1.00
Vanadium	mg/kg dw	16.2	54.4	45.0	55.4	98.8	45.7	58.8	53.0	53.4	22.7	16.2	53.7	98.8
Zinc	mg/kg dw	154	152	143	241	202	135	113	337	185	73.7	113	153	337
Zirconium	mg/kg dw	1.56	7.61	5.87	4.70	8.94	6.12	6.87	5.40	5.88	2.19	1.56	6.00	8.94

Notes: "-" = no data or summary statistic could not be calculated. mg/kg dw = milligrams per kilogram dry weight. All summary statistics are reported to three significant digits for display purposes and were calculated using the Kaplan-Meier method.

Table D.5.1: Periphyton Tissue Chemistry Data from Upper Hazeltine Creek (HAC-R1, HAC-U; Exposed) and Upper Edney Creek (EDC-U; Reference), 2022

Analyte	Units	Exposed												
		Upper Hazeltine Creek Reach 1 (HAC-R1)												
		HAC-R1-1	HAC-R1-2	HAC-R1-3	HAC-R1-4	HAC-R1-5	HAC-R1-6	HAC-R1-7	HAC-R1-8	Mean	Standard Deviation	Minimum	Median	Maximum
		10-Aug-22	10-Aug-22	10-Aug-22	10-Aug-22	10-Aug-22	10-Aug-22	10-Aug-22	10-Aug-22					
Moisture	mg/kg dw	65.7	67.7	64.7	61.0	72.3	67.4	69.8	71.3	67.5	3.71	61.0	67.5	72.3
Aluminum	mg/kg dw	2,010	1,750	868	920	1,400	857	4,720	4,470	2,124	1,584	857	1,575	4,720
Antimony	mg/kg dw	0.0800	0.0680	0.0640	0.0850	0.0680	0.0570	0.0720	0.0780	0.0715	0.00917	0.0570	0.0700	0.0850
Arsenic	mg/kg dw	2.30	2.24	1.78	1.87	2.11	2.17	3.41	3.97	2.48	0.781	1.78	2.20	3.97
Barium	mg/kg dw	133	99.3	68.3	125	84.5	71.6	246	165	124	59.4	68.3	112	246
Beryllium	mg/kg dw	0.0570	0.0620	0.0330	0.0360	0.0500	0.0370	0.171	0.138	0.0730	0.0521	0.0330	0.0535	0.171
Bismuth	mg/kg dw	<0.012	<0.010	<0.012	<0.015	<0.010	<0.012	<0.012	0.0160	0.0107	NaN	<0.010	0.0120	0.0160
Boron	mg/kg dw	363	288	289	295	325	117	232	150	257	85.3	117	288	363
Cadmium	mg/kg dw	0.148	0.169	0.148	0.152	0.182	0.190	0.180	0.238	0.176	0.0300	0.148	0.174	0.238
Calcium	mg/kg dw	224,000	246,000	236,000	250,000	223,000	280,000	247,000	210,000	239,500	21,527	210,000	241,000	280,000
Cesium	mg/kg dw	0.216	0.172	0.116	0.146	0.175	0.0775	0.258	0.267	0.178	0.0663	0.0775	0.174	0.267
Chromium	mg/kg dw	2.64	3.23	2.34	1.88	2.90	5.79	19.3	88.5	15.8	29.9	1.88	3.06	88.5
Cobalt	mg/kg dw	2.00	1.96	1.20	1.48	1.70	1.23	3.01	3.47	2.01	0.826	1.20	1.83	3.47
Copper	mg/kg dw	42.1	116	36.4	42.6	60.4	41.0	57.5	160	69.5	44.7	36.4	50.0	160
Iron	mg/kg dw	2,840	3,100	1,630	1,830	2,520	1,510	4,450	7,680	3,195	2,051	1,510	2,680	7,680
Lead	mg/kg dw	0.644	0.498	0.298	0.315	0.484	0.280	0.747	1.17	0.554	0.300	0.280	0.491	1.17
Lithium	mg/kg dw	1.59	1.49	0.910	0.990	1.39	0.960	2.56	2.80	1.59	0.724	0.910	1.44	2.80
Magnesium	mg/kg dw	3,090	2,840	2,570	2,750	2,840	2,610	3,260	3,660	2,952	367	2,570	2,840	3,660
Manganese	mg/kg dw	1,240	1,150	774	1,580	1,360	852	1,780	2,100	1,354	452	774	1,300	2,100
Mercury	mg/kg dw	0.00960	0.00910	0.00910	0.00640	0.00880	0.00600	0.0160	0.0243	0.0112	0.00612	0.00600	0.00910	0.0243
Molybdenum	mg/kg dw	1.50	1.35	1.17	1.31	1.71	1.01	1.23	2.29	1.45	0.401	1.01	1.33	2.29
Nickel	mg/kg dw	3.13	3.77	3.10	3.12	3.30	3.98	4.68	11.1	4.52	2.71	3.10	3.54	11.1
Phosphorus	mg/kg dw	866	886	731	681	787	780	880	1,340	869	204	681	826	1,340
Potassium	mg/kg dw	4,980	3,870	3,720	3,790	4,480	1,610	3,410	3,370	3,654	988	1,610	3,755	4,980
Rubidium	mg/kg dw	5.14	3.90	3.54	3.65	4.42	1.64	4.05	4.55	3.86	1.04	1.64	3.98	5.14
Selenium	mg/kg dw	2.22	1.88	2.28	2.57	1.95	1.50	1.51	1.92	1.98	0.371	1.50	1.94	2.57
Silver	mg/kg dw	0.0138	0.0246	0.0115	0.0150	0.0189	0.00930	0.0259	0.0295	0.0186	0.00738	0.00930	0.0170	0.0295
Sodium	mg/kg dw	326	358	249	270	313	225	333	370	306	52.2	225	320	370
Strontium	mg/kg dw	513	535	509	544	512	543	571	439	521	39.1	439	524	571
Tellurium	mg/kg dw	<0.025	0.0250	0.0310	0.0320	0.0250	0.0350	0.0270	0.0210	0.0271	0.00519	0.0210	0.0260	0.0350
Thallium	mg/kg dw	0.00700	0.00610	0.00480	0.00630	0.00640	0.00360	0.00680	0.00870	0.00621	0.00151	0.00360	0.00635	0.00870
Tin	mg/kg dw	<0.12	<0.10	<0.12	<0.15	<0.10	<0.12	<0.12	0.220	0.115	NaN	<0.10	0.120	0.220
Titanium	mg/kg dw	132	124	72.3	80.9	112	69.3	228	365	148	101	69.3	118	365
Uranium	mg/kg dw	0.156	0.150	0.117	0.122	0.138	0.0956	0.215	0.195	0.149	0.0401	0.0956	0.144	0.215
Vanadium	mg/kg dw	10.7	12.3	6.18	7.06	10.1	5.61	18.2	25.7	12.0	6.87	5.61	10.4	25.7
Zinc	mg/kg dw	19.2	20.7	16.9	16.4	21.4	11.6	27.4	59.8	24.2	15.1	11.6	20.0	59.8
Zirconium	mg/kg dw	1.42	1.26	0.960	0.910	1.23	0.710	2.10	2.38	1.37	0.586	0.710	1.25	2.38

Notes: "-" = no data or summary statistic could not be calculated. mg/kg dw = milligrams per kilogram dry weight. All summary statistics are reported to three significant digits for display purposes and were calculated using the Kaplan-Meier method.

Table D.5.1: Periphyton Tissue Chemistry Data from Upper Hazeltine Creek (HAC-R1, HAC-U; Exposed) and Upper Edney Creek (EDC-U; Reference), 2022

Analyte	Units	Exposed												
		Upper Hazeltine Creek Reach 2 (HAC-U)												
		HAC-U-1	HAC-U-2	HAC-U-3	HAC-U-4	HAC-U-5	HAC-U-6	HAC-U-7	HAC-U-8	Mean	Standard Deviation	Minimum	Median	Maximum
		6-Aug-22	6-Aug-22	6-Aug-22	6-Aug-22	5-Aug-22	5-Aug-22	6-Aug-22	5-Aug-22					
Moisture	mg/kg dw	59.8	57.2	70.5	74.3	76.4	71.7	87.3	71.0	71.0	9.43	57.2	71.3	87.3
Aluminum	mg/kg dw	1,370	3,010	1,170	3,900	2,610	595	3,730	11,600	3,498	3,490	595	2,810	11,600
Antimony	mg/kg dw	0.0820	0.0830	0.0600	0.0720	0.0540	0.0530	0.0610	0.0710	0.0670	0.0118	0.0530	0.0660	0.0830
Arsenic	mg/kg dw	2.31	2.97	1.95	2.92	3.12	1.93	4.70	5.27	3.15	1.23	1.93	2.94	5.27
Barium	mg/kg dw	113	238	96.1	272	136	84.0	114	823	235	247	84.0	125	823
Beryllium	mg/kg dw	0.0480	0.162	0.0400	0.131	0.0640	0.0230	0.0940	0.180	0.0928	0.0590	0.0230	0.0790	0.180
Bismuth	mg/kg dw	<0.010	0.0140	<0.010	<0.010	<0.010	<0.011	0.0110	<0.010	0.0106	0.00140	<0.010	0.0100	0.0140
Boron	mg/kg dw	239	228	323	197	114	201	115	90.4	188	78.4	90.4	199	323
Cadmium	mg/kg dw	0.242	0.234	0.197	0.237	0.152	0.162	0.209	0.127	0.195	0.0435	0.127	0.203	0.242
Calcium	mg/kg dw	212,000	176,000	203,000	196,000	188,000	238,000	145,000	185,000	192,875	27,195	145,000	192,000	238,000
Cesium	mg/kg dw	0.243	0.365	0.192	0.202	0.249	0.134	0.189	0.225	0.225	0.0673	0.134	0.214	0.365
Chromium	mg/kg dw	2.28	4.74	2.66	1.96	7.92	1.28	17.5	7.08	5.68	5.36	1.28	3.70	17.5
Cobalt	mg/kg dw	1.75	3.20	1.29	2.50	2.23	0.800	2.89	3.09	2.22	0.874	0.800	2.37	3.20
Copper	mg/kg dw	50.5	86.8	35.1	510	52.2	21.2	71.5	104	116	161	21.2	61.9	510
Iron	mg/kg dw	2,320	4,680	1,610	3,940	3,420	950	5,860	5,070	3,481	1,736	950	3,680	5,860
Lead	mg/kg dw	0.541	1.43	0.385	0.885	0.729	0.226	2.53	1.12	0.981	0.738	0.226	0.807	2.53
Lithium	mg/kg dw	1.27	2.51	0.920	1.53	1.76	0.600	2.31	2.72	1.70	0.766	0.600	1.64	2.72
Magnesium	mg/kg dw	3,020	4,110	2,740	3,420	3,270	2,650	3,780	4,460	3,431	646	2,650	3,345	4,460
Manganese	mg/kg dw	3,500	3,200	2,820	4,260	2,620	2,120	2,220	2,200	2,868	750	2,120	2,720	4,260
Mercury	mg/kg dw	0.0153	0.0195	0.00970	0.0129	0.0148	0.00640	0.0362	0.0202	0.0169	0.00906	0.00640	0.0150	0.0362
Molybdenum	mg/kg dw	1.37	1.49	1.35	1.56	1.20	0.900	1.96	0.745	1.32	0.382	0.745	1.36	1.96
Nickel	mg/kg dw	3.11	6.97	2.66	2.59	3.20	1.79	5.49	2.97	3.60	1.73	1.79	3.04	6.97
Phosphorus	mg/kg dw	1,050	1,360	861	1,280	1,670	896	4,480	1,650	1,656	1,182	861	1,320	4,480
Potassium	mg/kg dw	6,350	7,010	6,070	5,410	6,100	4,930	6,820	5,490	6,022	715	4,930	6,085	7,010
Rubidium	mg/kg dw	6.78	8.68	6.17	6.20	7.95	5.15	7.94	8.08	7.12	1.22	5.15	7.36	8.68
Selenium	mg/kg dw	5.00	3.83	4.05	12.2	1.97	1.94	2.30	1.62	4.11	3.49	1.62	3.06	12.2
Silver	mg/kg dw	0.0162	0.0616	0.0101	0.0631	0.0171	<0.0057	0.0477	0.0214	0.0304	0.0230	<0.0057	0.0192	0.0631
Sodium	mg/kg dw	317	375	307	345	420	246	269	306	323	56.1	246	312	420
Strontium	mg/kg dw	518	488	479	494	474	550	366	589	495	65.2	366	491	589
Tellurium	mg/kg dw	<0.020	<0.020	<0.020	0.0270	<0.020	<0.023	0.0210	0.0230	0.0214	0.00245	<0.020	0.0210	0.0270
Thallium	mg/kg dw	0.00970	0.0168	0.00880	0.0134	0.0123	0.00780	0.00640	0.00860	0.0105	0.00343	0.00640	0.00925	0.0168
Tin	mg/kg dw	<0.10	<0.10	<0.10	<0.10	<0.10	<0.11	0.100	<0.10	0.100	NaN	<0.10	0.100	0.100
Titanium	mg/kg dw	98.0	304	73.2	188	207	39.6	296	255	183	102	39.6	198	304
Uranium	mg/kg dw	0.186	0.189	0.144	0.163	0.165	0.123	0.130	0.174	0.159	0.0247	0.123	0.164	0.189
Vanadium	mg/kg dw	9.34	17.0	7.29	20.8	13.2	4.24	18.1	22.1	14.0	6.55	4.24	15.1	22.1
Zinc	mg/kg dw	43.1	31.7	14.5	13.2	12.4	6.40	19.7	15.3	19.5	12.0	6.40	14.9	43.1
Zirconium	mg/kg dw	0.890	2.15	0.800	1.30	1.14	0.600	1.13	1.90	1.24	0.537	0.600	1.14	2.15

Notes: "-" = no data or summary statistic could not be calculated. mg/kg dw = milligrams per kilogram dry weight. All summary statistics are reported to three significant digits for display purposes and were calculated using the Kaplan-Meier method.

Table D.5.2: Periphyton Tissue Primary and Secondary Analytes Concentrations for Upper Hazeltine Creek (HAC-R1, HAC-U; Exposed), Upper Edney Creek (EDC-U; Reference), Lower Hazeltine Creek (HAC-D; Exposed), and Lower Edney Creek Exposed (E1) and Reference (EDC-D), 2010 to 2021

Waterbody	Area	Parameter	Units	Year	Replicate								Mean	Standard Deviation	Minimum	Median	Maximum
					1	2	3	4	5	6	7	8					
Upper Edney Creek	EDC-U (Reference)	**Primary Analytes**															
		Arsenic	mg/kg	2018	9.13	14.3	7.99	10.1	12.8	9.89	13.1	13.2	11.3	2.31	7.99	11.4	14.3
				2019	10.4	8.81	8.98	8.9	8.67	5.32	10.3	16	9.67	2.99	5.32	8.94	16
				2020	16.8	77	29.9	18.7	25.8	10.6	28.3	55.2	32.8	22.3	10.6	27	77
				2021	7.31	23.1	12.3	9.78	18	11.2	15.9	19.8	14.7	5.42	7.31	14.1	23.1
		Copper	mg/kg	2018	37.9	30.9	24.6	27.8	48	42.9	37.2	51.2	37.6	9.5	24.6	37.6	51.2
				2019	29.9	27.3	30.6	24.8	24.7	16.9	30.1	42.2	28.3	7.18	16.9	28.6	42.2
				2020	30.5	36.6	21	25.4	46.1	35.8	28.3	26.2	31.2	7.96	21	29.4	46.1
				2021	26.4	40.8	27.6	35.9	59.3	35.7	68.8	37.5	41.5	15	26.4	36.7	68.8
		Iron	mg/kg	2018	18,400	24,100	14,500	20,700	25,700	27,100	17,500	26,100	21,763	4,654	14,500	22,400	27,100
				2019	20,300	24,200	16,500	17,200	21,200	12,700	20,200	21,000	19,163	3,545	12,700	20,250	24,200
				2020	22,000	72,300	13,000	13,600	34,900	27,900	38,000	42,700	33,050	19,237	13,000	31,400	72,300
				2021	14,300	27,800	25,400	23,100	35,600	29,600	21,700	19,700	24,650	6,521	14,300	24,250	35,600
		Selenium	mg/kg	2018	0.71	0.53	0.38	0.47	0.88	0.7	0.74	0.91	0.665	0.19	0.38	0.705	0.91
				2019	0.67	0.54	0.52	0.72	0.77	0.36	0.57	0.67	0.602	0.132	0.36	0.62	0.77
				2020	0.7	1.04	0.49	0.3	0.68	0.6	0.37	0.47	0.581	0.233	0.3	0.545	1.04
				2021	0.46	0.7	0.36	0.65	0.73	0.55	0.76	0.44	0.581	0.15	0.36	0.6	0.76
		Secondary Analytes															
		Barium	mg/kg	2018	177	220	211	201	243	195	218	243	214	22.8	177	214	243
				2019	180	158	186	181	153	95.5	213	422	199	96.6	95.5	180	422
				2020	785	243	916	370	787	248	851	380	572	288	243	582	916
				2021	146	177	139	168	235	148	290	436	217	102	139	172	436
		Cadmium	mg/kg	2018	0.735	0.518	0.454	0.52	0.878	0.645	1.15	0.933	0.729	0.243	0.454	0.69	1.15
				2019	0.729	0.498	0.844	0.627	0.555	0.312	0.924	1.44	0.741	0.343	0.312	0.678	1.44
				2020	2.62	1.36	3.52	1.5	2.71	0.71	2.01	1.42	1.98	0.915	0.71	1.76	3.52
				2021	0.532	0.804	0.382	0.69	0.937	0.481	1.63	1.67	0.891	0.501	0.382	0.747	1.67
		Calcium	mg/kg	2018	10,800	11,500	12,000	10,700	12,200	15,600	8,980	12,700	11,810	1,916	8,980	11,750	15,600
				2019	9,350	9,390	9,610	9,060	8,690	5,410	10,500	11,000	9,126	1,680	5,410	9,370	11,000
				2020	12,200	13,000	9,160	8,190	11,200	11,200	11,600	8,430	10,622	1,798	8,190	11,200	13,000
				2021	8,550	10,700	8,280	9,480	12,100	9,550	9,590	8,240	9,561	1,318	8,240	9,515	12,100
		Cobalt	mg/kg	2018	14.8	17	12.2	15.2	21.5	20.7	18.2	24.9	18.1	4.14	12.2	17.6	24.9
				2019	18.3	15.3	16.2	13.2	11.2	8.6	19.1	29.6	16.4	6.38	8.6	15.8	29.6
				2020	44.4	27.5	44.9	25	52	20.2	49.8	28.5	36.5	12.5	20.2	36.4	52
				2021	11.5	16.8	13.5	16.7	28	14.9	27.7	28.8	19.7	7.19	11.5	16.8	28.8
		Manganese	mg/kg	2018	4,430	6,120	4,950	5,280	8,170	5,790	6,830	9,730	6,412	1,777	4,430	5,955	9,730
				2019	6,220	4,460	7,610	5,740	4,990	2,270	8,070	13,800	6,645	3,419	2,270	5,980	13,800
				2020	20,900	8,250	34,200	14,000	27,000	5,840	21,500	11,700	17,924	9,730	5,840	17,450	34,200
				2021	4,650	6,670	3,120	5,460	10,600	2,670	13,700	14,200	7,634	4,603	2,670	6,065	14,200
		Mercury	mg/kg	2018	0.0988	0.101	0.0506	0.0785	0.118	0.127	0.0868	0.148	0.101	0.0303	0.0506	0.0999	0.148
				2019	0.096	0.078	0.072	0.223	0.21	0.115	0.1	0.12	0.127	0.0578	0.072	0.108	0.223
				2020	0.109	0.168	0.0484	0.052	0.0678	0.0713	0.0691	0.075	0.0826	0.0391	0.0484	0.0702	0.168
				2021	0.0582	0.0483	0.0688	0.0883	0.4	0.0827	0.0552	0.0419	0.105	0.12	0.0419	0.0635	0.4
		Molybdenum	mg/kg	2018	1.14	1.45	2.11	1.22	1.26	0.967	1.44	1.18	1.35	0.346	0.967	1.24	2.11
				2019	1.46	1.12	2.24	1.34	1.16	0.843	2.4	2.21	1.6	0.598	0.843	1.4	2.4
				2020	3.68	3.06	3.13	2.17	3.53	1.56	4.37	3.09	3.07	0.876	1.56	3.11	4.37
				2021	2.1	4.52	1.17	1.17	3.63	1.04	3.86	2.57	2.51	1.36	1.04	2.34	4.52
		Nickel	mg/kg	2018	29.1	27.9	27.3	25.8	36.6	33.4	45.5	38.1	33	6.77	25.8	31.2	45.5
				2019	29.9	27.2	31.7	25	26.9	15.4	36.7	47.8	30.1	9.41	15.4	28.6	47.8
				2020	71.5	53.3	69.8	35.1	85.1	59	62.1	41	59.6	16.4	35.1	60.5	85.1
				2021	29.2	34.9	24.7	34.2	51.6	34.8	83.1	49.7	42.8	18.8	24.7	34.8	83.1
		Phosphorus	mg/kg	2018	1,730	1,620	1,400	1,540	1,900	1,800	1,830	1,980	1,725	194	1,400	1,765	1,980
				2019	2,730	1,680	2,670	2,910	4,070	899	3,000	3,140	2,637	961	899	2,820	4,070
				2020	1,560	4,200	2,070	2,250	2,870	2,190	1,570	1,910	2,328	864	1,560	2,130	4,200
				2021	1,840	1,740	1,180	1,480	2,000	1,420	2,600	1,470	1,716	442	1,180	1,610	2,600
		Silver	mg/kg	2018	-	-	-	-	-	-	-	-	-	-	-	-	-
				2019	0.114	0.12	0.0854	0.123	0.145	0.0715	0.115	0.125	0.112	0.0233	0.0715	0.118	0.145
				2020	0.113	0.178	0.0493	0.0362	0.113	0.0997	0.089	0.0702	0.0935	0.0443	0.0362	0.0944	0.178
				2021	0.0891	0.142	0.0954	0.148	0.142	0.148	0.13	0.1	0.124	0.0252	0.0891	0.136	0.148
		Sodium	mg/kg	2018	424	402	457	537	387	818	346	344	464	156	344	413	818
				2019	430	574	1,140	457	777	217	690	651	617	275	217	612	1,140
				2020	212	354	<252	789	465	347	634	225	406	214	212	350	789
				2021	254	342	481	228	306	517	400	306	354	104	228	324	517
		Strontium	mg/kg	2018	84.7	90.3	91.5	84	93.6	116	65.8	101	90.9	14.4	65.8	90.9	116
				2019	73.8	74.9	74	72.9	72.1	44.3	84.2	109	75.7	17.7	44.3	73.9	109
				2020	120	113	113	76.2	106	99.9	94	78.6	100	16.2	76.2	103	120
				2021	64.5	67.9	68.3	75.1	89.2	74.6	77.4	84.6	75.2	8.49	64.5	74.8	89.2
		Tin	mg/kg	2018	<0.20	<0.30	<0.20	<0.20	0.28	0.25	0.21	0.22	0.223	0.0314	<0.2	0.21	0.28
				2019	1.09	0.47	0.91	0.53	2.17	1.3	1.88	1.47	1.23	0.605	0.47	1.2	2.17
				2020	<0.47	0.61	<1.26	<0.38	<0.38	0.3	<0.24	0.17	0.27	0.21	0.17	0.17	0.61
				2021	0.17	0.3	0.23	0.18	0.34	0.31	0.4	0.22	0.269	0.0815	0.17	0.265	0.4
		Titanium	mg/kg	2018	-	-	-	-	-	-	-	-	-	-	-	-	-
				2019	323	511	585	234	267	264	469	395	381	130	234	359	585
				2020	411	508	278	273	738	847	760	424	530	224	273	466	847
				2021	331	407	579	430	777	640	426	397	498	152	331	428	777
		Uranium	mg/kg	2018	0.893	0.524	0.397	0.533	0.967	0.939	0.901	1.25	0.8	0.287	0.397	0.897	1.25
				2019	0.682	0.732	0.624	0.514	0.453	0.484	0.685	0.778	0.619	0.121	0.453	0.653	0.778
				2020	0.611	0.93	0.337	0.358	0.61	0.731	0.651	0.752	0.622	0.198	0.337	0.631	0.93
				2021	0.453	0.643	0.75	0.855	1.13	1.14	0.774	0.568	0.789	0.247	0.453	0.762	1.14
		Vanadium	mg/kg	2018	44.5	51.8	29.3	47.1	59.5	66.7	45.9	61.1	50.7	11.8	29.3	49.5	66.7
				2019	41.7	54.5	38.7	32.2	36.6	29.5	46.5	50.9	41.3	8.82	29.5	40.2	54.5
				2020	50.4	180	35.2	41.6	91.2	60.2	78.3	93.9	78.8	46.4	35.2	69.2	180
				2021	33.4	68	62	52.2	94.2	73	51.7	50.3	60.6	18.3	33.4	57.1	94.2
		Zinc	mg/kg	2018	63.6	66.4	57.9	74.1	92.2	80.2	94.3	80	76.1	13.1	57.9	77	94.3
				2019	71.9	62.5	95.1	83.3	63	39.4	71	144	78.8	31	39.4	71.5	144
				2020	142	90.8	192	113	156	73.9	126	125	127	37.1	73.9	126	192
				2021	57.3	74	61.4	72.3	93.3	77.7	121	110	83.4	22.8	57.3	75.8	121
Upper Hazeltine Creek Reach 1	HAC-R1 (Exposed)	**Primary Analytes**															
		Arsenic	mg/kg	2017	3.88	4.88	5.71	5.28	4.38	4	8.07	5.19	5.17	1.33	3.88	5.04	8.07
				2018	1.88	1.75	3.15	4.56	7.85	2.23	1.87	1.96	3.16	2.12	1.75	2.1	7.85
				2019	2.38	2.3	2.54	2.19	2.49	2.04	2.07	2.01	2.25	0.207	2.01	2.24	2.54
				2020	1.97	1.9	2.17	2.16	2.19	2.01	1.69	1.81	1.99	0.182	1.69	1.99	2.19
				2021	2.18	1.31	1.94	1.42	1.43	1.11	1.76	1.02	1.52	0.405	1.02	1.42	2.18
		Copper	mg/kg	2017	79.3	122	183	149	95.7	92	180	186	136	44.4	79.3	136	186
				2018	36.3	31.7	123	171	238	52.8	33.1	34.2	90	78.9	31.7	44.5	238
				2019	32	31.5	59	39.6	44.7	30.1	27.2	32.4	37.1	10.5	27.2	32.2	59
				2020	30.7	32.4	35.9	49.7	40.8	43.9	31.8	33.1	37.3	6.83	30.7	34.5	49.7
				2021	31.2	23.7	44.3	51.9	28	19	53.4	16.9	33.6	14.5	16.9	29.6	53.4
		Iron	mg/kg	2017	5,280	11,700	6,910	9,400	5,020	7,720	11,000	7,420	8,056	2,464	5,020	7,570	11,700
				2018	1,510	1,500	4,790	8,130	11,000	2,560	1,560	953	4,000	3,712	953	2,060	11,000
				2019	1,470	1,390	1,630	1,940	1,770	1,460	1,100	931	1,461	332	931	1,465	1,940
				2020	1,630	1,880	1,900	2,820	2,390	2,370	1,710	1,700	2,050	427	1,630	1,890	2,820
				2021	1,280	460	1,260	405	276	359	1,170	296	688	459	276	432	1,280
		Selenium	mg/kg	2017	1.33	1.06	1.49	1.67	1.59	1.05	1.18	1.31	1.34	0.234	1.05	1.32	1.67
				2018	0.93	0.91	0.81	0.85	2.55	0.99	0.89	0.91	1.1	0.586	0.81	0.91	2.55
				2019	1.11	1.5	1.29	1.1	<1.3	1.1	1.32	1.27	1.23	0.15	1.1	1.27	1.5
				2020	1.54	1.47	1.68	1.72	1.7	1.4	1.42	1.4	1.54	0.139	1.4	1.5	1.72
				2021	<2.5	<2.5	1.53	1.81	1.41	1.59	1.52	1.22	1.51	0.226	1.22	1.52	1.81

Notes: For 2010 data at HAC-D and HAC-U, historical station codes were W11 and W7, respectively. All results are in dry weight. Summary statistics reported to 3 significant figures for display purposes. "-" indicates no data available.

Table D.5.2: Periphyton Tissue Primary and Secondary Analytes Concentrations for Upper Hazeltine Creek (HAC-R1, HAC-U; Exposed), Upper Edney Creek (EDC-U; Reference), Lower Hazeltine Creek (HAC-D; Exposed), and Lower Edney Creek Exposed (E1) and Reference (EDC-D), 2010 to 2021

Waterbody	Area	Parameter	Units	Year	Replicate								Mean	Standard Deviation	Minimum	Median	Maximum
					1	2	3	4	5	6	7	8					
Upper Hazeltine Creek Reach 1	HAC-R1 (Exposed)	**Secondary Analytes**															
		Barium	mg/kg	2017	243	128	372	345	102	487	701	499	360	202	102	358	701
				2018	75.4	72.9	119	1,050	178	101	83.9	73.4	219	338	72.9	92.5	1,050
				2019	79	108	88.1	152	133	116	87.4	69.9	104	28.3	69.9	98	152
				2020	68.6	67.1	108	80.3	81	82.2	71.6	78.9	79.7	12.9	67.1	79.6	108
				2021	236	103	180	82.3	80.8	81.6	68.5	157	124	60.6	68.5	92.7	236
		Cadmium	mg/kg	2017	0.238	0.222	0.202	0.226	0.179	0.35	0.316	0.2	0.242	0.0599	0.179	0.224	0.35
				2018	0.155	0.189	0.254	0.265	0.286	0.209	0.213	0.211	0.223	0.043	0.155	0.212	0.286
				2019	0.208	0.156	0.317	0.743	0.17	0.197	0.255	0.244	0.286	0.192	0.156	0.226	0.743
				2020	0.145	0.114	0.165	0.198	0.228	0.179	0.165	0.182	0.172	0.0341	0.114	0.172	0.228
				2021	<0.25	0.066	0.156	0.153	0.093	0.124	0.145	0.094	0.119	0.0374	0.066	0.124	0.156
		Calcium	mg/kg	2017	207,000	140,000	156,000	210,000	193,000	161,000	154,000	160,000	172,625	26,662	140,000	160,500	210,000
				2018	198,000	202,000	172,000	155,000	226,000	214,000	178,000	218,000	195,375	24,859	155,000	200,000	226,000
				2019	219,000	307,000	210,000	202,000	276,000	197,000	248,000	222,000	235,125	38,945	197,000	220,500	307,000
				2020	231,000	221,000	227,000	228,000	216,000	231,000	251,000	278,000	235,375	20,021	216,000	229,500	278,000
				2021	278,000	221,000	235,000	236,000	216,000	226,000	235,000	228,000	234,375	19,026	216,000	231,500	278,000
		Cobalt	mg/kg	2017	4.06	9.42	4.14	5.19	2.94	6.55	6.15	5.19	5.46	1.98	2.94	5.19	9.42
				2018	1.99	1.42	3.35	7.1	8.44	2.04	1.28	0.738	3.29	2.89	0.738	2.02	8.44
				2019	1.47	1.22	1.98	1.89	1.54	1.48	1.14	1.09	1.48	0.329	1.09	1.48	1.98
				2020	1.39	1.26	1.58	1.98	2	1.58	1.25	1.25	1.54	0.311	1.25	1.48	2
				2021	1.66	0.947	1.99	1.04	1.1	0.775	1.28	1.22	1.25	0.397	0.775	1.16	1.99
		Manganese	mg/kg	2017	1,050	927	863	953	716	1,120	1,000	1,000	954	123	716	976	1,120
				2018	1,080	710	1,260	1,400	2,410	778	783	636	1,132	585	636	932	2,410
				2019	1,510	1,050	2,280	1,750	1,050	1,260	1,240	1,350	1,436	413	1,050	1,305	2,280
				2020	949	814	1,180	1,560	1,740	1,250	1,110	1,030	1,204	310	814	1,145	1,740
				2021	1,060	653	1,180	1,260	1,080	1,040	1,020	1,000	1,037	178	653	1,050	1,260
		Mercury	mg/kg	2017	0.0192	0.023	0.0313	0.0343	0.0235	0.0205	0.0565	0.0361	0.0306	0.0123	0.0192	0.0274	0.0565
				2018	0.0111	0.012	0.0236	0.0278	0.0665	0.0214	0.0143	0.0101	0.0234	0.0186	0.0101	0.0178	0.0665
				2019	<0.010	0.017	<0.010	0.015	0.049	0.021	<0.010	<0.010	0.0177	0.0128	<0.01	0.0125	0.049
				2020	0.0057	0.0076	0.007	0.0098	0.0086	0.0076	0.0059	0.0087	0.00761	0.00141	0.0057	0.0076	0.0098
				2021	0.0068	<0.0050	0.0063	<0.0050	<0.0050	<0.0050	0.0068	0.0055	0.00568	0.000655	<0.005	0.00525	0.0068
		Molybdenum	mg/kg	2017	1.25	0.983	2.31	1.45	1.05	0.781	7.25	1.24	2.04	2.16	0.781	1.25	7.25
				2018	1.64	1.45	1.85	2.29	3.27	1.15	1.21	0.974	1.73	0.753	0.974	1.54	3.27
				2019	1.65	2.02	1.69	1.37	1.22	1.51	2.25	1.53	1.66	0.337	1.22	1.59	2.25
				2020	1.61	1.47	1.58	2.05	1.74	1.58	1.29	1.23	1.57	0.258	1.23	1.58	2.05
				2021	<1.0	0.725	0.986	1.04	0.908	0.779	0.946	0.892	0.894	0.117	0.725	0.908	1.04
		Nickel	mg/kg	2017	7.73	77.1	5.44	7.57	3.89	30.1	25.8	6.22	20.5	25	3.89	7.65	77.1
				2018	1.85	1.75	3.87	4.57	9.24	2.98	1.59	1.16	3.38	2.65	1.16	2.42	9.24
				2019	2.3	2.4	2.1	1.8	<2.5	3.7	2.3	2	2.34	0.598	1.8	2.3	3.7
				2020	2.86	2.75	3.18	3.39	3.69	3.2	3.09	3.23	3.17	0.293	2.75	3.19	3.69
				2021	<5	1.82	2.49	2.27	2.25	1.77	2.8	3.34	2.39	0.589	1.77	2.27	3.34
		Phosphorus	mg/kg	2017	890	1,060	1,090	1,160	921	835	866	1,130	994	130	835	990	1,160
				2018	476	525	723	579	1,270	546	463	594	647	264	463	562	1,270
				2019	860	740	760	860	860	740	660	730	776	75.2	660	750	860
				2020	716	730	811	837	831	801	651	669	756	73.8	651	766	837
				2021	808	512	809	513	567	468	839	335	606	188	335	540	839
		Silver	mg/kg	2017	-	-	-	-	-	-	-	-	-	-	-	-	-
				2018	-	-	-	-	-	-	-	-	-	-	-	-	-
				2019	<0.025	<0.025	<0.025	<0.025	<0.063	<0.025	<0.025	<0.025	<0.025	-	<0.025	<0.025	<0.025
				2020	0.0112	0.0134	0.0084	0.034	0.0102	0.0091	0.0078	0.0102	0.013	0.00865	0.0078	0.0102	0.034
				2021	<0.125	0.006	0.0067	0.017	0.0088	0.0086	0.0135	0.0058	0.00949	0.00452	0.0058	0.0086	0.017
		Sodium	mg/kg	2017	437	337	481	484	407	345	342	403	404	60	337	405	484
				2018	376	376	539	711	669	343	311	293	452	165	293	376	711
				2019	330	360	260	350	290	320	330	340	322	32.8	260	330	360
				2020	302	355	338	348	338	308	269	286	318	31.3	269	323	355
				2021	<500	213	245	223	206	171	213	168	206	29.5	168	213	245
		Strontium	mg/kg	2017	587	381	453	647	502	473	452	461	494	84.4	381	467	647
				2018	588	602	526	1,280	528	604	557	569	657	254	526	578	1,280
				2019	523	765	486	534	674	543	624	515	583	96.2	486	538	765
				2020	556	501	533	525	517	552	558	608	544	32.9	501	542	608
				2021	593	525	548	543	502	494	505	532	530	32.1	494	528	593
		Tin	mg/kg	2017	0.1	<0.20	0.13	0.22	0.11	<0.20	<0.20	0.15	0.135	0.0448	0.1	0.13	0.22
				2018	<0.10	<0.10	<0.20	0.29	0.35	<0.20	<0.10	<0.10	0.155	0.0281	<0.1	0.2	0.35
				2019	<0.50	<0.50	<0.50	<0.50	<1.3	<0.50	<0.50	<0.50	<0.5	-	<0.5	<0.5	<0.5
				2020	0.14	0.16	<0.10	<0.10	<0.10	0.12	<0.10	0.15	0.121	0.0177	<0.1	0.11	0.16
				2021	<2.5	<0.10	<0.13	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	-	<0.1	<0.1	<0.1
		Titanium	mg/kg	2017	-	-	-	-	-	-	-	-	-	-	-	-	-
				2018	-	-	-	-	-	-	-	-	-	-	-	-	-
				2019	86.9	77.8	84.9	101	102	114	59	43.1	83.6	23.5	43.1	85.9	114
				2020	77.4	97.7	89.7	116	111	124	94.2	94.2	101	15.3	77.4	96	124
				2021	58.4	9.66	23.2	8.98	3.3	2.6	35.6	8.94	18.8	19.5	2.6	9.32	58.4
		Uranium	mg/kg	2017	0.154	0.446	0.225	0.247	0.177	0.288	0.409	0.197	0.268	0.107	0.154	0.236	0.446
				2018	0.189	0.165	0.303	0.326	0.445	0.181	0.163	0.144	0.24	0.107	0.144	0.185	0.445
				2019	0.083	0.098	0.089	0.105	0.119	0.09	0.093	0.084	0.0951	0.012	0.083	0.0915	0.119
				2020	0.0864	0.094	0.1	0.113	0.1	0.0916	0.0836	0.0886	0.0946	0.00949	0.0836	0.0928	0.113
				2021	0.0828	0.0505	0.0641	0.0558	0.0481	0.0239	0.0682	0.0337	0.0534	0.0189	0.0239	0.0532	0.0828
		Vanadium	mg/kg	2017	21.7	37	23.9	34.9	17.9	23.3	26.3	25.7	26.3	6.49	17.9	24.8	37
				2018	6.72	6.78	18	28.2	39.3	9.83	6.53	4.63	15	12.6	4.63	8.3	39.3
				2019	7.05	6.36	7.07	8.34	7.1	6	5.26	4.33	6.44	1.25	4.33	6.7	8.34
				2020	6.57	7.68	8.18	11	9.75	9.61	6.91	7.38	8.38	1.57	6.57	7.93	11
				2021	4.09	1.99	3.92	2.5	1.99	1.07	4.09	1.81	2.68	1.19	1.07	2.24	4.09
		Zinc	mg/kg	2017	28.2	29.1	19.8	26.5	17	27.7	24.2	22.1	24.3	4.36	17	25.4	29.1
				2018	7.9	7.8	20.2	29.5	30	9.2	6.4	5.1	14.5	10.5	5.1	8.55	30
				2019	8.4	7.6	9.8	9.1	<13	8.4	7.7	7.4	8.34	0.932	7.4	8.4	9.8
				2020	11.7	9.7	11.8	13.7	15.2	10.4	8.62	10.2	11.4	2.17	8.62	11	15.2
				2021	<25	5.8	9	7.1	5.9	5.3	7.1	5.4	6.51	1.41	5.3	5.9	9
Upper Hazeltine Creek Reach 2	HAC-U (Exposed)	**Primary Analytes**															
		Arsenic	mg/kg	2010	5.55	8.18	6.65	12.5	8.53	-	-	-	8.28	2.65	5.55	8.18	12.5
				2018	3.81	3.07	4.59	2.73	2.75	2.56	3.54	3.95	3.38	0.716	2.56	3.3	4.59
				2019	2	2.41	2.96	2.09	3.65	3.14	3.75	2.09	2.76	0.713	2	2.68	3.75
				2020	2.68	2.27	3.06	2.46	2.64	2.51	4.22	2.58	2.8	0.616	2.27	2.61	4.22
				2021	2.18	3.1	2.79	2.2	2.81	2.24	2.44	2.38	2.52	0.341	2.18	2.41	3.1
		Copper	mg/kg	2010	49.8	73.4	54.3	89	75.5	-	-	-	68.4	16.2	49.8	73.4	89
				2018	111	92.3	102	68.7	48.4	76.4	99.4	222	103	52.4	48.4	95.8	222
				2019	45.4	49.7	62.3	49.5	74.4	91.1	125	62.7	70	26.8	45.4	62.5	125
				2020	42	31.5	50.1	68.3	42.6	39.9	83.8	43.1	50.2	17.3	31.5	42.9	83.8
				2021	28.6	75.4	221	27.4	49.7	25.8	188	89.7	88.2	76	25.8	62.5	221
		Iron	mg/kg	2010	14,000	18,200	14,500	23,800	18,000	-	-	-	17,700	3,920	14,000	18,000	23,800
				2018	5,310	2,490	4,520	3,130	1,560	3,040	6,030	5,000	3,885	1,554	1,560	3,825	6,030
				2019	2,040	2,070	3,070	2,220	4,040	3,300	6,340	2,660	3,218	1,437	2,040	2,865	6,340
				2020	2,410	1,690	3,020	3,510	2,240	1,820	5,010	2,340	2,755	1,088	1,690	2,375	5,010
				2021	1,170	2,640	2,310	422	2,150	1,020	1,290	1,960	1,620	758	422	1,625	2,640
		Selenium	mg/kg	2010	3.6	5.3	3.5	6.3	5.5	-	-	-	4.84	1.24	3.5	5.3	6.3
				2018	1.59	1.3	1.51	1.47	1.34	1.61	1.26	1.42	1.44	0.131	1.26	1.44	1.61
				2019	1.3	1.5	1.65	1.51	1.81	2.01	1.57	1.58	1.62	0.214	1.3	1.58	2.01
				2020	2	1.93	3.07	1.92	2.72	2.16	1.73	1.74	2.16	0.484	1.73	1.96	3.07
				2021	2.08	2.39	2.44	2.03	3.23	2.57	2.58	1.87	2.4	0.426	1.87	2.42	3.23

Notes: For 2010 data at HAC-D and HAC-U, historical station codes were W11 and W7, respectively. All results are in dry weight. Summary statistics reported to 3 significant figures for display purposes. "-" indicates no data available.

Table D.5.2: Periphyton Tissue Primary and Secondary Analytes Concentrations for Upper Hazeltine Creek (HAC-R1, HAC-U; Exposed), Upper Edney Creek (EDC-U; Reference), Lower Hazeltine Creek (HAC-D; Exposed), and Lower Edney Creek Exposed (E1) and Reference (EDC-D), 2010 to 2021

Waterbody	Area	Parameter	Units	Year	Replicate								Mean	Standard Deviation	Minimum	Median	Maximum
					1	2	3	4	5	6	7	8					
Upper Hazeltine Creek Reach 2	HAC-U (Exposed)	**Secondary Analytes**															
		Barium	mg/kg	2010	143	208	144	233	195	-	-	-	185	39.9	143	195	233
				2018	319	105	162	106	97.8	101	122	192	151	75.9	97.8	114	319
				2019	99.4	112	137	127	140	130	128	96.2	121	16.7	96.2	128	140
				2020	107	86.9	111	96.8	91.5	100	128	108	104	12.9	86.9	104	128
				2021	81.9	118	148	88.5	202	113	98.2	124	122	38.7	81.9	116	202
		Cadmium	mg/kg	2010	0.254	0.337	0.246	0.404	0.368	-	-	-	0.322	0.0698	0.246	0.337	0.404
				2018	0.203	0.19	0.24	0.217	0.233	0.235	0.203	0.252	0.222	0.0217	0.19	0.225	0.252
				2019	0.27	0.24	0.451	0.296	0.351	0.361	0.241	0.25	0.308	0.0748	0.24	0.283	0.451
				2020	0.241	0.186	0.298	0.248	0.24	0.257	0.232	0.261	0.245	0.0314	0.186	0.244	0.298
				2021	0.124	0.168	0.403	0.161	0.2	0.154	0.178	0.166	0.194	0.087	0.124	0.167	0.403
		Calcium	mg/kg	2010	9,990	13,700	11,300	16,600	14,900	-	-	-	13,298	2,672	9,990	13,700	16,600
				2018	183,000	270,000	246,000	276,000	247,000	304,000	255,000	270,000	256,375	35,063	183,000	262,500	304,000
				2019	250,000	237,000	275,000	246,000	286,000	258,000	259,000	224,000	254,375	19,906	224,000	254,000	286,000
				2020	246,000	220,000	235,000	214,000	195,000	224,000	200,000	220,000	219,250	16,791	195,000	220,000	246,000
				2021	210,000	223,000	249,000	198,000	244,000	266,000	251,000	236,000	234,625	22,778	198,000	240,000	266,000
		Cobalt	mg/kg	2010	6.77	8.94	7.23	11.4	9.01	-	-	-	8.67	1.83	6.77	8.94	11.4
				2018	3.26	1.46	2.25	1.79	1.12	1.87	3.18	2.86	2.22	0.803	1.12	2.06	3.26
				2019	1.6	1.59	2.31	1.72	3.03	2.53	3.8	1.85	2.3	0.79	1.59	2.08	3.8
				2020	1.9	1.39	2.18	2.16	1.69	1.49	2.68	1.61	1.89	0.433	1.39	1.8	2.68
				2021	1.05	1.92	1.55	1.32	1.84	0.95	1.2	1.45	1.41	0.35	0.95	1.38	1.92
		Manganese	mg/kg	2010	4,360	6,670	4,440	7,250	7,320	-	-	-	6,008	1,490	4,360	6,670	7,320
				2018	1,490	1,100	1,380	1,440	1,160	1,400	1,130	1,320	1,302	152	1,100	1,350	1,490
				2019	2,300	2,240	3,310	2,170	2,920	3,210	2,120	1,960	2,529	532	1,960	2,270	3,310
				2020	2,640	2,280	2,970	2,540	2,300	2,380	2,220	2,340	2,459	249	2,220	2,360	2,970
				2021	1,880	2,380	2,060	2,370	3,240	2,170	2,540	2,460	2,388	408	1,880	2,375	3,240
		Mercury	mg/kg	2010	0.0608	0.0895	0.0642	0.0219	0.0176	-	-	-	0.0508	0.0305	0.0176	0.0608	0.0895
				2018	0.0354	0.0159	0.0193	0.0231	0.0181	0.0223	0.0413	0.025	0.025	0.00885	0.0159	0.0227	0.0413
				2019	0.014	0.016	0.02	0.019	0.023	0.026	0.032	0.017	0.0209	0.00591	0.014	0.0195	0.032
				2020	0.0168	0.0136	0.0157	0.0152	0.0126	0.0097	0.0147	0.0092	0.0134	0.00277	0.0092	0.0142	0.0168
				2021	0.0092	0.015	0.0249	0.0088	0.0183	0.0074	0.0101	0.0062	0.0125	0.00643	0.0062	0.00965	0.0249
		Molybdenum	mg/kg	2010	1.33	1.2	0.94	1.62	1.34	-	-	-	1.29	0.247	0.94	1.33	1.62
				2018	1.09	0.62	0.8	0.6	0.599	0.73	0.63	0.65	0.715	0.167	0.599	0.64	1.09
				2019	1	1.19	1.06	1.36	1.09	1.26	1.07	1.14	1.15	0.119	1	1.12	1.36
				2020	1.67	1.59	2.07	1.4	1.57	1.65	1.56	1.18	1.59	0.252	1.18	1.58	2.07
				2021	1.22	1.66	1.26	1.49	1.48	1.21	1.14	0.926	1.3	0.233	0.926	1.24	1.66
		Nickel	mg/kg	2010	17.9	18.6	15.1	23.3	18.9	-	-	-	18.8	2.95	15.1	18.6	23.3
				2018	4.88	2.5	4	2.7	1.37	2.9	4.7	3.8	3.36	1.2	1.37	3.35	4.88
				2019	2.6	2.4	3.6	2.6	3.7	4.7	5.9	2.8	3.54	1.23	2.4	3.2	5.9
				2020	3.65	2.34	4.07	3.78	3.11	2.65	3.12	2.73	3.18	0.606	2.34	3.12	4.07
				2021	1.94	3.55	2.95	2.76	2.95	1.99	2.2	2.43	2.6	0.557	1.94	2.6	3.55
		Phosphorus	mg/kg	2010	1,600	2,330	1,810	2,470	2,930	-	-	-	2,228	532	1,600	2,330	2,930
				2018	639	570	838	625	415	600	848	878	677	163	415	632	878
				2019	510	720	930	720	910	910	820	500	752	173	500	770	930
				2020	957	1,020	974	747	919	844	974	1,010	931	92.7	747	966	1,020
				2021	939	1,160	1,730	356	1,260	1,060	1,120	920	1,068	384	356	1,090	1,730
		Silver	mg/kg	2010	-	-	-	-	-	-	-	-	-	-	-	-	-
				2018	-	-	-	-	-	-	-	-	-	-	-	-	-
				2019	<0.063	<0.025	<0.025	<0.025	<0.025	<0.025	0.059	<0.025	0.0299	-	<0.025	0.025	0.059
				2020	0.0137	<0.0125	0.0182	0.0185	0.0134	0.0112	0.0315	0.011	0.0161	0.00699	0.011	0.0136	0.0315
				2021	0.0083	0.0249	0.0781	0.0119	0.0229	0.0141	0.0346	0.0108	0.0257	0.0229	0.0083	0.0185	0.0781
		Sodium	mg/kg	2010	340	440	370	490	510	-	-	-	430	73.8	340	440	510
				2018	552	430	640	540	290	370	750	520	512	147	290	530	750
				2019	290	350	400	270	520	500	560	310	400	113	270	375	560
				2020	355	423	294	320	417	360	397	370	367	45.2	294	365	423
				2021	325	450	653	303	402	376	329	249	386	124	249	352	653
		Strontium	mg/kg	2010	107	148	117	176	140	-	-	-	138	27.2	107	140	176
				2018	557	669	598	622	628	720	609	628	629	48.5	557	625	720
				2019	602	589	637	584	690	611	640	542	612	44.4	542	606	690
				2020	582	520	540	512	504	556	490	539	530	29.9	490	530	582
				2021	526	558	654	546	596	645	597	563	586	46	526	580	654
		Tin	mg/kg	2010	1	1.52	1.17	1.61	2.06	-	-	-	1.47	0.413	1	1.52	2.06
				2018	<0.20	<1.0	<0.50	<0.50	<0.20	<0.50	<0.50	<0.50	<0.2	-	<0.2	<0.2	<0.2
				2019	<1.3	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.5	-	<0.5	<0.5	<0.5
				2020	<0.25	<0.25	<0.25	0.16	<0.10	0.24	0.16	0.14	0.16	0.0542	<0.1	0.16	0.24
				2021	<0.10	<0.12	<0.13	<0.10	<0.13	<0.10	<0.10	<0.12	<0.1	-	<0.1	<0.1	<0.1
		Titanium	mg/kg	2010	571	679	552	884	654	-	-	-	668	132	552	654	884
				2018	-	-	-	-	-	-	-	-	-	-	-	-	-
				2019	97.6	95	147	95.3	177	138	267	106	140	59.2	95	122	267
				2020	117	83	136	165	118	88.8	239	108	132	50.5	83	118	239
				2021	37.1	113	98	12.2	87.8	31.6	37.8	78.9	62	36.8	12.2	58.4	113
		Uranium	mg/kg	2010	0.555	0.764	0.581	0.966	0.773	-	-	-	0.728	0.167	0.555	0.764	0.966
				2018	0.271	0.126	0.173	0.166	0.146	0.146	0.214	0.184	0.178	0.0461	0.126	0.17	0.271
				2019	0.116	0.115	0.142	0.111	0.188	0.171	0.219	0.126	0.148	0.0399	0.111	0.134	0.219
				2020	0.115	0.103	0.147	0.154	0.137	0.123	0.185	0.122	0.136	0.026	0.103	0.13	0.185
				2021	0.0863	0.137	0.142	0.0888	0.187	0.142	0.116	0.115	0.127	0.0328	0.0863	0.126	0.187
		Vanadium	mg/kg	2010	42.6	53.7	43.9	68.6	51.4	-	-	-	52	10.4	42.6	51.4	68.6
				2018	18	8.6	14.8	10.8	7.17	9.81	20.7	17.2	13.4	4.96	7.17	12.8	20.7
				2019	7.3	7.51	10.9	7.88	13	11.5	22	9.48	11.2	4.82	7.3	10.2	22
				2020	9.39	7.03	11.1	12.6	9.88	8.1	20.8	9.54	11.1	4.29	7.03	9.71	20.8
				2021	4.44	9.6	9.39	4.17	7.81	4.4	5.24	8.57	6.7	2.37	4.17	6.52	9.6
		Zinc	mg/kg	2010	55.2	77.1	56.6	88.9	78.9	-	-	-	71.3	14.8	55.2	77.1	88.9
				2018	18.4	15	22.4	18.8	12.2	20	23.9	25.8	19.6	4.52	12.2	19.4	25.8
				2019	<13	9.7	16.4	13.4	16.3	15.4	18.1	12	14	3.1	9.7	14.4	18.1
				2020	12.5	10.4	14.5	16.1	11.8	11.3	14.6	11.5	12.8	1.99	10.4	12.2	16.1
				2021	6.7	11.2	16.6	8.2	11.9	6.9	7.3	7.5	9.54	3.47	6.7	7.85	16.6
Lower Edney Creek	EDC-D (Reference)	**Primary Analytes**															
		Arsenic	mg/kg	2017	13.8	20.3	28.2	18.3	24.3	12.4	18.1	13.8	18.6	5.51	12.4	18.2	28.2
				2018	18.4	16.3	13.5	9.79	11.7	9.73	18	11.7	13.6	3.51	9.73	12.6	18.4
				2019	19	14.7	15.4	8.7	8.66	9.09	21.8	12.2	13.7	4.95	8.66	13.4	21.8
				2020	11.7	15.8	8.63	16.3	13	11.7	9.18	9.06	11.9	2.98	8.63	11.7	16.3
				2021	16.6	16.5	16.4	15.8	15.2	15.7	15.1	6.88	14.8	3.24	6.88	15.8	16.6
		Copper	mg/kg	2017	21.2	17.6	29	18.8	26	8.89	12.5	13.8	18.5	6.82	8.89	18.2	29
				2018	25.8	23.9	20.1	13.1	29.8	14.3	18.4	19.7	20.6	5.66	13.1	19.9	29.8
				2019	42.1	41.6	39.9	22.9	25.6	19	44.9	25.2	32.6	10.4	19	32.8	44.9
				2020	27.2	26	19.6	23.4	24.3	21.4	18.2	23.3	22.9	3.06	18.2	23.4	27.2
				2021	16.5	20.8	20.3	18	24.1	21.4	23.2	8.7	19.1	4.89	8.7	20.6	24.1
		Iron	mg/kg	2017	14,700	9,070	10,100	15,700	21,200	7,120	5,920	11,100	11,864	5,060	5,920	10,600	21,200
				2018	12,600	10,100	5,740	1,990	13,000	5,790	7,950	5,710	7,860	3,813	1,990	6,870	13,000
				2019	28,200	30,700	23,000	20,500	19,600	14,200	31,100	17,400	23,088	6,307	14,200	21,750	31,100
				2020	26,300	23,200	22,600	28,200	23,200	24,300	19,400	24,900	24,013	2,625	19,400	23,750	28,200
				2021	11,400	11,500	19,000	9,940	9,930	12,100	16,600	5,430	11,988	4,183	5,430	11,450	19,000
		Selenium	mg/kg	2017	0.94	2.07	3.71	1.51	1.24	0.88	1.7	0.876	1.62	0.948	0.876	1.38	3.71
				2018	3.51	2.65	2.44	2.15	1.86	1.75	2.17	1.95	2.31	0.569	1.75	2.16	3.51
				2019	1.19	4.82	2.37	0.54	0.54	0.71	1.1	0.7	1.5	1.47	0.54	0.905	4.82
				2020	0.655	0.95	0.387	0.55	0.84	0.609	0.544	0.454	0.624	0.189	0.387	0.58	0.95
				2021	2.99	1.88	1.15	1.76	2.24	1.82	1.4	0.68	1.74	0.7	0.68	1.79	2.99

Notes: For 2010 data at HAC-D and HAC-U, historical station codes were W11 and W7, respectively. All results are in dry weight. Summary statistics reported to 3 significant figures for display purposes. "-" indicates no data available.

Table D.5.2: Periphyton Tissue Primary and Secondary Analytes Concentrations for Upper Hazeltine Creek (HAC-R1, HAC-U; Exposed), Upper Edney Creek (EDC-U; Reference), Lower Hazeltine Creek (HAC-D; Exposed), and Lower Edney Creek Exposed (E1) and Reference (EDC-D), 2010 to 2021

Waterbody	Area	Parameter	Units	Year	Replicate								Mean	Standard Deviation	Minimum	Median	Maximum
					1	2	3	4	5	6	7	8					
Lower Edney Creek	EDC-D (Reference)	**Secondary Analytes**															
		Barium	mg/kg	2017	107	141	228	156	175	143	137	136	153	35.9	107	142	228
				2018	120	139	100	105	94.6	89.9	147	71	108	25.6	71	102	147
				2019	205	770	166	112	158	92.6	185	103	224	224	92.6	162	770
				2020	137	172	105	118	142	133	105	130	130	21.9	105	132	172
				2021	139	126	147	149	142	139	115	54.6	126	31.1	54.6	139	149
		Cadmium	mg/kg	2017	0.26	0.286	0.676	0.313	0.338	0.194	0.353	0.222	0.33	0.15	0.194	0.3	0.676
				2018	0.353	0.387	0.285	0.236	0.357	0.416	0.373	0.342	0.344	0.0577	0.236	0.355	0.416
				2019	0.677	0.373	0.451	0.225	0.348	0.482	0.656	0.299	0.439	0.162	0.225	0.412	0.677
				2020	0.274	0.557	0.185	0.224	0.516	0.468	0.214	0.21	0.331	0.155	0.185	0.249	0.557
				2021	0.37	0.366	0.318	0.335	0.435	0.431	0.301	0.132	0.336	0.0957	0.132	0.35	0.435
		Calcium	mg/kg	2017	22,800	88,700	146,000	58,000	23,600	96,400	73,100	142,000	81,325	47,079	22,800	80,900	146,000
				2018	34,200	61,800	106,000	107,000	55,600	19,800	48,500	12,400	55,663	35,611	12,400	52,050	107,000
				2019	17,000	10,000	10,700	9,530	15,000	8,870	12,000	10,300	11,675	2,869	8,870	10,500	17,000
				2020	9,520	12,600	8,080	8,390	9,060	9,830	10,200	9,060	9,592	1,403	8,080	9,290	12,600
				2021	35,600	30,500	27,400	49,300	49,800	27,500	14,300	15,300	31,213	13,416	14,300	29,000	49,800
		Cobalt	mg/kg	2017	9.01	4.82	6.26	7.59	10.7	4.08	4.3	5.17	6.49	2.4	4.08	5.72	10.7
				2018	9.48	7.51	3.36	1.56	7.46	4.51	7.38	4.04	5.66	2.68	1.56	5.94	9.48
				2019	15.7	13.1	13.7	10.2	9.6	7.36	15.8	9.35	11.9	3.15	7.36	11.6	15.8
				2020	12.8	16.7	10.1	12.6	15	14.2	9.4	11.8	12.8	2.45	9.4	12.7	16.7
				2021	8.09	7.21	10.8	5.91	7.73	7.97	8.54	2.92	7.4	2.27	2.92	7.85	10.8
		Manganese	mg/kg	2017	1,570	2,700	3,810	1,750	2,740	1,360	2,130	1,210	2,159	879	1,210	1,940	3,810
				2018	2,190	2,720	1,200	796	1,540	1,510	2,060	974	1,624	657	796	1,525	2,720
				2019	3,840	2,700	2,620	1,490	1,330	1,900	3,540	1,560	2,372	959	1,330	2,260	3,840
				2020	2,120	4,730	1,200	1,930	4,440	2,900	1,850	1,840	2,626	1,298	1,200	2,025	4,730
				2021	2,880	3,040	2,500	2,000	3,170	2,790	1,940	911	2,404	754	911	2,645	3,170
		Mercury	mg/kg	2017	0.0378	0.051	0.077	0.047	0.0835	0.036	0.056	0.034	0.0528	0.0187	0.034	0.049	0.0835
				2018	0.0838	0.0465	0.0355	0.0246	0.129	0.0375	0.0559	0.0555	0.0585	0.0336	0.0246	0.051	0.129
				2019	0.123	0.052	0.083	0.059	0.041	0.061	0.128	0.068	0.0769	0.0324	0.041	0.0645	0.128
				2020	0.0645	0.051	0.0325	0.0416	0.045	0.0356	0.0496	0.0554	0.0469	0.0105	0.0325	0.0473	0.0645
				2021	0.0402	0.0306	0.038	0.0336	0.034	0.0353	0.0701	0.0182	0.0375	0.0147	0.0182	0.0346	0.0701
		Molybdenum	mg/kg	2017	0.648	0.924	2.78	0.748	0.856	1.39	3.8	0.564	1.46	1.19	0.564	0.89	3.8
				2018	0.91	1.7	0.684	1.68	0.935	1.89	4.35	2.08	1.78	1.16	0.684	1.69	4.35
				2019	4.7	2.81	2.19	0.759	1.03	2.54	2.01	1.39	2.18	1.25	0.759	2.1	4.7
				2020	1.32	6.64	0.676	0.838	2.6	3.17	2.74	0.61	2.32	2.02	0.61	1.96	6.64
				2021	3.3	1.67	1.01	5.56	2.74	3.18	0.689	0.786	2.37	1.67	0.689	2.2	5.56
		Nickel	mg/kg	2017	21	12.1	21.6	17.3	22.9	7.93	11	10.6	15.6	5.84	7.93	14.7	22.9
				2018	20.8	18.6	11.5	7.18	15.3	11.1	15.5	14.4	14.3	4.34	7.18	14.8	20.8
				2019	32.3	28.7	31.6	24.2	25.2	16.6	36	22.9	27.2	6.2	16.6	27	36
				2020	30.5	39.1	23.9	27.5	34.4	28.1	20.8	26.4	28.8	5.81	20.8	27.8	39.1
				2021	16.8	17.7	21.4	15.1	24.6	20.6	21.2	7.06	18.1	5.37	7.06	19.2	24.6
		Phosphorus	mg/kg	2017	748	2,340	4,240	1,630	1,300	1,160	2,190	1,240	1,856	1,101	748	1,465	4,240
				2018	1,990	2,210	2,510	2,160	2,640	1,650	2,080	2,070	2,164	307	1,650	2,120	2,640
				2019	2,770	1,590	1,730	1,020	1,150	2,460	2,980	1,640	1,918	733	1,020	1,685	2,980
				2020	1,510	2,020	1,140	1,100	1,970	1,750	1,160	1,130	1,472	395	1,100	1,335	2,020
				2021	1,680	1,770	1,420	2,010	1,970	2,080	1,420	825	1,647	417	825	1,725	2,080
		Silver	mg/kg	2017	-	-	-	-	-	-	-	-	-	-	-	-	-
				2018	-	-	-	-	-	-	-	-	-	-	-	-	-
				2019	0.113	0.118	0.101	0.082	0.111	0.0766	0.174	0.0907	0.108	0.0305	0.0766	0.106	0.174
				2020	0.102	0.0698	0.0738	0.0813	0.0576	0.0684	0.0659	0.088	0.0758	0.0141	0.0576	0.0718	0.102
				2021	0.0493	0.0773	0.0666	0.0682	0.071	0.0947	0.0743	0.0293	0.0663	0.0195	0.0293	0.0696	0.0947
		Sodium	mg/kg	2017	317	709	1,420	675	436	442	525	724	656	342	317	600	1,420
				2018	492	559	749	517	3,550	512	681	325	923	1,069	325	538	3,550
				2019	726	267	427	201	273	875	589	889	531	279	201	508	889
				2020	326	399	292	229	396	266	318	334	320	58.8	229	322	399
				2021	423	639	351	546	469	629	384	282	465	130	282	446	639
		Strontium	mg/kg	2017	88.9	301	529	236	137	328	328	435	298	145	88.9	314	529
				2018	144	230	339	381	179	135	256	96.8	220	101	96.8	204	381
				2019	142	94.1	88.3	72.8	83.4	68.3	95.2	77.7	90.2	23	68.3	85.8	142
				2020	83.1	116	69.4	64.4	76.2	95.9	85	73	82.9	16.6	64.4	79.7	116
				2021	200	153	129	252	200	166	82.7	76.7	157	60.4	76.7	160	252
		Tin	mg/kg	2017	<0.10	0.21	<0.20	0.16	0.15	<0.10	<0.10	<0.10	0.13	0.0241	<0.1	0.15	0.21
				2018	0.18	0.17	0.11	<0.10	0.41	0.12	0.14	<0.10	0.166	0.104	<0.1	0.13	0.41
				2019	1.83	0.67	1.58	0.19	1.18	2.87	6.68	0.41	1.93	2.11	0.19	1.38	6.68
				2020	0.24	0.32	0.19	0.17	0.3	0.22	0.18	0.21	0.229	0.0551	0.17	0.215	0.32
				2021	0.14	0.16	0.16	0.16	0.22	0.14	0.13	<0.10	0.151	0.0296	<0.1	0.15	0.22
		Titanium	mg/kg	2017	-	-	-	-	-	-	-	-	-	-	-	-	-
				2018	-	-	-	-	-	-	-	-	-	-	-	-	-
				2019	808	335	399	465	329	290	590	362	447	174	290	380	808
				2020	652	597	704	575	620	638	636	787	651	66.9	575	637	787
				2021	141	231	318	212	181	270	305	113	221	74.4	113	222	318
		Uranium	mg/kg	2017	0.522	0.264	0.407	0.684	0.61	0.183	0.313	0.281	0.408	0.18	0.183	0.36	0.684
				2018	0.959	0.309	0.277	0.186	0.729	0.34	0.276	0.597	0.459	0.272	0.186	0.324	0.959
				2019	0.631	12.3	0.623	0.494	0.499	0.352	0.714	0.45	2.01	4.16	0.352	0.561	12.3
				2020	0.704	0.61	0.693	0.496	0.564	0.652	0.571	0.715	0.626	0.0786	0.496	0.631	0.715
				2021	0.366	0.284	0.335	0.323	0.311	0.386	0.367	0.126	0.312	0.0823	0.126	0.329	0.386
		Vanadium	mg/kg	2017	41.9	19.9	19.4	34.4	46.1	15.2	14.1	28.1	27.4	12.3	14.1	24	46.1
				2018	27.3	30.7	14.5	3.75	50.7	17.8	27.3	11	22.9	14.5	3.75	22.6	50.7
				2019	69.7	64.5	52.5	42	42.6	23.5	52.2	30.2	47.1	15.8	23.5	47.4	69.7
				2020	56.5	48.2	55.7	49.3	52.6	64	46.6	57.1	53.8	5.74	46.6	54.1	64
				2021	22.2	23.2	42.8	23.2	18.5	26.5	33	11.6	25.1	9.4	11.6	23.2	42.8
		Zinc	mg/kg	2017	32.9	38.9	75.1	48	56.8	30.7	58.7	30.9	46.5	16.1	30.7	43.5	75.1
				2018	41.8	39	21.4	12.7	42.4	35.5	62.8	64.2	40	17.8	12.7	40.4	64.2
				2019	118	78.8	72.8	49.8	58	45.7	88.9	56.5	71.1	24.1	45.7	65.4	118
				2020	59.8	88.6	46.8	53.5	57.6	88.5	54.2	49.4	62.3	16.7	46.8	55.9	88.6
				2021	55.8	39.4	54.2	65.5	47.2	59.5	42.7	17.6	47.7	14.9	17.6	50.7	65.5
Lower Hazeltine Creek	HAC-D (Exposed)	**Primary Analytes**															
		Arsenic	mg/kg	2010	10.3	10.1	10.3	10.1	7.35	-	-	-	9.63	1.28	7.35	10.1	10.3
				2017	20.1	12.7	17.1	8.08	12.7	19.1	15.4	10.3	14.4	4.23	8.08	14	20.1
				2018	4.56	8.57	27.4	10.5	7.75	12.6	11	12.8	11.9	6.83	4.56	10.8	27.4
				2019	3.22	4.9	9.6	6.22	6.18	6.77	4.52	6.27	5.96	1.88	3.22	6.2	9.6
				2020	6.8	23.2	3.58	9.02	4.53	11.4	4.3	4.22	8.38	6.58	3.58	5.66	23.2
				2021	43.8	6.42	8.98	8.88	11	9.88	7.81	6.18	12.9	12.6	6.18	8.93	43.8
		Copper	mg/kg	2010	27.8	25	24.6	26.1	14.6	-	-	-	23.6	5.19	14.6	25	27.8
				2017	281	225	191	158	202	254	311	289	239	53.6	158	240	311
				2018	67.7	173	118	222	115	214	146	279	167	68.9	67.7	160	279
				2019	74.5	109	159	130	135	110	92.9	121	116	26.1	74.5	116	159
				2020	92.2	112	65.8	127	78	102	70.3	62.9	88.8	23.4	62.9	85.1	127
				2021	87.2	65.5	265	352	631	374	300	474	319	188	65.5	326	631
		Iron	mg/kg	2010	17,800	17,400	15,400	15,300	9,110	-	-	-	15,002	3,484	9,110	15,400	17,800
				2017	19,500	16,800	23,800	12,100	13,700	26,400	28,700	14,600	19,450	6,215	12,100	18,150	28,700
				2018	4,730	10,500	14,900	16,500	10,400	16,200	13,800	21,300	13,541	4,996	4,730	14,350	21,300
				2019	5,980	9,480	24,600	15,000	13,900	13,800	8,800	13,900	13,182	5,604	5,980	13,850	24,600
				2020	18,500	21,200	8,350	19,300	11,400	21,500	10,200	8,520	14,871	5,776	8,350	14,950	21,500
				2021	5,200	4,630	12,800	17,600	25,900	13,100	10,400	14,700	13,041	6,847	4,630	12,950	25,900

Notes: For 2010 data at HAC-D and HAC-U, historical station codes were W11 and W7, respectively. All results are in dry weight. Summary statistics reported to 3 significant figures for display purposes. "-" indicates no data available.

Table D.5.2: Periphyton Tissue Primary and Secondary Analytes Concentrations for Upper Hazeltine Creek (HAC-R1, HAC-U; Exposed), Upper Edney Creek (EDC-U; Reference), Lower Hazeltine Creek (HAC-D; Exposed), and Lower Edney Creek Exposed (E1) and Reference (EDC-D), 2010 to 2021

Waterbody	Area	Parameter	Units	Year	Replicate								Mean	Standard Deviation	Minimum	Median	Maximum
					1	2	3	4	5	6	7	8					
Lower Hazeltine Creek	HAC-D (Exposed)	Selenium	mg/kg	2010	1.32	1.21	1.54	1.71	1.31	-	-	-	1.42	0.203	1.21	1.32	1.71
				2017	1.26	0.79	1.67	0.94	1.43	1.29	1.72	1.88	1.37	0.381	0.79	1.36	1.88
				2018	1.1	1	1.15	0.98	1.1	0.8	1.1	1.24	1.06	0.132	0.8	1.1	1.24
				2019	0.7	0.97	0.54	0.75	0.89	0.59	0.99	0.87	0.788	0.169	0.54	0.81	0.99
				2020	1	0.76	1.01	0.82	0.958	0.726	1.22	1.13	0.953	0.175	0.726	0.979	1.22
				2021	1.45	1.55	1.55	1.49	1.12	2.26	2.05	0.54	1.5	0.528	0.54	1.52	2.26
		Secondary Analytes															
		Barium	mg/kg	2010	189	162	189	179	113	-	-	-	166	31.8	113	179	189
				2017	160	84.9	93.4	124	133	123	157	203	135	38.3	84.9	128	203
				2018	106	99.2	159	3,840	114	132	150	232	604	1,308	99.2	141	3,840
				2019	101	131	308	148	140	118	146	171	158	64.2	101	143	308
				2020	198	195	191	285	145	427	176	296	239	92.1	145	196	427
				2021	90.7	119	286	268	344	374	304	550	292	145	90.7	295	550
		Cadmium	mg/kg	2010	0.267	0.237	0.31	0.29	0.201	-	-	-	0.261	0.0432	0.201	0.267	0.31
				2017	0.572	0.332	0.536	0.412	0.678	0.415	0.546	0.875	0.546	0.172	0.332	0.541	0.875
				2018	0.31	0.41	0.599	0.493	0.57	0.29	0.49	0.764	0.491	0.157	0.29	0.492	0.764
				2019	0.538	0.664	0.28	0.49	0.448	0.356	0.874	0.714	0.546	0.196	0.28	0.514	0.874
				2020	0.485	0.194	0.908	0.499	0.729	0.424	1.03	1.24	0.689	0.351	0.194	0.614	1.24
				2021	0.261	0.306	0.46	0.376	0.399	0.331	0.398	0.167	0.337	0.0925	0.167	0.354	0.46
		Calcium	mg/kg	2010	23,400	23,400	26,700	20,600	21,900	-	-	-	23,200	2,279	20,600	23,400	26,700
				2017	36,900	28,100	35,000	54,500	60,200	35,700	59,100	71,600	47,638	15,628	28,100	45,700	71,600
				2018	283,000	211,000	175,000	149,000	232,000	112,000	210,000	129,000	187,625	57,221	112,000	192,500	283,000
				2019	150,000	193,000	58,900	141,000	140,000	101,000	210,000	146,000	142,488	47,652	58,900	143,500	210,000
				2020	188,000	93,600	234,000	129,000	182,000	120,000	210,000	242,000	174,825	55,006	93,600	185,000	242,000
				2021	185,000	238,000	33,300	28,000	32,100	26,900	28,000	17,700	73,625	86,395	17,700	30,050	238,000
		Cobalt	mg/kg	2010	10.8	9.43	8.36	9.12	5.65	-	-	-	8.67	1.91	5.65	9.12	10.8
				2017	14.8	9.69	9.21	6.17	8.48	9.98	11.7	8.19	9.78	2.58	6.17	9.45	14.8
				2018	2.28	4.43	5.53	7.41	4.73	8.01	6.75	10.9	6.26	2.62	2.28	6.14	10.9
				2019	3.3	4.73	10.3	6.5	6.23	6.6	4.88	7.45	6.25	2.1	3.3	6.36	10.3
				2020	6.34	9.27	7.01	6.96	4.91	8.55	5.2	6.15	6.8	1.51	4.91	6.65	9.27
				2021	3.18	2.66	9.15	7.63	13.5	6.03	4.87	8.37	6.92	3.55	2.66	6.83	13.5
		Manganese	mg/kg	2010	3,540	3,100	2,880	4,180	2,700	-	-	-	3,280	593	2,700	3,100	4,180
				2017	1,660	1,000	1,650	951	2,070	1,540	1,800	3,110	1,723	677	951	1,655	3,110
				2018	504	759	1,230	1,210	1,190	765	1,180	6,020	1,607	1,804	504	1,185	6,020
				2019	1,180	1,330	716	972	1,040	757	2,020	3,430	1,431	906	716	1,110	3,430
				2020	1,510	573	2,930	1,320	1,970	1,180	3,170	7,990	2,580	2,355	573	1,740	7,990
				2021	904	988	1,130	627	762	608	458	415	736	255	415	694	1,130
		Mercury	mg/kg	2010	0.0096	0.0088	0.0089	0.0102	0.0068	-	-	-	0.00886	0.00128	0.0068	0.0089	0.0102
				2017	0.0686	0.064	0.0416	0.0444	0.056	0.127	0.067	0.0626	0.0664	0.0265	0.0416	0.0633	0.127
				2018	0.0183	0.0346	0.0466	0.0606	0.0291	0.0567	0.0565	0.0546	0.0446	0.0155	0.0183	0.0506	0.0606
				2019	0.019	0.022	0.05	0.029	0.026	0.03	0.029	0.037	0.0302	0.00965	0.019	0.029	0.05
				2020	0.0226	0.0319	0.0136	0.0292	0.0149	0.0285	0.0135	0.0117	0.0207	0.00827	0.0117	0.0188	0.0319
				2021	0.0255	0.0157	0.0419	0.0532	0.0886	0.0647	0.227	0.0642	0.0726	0.0666	0.0157	0.0587	0.227
		Molybdenum	mg/kg	2010	0.76	0.74	1.44	0.83	0.68	-	-	-	0.89	0.312	0.68	0.76	1.44
				2017	3.33	1.35	7.76	1.4	3.17	2.5	3.4	4.95	3.48	2.08	1.35	3.25	7.76
				2018	0.58	0.74	0.72	1.28	1.04	1.16	0.87	2.4	1.1	0.577	0.58	0.955	2.4
				2019	0.83	1.29	0.97	1.7	0.94	0.79	0.94	1.1	1.07	0.299	0.79	0.955	1.7
				2020	0.934	0.753	0.943	0.805	0.747	0.847	0.932	1.11	0.884	0.121	0.747	0.89	1.11
				2021	0.634	1.4	1.92	2.2	3.07	1.51	1.33	0.879	1.62	0.774	0.634	1.46	3.07
		Nickel	mg/kg	2010	20.2	18	16.8	17	9.5	-	-	-	16.3	4.03	9.5	17	20.2
				2017	28.1	26.1	21	9.93	15	17.8	21.3	14.3	19.2	6.14	9.93	19.4	28.1
				2018	4.3	6.4	12.1	15.1	7.6	11.2	11.8	19.3	11	4.86	4.3	11.5	19.3
				2019	7.6	9.6	20.4	12.6	11.7	12.2	9	14.3	12.2	3.97	7.6	12	20.4
				2020	13.6	30.5	30	13.1	8.91	16.3	8.6	9.26	16.3	9.03	8.6	13.4	30.5
				2021	7.46	4.68	8.79	13.1	18.8	9.27	7.78	9.02	9.86	4.3	4.68	8.9	18.8
		Phosphorus	mg/kg	2010	1,070	1,070	1,140	1,200	1,100	-	-	-	1,116	55	1,070	1,100	1,200
				2017	825	826	738	676	655	986	1,150	869	841	165	655	826	1,150
				2018	580	730	779	960	780	838	930	1,170	846	177	580	809	1,170
				2019	550	800	1,340	990	960	830	680	1,040	899	242	550	895	1,340
				2020	1,300	1,310	645	1,120	747	1,040	742	692	950	276	645	894	1,310
				2021	930	1,430	2,220	2,010	1,490	2,530	2,190	983	1,723	599	930	1,750	2,530
		Silver	mg/kg	2010	-	-	-	-	-	-	-	-	-	-	-	-	-
				2017	-	-	-	-	-	-	-	-	-	-	-	-	-
				2018	-	-	-	-	-	-	-	-	-	-	-	-	-
				2019	0.035	0.047	0.111	0.07	0.0817	0.0626	0.0428	0.0627	0.0641	0.0243	0.035	0.0626	0.111
				2020	0.0443	0.0719	0.0236	0.0683	0.041	0.071	0.0332	0.0272	0.0476	0.0201	0.0236	0.0426	0.0719
				2021	0.0302	0.0369	0.0978	0.125	0.255	0.0828	0.0961	0.0852	0.101	0.0697	0.0302	0.0906	0.255
		Sodium	mg/kg	2010	520	510	650	560	490	-	-	-	546	63.5	490	520	650
				2017	450	473	284	328	438	462	646	621	463	125	284	456	646
				2018	290	320	410	460	330	343	970	430	444	221	290	376	970
				2019	240	310	330	290	280	220	310	330	289	40.5	220	300	330
				2020	278	421	314	253	235	354	252	253	295	64.3	235	266	421
				2021	266	514	1,070	679	1,010	912	853	280	698	316	266	766	1,070
		Strontium	mg/kg	2010	168	164	177	138	141	-	-	-	158	17.2	138	164	177
				2017	192	140	203	223	277	174	283	319	226	61.3	140	213	319
				2018	708	508	441	397	567	332	538	361	482	124	332	474	708
				2019	372	501	224	383	396	276	517	386	382	99.2	224	384	517
				2020	477	308	573	368	465	415	518	588	464	97.3	308	471	588
				2021	425	536	240	151	196	169	166	126	251	148	126	182	536
		Tin	mg/kg	2010	1.51	1.13	1.33	1.21	1.06	-	-	-	1.25	0.178	1.06	1.21	1.51
				2017	0.2	<0.20	<0.20	<0.20	<0.20	0.35	0.37	0.24	0.245	0.0783	0.2	0.2	0.37
				2018	<1.0	<1.0	<0.50	<0.50	<1.0	<0.20	<1.0	<0.50	<0.2	-	<0.2	<0.2	<0.2
				2019	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.5	-	<0.5	<0.5	<0.5
				2020	0.24	0.25	0.29	0.21	0.14	0.24	0.11	<0.10	0.198	0.0701	<0.1	0.225	0.29
				2021	<0.12	<0.12	0.34	0.33	0.41	0.24	0.19	0.24	0.249	0.0857	<0.12	0.24	0.41
		Titanium	mg/kg	2010	590	651	513	497	272	-	-	-	505	144	272	513	651
				2017	-	-	-	-	-	-	-	-	-	-	-	-	-
				2018	-	-	-	-	-	-	-	-	-	-	-	-	-
				2019	209	301	750	473	494	443	341	514	441	164	209	458	750
				2020	648	723	520	566	378	658	356	252	513	168	252	543	723
				2021	14.2	93.8	419	588	888	601	461	513	447	282	14.2	487	888
		Uranium	mg/kg	2010	0.722	0.59	0.494	0.534	0.283	-	-	-	0.525	0.16	0.283	0.534	0.722
				2017	0.936	0.569	1.02	0.487	0.502	0.659	0.696	0.719	0.698	0.193	0.487	0.678	1.02
				2018	0.251	0.367	0.559	0.497	0.354	0.683	0.457	0.695	0.483	0.158	0.251	0.477	0.695
				2019	0.19	0.312	0.699	0.486	0.398	0.401	0.291	0.4	0.397	0.151	0.19	0.399	0.699
				2020	0.452	0.594	0.237	0.465	0.275	0.601	0.267	0.234	0.391	0.157	0.234	0.364	0.601
				2021	0.393	0.24	0.311	0.354	0.507	0.24	0.199	0.296	0.318	0.0996	0.199	0.304	0.507
		Vanadium	mg/kg	2010	57.7	55.2	43.8	43.7	26.6	-	-	-	45.4	12.3	26.6	43.8	57.7
				2017	66.2	48.4	37.1	35.7	39.9	77.8	84.3	45.6	54.4	19.1	35.7	47	84.3
				2018	14.8	35.3	38.2	56.6	35.9	55.6	41.3	68.4	43.3	16.6	14.8	39.8	68.4
				2019	18.3	29.3	71.4	43.9	42.5	40.7	27.2	42.6	39.5	15.9	18.3	41.6	71.4
				2020	59.2	62	24.9	67	43.5	72.8	36.1	34	49.9	17.6	24.9	51.4	72.8
				2021	10.5	13.8	40.8	58.2	79.9	42.6	35	44.9	40.7	22.5	10.5	41.7	79.9

Notes: For 2010 data at HAC-D and HAC-U, historical station codes were W11 and W7, respectively. All results are in dry weight. Summary statistics reported to 3 significant figures for display purposes. "-" indicates no data available.

Table D.5.2: Periphyton Tissue Primary and Secondary Analytes Concentrations for Upper Hazeltine Creek (HAC-R1, HAC-U; Exposed), Upper Edney Creek (EDC-U; Reference), Lower Hazeltine Creek (HAC-D; Exposed), and Lower Edney Creek Exposed (E1) and Reference (EDC-D), 2010 to 2021

Waterbody	Area	Parameter	Units	Year	Replicate								Mean	Standard Deviation	Minimum	Median	Maximum
					1	2	3	4	5	6	7	8					
Lower Hazeltine Creek	HAC-D (Exposed)	Zinc	mg/kg	2010	51.8	42.3	40.1	39.1	25.9	-	-	-	39.8	9.27	25.9	40.1	51.8
				2017	61	49.9	57.7	41.8	60	64.3	76.6	67.4	59.8	10.6	41.8	60.5	76.6
				2018	15	29	38.8	49.4	31	34	39	56.1	36.5	12.6	15	36.4	56.1
				2019	21.8	27.7	48	34.6	33.1	32.7	32.5	41.6	34	7.99	21.8	32.9	48
				2020	41.7	40.1	45.5	43.1	40.6	40.9	51.2	56.7	45	5.98	40.1	42.4	56.7
				2021	21.6	21.4	46	48.9	72.4	61.6	49.8	35.5	44.6	18	21.4	47.5	72.4
Lower Edney Creek	E1 (Exposed)	**Primary Analytes**															
		Arsenic	mg/kg	2019	9.37	16.2	6.32	9.31	9.92	12.4	13.4	14.3	11.4	3.23	6.32	11.2	16.2
				2020	10.7	10.1	8.74	9.98	18	9.54	14	10.9	11.5	3.05	8.74	10.4	18
				2021	13.2	7.35	8.51	5.33	5.78	4.06	6.22	11.9	7.79	3.24	4.06	6.78	13.2
		Copper	mg/kg	2019	73.4	47.9	51.3	117	2,020	24.5	39.4	29.1	300	695	24.5	49.6	2,020
				2020	153	143	162	146	111	162	167	155	150	17.7	111	154	167
				2021	90.9	122	108	74.9	85.1	89.4	264	309	143	90.6	74.9	99.5	309
		Iron	mg/kg	2019	21,300	28,700	17,500	26,100	37,800	12,800	20,600	13,600	22,300	8,354	12,800	20,950	37,800
				2020	35,600	32,400	24,400	28,300	30,900	31,600	38,800	46,600	33,575	6,819	24,400	32,000	46,600
				2021	20,500	16,100	11,300	9,670	6,360	16,900	6,980	17,000	13,101	5,228	6,360	13,700	20,500
		Selenium	mg/kg	2019	0.77	1.17	0.46	0.59	1.51	0.62	0.9	0.62	0.83	0.352	0.46	0.695	1.51
				2020	0.917	0.82	0.59	0.74	0.76	0.682	0.906	0.865	0.785	0.114	0.59	0.79	0.917
				2021	0.83	0.81	0.71	0.76	1	0.96	1.39	0.87	0.916	0.214	0.71	0.85	1.39
		Secondary Analytes															
		Barium	mg/kg	2019	149	164	73.5	272	680	67.2	115	49.6	196	208	49.6	132	680
				2020	146	406	206	148	148	425	164	172	227	118	146	168	425
				2021	106	3,630	2,610	413	7,730	130	357	435	1,926	2,688	106	424	7,730
		Cadmium	mg/kg	2019	0.299	0.611	0.178	0.336	0.157	0.435	0.578	0.67	0.408	0.197	0.157	0.386	0.67
				2020	0.203	0.244	0.162	0.215	0.231	0.18	0.23	0.225	0.211	0.028	0.162	0.22	0.244
				2021	0.326	0.382	0.185	0.255	0.204	0.266	0.254	0.269	0.268	0.0629	0.185	0.26	0.382
		Calcium	mg/kg	2019	11,200	13,700	8,850	11,900	31,200	8,200	13,200	10,800	13,631	7,350	8,200	11,550	31,200
				2020	18,400	14,500	14,600	16,000	11,300	15,500	16,700	15,300	15,288	2,043	11,300	15,400	18,400
				2021	38,600	94,400	116,000	278,000	167,000	122,000	199,000	155,000	146,250	72,139	38,600	138,500	278,000
		Cobalt	mg/kg	2019	9.53	13.1	6.08	12.6	28.9	5.94	9.22	6.57	11.5	7.56	5.94	9.38	28.9
				2020	11.8	12	9.45	11.8	10.9	11	13.1	13.8	11.7	1.35	9.45	11.8	13.8
				2021	8.78	6.28	5.11	6.05	2.74	7.36	3.86	11.4	6.45	2.76	2.74	6.16	11.4
		Manganese	mg/kg	2019	1,560	2,680	808	1,630	1,610	1,250	1,740	1,100	1,547	556	808	1,585	2,680
				2020	1,700	1,650	988	1,540	1,230	1,190	1,800	1,690	1,474	297	988	1,595	1,800
				2021	965	889	930	473	310	488	1,850	1,280	898	500	310	910	1,850
		Mercury	mg/kg	2019	0.221	0.104	0.042	0.087	0.066	0.088	0.086	0.07	0.0955	0.054	0.042	0.0865	0.221
				2020	0.0624	0.0425	0.0482	0.0627	0.0632	0.0481	0.0532	0.0707	0.0564	0.00975	0.0425	0.0578	0.0707
				2021	0.039	0.027	0.033	0.022	0.0338	0.357	0.0384	0.0463	0.0746	0.114	0.022	0.0361	0.357
		Molybdenum	mg/kg	2019	1.24	1.94	0.9	0.851	2.54	2.41	2.56	4.63	2.13	1.23	0.851	2.17	4.63
				2020	1.62	1.06	0.872	0.969	1.82	1.16	1.25	1.24	1.25	0.322	0.872	1.2	1.82
				2021	1.61	2.14	0.64	0.857	0.655	0.625	0.875	0.78	1.02	0.553	0.625	0.818	2.14
		Nickel	mg/kg	2019	22.3	30.3	14.5	24.9	11.5	13.9	22.3	15.3	19.4	6.54	11.5	18.8	30.3
				2020	24.1	23	18.4	25.7	23.7	19.4	24.4	25.2	23	2.67	18.4	23.9	25.7
				2021	22.5	18.4	8.27	11.3	5.6	15.4	4.79	10	12	6.26	4.79	10.6	22.5
		Phosphorus	mg/kg	2019	1,820	2,480	1,360	1,200	1,310	2,700	2,870	3,840	2,198	934	1,200	2,150	3,840
				2020	1,380	1,550	1,160	1,200	1,830	1,270	1,490	1,610	1,436	228	1,160	1,435	1,830
				2021	1,310	1,620	1,110	1,060	1,260	1,580	1,830	1,170	1,368	277	1,060	1,285	1,830
		Silver	mg/kg	2019	0.104	0.17	0.06	0.121	0.314	0.0756	0.113	0.0631	0.128	0.0835	0.06	0.108	0.314
				2020	0.124	0.408	0.0988	0.149	0.0906	0.11	0.12	0.128	0.154	0.104	0.0906	0.122	0.408
				2021	<0.085	<0.115	<0.085	<0.095	0.0413	0.101	0.0623	0.128	0.0685	0.038	0.0413	0.0623	0.128
		Sodium	mg/kg	2019	929	806	519	385	420	665	366	381	559	217	366	470	929
				2020	416	382	410	357	842	539	449	580	497	159	357	432	842
				2021	835	885	802	575	797	2,570	687	600	969	656	575	800	2,570
		Strontium	mg/kg	2019	109	102	47.7	104	163	56.5	90.5	63.1	92	37.1	47.7	96.2	163
				2020	105	91.5	99.5	101	94.5	137	108	112	106	14.2	91.5	103	137
				2021	172	450	606	853	526	384	592	659	530	202	172	559	853
		Tin	mg/kg	2019	0.28	2.88	0.29	0.29	<0.50	0.94	0.6	1.33	0.862	0.911	0.28	0.445	2.88
				2020	0.43	0.35	0.33	0.35	0.32	0.44	0.52	0.51	0.406	0.0802	0.32	0.39	0.52
				2021	0.23	0.51	0.21	0.3	0.18	0.17	0.19	0.29	0.26	0.112	0.17	0.22	0.51
		Titanium	mg/kg	2019	456	491	447	710	374	276	434	271	432	139	271	440	710
				2020	956	893	744	1,170	805	1,020	1,110	1,320	1,002	193	744	988	1,320
				2021	498	469	630	409	327	707	253	910	525	215	253	484	910
		Uranium	mg/kg	2019	0.466	1.4	0.388	0.581	0.332	0.3	0.556	0.236	0.532	0.371	0.236	0.427	1.4
				2020	0.815	3.06	0.617	0.617	0.67	0.752	2.1	1.03	1.21	0.895	0.617	0.784	3.06
				2021	0.42	0.223	0.239	0.217	0.205	0.353	0.176	0.312	0.268	0.0847	0.176	0.231	0.42
		Vanadium	mg/kg	2019	41.8	46	50.9	65.1	84.5	22.5	37	27.3	46.9	20.2	22.5	43.9	84.5
				2020	107	108	74	75.5	103	104	132	158	108	27.6	74	106	158
				2021	54.4	35.5	41.1	20.1	22.6	58	22.2	52	38.2	15.5	20.1	38.3	58
		Zinc	mg/kg	2019	57.3	96.6	35.5	61	104	61.4	92.3	101	76.1	25.4	35.5	76.8	104
				2020	47.2	56	42.9	53.3	63	44.9	50.7	57.6	52	6.85	42.9	52	63
				2021	66.4	40.1	23.7	25.6	21.7	36.3	16	35.1	33.1	15.8	16	30.4	66.4

Notes: For 2010 data at HAC-D and HAC-U, historical station codes were W11 and W7, respectively. All results are in dry weight. Summary statistics reported to 3 significant figures for display purposes. "-" indicates no data available.

Table D.5.3: Caddisfly Tissue Chemistry Data from Upper Hazeltine Creek (HAC-R1, HAC-U; Exposed) and Upper Edney Creek (EDC-U; Reference), 2022

Analyte	Units	Reference												
		Upper Edney Creek (EDC-U)												
		EDC-U-1	EDC-U-2	EDC-U-3	EDC-U-4	EDC-U-5	EDC-U-6	EDC-U-7	EDC-U-8	Mean	Standard Deviation	Minimum	Median	Maximum
		8-Aug-22	7-Aug-22	7-Aug-22	7-Aug-22	7-Aug-22	7-Aug-22	7-Aug-22	7-Aug-22					
Moisture	mg/kg dw	75.3	75.1	75.7	75.2	78.3	74.9	76.6	78.0	76.1	1.35	74.9	75.5	78.3
Aluminum	mg/kg dw	89.4	21.2	80.5	1,670	34.1	70.9	29.5	46.0	255	572	21.2	58.5	1,670
Antimony	mg/kg dw	0.0130	0.0120	0.0120	0.0360	<0.010	<0.010	<0.010	0.0110	0.0142	0.00906	<0.010	0.0115	0.0360
Arsenic	mg/kg dw	0.634	0.409	0.532	2.96	0.382	0.312	0.417	0.324	0.746	0.901	0.312	0.413	2.96
Barium	mg/kg dw	3.88	1.32	10.6	117	2.73	3.19	2.54	3.16	18.1	40.1	1.32	3.18	117
Beryllium	mg/kg dw	<0.010	<0.010	<0.010	0.0600	<0.010	<0.010	<0.010	<0.010	0.0162	-	<0.010	0.0100	0.0600
Bismuth	mg/kg dw	<0.010	<0.010	<0.010	0.0120	<0.010	<0.010	<0.010	<0.010	0.0102	-	<0.010	0.0100	0.0120
Boron	mg/kg dw	<1.0	<1.0	<1.0	2.60	<1.0	<1.0	<1.0	<1.0	1.20	-	<1.0	1.00	2.60
Cadmium	mg/kg dw	0.207	<0.017	0.116	1.09	0.0310	0.0400	0.0160	0.0290	0.193	0.372	0.0160	0.0355	1.09
Calcium	mg/kg dw	548	514	695	1,560	558	586	559	592	702	351	514	572	1,560
Cesium	mg/kg dw	0.00710	<0.0050	0.00610	0.0981	<0.0050	0.00510	<0.0050	<0.0050	0.0170	0.0354	<0.0050	0.00505	0.0981
Chromium	mg/kg dw	0.350	0.230	1.15	11.8	<0.20	0.800	0.370	1.84	2.09	4.00	<0.20	0.585	11.8
Cobalt	mg/kg dw	0.348	0.149	0.456	6.59	0.251	0.323	0.242	0.279	1.08	2.23	0.149	0.301	6.59
Copper	mg/kg dw	17.1	13.0	15.4	24.3	14.3	12.2	14.1	15.6	15.8	3.78	12.2	14.8	24.3
Iron	mg/kg dw	224	109	242	3,620	131	196	115	173	601	1,221	109	184	3,620
Lead	mg/kg dw	0.0570	<0.050	0.0660	0.626	<0.050	<0.050	<0.050	0.0500	0.125	0.219	<0.050	0.0500	0.626
Lithium	mg/kg dw	<0.50	<0.50	<0.50	1.22	<0.50	<0.50	<0.50	<0.50	0.590	-	<0.50	0.500	1.22
Magnesium	mg/kg dw	1,330	1,200	1,400	1,800	1,270	1,130	1,340	1,360	1,354	201	1,130	1,335	1,800
Manganese	mg/kg dw	205	107	400	4,330	154	227	120	185	716	1,463	107	195	4,330
Mercury	mg/kg dw	0.0418	0.0294	0.0392	0.0561	0.0370	0.0447	0.0309	0.0435	0.0403	0.00846	0.0294	0.0405	0.0561
Molybdenum	mg/kg dw	24.2	16.7	14.5	1.28	9.63	6.23	11.5	4.86	11.1	7.33	1.28	10.6	24.2
Nickel	mg/kg dw	0.320	<0.20	0.790	10.6	<0.20	0.370	0.240	0.440	1.64	3.71	<0.20	0.345	10.6
Phosphorus	mg/kg dw	7,850	7,520	9,190	7,710	8,060	7,580	8,040	8,100	8,006	527	7,520	7,945	9,190
Potassium	mg/kg dw	7,170	6,720	8,350	12,900	7,410	7,070	7,430	7,520	8,071	2,007	6,720	7,420	12,900
Rubidium	mg/kg dw	3.49	2.28	3.00	5.06	2.49	1.87	2.04	1.35	2.70	1.16	1.35	2.38	5.06
Selenium	mg/kg dw	0.740	0.680	0.680	0.590	0.720	0.590	0.740	0.770	0.689	0.0681	0.590	0.700	0.770
Silver	mg/kg dw	0.0830	0.0552	0.0374	0.0802	0.0351	0.0331	0.0228	0.0285	0.0469	0.0234	0.0228	0.0362	0.0830
Sodium	mg/kg dw	2,920	2,660	3,170	2,390	2,950	2,490	3,100	3,070	2,844	294	2,390	2,935	3,170
Strontium	mg/kg dw	3.52	3.36	4.92	13.7	4.19	3.99	3.81	4.20	5.21	3.46	3.36	4.09	13.7
Tellurium	mg/kg dw	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	-	<0.020	<0.020	<0.020
Thallium	mg/kg dw	0.00340	<0.0020	<0.0020	0.0259	<0.0020	0.00220	<0.0020	<0.0020	0.00519	0.00954	<0.0020	0.00200	0.0259
Tin	mg/kg dw	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	-	<0.10	<0.10	<0.10
Titanium	mg/kg dw	4.01	0.960	3.71	73.8	1.44	2.76	1.24	1.87	11.2	25.3	0.960	2.32	73.8
Uranium	mg/kg dw	0.00660	0.00290	0.00920	0.218	0.00370	0.00590	0.00310	0.00420	0.0317	0.0753	0.00290	0.00505	0.218
Vanadium	mg/kg dw	0.620	0.280	0.470	7.52	0.210	0.310	0.300	0.250	1.25	2.54	0.210	0.305	7.52
Zinc	mg/kg dw	103	83.1	117	222	83.7	93.7	88.2	105	112	46	83.1	98.3	222
Zirconium	mg/kg dw	<0.20	<0.20	<0.20	1.52	<0.20	<0.20	<0.20	<0.20	0.365	-	<0.20	0.200	1.52

Value exceeds the British Columbia interim guideline for selenium in invertebrate tissue (4 mg/kg dw; BCMOE 2014).

Notes: "-" = no data or summary statistic could not be calculated. mg/kg dw = milligrams per kilogram dry weight. All summary statistics are reported to three significant digits for display purposes and were calculated using the Kaplan-Meier method.

Table D.5.3: Caddisfly Tissue Chemistry Data from Upper Hazeltine Creek (HAC-R1, HAC-U; Exposed) and Upper Edney Creek (EDC-U; Reference), 2022

Analyte	Units	Exposed												
		Upper Hazeltine Creek Reach 1 (HAC-R1)												
		HAC-R1-1	HAC-R1-2	HAC-R1-3	HAC-R1-4	HAC-R1-5	HAC-R1-6	HAC-R1-7	HAC-R1-8	Mean	Standard Deviation	Minimum	Median	Maximum
		10-Aug-22	10-Aug-22	10-Aug-22	10-Aug-22	10-Aug-22	10-Aug-22	10-Aug-22	10-Aug-22					
Moisture	mg/kg dw	68.2	78.3	73.1	68.8	67.6	73.2	71.0	73.6	71.7	3.57	67.6	72.0	78.3
Aluminum	mg/kg dw	18.0	34.3	80.8	14.7	126	69.1	64.4	56.3	58	36.5	14.7	60.4	126
Antimony	mg/kg dw	0.0140	0.0160	0.0180	0.0140	0.0220	0.0210	0.0210	0.0260	0.0190	0.00424	0.0140	0.0195	0.0260
Arsenic	mg/kg dw	0.220	0.192	0.361	0.279	0.389	0.334	0.317	0.338	0.304	0.0686	0.192	0.326	0.389
Barium	mg/kg dw	1.55	1.19	2.45	1.07	7.10	4.57	2.49	5.84	3.28	2.28	1.07	2.47	7.10
Beryllium	mg/kg dw	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	-	<0.010	<0.010	<0.010
Bismuth	mg/kg dw	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	-	<0.010	<0.010	<0.010
Boron	mg/kg dw	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-	<1.0	<1.0	<1.0
Cadmium	mg/kg dw	<0.010	<0.010	0.0210	<0.010	0.125	0.0390	0.0350	0.0430	0.0366	0.0369	<0.010	0.0280	0.125
Calcium	mg/kg dw	497	512	568	397	850	803	664	701	624	158	397	616	850
Cesium	mg/kg dw	<0.0050	0.00650	0.00880	<0.0050	0.0140	0.00960	0.00820	0.00780	0.00811	0.00257	<0.0050	0.00800	0.0140
Chromium	mg/kg dw	<0.20	<0.20	0.230	<0.20	0.530	0.210	0.400	0.250	0.278	0.125	<0.20	0.220	0.530
Cobalt	mg/kg dw	0.0630	0.0640	0.157	0.0630	0.277	0.121	0.140	0.269	0.144	0.0875	0.0630	0.130	0.277
Copper	mg/kg dw	11.5	14.8	16.3	11.1	23.6	16.6	14.3	16.4	15.6	3.88	11.1	15.6	23.6
Iron	mg/kg dw	95.0	127	191	85.0	286	179	175	177	164	63.8	85.0	176	286
Lead	mg/kg dw	<0.050	<0.050	0.204	<0.050	0.0760	<0.050	0.0560	<0.050	0.0732	0.0593	<0.050	0.0500	0.204
Lithium	mg/kg dw	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	-	<0.50	<0.50	<0.50
Magnesium	mg/kg dw	987	1,470	1,040	894	876	1,060	999	1,020	1,043	185	876	1,010	1,470
Manganese	mg/kg dw	99.4	58.5	235	67.6	266	130	151	368	172	109	58.5	140	368
Mercury	mg/kg dw	0.0471	0.0603	0.0446	0.0444	0.0410	0.0325	0.0329	0.0429	0.0432	0.00875	0.0325	0.0436	0.0603
Molybdenum	mg/kg dw	3.87	2.63	5.09	6.85	9.55	9.88	8.77	5.49	6.52	2.70	2.63	6.17	9.88
Nickel	mg/kg dw	<0.20	<0.20	0.290	<0.20	0.820	<0.20	0.270	0.230	0.301	0.221	<0.20	0.215	0.820
Phosphorus	mg/kg dw	7,180	8,460	6,860	6,660	6,940	6,800	6,450	6,540	6,986	639	6,450	6,830	8,460
Potassium	mg/kg dw	5,670	7,880	6,290	5,670	6,920	6,370	6,130	5,850	6,348	746	5,670	6,210	7,880
Rubidium	mg/kg dw	0.707	0.983	1.06	0.716	1.26	1.20	1.01	1.14	1.01	0.206	0.707	1.03	1.26
Selenium	mg/kg dw	4.50	5.29	5.46	6.93	10.4	7.69	7.87	5.35	6.69	1.94	4.50	6.20	10.4
Silver	mg/kg dw	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	-	<0.0050	<0.0050	<0.0050
Sodium	mg/kg dw	2,320	3,200	2,180	1,960	2,180	2,440	2,400	2,440	2,390	366	1,960	2,360	3,200
Strontium	mg/kg dw	3.50	3.32	3.63	2.37	5.24	5.59	3.95	4.80	4.05	1.08	2.37	3.79	5.59
Tellurium	mg/kg dw	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	-	<0.020	<0.020	<0.020
Thallium	mg/kg dw	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	-	<0.0020	<0.0020	<0.0020
Tin	mg/kg dw	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	-	<0.10	<0.10	<0.10
Titanium	mg/kg dw	1.22	2.10	5.45	1.37	7.56	4.24	3.56	3.54	3.63	2.15	1.22	3.55	7.56
Uranium	mg/kg dw	<0.0020	0.00240	0.00770	<0.0020	0.0152	0.00700	0.00650	0.0116	0.00680	0.00478	<0.0020	0.00675	0.0152
Vanadium	mg/kg dw	0.120	0.150	0.500	0.150	0.750	0.470	0.400	0.420	0.370	0.218	0.120	0.410	0.750
Zinc	mg/kg dw	63.4	62.0	101	76.8	119	83.6	87.0	99.3	86.5	19.5	62.0	85.3	119
Zirconium	mg/kg dw	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	-	<0.20	<0.20	<0.20

Value exceeds the British Columbia interim guideline for selenium in invertebrate tissue (4 mg/kg dw; BCMOE 2014).

Notes: "-" = no data or summary statistic could not be calculated. mg/kg dw = milligrams per kilogram dry weight. All summary statistics are reported to three significant digits for display purposes and were calculated using the Kaplan-Meier method.

Table D.5.3: Caddisfly Tissue Chemistry Data from Upper Hazeltine Creek (HAC-R1, HAC-U; Exposed) and Upper Edney Creek (EDC-U; Reference), 2022

Analyte	Units	Exposed												
		Upper Hazeltine Creek Reach 2 (HAC-U)												
		HAC-U-1	HAC-U-2	HAC-U-3	HAC-U-4	HAC-U-5	HAC-U-6	HAC-U-7	HAC-U-8	Mean	Standard Deviation	Minimum	Median	Maximum
		6-Aug-22	6-Aug-22	6-Aug-22	6-Aug-22	5-Aug-22	5-Aug-22	6-Aug-22	5-Aug-22					
Moisture	mg/kg dw	74.7	74.9	72.0	74.7	71.6	76.4	71.7	74.3	73.8	1.79	71.6	74.5	76.4
Aluminum	mg/kg dw	172	245	65.0	67.4	138	62.8	73.6	82.1	113	66.5	62.8	77.8	245
Antimony	mg/kg dw	0.0240	0.0190	0.0140	0.0150	0.0160	0.0210	0.0160	0.0210	0.0182	0.00354	0.0140	0.0175	0.0240
Arsenic	mg/kg dw	0.493	0.494	0.348	0.443	0.383	0.447	0.448	0.400	0.432	0.0516	0.348	0.445	0.494
Barium	mg/kg dw	11.0	5.29	3.26	3.60	4.62	4.32	6.74	2.97	5.22	2.63	2.97	4.47	11.0
Beryllium	mg/kg dw	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	-	<0.010	<0.010	<0.010
Bismuth	mg/kg dw	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	-	<0.010	<0.010	<0.010
Boron	mg/kg dw	1.60	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.08	-	<1.0	1.00	1.60
Cadmium	mg/kg dw	0.0940	0.0490	0.0290	0.0730	0.0580	0.110	0.0720	0.0330	0.0648	0.0283	0.0290	0.0650	0.110
Calcium	mg/kg dw	1,740	1,620	1,000	804	1,160	1,170	1,240	650	1,173	371	650	1,165	1,740
Cesium	mg/kg dw	0.0226	0.0138	0.00840	0.0108	0.0124	0.0107	0.0133	0.0112	0.0129	0.00427	0.00840	0.0118	0.0226
Chromium	mg/kg dw	1.10	0.460	0.270	0.260	0.260	0.210	0.320	0.240	0.390	0.297	0.210	0.265	1.10
Cobalt	mg/kg dw	0.324	0.221	0.0920	0.166	0.182	0.242	0.195	0.160	0.198	0.0679	0.0920	0.188	0.324
Copper	mg/kg dw	23.4	20.0	18.0	21.0	17.1	23.1	19.6	19.4	20.2	2.23	17.1	19.8	23.4
Iron	mg/kg dw	353	507	163	178	215	173	184	205	247	121	163	194	507
Lead	mg/kg dw	0.110	0.0940	<0.050	<0.050	0.0790	0.0540	0.0540	0.0550	0.0682	0.0229	<0.050	0.0545	0.110
Lithium	mg/kg dw	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	-	<0.50	<0.50	<0.50
Magnesium	mg/kg dw	1,220	1,170	1,000	1,220	1,060	1,100	1,140	1,190	1,138	79.1	1,000	1,155	1,220
Manganese	mg/kg dw	516	246	158	292	297	329	512	242	324	128	158	294	516
Mercury	mg/kg dw	0.0380	0.0233	0.0303	0.0456	0.0433	0.0424	0.0398	0.0750	0.0422	0.0152	0.0233	0.0411	0.0750
Molybdenum	mg/kg dw	11.1	12.4	9.71	9.67	9.20	8.68	11.8	8.16	10.1	1.52	8.16	9.69	12.4
Nickel	mg/kg dw	0.770	0.370	0.210	0.270	0.260	0.330	0.360	0.270	0.355	0.176	0.210	0.300	0.770
Phosphorus	mg/kg dw	7,980	7,660	7,440	7,670	6,780	7,190	7,640	7,090	7,431	388	6,780	7,540	7,980
Potassium	mg/kg dw	6,560	6,160	6,040	7,120	6,180	6,700	6,150	6,770	6,460	385	6,040	6,370	7,120
Rubidium	mg/kg dw	1.43	1.12	1.02	1.22	1.24	1.34	1.17	1.17	1.21	0.127	1.02	1.20	1.43
Selenium	mg/kg dw	10.1	17.8	12.4	15.4	13.1	12.0	14.7	9.65	13.1	2.74	9.65	12.8	17.8
Silver	mg/kg dw	<0.0050	0.00510	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.00501	-	<0.0050	0.00500	0.00510
Sodium	mg/kg dw	2,570	2,580	2,480	2,810	2,240	2,330	2,370	2,570	2,494	180	2,240	2,525	2,810
Strontium	mg/kg dw	13.3	12.5	6.87	5.60	5.99	6.45	8.13	4.17	7.88	3.30	4.17	6.66	13.3
Tellurium	mg/kg dw	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	-	<0.020	<0.020	<0.020
Thallium	mg/kg dw	0.00210	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	0.00201	-	<0.0020	0.00200	0.00210
Tin	mg/kg dw	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	-	<0.10	<0.10	<0.10
Titanium	mg/kg dw	9.92	27.2	5.09	4.08	5.22	3.33	4.18	4.90	7.99	8.02	3.33	5.00	27.2
Uranium	mg/kg dw	0.0266	0.0244	0.00810	0.0137	0.0160	0.0258	0.0198	0.0102	0.0181	0.00717	0.00810	0.0179	0.0266
Vanadium	mg/kg dw	0.930	1.87	0.440	0.480	0.680	0.520	0.550	0.470	0.742	0.483	0.440	0.535	1.87
Zinc	mg/kg dw	104	76.0	71.2	82.1	88.3	88.3	98.4	82.0	86.3	10.9	71.2	85.2	104
Zirconium	mg/kg dw	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	-	<0.20	<0.20	<0.20

Value exceeds the British Columbia interim guideline for selenium in invertebrate tissue (4 mg/kg dw; BCMOE 2014).

Notes: "-" = no data or summary statistic could not be calculated. mg/kg dw = milligrams per kilogram dry weight. All summary statistics are reported to three significant digits for display purposes and were calculated using the Kaplan-Meier method.

Table D.5.4: Caddisfly Tissue Primary and Secondary Analytes Concentrations for Upper Hazeltine Creek (HAC-R1, HAC-U; Exposed), Upper Edney Creek (EDC-U; Reference), Lower Hazeltine Creek (HAC-D; Exposed), and Lower Edney Creek Exposed (E1) and Reference (EDC) Areas, 2016 to 2021

Waterbody	Area	Parameter	Units	Year	Replicate								Mean	Standard Deviation	Minimum	Median	Maximum
					1	2	3	4	5	6	7	8					
Upper Edney Creek	EDC-U (Reference)	**Primary Analytes**															
		Arsenic	mg/kg	2018	1.29	2.42	1.31	1.96	0.615	2.84	1.00	0.867	1.54	0.789	0.615	1.30	2.84
				2019	2.06	1.07	0.573	0.898	1.97	0.694	1.43	1.44	1.27	0.556	0.573	1.25	2.06
				2020	1.40	3.06	0.823	1.23	1.44	1.06	0.709	0.599	1.29	0.780	0.599	1.14	3.06
				2021	2.39	1.51	2.76	1.39	2.21	3.57	0.759	2.80	2.17	0.909	0.759	2.30	3.57
		Copper	mg/kg	2018	18.2	25.1	19.6	20.4	20.4	29.5	21.8	20.7	22.0	3.64	18.2	20.6	29.5
				2019	30.7	21.3	18.4	21.1	17.9	16.2	28.9	15.6	21.3	5.66	15.6	19.8	30.7
				2020	23.5	30.8	23.0	21.7	23.8	23.8	24.4	19.0	23.8	3.33	19.0	23.6	30.8
				2021	23.1	18.4	22.7	17.8	23.3	35.3	17.0	22.8	22.6	5.78	17.0	22.8	35.3
		Iron	mg/kg	2018	1,040	1,850	1,510	1,520	903	2,190	534	553	1,262	603	534	1,275	2,190
				2019	1,260	454	496	912	4,010	608	15,300	2,510	3,194	5,044	454	1,086	15,300
				2020	1,680	2,190	1,370	1,610	1,960	1,800	1,180	861	1,581	430	861	1,645	2,190
				2021	2,360	1,580	3,270	1,450	2,290	5,200	580	3,400	2,516	1,434	580	2,325	5,200
		Selenium	mg/kg	2018	0.360	0.480	0.590	0.580	0.690	0.840	0.680	0.600	0.602	0.144	0.360	0.595	0.840
				2019	0.470	0.600	0.630	0.390	0.520	0.420	0.790	0.590	0.551	0.130	0.390	0.555	0.790
				2020	0.520	0.460	0.450	0.630	0.720	0.480	0.410	0.800	0.559	0.142	0.410	0.500	0.800
				2021	0.550	0.640	0.580	0.900	0.600	0.800	0.640	0.790	0.688	0.126	0.550	0.640	0.900
		Secondary Analytes															
		Barium	mg/kg	2018	66.7	143	71.4	89.3	31.8	133	57.5	59.3	81.5	38.5	31.8	69.0	143
				2019	109	43.2	8.62	30.8	15.2	18.0	28.8	11.5	33.1	32.7	8.62	23.4	109
				2020	99.7	212	71.5	75.3	69.3	78.4	72.7	20.8	87.5	54.9	20.8	74.0	212
				2021	112	99.7	128	43.3	163	217	38.2	96.7	112	59.1	38.2	106	217
		Cadmium	mg/kg	2018	0.442	0.797	0.471	0.544	0.251	0.747	0.454	0.435	0.518	0.178	0.251	0.462	0.797
				2019	0.685	0.258	0.0430	0.177	0.0660	0.173	0.176	0.0440	0.203	0.210	0.0430	0.174	0.685
				2020	0.924	1.05	0.718	0.622	0.759	0.689	0.621	0.447	0.729	0.188	0.447	0.704	1.05
				2021	0.708	0.660	0.963	0.307	1.05	1.47	0.333	0.633	0.766	0.386	0.307	0.684	1.47
		Calcium	mg/kg	2018	790	2,020	872	968	1,160	1,680	879	894	1,158	450	790	931	2,020
				2019	1,490	731	1,620	1,850	3,950	1,550	3,740	2,080	2,126	1,131	731	1,735	3,950
				2020	3,120	2,730	3,490	2,310	2,370	3,350	3,520	1,960	2,856	599	1,960	2,925	3,520
				2021	1,670	1,580	2,250	1,260	2,440	3,190	1,210	1,940	1,942	666	1,210	1,805	3,190
		Cobalt	mg/kg	2018	2.39	5.27	2.16	4.73	1.68	5.15	2.25	2.90	3.32	1.48	1.68	2.64	5.27
				2019	4.63	1.74	0.375	1.43	1.60	0.939	5.70	1.09	2.19	1.91	0.375	1.52	5.70
				2020	4.92	4.99	3.11	3.07	3.44	3.55	3.07	1.14	3.41	1.21	1.14	3.28	4.99
				2021	4.57	4.04	7.12	3.27	9.60	10.0	2.37	5.30	5.78	2.85	2.37	4.93	10.0
		Manganese	mg/kg	2018	1,210	3,010	1,010	2,110	1,340	2,270	1,790	2,280	1,878	671	1,010	1,950	3,010
				2019	1,450	793	155	683	240	377	623	159	560	435	155	500	1,450
				2020	3,490	3,750	2,810	2,360	2,490	2,650	2,800	850	2,650	871	850	2,725	3,750
				2021	2,350	3,030	3,150	1,480	5,480	5,380	1,510	2,770	3,144	1,544	1,480	2,900	5,480
		Mercury	mg/kg	2018	0.0475	0.0752	0.0683	0.0910	0.0515	0.0964	0.0398	0.0579	0.0660	0.0205	0.0398	0.0631	0.0964
				2019	0.0530	0.0450	0.0280	0.140	0.0270	0.0330	0.0430	0.0200	0.0486	0.0385	0.0200	0.0380	0.140
				2020	0.0381	0.0333	0.0407	0.0420	0.0517	0.0362	0.0414	0.0309	0.0393	0.00638	0.0309	0.0394	0.0517
				2021	0.0334	0.0373	0.0480	0.0302	0.0381	0.0917	0.0226	0.0240	0.0407	0.0222	0.0226	0.0354	0.0917
		Molybdenum	mg/kg	2018	0.818	1.59	1.88	1.68	0.746	2.11	1.91	0.830	1.45	0.559	0.746	1.64	2.11
				2019	6.16	6.60	11.1	6.02	7.27	5.47	3.91	7.18	6.71	2.07	3.91	6.38	11.1
				2020	0.811	1.04	0.793	1.15	1.11	0.872	0.651	6.74	1.65	2.07	0.651	0.956	6.74
				2021	2.56	1.90	2.27	3.22	3.00	3.72	3.92	4.58	3.15	0.900	1.90	3.11	4.58
		Nickel	mg/kg	2018	3.84	6.99	5.71	6.04	2.34	6.35	3.97	2.59	4.73	1.78	2.34	4.84	6.99
				2019	4.79	1.71	0.640	1.77	3.34	1.61	6.98	2.39	2.90	2.07	0.640	2.08	6.98
				2020	7.37	10.6	4.98	4.76	5.80	6.17	5.37	1.73	5.85	2.51	1.73	5.58	10.6
				2021	7.31	5.35	8.55	2.87	8.70	11.5	1.64	5.81	6.47	3.24	1.64	6.56	11.5
		Phosphorus	mg/kg	2018	5,480	8,000	7,010	6,750	8,110	9,600	8,680	8,390	7,752	1,287	5,480	8,055	9,600
				2019	10,100	8,880	10,200	9,030	7,650	8,460	6,600	8,110	8,629	1,209	6,600	8,670	10,200
				2020	11,000	13,000	10,900	9,890	10,300	10,500	11,800	9,730	10,890	1,078	9,730	10,700	13,000
				2021	9,400	8,040	8,600	8,540	8,880	10,300	8,410	8,310	8,810	726	8,040	8,570	10,300
		Silver	mg/kg	2018	-	-	-	-	-	-	-	-	-	-	-	-	-
				2019	0.0799	0.0641	0.0422	0.0428	0.0501	0.0299	0.0771	0.0399	0.0532	0.0184	0.0299	0.0464	0.0799
				2020	0.0685	0.0549	0.0506	0.0460	0.0753	0.0609	0.0500	0.0464	0.0566	0.0107	0.0460	0.0528	0.0753
				2021	0.0551	0.0452	0.0734	0.0480	0.0847	0.144	0.0355	0.0570	0.0679	0.0345	0.0355	0.0560	0.144
		Sodium	mg/kg	2018	2,010	4,900	3,030	2,870	3,400	4,900	4,550	3,540	3,650	1,048	2,010	3,470	4,900
				2019	4,950	4,370	3,880	4,030	2,590	3,330	2,810	2,660	3,578	868	2,590	3,605	4,950
				2020	5,160	6,560	5,160	5,230	4,980	5,660	6,710	4,040	5,438	869	4,040	5,195	6,710
				2021	4,430	3,460	3,920	3,120	4,730	5,470	3,790	4,030	4,119	745	3,120	3,975	5,470
		Strontium	mg/kg	2018	7.83	21.9	8.40	10.5	11.0	16.7	11.6	10.3	12.3	4.72	7.83	10.8	21.9
				2019	11.6	5.62	12.2	13.5	23.9	11.6	12.6	15.4	13.3	5.12	5.62	12.4	23.9
				2020	26.5	27.6	27.2	17.9	20.5	29.0	30.5	17.4	24.6	5.17	17.4	26.8	30.5
				2021	12.9	11.9	17.3	9.31	18.6	21.0	9.09	15.7	14.5	4.37	9.09	14.3	21.0
		Tin	mg/kg	2018	0.160	0.350	0.230	0.280	<0.10	0.110	<0.10	0.300	0.204	0.0990	<0.1	0.195	0.350
				2019	0.860	0.290	0.350	0.290	0.160	0.110	0.350	0.170	0.322	0.235	0.110	0.290	0.860
				2020	<0.10	<0.10	0.130	<0.10	<0.10	0.100	<0.10	<0.10	0.104	0.0140	<0.1	0.100	0.130
				2021	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	-	<0.1	<0.1	<0.1
		Titanium	mg/kg	2018	-	-	-	-	-	-	-	-	-	-	-	-	-
				2019	24.4	5.86	9.61	17.6	93.4	8.14	395	50.5	75.6	132	5.86	21.0	395
				2020	28.4	36.7	26.1	34.6	39.9	38.4	20.1	23.6	31.0	7.40	20.1	31.5	39.9
				2021	53.5	33.1	67.8	21.2	39.7	94.1	8.13	51.2	46.1	27.1	8.13	45.5	94.1
		Uranium	mg/kg	2018	0.124	0.182	0.106	0.162	0.0608	0.290	0.100	0.0708	0.137	0.0744	0.0608	0.115	0.290
				2019	0.148	0.0549	0.0249	0.0680	0.0889	0.0459	0.0808	0.124	0.0794	0.0407	0.0249	0.0744	0.148
				2020	0.186	0.236	0.142	0.139	0.184	0.163	0.164	0.0531	0.158	0.0524	0.0531	0.164	0.236
				2021	0.198	0.153	0.289	0.163	0.232	0.544	0.0560	0.208	0.230	0.144	0.0560	0.203	0.544
		Vanadium	mg/kg	2018	2.29	4.15	2.95	2.67	2.71	4.41	1.12	1.02	2.66	1.23	1.02	2.69	4.41
				2019	2.64	0.880	1.01	2.03	7.44	1.35	52.4	5.64	9.17	17.6	0.880	2.34	52.4
				2020	4.92	4.47	4.13	4.74	5.22	5.26	3.57	2.24	4.32	1.01	2.24	4.61	5.26
				2021	5.73	3.87	7.62	3.22	6.20	11.9	1.51	7.44	5.94	3.21	1.51	5.96	11.9
		Zinc	mg/kg	2018	203	231	161	145	291	228	302	260	228	56.7	145	230	302
				2019	253	276	98.7	163	91.7	121	140	83.4	153	73.7	83.4	130	276
				2020	350	530	478	251	314	404	428	366	390	89.6	251	385	530
				2021	207	182	196	153	206	258	173	180	194	31.3	153	189	258
Upper Hazeltine Reach 1	HAC-R1 (Exposed)	**Primary Analytes**															
		Arsenic	mg/kg	2017	1.63	1.88	1.13	1.41	1.68	1.95	2.34	2.66	1.84	0.492	1.13	1.78	2.66
				2018	2.29	1.76	2.28	1.87	1.71	4.92	2.00	1.99	2.35	1.06	1.71	2.00	4.92
				2019	2.01	3.95	2.16	2.01	1.96	2.44	2.33	2.59	2.43	0.654	1.96	2.24	3.95
				2020	1.14	1.16	0.542	1.64	1.36	0.735	0.716	0.393	0.961	0.431	0.393	0.938	1.64
				2021	0.895	0.723	0.616	3.78	9.10	0.372	0.416	0.448	2.04	3.07	0.372	0.670	9.10
		Copper	mg/kg	2017	131	204	96.1	120	128	188	246	209	165	53.2	96.1	160	246
				2018	122	107	95.1	126	102	297	130	120	137	65.6	95.1	121	297
				2019	97.2	124	137	142	133	203	159	185	148	33.9	97.2	140	203
				2020	56.4	58.5	21.7	57.8	56.3	35.0	26.7	18.8	41.4	17.6	18.8	45.6	58.5
				2021	38.8	44.4	31.0	188	196	20.7	12.8	16.3	68.5	77.0	12.8	34.9	196

Notes: All values reported in dry weight. Summary statistics reported to 3 significant figures for display purposes.

Table D.5.4: Caddisfly Tissue Primary and Secondary Analytes Concentrations for Upper Hazeltine Creek (HAC-R1, HAC-U; Exposed), Upper Edney Creek (EDC-U; Reference), Lower Hazeltine Creek (HAC-D; Exposed), and Lower Edney Creek Exposed (E1) and Reference (EDC) Areas, 2016 to 2021

Waterbody	Area	Parameter	Units	Year	Replicate								Mean	Standard Deviation	Minimum	Median	Maximum
					1	2	3	4	5	6	7	8					
Upper Hazeltine Reach 1	HAC-R1 (Exposed)	Iron	mg/kg	2017	2,400	2,490	1,040	1,290	1,830	2,320	4,200	4,270	2,480	1,202	1,040	2,360	4,270
				2018	4,390	3,340	2,590	3,280	2,230	7,150	3,290	3,030	3,662	1,544	2,230	3,285	7,150
				2019	3,250	4,740	3,930	3,150	2,870	3,440	3,760	3,930	3,634	588	2,870	3,600	4,740
				2020	1,490	1,250	182	1,910	1,270	619	572	248	943	626	182	934	1,910
				2021	722	618	442	7,760	8,640	274	92.6	159	2,338	3,632	92.6	530	8,640
		Selenium	mg/kg	2017	3.04	3.64	3.04	3.06	3.50	3.95	3.33	3.81	3.42	0.361	3.04	3.42	3.95
				2018	3.06	2.28	4.02	3.02	2.62	6.66	2.44	2.88	3.37	1.43	2.28	2.95	6.66
				2019	3.56	4.18	3.99	3.90	4.13	3.03	2.96	3.82	3.70	0.474	2.96	3.86	4.18
				2020	3.48	4.33	3.84	4.49	3.19	4.11	5.01	2.91	3.92	0.704	2.91	3.98	5.01
				2021	7.79	9.68	8.64	5.00	5.38	7.03	6.74	8.06	7.29	1.59	5.00	7.41	9.68
		Secondary Analytes															
		Barium	mg/kg	2017	44.1	40.6	19.1	26.2	32.6	43.1	61.7	84.4	44	20.8	19.1	41.9	84.4
				2018	97.4	51.0	54.6	42.8	36.0	161	64.2	65.9	71.6	40.6	36.0	59.4	161
				2019	43.2	84.7	57.6	47.2	50.7	61.4	60.5	120	65.7	25.3	43.2	59.0	120
				2020	19.7	21.7	4.49	29.8	30.7	10.2	8.38	4.02	16.1	10.8	4.02	15.0	30.7
				2021	11.8	8.77	8.48	148	50.9	6.01	2.28	2.61	29.9	50.3	2.28	8.62	148
		Cadmium	mg/kg	2017	0.257	0.403	0.155	0.230	0.203	0.331	0.315	0.297	0.274	0.0789	0.155	0.277	0.403
				2018	0.131	0.265	0.266	0.352	0.262	0.824	0.355	0.338	0.349	0.205	0.131	0.302	0.824
				2019	0.214	0.303	0.441	0.297	0.301	0.439	0.524	0.493	0.376	0.112	0.214	0.371	0.524
				2020	0.274	0.176	<0.010	0.124	0.191	0.0930	0.0483	0.0820	0.125	0.0798	<0.01	0.108	0.274
				2021	0.0900	0.0560	0.149	0.371	0.336	0.0200	0.0490	0.0450	0.140	0.138	0.0200	0.0730	0.371
		Calcium	mg/kg	2017	8,520	3,660	1,290	1,600	2,670	4,280	3,740	5,210	3,871	2,296	1,290	3,700	8,520
				2018	8,630	5,080	4,420	4,690	3,070	8,970	3,560	5,050	5,434	2,193	3,070	4,870	8,970
				2019	9,770	24,400	12,200	6,900	6,440	4,950	10,700	5,590	10,119	6,323	4,950	8,335	24,400
				2020	4,820	2,740	930	4,090	2,330	915	1,080	506	2,176	1,609	506	1,705	4,820
				2021	1,090	1,440	1,640	9,800	8,660	696	547	590	3,058	3,842	547	1,265	9,800
		Cobalt	mg/kg	2017	2.30	2.42	1.18	1.40	1.82	2.56	3.50	3.45	2.33	0.856	1.18	2.36	3.50
				2018	3.61	2.87	2.46	2.89	2.27	7.57	3.07	2.82	3.44	1.71	2.27	2.88	7.57
				2019	3.11	4.17	4.19	3.02	2.93	3.45	3.81	4.04	3.59	0.529	2.93	3.63	4.19
				2020	1.31	1.17	0.197	1.49	1.20	0.588	0.435	0.288	0.835	0.511	0.197	0.879	1.49
				2021	0.632	0.517	0.449	6.09	4.88	0.224	0.116	0.130	1.63	2.41	0.116	0.483	6.09
		Manganese	mg/kg	2017	1,610	1,850	699	743	1,030	2,090	1,540	1,530	1,386	510	699	1,535	2,090
				2018	1,170	1,140	1,230	1,230	1,200	3,130	1,270	1,260	1,454	679	1,140	1,230	3,130
				2019	1,730	1,490	1,770	2,120	1,860	2,710	3,330	3,470	2,310	764	1,490	1,990	3,470
				2020	789	805	116	920	631	434	297	247	530	298	116	532	920
				2021	568	413	516	3,570	2,870	156	170	146	1,051	1,362	146	464	3,570
		Mercury	mg/kg	2017	0.0661	0.0855	0.0754	0.0715	0.0587	0.0675	0.174	0.0800	0.0848	0.0370	0.0587	0.0734	0.174
				2018	0.0658	0.0650	0.0592	0.0690	0.0707	0.169	0.0738	0.0745	0.0809	0.0360	0.0592	0.0698	0.169
				2019	0.0900	0.0850	0.104	0.110	0.119	0.116	0.0960	0.128	0.106	0.0150	0.0850	0.107	0.128
				2020	0.102	0.0916	0.0848	0.132	0.126	0.0954	0.0780	0.0847	0.0993	0.0198	0.0780	0.0935	0.132
				2021	0.0850	0.0652	0.0634	0.0847	0.117	0.0634	0.0241	0.0633	0.0708	0.0265	0.0241	0.0643	0.117
		Molybdenum	mg/kg	2017	6.16	6.09	4.07	5.08	4.95	5.99	8.11	8.13	6.07	1.45	4.07	6.04	8.13
				2018	28.0	4.49	8.30	5.05	4.93	18.6	6.31	7.01	10.3	8.48	4.49	6.66	28.0
				2019	4.02	4.22	4.25	5.34	5.27	5.05	6.08	6.46	5.09	0.891	4.02	5.16	6.46
				2020	4.28	4.77	5.33	5.08	3.75	6.87	7.91	6.12	5.51	1.38	3.75	5.20	7.91
				2021	10.7	13.0	15.6	6.17	6.63	12.5	11.2	12.4	11.0	3.21	6.17	11.8	15.6
		Nickel	mg/kg	2017	3.73	2.98	2.70	2.73	4.03	3.50	5.95	5.89	3.94	1.31	2.70	3.62	5.95
				2018	5.46	4.62	2.99	4.64	2.92	10.6	5.33	4.79	5.17	2.39	2.92	4.72	10.6
				2019	2.91	2.97	5.00	3.17	4.76	3.60	4.49	4.64	3.94	0.870	2.91	4.04	5.00
				2020	2.12	1.52	0.220	1.82	1.37	0.890	0.470	0.440	1.11	0.703	0.220	1.13	2.12
				2021	0.870	0.660	0.620	15.5	6.19	0.650	<0.20	0.220	3.11	5.44	<0.2	0.655	15.5
		Phosphorus	mg/kg	2017	5,470	6,880	6,230	5,270	6,510	7,160	6,080	8,000	6,450	897	5,270	6,370	8,000
				2018	6,040	5,800	5,870	6,540	6,260	14,700	5,680	4,900	6,974	3,159	4,900	5,955	14,700
				2019	7,360	8,290	8,230	7,300	8,170	8,120	8,470	7,820	7,970	435	7,300	8,145	8,470
				2020	6,740	8,620	8,020	8,060	7,540	7,380	8,110	4,660	7,391	1,241	4,660	7,780	8,620
				2021	9,200	8,740	7,760	9,690	8,860	6,900	7,120	7,690	8,245	1,017	6,900	8,250	9,690
		Silver	mg/kg	2017	-	-	-	-	-	-	-	-	-	-	-	-	-
				2018	-	-	-	-	-	-	-	-	-	-	-	-	-
				2019	0.0290	0.0300	0.0428	0.0377	0.0323	0.0342	0.0372	0.0438	0.0359	0.00552	0.0290	0.0357	0.0438
				2020	0.0164	0.0159	<0.0050	0.0136	0.0166	0.00870	<0.0050	<0.0050	0.0108	0.00399	<0.005	0.0112	0.0166
				2021	0.00860	0.00720	0.00540	0.0549	0.0558	0.00750	<0.0050	<0.0050	0.0187	0.0232	<0.005	0.00735	0.0558
		Sodium	mg/kg	2017	2,890	3,650	3,300	3,400	3,490	3,860	3,590	5,370	3,694	735	2,890	3,540	5,370
				2018	3,370	3,150	3,340	3,790	3,180	8,190	3,340	2,670	3,879	1,769	2,670	3,340	8,190
				2019	3,920	4,000	4,010	3,380	3,950	4,100	4,540	4,210	4,014	325	3,380	4,005	4,540
				2020	2,920	3,460	3,620	3,850	2,930	2,690	3,080	1,640	3,024	684	1,640	3,005	3,850
				2021	3,400	3,310	2,400	5,720	4,670	2,640	2,080	2,570	3,349	1,253	2,080	2,975	5,720
		Strontium	mg/kg	2017	37.3	25.1	11.1	12.8	17.3	21.5	24.8	28.3	22.3	8.59	11.1	23.2	37.3
				2018	48.1	31.7	29.5	31.0	22.9	65.3	28.6	30.0	35.9	13.9	22.9	30.5	65.3
				2019	40.0	73.0	49.9	33.4	36.3	27.9	42.2	43.1	43.2	13.7	27.9	41.1	73.0
				2020	19.5	14.2	4.99	14.0	12.2	6.68	6.55	3.69	10.2	5.56	3.69	9.44	19.5
				2021	8.20	7.05	6.78	54.2	36.6	5.09	3.18	3.92	15.6	19.0	3.18	6.92	54.2
		Tin	mg/kg	2017	0.260	0.270	0.240	0.170	0.340	0.110	0.210	0.270	0.234	0.0703	0.110	0.250	0.340
				2018	<0.20	0.270	0.180	0.350	0.370	0.750	0.230	0.240	0.321	0.189	0.180	0.255	0.750
				2019	0.480	0.540	0.350	0.290	0.730	0.740	1.32	0.680	0.641	0.322	0.290	0.610	1.32
				2020	0.110	0.120	<0.10	0.160	<0.10	<0.10	<0.10	<0.10	0.111	0.0201	<0.1	0.100	0.160
				2021	<0.10	<0.10	<0.10	0.140	0.150	<0.10	<0.10	<0.10	0.111	0.00468	<0.1	0.100	0.150
		Titanium	mg/kg	2017	-	-	-	-	-	-	-	-	-	-	-	-	-
				2018	-	-	-	-	-	-	-	-	-	-	-	-	-
				2019	101	227	128	107	108	126	133	144	134	40.3	101	127	227
				2020	55.7	40.7	5.72	74.4	54.2	22.0	21.7	7.55	35.2	24.9	5.72	31.4	74.4
				2021	17.6	25.9	12.3	297	182	19.3	1.61	3.69	69.9	109	1.61	18.4	297
		Uranium	mg/kg	2017	0.122	0.100	0.0654	0.0718	0.0834	0.0961	0.135	0.176	0.106	0.0368	0.0654	0.0980	0.176
				2018	0.351	0.168	0.250	0.148	0.0978	0.358	0.145	0.307	0.228	0.102	0.0978	0.209	0.358
				2019	0.134	0.174	0.263	0.119	0.128	0.110	0.138	0.138	0.150	0.0492	0.110	0.136	0.263
				2020	0.0736	0.0588	0.00340	0.0609	0.0376	0.0250	0.0182	0.0124	0.0362	0.0257	0.00340	0.0313	0.0736
				2021	0.0362	0.0268	0.0271	0.266	0.263	0.0285	0.00820	0.0134	0.0836	0.112	0.00820	0.0278	0.266
		Vanadium	mg/kg	2017	7.90	9.22	3.41	4.20	5.95	8.33	13.9	14.8	8.46	4.15	3.41	8.12	14.8
				2018	16.1	12.0	9.48	11.1	7.68	22.4	11.4	11.0	12.6	4.61	7.68	11.2	22.4
				2019	9.55	16.3	13.1	10.6	8.79	12.4	11.6	12.2	11.8	2.33	8.79	11.9	16.3
				2020	4.96	4.16	0.300	7.46	4.15	1.76	1.71	0.640	3.14	2.46	0.300	2.96	7.46
				2021	2.38	2.25	1.52	25.7	31.2	0.920	0.260	0.460	8.09	12.7	0.260	1.88	31.2
		Zinc	mg/kg	2017	97.0	107	114	109	126	110	122	127	114	10.4	97.0	112	127
				2018	96.0	87.6	84.1	90.5	90.3	219	81.2	88.4	105	46.4	81.2	89.3	219
				2019	109	117	125	108	115	108	110	117	114	6.00	108	112	125
				2020	108	117	78.0	90.2	93.4	91.3	96.8	72.1	93.3	14.6	72.1	92.3	117
				2021	94.8	100	121	130	121	83.9	85.4	75.8	101	20.2	75.8	97.4	130

Notes: All values reported in dry weight. Summary statistics reported to 3 significant figures for display purposes.

Table D.5.4: Caddisfly Tissue Primary and Secondary Analytes Concentrations for Upper Hazeltine Creek (HAC-R1, HAC-U; Exposed), Upper Edney Creek (EDC-U; Reference), Lower Hazeltine Creek (HAC-D; Exposed), and Lower Edney Creek Exposed (E1) and Reference (EDC) Areas, 2016 to 2021

Waterbody	Area	Parameter	Units	Year	Replicate								Mean	Standard Deviation	Minimum	Median	Maximum
					1	2	3	4	5	6	7	8					
Upper Hazeltine Reach 2	HAC-U (Exposed)	**Primary Analytes**															
		Arsenic	mg/kg	2016	2.44	-	2.61	-	2.54	-	-	-	2.53	0.0854	2.44	2.54	2.61
				2018	1.84	2.06	2.15	1.65	1.58	1.84	1.85	2.13	1.89	0.212	1.58	1.84	2.15
				2019	3.31	2.08	1.90	2.34	2.01	2.20	2.07	1.89	2.22	0.463	1.89	2.08	3.31
				2020	0.439	0.499	0.566	0.717	1.03	0.621	0.653	0.735	0.658	0.182	0.439	0.637	1.03
				2021	0.336	0.415	0.895	0.745	0.793	0.907	1.37	1.21	0.834	0.353	0.336	0.844	1.37
		Copper	mg/kg	2016	216	-	203	-	195	-	-	-	205	10.6	195	203	216
				2018	61.3	79.9	87.6	55.2	66.4	71.1	69.6	86.6	72.2	11.7	55.2	70.3	87.6
				2019	178	108	109	114	105	121	99.2	79.9	114	28.5	79.9	108	178
				2020	15.5	22.5	20.2	25.2	24.3	21.9	22.5	32.2	23.0	4.74	15.5	22.5	32.2
				2021	12.1	17.8	21.3	26.4	37.8	26.2	31.5	36.3	26.2	8.93	12.1	26.3	37.8
		Iron	mg/kg	2016	2,170	-	5,330	-	4,600	-	-	-	4,033	1,654	2,170	4,600	5,330
				2018	1,240	2,560	2,280	840	1,040	1,300	1,290	1,820	1,546	611	840	1,295	2,560
				2019	5,780	2,450	2,780	2,790	2,330	3,210	2,390	2,260	2,999	1,167	2,260	2,615	5,780
				2020	172	166	163	190	294	194	211	464	232	103	163	192	464
				2021	92.9	188	206	509	300	583	956	694	441	296	92.9	404	956
		Selenium	mg/kg	2016	10.5	-	10.3	-	9.70	-	-	-	10.2	0.416	9.70	10.3	10.5
				2018	2.17	1.73	1.95	1.85	1.86	2.13	2.25	1.78	1.96	0.194	1.73	1.90	2.25
				2019	3.59	3.46	3.06	3.17	3.33	3.88	3.41	3.94	3.48	0.313	3.06	3.44	3.94
				2020	3.59	5.12	4.71	5.55	5.89	5.22	5.03	5.79	5.11	0.732	3.59	5.17	5.89
				2021	5.85	7.64	7.19	9.43	8.86	8.49	7.65	8.00	7.89	1.10	5.85	7.82	9.43
		Secondary Analytes															
		Barium	mg/kg	2016	58.2	-	62.1	-	61.1	-	-	-	60.5	2.03	58.2	61.1	62.1
				2018	28.1	43.3	35.4	21.6	19.5	26.4	31.8	35.2	30.2	7.87	19.5	30.0	43.3
				2019	84.5	42.9	47.1	39.2	36.6	42.5	59.8	54.1	50.8	15.6	36.6	45.0	84.5
				2020	19.5	2.26	2.09	3.58	2.81	3.49	2.92	9.72	5.80	6.06	2.09	3.20	19.5
				2021	4.56	5.71	11.8	6.89	15.6	14.4	15.5	21.3	12.0	5.84	4.56	13.1	21.3
		Cadmium	mg/kg	2016	0.656	-	0.448	-	0.434	-	-	-	0.513	0.124	0.434	0.448	0.656
				2018	0.219	0.285	0.224	0.222	0.227	0.283	0.227	0.189	0.234	0.0329	0.189	0.226	0.285
				2019	0.631	0.409	0.352	0.365	0.341	0.367	0.489	0.287	0.405	0.108	0.287	0.366	0.631
				2020	0.0330	<0.010	<0.010	0.0407	0.0102	0.0228	0.0260	0.0941	0.0308	0.0286	<0.01	0.0244	0.0941
				2021	0.0710	0.132	0.134	0.140	0.117	0.139	0.161	0.207	0.138	0.0383	0.0710	0.136	0.207
		Calcium	mg/kg	2016	4,160	-	4,050	-	8,840	-	-	-	5,683	2,734	4,050	4,160	8,840
				2018	5,170	9,790	5,860	3,110	3,710	6,000	5,160	7,570	5,796	2,122	3,110	5,515	9,790
				2019	18,500	8,030	8,440	9,580	7,480	14,100	11,200	9,220	10,819	3,753	7,480	9,400	18,500
				2020	453	736	549	784	809	825	642	979	722	168	453	760	979
				2021	475	682	946	930	1,170	1,260	6,430	11,100	2,874	3,852	475	1,058	11,100
		Cobalt	mg/kg	2016	6.73	-	6.62	-	5.87	-	-	-	6.41	0.468	5.87	6.62	6.73
				2018	0.951	1.69	1.53	0.741	0.809	1.01	0.957	1.20	1.11	0.339	0.741	0.984	1.69
				2019	4.22	1.90	1.94	2.12	1.79	2.05	1.74	1.56	2.16	0.849	1.56	1.92	4.22
				2020	0.122	0.120	0.110	0.169	0.220	0.147	0.179	0.357	0.178	0.0810	0.110	0.158	0.357
				2021	0.166	0.211	0.285	0.455	0.358	0.478	0.716	0.860	0.441	0.243	0.166	0.406	0.860
		Manganese	mg/kg	2016	2,100	-	2,020	-	1,850	-	-	-	1,990	128	1,850	2,020	2,100
				2018	1,040	1,110	980	772	883	908	789	776	907	128	772	896	1,110
				2019	3,480	2,220	2,100	2,150	2,030	2,040	2,050	1,690	2,220	533	1,690	2,075	3,480
				2020	157	119	111	249	153	169	158	362	185	82.9	111	158	362
				2021	366	371	826	602	764	795	883	1,330	742	310	366	780	1,330
		Mercury	mg/kg	2016	0.0362	-	0.0442	-	0.0423	-	-	-	0.0409	0.00418	0.0362	0.0423	0.0442
				2018	0.0420	0.0629	0.0587	0.0461	0.0530	0.0521	0.0586	0.0475	0.0526	0.00717	0.0420	0.0526	0.0629
				2019	0.120	0.0900	0.0980	0.0910	0.0870	0.0840	0.0830	0.0940	0.0934	0.0119	0.0830	0.0905	0.120
				2020	0.0616	0.0471	0.0584	0.0728	0.0717	0.0576	0.0661	0.0989	0.0668	0.0154	0.0471	0.0638	0.0989
				2021	0.0236	0.0289	0.0443	0.0385	0.0512	0.0567	0.0446	0.0556	0.0429	0.0120	0.0236	0.0445	0.0567
		Molybdenum	mg/kg	2016	24.1	-	29.1	-	27.5	-	-	-	26.9	2.55	24.1	27.5	29.1
				2018	3.94	4.07	3.42	3.01	3.23	2.87	2.79	3.20	3.32	0.472	2.79	3.22	4.07
				2019	5.94	5.24	5.22	5.38	4.92	4.00	5.45	4.10	5.03	0.670	4.00	5.23	5.94
				2020	5.58	10.1	8.02	7.72	8.80	8.06	8.77	6.94	8.00	1.35	5.58	8.04	10.1
				2021	6.53	8.06	9.75	12.6	10.0	9.19	7.70	10.0	9.23	1.84	6.53	9.47	12.6
		Nickel	mg/kg	2016	10.5	-	10.1	-	9.19	-	-	-	9.93	0.671	9.19	10.1	10.5
				2018	2.21	3.33	3.62	1.52	2.20	1.80	1.57	3.13	2.42	0.826	1.52	2.20	3.62
				2019	6.32	2.88	3.33	2.93	2.94	3.38	2.69	2.44	3.36	1.23	2.44	2.94	6.32
				2020	<0.20	<0.20	<0.20	0.520	<0.20	<0.20	<0.20	0.320	0.255	0.0935	<0.2	0.200	0.520
				2021	0.250	0.220	0.380	0.410	0.330	0.690	1.44	0.770	0.561	0.406	0.220	0.395	1.44
		Phosphorus	mg/kg	2016	6,300	-	6,920	-	5,780	-	-	-	6,333	571	5,780	6,300	6,920
				2018	5,870	5,770	6,650	6,410	5,480	5,550	6,860	5,350	5,992	573	5,350	5,820	6,860
				2019	9,140	8,910	6,700	7,690	8,000	6,770	8,000	7,640	7,856	878	6,700	7,845	9,140
				2020	4,730	6,900	6,990	7,930	8,500	7,940	7,740	8,200	7,366	1,200	4,730	7,835	8,500
				2021	4,600	5,160	7,560	7,790	8,270	7,910	7,450	8,420	7,145	1,443	4,600	7,675	8,420
		Silver	mg/kg	2016	0.0344	-	0.0307	-	0.0384	-	-	-	0.0345	0.00385	0.0307	0.0344	0.0384
				2018	-	-	-	-	-	-	-	-	-	-	-	-	-
				2019	0.0504	0.0287	0.0310	0.0276	0.0298	0.0373	0.0259	0.0232	0.0317	0.00859	0.0232	0.0292	0.0504
				2020	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.00500	0.00500	-	<0.005	0.00500	0.00500
				2021	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.00960	<0.0050	<0.0050	0.00558	-	<0.005	0.00500	0.00960
		Sodium	mg/kg	2016	4,940	-	4,560	-	4,200	-	-	-	4,567	370	4,200	4,560	4,940
				2018	2,490	2,580	3,020	2,670	2,890	2,950	2,980	3,030	2,826	214	2,490	2,920	3,030
				2019	5,030	4,260	3,360	4,130	4,180	3,480	4,180	3,660	4,035	534	3,360	4,155	5,030
				2020	1,700	3,000	2,410	3,140	3,300	2,760	2,810	3,230	2,794	528	1,700	2,905	3,300
				2021	1,670	1,600	2,320	2,640	3,310	2,290	2,410	2,440	2,335	541	1,600	2,365	3,310
		Strontium	mg/kg	2016	45.8	-	42.5	-	50.7	-	-	-	46.3	4.13	42.5	45.8	50.7
				2018	20.2	42.2	27.6	14.4	15.2	24.3	21.7	26.6	24.0	8.79	14.4	23.0	42.2
				2019	67.2	32.2	35.6	36.1	30.3	51.6	41.4	35.3	41.2	12.4	30.3	35.8	67.2
				2020	3.26	3.61	3.53	5.37	4.58	4.99	4.43	6.21	4.50	1.01	3.26	4.50	6.21
				2021	3.35	7.23	6.06	5.04	7.25	9.36	20.4	29.5	11.0	9.10	3.35	7.24	29.5
		Tin	mg/kg	2016	0.0130	-	0.0115	-	0.0102	-	-	-	0.0116	0.00140	0.0102	0.0115	0.0130
				2018	0.150	<0.10	0.420	<0.10	0.570	<0.10	<0.10	0.150	0.211	0.178	<0.1	0.125	0.570
				2019	0.590	0.260	0.320	1.04	0.390	0.580	0.330	0.280	0.474	0.262	0.260	0.360	1.04
				2020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	-	<0.1	<0.1	<0.1
				2021	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	-	<0.1	<0.1	<0.1
		Titanium	mg/kg	2016	46.5	-	46.7	-	50.1	-	-	-	47.8	2.02	46.5	46.7	50.1
				2018	-	-	-	-	-	-	-	-	-	-	-	-	-
				2019	215	83.4	93.3	91.6	77.5	110	74.9	72.8	102	47.1	72.8	87.5	215
				2020	4.71	3.87	4.39	4.50	6.69	4.75	6.09	15.4	6.30	3.79	3.87	4.73	15.4
				2021	1.40	5.10	4.74	5.17	9.96	14.2	11.8	26.9	9.91	8.07	1.40	7.56	26.9
		Uranium	mg/kg	2016	0.195	-	0.193	-	0.201	-	-	-	0.196	0.00416	0.193	0.195	0.201
				2018	0.0667	0.114	0.100	0.0487	0.0568	0.0721	0.0685	0.114	0.0801	0.0256	0.0487	0.0703	0.114
				2019	0.215	0.101	0.103	0.106	0.0876	0.214	0.115	0.0853	0.128	0.0540	0.0853	0.104	0.215
				2020	0.00560	0.00350	0.00420	0.00890	0.00480	0.00490	0.00800	0.0153	0.00690	0.00387	0.00350	0.00525	0.0153
				2021	0.0146	0.0187	0.0284	0.0306	0.0198	0.0343	0.0526	0.0607	0.0325	0.0165	0.0146	0.0295	0.0607

Notes: All values reported in dry weight. Summary statistics reported to 3 significant figures for display purposes.

Table D.5.4: Caddisfly Tissue Primary and Secondary Analytes Concentrations for Upper Hazeltine Creek (HAC-R1, HAC-U; Exposed), Upper Edney Creek (EDC-U; Reference), Lower Hazeltine Creek (HAC-D; Exposed), and Lower Edney Creek Exposed (E1) and Reference (EDC) Areas, 2016 to 2021

Waterbody	Area	Parameter	Units	Year	Replicate								Mean	Standard Deviation	Minimum	Median	Maximum
					1	2	3	4	5	6	7	8					
Upper Hazeltine Reach 2	HAC-U (Exposed)	Vanadium	mg/kg	2016	17.7	-	18.7	-	18.0	-	-	-	18.1	0.513	17.7	18.0	18.7
				2018	3.59	7.92	6.86	2.67	3.02	4.10	4.16	6.36	4.84	1.94	2.67	4.13	7.92
				2019	17.6	7.22	7.91	7.95	6.56	10.9	7.29	6.83	9.03	3.71	6.56	7.60	17.6
				2020	0.410	0.310	0.390	0.350	1.09	0.510	0.510	1.19	0.595	0.345	0.310	0.460	1.19
				2021	0.430	0.810	0.930	2.08	1.07	2.40	2.72	2.53	1.62	0.903	0.430	1.58	2.72
		Zinc	mg/kg	2016	153	-	146	-	137	-	-	-	145	8.02	137	146	153
				2018	90.0	79.2	90.8	86.1	66.4	74.8	91.7	82.2	82.7	8.88	66.4	84.2	91.7
				2019	124	111	107	113	105	92.0	110	97.2	107	9.81	92.0	108	124
				2020	61.0	75.6	81.5	98.8	94.1	80.6	85.2	104	85.1	13.8	61.0	83.3	104
				2021	64.6	80.7	126	112	116	131	109	140	110	25.5	64.6	114	140
Lower Edney Creek	EDC-D (Reference)	**Primary Analytes**															
		Arsenic	mg/kg	2018	14.5	18.7	19.9	11.7	10.2	8.57	12.0	8.37	13.0	4.37	8.37	11.8	19.9
				2019	3.41	1.26	2.54	2.96	1.64	1.62	4.06	1.29	2.35	1.06	1.26	2.09	4.06
				2020	5.07	9.47	6.49	5.85	8.09	9.57	2.54	1.48	6.07	2.99	1.48	6.17	9.57
				2021	17.6	3.72	11.8	3.43	1.18	1.62	1.35	2.02	5.34	6.05	1.18	2.72	17.6
		Copper	mg/kg	2018	23.4	27.7	45.6	21.7	26.5	21.2	26.6	24.6	27.2	7.81	21.2	25.6	45.6
				2019	20.2	15.2	29.1	19.0	12.9	18.3	24.6	15.9	19.4	5.28	12.9	18.6	29.1
				2020	25.0	35.0	26.9	25.8	33.0	27.4	21.0	23.6	27.2	4.67	21.0	26.4	35.0
				2021	26.4	14.1	24.9	14.4	13.4	14.8	12.6	13.2	16.7	5.57	12.6	14.2	26.4
		Iron	mg/kg	2018	3,910	3,530	7,990	3,310	3,040	2,770	1,900	5,710	4,020	1,942	1,900	3,420	7,990
				2019	1,440	296	2,540	1,530	1,490	344	2,020	207	1,233	866	207	1,465	2,540
				2020	6,350	11,800	9,270	8,230	9,690	13,000	6,210	300	8,106	3,948	300	8,750	13,000
				2021	6,030	632	3,600	960	110	165	1,700	290	1,686	2,102	110	796	6,030
		Selenium	mg/kg	2018	2.63	2.88	3.81	2.04	1.94	1.67	1.80	1.32	2.26	0.803	1.32	1.99	3.81
				2019	1.27	1.46	2.73	1.31	0.890	1.47	1.47	1.47	1.51	0.532	0.890	1.46	2.73
				2020	1.15	1.34	1.06	1.22	1.05	0.910	1.64	1.61	1.25	0.265	0.910	1.18	1.64
				2021	2.58	1.33	2.04	1.05	0.890	1.02	0.850	1.00	1.34	0.629	0.850	1.03	2.58
		Secondary Analytes															
		Barium	mg/kg	2018	138	163	321	118	110	104	155	110	152	71.6	104	128	321
				2019	47.9	4.55	19.1	24.4	18.1	4.49	43.9	4.12	20.8	17.3	4.12	18.6	47.9
				2020	126	173	131	133	132	163	26.2	6.46	111	61.2	6.46	132	173
				2021	135	23.4	147	27.6	4.47	6.08	5.26	12.6	45.2	59.8	4.47	18.0	147
		Cadmium	mg/kg	2018	0.375	0.432	0.927	0.448	0.369	0.366	0.592	0.472	0.498	0.189	0.366	0.440	0.927
				2019	0.159	0.0250	0.482	0.101	0.0310	0.0260	0.124	0.0390	0.123	0.154	0.0250	0.0700	0.482
				2020	0.470	0.600	0.425	0.313	0.311	0.392	0.282	0.0700	0.358	0.156	0.0700	0.352	0.600
				2021	0.559	0.0600	0.439	0.0880	0.0180	0.0290	0.0270	0.0330	0.157	0.215	0.0180	0.0465	0.559
		Calcium	mg/kg	2018	2,620	2,750	5,780	4,280	2,290	2,140	1,930	3,410	3,150	1,307	1,930	2,685	5,780
				2019	1,350	2,600	1,780	1,330	1,040	1,360	1,480	1,670	1,576	471	1,040	1,420	2,600
				2020	3,390	4,560	4,240	3,120	3,600	4,220	3,700	906	3,467	1,141	906	3,650	4,560
				2021	3,110	1,210	2,030	1,450	1,370	1,150	1,510	1,170	1,625	664	1,150	1,410	3,110
		Cobalt	mg/kg	2018	3.37	3.70	6.03	3.10	2.94	2.48	3.18	3.98	3.60	1.08	2.48	3.28	6.03
				2019	1.58	0.160	1.18	1.46	0.694	0.236	2.05	0.113	0.934	0.739	0.113	0.937	2.05
				2020	3.98	6.90	4.78	4.59	5.10	7.02	2.46	0.303	4.39	2.22	0.303	4.68	7.02
				2021	5.46	0.565	3.50	0.736	0.0760	0.211	0.878	0.214	1.46	1.96	0.0760	0.650	5.46
		Manganese	mg/kg	2018	1,270	1,490	2,670	1,030	940	796	1,220	559	1,247	644	559	1,125	2,670
				2019	956	42.9	286	525	270	80.3	644	35.9	355	330	35.9	278	956
				2020	1,900	2,540	1,630	1,340	1,610	1,900	276	141	1,417	823	141	1,620	2,540
				2021	2,350	440	1,970	312	55.0	121	113	230	699	916	55.0	271	2,350
		Mercury	mg/kg	2018	0.118	0.107	0.0739	0.0883	0.0733	0.0615	0.147	0.0935	0.0953	0.0279	0.0615	0.0909	0.147
				2019	0.0550	0.0420	0.125	0.0560	0.0370	0.0440	0.0930	0.0830	0.0669	0.0307	0.0370	0.0555	0.125
				2020	0.0768	0.0923	0.0656	0.0669	0.0662	0.0552	0.0860	0.0797	0.0736	0.0123	0.0552	0.0718	0.0923
				2021	0.0802	0.0292	0.0513	0.0194	0.0160	0.0207	0.0274	0.0232	0.0334	0.0218	0.0160	0.0253	0.0802
		Molybdenum	mg/kg	2018	2.25	3.08	4.55	2.11	1.61	1.77	2.40	1.58	2.42	0.992	1.58	2.18	4.55
				2019	4.40	5.66	5.66	3.31	2.51	5.28	4.54	5.84	4.65	1.21	2.51	4.91	5.84
				2020	5.72	2.45	6.96	3.41	3.76	2.15	6.17	8.78	4.92	2.35	2.15	4.74	8.78
				2021	2.07	7.86	2.70	8.88	8.86	8.22	6.32	4.54	6.18	2.76	2.07	7.09	8.88
		Nickel	mg/kg	2018	8.07	10.2	16.1	7.54	8.54	5.80	6.79	9.61	9.08	3.17	5.80	8.30	16.1
				2019	3.33	0.870	4.41	3.28	1.31	0.530	4.44	0.710	2.36	1.68	0.530	2.30	4.44
				2020	9.42	18.0	10.4	11.3	13.1	16.8	5.54	0.560	10.6	5.70	0.560	10.8	18.0
				2021	12.8	1.44	9.03	1.82	<0.20	0.260	2.46	0.470	3.56	4.76	<0.2	1.63	12.8
		Phosphorus	mg/kg	2018	5,910	8,280	10,200	5,840	6,250	6,170	8,090	4,710	6,931	1,775	4,710	6,210	10,200
				2019	9,770	9,320	10,500	7,980	7,410	8,980	9,370	9,950	9,160	1,025	7,410	9,345	10,500
				2020	8,100	7,980	8,950	7,840	7,810	5,670	7,340	9,160	7,856	1,070	5,670	7,910	9,160
				2021	8,690	8,420	8,720	9,310	9,200	9,380	8,080	8,540	8,792	464	8,080	8,705	9,380
		Silver	mg/kg	2018	-	-	-	-	-	-	-	-	-	-	-	-	-
				2019	0.0306	0.00890	0.111	0.0214	0.00960	0.0230	0.0312	0.0115	0.0309	0.0336	0.00890	0.0222	0.111
				2020	0.0698	0.117	0.0845	0.0719	0.0698	0.0839	0.0700	0.0306	0.0747	0.0239	0.0306	0.0710	0.117
				2021	0.0574	0.0137	0.0370	0.0151	0.0100	0.0139	0.00950	0.00740	0.0205	0.0175	0.00740	0.0138	0.0574
		Sodium	mg/kg	2018	2,700	4,310	4,530	3,130	3,500	3,520	5,450	2,880	3,752	939	2,700	3,510	5,450
				2019	3,320	2,970	4,430	2,410	2,450	3,090	3,610	3,450	3,216	655	2,410	3,205	4,430
				2020	2,770	4,160	3,390	3,150	3,460	2,460	2,480	2,660	3,066	589	2,460	2,960	4,160
				2021	4,320	2,480	4,160	3,280	2,800	3,060	2,540	2,730	3,171	710	2,480	2,930	4,320
		Strontium	mg/kg	2018	25.4	24.4	51.9	34.2	20.9	21.5	17.7	34.4	28.8	11.1	17.7	24.9	51.9
				2019	10.7	14.6	13.3	9.14	7.90	9.40	12.4	12.7	11.3	2.34	7.90	11.6	14.6
				2020	28.9	37.3	34.6	26.7	29.2	38.2	27.4	6.26	28.6	10.1	6.26	29.0	38.2
				2021	23.4	9.78	15.7	11.7	11.2	8.82	8.85	8.69	12.3	5.07	8.69	10.5	23.4
		Tin	mg/kg	2018	<0.10	0.140	<0.20	0.130	0.300	<0.10	0.270	<0.20	0.159	0.0769	<0.1	0.130	0.300
				2019	0.260	<0.10	0.160	0.290	<0.10	0.170	0.250	0.300	0.204	0.0637	<0.1	0.210	0.300
				2020	<0.10	0.160	0.130	<0.10	<0.10	0.150	<0.10	<0.10	0.118	0.0136	<0.1	0.100	0.160
				2021	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	-	<0.1	<0.1	<0.1
		Titanium	mg/kg	2018	-	-	-	-	-	-	-	-	-	-	-	-	-
				2019	20.5	5.34	45.9	53.0	40.4	7.22	48.5	3.42	28.0	21.1	3.42	30.4	53.0
				2020	154	266	212	192	228	294	166	5.11	190	88.3	5.11	202	294
				2021	96.7	9.44	55.0	19.3	0.880	1.54	86.1	7.52	34.6	39.2	0.880	14.4	96.7
		Uranium	mg/kg	2018	0.259	0.261	0.658	0.403	0.252	0.252	0.193	0.560	0.355	0.170	0.193	0.260	0.658
				2019	0.0669	0.0127	0.112	0.0727	0.0183	0.00910	0.164	0.0436	0.0624	0.0541	0.00910	0.0552	0.164
				2020	0.240	0.460	0.276	0.262	0.320	0.438	0.143	0.0124	0.269	0.147	0.0124	0.269	0.460
				2021	0.265	0.0187	0.157	0.0359	0.00310	0.00540	0.0233	0.0134	0.0652	0.0950	0.00310	0.0210	0.265
		Vanadium	mg/kg	2018	7.84	7.72	18.6	7.08	6.74	7.34	4.21	14.7	9.28	4.80	4.21	7.53	18.6
				2019	2.42	0.490	4.56	3.25	2.86	0.540	3.75	0.590	2.31	1.59	0.490	2.64	4.56
				2020	13.0	24.3	21.9	17.6	20.1	25.9	18.4	0.520	17.7	8.04	0.520	19.2	25.9
				2021	10.4	1.12	6.28	1.78	0.150	0.330	8.90	0.690	3.71	4.17	0.150	1.45	10.4
		Zinc	mg/kg	2018	94.4	118	210	101	118	126	171	111	131	39.4	94.4	118	210
				2019	180	92.3	119	158	106	102	149	101	126	32.2	92.3	112	180
				2020	174	180	164	174	151	173	148	128	162	17.8	128	168	180
				2021	164	98.5	151	103	80.4	98.8	87.9	97.7	110	30.3	80.4	98.7	164

Notes: All values reported in dry weight. Summary statistics reported to 3 significant figures for display purposes.

Table D.5.4: Caddisfly Tissue Primary and Secondary Analytes Concentrations for Upper Hazeltine Creek (HAC-R1, HAC-U; Exposed), Upper Edney Creek (EDC-U; Reference), Lower Hazeltine Creek (HAC-D; Exposed), and Lower Edney Creek Exposed (E1) and Reference (EDC) Areas, 2016 to 2021

Waterbody	Area	Parameter	Units	Year	Replicate								Mean	Standard Deviation	Minimum	Median	Maximum
					1	2	3	4	5	6	7	8					
Lower Hazeltine Creek	HAC-D (Exposed)	**Primary Analytes**															
		Arsenic	mg/kg	2016	3.27	-	3.46	-	2.99	-	-	-	3.24	0.236	2.99	3.27	3.46
				2017	4.46	3.17	-	-	5.28	5.09	4.56	4.68	4.48	0.661	3.17	4.58	5.28
				2018	1.30	1.28	1.30	1.88	1.18	0.932	1.16	1.02	1.26	0.285	0.932	1.23	1.88
				2019	1.43	2.12	1.43	1.23	2.06	1.20	1.43	1.35	1.53	0.357	1.20	1.43	2.12
				2020	2.79	3.56	1.70	2.46	7.69	2.98	1.18	0.738	2.89	2.16	0.738	2.62	7.69
				2021	2.08	1.70	1.28	3.10	1.23	2.21	2.49	1.33	1.93	0.666	1.23	1.89	3.10
		Copper	mg/kg	2016	136	-	168	-	142	-	-	-	149	17.0	136	142	168
				2017	215	106	-	-	151	109	131	188	147	38.8	106	141	215
				2018	30.8	30.4	37.2	41.4	29.0	24.6	28.8	24.2	30.8	5.89	24.2	29.7	41.4
				2019	36.2	48.8	36.7	34.3	37.0	32.0	49.4	33.9	38.5	6.73	32.0	36.4	49.4
				2020	67.3	110	75.0	47.7	139	81.2	47.0	27.7	74.4	36.2	27.7	71.2	139
				2021	73.7	52.8	61.4	86.3	66.9	71.0	69.0	68.1	68.7	9.63	52.8	68.5	86.3
		Iron	mg/kg	2016	6,420	-	5,800	-	2,790	-	-	-	5,003	1,942	2,790	5,800	6,420
				2017	11,100	4,280	-	-	5,120	4,940	6,350	6,540	6,351	2,192	4,280	5,735	11,100
				2018	470	665	592	829	270	239	387	352	476	206	239	428	829
				2019	1,020	715	1,190	802	2,240	767	1,600	645	1,122	550	645	911	2,240
				2020	2,230	3,980	2,150	614	7,100	2,250	1,330	397	2,506	2,170	397	2,190	7,100
				2021	1,190	1,060	855	2,850	1,020	1,870	2,140	997	1,498	713	855	1,125	2,850
		Selenium	mg/kg	2016	9.11	-	11.8	-	10.1	-	-	-	10.3	1.36	9.11	10.1	11.8
				2017	3.40	2.85	-	-	4.69	3.50	3.96	3.97	3.62	0.579	2.85	3.50	4.69
				2018	3.87	3.61	3.88	3.99	4.51	3.75	3.57	3.87	3.88	0.292	3.57	3.87	4.51
				2019	2.95	2.87	3.05	2.87	2.94	3.10	4.11	2.76	3.08	0.429	2.76	2.94	4.11
				2020	4.45	3.16	2.44	3.99	3.44	3.44	3.20	3.14	3.41	0.602	2.44	3.32	4.45
				2021	4.15	4.80	5.13	5.18	5.20	5.24	4.10	5.51	4.91	0.524	4.10	5.16	5.51
		Secondary Analytes															
		Barium	mg/kg	2016	98.6	-	137	-	93.6	-	-	-	110	23.7	93.6	98.6	137
				2017	71.7	84.4	-	-	125	68.4	62.4	93.6	81.9	19.9	62.4	75.0	125
				2018	6.63	8.23	9.99	25.7	7.47	4.68	4.46	4.65	8.98	7.04	4.46	7.05	25.7
				2019	10.7	39.3	20.5	8.49	9.49	7.49	23.8	25.6	18.2	11.2	7.49	15.6	39.3
				2020	36.6	84.3	76.3	24.3	127	97.5	20.7	8.32	59.4	42.7	8.32	56.5	127
				2021	30.4	33.9	38.3	67.1	37.1	48.6	50.5	38.6	43.1	11.9	30.4	38.4	67.1
		Cadmium	mg/kg	2016	1.12	-	1.15	-	1.25	-	-	-	1.17	0.0681	1.12	1.15	1.25
				2017	0.480	0.545	-	-	2.54	0.820	0.891	1.03	0.943	0.673	0.480	0.766	2.54
				2018	0.0250	0.0590	0.163	0.275	0.218	<0.010	0.0370	<0.010	0.0996	0.103	<0.01	0.0480	0.275
				2019	0.0250	0.409	0.242	0.0240	0.0480	0.0200	0.249	0.127	0.143	0.144	0.0200	0.0875	0.409
				2020	0.896	1.57	1.00	0.797	2.29	1.44	0.378	0.402	1.10	0.644	0.378	0.948	2.29
				2021	0.707	0.767	0.835	1.30	0.909	1.08	0.974	0.913	0.936	0.188	0.707	0.911	1.30
		Calcium	mg/kg	2016	4,490	-	6,410	-	3,870	-	-	-	4,923	1,324	3,870	4,490	6,410
				2017	3,780	3,010	-	-	6,920	4,610	4,730	4,920	4,471	1,225	3,010	4,600	6,920
				2018	832	1,360	966	1,050	851	667	782	802	914	214	667	842	1,360
				2019	1,180	968	1,300	1,010	1,880	888	2,640	951	1,352	611	888	1,095	2,640
				2020	1,850	3,420	2,060	964	4,550	1,900	1,350	770	2,108	1,280	770	1,875	4,550
				2021	2,170	3,160	2,000	4,600	2,280	2,650	2,640	1,760	2,658	898	1,760	2,460	4,600
		Cobalt	mg/kg	2016	3.88	-	4.99	-	3.88	-	-	-	4.25	0.641	3.88	3.88	4.99
				2017	4.58	3.59	-	-	3.19	3.70	3.25	3.82	3.77	0.514	3.19	3.64	4.58
				2018	0.430	0.643	0.651	0.862	0.349	0.258	0.417	0.307	0.490	0.208	0.258	0.424	0.862
				2019	0.702	1.42	0.815	0.551	0.992	0.499	0.950	0.539	0.808	0.310	0.499	0.758	1.42
				2020	1.97	4.36	2.39	1.15	5.73	3.45	1.07	0.575	2.59	1.80	0.575	2.18	5.73
				2021	0.967	0.964	0.889	2.07	0.941	1.45	1.58	1.12	1.25	0.418	0.889	1.04	2.07
		Manganese	mg/kg	2016	2,130	-	2,460	-	2,210	-	-	-	2,267	172	2,130	2,210	2,460
				2017	4,390	5,120	-	-	2,080	1,380	1,670	2,620	3,115	1,370	1,380	3,135	5,120
				2018	113	157	185	419	124	101	126	127	169	104	101	126	419
				2019	117	633	276	115	150	124	211	330	244	176	115	180	633
				2020	676	1,320	693	571	1,700	1,190	370	201	840	513	201	684	1,700
				2021	650	744	872	1,150	770	926	930	863	863	151	650	868	1,150
		Mercury	mg/kg	2016	0.0540	-	0.0517	-	0.0538	-	-	-	0.0532	0.00127	0.0517	0.0538	0.0540
				2017	0.0647	0.0631	-	-	0.0567	0.0545	0.0542	0.0617	0.0594	0.00396	0.0542	0.0600	0.0647
				2018	0.0396	0.0398	<0.0050	0.0785	0.0368	0.0353	0.0367	0.0451	0.0396	0.0147	<0.005	0.0382	0.0785
				2019	0.0230	0.0270	0.0280	0.0260	0.0290	0.0320	0.0290	0.0310	0.0281	0.00285	0.0230	0.0285	0.0320
				2020	0.0655	0.0584	0.0426	0.0404	0.0737	0.0664	0.0779	0.0716	0.0621	0.0140	0.0404	0.0660	0.0779
				2021	0.0275	0.0227	0.0519	0.0391	0.0495	0.0395	0.0410	0.0451	0.0395	0.0101	0.0227	0.0402	0.0519
		Molybdenum	mg/kg	2016	18.4	-	20.8	-	13.9	-	-	-	17.7	3.50	13.9	18.4	20.8
				2017	10.5	12.5	-	-	12.8	8.03	7.16	11.9	10.5	2.10	7.16	11.0	12.8
				2018	6.19	6.36	5.40	7.72	7.40	5.62	4.77	6.20	6.21	0.985	4.77	6.20	7.72
				2019	6.17	7.77	7.14	5.99	6.92	5.32	4.11	6.93	6.29	1.17	4.11	6.54	7.77
				2020	3.12	3.27	2.58	4.27	3.65	4.89	3.91	4.09	3.72	0.728	2.58	3.78	4.89
				2021	2.58	2.60	1.53	1.86	1.61	1.72	1.61	1.62	1.89	0.442	1.53	1.67	2.60
		Nickel	mg/kg	2016	6.05	-	7.80	-	5.92	-	-	-	6.59	1.05	5.92	6.05	7.80
				2017	8.04	5.15	-	-	6.26	5.91	6.62	6.93	6.58	0.855	5.15	6.64	8.04
				2018	0.530	0.760	0.690	1.08	0.450	0.480	1.53	0.640	0.770	0.367	0.450	0.665	1.53
				2019	1.75	1.63	1.37	1.00	2.07	0.940	1.75	0.830	1.42	0.454	0.830	1.50	2.07
				2020	2.48	5.81	3.15	1.40	8.03	4.42	1.61	0.540	3.43	2.52	0.540	2.82	8.03
				2021	1.70	1.59	1.69	3.77	2.11	3.09	2.84	2.74	2.44	0.791	1.59	2.42	3.77
		Phosphorus	mg/kg	2016	7,270	-	6,500	-	6,830	-	-	-	6,867	386	6,500	6,830	7,270
				2017	6,330	5,750	-	-	5,280	4,700	5,840	5,870	5,729	518	4,700	5,855	6,330
				2018	7,000	7,170	6,830	6,270	6,820	6,290	6,530	6,190	6,638	369	6,190	6,675	7,170
				2019	7,540	7,620	6,880	7,050	6,930	7,110	6,810	6,900	7,105	309	6,810	6,990	7,620
				2020	8,710	7,600	7,480	8,480	9,600	8,480	7,930	7,560	8,230	730	7,480	8,205	9,600
				2021	8,300	9,270	7,980	9,000	7,930	9,210	7,400	8,780	8,484	683	7,400	8,540	9,270
		Silver	mg/kg	2016	0.0438	-	0.0452	-	0.0317	-	-	-	0.0402	0.00742	0.0317	0.0438	0.0452
				2017	-	-	-	-	-	-	-	-	-	-	-	-	-
				2018	-	-	-	-	-	-	-	-	-	-	-	-	-
				2019	0.00630	0.0134	0.00750	<0.0050	0.00880	<0.0050	0.0432	0.00530	0.0118	0.0133	<0.005	0.00690	0.0432
				2020	0.0270	0.0636	0.0382	0.0136	0.0716	0.0430	0.0234	<0.0050	0.0357	0.0220	<0.005	0.0326	0.0716
				2021	0.0231	0.0249	0.0304	0.0482	0.0304	0.0386	0.0360	0.0312	0.0328	0.00803	0.0231	0.0308	0.0482
		Sodium	mg/kg	2016	3,360	-	3,420	-	3,570	-	-	-	3,450	108	3,360	3,420	3,570
				2017	2,690	2,420	-	-	2,240	1,940	2,740	2,690	2,455	283	1,940	2,525	2,740
				2018	3,140	3,130	2,890	2,240	2,520	2,210	2,580	2,180	2,611	400	2,180	2,550	3,140
				2019	2,650	2,930	2,420	2,200	2,380	2,330	1,460	2,130	2,312	428	1,460	2,355	2,930
				2020	4,340	3,500	4,150	3,750	4,230	3,970	3,200	2,940	3,760	508	2,940	3,860	4,340
				2021	2,030	2,490	1,640	1,900	1,700	2,030	1,650	1,900	1,918	280	1,640	1,900	2,490

Notes: All values reported in dry weight. Summary statistics reported to 3 significant figures for display purposes.

Table D.5.4: Caddisfly Tissue Primary and Secondary Analytes Concentrations for Upper Hazeltine Creek (HAC-R1, HAC-U; Exposed), Upper Edney Creek (EDC-U; Reference), Lower Hazeltine Creek (HAC-D; Exposed), and Lower Edney Creek Exposed (E1) and Reference (EDC) Areas, 2016 to 2021

Waterbody	Area	Parameter	Units	Year	Replicate								Mean	Standard Deviation	Minimum	Median	Maximum
					1	2	3	4	5	6	7	8					
Lower Hazeltine Creek	HAC-D (Exposed)	Strontium	mg/kg	2016	60.8	-	77.6	-	49.5	-	-	-	62.6	14.1	49.5	60.8	77.6
				2017	39.2	41.7	-	-	67.5	41.4	42.3	44.7	43.5	10.4	31.7	41.5	67.5
				2018	6.65	9.57	5.90	6.48	5.66	4.71	4.70	5.72	6.17	1.55	4.70	5.81	9.57
				2019	8.01	7.27	9.48	7.25	9.95	6.52	14.3	6.63	8.68	2.60	6.52	7.64	14.3
				2020	15.2	22.1	36.7	7.64	35.5	14.6	9.84	5.20	18.3	12.1	5.20	14.9	36.7
				2021	13.6	15.6	10.2	22.4	11.2	15.3	15.2	9.46	14.1	4.13	9.46	14.4	22.4
		Tin	mg/kg	2016	0.0792	-	0.00960	-	0.0415	-	-	-	0.0434	0.0348	0.00960	0.0415	0.0792
				2017	0.210	0.280	-	-	0.150	0.230	0.330	0.250	0.218	0.0690	0.130	0.220	0.330
				2018	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.130	0.104	-	<0.1	0.100	0.130
				2019	0.210	0.500	0.170	0.280	0.410	0.300	0.170	0.200	0.280	0.120	0.170	0.245	0.500
				2020	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	-	<0.1	<0.1	<0.1
				2021	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	-	<0.1	<0.1	<0.1
		Titanium	mg/kg	2016	83.2	-	21.2	-	43.1	-	-	-	49.2	31.4	21.2	43.1	83.2
				2017	-	-	-	-	-	-	-	-	-	-	-	-	-
				2018	-	-	-	-	-	-	-	-	-	-	-	-	-
				2019	36.8	24.0	37.0	21.8	41.7	25.7	39.0	21.0	30.9	8.53	21.0	31.2	41.7
				2020	61.6	92.6	57.7	14.5	131	57.1	31.2	10.6	57.0	40.3	10.6	57.4	131
				2021	20.6	13.7	21.7	55.4	21.9	29.2	49.0	18.4	28.7	15.2	13.7	21.8	55.4
		Uranium	mg/kg	2016	0.190	-	0.251	-	0.159	-	-	-	0.200	0.0468	0.159	0.190	0.251
				2017	0.204	0.168	-	-	0.306	0.232	0.232	0.272	0.222	0.0499	0.157	0.220	0.306
				2018	0.0217	0.0703	0.0169	0.0445	0.0110	0.00630	0.0120	0.0103	0.0241	0.0221	0.00630	0.0144	0.0703
				2019	0.0253	0.0331	0.0289	0.0177	0.0634	0.0190	0.0439	0.0176	0.0311	0.0158	0.0176	0.0271	0.0634
				2020	0.0844	0.187	0.152	0.0477	0.319	0.120	0.0564	0.0102	0.122	0.0983	0.0102	0.102	0.319
				2021	0.0650	0.0688	0.0791	0.158	0.0808	0.109	0.118	0.0814	0.0950	0.0314	0.0650	0.0811	0.158
		Vanadium	mg/kg	2016	23.5	-	30.9	-	12.7	-	-	-	22.4	9.15	12.7	23.5	30.9
				2017	45.2	15.4	-	-	16.6	17.0	21.1	23.9	23.2	9.85	15.4	19.7	45.2
				2018	1.13	2.15	1.72	2.51	0.860	0.460	0.970	0.810	1.33	0.721	0.460	1.05	2.51
				2019	2.61	1.99	2.95	1.91	6.86	1.92	4.14	1.68	3.01	1.75	1.68	2.30	6.86
				2020	6.06	12.6	6.96	1.48	19.9	6.81	3.94	0.840	7.32	6.28	0.840	6.44	19.9
				2021	3.58	3.60	2.68	8.78	3.03	5.51	6.43	2.75	4.54	2.18	2.68	3.59	8.78
		Zinc	mg/kg	2016	123	-	147	-	134	-	-	-	135	12.0	123	134	147
				2017	95.5	96.0	-	-	119	94.1	107	112	103	9.35	94.1	99.5	119
				2018	90.5	90.8	93.7	97.6	89.1	68.4	79.8	75.5	85.7	10.0	68.4	89.8	97.6
				2019	90.1	109	86.2	77.4	84.5	85.3	111	82.4	90.7	12.4	77.4	85.8	111
				2020	249	305	243	192	447	307	154	106	250	106	106	246	447
				2021	178	195	248	249	226	242	213	255	226	28.1	178	234	255
Lower Edney Creek	E1 (Exposed)	**Primary Analytes**															
		Arsenic	mg/kg	2019	1.27	1.90	1.28	1.02	1.38	1.23	2.72	1.04	1.48	0.570	1.02	1.27	2.72
				2020	1.19	3.52	1.91	1.66	2.16	3.01	3.04	1.62	2.26	0.829	1.19	2.04	3.52
				2021	1.40	1.48	1.03	1.22	1.12	1.09	2.77	1.58	1.46	0.564	1.03	1.31	2.77
		Copper	mg/kg	2019	16.0	19.9	16.9	15.9	15.3	18.3	21.5	14.7	17.3	2.39	14.7	16.4	21.5
				2020	45.7	84.1	46.4	49.3	52.0	53.8	69.7	33.6	54.3	15.7	33.6	50.6	84.1
				2021	14.7	17.7	15.0	20.9	40.8	34.2	49.9	41.7	29.4	13.9	14.7	27.6	49.9
		Iron	mg/kg	2019	489	253	206	229	307	362	1,300	188	417	370	188	280	1,300
				2020	1,220	5,440	3,080	1,930	3,490	4,340	2,570	1,410	2,935	1,463	1,220	2,825	5,440
				2021	207	231	169	523	259	282	869	443	373	234	169	270	869
		Selenium	mg/kg	2019	1.34	1.47	1.88	1.40	1.57	1.22	1.01	1.16	1.38	0.269	1.01	1.37	1.88
				2020	2.21	2.44	3.75	2.98	3.01	2.05	2.13	2.25	2.60	0.593	2.05	2.35	3.75
				2021	1.00	1.23	1.77	1.58	1.76	1.45	1.50	1.82	1.51	0.286	1.00	1.54	1.82
		Secondary Analytes															
		Barium	mg/kg	2019	8.28	5.73	10.0	2.95	13.0	9.19	31.6	5.67	10.8	8.95	2.95	8.74	31.6
				2020	26.1	108	96.3	30.2	62.2	52.6	87.6	53.8	64.6	30.1	26.1	58.0	108
				2021	15.3	21.4	3.90	12.5	33.8	19.0	59.1	29.7	24.3	16.9	3.90	20.2	59.1
		Cadmium	mg/kg	2019	0.0890	0.0170	0.0440	0.0270	0.0590	0.0410	0.237	0.0240	0.0672	0.0723	0.0170	0.0425	0.237
				2020	0.290	0.936	1.31	0.574	0.896	0.310	0.521	0.290	0.641	0.373	0.290	0.548	1.31
				2021	0.216	0.196	0.0200	0.166	0.428	0.141	0.357	0.328	0.232	0.132	0.0200	0.206	0.428
		Calcium	mg/kg	2019	933	581	541	472	568	700	1,810	682	786	437	472	632	1,810
				2020	1,250	3,290	3,980	1,970	2,480	2,390	1,640	1,410	2,301	947	1,250	2,180	3,980
				2021	1,130	1,000	649	928	1,160	1,210	1,240	1,070	1,048	192	649	1,100	1,240
		Cobalt	mg/kg	2019	0.283	0.321	0.328	0.156	0.268	0.244	1.33	0.130	0.382	0.389	0.130	0.276	1.33
				2020	0.860	3.78	2.25	1.11	4.11	2.02	2.65	1.22	2.25	1.21	0.860	2.13	4.11
				2021	0.265	0.406	0.211	0.333	0.628	0.439	0.960	0.696	0.492	0.252	0.211	0.422	0.960
		Manganese	mg/kg	2019	101	145	171	89.9	225	132	483	76.9	178	132	76.9	138	483
				2020	352	1,390	1,290	527	1,060	742	1,160	694	902	376	352	901	1,390
				2021	239	326	107	139	249	122	1,260	624	383	392	107	244	1,260
		Mercury	mg/kg	2019	0.0550	0.0560	0.0700	0.0720	0.0760	0.0690	0.0510	0.0690	0.0648	0.00929	0.0510	0.0690	0.0760
				2020	0.134	0.0953	0.0768	0.0955	0.0895	0.0938	0.0910	0.0779	0.0942	0.0177	0.0768	0.0924	0.134
				2021	0.0269	0.0258	0.0301	0.0210	0.0264	0.0217	0.0294	0.0421	0.0279	0.00657	0.0210	0.0266	0.0421
		Molybdenum	mg/kg	2019	2.98	4.16	2.99	3.75	2.82	2.75	2.39	3.18	3.13	0.570	2.39	2.98	4.16
				2020	2.86	1.65	1.64	2.90	1.99	3.28	2.69	3.19	2.52	0.668	1.64	2.78	3.28
				2021	3.50	2.62	3.09	1.99	2.09	1.84	2.30	2.12	2.44	0.584	1.84	2.21	3.50
		Nickel	mg/kg	2019	0.760	0.380	0.340	0.380	0.510	0.680	2.99	0.390	0.804	0.897	0.340	0.450	2.99
				2020	2.84	7.35	5.18	2.78	4.50	3.78	5.08	2.44	4.24	1.64	2.44	4.14	7.35
				2021	0.460	0.610	<0.20	0.350	0.870	0.760	1.32	0.900	0.684	0.335	<0.2	0.685	1.32
		Phosphorus	mg/kg	2019	8,980	8,080	8,460	7,760	7,630	9,160	8,740	7,710	8,315	604	7,630	8,270	9,160
				2020	9,770	8,780	9,010	10,600	9,850	9,360	8,510	8,120	9,250	808	8,120	9,185	10,600
				2021	8,160	8,340	7,820	9,120	9,420	7,930	8,810	8,350	8,494	570	7,820	8,345	9,420
		Silver	mg/kg	2019	0.0138	0.00670	0.0105	<0.0050	0.00940	0.00820	0.0322	0.0103	0.0120	0.00848	<0.005	0.00985	0.0322
				2020	0.0620	0.0898	0.0454	0.0588	0.0451	0.0476	0.0558	0.0381	0.0553	0.0161	0.0381	0.0517	0.0898
				2021	0.0129	0.00870	0.0151	0.00960	0.0149	0.0178	0.0188	0.0161	0.0142	0.00363	0.00870	0.0150	0.0188
		Sodium	mg/kg	2019	3,180	1,970	3,240	2,470	2,620	3,990	3,090	2,680	2,905	609	1,970	2,885	3,990
				2020	3,950	2,940	2,650	4,060	3,220	3,160	2,900	2,550	3,179	558	2,550	3,050	4,060
				2021	2,480	2,640	2,380	3,490	2,830	2,710	2,640	3,000	2,771	348	2,380	2,675	3,490
		Strontium	mg/kg	2019	7.11	4.51	4.16	3.30	8.55	4.95	13.5	5.08	6.40	3.33	3.30	5.01	13.5
				2020	9.96	23.1	15.0	12.1	22.2	15.0	11.7	8.85	14.7	5.34	8.85	13.6	23.1
				2021	7.86	6.66	4.36	7.18	7.88	8.18	10.1	7.02	7.40	1.62	4.36	7.52	10.1
		Tin	mg/kg	2019	0.130	0.190	<0.10	0.310	<0.10	0.200	0.360	<0.10	0.186	0.0947	<0.1	0.160	0.360
				2020	0.400	<0.10	<0.10	<0.10	0.160	<0.10	<0.10	<0.10	0.145	0.112	<0.1	0.100	0.400
				2021	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	-	<0.1	<0.1	<0.1

Notes: All values reported in dry weight. Summary statistics reported to 3 significant figures for display purposes.

Table D.5.4: Caddisfly Tissue Primary and Secondary Analytes Concentrations for Upper Hazeltine Creek (HAC-R1, HAC-U; Exposed), Upper Edney Creek (EDC-U; Reference), Lower Hazeltine Creek (HAC-D; Exposed), and Lower Edney Creek Exposed (E1) and Reference (EDC) Areas, 2016 to 2021

Waterbody	Area	Parameter	Units	Year	Replicate								Mean	Standard Deviation	Minimum	Median	Maximum
					1	2	3	4	5	6	7	8					
Lower Edney Creek (Remediated)	E1 (Exposed)	Titanium	mg/kg	2019	8.37	3.77	3.08	4.06	5.19	7.00	20.2	2.67	6.79	5.76	2.67	4.62	20.2
				2020	32.5	139	77.8	68.4	110	97.6	66.3	33.7	78.2	36.6	32.5	73.1	139
				2021	3.06	3.51	2.82	4.65	4.67	5.84	15.2	8.59	6.04	4.14	2.82	4.66	15.2
		Uranium	mg/kg	2019	0.0204	0.00580	0.00800	0.00500	0.0103	0.00820	0.0917	0.00400	0.0192	0.0298	0.00400	0.00810	0.0917
				2020	0.111	0.211	0.138	0.0950	0.116	0.106	0.116	0.0649	0.120	0.0424	0.0649	0.114	0.211
				2021	0.00890	0.0107	0.00400	0.0140	0.0207	0.0198	0.0328	0.0210	0.0165	0.00901	0.00400	0.0169	0.0328
		Vanadium	mg/kg	2019	0.970	0.350	0.300	0.310	0.450	0.510	2.35	0.210	0.681	0.714	0.210	0.400	2.35
				2020	2.58	15.5	9.18	9.18	9.20	11.2	6.56	3.70	8.39	4.13	2.58	9.18	15.5
				2021	0.340	0.410	0.270	1.03	0.720	0.650	2.47	1.09	0.872	0.713	0.270	0.685	2.47
		Zinc	mg/kg	2019	105	107	117	84.9	102	110	142	94.2	108	16.9	84.9	106	142
				2020	138	254	282	202	227	187	212	204	213	43.3	138	208	282
				2021	95.6	110	97.7	95.5	160	94.4	125	116	112	22.5	94.4	104	160

Notes: All values reported in dry weight. Summary statistics reported to 3 significant figures for display purposes.

Table D.5.5: Composite-Taxa Benthic Invertebrate Tissue Chemistry Data from Upper Hazeltine Creek (HAC-R1, HAC-U; Exposed) and Upper Edney Creek (EDC-U; Reference), 2022

Analyte	Units	Reference												
		Upper Edney Creek (EDC-U)												
		EDC-U-1	EDC-U-2	EDC-U-3	EDC-U-4	EDC-U-5	EDC-U-6	EDC-U-7	EDC-U-8	Mean	Standard Deviation	Minimum	Median	Maximum
		8-Aug-22	7-Aug-22	7-Aug-22	7-Aug-22	7-Aug-22	7-Aug-22	7-Aug-22	7-Aug-22					
Moisture	mg/kg dw	73.8	89.1	89.5	77.9	87.2	86.8	88.9	84.3	84.7	5.81	73.8	87.0	89.5
Aluminum	mg/kg dw	1,960	13,300	10,600	6,490	14,700	10,900	8,020	8,050	9,252	4,042	1,960	9,325	14,700
Antimony	mg/kg dw	0.0940	0.0860	0.0860	0.0930	0.0710	0.0670	0.0850	0.110	0.0865	0.0135	0.0670	0.0860	0.110
Arsenic	mg/kg dw	6.75	12.8	14.4	37.9	41.0	10.8	24.5	34.0	22.8	13.4	6.75	19.4	41.0
Barium	mg/kg dw	232	229	319	824	480	225	242	1,140	461	343	225	280	1,140
Beryllium	mg/kg dw	0.206	0.447	0.374	0.392	0.629	0.339	0.336	0.422	0.393	0.120	0.206	0.383	0.629
Bismuth	mg/kg dw	0.0140	0.111	0.0840	0.0560	0.123	0.0780	0.0530	0.0560	0.0719	0.0349	0.0140	0.0670	0.123
Boron	mg/kg dw	18.6	7.80	8.80	11.9	7.40	15.1	8.40	9.90	11.0	3.99	7.40	9.35	18.6
Cadmium	mg/kg dw	1.03	0.949	1.07	2.83	1.82	0.991	1.13	4.69	1.81	1.33	0.949	1.10	4.69
Calcium	mg/kg dw	7,430	11,700	11,000	10,100	13,100	9,420	8,310	12,000	10,382	1,932	7,430	10,550	13,100
Cesium	mg/kg dw	0.0886	1.01	0.783	0.306	1.02	0.848	0.440	0.419	0.614	0.347	0.0886	0.612	1.02
Chromium	mg/kg dw	23.9	127	79.1	119	68.6	145	233	46.6	105	66.2	23.9	99.0	233
Cobalt	mg/kg dw	14.4	21.9	22.8	47.6	35.9	20.6	22.0	65.9	31.4	17.4	14.4	22.4	65.9
Copper	mg/kg dw	24.7	44.1	39.1	34.8	43.0	35.3	36.4	39.7	37.1	6.06	24.7	37.8	44.1
Iron	mg/kg dw	4,460	26,400	22,600	22,700	45,500	21,800	26,000	19,800	23,658	11,206	4,460	22,650	45,500
Lead	mg/kg dw	0.742	5.27	3.99	2.96	6.26	3.94	3.71	3.33	3.78	1.63	0.742	3.82	6.26
Lithium	mg/kg dw	1.39	12.2	9.04	4.18	12.0	9.95	6.82	5.51	7.64	3.84	1.39	7.93	12.2
Magnesium	mg/kg dw	1,910	6,170	5,340	3,540	6,250	5,040	4,330	3,640	4,528	1,476	1,910	4,685	6,250
Manganese	mg/kg dw	6,970	8,460	11,300	26,900	18,300	8,900	9,480	38,600	16,114	11,264	6,970	10,390	38,600
Mercury	mg/kg dw	0.0486	0.157	0.188	0.0972	0.176	0.122	0.0730	0.0777	0.117	0.0517	0.0486	0.110	0.188
Molybdenum	mg/kg dw	2.38	2.24	2.42	2.87	2.74	2.17	3.78	4.41	2.88	0.806	2.17	2.58	4.41
Nickel	mg/kg dw	25.2	45.0	45.3	66.3	56.0	48.1	51.1	95.6	54.1	20.4	25.2	49.6	95.6
Phosphorus	mg/kg dw	2,760	3,290	3,900	3,030	3,600	2,630	2,630	2,670	3,064	487	2,630	2,895	3,900
Potassium	mg/kg dw	6,070	4,780	5,880	4,850	4,140	3,080	4,260	3,810	4,609	1,011	3,080	4,520	6,070
Rubidium	mg/kg dw	7.02	16.7	15.1	8.09	14.7	11.5	9.40	8.27	11.3	3.71	7.02	10.4	16.7
Selenium	mg/kg dw	0.390	0.980	0.820	0.700	1.13	0.770	0.600	0.770	0.770	0.225	0.390	0.770	1.13
Silver	mg/kg dw	0.0337	0.200	0.164	0.0811	0.193	0.129	0.0847	0.100	0.123	0.0589	0.0337	0.114	0.200
Sodium	mg/kg dw	159	291	289	147	291	214	224	151	221	64.0	147	219	291
Strontium	mg/kg dw	65.4	98.2	94.0	114	125	94.2	74.0	140	101	25.0	65.4	96.2	140
Tellurium	mg/kg dw	<0.026	<0.038	<0.025	0.0340	<0.060	<0.062	<0.050	<0.068	0.0280	-	<0.025	0.0500	0.0340
Thallium	mg/kg dw	0.0419	0.116	0.116	0.200	0.152	0.105	0.0929	0.404	0.153	0.111	0.0419	0.116	0.404
Tin	mg/kg dw	<0.13	0.270	0.190	<0.15	<0.30	<0.31	<0.25	<0.34	0.174	0.0572	<0.13	0.270	0.270
Titanium	mg/kg dw	116	458	353	200	487	385	417	289	338	129	116	369	487
Uranium	mg/kg dw	0.388	0.809	0.658	0.612	1.00	0.704	0.660	0.851	0.710	0.182	0.388	0.682	1.00
Vanadium	mg/kg dw	16.2	54.4	45.0	55.4	98.8	45.7	58.8	53.0	53.4	22.7	16.2	53.7	98.8
Zinc	mg/kg dw	154	152	143	241	202	135	113	337	185	73.7	113	153	337
Zirconium	mg/kg dw	1.56	7.61	5.87	4.70	8.94	6.12	6.87	5.40	5.88	2.19	1.56	6.00	8.94

Value exceeds the British Columbia interim guideline for selenium in invertebrate tissue (4 mg/kg dw; BCMOE 2014).

Notes: "-" = no data or summary statistic could not be calculated. mg/kg dw = milligrams per kilogram dry weight. All summary statistics are reported to three significant digits for display purposes and were calculated using the Kaplan-Meier method.

Table D.5.5: Composite-Taxa Benthic Invertebrate Tissue Chemistry Data from Upper Hazeltine Creek (HAC-R1, HAC-U; Exposed) and Upper Edney Creek (EDC-U; Reference), 2022

Analyte	Units	Exposed												
		Upper Hazeltine Creek Reach 1 (HAC-R1)												
		HAC-R1-1	HAC-R1-2	HAC-R1-3	HAC-R1-4	HAC-R1-5	HAC-R1-6	HAC-R1-7	HAC-R1-8	Mean	Standard Deviation	Minimum	Median	Maximum
		10-Aug-22	10-Aug-22	10-Aug-22	10-Aug-22	10-Aug-22	10-Aug-22	10-Aug-22	10-Aug-22					
Moisture	mg/kg dw	65.7	67.7	64.7	61.0	72.3	67.4	69.8	71.3	67.5	3.71	61.0	67.5	72.3
Aluminum	mg/kg dw	2,010	1,750	868	920	1,400	857	4,720	4,470	2,124	1,584	857	1,575	4,720
Antimony	mg/kg dw	0.0800	0.0680	0.0640	0.0850	0.0680	0.0570	0.0720	0.0780	0.0715	0.00917	0.0570	0.0700	0.0850
Arsenic	mg/kg dw	2.30	2.24	1.78	1.87	2.11	2.17	3.41	3.97	2.48	0.781	1.78	2.20	3.97
Barium	mg/kg dw	133	99.3	68.3	125	84.5	71.6	246	165	124	59.4	68.3	112	246
Beryllium	mg/kg dw	0.0570	0.0620	0.0330	0.0360	0.0500	0.0370	0.171	0.138	0.0730	0.0521	0.0330	0.0535	0.171
Bismuth	mg/kg dw	<0.012	<0.010	<0.012	<0.015	<0.010	<0.012	<0.012	0.0160	0.0107	-	<0.010	0.0120	0.0160
Boron	mg/kg dw	363	288	289	295	325	117	232	150	257	85.3	117	288	363
Cadmium	mg/kg dw	0.148	0.169	0.148	0.152	0.182	0.190	0.180	0.238	0.176	0.0300	0.148	0.174	0.238
Calcium	mg/kg dw	224,000	246,000	236,000	250,000	223,000	280,000	247,000	210,000	239,500	21,527	210,000	241,000	280,000
Cesium	mg/kg dw	0.216	0.172	0.116	0.146	0.175	0.0775	0.258	0.267	0.178	0.0663	0.0775	0.174	0.267
Chromium	mg/kg dw	2.64	3.23	2.34	1.88	2.90	5.79	19.3	88.5	15.8	29.9	1.88	3.06	88.5
Cobalt	mg/kg dw	2.00	1.96	1.20	1.48	1.70	1.23	3.01	3.47	2.01	0.826	1.20	1.83	3.47
Copper	mg/kg dw	42.1	116	36.4	42.6	60.4	41.0	57.5	160	69.5	44.7	36.4	50.0	160
Iron	mg/kg dw	2,840	3,100	1,630	1,830	2,520	1,510	4,450	7,680	3,195	2,051	1,510	2,680	7,680
Lead	mg/kg dw	0.644	0.498	0.298	0.315	0.484	0.280	0.747	1.17	0.554	0.300	0.280	0.491	1.17
Lithium	mg/kg dw	1.59	1.49	0.910	0.990	1.39	0.960	2.56	2.80	1.59	0.724	0.910	1.44	2.80
Magnesium	mg/kg dw	3,090	2,840	2,570	2,750	2,840	2,610	3,260	3,660	2,952	367	2,570	2,840	3,660
Manganese	mg/kg dw	1,240	1,150	774	1,580	1,360	852	1,780	2,100	1,354	452	774	1,300	2,100
Mercury	mg/kg dw	0.00960	0.00910	0.00910	0.00640	0.00880	0.00600	0.0160	0.0243	0.0112	0.00612	0.00600	0.00910	0.0243
Molybdenum	mg/kg dw	1.50	1.35	1.17	1.31	1.71	1.01	1.23	2.29	1.45	0.401	1.01	1.33	2.29
Nickel	mg/kg dw	3.13	3.77	3.10	3.12	3.30	3.98	4.68	11.1	4.52	2.71	3.10	3.54	11.1
Phosphorus	mg/kg dw	866	886	731	681	787	780	880	1,340	869	204	681	826	1,340
Potassium	mg/kg dw	4,980	3,870	3,720	3,790	4,480	1,610	3,410	3,370	3,654	988	1,610	3,755	4,980
Rubidium	mg/kg dw	5.14	3.90	3.54	3.65	4.42	1.64	4.05	4.55	3.86	1.04	1.64	3.98	5.14
Selenium	mg/kg dw	2.22	1.88	2.28	2.57	1.95	1.50	1.51	1.92	1.98	0.371	1.50	1.94	2.57
Silver	mg/kg dw	0.0138	0.0246	0.0115	0.0150	0.0189	0.00930	0.0259	0.0295	0.0186	0.00738	0.00930	0.0170	0.0295
Sodium	mg/kg dw	326	358	249	270	313	225	333	370	306	52.2	225	320	370
Strontium	mg/kg dw	513	535	509	544	512	543	571	439	521	39.1	439	524	571
Tellurium	mg/kg dw	<0.025	0.0250	0.0310	0.0320	0.0250	0.0350	0.0270	0.0210	0.0271	0.00519	0.0210	0.0260	0.0350
Thallium	mg/kg dw	0.00700	0.00610	0.00480	0.00630	0.00640	0.00360	0.00680	0.00870	0.00621	0.00151	0.00360	0.00635	0.00870
Tin	mg/kg dw	<0.12	<0.10	<0.12	<0.15	<0.10	<0.12	<0.12	0.220	0.115	-	<0.10	0.120	0.220
Titanium	mg/kg dw	132	124	72.3	80.9	112	69.3	228	365	148	101	69.3	118	365
Uranium	mg/kg dw	0.156	0.150	0.117	0.122	0.138	0.0956	0.215	0.195	0.149	0.0401	0.0956	0.144	0.215
Vanadium	mg/kg dw	10.7	12.3	6.18	7.06	10.1	5.61	18.2	25.7	12.0	6.87	5.61	10.4	25.7
Zinc	mg/kg dw	19.2	20.7	16.9	16.4	21.4	11.6	27.4	59.8	24.2	15.1	11.6	20.0	59.8
Zirconium	mg/kg dw	1.42	1.26	0.960	0.910	1.23	0.710	2.10	2.38	1.37	0.586	0.710	1.25	2.38

Value exceeds the British Columbia interim guideline for selenium in invertebrate tissue (4 mg/kg dw; BCMOE 2014).

Notes: "-" = no data or summary statistic could not be calculated. mg/kg dw = milligrams per kilogram dry weight. All summary statistics are reported to three significant digits for display purposes and were calculated using the Kaplan-Meier method.

Table D.5.5: Composite-Taxa Benthic Invertebrate Tissue Chemistry Data from Upper Hazeltine Creek (HAC-R1, HAC-U; Exposed) and Upper Edney Creek (EDC-U; Reference), 2022

Analyte	Units	Exposed												
		Upper Hazeltine Creek Reach 2 (HAC-U)												
		HAC-U-1 6-Aug-22	HAC-U-2 6-Aug-22	HAC-U-3 6-Aug-22	HAC-U-4 6-Aug-22	HAC-U-5 5-Aug-22	HAC-U-6 5-Aug-22	HAC-U-7 6-Aug-22	HAC-U-8 5-Aug-22	Mean	Standard Deviation	Minimum	Median	Maximum
Moisture	mg/kg dw	59.8	57.2	70.5	74.3	76.4	71.7	87.3	71.0	71.0	9.43	57.2	71.3	87.3
Aluminum	mg/kg dw	1,370	3,010	1,170	3,900	2,610	595	3,730	11,600	3,498	3,490	595	2,810	11,600
Antimony	mg/kg dw	0.0820	0.0830	0.0600	0.0720	0.0540	0.0530	0.0610	0.0710	0.0670	0.0118	0.0530	0.0660	0.0830
Arsenic	mg/kg dw	2.31	2.97	1.95	2.92	3.12	1.93	4.70	5.27	3.15	1.23	1.93	2.94	5.27
Barium	mg/kg dw	113	238	96.1	272	136	84.0	114	823	235	247	84.0	125	823
Beryllium	mg/kg dw	0.0480	0.162	0.0400	0.131	0.0640	0.0230	0.0940	0.180	0.0928	0.0590	0.0230	0.0790	0.180
Bismuth	mg/kg dw	<0.010	0.0140	<0.010	<0.010	<0.010	<0.011	0.0110	<0.010	0.0106	0.00140	<0.010	0.0100	0.0140
Boron	mg/kg dw	239	228	323	197	114	201	115	90.4	188	78.4	90.4	199	323
Cadmium	mg/kg dw	0.242	0.234	0.197	0.237	0.152	0.162	0.209	0.127	0.195	0.0435	0.127	0.203	0.242
Calcium	mg/kg dw	212,000	176,000	203,000	196,000	188,000	238,000	145,000	185,000	192,875	27,195	145,000	192,000	238,000
Cesium	mg/kg dw	0.243	0.365	0.192	0.202	0.249	0.134	0.189	0.225	0.225	0.0673	0.134	0.214	0.365
Chromium	mg/kg dw	2.28	4.74	2.66	1.96	7.92	1.28	17.5	7.08	5.68	5.36	1.28	3.70	17.5
Cobalt	mg/kg dw	1.75	3.20	1.29	2.50	2.23	0.800	2.89	3.09	2.22	0.874	0.800	2.37	3.20
Copper	mg/kg dw	50.5	86.8	35.1	510	52.2	21.2	71.5	104	116	161	21.2	61.9	510
Iron	mg/kg dw	2,320	4,680	1,610	3,940	3,420	950	5,860	5,070	3,481	1,736	950	3,680	5,860
Lead	mg/kg dw	0.541	1.43	0.385	0.885	0.729	0.226	2.53	1.12	0.981	0.738	0.226	0.807	2.53
Lithium	mg/kg dw	1.27	2.51	0.920	1.53	1.76	0.600	2.31	2.72	1.70	0.766	0.600	1.64	2.72
Magnesium	mg/kg dw	3,020	4,110	2,740	3,420	3,270	2,650	3,780	4,460	3,431	646	2,650	3,345	4,460
Manganese	mg/kg dw	3,500	3,200	2,820	4,260	2,620	2,120	2,220	2,200	2,868	750	2,120	2,720	4,260
Mercury	mg/kg dw	0.0153	0.0195	0.00970	0.0129	0.0148	0.00640	0.0362	0.0202	0.0169	0.00906	0.00640	0.0150	0.0362
Molybdenum	mg/kg dw	1.37	1.49	1.35	1.56	1.20	0.900	1.96	0.745	1.32	0.382	0.745	1.36	1.96
Nickel	mg/kg dw	3.11	6.97	2.66	2.59	3.20	1.79	5.49	2.97	3.60	1.73	1.79	3.04	6.97
Phosphorus	mg/kg dw	1,050	1,360	861	1,280	1,670	896	4,480	1,650	1,656	1,182	861	1,320	4,480
Potassium	mg/kg dw	6,350	7,010	6,070	5,410	6,100	4,930	6,820	5,490	6,022	715	4,930	6,085	7,010
Rubidium	mg/kg dw	6.78	8.68	6.17	6.20	7.95	5.15	7.94	8.08	7.12	1.22	5.15	7.36	8.68
Selenium	mg/kg dw	5.00	3.83	4.05	12.2	1.97	1.94	2.30	1.62	4.11	3.49	1.62	3.06	12.2
Silver	mg/kg dw	0.0162	0.0616	0.0101	0.0631	0.0171	<0.0057	0.0477	0.0214	0.0304	0.0230	<0.0057	0.0192	0.0631
Sodium	mg/kg dw	317	375	307	345	420	246	269	306	323	56.1	246	312	420
Strontium	mg/kg dw	518	488	479	494	474	550	366	589	495	65.2	366	491	589
Tellurium	mg/kg dw	<0.020	<0.020	<0.020	0.0270	<0.020	<0.023	0.0210	0.0230	0.0214	0.00245	<0.020	0.0210	0.0270
Thallium	mg/kg dw	0.00970	0.0168	0.00880	0.0134	0.0123	0.00780	0.00640	0.00860	0.0105	0.00343	0.00640	0.00925	0.0168
Tin	mg/kg dw	<0.10	<0.10	<0.10	<0.10	<0.10	<0.11	0.100	<0.10	0.100	-	<0.10	0.100	0.100
Titanium	mg/kg dw	98.0	304	73.2	188	207	39.6	296	255	183	102	39.6	198	304
Uranium	mg/kg dw	0.186	0.189	0.144	0.163	0.165	0.123	0.130	0.174	0.159	0.0247	0.123	0.164	0.189
Vanadium	mg/kg dw	9.34	17.0	7.29	20.8	13.2	4.24	18.1	22.1	14.0	6.55	4.24	15.1	22.1
Zinc	mg/kg dw	43.1	31.7	14.5	13.2	12.4	6.40	19.7	15.3	19.5	12.0	6.40	14.9	43.1
Zirconium	mg/kg dw	0.890	2.15	0.800	1.30	1.14	0.600	1.13	1.90	1.24	0.537	0.600	1.14	2.15

Value exceeds the British Columbia interim guideline for selenium in invertebrate tissue (4 mg/kg dw; BCMOE 2014).

Notes: "-" = no data or summary statistic could not be calculated. mg/kg dw = milligrams per kilogram dry weight. All summary statistics are reported to three significant digits for display purposes and were calculated using the Kaplan-Meier method.

Table D.5.6: Composite-Taxa Benthic Invertebrate Tissue Primary and Secondary Analytes Concentrations for Upper Hazeltine Creek (HAC-R1, HAC-U; Exposed), Upper Edney Creek (EDC-U; Reference), Lower Hazeltine Creek (HAC-D; Exposed), and Lower Edney Creek Exposed (E1) and Reference (EDC-D), 2010 to 2021

Waterbody	Area	Parameter	Units	Year	Replicate								Mean	Standard Deviation	Minimum	Median	Maximum
					1	2	3	4	5	6	7	8					
Upper Edney Creek (Reference)	EDC-U (Reference)	**Primary Analytes**															
		Arsenic	mg/kg	2018	1.25	1.99	1.87	3.01	1.55	2.29	0.601	1.15	1.71	0.747	0.601	1.71	3.01
				2019	3.76	2.81	2.85	3.53	1.52	2.45	2.96	4.54	3.05	0.907	1.52	2.90	4.54
				2020	1.08	2.84	3.27	2.12	2.62	0.951	0.906	1.80	1.95	0.916	0.906	1.96	3.27
				2021	1.78	2.74	3.29	3.67	3.82	3.82	2.84	3.81	3.22	0.729	1.78	3.48	3.82
		Copper	mg/kg	2018	19.2	22.5	22.7	29.5	21.5	23.9	20.3	17.9	22.2	3.55	17.9	22.0	29.5
				2019	26.1	18.5	37.1	22.5	24.6	32.5	31.1	25.5	27.2	5.98	18.5	25.8	37.1
				2020	27.0	24.1	20.9	26.9	27.3	21.2	25.2	27.3	25.0	2.68	20.9	26.0	27.3
				2021	18.8	25.0	21.6	27.8	26.0	25.6	27.0	26.8	24.8	3.08	18.8	25.8	27.8
		Iron	mg/kg	2018	1,530	3,170	2,130	4,100	1,420	3,690	652	977	2,209	1,294	652	1,830	4,100
				2019	6,790	2,680	3,030	5,260	3,000	2,650	3,800	3,940	3,894	1,456	2,650	3,415	6,790
				2020	1,450	4,780	3,180	2,480	3,010	1,580	1,340	1,440	2,408	1,211	1,340	2,030	4,780
				2021	1,570	3,360	3,240	4,490	4,940	4,510	3,060	4,480	3,706	1,115	1,570	3,920	4,940
		Selenium	mg/kg	2018	0.460	0.900	0.940	0.890	0.800	0.840	1.05	0.850	0.841	0.172	0.460	0.870	1.05
				2019	0.730	1.29	0.560	1.03	0.580	1.22	1.33	1.59	1.04	0.382	0.560	1.12	1.59
				2020	0.740	1.07	2.14	0.530	1.17	0.590	0.440	0.970	0.956	0.546	0.440	0.855	2.14
				2021	0.520	0.740	0.900	1.12	0.720	0.810	0.900	0.970	0.835	0.181	0.520	0.855	1.12
		Secondary Analytes															
		Barium	mg/kg	2018	45.0	46.7	24.0	117	46.2	107	18.7	36.5	55.1	36.7	18.7	45.6	117
				2019	33.8	25.4	21.6	31.3	17.3	23.9	34.4	57.0	30.6	12.3	17.3	28.4	57.0
				2020	60.6	130	67.2	127	33.6	37.6	43.1	35.5	66.8	39.9	33.6	51.9	130
				2021	52.3	110	69.9	108	163	92.8	72.7	36.4	88.1	39.7	36.4	82.8	163
		Cadmium	mg/kg	2018	2.11	3.39	2.56	2.26	2.53	2.90	1.18	1.43	2.30	0.729	1.18	2.40	3.39
				2019	2.29	1.55	1.22	1.83	2.76	4.32	4.57	3.82	2.80	1.30	1.22	2.52	4.57
				2020	1.87	1.30	1.83	1.41	3.12	2.15	1.10	3.27	2.01	0.809	1.10	1.85	3.27
				2021	2.42	3.13	5.04	4.06	3.87	3.16	6.41	8.35	4.56	1.98	2.42	3.96	8.35
		Calcium	mg/kg	2018	2,520	3,090	2,370	2,680	1,810	2,480	1,480	1,450	2,235	592	1,450	2,425	3,090
				2019	3,790	2,340	3,040	3,050	2,440	3,150	4,220	4,640	3,334	818	2,340	3,100	4,640
				2020	2,930	3,230	3,650	2,740	2,380	1,830	2,990	3,090	2,855	553	1,830	2,960	3,650
				2021	1,920	3,040	2,970	2,920	3,480	3,240	3,610	3,990	3,146	615	1,920	3,140	3,990
		Cobalt	mg/kg	2018	1.79	3.31	2.56	5.08	3.36	4.05	1.18	2.46	2.97	1.25	1.18	2.94	5.08
				2019	4.20	2.30	3.18	4.00	2.53	4.47	3.87	4.46	3.63	0.853	2.30	3.94	4.47
				2020	3.15	4.46	3.86	5.55	3.76	2.45	2.75	2.93	3.61	1.02	2.45	3.46	5.55
				2021	3.19	5.96	5.50	7.95	11.4	7.21	6.22	5.18	6.58	2.41	3.19	6.09	11.4
		Manganese	mg/kg	2018	1,100	1,100	620	2,040	1,700	1,390	624	1,430	1,250	495	620	1,245	2,040
				2019	672	485	854	767	291	684	868	988	701	225	291	726	988
				2020	1,730	2,410	2,410	4,140	1,230	1,250	1,960	1,490	2,078	953	1,230	1,845	4,140
				2021	1,130	3,360	1,920	2,860	5,330	2,860	2,680	1,260	2,675	1,339	1,130	2,770	5,330
		Mercury	mg/kg	2018	0.0716	0.172	0.125	0.121	0.0800	0.133	0.0770	0.0986	0.110	0.0345	0.0716	0.110	0.172
				2019	0.0750	0.0930	0.0590	0.109	0.0960	0.134	0.145	0.104	0.102	0.0283	0.0590	0.100	0.145
				2020	0.0446	0.0985	0.185	0.0391	0.0913	0.0658	0.0315	0.0490	0.0756	0.0504	0.0315	0.0574	0.185
				2021	0.0333	0.0674	0.0776	0.0758	0.0668	0.0686	0.0575	0.0707	0.0647	0.0141	0.0333	0.0680	0.0776
		Molybdenum	mg/kg	2018	0.925	1.43	1.62	1.49	1.10	1.55	1.15	1.00	1.28	0.270	0.925	1.29	1.62
				2019	0.846	0.519	0.874	0.677	0.798	1.47	1.39	1.40	0.997	0.368	0.519	0.860	1.47
				2020	1.10	0.958	0.960	0.852	1.26	0.869	0.878	1.08	0.995	0.142	0.852	0.959	1.26
				2021	0.817	1.24	1.48	1.66	2.09	2.72	1.70	1.72	1.68	0.564	0.817	1.68	2.72
		Nickel	mg/kg	2018	3.69	5.42	3.80	9.04	3.60	5.92	1.83	2.87	4.52	2.24	1.83	3.74	9.04
				2019	5.68	2.55	6.39	6.49	2.12	4.46	5.28	5.92	4.86	1.69	2.12	5.48	6.49
				2020	4.68	9.06	6.06	10.2	4.12	3.32	4.84	3.82	5.76	2.54	3.32	4.76	10.2
				2021	4.22	8.07	6.93	9.60	13.3	9.15	8.61	7.29	8.40	2.59	4.22	8.34	13.3
		Phosphorus	mg/kg	2018	6,670	8,170	8,190	7,580	8,010	6,610	6,970	6,800	7,375	689	6,610	7,275	8,190
				2019	6,490	7,740	6,440	6,560	8,710	10,100	9,080	8,020	7,892	1,355	6,440	7,880	10,100
				2020	10,700	9,550	9,880	11,000	9,770	7,500	9,090	10,300	9,724	1,090	7,500	9,825	11,000
				2021	9,000	10,200	11,000	9,480	8,920	10,100	11,200	11,900	10,225	1,078	8,920	10,150	11,900
		Silver	mg/kg	2018	-	-	-	-	-	-	-	-	-	-	-	-	-
				2019	0.185	0.164	0.192	0.156	0.168	0.291	0.252	0.163	0.196	0.0490	0.156	0.176	0.291
				2020	0.108	0.134	0.198	0.0736	0.272	0.148	0.0636	0.164	0.145	0.0682	0.0636	0.141	0.272
				2021	0.0730	0.105	0.116	0.118	0.131	0.122	0.212	0.102	0.122	0.0402	0.0730	0.117	0.212
		Sodium	mg/kg	2018	5,520	4,040	4,580	5,660	4,900	3,870	3,800	3,150	4,440	882	3,150	4,310	5,660
				2019	4,620	7,440	4,470	5,400	9,500	15,700	11,700	5,050	7,985	4,051	4,470	6,420	15,700
				2020	6,960	6,460	4,540	6,070	9,730	7,430	3,960	7,000	6,519	1,782	3,960	6,710	9,730
				2021	4,710	6,310	5,990	5,320	5,280	8,160	5,890	6,350	6,001	1,038	4,710	5,940	8,160
		Strontium	mg/kg	2018	16.9	23.0	13.4	18.3	13.4	19.1	7.63	8.97	15.1	5.22	7.63	15.2	23.0
				2019	26.2	11.5	25.0	20.0	7.49	12.5	21.0	25.6	18.7	7.24	7.49	20.5	26.2
				2020	21.5	25.4	24.6	23.6	13.9	11.7	21.4	21.7	20.5	5.00	11.7	21.6	25.4
				2021	13.0	20.4	20.7	20.7	25.5	21.7	24.8	24.8	21.4	4.01	13.0	21.2	25.5
		Tin	mg/kg	2018	<0.10	0.120	<0.10	0.130	<0.10	<0.10	<0.10	<0.10	0.106	0.00468	<0.1	0.100	0.130
				2019	0.490	0.150	0.340	0.420	0.880	0.770	1.07	1.23	0.669	0.378	0.150	0.630	1.23
				2020	<0.10	<0.10	0.120	0.100	<0.10	<0.10	<0.10	0.190	0.114	0.0362	<0.1	0.100	0.190
				2021	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	-	<0.1	<0.1	<0.1
		Titanium	mg/kg	2018	-	-	-	-	-	-	-	-	-	-	-	-	-
				2019	138	70.6	71.5	102	68.1	40.4	84.0	84.6	82.4	28.6	40.4	77.8	138
				2020	26.8	99.1	65.0	52.7	49.1	24.1	25.9	25.4	46.0	26.5	24.1	38.0	99.1
				2021	37.4	82.6	69.8	95.6	106	80.9	66.5	101	80	22.3	37.4	81.8	106
		Uranium	mg/kg	2018	0.152	0.245	0.181	0.385	0.161	0.352	0.0959	0.122	0.212	0.106	0.0959	0.171	0.385
				2019	0.245	0.120	0.150	0.248	0.0781	0.187	0.294	0.382	0.213	0.0992	0.0781	0.216	0.382
				2020	0.138	0.269	0.365	0.237	0.159	0.125	0.142	0.182	0.202	0.0829	0.125	0.170	0.365
				2021	0.143	0.288	0.284	0.593	0.420	0.415	0.329	0.315	0.348	0.131	0.143	0.322	0.593
		Vanadium	mg/kg	2018	3.74	7.25	5.13	9.59	3.15	11.3	1.38	2.02	5.44	3.61	1.38	4.43	11.3
				2019	17.2	6.33	7.48	11.5	11.1	6.43	9.57	9.18	9.85	3.56	6.33	9.38	17.2
				2020	3.85	9.73	7.44	6.80	6.94	3.33	4.05	3.72	5.73	2.32	3.33	5.42	9.73
				2021	3.88	8.28	7.81	11.4	13.1	10.9	8.26	10.6	9.28	2.85	3.88	9.44	13.1
		Zinc	mg/kg	2018	130	172	168	192	242	206	208	196	189	33.2	130	194	242
				2019	124	199	157	108	149	192	185	155	159	32.3	108	156	199
				2020	366	364	366	413	220	202	228	377	317	84.8	202	365	413
				2021	161	253	174	181	190	165	243	169	192	35.8	161	178	253
Upper Hazeltine Creek Reach 1	HAC-R1 (Exposed)	**Primary Analytes**															
		Arsenic	mg/kg	2018	3.02	2.82	2.38	3.28	2.39	2.71	3.51	2.46	2.82	0.422	2.38	2.76	3.51
				2019	4.93	1.69	2.40	1.65	1.90	2.13	3.16	2.64	2.56	1.08	1.65	2.26	4.93
				2020	1.59	1.36	2.16	3.95	2.24	0.714	0.671	0.926	1.70	1.09	0.671	1.48	3.95
				2021	2.76	3.55	2.93	3.57	3.51	3.03	3.88	2.78	3.25	0.426	2.76	3.27	3.88
		Copper	mg/kg	2018	252	258	260	228	128	165	230	259	222	49.6	128	241	260
				2019	162	73.3	122	182	92.5	144	159	177	139	39.7	73.3	152	182
				2020	107	67.6	232	425	214	35.0	26.8	63.7	146	137	26.8	87.3	425
				2021	149	184	170	217	227	198	223	167	192	29.0	149	191	227
		Iron	mg/kg	2018	1,930	1,650	1,120	1,760	3,010	2,490	2,930	1,660	2,069	672	1,120	1,845	3,010
				2019	8,230	1,830	3,900	2,860	2,400	2,830	4,460	5,450	3,995	2,076	1,830	3,380	8,230
				2020	2,180	1,670	5,600	7,570	4,730	655	528	1,680	3,077	2,574	528	1,930	7,570
				2021	3,270	4,960	4,260	6,190	6,580	4,840	5,620	3,600	4,915	1,181	3,270	4,900	6,580
		Selenium	mg/kg	2018	2.06	2.06	2.06	3.60	3.13	2.58	2.29	1.95	2.47	0.601	1.95	2.17	3.60
				2019	3.18	3.63	4.13	3.64	4.09	3.40	3.23	2.92	3.53	0.430	2.92	3.52	4.13
				2020	5.06	5.18	6.51	8.92	4.57	6.09	4.27	4.94	5.69	1.50	4.27	5.12	8.92
				2021	6.70	6.45	6.34	8.14	7.34	6.83	7.05	6.79	6.96	0.574	6.34	6.81	8.14

Notes: For 2010 data at HAC-D and HAC-U, historical station codes were W11 and W7, respectively. All values reported in dry weight. Summary statistics reported to 3 significant figures for display purposes. "-" indicates no data available.

Table D.5.6: Composite-Taxa Benthic Invertebrate Tissue Primary and Secondary Analytes Concentrations for Upper Hazeltine Creek (HAC-R1, HAC-U; Exposed), Upper Edney Creek (EDC-U; Reference), Lower Hazeltine Creek (HAC-D; Exposed), and Lower Edney Creek Exposed (E1) and Reference (EDC-D), 2010 to 2021

Waterbody	Area	Parameter	Units	Year	Replicate								Mean	Standard Deviation	Minimum	Median	Maximum
					1	2	3	4	5	6	7	8					
Upper Hazeltine Creek Reach 1	HAC-R1 (Exposed)	**Secondary Analytes**															
		Barium	mg/kg	2018	42.0	37.2	31.4	34.4	58.7	57.1	384	57.1	87.7	120	31.4	49.5	384
				2019	169	31.2	55.1	28.7	23.2	44.0	259	367	122	130	23.2	49.5	367
				2020	28.6	29.6	69.5	97.2	106	8.46	5.82	21.4	45.8	39.6	5.82	29.1	106
				2021	48.3	134	60.3	70.2	81.8	79.0	78.3	57.2	76.1	26.2	48.3	74.2	134
		Cadmium	mg/kg	2018	0.772	0.746	0.585	1.62	1.85	1.28	1.26	0.618	1.09	0.481	0.585	1.02	1.85
				2019	0.438	0.797	1.17	0.488	1.11	1.78	1.76	0.609	1.02	0.534	0.438	0.954	1.78
				2020	0.527	0.860	0.306	0.494	0.387	0.218	0.0800	0.175	0.381	0.247	0.0800	0.346	0.860
				2021	0.756	1.36	1.28	1.02	1.26	0.826	1.95	2.08	1.32	0.483	0.756	1.27	2.08
		Calcium	mg/kg	2018	166,000	162,000	194,000	109,000	6,860	119,000	136,000	161,000	131,733	57,464	6,860	148,500	194,000
				2019	36,000	6,300	11,400	4,170	3,370	9,130	9,410	9,980	11,220	10,411	3,370	9,270	36,000
				2020	12,900	3,360	6,980	7,420	7,990	1,330	783	4,390	5,644	4,002	783	5,685	12,900
				2021	6,640	7,250	5,940	7,980	10,300	5,770	13,100	4,620	7,700	2,768	4,620	6,945	13,100
		Cobalt	mg/kg	2018	1.82	1.78	1.27	1.75	3.27	2.23	2.59	1.66	2.05	0.631	1.27	1.80	3.27
				2019	6.36	1.79	3.41	2.42	2.12	2.90	3.70	4.24	3.37	1.46	1.79	3.16	6.36
				2020	1.91	1.36	4.61	5.59	3.55	0.501	0.386	1.40	2.41	1.94	0.386	1.66	5.59
				2021	3.08	3.80	3.69	4.92	4.90	4.30	5.14	3.68	4.19	0.741	3.08	4.05	5.14
		Manganese	mg/kg	2018	394	481	330	545	1,260	816	927	627	672	312	330	586	1,260
				2019	1,490	931	1,320	1,410	1,070	1,810	2,200	2,540	1,596	553	931	1,450	2,540
				2020	1,070	875	2,280	2,140	2,000	241	192	788	1,198	838	192	972	2,280
				2021	2,490	2,700	2,490	3,430	3,310	3,720	3,780	2,860	3,098	529	2,490	3,085	3,780
		Secondary Analytes															
		Mercury	mg/kg	2018	-	-	-	-	-	-	-	-	-	-	-	-	-
				2019	-	-	-	-	-	-	-	-	-	-	-	-	-
				2020	-	-	-	-	-	-	-	-	-	-	-	-	-
				2021	-	-	-	-	-	-	-	-	-	-	-	-	-
		Molybdenum	mg/kg	2018	7.72	1.54	1.90	2.22	5.04	3.11	3.50	1.77	3.35	2.11	1.54	2.66	7.72
				2019	2.96	2.59	3.11	3.27	1.47	4.15	3.89	4.39	3.23	0.943	1.47	3.19	4.39
				2020	5.61	5.18	5.52	6.50	4.66	9.91	6.76	8.36	6.56	1.77	4.66	6.06	9.91
				2021	6.16	6.18	4.71	5.26	5.49	5.72	7.19	7.02	5.97	0.850	4.71	5.94	7.19
		Nickel	mg/kg	2018	3.47	4.33	2.64	3.07	21.2	3.39	5.88	2.39	5.80	6.32	2.39	3.43	21.2
				2019	3.59	1.91	3.21	3.83	3.88	3.14	4.24	3.78	3.45	0.718	1.91	3.68	4.24
				2020	2.56	2.08	6.28	8.25	4.36	0.860	0.580	2.10	3.38	2.71	0.580	2.33	8.25
				2021	4.37	5.91	5.41	9.41	8.09	6.51	8.30	6.03	6.75	1.69	4.37	6.27	9.41
		Phosphorus	mg/kg	2018	4,180	5,160	3,870	6,240	6,730	4,760	4,690	4,740	5,046	979	3,870	4,750	6,730
				2019	6,610	6,290	7,700	6,430	5,710	7,260	6,120	6,340	6,558	638	5,710	6,385	7,700
				2020	8,670	9,060	11,000	20,500	7,840	7,080	6,970	7,030	9,769	4,546	6,970	8,255	20,500
				2021	12,500	11,700	12,200	10,900	11,200	11,000	12,400	12,200	11,762	652	10,900	11,950	12,500
		Silver	mg/kg	2018	-	-	-	-	-	-	-	-	-	-	-	-	-
				2019	0.0407	0.0188	0.0330	0.0370	0.0258	0.0334	0.0420	0.0426	0.0342	0.00838	0.0188	0.0352	0.0426
				2020	0.0280	0.0225	0.0981	0.220	0.117	0.0108	0.00560	0.0299	0.0665	0.0743	0.00560	0.0290	0.220
				2021	0.0421	0.0593	0.0582	0.0740	0.0877	0.0698	0.0718	0.0552	0.0648	0.0140	0.0421	0.0646	0.0877
		Sodium	mg/kg	2018	3,420	3,940	3,660	4,080	3,110	3,380	3,410	3,560	3,570	316	3,110	3,490	4,080
				2019	3,850	3,760	5,080	3,780	4,220	4,520	3,340	3,370	3,990	591	3,340	3,815	5,080
				2020	5,070	4,500	8,490	17,000	4,740	2,420	2,310	3,650	6,022	4,838	2,310	4,620	17,000
				2021	6,880	6,590	7,360	6,710	7,260	6,720	6,850	6,370	6,842	330	6,370	6,785	7,360
		Strontium	mg/kg	2018	341	324	348	203	33.1	244	290	310	262	105	33.1	300	348
				2019	111	25.8	38.7	21.3	18.5	34.5	50.4	36.4	42.1	29.7	18.5	35.4	111
				2020	38.8	17.5	57.7	76.6	55.0	8.52	4.94	17.6	34.6	26.4	4.94	28.2	76.6
				2021	35.2	43.3	40.7	45.1	65.0	46.4	55.6	34.7	45.8	10.2	34.7	44.2	65.0
		Tin	mg/kg	2018	<0.10	<0.10	<0.10	<0.10	0.150	<0.10	0.110	<0.10	0.108	0.0187	<0.1	0.100	0.150
				2019	0.220	0.160	0.420	0.150	0.160	0.280	0.180	0.290	0.232	0.0933	0.150	0.200	0.420
				2020	<0.10	0.270	0.210	0.330	0.120	<0.10	<0.10	0.120	0.169	0.0878	<0.1	0.120	0.330
				2021	<0.10	0.100	<0.10	0.120	0.120	<0.10	0.160	<0.10	0.112	0.0229	<0.1	0.100	0.160
		Titanium	mg/kg	2018	-	-	-	-	-	-	-	-	-	-	-	-	-
				2019	446	62.3	247	93.8	124	119	177	258	191	125	62.3	150	446
				2020	77.6	54.2	223	287	155	25.0	17.0	70.9	114	98.3	17.0	74.2	287
				2021	97.0	148	133	197	178	146	175	115	149	33.7	97.0	147	197
		Uranium	mg/kg	2018	0.167	0.145	0.135	0.156	0.130	0.159	0.252	0.115	0.157	0.0418	0.115	0.150	0.252
				2019	0.180	0.0991	0.149	0.0925	0.0872	0.0950	0.136	0.129	0.121	0.0331	0.0872	0.114	0.180
				2020	0.128	0.0863	0.353	0.267	0.210	0.0204	0.0154	0.0617	0.143	0.123	0.0154	0.107	0.353
				2021	0.179	0.235	0.202	0.235	0.224	0.213	0.277	0.194	0.220	0.0303	0.179	0.218	0.277
		Vanadium	mg/kg	2018	7.19	5.69	4.17	6.42	10.5	9.06	10.8	5.78	7.45	2.42	4.17	6.80	10.8
				2019	28.7	6.03	13.4	9.06	8.44	9.25	14.5	20.2	13.7	7.52	6.03	11.3	28.7
				2020	7.13	5.13	18.4	25.4	14.8	2.03	1.97	5.28	10.0	8.56	1.97	6.20	25.4
				2021	10.7	16.2	13.6	19.6	21.0	15.2	18.1	11.5	15.7	3.71	10.7	15.7	21.0
		Zinc	mg/kg	2018	39.8	42.4	34.3	69.5	107	50.8	49.1	46.7	55	23.5	34.3	47.9	107
				2019	94.8	89.9	105	88.1	84.7	99.3	84.4	85.2	91.4	7.60	84.4	89.0	105
				2020	130	116	136	173	104	82.9	90.3	94.1	116	29.8	82.9	110	173
				2021	145	148	134	137	136	138	162	160	145	10.9	134	142	162
Upper Hazeltine Creek Reach 2	HAC-U (Exposed)	**Primary Analytes**															
		Arsenic	mg/kg	2010	2.54	3.99	2.74	2.13	1.72	-	-	-	2.62	0.858	1.72	2.54	3.99
				2015	2.60	2.32	2.56	2.56	2.78	-	-	-	2.56	0.164	2.32	2.56	2.78
				2018	1.84	2.32	2.30	2.04	1.69	1.81	1.97	2.19	2.02	0.235	1.69	2.00	2.32
				2019	2.68	9.52	3.18	2.61	1.95	3.10	2.93	2.24	3.53	2.46	1.95	2.80	9.52
				2020	1.27	1.47	1.33	0.773	0.810	0.490	0.918	1.17	1.03	0.334	0.490	1.04	1.47
				2021	2.35	2.40	3.91	3.32	1.55	2.16	2.06	3.53	2.66	0.825	1.55	2.38	3.91
		Copper	mg/kg	2010	49.6	53.3	54.4	47.4	44.3	-	-	-	49.8	4.17	44.3	49.6	54.4
				2015	188	171	165	168	186	-	-	-	176	10.6	165	171	188
				2018	77.5	75.7	88.5	82.1	92.9	73.3	98.7	64.2	81.6	11.3	64.2	79.8	98.7
				2019	129	343	124	135	111	230	205	83.4	170	85.2	83.4	132	343
				2020	61.6	68.8	62.7	31.6	33.9	19.8	39.4	68.8	48.3	19.3	19.8	50.5	68.8
				2021	141	118	144	205	69.7	107	74.7	121	123	43.0	69.7	120	205
		Iron	mg/kg	2010	-	-	-	-	-	-	-	-	-	-	-	-	-
				2015	9,770	3,540	6,790	7,240	5,170	-	-	-	6,502	2,337	3,540	6,790	9,770
				2018	1,220	3,260	1,960	1,320	1,140	1,480	1,690	1,470	1,692	686	1,140	1,475	3,260
				2019	3,040	8,170	2,900	4,550	2,560	4,850	2,940	2,460	3,934	1,930	2,460	2,990	8,170
				2020	1,080	1,530	1,500	650	568	232	779	1,370	964	480	232	930	1,530
				2021	6,550	4,730	6,440	7,220	1,170	2,810	1,760	3,490	4,271	2,314	1,170	4,110	7,220
		Selenium	mg/kg	2010	10.8	10.0	10.7	11.2	11.8	-	-	-	10.9	0.663	10.0	10.8	11.8
				2015	4.05	4.49	5.44	5.56	4.99	-	-	-	4.91	0.638	4.05	4.99	5.56
				2018	2.70	2.88	2.49	2.73	2.96	2.21	3.04	2.10	2.64	0.344	2.10	2.72	3.04
				2019	3.61	2.51	3.30	3.42	3.10	2.30	3.13	2.80	3.02	0.452	2.30	3.12	3.61
				2020	6.95	6.47	5.52	5.98	5.10	4.44	6.40	6.48	5.92	0.840	4.44	6.19	6.95
				2021	6.08	5.73	5.28	5.14	4.77	4.41	4.94	5.27	5.20	0.527	4.41	5.20	6.08
		Secondary Analytes			-	-	-	-	-	-	-	-	-	-	-	-	-
		Barium	mg/kg	2010	63.7	72.7	78.0	63.1	47.6	-	-	-	65.0	11.6	47.6	63.7	78.0
				2015	135	93.0	87.3	84.3	90.1	-	-	-	97.9	21.0	84.3	90.1	135
				2018	24.9	25.8	28.5	31.0	26.7	28.0	35.9	27.9	28.6	3.49	24.9	28.0	35.9
				2019	50.2	91.4	40.5	126	43.1	216	57.2	60.8	85.7	60	40.5	59.0	216
				2020	23.2	22.3	27.2	11.9	9.29	3.36	14.0	28.3	17.4	9.08	3.36	18.2	28.3
				2021	55.4	68.0	97.7	65.9	57.9	92.0	69.9	75.2	72.8	15.1	55.4	69	97.7

Notes: For 2010 data at HAC-D and HAC-U, historical station codes were W11 and W7, respectively. All values reported in dry weight. Summary statistics reported to 3 significant figures for display purposes. "-" indicates no data available.

Table D.5.6: Composite-Taxa Benthic Invertebrate Tissue Primary and Secondary Analytes Concentrations for Upper Hazeltine Creek (HAC-R1, HAC-U; Exposed), Upper Edney Creek (EDC-U; Reference), Lower Hazeltine Creek (HAC-D; Exposed), and Lower Edney Creek Exposed (E1) and Reference (EDC-D), 2010 to 2021

Waterbody	Area	Parameter	Units	Year	Replicate								Mean	Standard Deviation	Minimum	Median	Maximum
					1	2	3	4	5	6	7	8					
Upper Hazeltine Creek Reach 2	HAC-U (Exposed)	Cadmium	mg/kg	2010	0.502	0.355	0.381	0.344	0.248	-	-	-	0.366	0.0912	0.248	0.355	0.502
				2015	0.304	0.333	0.327	0.327	0.328	-	-	-	0.324	0.0113	0.304	0.327	0.333
				2018	1.07	1.34	1.37	1.09	1.04	0.918	0.701	0.345	0.984	0.336	0.345	1.06	1.37
				2019	3.11	0.532	1.12	0.933	0.433	0.442	0.740	0.524	0.979	0.896	0.433	0.636	3.11
				2020	0.311	0.781	0.371	0.0664	0.0948	0.0790	0.319	0.430	0.307	0.239	0.0664	0.315	0.781
				2021	0.674	1.06	0.691	0.737	0.516	0.553	0.926	1.32	0.810	0.274	0.516	0.714	1.32
		Calcium	mg/kg	2010	2,320	12,900	2,560	1,730	1,870	-	-	-	4,276	4,833	1,730	2,320	12,900
				2015	10,200	7,010	5,950	6,760	7,160	-	-	-	7,416	1,625	5,950	7,010	10,200
				2018	4,630	5,220	4,200	4,330	4,000	5,550	5,710	8,250	5,236	1,373	4,000	4,925	8,250
				2019	9,660	30,500	11,700	14,700	9,870	55,900	42,900	11,600	23,354	17,771	9,660	13,200	55,900
				2020	2,140	2,290	2,330	1,830	1,520	738	1,520	3,040	1,926	690	738	1,985	3,040
				2021	7,780	13,600	8,870	9,020	5,000	15,000	3,340	16,300	9,864	4,691	3,340	8,945	16,300
		Cobalt	mg/kg	2010	2.78	2.69	3.19	2.14	1.76	-	-	-	2.51	0.563	1.76	2.69	3.19
				2015	5.74	4.23	3.86	3.57	3.70	-	-	-	4.22	0.885	3.57	3.86	5.74
				2018	1.37	2.09	1.75	1.28	1.16	1.06	1.31	1.04	1.38	0.363	1.04	1.30	2.09
				2019	2.20	4.39	2.09	2.99	1.95	2.78	2.12	1.85	2.55	0.845	1.85	2.16	4.39
				2020	0.988	1.17	1.29	0.440	0.472	0.151	0.562	1.07	0.768	0.413	0.151	0.775	1.29
				2021	3.55	2.71	3.94	3.87	1.33	2.20	1.76	2.41	2.72	0.980	1.33	2.56	3.94
		Manganese	mg/kg	2010	1,970	2,040	2,320	2,060	1,700	-	-	-	2,018	222	1,700	2,040	2,320
				2015	681	577	554	550	586	-	-	-	590	53.3	550	577	681
				2018	888	736	812	781	660	712	567	789	743	98.7	567	758	888
				2019	1,970	1,940	2,170	1,910	2,240	1,820	1,560	1,800	1,926	214	1,560	1,925	2,240
				2020	992	1,110	1,190	413	516	166	507	1,000	737	380	166	754	1,190
				2021	3,410	1,960	3,400	3,010	2,750	2,630	2,530	2,060	2,719	545	1,960	2,690	3,410
		Mercury	mg/kg	2010	-	-	-	-	-	-	-	-	-	-	-	-	-
				2015	-	-	-	-	-	-	-	-	-	-	-	-	-
				2018	-	-	-	-	-	-	-	-	-	-	-	-	-
				2019	-	-	-	-	-	-	-	-	-	-	-	-	-
				2020	-	-	-	-	-	-	-	-	-	-	-	-	-
				2021	-	-	-	-	-	-	-	-	-	-	-	-	-
		Molybdenum	mg/kg	2010	4.67	3.81	4.84	3.67	3.39	-	-	-	4.08	0.641	3.39	3.81	4.84
				2015	1.24	1.29	1.53	1.71	1.57	-	-	-	1.47	0.198	1.24	1.53	1.71
				2018	3.43	3.26	3.40	2.80	2.77	2.62	2.48	2.91	2.96	0.361	2.48	2.86	3.43
				2019	3.67	3.37	4.34	3.66	5.13	3.37	3.42	4.05	3.88	0.613	3.37	3.66	5.13
				2020	13.9	6.88	4.57	10.8	7.34	5.55	8.11	6.16	7.91	3.06	4.57	7.11	13.9
				2021	6.56	5.12	6.01	6.08	4.00	4.51	4.22	4.77	5.16	0.951	4.00	4.94	6.56
Upper Hazeltine Creek Reach 2	HAC-U (Exposed)	**Secondary Analytes**															
		Nickel	mg/kg	2010	20.8	13.1	19.6	7.97	6.25	-	-	-	13.5	6.59	6.25	13.1	20.8
				2015	9.25	8.80	11.1	7.05	6.00	-	-	-	8.44	1.98	6.00	8.80	11.1
				2018	2.42	2.54	2.56	1.82	1.74	2.37	2.12	1.87	2.18	0.336	1.74	2.24	2.56
				2019	3.35	4.04	2.98	4.87	3.07	2.86	3.49	3.86	3.56	0.671	2.86	3.42	4.87
				2020	1.46	1.84	2.02	0.640	0.650	0.280	1.04	1.72	1.21	0.645	0.280	1.25	2.02
				2021	6.59	5.97	5.99	4.41	2.03	6.09	2.51	6.56	5.02	1.83	2.03	5.98	6.59
		Phosphorus	mg/kg	2010	-	-	-	-	-	-	-	-	-	-	-	-	-
				2015	3,280	2,880	5,340	4,840	3,360	-	-	-	3,940	1,080	2,880	3,360	5,340
				2018	7,610	7,520	8,300	8,010	7,820	6,360	7,800	5,880	7,412	842	5,880	7,705	8,300
				2019	6,640	5,620	7,480	6,540	7,660	5,970	6,830	6,490	6,654	687	5,620	6,590	7,660
				2020	7,760	7,960	9,210	7,740	8,260	6,950	8,230	7,710	7,978	643	6,950	7,860	9,210
				2021	9,380	8,670	9,140	7,990	8,820	8,360	9,300	8,180	8,730	523	7,990	8,745	9,380
		Silver	mg/kg	2010	-	-	-	-	-	-	-	-	-	-	-	-	-
				2015	0.0889	0.0681	0.0636	0.0685	0.109	-	-	-	0.0796	0.0191	0.0636	0.0685	0.109
				2018	-	-	-	-	-	-	-	-	-	-	-	-	-
				2019	0.0429	0.0676	0.0403	0.0543	0.0325	0.0580	0.0323	0.0281	0.0445	0.0141	0.0281	0.0416	0.0676
				2020	0.0172	0.0287	0.0163	0.00610	0.00680	<0.0050	0.0100	0.0187	0.0136	0.00806	<0.005	0.0132	0.0287
				2021	0.0542	0.0435	0.0428	0.0586	0.0223	0.0272	0.0206	0.0328	0.0378	0.0143	0.0206	0.0378	0.0586
		Sodium	mg/kg	2010	-	-	-	-	-	-	-	-	-	-	-	-	-
				2015	2,980	3,320	4,260	2,960	3,640	-	-	-	3,432	540	2,960	3,320	4,260
				2018	3,450	2,590	3,140	3,170	3,380	2,790	3,840	2,850	3,151	406	2,590	3,155	3,840
				2019	3,460	2,860	4,260	3,830	3,800	3,540	3,950	3,440	3,642	420	2,860	3,670	4,260
				2020	3,200	2,610	4,000	3,500	4,100	4,500	3,550	3,340	3,600	590	2,610	3,525	4,500
				2021	5,150	4,200	4,890	3,730	3,660	3,680	3,870	3,120	4,038	679	3,120	3,800	5,150
		Strontium	mg/kg	2010	21.0	35.7	22.8	18.4	14.8	-	-	-	22.5	7.95	14.8	21.0	35.7
				2015	63.8	57.1	53.3	59.5	68.1	-	-	-	60.4	5.77	53.3	59.5	68.1
				2018	23.6	26.5	25.1	28.3	27.5	23.1	39.3	31.2	28.1	5.24	23.1	27.0	39.3
				2019	39.0	92.8	41.2	54.0	36.3	457	94.2	41.0	107	143	36.3	47.6	457
				2020	14.9	16.4	13.3	9.81	8.36	3.55	8.65	16.1	11.4	4.53	3.55	11.6	16.4
				2021	38.5	108	66.5	38.5	22.1	48.5	19.5	48.9	48.8	28.3	19.5	43.5	108
		Tin	mg/kg	2010	<0.20	<0.20	<0.20	<0.20	<0.20	-	-	-	<0.2	-	<0.2	<0.2	<0.2
				2015	0.0306	0.0271	0.0167	0.0503	0.0291	-	-	-	0.0308	0.0122	0.0167	0.0291	0.0503
				2018	<0.10	<0.10	<0.10	<0.10	0.140	<0.10	<0.10	<0.10	0.105	-	<0.1	0.100	0.140
				2019	0.130	0.300	0.170	0.230	0.510	0.360	0.230	0.310	0.280	0.120	0.130	0.265	0.510
				2020	<0.10	<0.10	0.120	0.120	<0.10	<0.10	<0.10	0.110	0.106	0.00530	<0.1	0.100	0.120
				2021	<0.10	<0.10	<0.10	0.150	<0.10	<0.10	<0.10	<0.10	0.106	-	<0.1	0.100	0.150
		Titanium	mg/kg	2010	-	-	-	-	-	-	-	-	-	-	-	-	-
				2015	67.2	28.9	27.3	58.5	74.8	-	-	-	51.3	22.0	27.3	58.5	74.8
				2018	-	-	-	-	-	-	-	-	-	-	-	-	-
				2019	113	292	111	310	84.5	144	90.5	79.0	153	93.7	79.0	112	310
				2020	40.4	46.6	41.0	24.7	21.1	5.42	24.4	44.2	31.0	14.4	5.42	32.6	46.6
				2021	333	133	193	213	42.3	115	57.8	134	153	93.4	42.3	134	333
		Uranium	mg/kg	2010	0.248	0.282	0.266	0.193	0.153	-	-	-	0.228	0.0539	0.153	0.248	0.282
				2015	0.230	0.180	0.166	0.175	0.198	-	-	-	0.190	0.0253	0.166	0.180	0.230
				2018	0.0595	0.0758	0.0725	0.0610	0.0610	0.0579	0.0831	0.0785	0.0687	0.00991	0.0579	0.0668	0.0831
				2019	0.156	0.178	0.116	0.163	0.112	0.141	0.117	0.0973	0.135	0.0286	0.0973	0.129	0.178
				2020	0.0455	0.0546	0.0526	0.0202	0.0215	0.00590	0.0279	0.0581	0.0358	0.0194	0.00590	0.0367	0.0581
				2021	0.187	0.128	0.149	0.195	0.0902	0.180	0.0919	0.243	0.158	0.0533	0.0902	0.164	0.243
		Vanadium	mg/kg	2010	7.89	7.78	9.04	4.58	3.72	-	-	-	6.60	2.31	3.72	7.78	9.04
				2015	40.0	23.3	22.6	25.1	33.4	-	-	-	28.9	7.57	22.6	25.1	40.0
				2018	3.35	11.1	6.30	3.80	3.68	4.91	5.37	4.77	5.41	2.50	3.35	4.84	11.1
				2019	9.51	32.8	8.96	16.0	7.58	18.1	9.50	7.19	13.7	8.68	7.19	9.51	32.8
				2020	3.48	4.67	4.04	1.95	1.46	0.540	2.12	3.99	2.78	1.46	0.540	2.80	4.67
				2021	24.1	15.9	21.8	24.6	4.18	10.5	6.01	14.0	15.1	7.94	4.18	15.0	24.6
		Zinc	mg/kg	2010	206	203	244	244	202	-	-	-	220	22.1	202	206	244
				2015	79.2	94.6	93.5	103	89.2	-	-	-	91.9	8.68	79.2	93.5	103
				2018	91.9	88.1	104	92.9	99.7	88.5	96.1	79.2	92.5	7.65	79.2	92.4	104
				2019	102	76.6	102	89.3	120	78.2	82.9	89.3	92.5	14.7	76.6	89.3	120
				2020	132	112	115	79.1	85.8	84.0	127	125	107	21.4	79.1	114	132
				2021	126	99.0	126	113	104	107	124	120	115	10.6	99.0	116	126

Notes: For 2010 data at HAC-D and HAC-U, historical station codes were W11 and W7, respectively. All values reported in dry weight. Summary statistics reported to 3 significant figures for display purposes. "-" indicates no data available.

Table D.5.6: Composite-Taxa Benthic Invertebrate Tissue Primary and Secondary Analytes Concentrations for Upper Hazeltine Creek (HAC-R1, HAC-U; Exposed), Upper Edney Creek (EDC-U; Reference), Lower Hazeltine Creek (HAC-D; Exposed), and Lower Edney Creek Exposed (E1) and Reference (EDC-D), 2010 to 2021

Waterbody	Area	Parameter	Units	Year	Replicate								Mean	Standard Deviation	Minimum	Median	Maximum
					1	2	3	4	5	6	7	8					
Lower Edney Creek	EDC-D (Reference)	**Primary Analytes**															
		Arsenic	mg/kg	2015	1.76	1.24	1.47	1.87	1.03	-	-	-	1.47	0.350	1.03	1.47	1.87
				2018	6.76	9.27	12.8	8.10	5.43	1.53	6.75	6.07	7.09	3.24	1.53	6.76	12.8
				2019	2.06	2.15	1.05	1.95	1.47	1.16	2.78	1.70	1.79	0.569	1.05	1.82	2.78
				2020	2.65	1.71	1.61	3.82	1.05	1.78	1.77	4.25	2.33	1.14	1.05	1.78	4.25
				2021	3.71	1.58	8.06	5.26	3.58	4.06	7.70	3.31	4.66	2.23	1.58	3.88	8.06
		Copper	mg/kg	2015	16.9	13.3	18.3	13.3	17.6	-	-	-	15.9	2.41	13.3	16.9	18.3
				2018	23.7	24.7	25.7	28.4	31.9	37.4	25.3	22.2	27.4	5.02	22.2	25.5	37.4
				2019	31.4	32.0	36.2	29.5	39.3	39.5	24.8	38.1	33.8	5.28	24.8	34.1	39.5
				2020	47.6	50.4	48.3	37.2	17.2	51.6	38.3	26.9	39.7	12.4	17.2	43	51.6
				2021	38.1	44.6	32.9	35.7	40.0	44.2	28.8	35.8	37.5	5.41	28.8	37.0	44.6
		Iron	mg/kg	2015	1,020	148	339	268	147	-	-	-	384	365	147	268	1,020
				2018	1,460	2,170	3,810	1,460	1,940	380	2,390	4,820	2,304	1,408	380	2,055	4,820
				2019	1,410	1,570	611	1,730	845	646	2,630	2,340	1,473	755	611	1,490	2,630
				2020	2,830	1,080	867	3,660	636	1,840	1,740	2,160	1,852	1,027	636	1,790	3,660
				2021	1,760	629	3,300	2,010	1,230	1,550	4,140	1,460	2,010	1,152	629	1,655	4,140
		Selenium	mg/kg	2015	1.24	1.12	2.70	1.36	1.12	-	-	-	1.51	0.674	1.12	1.24	2.70
				2018	1.48	3.14	2.92	3.59	2.28	1.61	2.80	2.12	2.49	0.745	1.48	2.54	3.59
				2019	2.44	1.04	1.30	2.23	1.71	0.680	3.34	0.720	1.68	0.934	0.680	1.50	3.34
				2020	1.38	1.61	1.47	1.86	1.32	0.618	1.70	1.37	1.42	0.372	0.618	1.42	1.86
				2021	2.21	1.39	3.21	1.95	2.34	2.42	3.47	1.62	2.33	0.720	1.39	2.28	3.47
		Secondary Analytes															
		Barium	mg/kg	2015	7.11	4.53	7.72	9.81	4.45	-	-	-	6.72	2.27	4.45	7.11	9.81
				2018	41.8	105	128	58.8	56.4	6.36	70.8	64.1	66.4	37.2	6.36	61.5	128
				2019	10.1	12.4	7.68	14.7	10.5	10.9	19.4	12.4	12.3	3.54	7.68	11.6	19.4
				2020	48.0	11.9	9.16	46.1	12.0	14.7	14.0	18.5	21.8	15.8	9.16	14.4	48.0
				2021	26.4	7.42	101	41.2	19.6	16.9	22.2	14.2	31.1	29.9	7.42	20.9	101
		Cadmium	mg/kg	2015	0.0427	0.0253	0.241	0.132	0.0996	-	-	-	0.108	0.0858	0.0253	0.0996	0.241
				2018	0.366	1.26	0.686	1.07	0.986	0.477	1.38	1.60	0.978	0.439	0.366	1.03	1.60
				2019	0.704	0.170	0.284	0.346	0.753	0.120	1.16	0.144	0.460	0.374	0.120	0.315	1.16
				2020	0.649	1.10	0.752	1.63	0.681	0.170	0.786	0.670	0.805	0.420	0.170	0.716	1.63
				2021	0.639	0.342	1.85	0.631	1.18	1.04	1.50	0.793	0.997	0.500	0.342	0.916	1.85
		Calcium	mg/kg	2015	1,600	1,620	1,420	764	1,980	-	-	-	1,477	447	764	1,600	1,980
				2018	2,500	2,680	2,940	2,310	3,620	2,820	2,730	3,030	2,829	394	2,310	2,775	3,620
				2019	2,080	4,740	3,380	5,490	3,250	5,860	2,380	4,890	4,009	1,428	2,080	4,060	5,860
				2020	3,110	3,080	3,830	3,050	1,610	5,250	2,900	2,180	3,126	1,086	1,610	3,065	5,250
				2021	2,300	2,170	2,960	2,450	2,880	2,830	2,780	3,440	2,726	409	2,170	2,805	3,440
		Cobalt	mg/kg	2015	0.301	0.0751	0.179	0.275	0.137	-	-	-	0.193	0.0944	0.0751	0.179	0.301
				2018	1.44	2.62	3.26	2.15	1.84	0.626	2.78	3.64	2.29	0.987	0.626	2.38	3.64
				2019	1.08	0.912	0.580	1.17	1.06	0.746	1.66	1.28	1.06	0.332	0.580	1.07	1.66
				2020	1.88	1.36	1.10	3.08	0.551	1.50	1.37	1.48	1.54	0.730	0.551	1.42	3.08
				2021	1.40	0.561	3.28	1.72	1.34	1.65	2.57	1.69	1.78	0.822	0.561	1.67	3.28
		Manganese	mg/kg	2015	58.6	32.0	79.1	127	72.2	-	-	-	73.8	34.8	32.0	72.2	127
				2018	643	1,430	1,170	789	633	154	695	294	726	419	154	669	1,430
				2019	190	183	155	228	202	195	264	188	201	32.7	155	192	264
				2020	769	342	286	906	192	468	333	236	442	260	192	338	906
				2021	524	269	1,420	704	441	524	395	423	588	359	269	482	1,420
		Mercury	mg/kg	2015	-	-	-	-	-	-	-	-	-	-	-	-	-
				2018	-	-	-	-	-	-	-	-	-	-	-	-	-
				2019	-	-	-	-	-	-	-	-	-	-	-	-	-
				2020	-	-	-	-	-	-	-	-	-	-	-	-	-
				2021	-	-	-	-	-	-	-	-	-	-	-	-	-
	EDC-D (Reference)	Molybdenum	mg/kg	2015	5.72	7.57	3.66	3.39	4.69	-	-	-	5.01	1.70	3.39	4.69	7.57
				2018	1.41	1.60	2.15	2.00	1.94	0.500	1.54	1.01	1.52	0.551	0.500	1.57	2.15
				2019	0.530	0.879	0.439	0.409	0.511	0.342	0.588	0.350	0.506	0.174	0.342	0.475	0.879
				2020	1.06	0.738	0.555	2.24	1.55	0.694	0.579	2.21	1.20	0.709	0.555	0.899	2.24
				2021	0.841	0.335	1.49	1.12	0.593	0.750	0.770	0.528	0.803	0.362	0.335	0.760	1.49
		Nickel	mg/kg	2015	0.612	0.166	0.525	0.513	0.275	-	-	-	0.418	0.188	0.166	0.513	0.612
				2018	4.63	6.15	8.50	7.03	4.81	2.31	5.89	7.20	5.82	1.91	2.31	6.02	8.50
				2019	3.09	3.68	1.89	3.90	2.06	3.80	3.68	5.34	3.43	1.10	1.89	3.68	5.34
				2020	4.79	3.30	3.16	7.00	1.66	8.37	3.67	2.77	4.34	2.27	1.66	3.48	8.37
				2021	4.23	2.02	7.25	4.52	3.22	3.82	7.09	5.96	4.76	1.86	2.02	4.38	7.25
		Phosphorus	mg/kg	2015	7,190	8,190	7,210	6,550	7,900	-	-	-	7,408	647	6,550	7,210	8,190
				2018	6,500	8,080	6,550	8,030	8,800	7,600	7,730	4,650	7,242	1,302	4,650	7,665	8,800
				2019	8,910	9,400	9,880	7,080	10,300	11,300	9,860	8,350	9,385	1,286	7,080	9,630	11,300
				2020	8,830	9,860	10,200	8,740	5,530	8,600	8,140	6,900	8,350	1,523	5,530	8,670	10,200
				2021	9,140	8,810	10,500	9,220	11,300	10,600	8,070	9,730	9,671	1,069	8,070	9,475	11,300
		Silver	mg/kg	2015	0.0258	0.00734	0.0158	0.0126	0.0514	-	-	-	0.0226	0.0175	0.00734	0.0158	0.0514
				2018	-	-	-	-	-	-	-	-	-	-	-	-	-
				2019	0.155	0.0987	0.130	0.121	0.147	0.0866	0.118	0.115	0.121	0.0228	0.0866	0.120	0.155
				2020	0.218	0.242	0.200	0.158	0.0862	0.113	0.224	0.134	0.172	0.0573	0.0862	0.179	0.242
				2021	0.161	0.175	0.111	0.140	0.164	0.141	0.148	0.142	0.148	0.0195	0.111	0.145	0.175
		Sodium	mg/kg	2015	2,080	2,070	1,840	1,790	2,080	-	-	-	1,972	144	1,790	2,070	2,080
				2018	2,230	3,660	3,090	3,360	3,120	3,500	4,290	2,390	3,205	669	2,230	3,240	4,290
				2019	3,910	4,040	3,670	4,680	4,070	5,150	4,080	5,510	4,389	653	3,670	4,075	5,510
				2020	3,060	4,260	5,180	4,490	2,230	4,130	4,630	3,830	3,976	938	2,230	4,195	5,180
				2021	3,360	3,980	4,150	3,560	5,950	4,550	3,810	3,660	4,128	824	3,360	3,895	5,950
		Strontium	mg/kg	2015	13.4	13.2	10.0	6.03	11.2	-	-	-	10.8	3.00	6.03	11.2	13.4
				2018	15.4	22.0	27.3	14.7	22.7	19.9	23.9	31.0	22.1	5.53	14.7	22.4	31.0
				2019	13.4	30.4	18.0	30.2	15.9	38.2	16.3	39.9	25.3	10.6	13.4	24.1	39.9
				2020	17.5	15.1	17.6	22.2	10.4	34.5	18.3	13.7	18.7	7.29	10.4	17.6	34.5
				2021	13.1	9.42	21.6	16.3	15.1	19.8	22.2	26.6	18.0	5.56	9.42	18.0	26.6
		Tin	mg/kg	2015	0.110	0.0814	0.180	0.243	0.125	-	-	-	0.148	0.0641	0.0814	0.125	0.243
				2018	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.440	0.110	0.144	0.154	<0.1	0.100	0.440
				2019	0.140	0.130	0.270	0.190	0.610	0.510	0.510	0.590	0.369	0.206	0.130	0.390	0.610
				2020	<0.10	0.100	<0.10	0.150	0.150	<0.10	0.100	<0.10	0.112	0.0250	<0.1	0.100	0.150
				2021	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	-	<0.1	<0.1	<0.1
		Titanium	mg/kg	2015	5.52	2.77	4.53	4.63	2.06	-	-	-	3.90	1.43	2.06	4.53	5.52
				2018	-	-	-	-	-	-	-	-	-	-	-	-	-
				2019	34.1	35.5	13.0	36.5	16.8	12.5	64.4	32.0	30.6	17.1	12.5	33.0	64.4
				2020	64.3	21.4	21.4	84.4	13.6	46.2	39.2	28.3	39.8	24.3	13.6	33.8	84.4
				2021	45.9	13.6	56.2	37.3	21.8	29.9	87.7	33.6	40.8	23.1	13.6	35.4	87.7
		Vanadium	mg/kg	2015	2.55	0.272	0.581	0.610	0.249	-	-	-	0.852	0.964	0.249	0.581	2.55
				2018	2.96	4.84	7.74	2.74	4.12	0.820	5.48	12.5	5.15	3.61	0.820	4.48	12.5
				2019	2.79	3.34	1.08	4.02	1.99	1.24	5.67	5.19	3.16	1.72	1.08	3.06	5.67
				2020	5.36	2.02	1.63	7.84	1.42	4.57	4.86	5.63	4.17	2.28	1.42	4.72	7.84
				2021	3.22	1.23	6.14	4.06	2.24	3.46	8.49	3.60	4.06	2.29	1.23	3.53	8.49
		Zinc	mg/kg	2015	72.0	68.8	74.6	80.1	78.8	-	-	-	74.9	4.69	68.8	74.6	80.1
				2018	141	142	103	125	164	162	182	90.1	139	31.4	90.1	142	182
				2019	155	169	140	154	181	189	190	185	170	18.9	140	175	190
				2020	236	213	183	179	97.5	155	202	136	175	44.6	97.5	181	236
				2021	174	168	193	177	183	192	132	175	174	19.2	132	176	193

Notes: For 2010 data at HAC-D and HAC-U, historical station codes were W11 and W7, respectively. All values reported in dry weight. Summary statistics reported to 3 significant figures for display purposes. "-" indicates no data available.

Table D.5.6: Composite-Taxa Benthic Invertebrate Tissue Primary and Secondary Analytes Concentrations for Upper Hazeltine Creek (HAC-R1, HAC-U; Exposed), Upper Edney Creek (EDC-U; Reference), Lower Hazeltine Creek (HAC-D; Exposed), and Lower Edney Creek Exposed (E1) and Reference (EDC-D), 2010 to 2021

Waterbody	Area	Parameter	Units	Year	Replicate								Mean	Standard Deviation	Minimum	Median	Maximum
					1	2	3	4	5	6	7	8					
Lower Hazeltine Creek	HAC-D (Exposed)	**Primary Analytes**															
		Arsenic	mg/kg	2010	7.33	1.46	3.63	3.97	3.32	-	-	-	3.94	2.13	1.46	3.63	7.33
				2015	2.43	2.51	2.72	1.97	1.84	-	-	-	2.29	0.373	1.84	2.43	2.72
				2018	2.07	1.35	1.85	1.42	1.51	1.30	1.07	1.44	1.50	0.317	1.07	1.43	2.07
				2019	2.48	11.7	1.15	2.93	1.23	1.40	2.02	1.48	3.05	3.55	1.15	1.75	11.7
				2020	1.41	2.48	2.87	1.36	1.81	4.36	2.06	2.15	2.31	0.971	1.36	2.10	4.36
				2021	2.64	2.64	3.61	2.37	3.59	2.32	2.38	4.56	3.01	0.815	2.32	2.64	4.56
		Copper	mg/kg	2010	31.8	19.2	23.6	33.9	22.6	-	-	-	26.2	6.31	19.2	23.6	33.9
				2015	251	254	184	174	158	-	-	-	204	45.1	158	184	254
				2018	41.7	36.1	71.2	43.5	58.4	40.8	36.5	76.1	50.5	15.9	36.1	42.6	76.1
				2019	72.2	135	36.4	91.1	39.2	63.4	99.8	53.1	73.8	33.5	36.4	67.8	135
				2020	88.2	43.9	107	41.8	81.3	87.2	94.3	65.7	76.2	23.6	41.8	84.2	107
				2021	75.4	76.8	150	117	192	394	144	399	194	131	75.4	147	399
		Iron	mg/kg	2010	-	-	-	-	-	-	-	-	-	-	-	-	-
				2015	8,460	10,200	10,300	7,420	2,220	-	-	-	7,720	3,305	2,220	8,460	10,300
				2018	1,170	964	901	1,090	1,630	1,280	541	2,360	1,242	550	541	1,130	2,360
				2019	2,690	7,690	747	4,570	1,210	1,770	3,420	1,910	3,001	2,259	747	2,300	7,690
				2020	731	1,910	2,550	1,070	4,750	6,780	2,400	684	2,609	2,142	684	2,155	6,780
				2021	2,050	2,500	5,010	4,480	8,060	4,250	4,680	13,600	5,579	3,714	2,050	4,580	13,600
		Selenium	mg/kg	2010	3.49	3.55	3.67	3.19	3.64	-	-	-	3.51	0.192	3.19	3.55	3.67
				2015	2.55	2.76	3.02	2.49	2.77	-	-	-	2.72	0.210	2.49	2.76	3.02
				2018	3.53	3.76	4.30	2.79	3.36	3.49	4.11	2.79	3.52	0.549	2.79	3.51	4.30
				2019	2.85	2.39	2.36	2.35	2.66	2.93	2.32	2.95	2.60	0.278	2.32	2.52	2.95
				2020	3.58	3.98	4.22	2.88	3.04	3.10	3.91	2.60	3.41	0.589	2.60	3.34	4.22
				2021	4.31	4.89	4.34	3.89	4.72	4.11	6.04	4.04	4.54	0.692	3.89	4.32	6.04
		Secondary Analytes															
		Barium	mg/kg	2010	110	35.3	66.6	69.8	66.0	-	-	-	69.5	26.6	35.3	66.6	110
				2015	69.5	61.1	69.0	61.1	88.2	-	-	-	69.8	11.1	61.1	69.0	88.2
				2018	8.49	8.20	30.8	13.8	11.9	7.74	5.45	16.0	12.8	8.07	5.45	10.2	30.8
				2019	24.9	138	8.33	36.2	9.03	43.6	41.3	24.7	40.8	41.5	8.33	30.6	138
				2020	42.2	23.4	86.8	21.0	48.0	85.9	52.8	76.9	54.6	26.2	21.0	50.4	86.8
				2021	42.2	41.4	75.2	65.6	155	77.6	63.2	132	81.5	41	41.4	70.4	155
		Cadmium	mg/kg	2010	0.495	0.214	0.339	0.369	0.312	-	-	-	0.346	0.102	0.214	0.339	0.495
				2015	0.904	1.33	0.989	0.594	0.760	-	-	-	0.915	0.276	0.594	0.904	1.33
				2018	0.608	0.553	1.67	0.359	2.74	0.304	0.346	2.22	1.10	0.968	0.304	0.580	2.74
				2019	0.311	1.46	0.124	1.01	0.235	0.298	0.996	0.321	0.594	0.489	0.124	0.316	1.46
				2020	1.38	0.359	1.85	0.563	1.03	1.23	1.09	1.67	1.15	0.508	0.359	1.16	1.85
				2021	0.950	0.814	0.463	0.529	0.594	0.665	0.800	0.604	0.677	0.164	0.463	0.634	0.950
		Calcium	mg/kg	2010	3,260	1,360	2,180	3,780	2,260	-	-	-	2,568	956	1,360	2,260	3,780
				2015	3,840	5,720	4,530	4,070	2,850	-	-	-	4,202	1,047	2,850	4,070	5,720
				2018	1,130	1,350	1,390	1,430	2,730	1,360	890	4,980	1,908	1,356	890	1,375	4,980
				2019	3,530	8,910	1,060	4,580	1,240	2,480	3,420	1,680	3,362	2,555	1,060	2,950	8,910
				2020	1,360	2,210	3,080	1,780	2,740	4,180	7,290	1,440	3,010	1,968	1,360	2,475	7,290
				2021	4,670	3,980	5,780	5,030	9,360	4,880	4,400	11,400	6,188	2,694	3,980	4,955	11,400
		Cobalt	mg/kg	2010	5.68	0.980	2.96	4.70	3.01	-	-	-	3.47	1.81	0.980	3.01	5.68
				2015	3.45	6.98	3.95	2.92	2.46	-	-	-	3.95	1.78	2.46	3.45	6.98
				2018	0.924	0.925	1.76	0.901	1.39	0.775	0.675	2.43	1.22	0.604	0.675	0.924	2.43
				2019	1.72	4.93	0.551	2.71	0.789	1.23	2.43	1.21	1.95	1.42	0.551	1.48	4.93
				2020	2.37	1.29	3.06	1.02	3.85	4.41	2.31	1.69	2.50	1.20	1.02	2.34	4.41
				2021	1.50	1.74	2.87	2.44	4.20	2.60	2.70	6.21	3.03	1.52	1.50	2.65	6.21
		Manganese	mg/kg	2010	1,710	701	981	1,020	1,320	-	-	-	1,146	384	701	1,020	1,710
				2015	188	242	201	189	199	-	-	-	204	22.1	188	199	242
				2018	107	124	772	140	150	103	104	319	227	231	103	132	772
				2019	219	1,370	133	445	112	201	222	351	382	414	112	220	1,370
				2020	994	254	1,300	469	973	938	921	658	813	333	254	930	1,300
				2021	777	684	522	320	449	224	186	490	456	209	186	470	777
		Mercury	mg/kg	2010	-	-	-	-	-	-	-	-	-	-	-	-	-
				2015	-	-	-	-	-	-	-	-	-	-	-	-	-
				2018	-	-	-	-	-	-	-	-	-	-	-	-	-
				2019	-	-	-	-	-	-	-	-	-	-	-	-	-
				2020	-	-	-	-	-	-	-	-	-	-	-	-	-
				2021	-	-	-	-	-	-	-	-	-	-	-	-	-
	HAC-D (Exposed)	Molybdenum	mg/kg	2010	3.88	3.74	4.49	9.25	4.32	-	-	-	5.14	2.32	3.74	4.32	9.25
				2015	1.18	1.37	1.38	0.924	1.47	-	-	-	1.26	0.218	0.924	1.37	1.47
				2018	3.28	3.23	3.92	5.12	2.22	4.95	3.79	1.70	3.53	1.19	1.70	3.54	5.12
				2019	6.52	3.18	3.83	3.54	3.67	4.19	0.835	4.51	3.78	1.57	0.835	3.75	6.52
				2020	3.58	3.19	2.33	3.14	3.27	3.61	4.07	3.42	3.33	0.501	2.33	3.34	4.07
				2021	1.50	1.42	1.34	1.04	1.69	1.61	3.34	3.77	1.96	1.01	1.04	1.56	3.77
		Nickel	mg/kg	2010	27.8	5.17	15.8	69.3	16.1	-	-	-	26.8	25.1	5.17	16.1	69.3
				2015	2.66	4.43	3.41	2.81	2.40	-	-	-	3.14	0.810	2.40	2.81	4.43
				2018	1.73	0.980	6.56	2.56	9.66	7.28	1.03	28.5	7.29	9.17	0.980	4.56	28.5
				2019	3.36	8.52	0.870	4.59	1.29	2.06	3.86	2.24	3.35	2.44	0.870	2.80	8.52
				2020	2.45	2.39	4.13	1.51	9.91	6.94	2.60	1.69	3.95	2.98	1.51	2.52	9.91
				2021	3.28	3.12	5.04	4.67	5.53	3.29	4.47	5.06	4.31	0.945	3.12	4.57	5.53
		Phosphorus	mg/kg	2010	-	-	-	-	-	-	-	-	-	-	-	-	-
				2015	2,840	1,940	2,990	2,650	4,150	-	-	-	2,914	800	1,940	2,840	4,150
				2018	7,140	7,220	8,900	6,450	7,900	6,380	6,600	8,370	7,370	935	6,380	7,180	8,900
				2019	7,610	6,510	6,590	6,870	6,660	5,970	8,840	6,580	6,954	888	5,970	6,625	8,840
				2020	7,590	8,610	9,740	7,500	6,570	8,790	9,170	6,690	8,082	1,166	6,570	8,100	9,740
				2021	7,750	8,870	13,300	11,300	11,800	9,470	6,870	6,830	9,524	2,405	6,830	9,170	13,300
		Silver	mg/kg	2010	-	-	-	-	-	-	-	-	-	-	-	-	-
				2015	0.214	0.125	0.126	0.0976	0.0684	-	-	-	0.126	0.0545	0.0684	0.125	0.214
				2018	-	-	-	-	-	-	-	-	-	-	-	-	-
				2019	0.0238	0.0759	0.00750	0.0647	0.0145	0.125	0.193	0.0519	0.0695	0.0629	0.00750	0.0583	0.193
				2020	0.0311	0.0167	0.0694	0.0111	0.0441	0.0598	0.0327	0.0196	0.0356	0.0208	0.0111	0.0319	0.0694
				2021	0.0397	0.0382	<0.080	<0.060	<0.125	<0.14	<0.045	<0.065	0.0390	0.00212	0.0382	0.0390	0.0397
		Sodium	mg/kg	2010	-	-	-	-	-	-	-	-	-	-	-	-	-
				2015	1,300	834	1,050	1,410	1,400	-	-	-	1,199	250	834	1,300	1,410
				2018	3,050	2,330	6,370	2,570	8,090	2,320	3,570	9,370	4,709	2,826	2,320	3,310	9,370
				2019	2,730	4,450	2,160	5,030	2,390	2,320	5,190	3,240	3,439	1,262	2,160	2,985	5,190
				2020	3,280	3,730	3,540	4,350	3,050	4,640	4,010	3,370	3,746	550	3,050	3,635	4,640
				2021	1,640	2,550	5,560	4,530	4,550	3,390	2,890	3,000	3,514	1,276	1,640	3,195	5,560
		Strontium	mg/kg	2010	29.5	10.3	19.8	24.5	19.5	-	-	-	20.7	7.11	10.3	19.8	29.5
				2015	26.5	37.6	26.6	28.3	22.9	-	-	-	28.4	5.52	22.9	26.6	37.6
				2018	9.24	9.02	7.83	9.69	15.1	9.07	5.99	18.9	10.6	4.24	5.99	9.15	18.9
				2019	19.0	47.5	6.79	29.7	8.00	15.3	19.3	10.3	19.5	13.5	6.79	17.2	47.5
				2020	12.0	12.8	16.9	9.01	12.4	24.1	18.6	9.79	14.4	5.08	9.01	12.6	24.1
				2021	19.9	25.3	57.3	43.7	58.2	31.7	26.0	72.6	41.8	19.1	19.9	37.7	72.6

Notes: For 2010 data at HAC-D and HAC-U, historical station codes were W11 and W7, respectively. All values reported in dry weight. Summary statistics reported to 3 significant figures for display purposes. "-" indicates no data available.

Table D.5.6: Composite-Taxa Benthic Invertebrate Tissue Primary and Secondary Analytes Concentrations for Upper Hazeltine Creek (HAC-R1, HAC-U; Exposed), Upper Edney Creek (EDC-U; Reference), Lower Hazeltine Creek (HAC-D; Exposed), and Lower Edney Creek Exposed (E1) and Reference (EDC-D), 2010 to 2021

Waterbody	Area	Parameter	Units	Year	Replicate								Mean	Standard Deviation	Minimum	Median	Maximum
					1	2	3	4	5	6	7	8					
Lower Hazeltine Creek	HAC-D (Exposed)	Tin	mg/kg	2010	0.360	<0.20	<0.20	0.250	<0.20	-	-	-	0.242	0.0622	<0.2	0.200	0.360
				2015	0.0145	0.0417	0.0426	0.0215	0.0111	-	-	-	0.0263	0.0150	0.0111	0.0215	0.0426
				2018	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.110	0.101	-	<0.1	0.100	0.110
				2019	0.330	0.450	0.180	0.200	0.710	0.230	1.19	0.140	0.429	0.360	0.140	0.280	1.19
				2020	<0.10	0.100	0.160	<0.10	<0.10	0.300	<0.10	<0.10	0.132	0.0812	<0.1	0.100	0.300
				2021	<0.10	<0.10	<0.10	<0.10	0.320	0.120	0.120	0.240	0.150	0.0833	<0.1	0.110	0.320
		Titanium	mg/kg	2010	-	-	-	-	-	-	-	-	-	-	-	-	-
				2015	50.0	60.4	62.8	56.0	11.8	-	-	-	48.2	20.9	11.8	56.0	62.8
				2018	-	-	-	-	-	-	-	-	-	-	-	-	-
				2019	64.0	138	21.3	113	35.9	60.2	114	60.8	75.9	41.2	21.3	62.4	138
				2020	17.4	51.4	63.8	29.8	112	170	52.4	18.6	64.4	52.4	17.4	51.9	170
				2021	46.8	82.2	155	157	322	168	185	575	211	168	46.8	162	575
		Uranium	mg/kg	2010	0.334	0.0550	0.172	0.272	0.183	-	-	-	0.203	0.106	0.0550	0.183	0.334
				2015	0.215	0.262	0.240	0.200	0.185	-	-	-	0.220	0.0309	0.185	0.215	0.262
				2018	0.0399	0.0436	0.0374	0.0329	0.0815	0.0328	0.0199	0.0610	0.0436	0.0192	0.0199	0.0386	0.0815
				2019	0.0993	0.303	0.0168	0.127	0.0279	0.0664	0.108	0.0475	0.0995	0.0910	0.0168	0.0828	0.303
				2020	0.0531	0.0826	0.123	0.0332	0.157	0.290	0.0844	0.0377	0.108	0.0849	0.0332	0.0835	0.290
				2021	0.123	0.124	0.127	0.0985	0.140	0.0883	0.0756	0.305	0.135	0.0720	0.0756	0.124	0.305
		Vanadium	mg/kg	2010	17.8	4.21	11.4	12.6	9.11	-	-	-	11.0	4.97	4.21	11.4	17.8
				2015	46.4	60.2	51.7	41.9	20.6	-	-	-	44.2	14.8	20.6	46.4	60.2
				2018	3.67	2.90	2.72	3.74	6.22	4.60	1.46	7.20	4.06	1.89	1.46	3.70	7.20
				2019	6.59	22.0	1.77	12.5	3.15	4.62	8.81	5.12	8.07	6.56	1.77	5.86	22.0
				2020	2.08	5.58	7.96	3.18	16.4	21.3	7.58	1.57	8.21	7.10	1.57	6.58	21.3
				2021	5.79	8.03	14.2	12.9	27.9	12.7	15.5	43.5	17.6	12.4	5.79	13.6	43.5
		Zinc	mg/kg	2010	112	91.1	95.5	113	92.1	-	-	-	101	10.9	91.1	95.5	113
				2015	110	120	111	101	110	-	-	-	110	6.73	101	110	120
				2018	124	131	199	113	133	86.2	95.7	142	128	34.4	86.2	128	199
				2019	101	182	85.2	116	83.9	84.8	145	97.3	112	35.0	83.9	99.2	182
				2020	326	168	450	125	199	261	349	329	276	108	125	294	450
				2021	208	190	151	126	144	148	110	110	148	35.4	110	146	208
Lower Edney Creek	E1 (Exposed)	**Primary Analytes**															
		Arsenic	mg/kg	2019	1.01	0.727	2.59	1.21	6.13	1.59	2.06	1.64	2.12	1.72	0.727	1.62	6.13
				2020	1.01	1.19	1.45	1.47	1.19	2.07	1.57	1.25	1.40	0.327	1.01	1.35	2.07
				2021	1.77	4.49	2.10	3.56	4.32	4.30	3.40	4.82	3.60	1.13	1.77	3.93	4.82
		Copper	mg/kg	2019	33.6	26.2	27.7	30.6	60.3	26.2	32.6	29.4	33.3	11.2	26.2	30.0	60.3
				2020	36.7	33.1	50.3	74.2	53.1	62.2	65.9	45.4	52.6	14.3	33.1	51.7	74.2
				2021	23.1	62.5	36.6	95.9	82.0	123	132	182	92.1	52.7	23.1	89	182
		Iron	mg/kg	2019	482	703	3,810	2,610	5,380	1,570	1,240	1,410	2,151	1,690	482	1,490	5,380
				2020	1,340	2,490	2,740	2,110	1,980	3,880	1,970	1,970	2,310	756	1,340	2,045	3,880
				2021	1,100	2,320	1,040	2,740	2,370	4,040	2,920	5,470	2,750	1,467	1,040	2,555	5,470
		Selenium	mg/kg	2019	1.40	1.33	1.02	1.49	1.31	2.45	1.53	2.40	1.62	0.522	1.02	1.44	2.45
				2020	1.27	0.900	2.08	1.82	1.67	1.48	1.41	1.45	1.51	0.357	0.900	1.46	2.08
				2021	2.42	3.15	2.11	2.36	2.29	2.94	2.06	3.05	2.55	0.434	2.06	2.39	3.15
		Secondary Analytes															
		Barium	mg/kg	2019	6.38	5.62	36.2	9.87	33.3	14.7	18.9	6.49	16.4	12.2	5.62	12.3	36.2
				2020	10.9	12.0	105	14.3	13.0	23.3	15.4	13.1	25.9	32.2	10.9	13.7	105
				2021	14.3	23.3	11.5	21.4	25.2	44.3	41.6	46.3	28.5	13.7	11.5	24.2	46.3
		Cadmium	mg/kg	2019	0.668	1.30	0.521	1.02	0.546	1.35	0.754	0.897	0.882	0.320	0.521	0.826	1.35
				2020	0.798	0.723	1.38	1.33	1.49	0.775	0.785	0.821	1.01	0.325	0.723	0.810	1.49
				2021	1.50	2.93	0.983	2.72	1.52	2.30	1.94	3.72	2.20	0.896	0.983	2.12	3.72
		Calcium	mg/kg	2019	2,630	2,830	2,850	2,080	3,800	2,320	1,660	1,870	2,505	681	1,660	2,475	3,800
				2020	2,230	3,020	4,190	2,400	1,970	3,420	2,130	2,300	2,708	772	1,970	2,350	4,190
				2021	1,900	2,990	1,350	2,790	1,890	3,010	3,070	4,940	2,742	1,099	1,350	2,890	4,940
		Cobalt	mg/kg	2019	0.640	0.965	2.26	1.61	2.85	1.40	1.53	1.19	1.56	0.709	0.640	1.46	2.85
				2020	1.27	1.34	2.09	1.60	1.65	1.98	1.70	1.32	1.62	0.305	1.27	1.62	2.09
				2021	1.23	2.92	1.08	3.36	1.90	3.98	3.02	4.46	2.74	1.24	1.08	2.97	4.46
		Manganese	mg/kg	2019	119	126	380	169	546	234	310	107	249	155	107	202	546
				2020	268	190	244	386	325	553	283	348	325	111	190	304	553
				2021	225	351	216	258	186	299	1,130	818	435	347	186	278	1,130
		Mercury	mg/kg	2019	0.0810	0.0890	0.0940	0.0640	0.145	0.122	0.0910	0.0910	0.0971	0.0251	0.0640	0.0910	0.145
				2020	0.0753	0.119	0.108	0.0901	0.107	0.0609	0.0948	0.0656	0.0901	0.0212	0.0609	0.0924	0.119
				2021	0.0730	0.0648	0.0519	0.0622	0.0535	0.0669	0.0680	0.0990	0.0674	0.0146	0.0519	0.0659	0.0990
		Molybdenum	mg/kg	2019	0.517	0.765	1.42	0.348	0.732	0.784	0.905	0.604	0.759	0.319	0.348	0.748	1.42
				2020	0.683	0.582	0.660	0.550	0.556	1.87	0.627	0.935	0.808	0.446	0.550	0.644	1.87
				2021	0.646	0.846	2.06	1.01	1.88	0.974	1.48	0.914	1.23	0.518	0.646	0.992	2.06
		Nickel	mg/kg	2019	1.12	0.880	4.25	2.50	7.35	2.10	2.16	2.49	2.86	2.08	0.880	2.33	7.35
				2020	2.11	1.80	8.06	2.80	2.20	3.28	2.57	2.78	3.20	2.02	1.80	2.68	8.06
				2021	1.93	4.40	1.52	3.54	2.09	4.80	3.32	5.34	3.37	1.42	1.52	3.43	5.34
		Phosphorus	mg/kg	2019	9,150	8,570	5,920	7,380	7,820	7,980	9,350	8,300	8,059	1,087	5,920	8,140	9,350
				2020	7,340	4,610	9,180	7,510	6,420	7,210	6,860	9,070	7,275	1,460	4,610	7,275	9,180
				2021	10,100	10,000	8,770	9,080	9,210	8,830	8,940	9,600	9,316	522	8,770	9,145	10,100
		Silver	mg/kg	2019	0.0939	0.0425	0.0435	0.0775	0.146	0.0881	0.105	0.0949	0.0864	0.0335	0.0425	0.0910	0.146
				2020	0.0760	0.0663	0.104	0.102	0.0643	0.0836	0.0917	0.0684	0.0820	0.0159	0.0643	0.0798	0.104
				2021	0.139	0.0687	0.0328	0.0442	0.0473	0.0797	0.0655	0.0826	0.0700	0.0330	0.0328	0.0671	0.139
		Sodium	mg/kg	2019	5,670	10,600	3,710	8,260	4,730	10,200	4,860	4,980	6,626	2,675	3,710	5,325	10,600
				2020	9,060	4,830	11,600	5,370	7,270	3,100	5,000	9,340	6,946	2,866	3,100	6,320	11,600
				2021	9,530	4,840	2,910	3,860	3,450	3,450	3,510	4,080	4,454	2,128	2,910	3,685	9,530
		Strontium	mg/kg	2019	11.9	9.19	14.1	7.98	23.0	10.1	10.4	7.97	11.8	4.95	7.97	10.2	23.0
				2020	14.1	7.81	14.8	12.5	11.9	18.4	17.5	12.1	13.6	3.38	7.81	13.3	18.4
				2021	10.8	19.4	9.55	17.1	13.6	21.6	20.3	28.6	17.6	6.27	9.55	18.2	28.6
		Tin	mg/kg	2019	0.420	0.450	0.230	0.440	0.500	0.690	0.430	0.500	0.458	0.126	0.230	0.445	0.690
				2020	<0.10	<0.10	<0.10	0.120	0.130	0.110	0.120	0.100	0.110	0.0125	<0.1	0.105	0.130
				2021	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	-	<0.1	<0.1	<0.1
		Titanium	mg/kg	2019	8.15	18.2	102	107	146	38.9	29.4	38.3	61	50.2	8.15	38.6	146
				2020	30.2	69.4	146	57.5	53.0	101	67.3	39.9	70.5	37.2	30.2	62.4	146
				2021	32.5	51.1	22.2	71.9	81.8	110	65.4	149	73	41.4	22.2	68.7	149
		Uranium	mg/kg	2019	0.0216	0.0193	0.0915	0.0713	0.222	0.0582	0.0591	0.0484	0.0739	0.0645	0.0193	0.0586	0.222
				2020	0.120	0.0634	0.0924	0.0772	0.0790	0.0862	0.0935	0.0722	0.0855	0.0172	0.0634	0.0826	0.120
				2021	0.0501	0.108	0.0517	0.0827	0.0665	0.114	0.119	0.152	0.0930	0.0362	0.0501	0.0954	0.152
		Vanadium	mg/kg	2019	0.850	1.56	9.97	8.22	14.1	3.48	2.65	2.85	5.46	4.75	0.850	3.16	14.1
				2020	2.90	10.2	6.96	5.40	5.98	13.1	5.82	4.72	6.88	3.26	2.90	5.90	13.1
				2021	2.84	5.06	2.29	7.17	6.56	12.1	7.63	15.6	7.41	4.51	2.29	6.86	15.6
		Zinc	mg/kg	2019	137	130	140	112	165	134	202	121	143	28.5	112	136	202
				2020	124	91.9	181	154	133	174	122	164	143	30.4	91.9	144	181
				2021	141	135	107	110	118	140	142	146	130	15.7	107	138	146

Notes: For 2010 data at HAC-D and HAC-U, historical station codes were W11 and W7, respectively. All values reported in dry weight. Summary statistics reported to 3 significant figures for display purposes. "-" indicates no data available.

Table D.5.7: Trophic Transfer Factors for Caddisfly Tissue Primary and Secondary Analytes Concentrations for Upper Hazeltine Creek (HAC-R1, HAC-U; Exposed), Upper Edney Creek (EDC-U; Reference), Lower Hazeltine Creek (HAC-D; Exposed), and Lower Edney Creek Exposed (E1) and Reference (EDC) Areas, 2018 to 2022

Waterbody	Area	Parameter	Units	Year	Replicate								Mean	Standard Deviation	Minimum	Median	Maximum
					1	2	3	4	5	6	7	8					
Upper Edney Creek	EDC-U (Reference)	**Primary Analytes**															
		Arsenic	mg/kg	2018	0.141	0.169	0.164	0.194	0.0480	0.287	0.0763	0.0657	0.143	0.0792	0.0480	0.153	0.287
				2019	0.198	0.121	0.0638	0.101	0.227	0.130	0.139	0.0900	0.134	0.0547	0.0638	0.126	0.227
				2020	0.0833	0.0397	0.0275	0.0658	0.0558	0.100	0.0251	0.0109	0.0510	0.0308	0.0109	0.0478	0.100
				2021	0.327	0.0654	0.224	0.142	0.123	0.319	0.0477	0.141	0.174	0.106	0.0477	0.142	0.327
				2022	0.0939	0.0320	0.0369	0.0781	0.00932	0.0289	0.0170	0.00953	0.0382	0.0315	0.00932	0.0304	0.0939
		Copper	mg/kg	2018	0.480	0.812	0.797	0.734	0.425	0.688	0.586	0.404	0.616	0.165	0.404	0.637	0.812
				2019	1.03	0.780	0.601	0.851	0.725	0.959	0.960	0.370	0.784	0.218	0.370	0.816	1.03
				2020	0.770	0.842	1.10	0.854	0.516	0.665	0.862	0.725	0.791	0.169	0.516	0.806	1.10
				2021	0.875	0.451	0.822	0.496	0.393	0.989	0.247	0.608	0.610	0.261	0.247	0.552	0.989
				2022	0.692	0.295	0.394	0.698	0.333	0.346	0.387	0.393	0.442	0.160	0.295	0.390	0.698
		Iron	mg/kg	2018	0.0565	0.0768	0.104	0.0734	0.0351	0.0808	0.0305	0.0212	0.0598	0.0289	0.0212	0.0650	0.104
				2019	0.0621	0.0188	0.0301	0.0530	0.189	0.0479	0.757	0.120	0.160	0.248	0.0188	0.0575	0.757
				2020	0.0764	0.0303	0.105	0.118	0.0562	0.0645	0.0311	0.0202	0.0628	0.0359	0.0202	0.0603	0.118
				2021	0.165	0.0568	0.129	0.0628	0.0643	0.176	0.0267	0.173	0.107	0.0605	0.0267	0.0965	0.176
				2022	0.0502	0.00413	0.0107	0.159	0.00288	0.00899	0.00442	0.00874	0.0312	0.0541	0.00288	0.00886	0.159
		Selenium	mg/kg	2018	0.507	0.906	1.55	1.23	0.784	1.20	0.919	0.659	0.970	0.341	0.507	0.912	1.55
				2019	0.701	1.11	1.21	0.542	0.675	1.17	1.39	0.881	0.959	0.302	0.542	0.996	1.39
				2020	0.743	0.442	0.918	2.10	1.06	0.800	1.11	1.70	1.11	0.541	0.442	0.989	2.10
				2021	1.20	0.914	1.61	1.38	0.822	1.45	0.842	1.80	1.25	0.369	0.822	1.29	1.80
				2022	1.90	0.694	0.829	0.843	0.637	0.766	1.23	1.00	0.988	0.413	0.637	0.836	1.90
		Secondary Analytes															
		Barium	mg/kg	2018	0.377	0.650	0.338	0.444	0.131	0.682	0.264	0.244	0.391	0.194	0.131	0.358	0.682
				2019	0.606	0.273	0.0463	0.170	0.0993	0.188	0.135	0.0273	0.193	0.185	0.0273	0.153	0.606
				2020	0.127	0.872	0.0781	0.204	0.0881	0.316	0.0854	0.0547	0.228	0.274	0.0547	0.108	0.872
				2021	0.767	0.563	0.921	0.258	0.694	1.47	0.132	0.222	0.628	0.442	0.132	0.628	1.47
				2022	0.0167	0.00576	0.0332	0.142	0.00569	0.0142	0.0105	0.00277	0.0289	0.0467	0.00277	0.0123	0.142
		Cadmium	mg/kg	2018	0.601	1.54	1.04	1.05	0.286	1.16	0.395	0.466	0.816	0.442	0.286	0.819	1.54
				2019	0.940	0.518	0.0509	0.282	0.119	0.554	0.190	0.0306	0.336	0.314	0.0306	0.236	0.940
				2020	0.353	0.772	0.204	0.415	0.280	0.970	0.309	0.315	0.452	0.271	0.204	0.334	0.970
				2021	1.33	0.821	2.52	0.445	1.12	3.06	0.204	0.379	1.23	1.04	0.204	0.971	3.06
				2022	0.201	-	0.108	0.385	0.0170	0.0404	0.0142	0.00618	0.110	0.140	0.00618	0.0404	0.385
		Calcium	mg/kg	2018	0.0731	0.176	0.0727	0.0905	0.0951	0.108	0.0979	0.0704	0.0979	0.0342	0.0704	0.0928	0.176
				2019	0.159	0.0778	0.169	0.204	0.455	0.287	0.356	0.189	0.237	0.122	0.0778	0.197	0.455
				2020	0.256	0.210	0.381	0.282	0.212	0.299	0.303	0.233	0.272	0.0573	0.210	0.269	0.381
				2021	0.195	0.148	0.272	0.133	0.202	0.334	0.126	0.235	0.206	0.0725	0.126	0.198	0.334
				2022	0.0738	0.0439	0.0632	0.154	0.0426	0.0622	0.0673	0.0493	0.0696	0.0361	0.0426	0.0627	0.154
		Cobalt	mg/kg	2018	0.161	0.310	0.177	0.311	0.0781	0.249	0.124	0.116	0.191	0.0893	0.0781	0.169	0.311
				2019	0.253	0.114	0.0231	0.108	0.143	0.109	0.298	0.0368	0.136	0.0961	0.0231	0.111	0.298
				2020	0.111	0.181	0.0693	0.123	0.0662	0.176	0.0616	0.0400	0.103	0.0535	0.0400	0.0900	0.181
				2021	0.397	0.240	0.527	0.196	0.343	0.671	0.0856	0.184	0.331	0.195	0.0856	0.292	0.671
				2022	0.0242	0.00680	0.0200	0.138	0.00699	0.0157	0.0110	0.00423	0.0284	0.0450	0.00423	0.0133	0.138
		Manganese	mg/kg	2018	0.273	0.492	0.204	0.400	0.164	0.392	0.262	0.234	0.303	0.113	0.164	0.268	0.492
				2019	0.233	0.178	0.0204	0.119	0.0481	0.166	0.0772	0.0115	0.107	0.0807	0.0115	0.0981	0.233
				2020	0.167	0.455	0.0822	0.169	0.0922	0.454	0.130	0.0726	0.203	0.159	0.0726	0.149	0.455
				2021	0.505	0.454	1.01	0.271	0.517	2.01	0.110	0.195	0.635	0.622	0.110	0.480	2.01
				2022	0.0294	0.0126	0.0354	0.161	0.00842	0.0255	0.0127	0.00479	0.0362	0.0515	0.00479	0.0191	0.161
		Mercury	mg/kg	2018	0.481	0.745	1.35	1.16	0.436	0.759	0.459	0.391	0.722	0.360	0.391	0.613	1.35
				2019	0.552	0.577	0.389	0.628	0.129	0.287	0.430	0.167	0.395	0.188	0.129	0.409	0.628
				2020	0.350	0.198	0.841	0.808	0.763	0.508	0.599	0.412	0.560	0.234	0.198	0.553	0.841
				2021	0.574	0.772	0.698	0.342	0.0952	1.11	0.409	0.573	0.572	0.305	0.0952	0.573	1.11
				2022	0.860	0.187	0.209	0.577	0.210	0.366	0.423	0.560	0.424	0.234	0.187	0.395	0.860
		Molybdenum	mg/kg	2018	0.718	1.10	0.891	1.38	0.592	2.18	1.33	0.703	1.11	0.521	0.592	0.994	2.18
				2019	4.22	5.89	4.96	4.49	6.27	6.49	1.63	3.25	4.65	1.64	1.63	4.72	6.49
				2020	0.220	0.340	0.253	0.530	0.314	0.559	0.149	2.18	0.568	0.667	0.149	0.327	2.18
				2021	1.22	0.420	1.94	2.75	0.826	3.58	1.02	1.78	1.69	1.06	0.420	1.50	3.58
				2022	10.2	7.46	5.99	0.446	3.51	2.87	3.04	1.10	4.32	3.31	0.446	3.28	10.2
		Nickel	mg/kg	2018	0.132	0.251	0.209	0.234	0.0639	0.190	0.0873	0.0680	0.154	0.0761	0.0639	0.161	0.251
				2019	0.160	0.0629	0.0202	0.0708	0.124	0.105	0.190	0.0500	0.0979	0.0579	0.0202	0.0877	0.190
				2020	0.103	0.199	0.0713	0.136	0.0682	0.105	0.0865	0.0422	0.101	0.0484	0.0422	0.0948	0.199
				2021	0.250	0.153	0.346	0.0839	0.169	0.330	0.0197	0.117	0.184	0.116	0.0197	0.161	0.346
				2022	0.0127	-	0.0174	0.160	-	0.00769	0.00470	0.00460	0.0345	0.0616	0.00460	0.0102	0.160
		Phosphorus	mg/kg	2018	3.17	4.94	5.01	4.38	4.27	5.33	4.74	4.24	4.51	0.667	3.17	4.56	5.33
				2019	3.70	5.29	3.82	3.10	1.88	9.41	2.20	2.58	4.00	2.44	1.88	3.40	9.41
				2020	7.05	3.10	5.27	4.40	3.59	4.79	7.52	5.09	5.10	1.54	3.10	4.94	7.52
				2021	5.11	4.62	7.29	5.77	4.44	7.25	3.23	5.65	5.42	1.39	3.23	5.38	7.29
				2022	2.84	2.29	2.36	2.54	2.24	2.88	3.06	3.03	2.66	0.339	2.24	2.69	3.06
		Silver	mg/kg	2018	-	-	-	-	-	-	-	-	-	-	-	-	-
				2019	0.701	0.534	0.494	0.348	0.346	0.418	0.670	0.319	0.479	0.148	0.319	0.456	0.701
				2020	0.606	0.308	1.03	1.27	0.666	0.611	0.562	0.661	0.714	0.298	0.308	0.636	1.27
				2021	0.618	0.318	0.769	0.324	0.596	0.973	0.273	0.570	0.555	0.244	0.273	0.583	0.973
				2022	2.46	0.276	0.228	0.989	0.182	0.257	0.269	0.285	0.619	0.790	0.182	0.273	2.46
		Sodium	mg/kg	2018	4.74	12.2	6.63	5.34	8.79	5.99	13.2	10.3	8.39	3.21	4.74	7.71	13.2
				2019	11.5	7.61	3.40	8.82	3.33	15.3	4.07	4.09	7.27	4.42	3.33	5.85	15.3
				2020	24.3	18.5	-	6.63	10.7	16.3	10.6	18.0	15.0	6.03	6.63	16.3	24.3
				2021	17.4	10.1	8.15	13.7	15.5	10.6	9.48	13.2	12.3	3.21	8.15	11.9	17.4
				2022	18.4	9.14	11.0	16.3	10.1	11.6	13.8	20.3	13.8	4.09	9.14	12.7	20.3
		Strontium	mg/kg	2018	0.0924	0.243	0.0918	0.125	0.118	0.144	0.176	0.102	0.136	0.0514	0.0918	0.121	0.243
				2019	0.157	0.0750	0.165	0.185	0.331	0.262	0.150	0.141	0.183	0.0791	0.0750	0.161	0.331
				2020	0.221	0.244	0.241	0.235	0.193	0.290	0.324	0.221	0.246	0.0419	0.193	0.238	0.324
				2021	0.200	0.175	0.253	0.124	0.209	0.282	0.117	0.186	0.193	0.0568	0.117	0.193	0.282
				2022	0.0538	0.0342	0.0523	0.120	0.0335	0.0424	0.0515	0.0300	0.0522	0.0290	0.0300	0.0469	0.120
		Tin	mg/kg	2018	-	-	-	-	-	0.440	-	1.36	0.902	0.653	0.440	0.902	1.36
				2019	0.789	0.617	0.385	0.547	0.0737	0.0846	0.186	0.116	0.350	0.276	0.0737	0.285	0.789
				2020	-	-	-	-	-	0.333	-	-	0.333	-	0.333	0.333	0.333
				2021	-	-	-	-	-	-	-	-	-	-	-	-	-
				2022	-	-	-	-	-	-	-	-	-	-	-	-	-
		Titanium	mg/kg	2018	-	-	-	-	-	-	-	-	-	-	-	-	-
				2019	0.0755	0.0115	0.0164	0.0752	0.350	0.0308	0.842	0.128	0.191	0.285	0.0115	0.0754	0.842
				2020	0.0691	0.0722	0.0939	0.127	0.0541	0.0453	0.0264	0.0557	0.0679	0.0310	0.0264	0.0624	0.127
				2021	0.162	0.0813	0.117	0.0493	0.0511	0.147	0.0191	0.129	0.0944	0.0518	0.0191	0.0992	0.162
				2022	0.0346	0.00210	0.0105	0.369	0.00296	0.00717	0.00297	0.00647	0.0545	0.128	0.00210	0.00682	0.369
		Uranium	mg/kg	2018	0.139	0.347	0.267	0.304	0.0629	0.309	0.111	0.0566	0.200	0.119	0.0566	0.203	0.347
				2019	0.217	0.0750	0.0399	0.132	0.196	0.0948	0.118	0.159	0.129	0.0602	0.0399	0.125	0.217
				2020	0.304	0.254	0.421	0.388	0.302	0.223	0.252	0.0706	0.277	0.108	0.0706	0.278	0.421
				2021	0.437	0.238	0.385	0.191	0.205	0.477	0.0724	0.366	0.297	0.141	0.0724	0.302	0.477
				2022	0.0170	0.00358	0.0140	0.356	0.00370	0.00838	0.00470	0.00494	0.0516	0.123	0.00358	0.00666	0.356
		Vanadium	mg/kg	2018	0.0515	0.0801	0.101	0.0567	0.0455	0.0661	0.0244	0.0167	0.0552	0.0276	0.0167	0.0541	0.101
				2019	0.0633	0.0161	0.0261	0.0630	0.203	0.0458	1.13	0.111	0.207	0.376	0.0161	0.0632	1.13
				2020	0.0976	0.0248	0.117	0.114	0.0572	0.0874	0.0456	0.0239	0.0710	0.0381	0.0239	0.0723	0.117
				2021	0.172	0.0569	0.123	0.0617	0.0658	0.163	0.0292	0.148	0.102	0.0553	0.0292	0.0944	0.172
				2022	0.0383	0.00515	0.0104	0.136	0.00213	0.00678	0.00510	0.00472	0.0260	0.0458	0.00213	0.00597	0.136
		Zinc	mg/kg	2018	3.19	3.48	2.78	1.96	3.16	2.84	3.20	3.25	2.98	0.471	1.96	3.17	3.48
				2019	3.52	4.42	1.04	1.96	1.46	3.07	1.97	0.579	2.25	1.31	0.579	1.96	4.42
				2020	2.46	5.84	2.49	2.22	2.01	5.47	3.40	2.93	3.35	1.48	2.01	2.71	5.84
				2021	3.61	2.46	3.19	2.12	2.21	3.32	1.43	1.64	2.50	0.803	1.43	2.33	3.61
				2022	0.669	0.547	0.818	0.921	0.414	0.694	0.781	0.312	0.644	0.208	0.312	0.681	0.921

Notes: For 2010 data at HAC-D and HAC-U, historical station codes were W11 and W7, respectively. All values reported in dry weight. Summary statistics reported to 3 significant figures for display purposes. TTF calculated as Benthic Invertebrate Analyte Concentration/Periphyton Analyte Concentration. "-" = data were not available to calculate a TTF or TTF was not calculated because the concentration of an analyte was below the Laboratory Reporting Limit (LRL) for either the periphyton or benthic invertebrate tissue results.

Table D.5.7: Trophic Transfer Factors for Caddisfly Tissue Primary and Secondary Analytes Concentrations for Upper Hazeltine Creek (HAC-R1, HAC-U; Exposed), Upper Edney Creek (EDC-U; Reference), Lower Hazeltine Creek (HAC-D; Exposed), and Lower Edney Creek Exposed (E1) and Reference (EDC) Areas, 2018 to 2022

Waterbody	Area	Parameter	Units	Year	Replicate								Mean	Standard Deviation	Minimum	Median	Maximum
					1	2	3	4	5	6	7	8					
Upper Hazeltine Creek Reach 1	HAC-R1 (Exposed)	**Primary Analytes**															
		Arsenic	mg/kg	2017	0.420	0.385	0.198	0.267	0.384	0.488	0.290	0.513	0.368	0.109	0.198	0.384	0.513
				2018	1.22	1.01	0.724	0.410	0.218	2.21	1.07	1.02	0.983	0.603	0.218	1.01	2.21
				2019	0.845	1.72	0.850	0.918	0.787	1.20	1.13	1.29	1.09	0.313	0.787	1.02	1.72
				2020	0.579	0.611	0.250	0.759	0.621	0.366	0.424	0.217	0.478	0.194	0.217	0.501	0.759
				2021	0.411	0.552	0.318	2.66	6.36	0.335	0.236	0.439	1.41	2.16	0.236	0.425	6.36
				2022	0.0957	0.0857	0.203	0.149	0.184	0.154	0.0930	0.0851	0.131	0.0474	0.0851	0.122	0.203
		Copper	mg/kg	2017	1.65	1.67	0.525	0.805	1.34	2.04	1.37	1.12	1.32	0.492	0.525	1.35	2.04
				2018	3.36	3.38	0.773	0.737	0.429	5.62	3.93	3.51	2.72	1.86	0.429	3.37	5.62
				2019	3.04	3.94	2.32	3.59	2.98	6.74	5.85	5.71	4.27	1.61	2.32	3.76	6.74
				2020	1.84	1.81	0.604	1.16	1.38	0.797	0.840	0.568	1.12	0.508	0.568	1.00	1.84
				2021	1.24	1.87	0.700	3.62	7.00	1.09	0.240	0.964	2.09	2.23	0.240	1.17	7.00
				2022	0.273	0.128	0.448	0.261	0.391	0.405	0.249	0.102	0.282	0.127	0.102	0.267	0.448
		Iron	mg/kg	2017	0.455	0.213	0.151	0.137	0.365	0.301	0.382	0.575	0.322	0.153	0.137	0.333	0.575
				2018	2.91	2.23	0.541	0.403	0.203	2.79	2.11	3.18	1.80	1.22	0.203	2.17	3.18
				2019	2.21	3.41	2.41	1.62	1.62	2.36	3.42	4.22	2.66	0.932	1.62	2.38	4.22
				2020	0.914	0.665	0.0958	0.677	0.531	0.261	0.335	0.146	0.453	0.290	0.0958	0.433	0.914
				2021	0.564	1.34	0.351	19.2	31.3	0.763	0.0791	0.537	6.76	11.9	0.0791	0.664	31.3
				2022	0.0335	0.0410	0.117	0.0464	0.113	0.119	0.0393	0.0230	0.0666	0.0418	0.0230	0.0437	0.119
		Selenium	mg/kg	2017	2.29	3.43	2.04	1.83	2.20	3.76	2.82	2.91	2.66	0.689	1.83	2.55	3.76
				2018	3.29	2.51	4.96	3.55	1.03	6.73	2.74	3.16	3.50	1.71	1.03	3.23	6.73
				2019	3.21	2.79	3.09	3.55	-	2.75	2.24	3.01	2.95	0.410	2.24	3.01	3.55
				2020	2.26	2.95	2.29	2.61	1.88	2.94	3.53	2.08	2.57	0.547	1.88	2.45	3.53
				2021	-	-	5.65	2.76	3.82	4.42	4.43	6.61	4.61	1.35	2.76	4.43	6.61
				2022	2.03	2.81	2.39	2.70	5.33	5.13	5.21	2.79	3.55	1.41	2.03	2.80	5.33
		Secondary Analytes															
		Barium	mg/kg	2017	0.181	0.317	0.0513	0.0759	0.320	0.0885	0.0880	0.169	0.161	0.107	0.0513	0.129	0.320
				2018	1.29	0.700	0.459	0.0408	0.202	1.59	0.765	0.898	0.744	0.523	0.0408	0.732	1.59
				2019	0.547	0.784	0.654	0.311	0.381	0.529	0.692	1.72	0.702	0.439	0.311	0.600	1.72
				2020	0.287	0.323	0.0416	0.371	0.379	0.124	0.117	0.0510	0.212	0.143	0.0416	0.206	0.379
				2021	0.0500	0.0851	0.0471	1.80	0.630	0.0737	0.0333	0.0166	0.342	0.623	0.0166	0.0618	1.80
				2022	0.0117	0.0120	0.0359	0.00856	0.0840	0.0638	0.0101	0.0354	0.0327	0.0282	0.00856	0.0237	0.0840
		Cadmium	mg/kg	2017	1.08	1.82	0.767	1.02	1.13	0.946	0.997	1.48	1.16	0.336	0.767	1.05	1.82
				2018	0.845	1.40	1.05	1.33	0.916	3.94	1.67	1.60	1.59	0.996	0.845	1.37	3.94
				2019	1.03	1.94	1.39	0.400	1.77	2.23	2.05	2.02	1.60	0.625	0.400	1.86	2.23
				2020	1.89	1.54	-	0.626	0.838	0.520	0.293	0.451	0.880	0.604	0.293	0.626	1.89
				2021	-	0.848	0.955	2.42	3.61	0.161	0.338	0.479	1.26	1.28	0.161	0.848	3.61
				2022	-	-	0.142	-	0.687	0.205	0.194	0.181	0.282	0.228	0.142	0.194	0.687
		Calcium	mg/kg	2017	0.0412	0.0261	0.00827	0.00762	0.0138	0.0266	0.0243	0.0326	0.0226	0.0118	0.00762	0.0252	0.0412
				2018	0.0436	0.0251	0.0257	0.0303	0.0136	0.0419	0.0200	0.0232	0.0279	0.0104	0.0136	0.0254	0.0436
				2019	0.0446	0.0795	0.0581	0.0342	0.0233	0.0251	0.0431	0.0252	0.0416	0.0195	0.0233	0.0387	0.0795
				2020	0.0209	0.0124	0.00410	0.0179	0.0108	0.00396	0.00430	0.00182	0.00952	0.00713	0.00182	0.00754	0.0209
				2021	0.00392	0.00652	0.00698	0.0415	0.0401	0.00308	0.00233	0.00259	0.0134	0.0170	0.00233	0.00522	0.0415
				2022	0.00222	0.00208	0.00241	0.00159	0.00381	0.00287	0.00269	0.00334	0.00263	0.000713	0.00159	0.00255	0.00381
		Cobalt	mg/kg	2017	0.567	0.257	0.285	0.270	0.619	0.391	0.569	0.665	0.453	0.170	0.257	0.479	0.665
				2018	1.81	2.02	0.734	0.407	0.269	3.71	2.40	3.82	1.90	1.39	0.269	1.92	3.82
				2019	2.12	3.42	2.12	1.60	1.90	2.33	3.34	3.71	2.57	0.799	1.60	2.22	3.71
				2020	0.942	0.929	0.125	0.753	0.600	0.372	0.348	0.230	0.537	0.315	0.125	0.486	0.942
				2021	0.381	0.546	0.226	5.86	4.44	0.289	0.0906	0.107	1.49	2.29	0.0906	0.335	5.86
				2022	0.0315	0.0327	0.131	0.0426	0.163	0.0984	0.0465	0.0775	0.0779	0.0491	0.0315	0.0620	0.163
		Manganese	mg/kg	2017	1.53	2.00	0.810	0.780	1.44	1.87	1.54	1.53	1.44	0.439	0.780	1.53	2.00
				2018	1.08	1.61	0.976	0.879	0.498	4.02	1.62	1.98	1.58	1.10	0.498	1.34	4.02
				2019	1.15	1.42	0.776	1.21	1.77	2.15	2.69	2.57	1.72	0.698	0.776	1.60	2.69
				2020	0.831	0.989	0.0983	0.590	0.363	0.347	0.268	0.240	0.466	0.310	0.0983	0.355	0.989
				2021	0.536	0.632	0.437	2.83	2.66	0.150	0.167	0.146	0.945	1.13	0.146	0.487	2.83
				2022	0.0802	0.0509	0.304	0.0428	0.196	0.153	0.0848	0.175	0.136	0.0887	0.0428	0.119	0.304
		Mercury	mg/kg	2017	3.44	3.72	2.41	2.08	2.50	3.29	3.08	2.22	2.84	0.616	2.08	2.79	3.72
				2018	5.93	5.42	2.51	2.48	1.06	7.90	5.16	7.38	4.73	2.47	1.06	5.29	7.90
				2019	-	5.00	-	7.33	2.43	5.52	-	-	5.07	2.03	2.43	5.26	7.33
				2020	17.9	12.1	12.1	13.5	14.7	12.6	13.2	9.74	13.2	2.36	9.74	12.9	17.9
				2021	12.5	-	10.1	-	-	-	3.54	11.5	9.40	4.03	3.54	10.8	12.5
				2022	4.91	6.63	4.90	6.94	4.66	5.42	2.06	1.77	4.66	1.89	1.77	4.90	6.94
		Molybdenum	mg/kg	2017	4.93	6.20	1.76	3.50	4.71	7.67	1.12	6.56	4.56	2.31	1.12	4.82	7.67
				2018	17.1	3.10	4.49	2.21	1.51	16.2	5.21	7.20	7.12	6.13	1.51	4.85	17.1
				2019	2.44	2.09	2.51	3.90	4.32	3.34	2.70	4.22	3.19	0.873	2.09	3.02	4.32
				2020	2.66	3.24	3.37	2.48	2.16	4.35	6.13	4.98	3.67	1.37	2.16	3.31	6.13
				2021	-	17.9	15.8	5.93	7.30	16.0	11.8	13.9	12.7	4.57	5.93	13.9	17.9
				2022	2.58	1.95	4.35	5.23	5.58	9.78	7.13	2.40	4.88	2.67	1.95	4.79	9.78
		Nickel	mg/kg	2017	0.483	0.0387	0.496	0.361	1.04	0.116	0.231	0.947	0.463	0.364	0.0387	0.422	1.04
				2018	2.95	2.64	0.773	1.02	0.316	3.56	3.35	4.13	2.34	1.44	0.316	2.80	4.13
				2019	1.27	1.24	2.38	1.76	-	0.973	1.95	2.32	1.70	0.555	0.973	1.76	2.38
				2020	0.741	0.553	0.0692	0.537	0.371	0.278	0.152	0.136	0.355	0.239	0.0692	0.325	0.741
				2021	-	0.363	0.249	6.83	2.75	0.367	-	0.0659	1.77	2.67	0.0659	0.365	6.83
				2022	-	-	0.0935	-	0.248	-	0.0577	0.0207	0.105	0.100	0.0207	0.0756	0.248
		Phosphorus	mg/kg	2017	6.15	6.49	5.72	4.54	7.07	8.57	7.02	7.08	6.58	1.18	4.54	6.76	8.57
				2018	12.7	11.0	8.12	11.3	4.93	26.9	12.3	8.25	11.9	6.59	4.93	11.2	26.9
				2019	8.56	11.2	10.8	8.49	9.50	11.0	12.8	10.7	10.4	1.47	8.49	10.8	12.8
				2020	9.41	11.8	9.89	9.63	9.07	9.21	12.5	6.97	9.81	1.70	6.97	9.52	12.5
				2021	11.4	17.1	9.59	18.9	15.6	14.7	8.49	23.0	14.8	4.89	8.49	15.2	23.0
				2022	8.29	9.55	9.38	9.78	8.82	8.72	7.33	4.88	8.34	1.60	4.88	8.77	9.78
		Silver	mg/kg	2017	-	-	-	-	-	-	-	-	-	-	-	-	-
				2018	-	-	-	-	-	-	-	-	-	-	-	-	-
				2019	-	-	-	-	-	-	-	-	-	-	-	-	-
				2020	1.46	1.19	-	0.400	1.63	0.956	-	-	1.13	0.481	0.400	1.19	1.63
				2021	-	1.20	0.806	3.23	6.34	0.872	-	-	2.49	2.37	0.806	1.20	6.34
				2022	-	-	-	-	-	-	-	-	-	-	-	-	-
		Sodium	mg/kg	2017	6.61	10.8	6.86	7.02	8.57	11.2	10.5	13.3	9.36	2.46	6.61	9.54	13.3
				2018	8.96	8.38	6.20	5.33	4.75	23.9	10.7	9.11	9.67	6.10	4.75	8.67	23.9
				2019	11.9	11.1	15.4	9.66	13.6	12.8	13.8	12.4	12.6	1.77	9.66	12.6	15.4
				2020	9.67	9.75	10.7	11.1	8.67	8.73	11.4	5.73	9.47	1.82	5.73	9.71	11.4
				2021	-	15.5	9.80	25.7	22.7	15.4	9.77	15.3	16.3	5.99	9.77	15.4	25.7
				2022	7.12	8.94	8.76	7.26	6.96	10.8	7.21	6.59	7.96	1.44	6.59	7.23	10.8
		Strontium	mg/kg	2017	0.0635	0.0659	0.0245	0.0198	0.0345	0.0455	0.0549	0.0614	0.0462	0.0181	0.0198	0.0502	0.0659
				2018	0.0818	0.0527	0.0561	0.0242	0.0434	0.108	0.0513	0.0527	0.0588	0.0254	0.0242	0.0527	0.108
				2019	0.0765	0.0954	0.103	0.0625	0.0539	0.0514	0.0676	0.0837	0.0742	0.0188	0.0514	0.0721	0.103
				2020	0.0351	0.0283	0.00936	0.0267	0.0236	0.0121	0.0117	0.00607	0.0191	0.0106	0.00607	0.0178	0.0351
				2021	0.0138	0.0134	0.0124	0.0998	0.0729	0.0103	0.00630	0.00737	0.0295	0.0359	0.00630	0.0129	0.0998
				2022	0.00682	0.00621	0.00713	0.00436	0.0102	0.0103	0.00692	0.0109	0.00786	0.00235	0.00436	0.00702	0.0109
		Tin	mg/kg	2017	2.60	-	1.85	0.773	3.09	-	-	1.80	2.02	0.883	0.773	1.85	3.09
				2018	-	-	-	1.21	1.06	-	-	-	1.13	0.106	1.06	1.13	1.21
				2019	-	-	-	-	-	-	-	-	-	-	-	-	-
				2020	0.786	0.750	-	-	-	-	-	-	0.768	0.0253	0.750	0.768	0.786
				2021	-	-	-	-	-	-	-	-	-	-	-	-	-
				2022	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes: For 2010 data at HAC-D and HAC-U, historical station codes were W11 and W7, respectively. All values reported in dry weight. Summary statistics reported to 3 significant figures for display purposes. TTF calculated as Benthic Invertebrate Analyte Concentration/Periphyton Analyte Concentration. "-" = data were not available to calculate a TTF or TTF was not calculated because the concentration of an analyte was below the Laboratory Reporting Limit (LRL) for either the periphyton or benthic invertebrate tissue results.

Table D.5.7: Trophic Transfer Factors for Caddisfly Tissue Primary and Secondary Analytes Concentrations for Upper Hazeltine Creek (HAC-R1, HAC-U; Exposed), Upper Edney Creek (EDC-U; Reference), Lower Hazeltine Creek (HAC-D; Exposed), and Lower Edney Creek Exposed (E1) and Reference (EDC) Areas, 2018 to 2022

Waterbody	Area	Parameter	Units	Year	Replicate								Mean	Standard Deviation	Minimum	Median	Maximum
					1	2	3	4	5	6	7	8					
Upper Hazeltine Creek Reach 1	HAC-R1 (Exposed)	Titanium	mg/kg	2017	-	-	-	-	-	-	-	-	-	-	-	-	-
				2018	-	-	-	-	-	-	-	-	-	-	-	-	-
				2019	1.16	2.92	1.51	1.06	1.06	1.11	2.25	3.34	1.80	0.918	1.06	1.33	3.34
				2020	0.720	0.417	0.0638	0.641	0.488	0.177	0.230	0.0801	0.352	0.252	0.0638	0.323	0.720
				2021	0.301	2.68	0.530	33.1	55.2	7.42	0.0452	0.413	12.5	20.6	0.0452	1.61	55.2
				2022	0.00924	0.0169	0.0754	0.0169	0.0675	0.0612	0.0156	0.00970	0.0341	0.0285	0.00924	0.0169	0.0754
		Uranium	mg/kg	2017	0.792	0.224	0.291	0.291	0.471	0.334	0.330	0.893	0.453	0.252	0.224	0.332	0.893
				2018	1.86	1.02	0.825	0.454	0.220	1.98	0.890	2.13	1.17	0.726	0.220	0.954	2.13
				2019	1.61	1.78	2.96	1.13	1.08	1.22	1.48	1.64	1.61	0.600	1.08	1.55	2.96
				2020	0.852	0.626	0.0340	0.539	0.376	0.273	0.218	0.140	0.382	0.273	0.0340	0.324	0.852
				2021	0.437	0.531	0.423	4.77	5.47	1.19	0.120	0.398	1.67	2.16	0.120	0.484	5.47
				2022	-	0.0160	0.0658	-	0.110	0.0732	0.0302	0.0595	0.0591	0.0333	0.0160	0.0626	0.110
		Vanadium	mg/kg	2017	0.364	0.249	0.143	0.120	0.332	0.358	0.529	0.576	0.334	0.164	0.120	0.345	0.576
				2018	2.40	1.77	0.527	0.394	0.195	2.28	1.75	2.38	1.46	0.939	0.195	1.76	2.40
				2019	1.35	2.56	1.85	1.27	1.24	2.07	2.21	2.82	1.92	0.601	1.24	1.96	2.82
				2020	0.755	0.542	0.0367	0.678	0.426	0.183	0.247	0.0867	0.369	0.272	0.0367	0.337	0.755
				2021	0.582	1.13	0.388	10.3	15.7	0.860	0.0636	0.254	3.65	5.94	0.0636	0.721	15.7
				2022	0.0112	0.0122	0.0809	0.0212	0.0743	0.0838	0.0220	0.0163	0.0402	0.0330	0.0112	0.0216	0.0838
		Zinc	mg/kg	2017	3.44	3.68	5.76	4.11	7.41	3.97	5.04	5.75	4.89	1.36	3.44	4.58	7.41
				2018	12.2	11.2	4.16	3.07	3.01	23.8	12.7	17.3	10.9	7.38	3.01	11.7	23.8
				2019	13.0	15.4	12.8	11.9	-	12.9	14.3	15.8	13.7	1.48	11.9	13.0	15.8
				2020	9.23	12.1	6.61	6.58	6.14	8.78	11.2	7.07	8.46	2.25	6.14	7.92	12.1
				2021	-	17.2	13.4	18.3	20.5	15.8	12.0	14.0	15.9	2.98	12.0	15.8	20.5
				2022	3.30	3.00	5.98	4.68	5.56	7.21	3.18	1.66	4.32	1.85	1.66	3.99	7.21
Upper Hazeltine Creek Reach 2	HAC-U (Exposed)	**Primary Analytes**															
		Arsenic	mg/kg	2018	0.483	0.671	0.468	0.604	0.575	0.719	0.523	0.539	0.573	0.0883	0.468	0.557	0.719
				2019	1.66	0.863	0.642	1.12	0.551	0.701	0.552	0.904	0.873	0.371	0.551	0.782	1.66
				2020	0.164	0.220	0.185	0.291	0.390	0.247	0.155	0.285	0.242	0.0790	0.155	0.234	0.390
				2021	0.154	0.134	0.321	0.339	0.282	0.405	0.561	0.508	0.338	0.152	0.134	0.330	0.561
				2022	0.213	0.166	0.178	0.152	0.123	0.232	0.0953	0.0759	0.154	0.0545	0.0759	0.159	0.232
		Copper	mg/kg	2018	0.552	0.866	0.859	0.803	1.37	0.931	0.700	0.390	0.809	0.290	0.390	0.831	1.37
				2019	3.92	2.17	1.75	2.30	1.41	1.33	0.794	1.27	1.87	0.965	0.794	1.58	3.92
				2020	0.369	0.714	0.403	0.369	0.570	0.549	0.268	0.747	0.499	0.174	0.268	0.476	0.747
				2021	0.423	0.236	0.0964	0.964	0.761	1.02	0.168	0.405	0.508	0.360	0.0964	0.414	1.02
				2022	0.463	0.230	0.513	0.0412	0.328	1.09	0.274	0.187	0.391	0.320	0.0412	0.301	1.09
		Iron	mg/kg	2018	0.234	1.03	0.504	0.268	0.667	0.428	0.214	0.364	0.463	0.274	0.214	0.396	1.03
				2019	2.83	1.18	0.906	1.26	0.577	0.973	0.377	0.850	1.12	0.751	0.377	0.939	2.83
				2020	0.0714	0.0982	0.0540	0.0541	0.131	0.107	0.0421	0.198	0.0945	0.0519	0.0421	0.0848	0.198
				2021	0.0794	0.0712	0.0892	1.21	0.140	0.572	0.741	0.354	0.407	0.409	0.0712	0.247	1.21
				2022	0.152	0.108	0.101	0.0452	0.0629	0.182	0.0314	0.0404	0.0905	0.0553	0.0314	0.0821	0.182
		Selenium	mg/kg	2010	-	-	-	-	-	-	-	-	-	-	-	-	-
				2018	1.36	1.33	1.29	1.26	1.39	1.32	1.79	1.25	1.37	0.173	1.25	1.33	1.79
				2019	2.76	2.31	1.85	2.10	1.84	1.93	2.17	2.49	2.18	0.326	1.84	2.14	2.76
				2020	1.80	2.65	1.53	2.89	2.17	2.42	2.91	3.33	2.46	0.605	1.53	2.53	3.33
				2021	2.81	3.20	2.95	4.65	2.74	3.30	2.97	4.28	3.36	0.710	2.74	3.08	4.65
				2022	2.02	4.65	3.06	1.26	6.65	6.19	6.39	5.96	4.52	2.13	1.26	5.30	6.65
		Secondary Analytes															
		Barium	mg/kg	2010	-	-	-	-	-	-	-	-	-	-	-	-	-
				2018	0.0881	0.412	0.219	0.204	0.199	0.261	0.261	0.183	0.228	0.0920	0.0881	0.211	0.412
				2019	0.850	0.383	0.344	0.309	0.261	0.327	0.467	0.562	0.438	0.192	0.261	0.363	0.850
				2020	0.182	0.0260	0.0188	0.0370	0.0307	0.0349	0.0228	0.0900	0.0553	0.0560	0.0188	0.0328	0.182
				2021	0.0557	0.0484	0.0797	0.0779	0.0772	0.127	0.158	0.172	0.0995	0.0467	0.0484	0.0788	0.172
				2022	0.0973	0.0222	0.0339	0.0132	0.0340	0.0514	0.0591	0.00361	0.0394	0.0298	0.00361	0.0339	0.0973
		Cadmium	mg/kg	2018	1.08	1.50	0.933	1.02	0.974	1.20	1.12	0.750	1.07	0.220	0.750	1.05	1.50
				2019	2.34	1.70	0.780	1.23	0.972	1.02	2.03	1.15	1.40	0.557	0.780	1.19	2.34
				2020	0.137	-	-	0.164	0.0425	0.0887	0.112	0.361	0.151	0.111	0.0425	0.124	0.361
				2021	0.573	0.786	0.333	0.870	0.585	0.903	0.904	1.25	0.775	0.277	0.333	0.828	1.25
				2022	0.388	0.209	0.147	0.308	0.382	0.679	0.344	0.260	0.340	0.161	0.147	0.326	0.679
		Calcium	mg/kg	2018	0.0283	0.0363	0.0238	0.0113	0.0150	0.0197	0.0202	0.0280	0.0228	0.00801	0.0113	0.0220	0.0363
				2019	0.0740	0.0339	0.0307	0.0389	0.0262	0.0547	0.0432	0.0412	0.0428	0.0153	0.0262	0.0401	0.0740
				2020	0.00184	0.00335	0.00234	0.00366	0.00415	0.00368	0.00321	0.00445	0.00333	0.000877	0.00184	0.00350	0.00445
				2021	0.00226	0.00306	0.00380	0.00470	0.00480	0.00474	0.0256	0.0470	0.0120	0.0161	0.00226	0.00472	0.0470
				2022	0.00821	0.00920	0.00493	0.00410	0.00617	0.00492	0.00855	0.00351	0.00620	0.00219	0.00351	0.00555	0.00920
		Cobalt	mg/kg	2018	0.292	1.16	0.680	0.414	0.722	0.540	0.301	0.420	0.566	0.287	0.292	0.480	1.16
				2019	2.64	1.19	0.840	1.23	0.591	0.810	0.458	0.843	1.08	0.684	0.458	0.842	2.64
				2020	0.0642	0.0863	0.0505	0.0782	0.130	0.0987	0.0668	0.222	0.0996	0.0551	0.0505	0.0823	0.222
				2021	0.158	0.110	0.184	0.345	0.195	0.503	0.597	0.593	0.336	0.203	0.110	0.270	0.597
				2022	0.185	0.0691	0.0713	0.0664	0.0816	0.302	0.0675	0.0518	0.112	0.0876	0.0518	0.0702	0.302
		Manganese	mg/kg	2018	0.698	1.01	0.710	0.536	0.761	0.649	0.698	0.588	0.706	0.142	0.536	0.698	1.01
				2019	1.51	0.991	0.634	0.991	0.695	0.636	0.967	0.862	0.911	0.288	0.634	0.915	1.51
				2020	0.0595	0.0522	0.0374	0.0980	0.0665	0.0710	0.0712	0.155	0.0763	0.0362	0.0374	0.0688	0.155
				2021	0.195	0.156	0.401	0.254	0.236	0.366	0.348	0.541	0.312	0.126	0.156	0.301	0.541
				2022	0.147	0.0769	0.0560	0.0685	0.113	0.155	0.231	0.110	0.120	0.0573	0.0560	0.112	0.231
		Mercury	mg/kg	2018	1.19	3.96	3.04	2.00	2.93	2.34	1.42	1.90	2.35	0.921	1.19	2.17	3.96
				2019	8.57	5.62	4.90	4.79	3.78	3.23	2.59	5.53	4.88	1.84	2.59	4.84	8.57
				2020	3.67	3.46	3.72	4.79	5.69	5.94	4.50	10.8	5.31	2.38	3.46	4.64	10.8
				2021	2.57	1.93	1.78	4.38	2.80	7.66	4.42	8.97	4.31	2.68	1.78	3.59	8.97
				2022	2.48	1.19	3.12	3.53	2.93	6.62	1.10	3.71	3.09	1.73	1.10	3.02	6.62
		Molybdenum	mg/kg	2018	3.61	6.56	4.28	5.02	5.39	3.93	4.43	4.92	4.77	0.933	3.61	4.68	6.56
				2019	5.94	4.40	4.92	3.96	4.51	3.17	5.09	3.60	4.45	0.884	3.17	4.46	5.94
				2020	3.34	6.35	3.87	5.51	5.61	4.88	5.62	5.88	5.13	1.04	3.34	5.56	6.35
				2021	5.35	4.86	7.74	8.46	6.76	7.60	6.75	10.8	7.29	1.86	4.86	7.18	10.8
				2022	8.10	8.32	7.19	6.20	7.67	9.64	6.02	11.0	8.01	1.67	6.02	7.88	11.0
		Nickel	mg/kg	2018	0.453	1.33	0.905	0.563	1.61	0.621	0.334	0.824	0.830	0.441	0.334	0.722	1.61
				2019	2.43	1.20	0.925	1.13	0.795	0.719	0.456	0.871	1.07	0.599	0.456	0.898	2.43
				2020	-	-	-	0.138	-	-	-	0.117	0.127	0.0144	0.117	0.127	0.138
				2021	0.129	0.0620	0.129	0.149	0.112	0.347	0.655	0.317	0.237	0.196	0.0620	0.139	0.655
				2022	0.248	0.0531	0.0789	0.104	0.0812	0.184	0.0656	0.0909	0.113	0.0674	0.0531	0.0861	0.248
		Phosphorus	mg/kg	2018	9.19	10.1	7.94	10.3	13.2	9.25	8.09	6.09	9.27	2.09	6.09	9.22	13.2
				2019	17.9	12.4	7.20	10.7	8.79	7.44	9.76	15.3	11.2	3.81	7.20	10.2	17.9
				2020	4.94	6.76	7.18	10.6	9.25	9.41	7.95	8.12	8.03	1.77	4.94	8.03	10.6
				2021	4.90	4.45	4.37	21.9	6.56	7.46	6.65	9.15	8.18	5.77	4.37	6.61	21.9
				2022	7.60	5.63	8.64	5.99	4.06	8.02	1.71	4.30	5.74	2.34	1.71	5.81	8.64
		Silver	mg/kg	2018	-	-	-	-	-	-	-	-	-	-	-	-	-
				2019	-	-	-	-	-	-	0.439	-	0.439	-	0.439	0.439	0.439
				2020	-	-	-	-	-	-	-	0.455	0.455	-	0.455	0.455	0.455
				2021	-	-	-	-	-	0.681	-	-	0.681	-	0.681	0.681	0.681
				2022	-	0.0828	-	-	-	-	-	-	0.0828	-	0.0828	0.0828	0.0828
		Sodium	mg/kg	2018	4.51	6.00	4.72	4.94	9.97	7.97	3.97	5.83	5.99	2.03	3.97	5.39	9.97
				2019	17.3	12.2	8.40	15.3	8.04	6.96	7.46	11.8	10.9	3.87	6.96	10.1	17.3
				2020	4.79	7.09	8.20	9.81	7.91	7.67	7.08	8.73	7.66	1.47	4.79	7.79	9.81
				2021	5.14	3.56	3.55	8.71	8.23	6.09	7.33	9.80	6.55	2.36	3.55	6.71	9.80
				2022	8.11	6.88	8.08	8.14	5.33	9.47	8.81	8.40	7.90	1.27	5.33	8.13	9.47
		Strontium	mg/kg	2018	0.0363	0.0631	0.0462	0.0232	0.0242	0.0338	0.0356	0.0424	0.0381	0.0128	0.0232	0.0359	0.0631
				2019	0.112	0.0547	0.0559	0.0618	0.0439	0.0845	0.0647	0.0651	0.0678	0.0212	0.0439	0.0633	0.112
				2020	0.00560	0.00694	0.00654	0.0105	0.00909	0.00897	0.00904	0.0115	0.00852	0.00202	0.00560	0.00901	0.0115
				2021	0.00637	0.0130	0.00927	0.00923	0.0122	0.0145	0.0342	0.0524	0.0189	0.0160	0.00637	0.0126	0.0524
				2022	0.0257	0.0256	0.0143	0.0113	0.0126	0.0117	0.0222	0.00708	0.0163	0.00715	0.00708	0.0135	0.0257

Notes: For 2010 data at HAC-D and HAC-U, historical station codes were W11 and W7, respectively. All values reported in dry weight. Summary statistics reported to 3 significant figures for display purposes. TTF calculated as Benthic Invertebrate Analyte Concentration/Periphyton Analyte Concentration. "-" = data were not available to calculate a TTF or TTF was not calculated because the concentration of an analyte was below the Laboratory Reporting Limit (LRL) for either the periphyton or benthic invertebrate tissue results.

Table D.5.7: Trophic Transfer Factors for Caddisfly Tissue Primary and Secondary Analytes Concentrations for Upper Hazeltine Creek (HAC-R1, HAC-U; Exposed), Upper Edney Creek (EDC-U; Reference), Lower Hazeltine Creek (HAC-D; Exposed), and Lower Edney Creek Exposed (E1) and Reference (EDC) Areas, 2018 to 2022

Waterbody	Area	Parameter	Units	Year	Replicate								Mean	Standard Deviation	Minimum	Median	Maximum
					1	2	3	4	5	6	7	8					
Upper Hazeltine Creek Reach 2	HAC-U (Exposed)	Tin	mg/kg	2018	-	-	-	-	-	-	-	-	-	-	-	-	-
				2019	-	-	-	-	-	-	-	-	-	-	-	-	-
				2020	-	-	-	-	-	-	-	-	-	-	-	-	-
				2021	-	-	-	-	-	-	-	-	-	-	-	-	-
				2022	-	-	-	-	-	-	-	-	-	-	-	-	-
		Titanium	mg/kg	2018	-	-	-	-	-	-	-	-	-	-	-	-	-
				2019	2.20	0.878	0.635	0.961	0.438	0.797	0.281	0.687	0.860	0.587	0.281	0.742	2.20
				2020	0.0403	0.0466	0.0323	0.0273	0.0567	0.0535	0.0255	0.143	0.0531	0.0380	0.0255	0.0434	0.143
				2021	0.0377	0.0451	0.0484	0.424	0.113	0.449	0.312	0.341	0.221	0.178	0.0377	0.213	0.449
				2022	0.101	0.0895	0.0695	0.0217	0.0252	0.0841	0.0141	0.0192	0.0531	0.0365	0.0141	0.0474	0.101
		Uranium	mg/kg	2018	0.246	0.905	0.578	0.293	0.389	0.494	0.320	0.620	0.481	0.218	0.246	0.441	0.905
				2019	1.85	0.878	0.725	0.955	0.466	1.25	0.525	0.677	0.916	0.454	0.466	0.802	1.85
				2020	0.0487	0.0340	0.0286	0.0578	0.0350	0.0398	0.0432	0.125	0.0516	0.0312	0.0286	0.0415	0.125
				2021	0.169	0.136	0.200	0.345	0.106	0.242	0.453	0.528	0.272	0.154	0.106	0.221	0.528
				2022	0.143	0.129	0.0562	0.0840	0.0970	0.210	0.152	0.0586	0.116	0.0524	0.0562	0.113	0.210
		Vanadium	mg/kg	2018	0.199	0.921	0.464	0.247	0.421	0.418	0.201	0.370	0.405	0.233	0.199	0.394	0.921
				2019	2.41	0.961	0.726	1.01	0.505	0.948	0.331	0.720	0.951	0.635	0.331	0.837	2.41
				2020	0.0437	0.0441	0.0351	0.0278	0.110	0.0630	0.0245	0.125	0.0592	0.0381	0.0245	0.0439	0.125
				2021	0.0968	0.0844	0.0990	0.499	0.137	0.545	0.519	0.295	0.284	0.207	0.0844	0.216	0.545
				2022	0.0996	0.110	0.0604	0.0231	0.0515	0.123	0.0304	0.0213	0.0649	0.0407	0.0213	0.0559	0.123
		Zinc	mg/kg	2018	4.89	5.28	4.05	4.58	5.44	3.74	3.84	3.19	4.38	0.800	3.19	4.32	5.44
				2019	-	11.4	6.52	8.43	6.44	5.97	6.08	8.10	7.57	1.97	5.97	6.52	11.4
				2020	4.88	7.27	5.62	6.14	7.97	7.13	5.84	9.04	6.74	1.37	4.88	6.63	9.04
				2021	9.64	7.21	7.59	13.7	9.75	19.0	14.9	18.7	12.6	4.71	7.21	11.7	19.0
				2022	2.41	2.40	4.91	6.22	7.12	13.8	4.99	5.36	5.90	3.60	2.40	5.18	13.8
Lower Edney Creek	EDC-D (Reference)	**Primary Analytes**															
		Arsenic	mg/kg	2018	0.788	1.15	1.47	1.20	0.872	0.881	0.667	0.715	0.967	0.279	0.667	0.876	1.47
				2019	0.179	0.0857	0.165	0.340	0.189	0.178	0.186	0.106	0.179	0.0760	0.0857	0.179	0.340
				2020	0.433	0.599	0.752	0.359	0.622	0.818	0.277	0.163	0.503	0.232	0.163	0.516	0.818
				2021	1.06	0.225	0.720	0.217	0.0776	0.103	0.0894	0.294	0.348	0.355	0.0776	0.221	1.06
				2022	0.229	0.152	0.577	0.438	0.242	0.0456	0.416	0.0589	0.270	0.191	0.0456	0.235	0.577
		Copper	mg/kg	2018	0.907	1.16	2.27	1.66	0.889	1.48	1.45	1.25	1.38	0.449	0.889	1.35	2.27
				2019	0.480	0.365	0.729	0.830	0.504	0.963	0.548	0.631	0.631	0.199	0.365	0.589	0.963
				2020	0.919	1.35	1.37	1.10	1.36	1.28	1.15	1.01	1.19	0.172	0.919	1.22	1.37
				2021	1.60	0.678	1.23	0.800	0.556	0.692	0.543	1.52	0.952	0.432	0.543	0.746	1.60
				2022	0.630	0.917	0.749	1.08	0.959	0.734	0.804	0.418	0.787	0.207	0.418	0.776	1.08
		Iron	mg/kg	2018	0.310	0.350	1.39	1.66	0.234	0.478	0.239	1.00	0.708	0.567	0.234	0.414	1.66
				2019	0.0511	0.00964	0.110	0.0746	0.0760	0.0242	0.0650	0.0119	0.0529	0.0355	0.00964	0.0580	0.110
				2020	0.241	0.509	0.410	0.292	0.418	0.535	0.320	0.0120	0.342	0.168	0.0120	0.365	0.535
				2021	0.529	0.0550	0.189	0.0966	0.0111	0.0136	0.102	0.0534	0.131	0.171	0.0111	0.0758	0.529
				2022	0.0611	0.0463	0.206	0.465	0.203	0.0255	0.589	0.0327	0.204	0.215	0.0255	0.132	0.589
		Selenium	mg/kg	2018	0.749	1.09	1.56	0.949	1.04	0.954	0.829	0.677	0.981	0.273	0.677	0.952	1.56
				2019	1.07	0.303	1.15	2.43	1.65	2.07	1.34	2.10	1.51	0.690	0.303	1.49	2.43
				2020	1.76	1.41	2.74	2.22	1.25	1.49	3.01	3.55	2.18	0.844	1.25	1.99	3.55
				2021	0.863	0.707	1.77	0.597	0.397	0.560	0.607	1.47	0.872	0.488	0.397	0.657	1.77
				2022	1.38	1.64	1.72	1.28	1.26	1.07	1.75	0.779	1.36	0.337	0.779	1.33	1.75
		Secondary Analytes															
		Barium	mg/kg	2018	1.15	1.17	3.21	1.12	1.16	1.16	1.05	1.55	1.45	0.728	1.05	1.16	3.21
				2019	0.234	0.00591	0.115	0.218	0.115	0.0485	0.237	0.0400	0.127	0.0930	0.00591	0.115	0.237
				2020	0.920	1.01	1.25	1.13	0.930	1.23	0.250	0.0497	0.844	0.449	0.0497	0.968	1.25
				2021	0.971	0.186	1.00	0.185	0.0315	0.0437	0.0457	0.231	0.337	0.408	0.0315	0.185	1.00
				2022	0.238	0.101	0.606	0.201	0.372	0.130	0.941	0.0412	0.329	0.305	0.0412	0.220	0.941
		Cadmium	mg/kg	2018	1.06	1.12	3.25	1.90	1.03	0.880	1.59	1.38	1.53	0.773	0.880	1.25	3.25
				2019	0.235	0.0670	1.07	0.449	0.0891	0.0539	0.189	0.130	0.285	0.341	0.0539	0.160	1.07
				2020	1.72	1.08	2.30	1.40	0.603	0.838	1.32	0.333	1.20	0.630	0.333	1.20	2.30
				2021	1.51	0.164	1.38	0.263	0.0414	0.0673	0.0897	0.250	0.471	0.608	0.0414	0.207	1.51
				2022	0.944	1.26	0.899	1.56	1.03	0.179	0.907	0.162	0.867	0.483	0.162	0.925	1.56
		Calcium	mg/kg	2018	0.0766	0.0445	0.0545	0.0400	0.0412	0.108	0.0398	0.275	0.0850	0.0804	0.0398	0.0495	0.275
				2019	0.0794	0.260	0.166	0.140	0.0693	0.153	0.123	0.162	0.144	0.0592	0.0693	0.146	0.260
				2020	0.356	0.362	0.525	0.372	0.397	0.429	0.363	0.100	0.363	0.120	0.100	0.367	0.525
				2021	0.0874	0.0397	0.0741	0.0294	0.0275	0.0418	0.106	0.0765	0.0602	0.0294	0.0275	0.0580	0.106
				2022	0.208	0.0957	0.226	0.386	0.194	0.0502	0.323	0.139	0.203	0.112	0.0502	0.201	0.386
		Cobalt	mg/kg	2018	0.355	0.493	1.79	1.99	0.394	0.550	0.431	0.985	0.874	0.660	0.355	0.521	1.99
				2019	0.101	0.0122	0.0861	0.143	0.0723	0.0321	0.130	0.0121	0.0735	0.0509	0.0121	0.0792	0.143
				2020	0.311	0.413	0.473	0.364	0.340	0.494	0.262	0.0257	0.335	0.148	0.0257	0.352	0.494
				2021	0.675	0.0784	0.324	0.125	0.00983	0.0265	0.103	0.0733	0.177	0.223	0.00983	0.0906	0.675
				2022	0.107	0.0585	0.267	0.548	0.251	0.0500	0.481	0.0214	0.223	0.202	0.0214	0.179	0.548
		Manganese	mg/kg	2018	0.580	0.548	2.22	1.29	0.610	0.527	0.592	0.574	0.869	0.604	0.527	0.586	2.22
				2019	0.249	0.0159	0.109	0.352	0.203	0.0423	0.182	0.0230	0.147	0.121	0.0159	0.146	0.352
				2020	0.896	0.537	1.36	0.694	0.363	0.655	0.149	0.0766	0.591	0.416	0.0766	0.596	1.36
				2021	0.816	0.145	0.788	0.156	0.0174	0.0434	0.0582	0.252	0.285	0.328	0.0174	0.150	0.816
				2022	0.235	0.112	0.433	0.165	0.294	0.0781	0.333	0.0364	0.211	0.137	0.0364	0.200	0.433
		Mercury	mg/kg	2018	1.41	2.30	2.08	3.59	0.568	1.64	2.63	1.68	1.99	0.898	0.568	1.88	3.59
				2019	0.447	0.808	1.51	0.949	0.902	0.721	0.727	1.22	0.910	0.327	0.447	0.855	1.51
				2020	1.19	1.81	2.02	1.61	1.47	1.55	1.73	1.44	1.60	0.253	1.19	1.58	2.02
				2021	2.00	0.954	1.35	0.577	0.471	0.586	0.391	1.27	0.950	0.557	0.391	0.770	2.00
				2022	1.36	1.98	1.11	0.869	1.27	1.22	1.97	0.653	1.30	0.472	0.653	1.24	1.98
		Molybdenum	mg/kg	2018	2.47	1.81	6.65	1.26	1.72	0.937	0.552	0.760	2.02	1.97	0.552	1.49	6.65
				2019	0.936	2.01	2.58	4.36	2.44	2.08	2.26	4.20	2.61	1.15	0.936	2.35	4.36
				2020	4.33	0.369	10.3	4.07	1.45	0.678	2.25	14.4	4.73	5.03	0.369	3.16	14.4
				2021	0.627	4.71	2.67	1.60	3.23	2.58	9.17	5.78	3.80	2.71	0.627	2.95	9.17
				2022	5.33	1.56	3.62	2.73	0.797	1.50	2.73	3.48	2.72	1.45	0.797	2.73	5.33
		Nickel	mg/kg	2018	0.388	0.548	1.40	1.05	0.558	0.523	0.438	0.667	0.697	0.349	0.388	0.553	1.40
				2019	0.103	0.0303	0.140	0.136	0.0520	0.0319	0.123	0.0310	0.0808	0.0493	0.0303	0.0775	0.140
				2020	0.309	0.460	0.435	0.411	0.381	0.598	0.266	0.0212	0.360	0.170	0.0212	0.396	0.598
				2021	0.762	0.0814	0.422	0.121	-	0.0126	0.116	0.0666	0.226	0.271	0.0126	0.116	0.762
				2022	0.115	0.197	0.222	0.977	0.433	0.106	0.319	0.0440	0.302	0.300	0.0440	0.210	0.977
		Phosphorus	mg/kg	2018	2.97	3.75	4.06	2.70	2.37	3.74	3.89	2.28	3.22	0.723	2.28	3.35	4.06
				2019	3.53	5.86	6.07	7.82	6.44	3.65	3.14	6.07	5.32	1.68	3.14	5.96	7.82
				2020	5.36	3.95	7.85	7.13	3.96	3.24	6.33	8.11	5.74	1.89	3.24	5.85	8.11
				2021	5.17	4.76	6.14	4.63	4.67	4.51	5.69	10.4	5.74	1.95	4.51	4.96	10.4
				2022	6.67	4.07	4.42	5.53	3.06	4.45	4.54	5.86	4.83	1.14	3.06	4.50	6.67
		Silver	mg/kg	2018	-	-	-	-	-	-	-	-	-	-	-	-	-
				2019	0.271	0.0754	1.10	0.261	0.0865	0.300	0.179	0.127	0.300	0.334	0.0754	0.220	1.10
				2020	0.684	1.68	1.14	0.884	1.21	1.23	1.06	0.348	1.03	0.398	0.348	1.10	1.68
				2021	1.16	0.177	0.556	0.221	0.141	0.147	0.128	0.253	0.348	0.358	0.128	0.199	1.16
				2022	0.382	0.645	0.534	0.215	0.996	0.423	1.13	0.142	0.559	0.353	0.142	0.479	1.13
		Sodium	mg/kg	2018	5.49	7.71	6.05	6.05	0.986	6.88	8.00	8.86	6.25	2.41	0.986	6.46	8.86
				2019	4.57	11.1	10.4	12.0	8.97	3.53	6.13	3.88	7.57	3.44	3.53	7.55	12.0
				2020	8.50	10.4	11.6	13.8	8.74	9.25	7.80	7.96	9.75	2.06	7.80	8.99	13.8
				2021	10.2	3.88	11.9	6.01	5.97	4.86	6.61	9.68	7.39	2.84	3.88	6.31	11.9
				2022	12.3	8.99	8.72	7.96	10.9	7.69	15.1	5.11	9.60	3.10	5.11	8.85	15.1
		Strontium	mg/kg	2018	0.176	0.106	0.153	0.0898	0.117	0.159	0.0691	0.355	0.153	0.0895	0.0691	0.135	0.355
				2019	0.0754	0.155	0.151	0.126	0.0947	0.138	0.130	0.163	0.129	0.0304	0.0754	0.134	0.163
				2020	0.348	0.322	0.499	0.415	0.383	0.398	0.322	0.0858	0.347	0.120	0.0858	0.365	0.499
				2021	0.117	0.0639	0.122	0.0464	0.0560	0.0531	0.107	0.113	0.0848	0.0326	0.0464	0.0855	0.122
				2022	0.161	0.0613	0.280	0.251	0.156	0.0419	0.348	0.0985	0.175	0.109	0.0419	0.159	0.348

Notes: For 2010 data at HAC-D and HAC-U, historical station codes were W11 and W7, respectively. All values reported in dry weight. Summary statistics reported to 3 significant figures for display purposes. TTF calculated as Benthic Invertebrate Analyte Concentration/Periphyton Analyte Concentration. "-" = data were not available to calculate a TTF or TTF was not calculated because the concentration of an analyte was below the Laboratory Reporting Limit (LRL) for either the periphyton or benthic invertebrate tissue results.

Table D.5.7: Trophic Transfer Factors for Caddisfly Tissue Primary and Secondary Analytes Concentrations for Upper Hazeltine Creek (HAC-R1, HAC-U; Exposed), Upper Edney Creek (EDC-U; Reference), Lower Hazeltine Creek (HAC-D; Exposed), and Lower Edney Creek Exposed (E1) and Reference (EDC) Areas, 2018 to 2022

Waterbody	Area	Parameter	Units	Year	Replicate								Mean	Standard Deviation	Minimum	Median	Maximum
					1	2	3	4	5	6	7	8					
Lower Edney Creek	EDC-D (Reference)	Tin	mg/kg	2018	-	0.824	-	-	0.732	-	1.93	-	1.16	0.666	0.732	0.824	1.93
				2019	0.142	-	0.101	1.53	-	0.0592	0.0374	0.732	0.433	0.596	0.0374	0.122	1.53
				2020	-	0.500	0.684	-	-	0.682	-	-	0.622	0.106	0.500	0.682	0.684
				2021	-	-	-	-	-	-	-	-	-	-	-	-	-
				2022	-	-	-	-	-	-	-	-	-	-	-	-	-
		Titanium	mg/kg	2018	-	-	-	-	-	-	-	-	-	-	-	-	-
				2019	0.0254	0.0159	0.115	0.114	0.123	0.0249	0.0822	0.00945	0.0637	0.0496	0.00945	0.0538	0.123
				2020	0.236	0.446	0.301	0.334	0.368	0.461	0.261	0.00649	0.302	0.144	0.00649	0.318	0.461
				2021	0.686	0.0409	0.173	0.0910	0.00486	0.00570	0.282	0.0665	0.169	0.229	0.00486	0.0788	0.686
				2022	0.0630	0.0369	0.143	0.532	0.173	0.0217	0.476	0.0536	0.187	0.203	0.0217	0.103	0.532
		Uranium	mg/kg	2018	0.270	0.845	2.38	2.17	0.346	0.741	0.699	0.938	1.05	0.791	0.270	0.793	2.38
				2019	0.106	0.00103	0.180	0.147	0.0367	0.0259	0.230	0.0969	0.103	0.0799	0.00103	0.101	0.230
				2020	0.341	0.754	0.398	0.528	0.567	0.672	0.250	0.0173	0.441	0.240	0.0173	0.463	0.754
				2021	0.724	0.0658	0.469	0.111	0.00997	0.0140	0.0635	0.106	0.195	0.259	0.00997	0.0861	0.724
				2022	0.104	0.0620	0.286	0.483	0.466	0.0505	0.312	0.0336	0.225	0.187	0.0336	0.195	0.483
		Vanadium	mg/kg	2018	0.287	0.251	1.28	1.89	0.133	0.412	0.154	1.34	0.718	0.679	0.133	0.350	1.89
				2019	0.0347	0.00760	0.0869	0.0774	0.0671	0.0230	0.0718	0.0195	0.0485	0.0306	0.00760	0.0509	0.0869
				2020	0.230	0.504	0.393	0.357	0.382	0.405	0.395	0.00911	0.334	0.151	0.00911	0.388	0.504
				2021	0.468	0.0483	0.147	0.0767	0.00811	0.0125	0.270	0.0595	0.136	0.159	0.00811	0.0681	0.468
				2022	0.0518	0.0422	0.212	0.655	0.223	0.0284	0.742	0.0575	0.252	0.287	0.0284	0.135	0.742
		Zinc	mg/kg	2018	2.26	3.03	9.81	7.95	2.78	3.55	2.72	1.73	4.23	2.96	1.73	2.90	9.81
				2019	1.53	1.17	1.63	3.17	1.83	2.23	1.68	1.79	1.88	0.602	1.17	1.73	3.17
				2020	2.91	2.03	3.50	3.25	2.62	1.95	2.73	2.59	2.70	0.537	1.95	2.68	3.50
				2021	2.94	2.50	2.79	1.57	1.70	1.66	2.06	5.55	2.60	1.30	1.57	2.28	5.55
				2022	1.77	1.79	1.89	1.80	1.79	1.80	1.83	1.38	1.76	0.157	1.38	1.80	1.89
Lower Hazeltine Creek	HAC-D (Exposed)	**Primary Analytes**															
		Arsenic	mg/kg	2017	-	-	-	-	0.416	0.266	0.296	0.454	0.358	0.0910	0.266	0.356	0.454
				2018	0.285	0.149	0.0474	0.179	0.152	0.0740	0.105	0.0797	0.134	0.0759	0.0474	0.127	0.285
				2019	0.444	0.433	0.149	0.198	0.333	0.177	0.316	0.215	0.283	0.115	0.149	0.266	0.444
				2020	0.410	0.153	0.475	0.273	1.70	0.261	0.274	0.175	0.465	0.510	0.153	0.274	1.70
				2021	0.0475	0.265	0.143	0.349	0.112	0.224	0.319	0.215	0.209	0.104	0.0475	0.219	0.349
				2022	0.0120	0.126	0.178	0.189	0.323	0.102	0.124	0.0674	0.140	0.0932	0.0120	0.125	0.323
		Copper	mg/kg	2017	-	-	-	-	0.748	0.429	0.421	0.651	0.562	0.163	0.421	0.540	0.748
				2018	0.455	0.176	0.315	0.186	0.252	0.115	0.197	0.0867	0.223	0.118	0.0867	0.192	0.455
				2019	0.486	0.448	0.231	0.264	0.274	0.291	0.532	0.280	0.351	0.118	0.231	0.286	0.532
				2020	0.730	0.982	1.14	0.376	1.78	0.796	0.669	0.440	0.864	0.449	0.376	0.763	1.78
				2021	0.845	0.806	0.232	0.245	0.106	0.190	0.230	0.144	0.350	0.298	0.106	0.231	0.845
				2022	0.0269	0.418	0.772	0.348	0.400	0.383	0.146	0.190	0.335	0.225	0.0269	0.366	0.772
		Iron	mg/kg	2017	-	-	-	-	0.374	0.187	0.221	0.448	0.308	0.124	0.187	0.297	0.448
				2018	0.0994	0.0633	0.0397	0.0502	0.0260	0.0148	0.0280	0.0165	0.0422	0.0284	0.0148	0.0339	0.0994
				2019	0.171	0.0754	0.0484	0.0535	0.161	0.0556	0.182	0.0464	0.0991	0.0606	0.0464	0.0655	0.182
				2020	0.121	0.188	0.257	0.0318	0.623	0.105	0.130	0.0466	0.188	0.190	0.0318	0.125	0.623
				2021	0.229	0.229	0.0668	0.162	0.0394	0.143	0.206	0.0678	0.143	0.0768	0.0394	0.152	0.229
				2022	0.00374	0.0620	0.169	0.175	0.456	0.0813	0.0835	0.0561	0.136	0.141	0.00374	0.0824	0.456
		Selenium	mg/kg	2017	-	-	-	-	3.28	2.71	2.30	2.11	2.60	0.517	2.11	2.51	3.28
				2018	3.52	3.61	3.37	4.07	4.10	4.69	3.25	3.12	3.72	0.529	3.12	3.56	4.69
				2019	4.21	2.96	5.65	3.83	3.30	5.25	4.15	3.17	4.07	0.972	2.96	3.99	5.65
				2020	4.45	4.16	2.42	4.87	3.59	4.74	2.62	2.78	3.70	0.991	2.42	3.87	4.87
				2021	2.86	3.10	3.31	3.48	4.64	2.32	2.00	10.2	3.99	2.63	2.00	3.20	10.2
				2022	0.609	2.65	3.42	2.59	2.42	2.34	1.27	1.98	2.16	0.873	0.609	2.38	3.42
		Secondary Analytes															
		Barium	mg/kg	2017	-	-	-	-	0.940	0.556	0.397	0.461	0.589	0.243	0.397	0.509	0.940
				2018	0.0625	0.0830	0.0628	0.00669	0.0655	0.0355	0.0297	0.0200	0.0457	0.0265	0.00669	0.0490	0.0830
				2019	0.106	0.300	0.0666	0.0574	0.0678	0.0635	0.163	0.150	0.122	0.0828	0.0574	0.0869	0.300
				2020	0.185	0.432	0.399	0.0853	0.876	0.228	0.118	0.0281	0.294	0.275	0.0281	0.207	0.876
				2021	0.335	0.285	0.134	0.250	0.108	0.130	0.166	0.0702	0.185	0.0941	0.0702	0.150	0.335
				2022	0.0179	0.157	0.133	0.330	0.0890	0.0348	0.0572	0.0113	0.104	0.106	0.0113	0.0731	0.330
		Cadmium	mg/kg	2017	-	-	-	-	3.75	1.98	1.63	1.18	2.13	1.12	1.18	1.80	3.75
				2018	0.0806	0.144	0.272	0.558	0.382	-	0.0755	-	0.252	0.191	0.0755	0.208	0.558
				2019	0.0465	0.616	0.864	0.0490	0.107	0.0562	0.285	0.178	0.275	0.305	0.0465	0.143	0.864
				2020	1.85	8.09	1.10	1.60	3.14	3.40	0.367	0.324	2.48	2.53	0.324	1.72	8.09
				2021	2.71	2.51	1.82	3.46	2.28	3.26	2.45	5.47	2.99	1.13	1.82	2.61	5.47
				2022	0.264	2.56	1.85	1.90	0.569	0.488	0.323	0.0680	1.00	0.949	0.0680	0.528	2.56
		Calcium	mg/kg	2017	-	-	-	-	0.115	0.129	0.0800	0.0687	0.0982	0.0285	0.0687	0.0975	0.129
				2018	0.00294	0.00645	0.00552	0.00705	0.00367	0.00596	0.00372	0.00622	0.00519	0.00153	0.00294	0.00574	0.00705
				2019	0.00787	0.00502	0.0221	0.00716	0.0134	0.00879	0.0126	0.00651	0.0104	0.00552	0.00502	0.00833	0.0221
				2020	0.00984	0.0365	0.00880	0.00747	0.0250	0.0158	0.00643	0.00318	0.0141	0.0113	0.00318	0.00932	0.0365
				2021	0.0117	0.0133	0.0601	0.164	0.0710	0.0985	0.0943	0.0994	0.0766	0.0500	0.0117	0.0827	0.164
				2022	0.00113	0.00707	0.00889	0.00413	0.0156	0.00289	0.00377	0.00233	0.00572	0.00472	0.00113	0.00395	0.0156
		Cobalt	mg/kg	2017	-	-	-	-	0.376	0.371	0.278	0.466	0.373	0.0770	0.278	0.373	0.466
				2018	0.189	0.145	0.118	0.116	0.0738	0.0322	0.0618	0.0282	0.0955	0.0563	0.0282	0.0951	0.189
				2019	0.213	0.300	0.0791	0.0848	0.159	0.0756	0.195	0.0723	0.147	0.0840	0.0723	0.122	0.300
				2020	0.311	0.470	0.341	0.165	1.17	0.404	0.206	0.0935	0.395	0.336	0.0935	0.326	1.17
				2021	0.304	0.362	0.0972	0.271	0.0697	0.240	0.324	0.134	0.225	0.111	0.0697	0.256	0.362
				2022	0.0112	0.167	0.444	0.479	0.369	0.224	0.124	0.0374	0.232	0.180	0.0112	0.196	0.479
		Manganese	mg/kg	2017	-	-	-	-	1.00	0.896	0.928	0.842	0.918	0.0679	0.842	0.912	1.00
				2018	0.224	0.207	0.150	0.346	0.104	0.132	0.107	0.0211	0.161	0.0979	0.0211	0.141	0.346
				2019	0.0992	0.476	0.385	0.118	0.144	0.164	0.104	0.0962	0.198	0.147	0.0962	0.131	0.476
				2020	0.448	2.30	0.237	0.433	0.863	1.01	0.117	0.0252	0.679	0.740	0.0252	0.440	2.30
				2021	0.719	0.753	0.772	1.83	1.01	1.52	2.03	2.08	1.34	0.593	0.719	1.27	2.08
				2022	0.116	0.632	0.844	0.462	0.164	0.133	0.0741	0.0186	0.305	0.303	0.0186	0.149	0.844
		Mercury	mg/kg	2017	-	-	-	-	1.01	0.429	0.809	0.986	0.809	0.269	0.429	0.897	1.01
				2018	2.16	1.15	-	1.30	1.26	0.623	0.650	0.826	1.14	0.532	0.623	1.15	2.16
				2019	1.21	1.23	0.560	0.897	1.12	1.07	1.00	0.838	0.989	0.221	0.560	1.03	1.23
				2020	2.90	1.83	3.13	1.38	4.95	2.33	5.77	6.12	3.55	1.82	1.38	3.02	6.12
				2021	1.08	1.45	1.24	0.735	0.559	0.611	0.181	0.702	0.819	0.410	0.181	0.719	1.45
				2022	0.207	1.32	3.56	3.64	1.77	2.25	1.67	2.16	2.07	1.13	0.207	1.97	3.64
		Molybdenum	mg/kg	2017	-	-	-	-	4.04	3.21	2.11	2.40	2.94	0.868	2.11	2.81	4.04
				2018	10.7	8.59	7.50	6.03	7.12	4.84	5.48	2.58	6.60	2.46	2.58	6.57	10.7
				2019	7.43	6.02	7.36	3.52	7.36	6.73	4.37	6.30	6.14	1.46	3.52	6.52	7.43
				2020	3.34	4.34	2.74	5.30	4.89	5.77	4.20	3.68	4.28	1.02	2.74	4.27	5.77
				2021	4.07	1.86	0.797	0.845	0.524	1.14	1.21	1.84	1.54	1.13	0.524	1.17	4.07
				2022	0.374	4.95	6.63	4.70	5.52	6.20	4.16	3.00	4.44	2.00	0.374	4.83	6.63
		Nickel	mg/kg	2017	-	-	-	-	0.417	0.332	0.311	0.485	0.386	0.0802	0.311	0.375	0.485
				2018	0.123	0.119	0.0570	0.0715	0.0592	0.0429	0.130	0.0332	0.0794	0.0386	0.0332	0.0654	0.130
				2019	0.230	0.170	0.0672	0.0794	0.177	0.0770	0.194	0.0580	0.132	0.0681	0.0580	0.125	0.230
				2020	0.182	0.190	0.105	0.107	0.901	0.271	0.187	0.0583	0.250	0.271	0.0583	0.185	0.901
				2021	0.228	0.340	0.192	0.288	0.112	0.333	0.365	0.304	0.270	0.0862	0.112	0.296	0.365
				2022	0.00724	0.136	0.327	0.311	0.344	0.105	0.139	0.0403	0.176	0.133	0.00724	0.138	0.344
		Phosphorus	mg/kg	2017	-	-	-	-	8.06	4.77	5.08	6.75	6.17	1.54	4.77	5.92	8.06
				2018	12.1	9.82	8.77	6.53	8.74	7.51	7.02	5.29	8.22	2.12	5.29	8.12	12.1
				2019	13.7	9.52	5.13	7.12	7.22	8.57	10.0	6.63	8.49	2.64	5.13	7.89	13.7
				2020	6.70	5.80	11.6	7.57	12.9	8.15	10.7	10.9	9.29	2.56	5.80	9.42	12.9
				2021	8.92	6.48	3.59	4.48	5.32	3.64	3.38	8.93	5.59	2.30	3.38	4.90	8.93
				2022	0.581	3.30	3.95	4.02	4.02	3.82	3.32	3.79	3.35	1.16	0.581	3.81	4.02

Notes: For 2010 data at HAC-D and HAC-U, historical station codes were W11 and W7, respectively. All values reported in dry weight. Summary statistics reported to 3 significant figures for display purposes. TTF calculated as Benthic Invertebrate Analyte Concentration/Periphyton Analyte Concentration. "-" = data were not available to calculate a TTF or TTF was not calculated because the concentration of an analyte was below the Laboratory Reporting Limit (LRL) for either the periphyton or benthic invertebrate tissue results.

Table D.5.7: Trophic Transfer Factors for Caddisfly Tissue Primary and Secondary Analytes Concentrations for Upper Hazeltine Creek (HAC-R1, HAC-U; Exposed), Upper Edney Creek (EDC-U; Reference), Lower Hazeltine Creek (HAC-D; Exposed), and Lower Edney Creek Exposed (E1) and Reference (EDC) Areas, 2018 to 2022

Waterbody	Area	Parameter	Units	Year	Replicate								Mean	Standard Deviation	Minimum	Median	Maximum
					1	2	3	4	5	6	7	8					
Lower Hazeltine Creek	HAC-D (Exposed)	Silver	mg/kg	2017	-	-	-	-	-	-	-	-	-	-	-	-	-
				2018	-	-	-	-	-	-	-	-	-	-	-	-	-
				2019	0.180	0.285	0.0676	-	0.108	-	1.01	0.0845	0.289	0.362	0.0676	0.144	1.01
				2020	0.609	0.885	1.62	0.199	1.75	0.606	0.705	-	0.910	0.568	0.199	0.705	1.75
				2021	0.765	0.675	0.311	0.386	0.119	0.466	0.375	0.366	0.433	0.205	0.119	0.380	0.765
				2022	0.0200	0.329	1.07	0.861	1.24	0.228	0.245	-	0.571	0.478	0.0200	0.329	1.24
		Sodium	mg/kg	2017	-	-	-	-	5.11	4.20	4.24	4.33	4.47	0.432	4.20	4.29	5.11
				2018	10.8	9.78	7.05	4.87	7.64	6.44	2.66	5.07	6.79	2.67	2.66	6.75	10.8
				2019	11.0	9.45	7.33	7.59	8.50	10.6	4.71	6.45	8.21	2.13	4.71	8.04	11.0
				2020	15.6	8.31	13.2	14.8	18.0	11.2	12.7	11.6	13.2	2.98	8.31	13.0	18.0
				2021	7.63	4.84	1.53	2.80	1.68	2.23	1.93	6.79	3.68	2.42	1.53	2.51	7.63
				2022	0.880	7.41	6.33	5.94	9.02	9.55	6.36	7.18	6.59	2.64	0.880	6.77	9.55
		Strontium	mg/kg	2017	-	-	-	-	0.244	0.238	0.149	0.140	0.193	0.0556	0.140	0.194	0.244
				2018	0.00939	0.0188	0.0134	0.0163	0.00998	0.0142	0.00874	0.0158	0.0133	0.00367	0.00874	0.0138	0.0188
				2019	0.0215	0.0145	0.0423	0.0189	0.0251	0.0236	0.0277	0.0172	0.0239	0.00861	0.0145	0.0226	0.0423
				2020	0.0319	0.0718	0.0640	0.0208	0.0763	0.0352	0.0190	0.00884	0.0410	0.0261	0.00884	0.0335	0.0763
				2021	0.0320	0.0291	0.0425	0.148	0.0571	0.0905	0.0916	0.0751	0.0708	0.0398	0.0291	0.0661	0.148
				2022	0.00280	0.0194	0.0186	0.0110	0.0233	0.00840	0.0125	0.00718	0.0129	0.00700	0.00280	0.0117	0.0233
		Tin	mg/kg	2017	-	-	-	-	-	0.657	0.892	1.04	0.864	0.194	0.657	0.892	1.04
				2018	-	-	-	-	-	-	-	-	-	-	-	-	-
				2019	-	-	-	-	-	-	-	-	-	-	-	-	-
				2020	-	-	-	-	-	-	-	-	-	-	-	-	-
				2021	-	-	-	-	-	-	-	-	-	-	-	-	-
				2022	-	-	-	-	-	-	-	-	-	-	-	-	-
		Titanium	mg/kg	2017	-	-	-	-	-	-	-	-	-	-	-	-	-
				2018	-	-	-	-	-	-	-	-	-	-	-	-	-
				2019	0.176	0.0797	0.0493	0.0461	0.0844	0.0580	0.114	0.0409	0.0811	0.0456	0.0409	0.0689	0.176
				2020	0.0951	0.128	0.111	0.0256	0.347	0.0868	0.0876	0.0421	0.115	0.0993	0.0256	0.0914	0.347
				2021	1.45	0.146	0.0518	0.0942	0.0247	0.0486	0.106	0.0359	0.245	0.489	0.0247	0.0730	1.45
				2022	0.00362	0.0643	0.143	0.159	0.815	0.0559	0.0775	0.0344	0.169	0.266	0.00362	0.0709	0.815
		Uranium	mg/kg	2017	-	-	-	-	0.610	0.352	0.333	0.378	0.418	0.129	0.333	0.365	0.610
				2018	0.0865	0.192	0.0302	0.0895	0.0311	0.00922	0.0263	0.0148	0.0599	0.0614	0.00922	0.0307	0.192
				2019	0.133	0.106	0.0413	0.0364	0.159	0.0474	0.151	0.0440	0.0898	0.0532	0.0364	0.0767	0.159
				2020	0.187	0.315	0.641	0.103	1.16	0.200	0.211	0.0436	0.357	0.371	0.0436	0.205	1.16
				2021	0.165	0.287	0.254	0.446	0.159	0.454	0.593	0.275	0.329	0.153	0.159	0.281	0.593
				2022	0.00734	0.105	0.362	0.235	0.349	0.136	0.0905	0.0465	0.166	0.134	0.00734	0.120	0.362
		Vanadium	mg/kg	2017	-	-	-	-	0.416	0.219	0.250	0.524	0.352	0.144	0.219	0.333	0.524
				2018	0.0764	0.0609	0.0450	0.0443	0.0240	0.00827	0.0235	0.0118	0.0368	0.0241	0.00827	0.0342	0.0764
				2019	0.143	0.0679	0.0413	0.0435	0.161	0.0472	0.152	0.0394	0.0869	0.0549	0.0394	0.0575	0.161
				2020	0.102	0.203	0.280	0.0221	0.457	0.0935	0.109	0.0247	0.162	0.147	0.0221	0.106	0.457
				2021	0.341	0.261	0.0657	0.151	0.0379	0.129	0.184	0.0612	0.154	0.105	0.0379	0.140	0.341
				2022	0.00266	0.0519	0.138	0.148	0.713	0.0652	0.0604	0.0296	0.151	0.233	0.00266	0.0628	0.713
		Zinc	mg/kg	2017	-	-	-	-	1.98	1.46	1.40	1.66	1.63	0.263	1.40	1.56	1.98
				2018	6.03	3.13	2.41	1.98	2.87	2.01	2.05	1.35	2.73	1.45	1.35	2.23	6.03
				2019	4.13	3.94	1.80	2.24	2.55	2.61	3.42	1.98	2.83	0.889	1.80	2.58	4.13
				2020	5.97	7.61	5.34	4.45	11.0	7.51	3.01	1.87	5.85	2.89	1.87	5.66	11.0
				2021	8.24	9.11	5.39	5.09	3.12	3.93	4.28	7.18	5.79	2.15	3.12	5.24	9.11
				2022	0.727	5.33	8.17	8.19	4.90	5.41	2.95	2.06	4.72	2.70	0.727	5.12	8.19
Lower Edney Creek	E1 (Exposed)	**Primary Analytes**															
		Arsenic	mg/kg	2019	0.136	0.117	0.203	0.110	0.139	0.0992	0.203	0.0727	0.135	0.0468	0.0727	0.126	0.203
				2020	0.111	0.349	0.219	0.166	0.120	0.316	0.217	0.149	0.206	0.0877	0.111	0.192	0.349
				2021	0.106	0.201	0.121	0.229	0.194	0.268	0.445	0.133	0.212	0.110	0.106	0.198	0.445
				2022	0.212	1.76	0.366	2.50	0.531	0.411	0.658	0.208	0.831	0.840	0.208	0.471	2.50
		Copper	mg/kg	2019	0.218	0.415	0.329	0.136	0.00757	0.747	0.546	0.505	0.363	0.240	0.00757	0.372	0.747
				2020	0.299	0.588	0.286	0.338	0.468	0.332	0.417	0.217	0.368	0.118	0.217	0.335	0.588
				2021	0.162	0.145	0.139	0.279	0.479	0.383	0.189	0.135	0.239	0.130	0.135	0.175	0.479
				2022	0.818	2.00	1.64	1.25	0.551	0.399	0.884	0.0699	0.951	0.646	0.0699	0.851	2.00
		Iron	mg/kg	2019	0.0230	0.00882	0.0118	0.00877	0.00812	0.0283	0.0631	0.0138	0.0207	0.0186	0.00812	0.0128	0.0631
				2020	0.0343	0.168	0.126	0.0682	0.113	0.137	0.0662	0.0303	0.0929	0.0504	0.0303	0.0906	0.168
				2021	0.0101	0.0143	0.0150	0.0541	0.0407	0.0167	0.124	0.0261	0.0377	0.0382	0.0101	0.0214	0.124
				2022	0.0403	0.848	0.213	1.77	0.336	0.288	0.625	0.113	0.529	0.568	0.0403	0.312	1.77
		Selenium	mg/kg	2019	1.74	1.26	4.09	2.37	1.04	1.97	1.12	1.87	1.93	0.985	1.04	1.81	4.09
				2020	2.41	2.98	6.36	4.03	3.96	3.01	2.35	2.60	3.46	1.33	2.35	2.99	6.36
				2021	1.20	1.52	2.49	2.08	1.76	1.51	1.08	2.09	1.72	0.482	1.08	1.64	2.49
				2022	3.37	3.20	1.62	5.07	1.53	1.49	1.92	0.899	2.39	1.38	0.899	1.77	5.07
		Secondary Analytes															
		Barium	mg/kg	2019	0.0556	0.0349	0.136	0.0108	0.0191	0.137	0.275	0.114	0.0978	0.0879	0.0108	0.0849	0.275
				2020	0.179	0.266	0.467	0.204	0.420	0.124	0.534	0.313	0.313	0.147	0.124	0.289	0.534
				2021	0.144	0.00590	0.00149	0.0303	0.00437	0.146	0.166	0.0683	0.0708	0.0709	0.00149	0.0493	0.166
				2022	0.152	3.61	1.15	0.984	1.04	0.601	1.74	0.0767	1.17	1.13	0.0767	1.01	3.61
		Cadmium	mg/kg	2019	0.298	0.0278	0.247	0.0804	0.376	0.0943	0.410	0.0358	0.196	0.155	0.0278	0.171	0.410
				2020	1.43	3.84	8.09	2.67	3.88	1.72	2.27	1.29	3.15	2.23	1.29	2.47	8.09
				2021	0.663	0.513	0.108	0.651	2.10	0.530	1.41	1.22	0.898	0.635	0.108	0.657	2.10
				2022	1.30	3.26	3.04	11.9	3.28	4.37	3.72	1.91	4.10	3.29	1.30	3.27	11.9
		Calcium	mg/kg	2019	0.0833	0.0424	0.0611	0.0397	0.0182	0.0854	0.137	0.0631	0.0663	0.0364	0.0182	0.0621	0.137
				2020	0.0679	0.227	0.273	0.123	0.219	0.154	0.0982	0.0922	0.157	0.0745	0.0679	0.139	0.273
				2021	0.0293	0.0106	0.00559	0.00334	0.00695	0.00992	0.00623	0.00690	0.00985	0.00818	0.00334	0.00692	0.0293
				2022	0.488	0.964	0.251	1.16	0.335	0.238	0.210	0.105	0.469	0.385	0.105	0.293	1.16
		Cobalt	mg/kg	2019	0.0297	0.0245	0.0539	0.0124	0.00927	0.0411	0.144	0.0198	0.0419	0.0439	0.00927	0.0271	0.144
				2020	0.0729	0.315	0.238	0.0941	0.377	0.184	0.202	0.0884	0.196	0.111	0.0729	0.193	0.377
				2021	0.0302	0.0646	0.0413	0.0550	0.229	0.0596	0.249	0.0611	0.0987	0.0874	0.0302	0.0603	0.249
				2022	0.0622	1.46	0.448	2.38	0.540	0.518	0.882	0.136	0.803	0.775	0.0622	0.529	2.38
		Manganese	mg/kg	2019	0.0647	0.0541	0.212	0.0552	0.140	0.106	0.278	0.0699	0.122	0.0827	0.0541	0.0878	0.278
				2020	0.207	0.842	1.31	0.342	0.862	0.624	0.644	0.411	0.655	0.351	0.207	0.634	1.31
				2021	0.248	0.367	0.115	0.294	0.803	0.250	0.681	0.488	0.406	0.236	0.115	0.330	0.803
				2022	0.363	2.42	0.908	5.38	1.09	1.46	1.11	0.236	1.62	1.66	0.236	1.10	5.38
		Mercury	mg/kg	2019	0.249	0.538	1.67	0.828	1.15	0.784	0.593	0.986	0.849	0.432	0.249	0.806	1.67
				2020	2.15	2.24	1.59	1.52	1.42	1.95	1.71	1.10	1.71	0.385	1.10	1.65	2.24
				2021	0.690	0.956	0.912	0.955	0.781	0.0608	0.766	0.909	0.754	0.297	0.0608	0.845	0.956
				2022	0.936	1.19	1.75	1.16	0.754	0.995	1.09	1.29	1.14	0.294	0.754	1.12	1.75
		Molybdenum	mg/kg	2019	2.40	2.14	3.32	4.41	1.11	1.14	0.934	0.687	2.02	1.32	0.687	1.64	4.41
				2020	1.77	1.56	1.88	2.99	1.09	2.83	2.15	2.57	2.11	0.657	1.09	2.02	2.99
				2021	2.17	1.22	4.83	2.32	3.19	2.94	2.63	2.72	2.75	1.03	1.22	2.67	4.83
				2022	7.95	3.58	0.322	3.67	1.29	1.09	1.07	2.10	2.63	2.46	0.322	1.69	7.95
		Nickel	mg/kg	2019	0.0341	0.0125	0.0234	0.0153	0.0443	0.0489	0.134	0.0255	0.0423	0.0393	0.0125	0.0298	0.134
				2020	0.118	0.320	0.282	0.108	0.190	0.195	0.208	0.0968	0.190	0.0812	0.0968	0.192	0.320
				2021	0.0204	0.0332	-	0.0310	0.155	0.0494	0.276	0.0900	0.0936	0.0929	0.0204	0.0494	0.276
				2022	0.0630	0.962	0.423	2.13	0.661	0.430	0.726	0.243	0.705	0.641	0.0630	0.546	2.13
		Phosphorus	mg/kg	2019	4.93	3.26	6.22	6.47	5.82	3.39	3.05	2.01	4.39	1.68	2.01	4.16	6.47
				2020	7.08	5.66	7.77	8.83	5.38	7.37	5.71	5.04	6.61	1.35	5.04	6.40	8.83
				2021	6.23	5.15	7.05	8.60	7.48	5.02	4.81	7.14	6.43	1.36	4.81	6.64	8.60
				2022	11.8	9.26	4.73	10.1	3.70	4.80	2.34	5.10	6.47	3.41	2.34	4.95	11.8
		Silver	mg/kg	2019	0.133	0.0394	0.175	-	0.0299	0.108	0.285	0.163	0.133	0.0873	0.0299	0.133	0.285
				2020	0.500	0.220	0.460	0.395	0.498	0.433	0.465	0.298	0.408	0.100	0.220	0.446	0.500
				2021	-	-	-	-	0.361	0.176	0.302	0.126	0.241	0.109	0.126	0.239	0.361
				2022	1.13	1.87	0.977	4.91	0.684	0.842	1.30	0.472	1.52	1.43	0.472	1.06	4.91

Notes: For 2010 data at HAC-D and HAC-U, historical station codes were W11 and W7, respectively. All values reported in dry weight. Summary statistics reported to 3 significant figures for display purposes. TTF calculated as Benthic Invertebrate Analyte Concentration/Periphyton Analyte Concentration. "-" = data were not available to calculate a TTF or TTF was not calculated because the concentration of an analyte was below the Laboratory Reporting Limit (LRL) for either the periphyton or benthic invertebrate tissue results.

Table D.5.7: Trophic Transfer Factors for Caddisfly Tissue Primary and Secondary Analytes Concentrations for Upper Hazeltine Creek (HAC-R1, HAC-U; Exposed), Upper Edney Creek (EDC-U; Reference), Lower Hazeltine Creek (HAC-D; Exposed), and Lower Edney Creek Exposed (E1) and Reference (EDC) Areas, 2018 to 2022

Waterbody	Area	Parameter	Units	Year	Replicate								Mean	Standard Deviation	Minimum	Median	Maximum
					1	2	3	4	5	6	7	8					
Lower Edney Creek	E1 (Exposed)	Sodium	mg/kg	2019	3.42	2.44	6.24	6.42	6.24	6.00	8.44	7.03	5.78	1.94	2.44	6.24	8.44
				2020	9.50	7.70	6.46	11.4	3.82	5.86	6.46	4.40	6.95	2.52	3.82	6.46	11.4
				2021	2.97	2.98	2.97	6.07	3.55	1.05	3.84	5.00	3.55	1.50	1.05	3.27	6.07
				2022	14.8	15.9	13.1	14.1	7.56	10.4	7.66	8.05	11.4	3.43	7.56	11.8	15.9
		Strontium	mg/kg	2019	0.0652	0.0442	0.0872	0.0317	0.0525	0.0876	0.149	0.0805	0.0748	0.0364	0.0317	0.0729	0.149
				2020	0.0949	0.252	0.151	0.120	0.235	0.109	0.108	0.0790	0.144	0.0652	0.0790	0.115	0.252
				2021	0.0457	0.0148	0.00719	0.00842	0.0150	0.0213	0.0171	0.0107	0.0175	0.0123	0.00719	0.0149	0.0457
				2022	0.371	1.01	0.245	0.539	0.310	0.110	0.302	0.0435	0.366	0.300	0.0435	0.306	1.01
		Tin	mg/kg	2019	0.464	0.0660	-	1.07	-	0.213	0.600	-	0.482	0.389	0.0660	0.464	1.07
				2020	0.930	-	-	-	0.500	-	-	-	0.715	0.304	0.500	0.715	0.930
				2021	-	-	-	-	-	-	-	-	-	-	-	-	-
				2022	-	-	-	1.33	0.429	-	0.500	-	0.754	0.503	0.429	0.500	1.33
		Titanium	mg/kg	2019	0.0184	0.00768	0.00689	0.00572	0.0139	0.0254	0.0465	0.00985	0.0168	0.0137	0.00572	0.0119	0.0465
				2020	0.0340	0.156	0.105	0.0585	0.137	0.0957	0.0597	0.0255	0.0838	0.0472	0.0255	0.0777	0.156
				2021	0.00614	0.00748	0.00448	0.0114	0.0143	0.00826	0.0601	0.00944	0.0152	0.0184	0.00448	0.00885	0.0601
				2022	0.0284	0.861	0.594	0.807	0.346	0.230	0.601	0.0978	0.446	0.316	0.0284	0.470	0.861
		Uranium	mg/kg	2019	0.0438	0.00414	0.0206	0.00861	0.0310	0.0273	0.165	0.0169	0.0397	0.0522	0.00414	0.0240	0.165
				2020	0.136	0.0690	0.224	0.154	0.173	0.141	0.0552	0.0630	0.127	0.0599	0.0552	0.139	0.224
				2021	0.0212	0.0480	0.0167	0.0645	0.101	0.0561	0.186	0.0673	0.0701	0.0540	0.0167	0.0603	0.186
				2022	0.0970	1.26	0.157	4.05	0.704	0.730	0.912	0.205	1.01	1.29	0.0970	0.717	4.05
		Vanadium	mg/kg	2019	0.0232	0.00761	0.00589	0.00476	0.00533	0.0227	0.0635	0.00769	0.0176	0.0201	0.00476	0.00765	0.0635
				2020	0.0241	0.144	0.124	0.122	0.0893	0.108	0.0497	0.0234	0.0854	0.0472	0.0234	0.0985	0.144
				2021	0.00625	0.0115	0.00657	0.0512	0.0319	0.0112	0.111	0.0210	0.0314	0.0357	0.00625	0.0163	0.111
				2022	0.0350	0.775	0.256	1.48	0.324	0.249	0.709	0.0918	0.490	0.480	0.0350	0.290	1.48
		Zinc	mg/kg	2019	1.83	1.11	3.30	1.39	0.981	1.79	1.54	0.933	1.61	0.764	0.933	1.47	3.30
				2020	2.92	4.54	6.57	3.79	3.60	4.16	4.18	3.54	4.16	1.09	2.92	3.98	6.57
				2021	1.44	2.74	4.12	3.73	7.37	2.60	7.81	3.30	4.14	2.28	1.44	3.52	7.81
				2022	5.86	8.24	1.88	9.14	2.49	3.08	3.46	2.39	4.57	2.82	1.88	3.27	9.14

Notes: For 2010 data at HAC-D and HAC-U, historical station codes were W11 and W7, respectively. All values reported in dry weight. Summary statistics reported to 3 significant figures for display purposes. TTF calculated as Benthic Invertebrate Analyte Concentration/Periphyton Analyte Concentration. “-“ = data were not available to calculate a TTF or TTF was not calculated because the concentration of an analyte was below the Laboratory Reporting Limit (LRL) for either the periphyton or benthic invertebrate tissue results.

Table D.5.8: Trophic Transfer Factors for Composite-Taxa Benthic Invertebrate Tissue Primary and Secondary Analytes Concentrations for Upper Hazeltine Creek (HAC-R1, HAC-U; Exposed), Upper Edney Creek (EDC-U; Reference), Lower Hazeltine Creek (HAC-D; Exposed), and Lower Edney Creek Exposed (E1) and Reference (EDC-D) Areas, 2010 to 2022

Waterbody	Area	Parameter	Units	Year	Replicate								Mean	Standard Deviation	Minimum	Median	Maximum
					1	2	3	4	5	6	7	8					
Upper Edney Creek	EDC-U (Reference)	**Primary Analytes**															
		Arsenic	mg/kg	2018	0.137	0.139	0.234	0.298	0.121	0.232	0.0459	0.0871	0.162	0.0849	0.0459	0.138	0.298
				2019	0.362	0.319	0.317	0.397	0.175	0.461	0.287	0.284	0.325	0.0849	0.175	0.318	0.461
				2020	0.0643	0.0369	0.109	0.113	0.102	0.0897	0.0320	0.0326	0.0725	0.0353	0.0320	0.0770	0.113
				2021	0.244	0.119	0.267	0.375	0.212	0.341	0.179	0.192	0.241	0.0852	0.119	0.228	0.375
				2022	0.160	0.0550	0.105	0.0230	0.0217	0.113	0.0502	0.0182	0.0682	0.0521	0.0182	0.0526	0.160
		Copper	mg/kg	2018	0.507	0.728	0.923	1.06	0.448	0.557	0.546	0.350	0.640	0.245	0.350	0.551	1.06
				2019	0.873	0.678	1.21	0.907	0.996	1.92	1.03	0.604	1.03	0.410	0.604	0.952	1.92
				2020	0.885	0.658	0.995	1.06	0.592	0.592	0.890	1.04	0.839	0.198	0.592	0.888	1.06
				2021	0.712	0.613	0.783	0.774	0.438	0.717	0.392	0.715	0.643	0.150	0.392	0.713	0.783
				2022	0.984	0.501	0.650	0.675	0.495	0.853	0.659	0.443	0.658	0.186	0.443	0.654	0.984
		Iron	mg/kg	2018	0.0832	0.132	0.147	0.198	0.0553	0.136	0.0373	0.0374	0.103	0.0588	0.0373	0.107	0.198
				2019	0.334	0.111	0.184	0.306	0.142	0.209	0.188	0.188	0.208	0.0764	0.111	0.188	0.334
				2020	0.0659	0.0661	0.245	0.182	0.0862	0.0566	0.0353	0.0337	0.0964	0.0761	0.0337	0.0660	0.245
				2021	0.110	0.121	0.128	0.194	0.139	0.152	0.141	0.227	0.152	0.0399	0.110	0.140	0.227
				2022	0.224	0.0324	0.0805	0.0387	0.0203	0.0853	0.0762	0.0394	0.0745	0.0650	0.0203	0.0578	0.224
		Selenium	mg/kg	2018	0.648	1.70	2.47	1.89	0.909	1.20	1.42	0.934	1.40	0.603	0.648	1.31	2.47
				2019	1.09	2.39	1.08	1.43	0.753	3.39	2.33	2.37	1.85	0.904	0.753	1.88	3.39
				2020	1.06	1.03	4.37	1.77	1.72	0.983	1.19	2.06	1.77	1.12	0.983	1.45	4.37
				2021	1.13	1.06	2.50	1.72	0.986	1.47	1.18	2.20	1.53	0.565	0.986	1.33	2.50
				2022	3.05	0.888	1.05	1.29	0.841	1.32	1.68	1.32	1.43	0.709	0.841	1.31	3.05
		Secondary Analytes															
		Barium	mg/kg	2018	0.254	0.212	0.114	0.582	0.190	0.549	0.0858	0.150	0.267	0.192	0.0858	0.201	0.582
				2019	0.188	0.161	0.116	0.173	0.113	0.250	0.162	0.135	0.162	0.0444	0.113	0.161	0.250
				2020	0.0772	0.535	0.0734	0.343	0.0427	0.152	0.0506	0.0934	0.171	0.176	0.0427	0.0853	0.535
				2021	0.358	0.621	0.503	0.643	0.694	0.627	0.251	0.0835	0.473	0.220	0.0835	0.562	0.694
				2022	0.0343	0.0369	0.0339	0.00978	0.0161	0.0684	0.0839	0.00590	0.0361	0.0276	0.00590	0.0341	0.0839
		Cadmium	mg/kg	2018	2.87	6.54	5.64	4.35	2.88	4.50	1.03	1.53	3.67	1.93	1.03	3.61	6.54
				2019	3.14	3.11	1.45	2.92	4.97	13.8	4.95	2.65	4.63	3.90	1.45	3.13	13.8
				2020	0.714	0.956	0.520	0.940	1.15	3.03	0.547	2.30	1.27	0.908	0.520	0.948	3.03
				2021	4.55	3.89	13.2	5.88	4.13	6.57	3.93	5.00	5.89	3.10	3.89	4.77	13.2
				2022	1.13	0.855	1.59	0.431	0.577	1.08	1.14	0.0904	0.861	0.476	0.0904	0.967	1.59
		Calcium	mg/kg	2018	0.233	0.269	0.198	0.250	0.148	0.159	0.165	0.114	0.192	0.0546	0.114	0.181	0.269
				2019	0.405	0.249	0.316	0.337	0.281	0.582	0.402	0.422	0.374	0.104	0.249	0.369	0.582
				2020	0.240	0.248	0.398	0.335	0.212	0.163	0.258	0.367	0.278	0.0808	0.163	0.253	0.398
				2021	0.225	0.284	0.359	0.308	0.288	0.339	0.376	0.484	0.333	0.0777	0.225	0.324	0.484
				2022	0.167	0.123	0.167	0.141	0.0977	0.215	0.185	0.0842	0.148	0.0447	0.0842	0.154	0.215
		Cobalt	mg/kg	2018	0.121	0.195	0.210	0.334	0.156	0.196	0.0648	0.0988	0.172	0.0833	0.0648	0.175	0.334
				2019	0.230	0.150	0.196	0.303	0.226	0.520	0.203	0.151	0.247	0.120	0.150	0.214	0.520
				2020	0.0709	0.162	0.0860	0.222	0.0723	0.121	0.0552	0.103	0.112	0.0560	0.0552	0.0944	0.222
				2021	0.277	0.355	0.407	0.476	0.407	0.484	0.225	0.180	0.351	0.114	0.180	0.381	0.484
				2022	0.130	0.0717	0.116	0.0370	0.0435	0.187	0.143	0.0240	0.0940	0.0586	0.0240	0.0937	0.187
		Manganese	mg/kg	2018	0.248	0.180	0.125	0.386	0.208	0.240	0.0914	0.147	0.203	0.0920	0.0914	0.194	0.386
				2019	0.108	0.109	0.112	0.134	0.0583	0.301	0.108	0.0716	0.125	0.0751	0.0583	0.108	0.301
				2020	0.0828	0.292	0.0705	0.296	0.0456	0.214	0.0912	0.127	0.152	0.101	0.0456	0.109	0.296
				2021	0.243	0.504	0.615	0.524	0.503	1.07	0.196	0.0887	0.468	0.307	0.0887	0.503	1.07
				2022	0.0542	0.0446	0.0513	0.0180	0.0249	0.178	0.139	0.0174	0.0659	0.0597	0.0174	0.0479	0.178
		Mercury	mg/kg	2018	0.725	1.70	2.47	1.54	0.678	1.05	0.887	0.666	1.21	0.642	0.666	0.967	2.47
				2019	0.781	1.19	0.819	0.489	0.457	1.17	1.45	0.867	0.903	0.347	0.457	0.843	1.45
				2020	0.409	0.586	3.82	0.752	1.35	0.923	0.456	0.653	1.12	1.13	0.409	0.703	3.82
				2021	0.572	1.40	1.13	0.858	0.167	0.830	1.04	1.69	0.960	0.472	0.167	0.950	1.69
				2022	1.44	0.356	0.543	0.934	0.378	1.04	1.07	0.763	0.816	0.378	0.356	0.849	1.44
		Molybdenum	mg/kg	2018	0.811	0.986	0.768	1.22	0.873	1.60	0.799	0.847	0.989	0.288	0.768	0.860	1.60
				2019	0.579	0.463	0.390	0.505	0.688	1.74	0.579	0.633	0.698	0.433	0.390	0.579	1.74
				2020	0.299	0.313	0.307	0.393	0.357	0.557	0.201	0.350	0.347	0.102	0.201	0.331	0.557
				2021	0.389	0.274	1.26	1.42	0.576	2.62	0.440	0.669	0.956	0.788	0.274	0.623	2.62
				2022	10.8	2.33	1.31	0.787	1.59	0.288	0.231	1.02	2.29	3.49	0.231	1.16	10.8
		Nickel	mg/kg	2018	0.127	0.194	0.139	0.350	0.0984	0.177	0.0402	0.0753	0.150	0.0955	0.0402	0.133	0.350
				2019	0.190	0.0938	0.202	0.260	0.0788	0.290	0.144	0.124	0.173	0.0762	0.0788	0.167	0.290
				2020	0.0655	0.170	0.0868	0.291	0.0484	0.0563	0.0779	0.0932	0.111	0.0817	0.0484	0.0824	0.291
				2021	0.145	0.231	0.281	0.281	0.258	0.263	0.104	0.147	0.213	0.0707	0.104	0.244	0.281
				2022	0.0762	0.0333	0.0563	0.0229	0.0257	0.0611	0.0483	0.0120	0.0420	0.0220	0.0120	0.0408	0.0762
		Phosphorus	mg/kg	2018	3.86	5.04	5.85	4.92	4.22	3.67	3.81	3.43	4.35	0.838	3.43	4.04	5.85
				2019	2.38	4.61	2.41	2.25	2.14	11.2	3.03	2.55	3.83	3.10	2.14	2.48	11.2
				2020	6.86	2.27	4.77	4.89	3.40	3.42	5.79	5.39	4.60	1.49	2.27	4.83	6.86
				2021	4.89	5.86	9.32	6.41	4.46	7.11	4.31	8.10	6.31	1.80	4.31	6.13	9.32
				2022	3.04	2.64	2.01	2.71	2.26	3.38	3.01	3.03	2.76	0.451	2.01	2.86	3.38
		Silver	mg/kg	2018	-	-	-	-	-	-	-	-	-	-	-	-	-
				2019	1.62	1.37	2.25	1.27	1.16	4.07	2.19	1.30	1.90	0.970	1.16	1.49	4.07
				2020	0.956	0.753	4.02	2.03	2.41	1.48	0.715	2.34	1.84	1.11	0.715	1.76	4.02
				2021	0.819	0.739	1.22	0.797	0.923	0.824	1.63	1.02	0.996	0.298	0.739	0.873	1.63
				2022	4.69	0.950	1.55	3.38	0.637	2.49	2.22	1.04	2.12	1.38	0.637	1.88	4.69
		Sodium	mg/kg	2018	13.0	10.0	10.0	10.5	12.7	4.73	11.0	9.16	10.1	2.56	4.73	10.3	13.0
				2019	10.7	13.0	3.92	11.8	12.2	72.4	17.0	7.76	18.6	22.1	3.92	12.0	72.4
				2020	32.8	18.2	-	7.69	20.9	21.4	6.25	31.1	19.8	10.3	6.25	20.9	32.8
				2021	18.5	18.5	12.5	23.3	17.3	15.8	14.7	20.8	17.7	3.43	12.5	17.9	23.3
				2022	17.9	11.3	11.1	19.9	13.0	17.2	16.4	18.1	15.6	3.37	11.1	16.8	19.9
		Strontium	mg/kg	2018	0.200	0.255	0.146	0.218	0.143	0.165	0.116	0.0888	0.166	0.0548	0.0888	0.156	0.255
				2019	0.355	0.154	0.338	0.274	0.104	0.282	0.249	0.235	0.249	0.0856	0.104	0.262	0.355
				2020	0.179	0.225	0.218	0.310	0.131	0.117	0.228	0.276	0.210	0.0662	0.117	0.221	0.310
				2021	0.202	0.300	0.303	0.276	0.286	0.291	0.320	0.293	0.284	0.0358	0.202	0.292	0.320
				2022	0.113	0.0869	0.113	0.0682	0.0644	0.127	0.151	0.0623	0.0983	0.0329	0.0623	0.0998	0.151
		Tin	mg/kg	2018	-	-	-	-	-	-	-	-	-	-	-	-	-
				2019	0.450	0.319	0.374	0.792	0.406	0.592	0.569	0.837	0.542	0.192	0.319	0.509	0.837
				2020	-	-	-	-	-	-	-	1.12	1.12	-	1.12	1.12	1.12
				2021	-	-	-	-	-	-	-	-	-	-	-	-	-
				2022	-	-	-	-	-	-	-	-	-	-	-	-	-
		Titanium	mg/kg	2018	-	-	-	-	-	-	-	-	-	-	-	-	-
				2019	0.427	0.138	0.122	0.436	0.255	0.153	0.179	0.214	0.241	0.125	0.122	0.197	0.436
				2020	0.0652	0.195	0.234	0.193	0.0665	0.0285	0.0341	0.0599	0.110	0.0830	0.0285	0.0659	0.234
				2021	0.113	0.203	0.121	0.222	0.136	0.126	0.156	0.254	0.167	0.0531	0.113	0.146	0.254
				2022	0.263	0.0493	0.0972	0.0940	0.0409	0.0977	0.125	0.0526	0.102	0.0712	0.0409	0.0956	0.263
		Uranium	mg/kg	2018	0.170	0.468	0.456	0.722	0.166	0.375	0.106	0.0976	0.320	0.222	0.0976	0.273	0.722
				2019	0.359	0.164	0.240	0.482	0.172	0.386	0.429	0.491	0.341	0.132	0.164	0.373	0.491
				2020	0.226	0.289	1.08	0.662	0.261	0.171	0.218	0.242	0.394	0.318	0.171	0.251	1.08
				2021	0.316	0.448	0.379	0.694	0.372	0.364	0.425	0.555	0.444	0.124	0.316	0.402	0.694
				2022	0.144	0.0756	0.153	0.101	0.0535	0.203	0.136	0.0659	0.117	0.0513	0.0535	0.119	0.203
		Vanadium	mg/kg	2018	0.0840	0.140	0.175	0.204	0.0529	0.169	0.0301	0.0331	0.111	0.0693	0.0301	0.112	0.204
				2019	0.412	0.116	0.193	0.357	0.303	0.218	0.206	0.180	0.248	0.0998	0.116	0.212	0.412
				2020	0.0764	0.0541	0.211	0.163	0.0761	0.0553	0.0517	0.0396	0.0910	0.0621	0.0396	0.0657	0.211
				2021	0.116	0.122	0.126	0.218	0.139	0.149	0.160	0.211	0.155	0.0394	0.116	0.144	0.218
				2022	0.146	0.0360	0.0942	0.0334	0.0192	0.0803	0.0784	0.0323	0.0650	0.0429	0.0192	0.0572	0.146
		Zinc	mg/kg	2018	2.04	2.59	2.90	2.59	2.62	2.57	2.21	2.45	2.50	0.266	2.04	2.58	2.90
				2019	1.72	3.18	1.65	1.30	2.37	4.87	2.61	1.08	2.35	1.24	1.08	2.04	4.87
				2020	2.58	4.01	1.91	3.65	1.41	2.73	1.81	3.02	2.64	0.910	1.41	2.66	4.01
				2021	2.81	3.42	2.83	2.50	2.04	2.12	2.01	1.54	2.41	0.599	1.54	2.31	3.42
				2022	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes: For 2010 data at HAC-D and HAC-U, historical station codes were W11 and W7, respectively. All values reported in dry weight. Summary statistics reported to 3 significant figures for display purposes. TTF calculated as Benthic Invertebrate Analyte Concentration/Periphyton Analyte Concentration. "-" = data were not available to calculate a TTF or TTF was not calculated because the concentration of an analyte was below the Laboratory Reporting Limit (LRL) for either the periphyton or benthic invertebrate tissue results.

Table D.5.8: Trophic Transfer Factors for Composite-Taxa Benthic Invertebrate Tissue Primary and Secondary Analytes Concentrations for Upper Hazeltine Creek (HAC-R1, HAC-U; Exposed), Upper Edney Creek (EDC-U; Reference), Lower Hazeltine Creek (HAC-D; Exposed), and Lower Edney Creek Exposed (E1) and Reference (EDC-D) Areas, 2010 to 2022

Waterbody	Area	Parameter	Units	Year	Replicate								Mean	Standard Deviation	Minimum	Median	Maximum
					1	2	3	4	5	6	7	8					
Upper Hazeltine Creek Reach 1	HAC-R1 (Exposed)	**Primary Analytes**															
		Arsenic	mg/kg	2010	0.712	0.145	0.352	0.393	0.452	-	-	-	0.411	0.204	0.145	0.393	0.712
				2018	1.61	1.61	0.756	0.719	0.304	1.22	1.88	1.26	1.17	0.537	0.304	1.24	1.88
				2019	2.07	0.735	0.945	0.753	0.763	1.04	1.53	1.31	1.14	0.471	0.735	0.994	2.07
				2020	0.807	0.716	0.995	1.83	1.02	0.355	0.397	0.512	0.829	0.477	0.355	0.761	1.83
				2021	1.27	2.71	1.51	2.51	2.45	2.73	2.20	2.73	2.26	0.573	1.27	2.48	2.73
				2022	0.639	0.929	0.674	0.936	1.54	1.25	0.513	0.524	0.875	0.366	0.513	0.801	1.54
		Copper	mg/kg	2010	-	-	-	-	-	-	-	-	-	-	-	-	-
				2018	-	-	-	-	-	-	-	-	-	-	-	-	-
				2019	5.06	2.33	2.07	4.60	2.07	4.78	5.85	5.46	4.03	1.60	2.07	4.69	5.85
				2020	3.49	2.09	6.46	8.55	5.25	0.797	0.843	1.92	3.67	2.83	0.797	2.79	8.55
				2021	4.78	7.76	3.84	4.18	8.11	10.4	4.18	9.88	6.64	2.72	3.84	6.27	10.4
				2022	2.12	0.879	2.50	3.50	1.58	3.71	2.33	0.862	2.18	1.07	0.862	2.23	3.71
		Iron	mg/kg	2010	-	-	-	-	-	-	-	-	-	-	-	-	-
				2018	1.28	1.10	0.234	0.216	0.274	0.973	1.88	1.74	0.962	0.668	0.216	1.04	1.88
				2019	5.60	1.32	2.39	1.47	1.36	1.94	4.05	5.85	3.00	1.90	1.32	2.17	5.85
				2020	1.34	0.888	2.95	2.68	1.98	0.276	0.309	0.988	1.43	1.02	0.276	1.16	2.95
				2021	2.55	10.8	3.38	15.3	23.8	13.5	4.80	12.2	10.8	7.15	2.55	11.5	23.8
				2022	0.856	1.14	1.27	1.62	1.71	4.13	0.679	0.237	1.46	1.19	0.237	1.20	4.13
		Selenium	mg/kg	2010	2.64	2.93	2.38	1.87	2.78	-	-	-	2.52	0.419	1.87	2.64	2.93
				2018	2.22	2.26	2.54	4.24	1.23	2.61	2.57	2.14	2.48	0.837	1.23	2.40	4.24
				2019	2.86	2.42	3.20	3.31	-	3.09	2.45	2.30	2.80	0.414	2.30	2.86	3.31
				2020	3.29	3.52	3.88	5.19	2.69	4.35	3.01	3.53	3.68	0.792	2.69	3.53	5.19
				2021	-	-	4.14	4.50	5.21	4.30	4.64	5.57	4.72	0.551	4.14	4.57	5.57
				2022	1.90	2.48	3.20	2.00	2.18	2.75	3.25	2.69	2.56	0.514	1.90	2.58	3.25
		Secondary Analytes															
		Barium	mg/kg	2010	0.582	0.218	0.352	0.390	0.584	-	-	-	0.425	0.158	0.218	0.390	0.584
				2018	0.557	0.510	0.264	0.0328	0.330	0.565	4.58	0.778	0.952	1.48	0.0328	0.534	4.58
				2019	2.14	0.289	0.625	0.189	0.174	0.379	2.96	5.25	1.50	1.84	0.174	0.502	5.25
				2020	0.417	0.441	0.644	1.21	1.31	0.103	0.0813	0.271	0.560	0.470	0.0813	0.429	1.31
				2021	0.205	1.30	0.335	0.853	1.01	0.968	1.14	0.364	0.773	0.414	0.205	0.911	1.30
				2022	0.184	0.365	0.414	0.262	0.367	0.814	0.419	0.152	0.372	0.205	0.152	0.366	0.814
		Cadmium	mg/kg	2010	1.85	0.903	1.09	1.27	1.55	-	-	-	1.34	0.376	0.903	1.27	1.85
				2018	4.98	3.95	2.30	6.11	6.47	6.12	5.92	2.93	4.85	1.60	2.30	5.45	6.47
				2019	2.11	5.11	3.69	0.657	6.53	9.04	6.90	2.50	4.57	2.83	0.657	4.40	9.04
				2020	3.63	7.54	1.85	2.49	1.70	1.22	0.485	0.962	2.49	2.26	0.485	1.78	7.54
				2021	-	20.6	8.21	6.67	13.5	6.66	13.4	22.1	13.0	6.39	6.66	13.4	22.1
				2022	1.52	1.64	2.57	3.03	1.99	2.16	5.19	8.28	3.30	2.33	1.52	2.37	8.28
		Calcium	mg/kg	2010	0.139	0.0581	0.0816	0.183	0.103	-	-	-	0.113	0.0494	0.0581	0.103	0.183
				2018	0.838	0.802	1.13	0.703	0.0304	0.556	0.764	0.739	0.695	0.313	0.0304	0.751	1.13
				2019	0.164	0.0205	0.0543	0.0206	0.0122	0.0463	0.0379	0.0450	0.0502	0.0485	0.0122	0.0414	0.164
				2020	0.0558	0.0152	0.0307	0.0325	0.0370	0.00576	0.00312	0.0158	0.0245	0.0178	0.00312	0.0233	0.0558
				2021	0.0239	0.0328	0.0253	0.0338	0.0477	0.0255	0.0557	0.0203	0.0331	0.0125	0.0203	0.0292	0.0557
				2022	0.0374	0.0377	0.0178	0.0138	0.0713	0.0382	0.0165	0.0315	0.0330	0.0185	0.0138	0.0344	0.0713
		Cobalt	mg/kg	2010	0.526	0.104	0.354	0.515	0.533	-	-	-	0.406	0.185	0.104	0.515	0.533
				2018	0.915	1.25	0.379	0.246	0.387	1.09	2.02	2.25	1.07	0.754	0.246	1.00	2.25
				2019	4.33	1.47	1.72	1.28	1.38	1.96	3.25	3.89	2.41	1.22	1.28	1.84	4.33
				2020	1.37	1.08	2.92	2.82	1.78	0.317	0.309	1.12	1.46	0.999	0.309	1.25	2.92
				2021	1.86	4.01	1.85	4.73	4.45	5.55	4.02	3.02	3.69	1.34	1.85	4.01	5.55
				2022	0.900	1.24	1.29	1.44	1.69	3.07	0.694	0.484	1.35	0.799	0.484	1.27	3.07
		Manganese	mg/kg	2010	0.483	0.226	0.341	0.244	0.489	-	-	-	0.357	0.126	0.226	0.341	0.489
				2018	0.365	0.677	0.262	0.389	0.523	1.05	1.18	0.986	0.679	0.352	0.262	0.600	1.18
				2019	0.987	0.887	0.579	0.806	1.02	1.44	1.77	1.88	1.17	0.472	0.579	1.00	1.88
				2020	1.13	1.07	1.93	1.37	1.15	0.193	0.173	0.765	0.973	0.590	0.173	1.10	1.93
				2021	2.35	4.13	2.11	2.72	3.06	3.58	3.71	2.86	3.07	0.697	2.11	2.96	4.13
				2022	0.679	0.761	0.779	0.594	0.654	1.68	0.551	0.394	0.761	0.390	0.394	0.667	1.68
		Mercury	mg/kg	2010	5.47	3.94	4.84	5.86	5.43	-	-	-	5.11	0.746	3.94	5.43	5.86
				2018	5.67	5.90	2.46	2.64	1.20	3.85	5.59	7.03	4.29	2.05	1.20	4.72	7.03
				2019	-	5.59	-	7.73	2.00	5.57	-	-	5.22	2.38	2.00	5.58	7.73
				2020	26.3	14.6	29.1	24.1	19.3	11.2	14.5	12.5	19.0	6.80	11.2	17.0	29.1
				2021	10.8	-	11.5	-	-	-	12.0	16.9	12.8	2.78	10.8	11.7	16.9
				2022	5.73	5.93	4.04	11.0	7.02	11.7	4.76	3.47	6.70	3.07	3.47	5.83	11.7
		Molybdenum	mg/kg	2010	5.11	5.05	3.12	11.1	6.35	-	-	-	6.15	3.02	3.12	5.11	11.1
				2018	4.71	1.06	1.03	0.969	1.54	2.70	2.89	1.82	2.09	1.29	0.969	1.68	4.71
				2019	1.79	1.28	1.84	2.39	1.20	2.75	1.73	2.87	1.98	0.627	1.20	1.82	2.87
				2020	3.48	3.52	3.49	3.17	2.68	6.27	5.24	6.80	4.33	1.55	2.68	3.51	6.80
				2021	-	8.52	4.78	5.06	6.05	7.34	7.60	7.87	6.75	1.46	4.78	7.34	8.52
				2022	2.24	3.00	4.15	3.12	2.04	3.28	2.93	1.10	2.73	0.923	1.10	2.96	4.15
		Nickel	mg/kg	2010	1.38	0.287	0.940	4.08	1.69	-	-	-	1.68	1.44	0.287	1.38	4.08
				2018	1.88	2.47	0.682	0.672	2.29	1.14	3.70	2.06	1.86	1.02	0.672	1.97	3.70
				2019	1.56	0.796	1.53	2.13	-	0.849	1.84	1.89	1.51	0.514	0.796	1.56	2.13
				2020	0.895	0.756	1.97	2.43	1.18	0.269	0.188	0.650	1.04	0.794	0.188	0.826	2.43
				2021	-	3.25	2.17	4.15	3.60	3.68	2.96	1.81	3.09	0.841	1.81	3.25	4.15
				2022	0.990	1.16	1.15	1.10	0.809	1.44	0.692	0.227	0.947	0.370	0.227	1.04	1.44
		Phosphorus	mg/kg	2010	-	-	-	-	-	-	-	-	-	-	-	-	-
				2018	8.78	9.83	5.35	10.8	5.30	8.72	10.1	7.98	8.36	2.07	5.30	8.75	10.8
				2019	7.69	8.50	10.1	7.48	6.64	9.81	9.27	8.68	8.53	1.21	6.64	8.59	10.1
				2020	12.1	12.4	13.6	24.5	9.43	8.84	10.7	10.5	12.8	4.99	8.84	11.4	24.5
				2021	15.5	22.9	15.1	21.2	19.8	23.5	14.8	36.4	21.1	7.10	14.8	20.5	36.4
				2022	9.68	9.98	9.85	11.4	8.98	9.76	9.07	7.91	9.58	0.994	7.91	9.72	11.4
		Silver	mg/kg	2010	-	-	-	-	-	-	-	-	-	-	-	-	-
				2018	-	-	-	-	-	-	-	-	-	-	-	-	-
				2019	-	-	-	-	-	-	-	-	-	-	-	-	-
				2020	2.50	1.68	11.7	6.47	11.5	1.19	0.718	2.93	4.83	4.52	0.718	2.72	11.7
				2021	-	9.88	8.69	4.35	9.97	8.12	5.32	9.52	7.98	2.26	4.35	8.69	9.97
				2022	2.02	1.37	2.19	2.61	1.50	4.76	1.37	1.13	2.12	1.18	1.13	1.76	4.76
		Sodium	mg/kg	2010	-	-	-	-	-	-	-	-	-	-	-	-	-
				2018	9.10	10.5	6.79	5.74	4.65	9.85	11.0	12.2	8.72	2.69	4.65	9.47	12.2
				2019	11.7	10.4	19.5	10.8	14.6	14.1	10.1	9.91	12.6	3.30	9.91	11.2	19.5
				2020	16.8	12.7	25.1	48.9	14.0	7.86	8.59	12.8	18.3	13.4	7.86	13.4	48.9
				2021	-	30.9	30.0	30.1	35.2	39.3	32.2	37.9	33.7	3.83	30.0	32.2	39.3
				2022	12.9	15.1	12.1	19.1	9.97	18.4	10.3	9.78	13.4	3.71	9.78	12.5	19.1
		Strontium	mg/kg	2010	0.176	0.0628	0.112	0.178	0.138	-	-	-	0.133	0.0480	0.0628	0.138	0.178
				2018	0.580	0.538	0.662	0.159	0.0627	0.404	0.521	0.545	0.434	0.213	0.0627	0.529	0.662
				2019	0.212	0.0337	0.0796	0.0399	0.0274	0.0635	0.0808	0.0707	0.0760	0.0588	0.0274	0.0671	0.212
				2020	0.0698	0.0349	0.108	0.146	0.106	0.0154	0.00885	0.0289	0.0648	0.0507	0.00885	0.0524	0.146
				2021	0.0594	0.0825	0.0743	0.0831	0.129	0.0939	0.110	0.0652	0.0872	0.0234	0.0594	0.0828	0.129
				2022	0.0478	0.0770	0.0371	0.0379	0.0762	0.0674	0.0695	0.0588	0.0590	0.0163	0.0371	0.0631	0.0770
		Tin	mg/kg	2010	0.238	-	-	0.207	-	-	-	-	0.223	0.0225	0.207	0.223	0.238
				2018	-	-	-	-	0.429	-	-	-	0.429	-	0.429	0.429	0.429
				2019	-	-	-	-	-	-	-	-	-	-	-	-	-
				2020	-	1.69	-	-	-	-	-	0.800	1.24	0.628	0.800	1.24	1.69
				2021	-	-	-	-	-	-	-	-	-	-	-	-	-
				2022	-	-	-	-	-	-	-	-	-	-	-	-	-
		Titanium	mg/kg	2010	-	-	-	-	-	-	-	-	-	-	-	-	-
				2018	-	-	-	-	-	-	-	-	-	-	-	-	-
				2019	5.13	0.801	2.91	0.929	1.22	1.04	3.00	5.99	2.63	2.02	0.801	2.06	5.99
				2020	1.00	0.555	2.49	2.47	1.40	0.202	0.180	0.753	1.13	0.923	0.180	0.878	2.49
				2021	1.66	15.3	5.73	21.9	53.9	56.2	4.92	12.9	21.6	21.7	1.66	14.1	56.2
				2022	0.556	0.960	0.994	1.43	1.05	3.30	0.447	0.157	1.11	0.972	0.157	0.977	3.30

Notes: For 2010 data at HAC-D and HAC-U, historical station codes were W11 and W7, respectively. All values reported in dry weight. Summary statistics reported to 3 significant figures for display purposes. TTF calculated as Benthic Invertebrate Analyte Concentration/Periphyton Analyte Concentration. "-" = data were not available to calculate a TTF or TTF was not calculated because the concentration of an analyte was below the Laboratory Reporting Limit (LRL) for either the periphyton or benthic invertebrate tissue results.

Table D.5.8: Trophic Transfer Factors for Composite-Taxa Benthic Invertebrate Tissue Primary and Secondary Analytes Concentrations for Upper Hazeltine Creek (HAC-R1, HAC-U; Exposed), Upper Edney Creek (EDC-U; Reference), Lower Hazeltine Creek (HAC-D; Exposed), and Lower Edney Creek Exposed (E1) and Reference (EDC-D) Areas, 2010 to 2022

Waterbody	Area	Parameter	Units	Year	Replicate								Mean	Standard Deviation	Minimum	Median	Maximum
					1	2	3	4	5	6	7	8					
Upper Hazeltine Creek Reach 1	HAC-R1 (Exposed)	Uranium	mg/kg	2010	0.463	0.0932	0.348	0.509	0.647	-	-	-	0.412	0.208	0.0932	0.463	0.647
				2018	0.884	0.879	0.446	0.479	0.292	0.878	1.55	0.799	0.775	0.389	0.292	0.839	1.55
				2019	2.17	1.01	1.67	0.881	0.733	1.06	1.46	1.54	1.32	0.480	0.733	1.26	2.17
				2020	1.48	0.918	3.53	2.36	2.10	0.223	0.184	0.696	1.44	1.17	0.184	1.20	3.53
				2021	2.16	4.65	3.15	4.21	4.66	8.91	4.06	5.76	4.70	2.01	2.16	4.43	8.91
				2022	0.699	1.25	0.872	1.26	1.24	2.02	0.595	0.459	1.05	0.503	0.459	1.06	2.02
		Vanadium	mg/kg	2010	0.308	0.0763	0.260	0.288	0.342	-	-	-	0.255	0.104	0.0763	0.288	0.342
				2018	1.07	0.839	0.232	0.228	0.267	0.922	1.65	1.25	0.807	0.528	0.228	0.880	1.65
				2019	4.07	0.948	1.90	1.09	1.19	1.54	2.76	4.67	2.27	1.42	0.948	1.72	4.67
				2020	1.09	0.668	2.25	2.31	1.52	0.211	0.285	0.715	1.13	0.823	0.211	0.900	2.31
				2021	2.62	8.14	3.47	7.84	10.6	14.2	4.43	6.35	7.20	3.87	2.62	7.10	14.2
				2022	0.761	1.06	1.16	1.46	1.01	4.26	0.549	0.224	1.31	1.25	0.224	1.03	4.26
		Zinc	mg/kg	2010	2.16	2.15	2.38	2.89	3.56	-	-	-	2.63	0.598	2.15	2.38	3.56
				2018	5.04	5.44	1.70	2.36	3.57	5.52	7.67	9.16	5.06	2.53	1.70	5.24	9.16
				2019	11.3	11.8	10.7	9.68	-	11.8	11.0	11.5	11.1	0.757	9.68	11.3	11.8
				2020	11.1	12.0	11.5	12.6	6.84	7.97	10.5	9.23	10.2	2.03	6.84	10.8	12.6
				2021	-	25.5	14.9	19.3	23.1	26.0	22.8	29.6	23.0	4.81	14.9	23.1	29.6
				2022	5.36	5.60	6.51	7.26	5.19	8.79	4.34	2.19	5.66	1.97	2.19	5.48	8.79
Upper Hazeltine Creek Reach 2	HAC-U (Exposed)	**Primary Analytes**															
		Arsenic	mg/kg	2010	-	-	-	-	-	-	-	-	-	-	-	-	-
				2018	0.483	0.756	0.501	0.747	0.615	0.707	0.556	0.554	0.615	0.109	0.483	0.586	0.756
				2019	1.34	3.95	1.07	1.25	0.534	0.987	0.781	1.07	1.37	1.07	0.534	1.07	3.95
				2020	0.474	0.648	0.435	0.314	0.307	0.195	0.218	0.453	0.380	0.151	0.195	0.374	0.648
				2021	1.08	0.774	1.40	1.51	0.552	0.964	0.844	1.48	1.08	0.357	0.552	1.02	1.51
				2022	1.62	1.05	1.89	0.702	1.00	1.00	0.915	0.478	1.08	0.462	0.478	1.00	1.89
		Copper	mg/kg	2010	-	-	-	-	-	-	-	-	-	-	-	-	-
				2018	0.698	0.820	0.868	1.20	1.92	0.959	0.993	0.289	0.968	0.466	0.289	0.914	1.92
				2019	2.84	6.90	1.99	2.73	1.49	2.52	1.64	1.33	2.68	1.80	1.33	2.26	6.90
				2020	1.47	2.18	1.25	0.463	0.796	0.496	0.470	1.60	1.09	0.637	0.463	1.02	2.18
				2021	4.93	1.56	0.652	7.48	1.40	4.15	0.397	1.35	2.74	2.51	0.397	1.48	7.48
				2022	8.75	13.6	26.4	0.261	7.72	18.6	5.50	1.22	10.3	8.89	0.261	8.24	26.4
		Iron	mg/kg	2010	-	-	-	-	-	-	-	-	-	-	-	-	-
				2018	0.230	1.31	0.434	0.422	0.731	0.487	0.280	0.294	0.523	0.354	0.230	0.428	1.31
				2019	1.49	3.95	0.945	2.05	0.634	1.47	0.464	0.925	1.49	1.12	0.464	1.21	3.95
				2020	0.448	0.905	0.497	0.185	0.254	0.127	0.155	0.585	0.395	0.268	0.127	0.351	0.905
				2021	5.60	1.79	2.79	17.1	0.544	2.75	1.36	1.78	4.22	5.42	0.544	2.27	17.1
				2022	1.60	0.194	1.43	0.180	0.281	1.47	0.725	0.0868	0.746	0.655	0.0868	0.503	1.60
		Selenium	mg/kg	2010	-	-	-	-	-	-	-	-	-	-	-	-	-
				2018	1.70	2.22	1.65	1.86	2.21	1.37	2.41	1.48	1.86	0.379	1.37	1.78	2.41
				2019	2.78	1.67	2.00	2.26	1.71	1.14	1.99	1.77	1.92	0.477	1.14	1.88	2.78
				2020	3.48	3.35	1.80	3.11	1.88	2.06	3.70	3.72	2.89	0.835	1.80	3.23	3.72
				2021	2.92	2.40	2.16	2.53	1.48	1.72	1.91	2.82	2.24	0.518	1.48	2.28	2.92
				2022	1.11	1.53	1.65	0.506	3.08	4.65	2.95	4.94	2.55	1.63	0.506	2.30	4.94
		Secondary Analytes															
		Barium	mg/kg	2010	-	-	-	-	-	-	-	-	-	-	-	-	-
				2018	0.0781	0.246	0.176	0.292	0.273	0.277	0.294	0.145	0.223	0.0803	0.0781	0.259	0.294
				2019	0.505	0.816	0.296	0.992	0.308	1.66	0.447	0.632	0.707	0.455	0.296	0.569	1.66
				2020	0.217	0.257	0.245	0.123	0.102	0.0336	0.109	0.262	0.168	0.0870	0.0336	0.170	0.262
				2021	0.676	0.576	0.660	0.745	0.287	0.814	0.712	0.606	0.635	0.159	0.287	0.668	0.814
				2022	0.496	0.104	0.620	0.0893	0.262	0.226	0.659	0.0491	0.313	0.245	0.0491	0.244	0.659
		Cadmium	mg/kg	2010	-	-	-	-	-	-	-	-	-	-	-	-	-
				2018	5.27	7.05	5.71	5.02	4.46	3.91	3.45	1.37	4.53	1.69	1.37	4.74	7.05
				2019	11.5	2.22	2.48	3.15	1.23	1.22	3.07	2.10	3.37	3.37	1.22	2.35	11.5
				2020	1.29	4.20	1.24	0.268	0.395	0.307	1.38	1.65	1.34	1.28	0.268	1.27	4.20
				2021	5.44	6.31	1.71	4.58	2.58	3.59	5.20	7.95	4.67	2.02	1.71	4.89	7.95
				2022	1.89	4.25	3.02	1.29	4.74	3.33	1.75	5.25	3.19	1.47	1.29	3.17	5.25
		Calcium	mg/kg	2010	-	-	-	-	-	-	-	-	-	-	-	-	-
				2018	0.0253	0.0193	0.0171	0.0157	0.0162	0.0183	0.0224	0.0306	0.0206	0.00518	0.0157	0.0188	0.0306
				2019	0.0386	0.129	0.0425	0.0598	0.0345	0.217	0.166	0.0518	0.0923	0.0692	0.0345	0.0558	0.217
				2020	0.00870	0.0104	0.00991	0.00855	0.00779	0.00329	0.00760	0.0138	0.00876	0.00297	0.00329	0.00863	0.0138
				2021	0.0370	0.0610	0.0356	0.0456	0.0205	0.0564	0.0133	0.0691	0.0423	0.0195	0.0133	0.0413	0.0691
				2022	0.176	0.293	0.139	0.0602	0.109	0.0306	0.139	0.156	0.138	0.0794	0.0306	0.139	0.293
		Cobalt	mg/kg	2010	-	-	-	-	-	-	-	-	-	-	-	-	-
				2018	0.420	1.43	0.778	0.715	1.04	0.567	0.412	0.364	0.715	0.367	0.364	0.641	1.43
				2019	1.38	2.76	0.905	1.74	0.644	1.10	0.558	1.00	1.26	0.716	0.558	1.05	2.76
				2020	0.520	0.842	0.592	0.204	0.279	0.101	0.210	0.665	0.427	0.264	0.101	0.400	0.842
				2021	3.38	1.41	2.54	2.93	0.723	2.32	1.47	1.66	2.05	0.888	0.723	1.99	3.38
				2022	1.23	0.412	1.81	0.237	0.561	1.26	0.879	0.238	0.830	0.569	0.237	0.720	1.81
		Manganese	mg/kg	2010	-	-	-	-	-	-	-	-	-	-	-	-	-
				2018	0.596	0.669	0.588	0.542	0.569	0.509	0.502	0.598	0.572	0.0545	0.502	0.579	0.669
				2019	0.857	0.866	0.656	0.880	0.767	0.567	0.736	0.918	0.781	0.123	0.567	0.812	0.918
				2020	0.376	0.487	0.401	0.163	0.224	0.0697	0.228	0.427	0.297	0.146	0.0697	0.302	0.487
				2021	1.81	0.824	1.65	1.27	0.849	1.21	0.996	0.837	1.18	0.382	0.824	1.10	1.81
				2022	0.306	0.138	0.465	0.188	0.325	0.271	0.554	0.736	0.373	0.200	0.138	0.315	0.736
		Mercury	mg/kg	2010	-	-	-	-	-	-	-	-	-	-	-	-	-
				2018	1.67	3.48	3.52	2.79	3.79	2.60	1.72	1.97	2.69	0.850	1.67	2.69	3.79
				2019	9.79	6.75	5.25	5.00	5.09	3.42	2.72	5.41	5.43	2.15	2.72	5.17	9.79
				2020	5.02	6.24	5.68	4.28	6.30	9.70	6.15	13.7	7.13	3.09	4.28	6.20	13.7
				2021	12.5	8.87	4.14	10.8	4.77	9.80	7.55	10.4	8.60	2.93	4.14	9.33	12.5
				2022	5.25	5.23	10.4	6.62	7.23	14.0	2.87	3.74	6.92	3.68	2.87	5.93	14.0
		Molybdenum	mg/kg	2010	-	-	-	-	-	-	-	-	-	-	-	-	-
				2018	3.15	5.26	4.25	4.67	4.62	3.59	3.94	4.48	4.24	0.669	3.15	4.36	5.26
				2019	3.67	2.83	4.09	2.69	4.71	2.67	3.20	3.55	3.43	0.724	2.67	3.37	4.71
				2020	8.32	4.33	2.21	7.71	4.68	3.36	5.20	5.22	5.13	2.05	2.21	4.94	8.32
				2021	5.38	3.08	4.77	4.08	2.70	3.73	3.70	5.15	4.07	0.961	2.70	3.90	5.38
				2022	1.85	0.906	1.36	2.58	1.47	7.31	1.12	2.26	2.36	2.08	0.906	1.66	7.31
		Nickel	mg/kg	2010	-	-	-	-	-	-	-	-	-	-	-	-	-
				2018	0.496	1.02	0.640	0.674	1.27	0.817	0.451	0.492	0.732	0.288	0.451	0.657	1.27
				2019	1.29	1.68	0.828	1.87	0.830	0.609	0.592	1.38	1.14	0.491	0.592	1.06	1.87
				2020	0.400	0.786	0.496	0.169	0.209	0.106	0.333	0.630	0.391	0.237	0.106	0.367	0.786
				2021	3.40	1.68	2.03	1.60	0.688	3.06	1.14	2.70	2.04	0.947	0.688	1.86	3.40
				2022	1.20	0.377	1.70	0.359	1.03	1.30	0.754	0.330	0.882	0.510	0.330	0.894	1.70
		Phosphorus	mg/kg	2010	-	-	-	-	-	-	-	-	-	-	-	-	-
				2018	11.9	13.2	9.90	12.8	18.8	10.6	9.20	6.70	11.6	3.59	6.70	11.3	18.8
				2019	13.0	7.81	8.04	9.08	8.42	6.56	8.33	13.0	9.28	2.40	6.56	8.37	13.0
				2020	8.11	7.80	9.46	10.4	8.99	8.23	8.45	7.63	8.63	0.921	7.63	8.34	10.4
				2021	9.99	7.47	5.28	22.4	7.00	7.89	8.30	8.89	9.66	5.35	5.28	8.10	22.4
				2022	8.47	7.79	11.8	6.88	6.89	7.19	2.63	6.73	7.30	2.53	2.63	7.04	11.8
		Silver	mg/kg	2010	-	-	-	-	-	-	-	-	-	-	-	-	-
				2018	-	-	-	-	-	-	-	-	-	-	-	-	-
				2019	-	-	-	-	-	-	0.547	-	0.547	-	0.547	0.547	0.547
				2020	1.26	-	0.896	0.330	0.507	-	0.317	1.70	0.834	0.558	0.317	0.702	1.70
				2021	6.53	1.75	0.548	4.92	0.974	1.93	0.595	3.04	2.54	2.17	0.548	1.84	6.53
				2022	9.81	6.15	46.6	0.572	5.15	-	5.20	2.96	10.9	16.0	0.572	5.20	46.6

Notes: For 2010 data at HAC-D and HAC-U, historical station codes were W11 and W7, respectively. All values reported in dry weight. Summary statistics reported to 3 significant figures for display purposes. TTF calculated as Benthic Invertebrate Analyte Concentration/Periphyton Analyte Concentration. "-" = data were not available to calculate a TTF or TTF was not calculated because the concentration of an analyte was below the Laboratory Reporting Limit (LRL) for either the periphyton or benthic invertebrate tissue results.

Table D.5.8: Trophic Transfer Factors for Composite-Taxa Benthic Invertebrate Tissue Primary and Secondary Analytes Concentrations for Upper Hazeltine Creek (HAC-R1, HAC-U; Exposed), Upper Edney Creek (EDC-U; Reference), Lower Hazeltine Creek (HAC-D; Exposed), and Lower Edney Creek Exposed (E1) and Reference (EDC-D) Areas, 2010 to 2022

Waterbody	Area	Parameter	Units	Year	Replicate								Mean	Standard Deviation	Minimum	Median	Maximum
					1	2	3	4	5	6	7	8					
Upper Hazeltine Creek Reach 2	HAC-U (Exposed)	Sodium	mg/kg	2010	-	-	-	-	-	-	-	-	-	-	-	-	-
				2018	6.25	6.02	4.91	5.87	11.7	7.54	5.12	5.48	6.61	2.20	4.91	5.95	11.7
				2019	11.9	8.17	10.6	14.2	7.31	7.08	7.05	11.1	9.68	2.67	7.05	9.41	14.2
				2020	9.01	6.17	13.6	10.9	9.83	12.5	8.94	9.03	10.0	2.33	6.17	9.43	13.6
				2021	15.8	9.33	7.49	12.3	9.10	9.79	11.8	12.5	11.0	2.63	7.49	10.8	15.8
				2022	8.14	7.87	8.05	11.2	8.98	9.02	11.9	13.4	9.82	2.08	7.87	9.00	13.4
		Strontium	mg/kg	2010	-	-	-	-	-	-	-	-	-	-	-	-	-
				2018	0.0424	0.0396	0.0420	0.0455	0.0438	0.0321	0.0645	0.0497	0.0449	0.00939	0.0321	0.0431	0.0645
				2019	0.0648	0.158	0.0647	0.0925	0.0526	0.748	0.147	0.0756	0.175	0.235	0.0526	0.0841	0.748
				2020	0.0256	0.0315	0.0246	0.0192	0.0166	0.00638	0.0177	0.0299	0.0214	0.00820	0.00638	0.0219	0.0315
				2021	0.0732	0.194	0.102	0.0705	0.0371	0.0752	0.0327	0.0869	0.0838	0.0500	0.0327	0.0742	0.194
				2022	0.175	0.213	0.196	0.0994	0.170	0.0493	0.229	0.125	0.157	0.0612	0.0493	0.173	0.229
		Tin	mg/kg	2010	-	-	-	-	-	-	-	-	-	-	-	-	-
				2018	-	-	-	-	-	-	-	-	-	-	-	-	-
				2019	-	-	-	-	-	-	-	-	-	-	-	-	-
				2020	-	-	-	0.750	-	-	-	0.786	0.768	0.0253	0.750	0.768	0.786
				2021	-	-	-	-	-	-	-	-	-	-	-	-	-
				2022	-	-	-	-	-	-	-	-	-	-	-	-	-
		Titanium	mg/kg	2010	-	-	-	-	-	-	-	-	-	-	-	-	-
				2018	-	-	-	-	-	-	-	-	-	-	-	-	-
				2019	1.16	3.07	0.755	3.25	0.477	1.04	0.339	0.745	1.36	1.15	0.339	0.899	3.25
				2020	0.345	0.561	0.301	0.150	0.179	0.0610	0.102	0.409	0.264	0.171	0.0610	0.240	0.561
				2021	8.98	1.18	1.97	17.5	0.482	3.64	1.53	1.70	4.62	5.84	0.482	1.83	17.5
				2022	1.10	0.0543	0.792	0.0920	0.0986	1.11	0.385	0.0174	0.457	0.475	0.0174	0.242	1.11
		Uranium	mg/kg	2010	-	-	-	-	-	-	-	-	-	-	-	-	-
				2018	0.220	0.602	0.419	0.367	0.418	0.397	0.388	0.427	0.405	0.104	0.220	0.407	0.602
				2019	1.34	1.55	0.817	1.47	0.596	0.825	0.534	0.772	0.988	0.402	0.534	0.821	1.55
				2020	0.396	0.530	0.358	0.131	0.157	0.0480	0.151	0.476	0.281	0.181	0.0480	0.257	0.530
				2021	2.17	0.934	1.05	2.20	0.482	1.27	0.792	2.11	1.38	0.686	0.482	1.16	2.20
				2022	1.37	1.06	1.44	0.250	0.691	0.685	1.54	0.181	0.903	0.532	0.181	0.877	1.54
		Vanadium	mg/kg	2010	-	-	-	-	-	-	-	-	-	-	-	-	-
				2018	0.186	1.29	0.426	0.352	0.513	0.501	0.259	0.277	0.476	0.349	0.186	0.389	1.29
				2019	1.30	4.37	0.822	2.03	0.583	1.57	0.432	0.758	1.48	1.28	0.432	1.06	4.37
				2020	0.371	0.664	0.364	0.155	0.148	0.0667	0.102	0.418	0.286	0.204	0.0667	0.259	0.664
				2021	5.43	1.66	2.32	5.90	0.535	2.39	1.15	1.63	2.63	1.97	0.535	1.99	5.90
				2022	1.45	0.166	1.09	0.0962	0.189	1.12	0.812	0.0602	0.623	0.557	0.0602	0.501	1.45
		Zinc	mg/kg	2010	-	-	-	-	-	-	-	-	-	-	-	-	-
				2018	4.99	5.87	4.64	4.94	8.17	4.42	4.02	3.07	5.02	1.51	3.07	4.79	8.17
				2019	-	7.90	6.22	6.66	7.36	5.08	4.58	7.44	6.46	1.25	4.58	6.66	7.90
				2020	10.6	10.8	7.93	4.91	7.27	7.43	8.70	10.9	8.56	2.10	4.91	8.31	10.9
				2021	18.8	8.84	7.59	13.8	8.74	15.5	17.0	16.0	13.3	4.30	7.59	14.6	18.8
				2022	1.85	2.79	6.68	7.80	8.05	15.8	4.30	4.49	6.47	4.38	1.85	5.58	15.8
Lower Edney Creek	EDC-D (Reference)	**Primary Analytes**															
		Arsenic	mg/kg	2018	0.367	0.569	0.948	0.827	0.464	0.157	0.375	0.519	0.528	0.256	0.157	0.491	0.948
				2019	0.108	0.146	0.0682	0.224	0.170	0.128	0.128	0.139	0.139	0.0454	0.0682	0.133	0.224
				2020	0.226	0.108	0.187	0.234	0.0808	0.152	0.193	0.469	0.206	0.119	0.0808	0.190	0.469
				2021	0.223	0.0958	0.491	0.333	0.236	0.259	0.510	0.481	0.329	0.152	0.0958	0.296	0.510
				2022	0.154	0.0873	0.250	0.136	0.137	0.0705	0.194	0.0843	0.139	0.0609	0.0705	0.136	0.250
		Copper	mg/kg	2018	0.919	1.03	1.28	2.17	1.07	2.62	1.38	1.13	1.45	0.611	0.919	1.20	2.62
				2019	0.746	0.769	0.907	1.29	1.54	2.08	0.552	1.51	1.17	0.518	0.552	1.10	2.08
				2020	1.75	1.94	2.46	1.59	0.708	2.41	2.10	1.15	1.77	0.606	0.708	1.84	2.46
				2021	2.31	2.14	1.62	1.98	1.66	2.07	1.24	4.11	2.14	0.867	1.24	2.02	4.11
				2022	1.39	1.17	1.50	2.17	1.28	1.25	1.13	0.875	1.34	0.381	0.875	1.26	2.17
		Iron	mg/kg	2018	0.116	0.215	0.664	0.734	0.149	0.0656	0.301	0.844	0.386	0.311	0.0656	0.258	0.844
				2019	0.0500	0.0511	0.0266	0.0844	0.0431	0.0455	0.0846	0.134	0.0650	0.0345	0.0266	0.0506	0.134
				2020	0.108	0.0466	0.0384	0.130	0.0274	0.0757	0.0897	0.0867	0.0752	0.0355	0.0274	0.0812	0.130
				2021	0.154	0.0547	0.174	0.202	0.124	0.128	0.249	0.269	0.169	0.0703	0.0547	0.164	0.269
				2022	0.0393	0.0300	0.105	0.0297	0.106	0.0667	0.0896	0.0353	0.0627	0.0335	0.0297	0.0530	0.106
		Selenium	mg/kg	2018	0.422	1.18	1.20	1.67	1.23	0.920	1.29	1.09	1.12	0.355	0.422	1.19	1.67
				2019	2.05	0.216	0.549	4.13	3.17	0.958	3.04	1.03	1.89	1.42	0.216	1.54	4.13
				2020	2.11	1.69	3.80	3.38	1.57	1.01	3.12	3.02	2.46	0.999	1.01	2.56	3.80
				2021	0.739	0.739	2.79	1.11	1.04	1.33	2.48	2.38	1.58	0.837	0.739	1.22	2.79
				2022	2.00	1.67	2.25	1.92	1.30	0.988	2.28	1.77	1.77	0.448	0.988	1.84	2.28
		Secondary Analytes															
		Barium	mg/kg	2018	0.348	0.755	1.28	0.560	0.596	0.0707	0.482	0.903	0.624	0.365	0.0707	0.578	1.28
				2019	0.0493	0.0161	0.0463	0.131	0.0665	0.118	0.105	0.120	0.0815	0.0425	0.0161	0.0857	0.131
				2020	0.350	0.0692	0.0872	0.391	0.0845	0.111	0.133	0.142	0.171	0.126	0.0692	0.122	0.391
				2021	0.190	0.0589	0.687	0.277	0.138	0.122	0.193	0.260	0.241	0.194	0.0589	0.191	0.687
				2022	0.0654	0.0713	0.174	0.0463	0.140	0.125	0.245	0.0883	0.119	0.0661	0.0463	0.107	0.245
		Cadmium	mg/kg	2018	1.04	3.26	2.41	4.53	2.76	1.15	3.70	4.68	2.94	1.38	1.04	3.01	4.68
				2019	1.04	0.456	0.630	1.54	2.16	0.249	1.77	0.482	1.04	0.706	0.249	0.835	2.16
				2020	2.37	1.97	4.06	7.28	1.32	0.363	3.67	3.19	3.03	2.11	0.363	2.78	7.28
				2021	1.73	0.934	5.82	1.88	2.71	2.41	4.98	6.01	3.31	1.99	0.934	2.56	6.01
				2022	2.80	2.99	8.20	3.02	2.30	0.246	3.73	2.19	3.18	2.27	0.246	2.89	8.20
		Calcium	mg/kg	2018	0.0731	0.0434	0.0277	0.0216	0.0651	0.142	0.0563	0.244	0.0842	0.0747	0.0216	0.0607	0.244
				2019	0.122	0.474	0.316	0.576	0.217	0.661	0.198	0.475	0.380	0.195	0.122	0.395	0.661
				2020	0.327	0.244	0.474	0.364	0.178	0.534	0.284	0.241	0.331	0.122	0.178	0.305	0.534
				2021	0.0646	0.0711	0.108	0.0497	0.0578	0.103	0.194	0.225	0.109	0.0658	0.0497	0.0870	0.225
				2022	0.238	0.157	0.256	0.449	0.118	0.134	0.157	0.153	0.208	0.109	0.118	0.157	0.449
		Cobalt	mg/kg	2018	0.152	0.349	0.970	1.38	0.247	0.139	0.377	0.901	0.564	0.459	0.139	0.363	1.38
				2019	0.0688	0.0696	0.0423	0.115	0.110	0.101	0.105	0.137	0.0936	0.0307	0.0423	0.103	0.137
				2020	0.147	0.0814	0.109	0.244	0.0367	0.106	0.146	0.125	0.124	0.0604	0.0367	0.117	0.244
				2021	0.173	0.0778	0.304	0.291	0.173	0.207	0.301	0.579	0.263	0.150	0.0778	0.249	0.579
				2022	0.0830	0.0666	0.164	0.0896	0.128	0.0629	0.154	0.0610	0.101	0.0417	0.0610	0.0863	0.164
		Manganese	mg/kg	2018	0.294	0.526	0.975	0.991	0.411	0.102	0.337	0.302	0.492	0.326	0.102	0.374	0.991
				2019	0.0495	0.0678	0.0592	0.153	0.152	0.103	0.0746	0.121	0.0974	0.0410	0.0495	0.0886	0.153
				2020	0.363	0.0723	0.238	0.469	0.0432	0.161	0.180	0.128	0.207	0.145	0.0432	0.171	0.469
				2021	0.182	0.0885	0.568	0.352	0.139	0.188	0.204	0.464	0.273	0.170	0.0885	0.196	0.568
				2022	0.118	0.0778	0.198	0.115	0.117	0.0620	0.246	0.0921	0.128	0.0627	0.0620	0.116	0.246
		Mercury	mg/kg	2018	1.06	1.70	2.38	2.80	0.770	1.27	2.15	1.46	1.70	0.698	0.770	1.58	2.80
				2019	0.902	0.712	0.976	1.24	2.02	0.344	1.05	0.544	0.974	0.512	0.344	0.939	2.02
				2020	1.75	2.20	2.10	1.83	2.98	0.683	2.36	1.99	1.98	0.650	0.683	2.04	2.98
				2021	2.89	3.53	1.87	1.72	2.16	1.40	1.60	2.48	2.21	0.723	1.40	2.02	3.53
				2022	2.76	2.00	2.23	1.10	2.20	1.92	2.79	2.52	2.19	0.549	1.10	2.21	2.79
		Molybdenum	mg/kg	2018	1.55	0.941	3.14	1.19	2.07	0.265	0.354	0.486	1.25	0.986	0.265	1.07	3.14
				2019	0.113	0.313	0.200	0.539	0.496	0.135	0.293	0.252	0.292	0.156	0.113	0.272	0.539
				2020	0.803	0.111	0.821	2.67	0.596	0.219	0.211	3.62	1.13	1.30	0.111	0.700	3.62
				2021	0.255	0.201	1.48	0.201	0.216	0.236	1.12	0.672	0.547	0.498	0.201	0.245	1.48
				2022	0.638	0.388	0.644	0.751	0.332	0.408	0.713	0.578	0.557	0.160	0.332	0.608	0.751

Notes: For 2010 data at HAC-D and HAC-U, historical station codes were W11 and W7, respectively. All values reported in dry weight. Summary statistics reported to 3 significant figures for display purposes. TTF calculated as Benthic Invertebrate Analyte Concentration/Periphyton Analyte Concentration. "-" = data were not available to calculate a TTF or TTF was not calculated because the concentration of an analyte was below the Laboratory Reporting Limit (LRL) for either the periphyton or benthic invertebrate tissue results.

Table D.5.8: Trophic Transfer Factors for Composite-Taxa Benthic Invertebrate Tissue Primary and Secondary Analytes Concentrations for Upper Hazeltine Creek (HAC-R1, HAC-U; Exposed), Upper Edney Creek (EDC-U; Reference), Lower Hazeltine Creek (HAC-D; Exposed), and Lower Edney Creek Exposed (E1) and Reference (EDC-D) Areas, 2010 to 2022

Waterbody	Area	Parameter	Units	Year	Replicate								Mean	Standard Deviation	Minimum	Median	Maximum
					1	2	3	4	5	6	7	8					
Lower Edney Creek	EDC-D (Reference)	Nickel	mg/kg	2018	0.223	0.331	0.739	0.979	0.314	0.208	0.380	0.500	0.459	0.271	0.208	0.355	0.979
				2019	0.0957	0.128	0.0598	0.161	0.0817	0.229	0.102	0.233	0.136	0.0658	0.0598	0.115	0.233
				2020	0.157	0.0844	0.132	0.255	0.0483	0.298	0.176	0.105	0.157	0.0846	0.0483	0.145	0.298
				2021	0.252	0.114	0.339	0.299	0.131	0.185	0.334	0.844	0.312	0.232	0.114	0.276	0.844
				2022	0.0735	0.115	0.122	0.242	0.0845	0.0893	0.0884	0.201	0.127	0.0614	0.0735	0.102	0.242
		Phosphorus	mg/kg	2018	3.27	3.66	2.61	3.72	3.33	4.61	3.72	2.25	3.39	0.727	2.25	3.49	4.61
				2019	3.22	5.91	5.71	6.94	8.96	4.59	3.31	5.09	5.47	1.90	3.22	5.40	8.96
				2020	5.85	4.88	8.95	7.95	2.81	4.91	7.02	6.11	6.06	1.93	2.81	5.98	8.95
				2021	5.44	4.98	7.39	4.59	5.74	5.10	5.68	11.8	6.34	2.36	4.59	5.56	11.8
				2022	5.21	4.34	4.62	9.04	3.44	4.11	4.75	6.40	5.24	1.76	3.44	4.69	9.04
		Silver	mg/kg	2018	-	-	-	-	-	-	-	-	-	-	-	-	-
				2019	1.37	0.836	1.29	1.48	1.32	1.13	0.678	1.27	1.17	0.277	0.678	1.28	1.48
				2020	2.14	3.47	2.71	1.94	1.50	1.65	3.40	1.52	2.29	0.807	1.50	2.04	3.47
				2021	3.27	2.26	1.67	2.05	2.31	1.49	1.99	4.85	2.49	1.09	1.49	2.16	4.85
				2022	1.83	1.64	2.28	0.700	2.82	1.74	1.46	1.63	1.76	0.614	0.700	1.69	2.82
		Sodium	mg/kg	2018	4.53	6.55	4.13	6.50	0.879	6.84	6.30	7.35	5.38	2.14	0.879	6.40	7.35
				2019	5.39	15.1	8.59	23.3	14.9	5.89	6.93	6.20	10.8	6.39	5.39	7.76	23.3
				2020	9.39	10.7	17.7	19.6	5.63	15.5	14.6	11.5	13.1	4.63	5.63	13.0	19.6
				2021	7.94	6.23	11.8	6.52	12.7	7.23	9.92	13.0	9.42	2.80	6.23	8.93	13.0
				2022	12.0	12.7	10.7	14.5	13.4	9.75	10.8	8.02	11.5	2.08	8.02	11.4	14.5
		Strontium	mg/kg	2018	0.107	0.0957	0.0805	0.0386	0.127	0.147	0.0934	0.320	0.126	0.0847	0.0386	0.101	0.320
				2019	0.0944	0.323	0.204	0.415	0.191	0.559	0.171	0.514	0.309	0.172	0.0944	0.263	0.559
				2020	0.211	0.130	0.254	0.345	0.136	0.360	0.215	0.188	0.230	0.0859	0.130	0.213	0.360
				2021	0.0655	0.0616	0.167	0.0647	0.0755	0.119	0.268	0.347	0.146	0.108	0.0616	0.0974	0.347
				2022	0.131	0.0964	0.175	0.202	0.0693	0.0873	0.133	0.154	0.131	0.0455	0.0693	0.132	0.202
		Tin	mg/kg	2018	-	-	-	-	-	-	3.14	-	3.14	-	3.14	3.14	3.14
				2019	0.0765	0.194	0.171	1.00	0.517	0.178	0.0763	1.44	0.456	0.504	0.0763	0.186	1.44
				2020	-	0.312	-	0.882	0.500	-	0.556	-	0.563	0.237	0.312	0.528	0.882
				2021	-	-	-	-	-	-	-	-	-	-	-	-	-
				2022	-	-	-	-	-	-	-	-	-	-	-	-	-
		Titanium	mg/kg	2018	-	-	-	-	-	-	-	-	-	-	-	-	-
				2019	0.0422	0.106	0.0326	0.0785	0.0511	0.0431	0.109	0.0884	0.0689	0.0304	0.0326	0.0648	0.109
				2020	0.0986	0.0358	0.0304	0.147	0.0219	0.0724	0.0616	0.0360	0.0629	0.0424	0.0219	0.0488	0.147
				2021	0.326	0.0589	0.177	0.176	0.120	0.111	0.288	0.297	0.194	0.0985	0.0589	0.176	0.326
				2022	0.0421	0.0231	0.0894	0.0308	0.110	0.0272	0.0681	0.0262	0.0521	0.0331	0.0231	0.0365	0.110
		Uranium	mg/kg	2018	0.0978	0.744	0.982	0.699	0.158	0.114	0.678	0.546	0.502	0.337	0.0978	0.612	0.982
				2019	0.113	0.00504	0.0494	0.165	0.107	0.168	0.129	0.172	0.114	0.0600	0.00504	0.121	0.172
				2020	0.148	0.0916	0.0681	0.310	0.0798	0.121	0.139	0.0796	0.130	0.0788	0.0681	0.106	0.310
				2021	0.151	0.0669	0.519	0.274	0.185	0.167	0.406	0.484	0.282	0.168	0.0669	0.229	0.519
				2022	0.0821	0.0459	0.162	0.0700	0.157	0.0984	0.179	0.0787	0.109	0.0498	0.0459	0.0902	0.179
		Vanadium	mg/kg	2018	0.108	0.158	0.534	0.731	0.0813	0.0461	0.201	1.14	0.374	0.392	0.0461	0.179	1.14
				2019	0.0400	0.0518	0.0206	0.0957	0.0467	0.0528	0.109	0.172	0.0735	0.0492	0.0206	0.0523	0.172
				2020	0.0949	0.0419	0.0293	0.159	0.0270	0.0714	0.104	0.0986	0.0783	0.0452	0.0270	0.0831	0.159
				2021	0.145	0.0530	0.143	0.175	0.121	0.131	0.257	0.310	0.167	0.0813	0.0530	0.144	0.310
				2022	0.0328	0.0260	0.0935	0.0352	0.109	0.0944	0.0751	0.0296	0.0620	0.0345	0.0260	0.0552	0.109
		Zinc	mg/kg	2018	3.37	3.64	4.81	9.84	3.87	4.56	2.90	1.40	4.30	2.48	1.40	3.75	9.84
				2019	1.31	2.14	1.92	3.09	3.12	4.14	2.14	3.27	2.64	0.914	1.31	2.62	4.14
				2020	3.95	2.40	3.91	3.35	1.69	1.75	3.73	2.75	2.94	0.928	1.69	3.05	3.95
				2021	3.12	4.26	3.56	2.70	3.88	3.23	3.09	9.94	4.22	2.36	2.70	3.39	9.94
				2022	2.13	4.92	2.96	3.17	1.94	1.66	2.07	2.65	2.69	1.04	1.66	2.39	4.92
Lower Hazeltine Creek	HAC-D (Exposed)	**Primary Analytes**															
		Arsenic	mg/kg	2010	-	-	-	-	-	-	-	-	-	-	-	-	-
				2018	0.454	0.158	0.0675	0.135	0.195	0.103	0.0973	0.112	0.165	0.123	0.0675	0.124	0.454
				2019	0.770	2.39	0.120	0.471	0.199	0.207	0.447	0.236	0.605	0.751	0.120	0.341	2.39
				2020	0.207	0.107	0.802	0.151	0.400	0.382	0.479	0.509	0.380	0.227	0.107	0.391	0.802
				2021	0.0603	0.411	0.402	0.267	0.326	0.235	0.305	0.738	0.343	0.194	0.0603	0.316	0.738
				2022	0.114	0.144	0.397	0.252	0.384	0.161	0.334	0.239	0.253	0.110	0.114	0.246	0.397
		Copper	mg/kg	2010	-	-	-	-	-	-	-	-	-	-	-	-	-
				2018	0.616	0.209	0.603	0.196	0.508	0.191	0.250	0.273	0.356	0.187	0.191	0.261	0.616
				2019	0.969	1.24	0.229	0.701	0.290	0.576	1.07	0.439	0.690	0.373	0.229	0.639	1.24
				2020	0.957	0.392	1.63	0.329	1.04	0.855	1.34	1.04	0.948	0.437	0.329	0.999	1.63
				2021	0.865	1.17	0.566	0.332	0.304	1.05	0.480	0.842	0.702	0.328	0.304	0.704	1.17
				2022	0.0920	0.368	1.31	0.634	1.09	0.772	0.420	0.781	0.682	0.394	0.0920	0.703	1.31
		Iron	mg/kg	2010	-	-	-	-	-	-	-	-	-	-	-	-	-
				2018	0.247	0.0918	0.0605	0.0661	0.157	0.0790	0.0392	0.111	0.106	0.0672	0.0392	0.0854	0.247
				2019	0.450	0.811	0.0304	0.305	0.0871	0.128	0.389	0.137	0.292	0.258	0.0304	0.221	0.811
				2020	0.0395	0.0901	0.305	0.0554	0.417	0.315	0.235	0.0803	0.192	0.144	0.0395	0.163	0.417
				2021	0.394	0.540	0.391	0.255	0.311	0.324	0.450	0.925	0.449	0.212	0.255	0.393	0.925
				2022	0.0591	0.0311	0.397	0.290	0.304	0.155	0.268	0.581	0.261	0.181	0.0311	0.279	0.581
		Selenium	mg/kg	2010	-	-	-	-	-	-	-	-	-	-	-	-	-
				2018	3.21	3.76	3.74	2.85	3.05	4.36	3.74	2.25	3.37	0.661	2.25	3.47	4.36
				2019	4.07	2.46	4.37	3.13	2.99	4.97	2.34	3.39	3.47	0.929	2.34	3.26	4.97
				2020	3.58	5.24	4.18	3.51	3.17	4.27	3.20	2.30	3.68	0.882	2.30	3.55	5.24
				2021	2.97	3.15	2.80	2.61	4.21	1.82	2.95	7.48	3.50	1.74	1.82	2.96	7.48
				2022	0.733	2.57	3.06	2.45	2.65	2.86	1.67	2.22	2.28	0.753	0.733	2.51	3.06
		Secondary Analytes															
		Barium	mg/kg	2010	-	-	-	-	-	-	-	-	-	-	-	-	-
				2018	0.0801	0.0827	0.194	0.00359	0.104	0.0586	0.0363	0.0690	0.0785	0.0559	0.00359	0.0745	0.194
				2019	0.247	1.05	0.0270	0.245	0.0645	0.369	0.283	0.144	0.304	0.324	0.0270	0.246	1.05
				2020	0.213	0.120	0.454	0.0737	0.331	0.201	0.300	0.260	0.244	0.121	0.0737	0.236	0.454
				2021	0.465	0.348	0.263	0.245	0.451	0.207	0.208	0.240	0.303	0.105	0.207	0.254	0.465
				2022	0.0444	0.159	0.128	0.195	0.326	0.0849	0.143	0.148	0.153	0.0835	0.0444	0.146	0.326
		Cadmium	mg/kg	2010	-	-	-	-	-	-	-	-	-	-	-	-	-
				2018	1.96	1.35	2.79	0.728	4.81	1.05	0.706	2.91	2.04	1.41	0.706	1.66	4.81
				2019	0.578	2.20	0.443	2.06	0.525	0.837	1.14	0.450	1.03	0.719	0.443	0.708	2.20
				2020	2.85	1.85	2.04	1.13	1.41	2.90	1.06	1.35	1.82	0.729	1.06	1.63	2.90
				2021	3.64	2.66	1.01	1.41	1.49	2.01	2.01	3.62	2.23	0.994	1.01	2.01	3.64
				2022	0.757	2.20	3.36	3.25	4.81	2.41	3.87	0.872	2.69	1.41	0.757	2.83	4.81
		Calcium	mg/kg	2010	-	-	-	-	-	-	-	-	-	-	-	-	-
				2018	0.00399	0.00640	0.00794	0.00960	0.0118	0.0121	0.00424	0.0386	0.0118	0.0112	0.00399	0.00877	0.0386
				2019	0.0235	0.0462	0.0180	0.0325	0.00886	0.0246	0.0163	0.0115	0.0227	0.0121	0.00886	0.0208	0.0462
				2020	0.00723	0.0236	0.0132	0.0138	0.0151	0.0348	0.0347	0.00595	0.0185	0.0114	0.00595	0.0144	0.0348
				2021	0.0252	0.0167	0.174	0.180	0.292	0.181	0.157	0.644	0.209	0.197	0.0167	0.177	0.644
				2022	0.00889	0.00529	0.00937	0.0110	0.0155	0.00691	0.0186	0.0143	0.0112	0.00456	0.00529	0.0102	0.0186
		Cobalt	mg/kg	2010	-	-	-	-	-	-	-	-	-	-	-	-	-
				2018	0.405	0.209	0.318	0.122	0.294	0.0968	0.100	0.223	0.221	0.113	0.0968	0.216	0.405
				2019	0.521	1.04	0.0535	0.417	0.127	0.186	0.498	0.162	0.376	0.323	0.0535	0.302	1.04
				2020	0.374	0.139	0.437	0.147	0.784	0.516	0.444	0.275	0.389	0.211	0.139	0.405	0.784
				2021	0.472	0.654	0.314	0.320	0.311	0.431	0.554	0.742	0.475	0.164	0.311	0.451	0.742
				2022	0.0800	0.332	0.787	0.620	0.585	0.316	0.410	0.285	0.427	0.225	0.0800	0.371	0.787

Notes: For 2010 data at HAC-D and HAC-U, historical station codes were W11 and W7, respectively. All values reported in dry weight. Summary statistics reported to 3 significant figures for display purposes. TTF calculated as Benthic Invertebrate Analyte Concentration/Periphyton Analyte Concentration. "-" = data were not available to calculate a TTF or TTF was not calculated because the concentration of an analyte was below the Laboratory Reporting Limit (LRL) for either the periphyton or benthic invertebrate tissue results.

Table D.5.8: Trophic Transfer Factors for Composite-Taxa Benthic Invertebrate Tissue Primary and Secondary Analytes Concentrations for Upper Hazeltine Creek (HAC-R1, HAC-U; Exposed), Upper Edney Creek (EDC-U; Reference), Lower Hazeltine Creek (HAC-D; Exposed), and Lower Edney Creek Exposed (E1) and Reference (EDC-D) Areas, 2010 to 2022

Waterbody	Area	Parameter	Units	Year	Replicate								Mean	Standard Deviation	Minimum	Median	Maximum
					1	2	3	4	5	6	7	8					
Lower Hazeltine Creek	HAC-D (Exposed)	Manganese	mg/kg	2010	-	-	-	-	-	-	-	-	-	-	-	-	-
				2018	0.212	0.163	0.628	0.116	0.126	0.135	0.0881	0.0530	0.190	0.183	0.0530	0.130	0.628
				2019	0.186	1.03	0.186	0.458	0.108	0.266	0.110	0.102	0.306	0.316	0.102	0.186	1.03
				2020	0.658	0.443	0.444	0.355	0.494	0.795	0.291	0.0824	0.445	0.218	0.0824	0.443	0.795
				2021	0.860	0.692	0.462	0.510	0.589	0.368	0.406	1.18	0.634	0.273	0.368	0.550	1.18
				2022	0.141	0.691	0.493	0.442	0.375	0.232	0.193	0.0950	0.333	0.204	0.0950	0.303	0.691
		Mercury	mg/kg	2010	-	-	-	-	-	-	-	-	-	-	-	-	-
				2018	3.52	1.97	1.43	0.741	2.90	0.907	0.754	1.28	1.69	1.04	0.741	1.36	3.52
				2019	2.47	3.36	0.840	2.28	2.00	2.27	4.10	2.19	2.44	0.963	0.840	2.27	4.10
				2020	3.22	1.54	6.38	1.16	3.33	2.71	6.40	11.5	4.52	3.42	1.16	3.28	11.5
				2021	1.86	1.92	1.69	0.977	0.779	0.788	0.207	1.29	1.19	0.609	0.207	1.14	1.92
				2022	0.403	1.82	3.35	5.15	3.05	2.91	3.97	3.70	3.04	1.43	0.403	3.20	5.15
		Molybdenum	mg/kg	2010	-	-	-	-	-	-	-	-	-	-	-	-	-
				2018	5.66	4.36	5.44	4.00	2.13	4.27	4.36	0.708	3.87	1.66	0.708	4.31	5.66
				2019	7.86	2.47	3.95	2.08	3.90	5.30	0.888	4.10	3.82	2.14	0.888	3.93	7.86
				2020	3.83	4.24	2.47	3.90	4.38	4.26	4.37	3.08	3.82	0.692	2.47	4.07	4.38
				2021	2.37	1.01	0.698	0.473	0.550	1.07	2.51	4.29	1.62	1.33	0.473	1.04	4.29
				2022	0.130	6.81	3.39	1.87	2.36	3.56	1.79	1.68	2.70	1.98	0.130	2.11	6.81
		Nickel	mg/kg	2010	-	-	-	-	-	-	-	-	-	-	-	-	-
				2018	0.402	0.153	0.542	0.170	1.27	0.650	0.0873	1.48	0.594	0.523	0.0873	0.472	1.48
				2019	0.442	0.888	0.0426	0.364	0.110	0.169	0.429	0.157	0.325	0.273	0.0426	0.267	0.888
				2020	0.180	0.0784	0.138	0.115	1.11	0.426	0.302	0.183	0.317	0.340	0.0784	0.181	1.11
				2021	0.440	0.667	0.573	0.356	0.294	0.355	0.575	0.561	0.478	0.134	0.294	0.500	0.667
				2022	0.0597	0.113	19.9	0.400	1.06	0.237	0.361	0.357	2.81	6.91	0.0597	0.359	19.9
		Phosphorus	mg/kg	2010	-	-	-	-	-	-	-	-	-	-	-	-	-
				2018	12.3	9.89	11.4	6.72	10.1	7.61	7.10	7.15	9.04	2.17	6.72	8.75	12.3
				2019	13.8	8.14	4.92	6.94	6.94	7.19	13.0	6.33	8.41	3.23	4.92	7.07	13.8
				2020	5.84	6.57	15.1	6.70	8.80	8.45	12.4	9.67	9.19	3.17	5.84	8.62	15.1
				2021	8.33	6.20	5.99	5.62	7.92	3.74	3.14	6.95	5.99	1.83	3.14	6.10	8.33
				2022	0.527	2.55	4.65	4.45	5.11	3.90	4.87	4.21	3.78	1.53	0.527	4.33	5.11
		Silver	mg/kg	2010	-	-	-	-	-	-	-	-	-	-	-	-	-
				2018	-	-	-	-	-	-	-	-	-	-	-	-	-
				2019	0.680	1.61	0.0676	0.924	0.177	2.00	4.51	0.828	1.35	1.43	0.0676	0.876	4.51
				2020	0.702	0.232	2.94	0.163	1.08	0.842	0.985	0.721	0.958	0.865	0.163	0.781	2.94
				2021	1.31	1.04	-	-	-	-	-	-	1.17	0.198	1.04	1.17	1.31
				2022	0.230	0.229	1.80	1.25	1.05	0.772	1.12	1.79	1.03	0.606	0.229	1.09	1.80
		Sodium	mg/kg	2010	-	-	-	-	-	-	-	-	-	-	-	-	-
				2018	10.5	7.28	15.5	5.59	24.5	6.76	3.68	21.8	12.0	7.81	3.68	8.90	24.5
				2019	11.4	14.4	6.55	17.3	8.54	10.5	16.7	9.82	11.9	3.88	6.55	11.0	17.3
				2020	11.8	8.86	11.3	17.2	13.0	13.1	15.9	13.3	13.1	2.61	8.86	13.0	17.2
				2021	6.17	4.96	5.20	6.67	4.50	3.72	3.39	10.7	5.66	2.32	3.39	5.08	10.7
				2022	0.891	6.70	9.42	9.20	9.61	12.3	24.2	17.6	11.2	7.04	0.891	9.51	24.2
		Strontium	mg/kg	2010	-	-	-	-	-	-	-	-	-	-	-	-	-
				2018	0.0131	0.0178	0.0178	0.0244	0.0266	0.0273	0.0111	0.0524	0.0238	0.0130	0.0111	0.0211	0.0524
				2019	0.0511	0.0948	0.0303	0.0775	0.0202	0.0554	0.0373	0.0267	0.0492	0.0261	0.0202	0.0442	0.0948
				2020	0.0252	0.0416	0.0295	0.0245	0.0267	0.0581	0.0359	0.0166	0.0322	0.0129	0.0166	0.0281	0.0581
				2021	0.0468	0.0472	0.239	0.289	0.297	0.188	0.157	0.576	0.230	0.170	0.0468	0.213	0.576
				2022	0.0190	0.0128	0.0243	0.0214	0.0366	0.0188	0.0311	0.0321	0.0245	0.00806	0.0128	0.0229	0.0366
		Tin	mg/kg	2010	-	-	-	-	-	-	-	-	-	-	-	-	-
				2018	-	-	-	-	-	-	-	-	-	-	-	-	-
				2019	-	-	-	-	-	-	-	-	-	-	-	-	-
				2020	-	0.400	0.552	-	-	1.25	-	-	0.734	0.453	0.400	0.552	1.25
				2021	-	-	-	-	0.780	0.500	0.632	1.00	0.728	0.214	0.500	0.706	1.00
				2022	-	-	-	-	-	-	-	-	-	-	-	-	-
		Titanium	mg/kg	2010	-	-	-	-	-	-	-	-	-	-	-	-	-
				2018	-	-	-	-	-	-	-	-	-	-	-	-	-
				2019	0.306	0.458	0.0284	0.239	0.0727	0.136	0.334	0.118	0.212	0.148	0.0284	0.187	0.458
				2020	0.0269	0.0711	0.123	0.0527	0.296	0.258	0.147	0.0738	0.131	0.0984	0.0269	0.0983	0.296
				2021	3.30	0.876	0.370	0.267	0.363	0.280	0.401	1.12	0.872	1.03	0.267	0.386	3.30
				2022	0.0433	0.0271	0.336	0.236	0.199	0.150	0.242	0.663	0.237	0.201	0.0271	0.218	0.663
		Uranium	mg/kg	2010	-	-	-	-	-	-	-	-	-	-	-	-	-
				2018	0.159	0.119	0.0669	0.0662	0.230	0.0480	0.0435	0.0878	0.103	0.0644	0.0435	0.0773	0.230
				2019	0.523	0.971	0.0240	0.261	0.0701	0.166	0.371	0.119	0.313	0.313	0.0240	0.213	0.971
				2020	0.117	0.139	0.519	0.0714	0.571	0.483	0.316	0.161	0.297	0.202	0.0714	0.239	0.571
				2021	0.313	0.517	0.408	0.278	0.276	0.368	0.380	1.03	0.446	0.249	0.276	0.374	1.03
				2022	0.0620	0.0983	0.353	0.301	0.383	0.228	0.343	0.520	0.286	0.152	0.0620	0.322	0.520
		Vanadium	mg/kg	2010	-	-	-	-	-	-	-	-	-	-	-	-	-
				2018	0.248	0.0822	0.0712	0.0661	0.173	0.0827	0.0354	0.105	0.108	0.0692	0.0354	0.0824	0.248
				2019	0.360	0.751	0.0248	0.285	0.0741	0.114	0.324	0.120	0.257	0.235	0.0248	0.202	0.751
				2020	0.0351	0.0900	0.320	0.0475	0.377	0.293	0.210	0.0462	0.177	0.140	0.0351	0.150	0.377
				2021	0.551	0.582	0.348	0.222	0.349	0.298	0.443	0.969	0.470	0.236	0.222	0.396	0.969
				2022	0.0505	0.0294	0.391	0.254	0.275	0.162	0.233	0.520	0.239	0.164	0.0294	0.244	0.520
		Zinc	mg/kg	2010	-	-	-	-	-	-	-	-	-	-	-	-	-
				2018	8.27	4.52	5.13	2.29	4.29	2.54	2.45	2.53	4.00	2.05	2.29	3.41	8.27
				2019	4.63	6.57	1.78	3.35	2.53	2.59	4.46	2.34	3.53	1.59	1.78	2.97	6.57
				2020	7.82	4.19	9.89	2.90	4.90	6.38	6.82	5.80	6.09	2.18	2.90	6.09	9.89
				2021	9.63	8.88	3.28	2.58	1.99	2.40	2.21	3.10	4.26	3.12	1.99	2.84	9.63
				2022	0.658	6.46	6.94	7.37	7.58	5.73	4.97	3.62	5.42	2.33	0.658	6.09	7.58
Lower Edney Creek	E1 (Exposed)	**Primary Analytes**															
		Arsenic	mg/kg	2019	0.108	0.0449	0.410	0.130	0.618	0.128	0.154	0.115	0.213	0.196	0.0449	0.129	0.618
				2020	0.0944	0.118	0.166	0.147	0.0661	0.217	0.112	0.115	0.129	0.0466	0.0661	0.116	0.217
				2021	0.134	0.611	0.247	0.668	0.747	1.06	0.547	0.405	0.552	0.293	0.134	0.579	1.06
				2022	0.839	0.727	0.0875	0.375	0.266	0.198	0.152	0.528	0.397	0.276	0.0875	0.321	0.839
		Copper	mg/kg	2019	0.458	0.547	0.540	0.262	0.0299	1.07	0.827	1.01	0.593	0.360	0.0299	0.543	1.07
				2020	0.240	0.231	0.310	0.508	0.478	0.384	0.395	0.293	0.355	0.104	0.231	0.347	0.508
				2021	0.254	0.512	0.339	1.28	0.964	1.38	0.500	0.589	0.727	0.427	0.254	0.551	1.38
				2022	1.99	1.62	0.460	0.551	0.362	0.254	0.237	0.156	0.704	0.699	0.156	0.411	1.99
		Iron	mg/kg	2019	0.0226	0.0245	0.218	0.100	0.142	0.123	0.0602	0.104	0.0992	0.0649	0.0226	0.102	0.218
				2020	0.0376	0.0769	0.112	0.0746	0.0641	0.123	0.0508	0.0423	0.0727	0.0312	0.0376	0.0693	0.123
				2021	0.0537	0.144	0.0920	0.283	0.373	0.239	0.418	0.322	0.241	0.133	0.0537	0.261	0.418
				2022	0.299	0.597	0.0204	0.0785	0.144	0.111	0.0447	0.232	0.191	0.189	0.0204	0.128	0.597
		Selenium	mg/kg	2019	1.82	1.14	2.22	2.53	0.868	3.95	1.70	3.87	2.26	1.15	0.868	2.02	3.95
				2020	1.38	1.10	3.53	2.46	2.20	2.17	1.56	1.68	2.01	0.765	1.10	1.92	3.53
				2021	2.92	3.89	2.97	3.11	2.29	3.06	1.48	3.51	2.90	0.737	1.48	3.02	3.89
				2022	4.44	4.83	2.02	5.70	2.03	1.90	2.10	1.29	3.04	1.67	1.29	2.06	5.70

Notes: For 2010 data at HAC-D and HAC-U, historical station codes were W11 and W7, respectively. All values reported in dry weight. Summary statistics reported to 3 significant figures for display purposes. TTF calculated as Benthic Invertebrate Analyte Concentration/Periphyton Analyte Concentration. "-" = data were not available to calculate a TTF or TTF was not calculated because the concentration of an analyte was below the Laboratory Reporting Limit (LRL) for either the periphyton or benthic invertebrate tissue results.

Table D.5.8: Trophic Transfer Factors for Composite-Taxa Benthic Invertebrate Tissue Primary and Secondary Analytes Concentrations for Upper Hazeltine Creek (HAC-R1, HAC-U; Exposed), Upper Edney Creek (EDC-U; Reference), Lower Hazeltine Creek (HAC-D; Exposed), and Lower Edney Creek Exposed (E1) and Reference (EDC-D) Areas, 2010 to 2022

Waterbody	Area	Parameter	Units	Year	Replicate								Mean	Standard Deviation	Minimum	Median	Maximum
					1	2	3	4	5	6	7	8					
Lower Edney Creek	E1 (Exposed)	**Secondary Analytes**															
		Barium	mg/kg	2019	0.0428	0.0343	0.493	0.0363	0.0490	0.219	0.164	0.131	0.146	0.156	0.0343	0.0899	0.493
				2020	0.0747	0.0296	0.510	0.0966	0.0878	0.0548	0.0939	0.0762	0.128	0.156	0.0296	0.0820	0.510
				2021	0.135	0.00642	0.00441	0.0518	0.00326	0.341	0.117	0.106	0.0956	0.113	0.00326	0.0791	0.341
				2022	0.348	0.656	0.0477	0.0291	0.558	0.199	0.114	0.0520	0.250	0.245	0.0291	0.156	0.656
		Cadmium	mg/kg	2019	2.23	2.13	2.93	3.04	3.48	3.10	1.30	1.34	2.44	0.824	1.30	2.58	3.48
				2020	3.93	2.96	8.52	6.19	6.45	4.31	3.41	3.65	4.93	1.93	2.96	4.12	8.52
				2021	4.60	7.67	5.31	10.7	7.45	8.65	7.64	13.8	8.23	2.94	4.60	7.65	13.8
				2022	14.8	24.0	2.11	9.79	8.07	5.56	3.17	9.81	9.66	7.07	2.11	8.93	24.0
		Calcium	mg/kg	2019	0.235	0.207	0.322	0.175	0.122	0.283	0.126	0.173	0.205	0.0715	0.122	0.191	0.322
				2020	0.121	0.208	0.287	0.150	0.174	0.221	0.128	0.150	0.180	0.0560	0.121	0.162	0.287
				2021	0.0492	0.0317	0.0116	0.0100	0.0113	0.0247	0.0154	0.0319	0.0232	0.0138	0.0100	0.0200	0.0492
				2022	0.967	1.11	0.119	0.376	0.253	0.179	0.0625	0.295	0.420	0.395	0.0625	0.274	1.11
		Cobalt	mg/kg	2019	0.0672	0.0737	0.372	0.128	0.0986	0.236	0.166	0.181	0.165	0.101	0.0672	0.147	0.372
				2020	0.108	0.112	0.221	0.136	0.151	0.180	0.130	0.0957	0.142	0.0418	0.0957	0.133	0.221
				2021	0.140	0.465	0.211	0.555	0.693	0.541	0.782	0.391	0.472	0.221	0.140	0.503	0.782
				2022	0.665	0.991	0.0746	0.319	0.259	0.220	0.147	0.336	0.377	0.304	0.0746	0.289	0.991
		Manganese	mg/kg	2019	0.0763	0.0470	0.470	0.104	0.339	0.187	0.178	0.0973	0.187	0.147	0.0470	0.141	0.470
				2020	0.158	0.115	0.247	0.251	0.264	0.465	0.157	0.206	0.233	0.108	0.115	0.226	0.465
				2021	0.233	0.395	0.232	0.545	0.600	0.613	0.611	0.639	0.484	0.172	0.232	0.573	0.639
				2022	1.33	0.706	0.0849	0.473	0.498	0.354	0.138	0.240	0.478	0.400	0.0849	0.414	1.33
		Mercury	mg/kg	2019	0.367	0.856	2.24	0.736	2.20	1.39	1.06	1.30	1.27	0.669	0.367	1.18	2.24
				2020	1.21	2.80	2.24	1.44	1.69	1.27	1.78	0.928	1.67	0.609	0.928	1.57	2.80
				2021	1.87	2.40	1.57	2.83	1.58	0.187	1.77	2.14	1.79	0.778	0.187	1.82	2.83
				2022	1.19	2.17	1.23	1.03	1.22	1.76	1.43	2.20	1.53	0.457	1.03	1.33	2.20
		Molybdenum	mg/kg	2019	0.417	0.394	1.58	0.409	0.288	0.325	0.354	0.130	0.487	0.450	0.130	0.374	1.58
				2020	0.422	0.549	0.757	0.568	0.305	1.61	0.502	0.754	0.684	0.405	0.305	0.558	1.61
				2021	0.401	0.395	3.22	1.18	2.87	1.56	1.69	1.17	1.56	1.03	0.395	1.37	3.22
				2022	1.03	0.920	0.0740	0.858	0.566	0.808	1.47	0.476	0.774	0.413	0.0740	0.833	1.47
		Nickel	mg/kg	2019	0.0502	0.0290	0.293	0.100	0.639	0.151	0.0969	0.163	0.190	0.199	0.0290	0.126	0.639
				2020	0.0876	0.0783	0.438	0.109	0.0928	0.169	0.105	0.110	0.149	0.120	0.0783	0.107	0.438
				2021	0.0858	0.239	0.184	0.313	0.373	0.312	0.693	0.534	0.342	0.194	0.0858	0.312	0.693
				2022	0.621	1.07	0.421	0.161	0.125	0.232	0.389	0.290	0.414	0.309	0.125	0.340	1.07
		Phosphorus	mg/kg	2019	5.03	3.46	4.35	6.15	5.97	2.96	3.26	2.16	4.17	1.45	2.16	3.90	6.15
				2020	5.32	2.97	7.91	6.26	3.51	5.68	4.60	5.63	5.24	1.56	2.97	5.48	7.91
				2021	7.71	6.17	7.90	8.57	7.31	5.59	4.89	8.21	7.04	1.33	4.89	7.51	8.57
				2022	13.6	11.1	5.57	13.5	5.15	5.98	2.76	4.56	7.77	4.27	2.76	5.77	13.6
		Silver	mg/kg	2019	0.903	0.250	0.725	0.640	0.465	1.17	0.929	1.50	0.823	0.396	0.250	0.814	1.50
				2020	0.613	0.162	1.05	0.685	0.710	0.760	0.764	0.534	0.660	0.252	0.162	0.697	1.05
				2021	-	-	-	-	1.15	0.789	1.05	0.645	0.908	0.231	0.645	0.920	1.15
				2022	4.64	8.19	0.420	3.40	0.837	1.61	0.511	0.522	2.52	2.76	0.420	1.22	8.19
		Sodium	mg/kg	2019	6.10	13.2	7.15	21.5	11.3	15.3	13.3	13.1	12.6	4.79	6.10	13.1	21.5
				2020	21.8	12.6	28.3	15.0	8.63	5.75	11.1	16.1	14.9	7.27	5.75	13.8	28.3
				2021	11.4	5.47	3.63	6.71	4.33	1.34	5.11	6.80	5.60	2.94	1.34	5.29	11.4
				2022	27.6	66.5	38.9	17.1	21.5	25.7	8.86	8.56	26.8	18.9	8.56	23.6	66.5
		Strontium	mg/kg	2019	0.109	0.0901	0.296	0.0767	0.141	0.179	0.115	0.126	0.142	0.0696	0.0767	0.121	0.296
				2020	0.134	0.0854	0.149	0.124	0.126	0.134	0.162	0.108	0.128	0.0236	0.0854	0.130	0.162
				2021	0.0628	0.0431	0.0158	0.0200	0.0259	0.0562	0.0343	0.0434	0.0377	0.0168	0.0158	0.0387	0.0628
				2022	0.720	0.797	0.0667	0.101	0.153	0.0690	0.0676	0.0651	0.255	0.313	0.0651	0.0852	0.797
		Tin	mg/kg	2019	1.50	0.156	0.793	1.52	-	0.734	0.717	0.376	0.828	0.517	0.156	0.734	1.52
				2020	-	-	-	0.343	0.406	0.250	0.231	0.196	0.285	0.0868	0.196	0.250	0.406
				2021	-	-	-	-	-	-	-	-	-	-	-	-	-
				2022	-	-	-	1.08	-	-	-	-	1.08	-	1.08	1.08	1.08
		Titanium	mg/kg	2019	0.0179	0.0371	0.228	0.151	0.390	0.141	0.0677	0.141	0.147	0.120	0.0179	0.141	0.390
				2020	0.0316	0.0777	0.196	0.0491	0.0658	0.0990	0.0606	0.0302	0.0763	0.0536	0.0302	0.0632	0.196
				2021	0.0653	0.109	0.0352	0.176	0.250	0.156	0.258	0.164	0.152	0.0799	0.0352	0.160	0.258
				2022	0.312	0.530	0.106	0.0356	0.162	0.116	0.0461	0.215	0.190	0.164	0.0356	0.139	0.530
		Uranium	mg/kg	2019	0.0464	0.0138	0.236	0.123	0.669	0.194	0.106	0.205	0.199	0.205	0.0138	0.158	0.669
				2020	0.147	0.0207	0.150	0.125	0.118	0.115	0.0445	0.0701	0.0987	0.0480	0.0207	0.116	0.150
				2021	0.119	0.484	0.216	0.381	0.324	0.323	0.676	0.487	0.376	0.174	0.119	0.353	0.676
				2022	0.449	0.950	0.00982	0.193	0.289	0.236	0.0832	0.356	0.321	0.291	0.00982	0.262	0.950
		Vanadium	mg/kg	2019	0.0203	0.0339	0.196	0.126	0.167	0.155	0.0716	0.104	0.109	0.0635	0.0203	0.115	0.196
				2020	0.0271	0.0944	0.0941	0.0715	0.0581	0.126	0.0441	0.0299	0.0681	0.0349	0.0271	0.0648	0.126
				2021	0.0522	0.143	0.0557	0.357	0.290	0.209	0.344	0.300	0.219	0.123	0.0522	0.249	0.357
				2022	0.337	0.675	0.0277	0.0632	0.165	0.112	0.0421	0.229	0.206	0.216	0.0277	0.138	0.675
		Zinc	mg/kg	2019	2.39	1.35	3.94	1.84	1.59	2.18	2.19	1.20	2.08	0.863	1.20	2.01	3.94
				2020	2.63	1.64	4.22	2.89	2.11	3.88	2.41	2.85	2.83	0.860	1.64	2.74	4.22
				2021	2.12	3.37	4.51	4.30	5.44	3.86	8.88	4.16	4.58	1.98	2.12	4.23	8.88
				2022	7.32	8.95	1.19	8.21	2.31	2.51	2.68	2.26	4.43	3.15	1.19	2.60	8.95

Notes: For 2010 data at HAC-D and HAC-U, historical station codes were W11 and W7, respectively. All values reported in dry weight. Summary statistics reported to 3 significant figures for display purposes. TTF calculated as Benthic Invertebrate Analyte Concentration/Periphyton Analyte Concentration. "-" = data were not available to calculate a TTF or TTF was not calculated because the concentration of an analyte was below the Laboratory Reporting Limit (LRL) for either the periphyton or benthic invertebrate tissue results.

Table D.5.9: Periphyton Tissue Chemistry Data for Lower Hazeltine Creek (HAC-D; Exposed) and Lower Edney Creek Exposed (E1) and Reference (EDC-D), 2022

Analyte	Units	Reference												
		Lower Edney Creek (EDC-D)												
		EDC-D-1	EDC-D-2	EDC-D-3	EDC-D-4	EDC-D-5	EDC-D-6	EDC-D-7	EDC-D-8	Mean	Standard Deviation	Minimum	Median	Maximum
		4-Aug-22	4-Aug-22	3-Aug-22	3-Aug-22	3-Aug-22	3-Aug-22	3-Aug-22	3-Aug-22					
Moisture	mg/kg dw	66.6	83.8	82.2	79.0	88.3	71.0	80.1	83.1	79.3	7.12	66.6	81.2	88.3
Aluminum	mg/kg dw	10,500	9,850	11,400	7,600	6,060	13,300	9,740	11,700	10,019	2,310	6,060	10,175	13,300
Antimony	mg/kg dw	0.0400	0.0640	0.0530	0.0510	0.0800	0.219	0.0710	0.0950	0.0841	0.0572	0.0400	0.0675	0.219
Arsenic	mg/kg dw	12.7	14.2	12.9	9.58	13.9	32.9	12.6	15.3	15.5	7.22	9.58	13.4	32.9
Barium	mg/kg dw	130	138	149	114	174	205	119	154	148	30.2	114	144	205
Beryllium	mg/kg dw	0.323	0.292	0.310	0.260	0.212	0.500	0.318	0.326	0.318	0.0833	0.212	0.314	0.500
Bismuth	mg/kg dw	0.0690	0.0750	0.0830	0.0810	0.0620	0.0680	0.0570	0.110	0.0756	0.0165	0.0570	0.0720	0.110
Boron	mg/kg dw	6.60	10.5	9.40	5.30	17.8	27.9	10.1	10.0	12.2	7.34	5.30	10.0	27.9
Cadmium	mg/kg dw	0.338	0.294	0.328	0.197	0.461	2.12	0.311	0.328	0.547	0.640	0.197	0.328	2.12
Calcium	mg/kg dw	7,550	9,440	9,330	5,720	12,100	23,300	9,580	9,410	10,804	5,368	5,720	9,425	23,300
Cesium	mg/kg dw	1.27	1.21	1.24	1.29	0.815	1.55	1.22	1.53	1.27	0.227	0.815	1.25	1.55
Chromium	mg/kg dw	50.3	41.6	54.4	25.8	27.1	54.4	37.7	50.1	42.7	11.6	25.8	45.9	54.4
Cobalt	mg/kg dw	10.8	10.0	11.3	6.99	7.94	21.0	9.15	12.0	11.1	4.32	6.99	10.4	21.0
Copper	mg/kg dw	27.3	25.2	26.3	17.9	24.1	27.1	28.5	30.4	25.8	3.75	17.9	26.7	30.4
Iron	mg/kg dw	21,600	19,700	21,600	15,500	12,600	42,400	19,200	25,400	22,250	9,034	12,600	20,650	42,400
Lead	mg/kg dw	4.57	4.44	4.39	3.68	2.84	9.34	3.66	5.33	4.78	1.99	2.84	4.42	9.34
Lithium	mg/kg dw	10.8	10.3	11.2	9.34	6.56	10.1	15.8	12.3	10.8	2.63	6.56	10.6	15.8
Magnesium	mg/kg dw	6,370	5,710	5,980	4,300	4,250	8,000	5,670	6,000	5,785	1,190	4,250	5,845	8,000
Manganese	mg/kg dw	2,020	2,300	2,540	1,640	2,960	5,970	1,710	2,280	2,678	1,398	1,640	2,290	5,970
Mercury	mg/kg dw	0.0435	0.0516	0.0494	0.0666	0.0550	0.0630	0.0433	0.0452	0.0522	0.00882	0.0433	0.0505	0.0666
Molybdenum	mg/kg dw	1.05	1.70	1.26	0.776	2.86	1.94	1.43	1.06	1.51	0.662	0.776	1.34	2.86
Nickel	mg/kg dw	33.6	29.8	36.0	22.0	25.2	43.1	29.3	33.2	31.5	6.54	22.0	31.5	43.1
Phosphorus	mg/kg dw	1,370	1,960	1,680	1,030	2,560	1,950	1,870	1,400	1,728	469	1,030	1,775	2,560
Potassium	mg/kg dw	2,540	4,380	2,990	2,300	5,480	2,720	3,650	2,910	3,371	1,080	2,300	2,950	5,480
Rubidium	mg/kg dw	8.97	11.5	10.3	8.24	10.9	11.7	10.3	11.6	10.4	1.27	8.24	10.6	11.7
Selenium	mg/kg dw	0.880	1.08	0.880	0.860	1.56	1.73	0.930	0.860	1.10	0.348	0.860	0.905	1.73
Silver	mg/kg dw	0.0897	0.0744	0.0760	0.263	0.0504	0.0870	0.105	0.0824	0.103	0.0663	0.0504	0.0847	0.263
Sodium	mg/kg dw	266	316	289	240	274	403	381	505	334	89.1	240	302	505
Strontium	mg/kg dw	73.7	91.3	79.9	50.9	111	189	70.4	77.7	93	42.4	50.9	78.8	189
Tellurium	mg/kg dw	<0.033	<0.054	<0.053	<0.035	<0.032	<0.054	<0.070	<0.052	<0.032	#N/A	<0.032	<0.032	<0.032
Thallium	mg/kg dw	0.0812	0.0726	0.0752	0.0596	0.0626	0.109	0.100	0.108	0.0835	0.0197	0.0596	0.0782	0.109
Tin	mg/kg dw	<0.16	<0.27	<0.27	<0.18	<0.16	0.320	<0.35	<0.26	0.183	#N/A	<0.16	0.270	0.320
Titanium	mg/kg dw	432	485	566	301	252	1,020	529	580	521	234	252	507	1,020
Uranium	mg/kg dw	0.546	0.645	0.559	0.377	0.382	0.860	0.477	0.494	0.542	0.156	0.377	0.520	0.860
Vanadium	mg/kg dw	46.3	40.0	46.2	26.1	23.9	91.5	45.8	49.6	46.2	20.7	23.9	46.0	91.5
Zinc	mg/kg dw	55.8	59.2	58.2	40.7	76.9	89.1	62.3	58.5	62.6	14.5	40.7	58.9	89.1
Zirconium	mg/kg dw	6.12	6.44	6.96	4.27	2.00	16.2	6.41	7.08	6.94	4.11	2.00	6.42	16.2

Notes: "-" = no data or summary statistic could not be calculated. Mg/kg dw = milligrams per kilogram dry weight. All summary statistics are reported to three significant digits for display purposes and were calculated using the Kaplan-Meier method.

Table D.5.9: Periphyton Tissue Chemistry Data for Lower Hazeltine Creek (HAC-D; Exposed) and Lower Edney Creek Exposed (E1) and Reference (EDC-D), 2022

Analyte	Units	Exposed												
		Lower Hazeltine Creek (HAC-D)												
		HAC-D-1	HAC-D-2	HAC-D-3	HAC-D-4	HAC-D-5	HAC-D-6	HAC-D-7	HAC-D-8	Mean	Standard Deviation	Minimum	Median	Maximum
		5-Aug-22	5-Aug-22	5-Aug-22	5-Aug-22	5-Aug-22	5-Aug-22	5-Aug-22	5-Aug-22					
Moisture	mg/kg dw	93.5	73.3	63.4	64.5	64.0	62.0	61.9	65.7	68.5	10.7	61.9	64.2	93.5
Aluminum	mg/kg dw	53,800	4,190	2,400	1,900	2,580	2,130	2,320	1,760	8,885	18,164	1,760	2,360	53,800
Antimony	mg/kg dw	0.341	0.0610	0.0550	0.0500	0.0600	0.0580	0.0820	0.0820	0.0986	0.0987	0.0500	0.0605	0.341
Arsenic	mg/kg dw	63.0	6.96	5.32	5.19	5.89	6.33	6.29	7.60	13.3	20.1	5.19	6.31	63.0
Barium	mg/kg dw	987	127	177	130	164	232	222	304	293	287	127	200	987
Beryllium	mg/kg dw	1.85	0.155	0.0760	0.0720	0.104	0.0890	0.105	0.0750	0.316	0.621	0.0720	0.0965	1.85
Bismuth	mg/kg dw	0.376	0.0340	0.0160	0.0140	0.0170	0.0150	<0.024	<0.014	0.0626	0.130	0.0140	0.0160	0.376
Boron	mg/kg dw	181	36.8	43.0	41.5	38.0	25.5	88.8	71.3	65.7	51	25.5	42.2	181
Cadmium	mg/kg dw	1.73	0.249	0.285	0.311	0.318	0.320	0.597	0.853	0.583	0.507	0.249	0.319	1.73
Calcium	mg/kg dw	827,000	174,000	252,000	271,000	230,000	246,000	260,000	236,000	312,000	210,139	174,000	249,000	827,000
Cesium	mg/kg dw	5.30	0.570	0.301	0.271	0.325	0.255	0.315	0.265	0.950	1.76	0.255	0.308	5.30
Chromium	mg/kg dw	258	11.7	5.88	5.81	9.29	9.25	7.85	6.83	39.3	88.4	5.81	8.55	258
Cobalt	mg/kg dw	43.9	3.74	2.16	1.84	2.82	2.56	3.93	6.07	8.38	14.4	1.84	3.28	43.9
Copper	mg/kg dw	1,130	93.4	59.1	118	75.2	71.2	194	96.3	230	366	59.1	94.8	1,130
Iron	mg/kg dw	117,000	9,110	4,460	3,830	5,200	4,380	4,740	4,080	19,100	39,593	3,830	4,600	117,000
Lead	mg/kg dw	24.2	2.10	1.25	0.894	1.25	1.04	1.12	0.863	4.09	8.14	0.863	1.18	24.2
Lithium	mg/kg dw	48.5	4.52	2.37	2.08	2.80	2.47	2.65	1.82	8.40	16.2	1.82	2.56	48.5
Magnesium	mg/kg dw	34,100	4,000	3,480	3,540	3,740	3,510	4,170	3,280	7,478	10,761	3,280	3,640	34,100
Manganese	mg/kg dw	4,970	779	921	1,890	3,280	3,540	7,210	12,000	4,324	3,769	779	3,410	12,000
Mercury	mg/kg dw	0.225	0.0364	0.0189	0.0161	0.0266	0.0222	0.0212	0.0200	0.0483	0.0717	0.0161	0.0217	0.225
Molybdenum	mg/kg dw	11.1	0.620	0.490	0.755	0.703	0.626	0.998	1.33	2.08	3.66	0.490	0.729	11.1
Nickel	mg/kg dw	105	8.23	4.41	4.38	5.67	6.38	6.17	8.18	18.6	35.0	4.38	6.28	105
Phosphorus	mg/kg dw	13,300	2,530	1,820	1,850	1,690	1,890	1,910	1,700	3,336	4,035	1,690	1,870	13,300
Potassium	mg/kg dw	19,300	3,750	3,550	3,640	3,610	2,980	3,480	3,370	5,460	5,597	2,980	3,580	19,300
Rubidium	mg/kg dw	49.3	7.70	6.43	5.89	6.69	5.67	5.26	5.03	11.5	15.3	5.03	6.16	49.3
Selenium	mg/kg dw	9.13	2.11	1.59	1.98	1.67	1.65	2.53	1.94	2.82	2.57	1.59	1.96	9.13
Silver	mg/kg dw	0.470	0.0398	0.0188	0.0216	0.0226	0.0298	0.0265	0.0191	0.0810	0.157	0.0188	0.0246	0.470
Sodium	mg/kg dw	2,740	351	311	350	306	292	341	312	625	855	292	326	2,740
Strontium	mg/kg dw	2,510	478	596	659	604	617	618	574	832	680	478	610	2,510
Tellurium	mg/kg dw	0.185	0.0310	0.0310	0.0280	0.0330	0.0260	<0.048	0.0360	0.0501	0.0552	0.0260	0.0310	0.185
Thallium	mg/kg dw	0.390	0.0457	0.0239	0.0255	0.0256	0.0255	0.0344	0.0422	0.0766	0.127	0.0239	0.0300	0.390
Tin	mg/kg dw	1.66	0.140	<0.10	<0.12	<0.10	<0.10	<0.24	<0.14	0.301	0.711	<0.10	0.140	1.66
Titanium	mg/kg dw	3,120	244	141	111	178	135	142	99.1	521	1,051	99.1	142	3,120
Uranium	mg/kg dw	3.68	0.354	0.229	0.206	0.219	0.192	0.210	0.172	0.658	1.22	0.172	0.214	3.68
Vanadium	mg/kg dw	380	26.2	13.8	10.9	17.1	13.2	16.9	14.2	61.5	129	10.9	15.6	380
Zinc	mg/kg dw	231	27.4	18.0	17.1	17.8	18.5	28.6	34.3	49.1	73.8	17.1	23.0	231
Zirconium	mg/kg dw	33.5	2.75	1.30	1.06	1.75	1.24	1.22	1.06	5.48	11.3	1.06	1.27	33.5

Notes: "-" = no data or summary statistic could not be calculated. Mg/kg dw = milligrams per kilogram dry weight. All summary statistics are reported to three significant digits for display purposes and were calculated using the Kaplan-Meier method.

Table D.5.9: Periphyton Tissue Chemistry Data for Lower Hazeltine Creek (HAC-D; Exposed) and Lower Edney Creek Exposed (E1) and Reference (EDC-D), 2022

Analyte	Units	Exposed												
		Lower Edney Creek (E1)												
		E1-1	E1-2	E1-3	E1-4	E1-5	E1-6	E1-7	E1-8	Mean	Standard Deviation	Minimum	Median	Maximum
		5-Aug-22	5-Aug-22	5-Aug-22	4-Aug-22	4-Aug-22	4-Aug-22	4-Aug-22	4-Aug-22					
Moisture	mg/kg dw	92.1	89.8	83.7	93.6	78.4	76.4	87.3	70.4	84	8.25	70.4	85.5	93.6
Aluminum	mg/kg dw	2,860	2,210	11,100	4,160	12,300	11,600	6,810	14,000	8,130	4,676	2,210	8,955	14,000
Antimony	mg/kg dw	0.0220	0.0230	0.0560	0.0260	0.0490	0.0960	0.0850	0.0960	0.0566	0.0321	0.0220	0.0525	0.0960
Arsenic	mg/kg dw	2.79	2.78	12.8	3.01	11.4	12.7	9.48	8.94	7.99	4.46	2.78	9.21	12.8
Barium	mg/kg dw	31.3	24.1	112	190	157	291	103	725	204	227	24.1	134	725
Beryllium	mg/kg dw	0.0780	0.0650	0.529	0.162	0.411	0.434	0.224	0.450	0.294	0.183	0.0650	0.318	0.529
Bismuth	mg/kg dw	0.0230	0.0170	0.0540	0.0150	0.0890	0.0840	0.0510	0.0850	0.0522	0.0314	0.0150	0.0525	0.0890
Boron	mg/kg dw	5.80	6.60	19.4	6.90	11.9	12.3	56.2	46.7	20.7	19.6	5.80	12.1	56.2
Cadmium	mg/kg dw	0.0730	0.0980	0.473	0.0810	0.275	0.284	0.248	0.363	0.237	0.144	0.0730	0.262	0.473
Calcium	mg/kg dw	2,110	1,960	13,400	3,910	9,300	11,800	16,800	16,900	9,522	6,225	1,960	10,550	16,900
Cesium	mg/kg dw	0.346	0.247	1.16	0.369	1.36	1.12	0.808	0.957	0.796	0.426	0.247	0.882	1.36
Chromium	mg/kg dw	30.9	40.1	416	9.94	32.0	34.3	23.2	20.4	75.9	138	9.94	31.4	416
Cobalt	mg/kg dw	2.54	2.19	12.2	3.26	11.7	10.3	6.87	11.9	7.62	4.44	2.19	8.59	12.2
Copper	mg/kg dw	17.6	17.0	49.6	102	214	293	147	823	208	267	17.0	124	823
Iron	mg/kg dw	5,880	4,790	30,300	6,840	25,000	22,800	15,000	18,200	16,101	9,632	4,790	16,600	30,300
Lead	mg/kg dw	1.33	1.01	3.58	1.41	5.97	6.19	3.28	6.13	3.61	2.25	1.01	3.43	6.19
Lithium	mg/kg dw	3.40	2.47	5.95	3.14	13.4	11.6	7.19	8.29	6.93	4.02	2.47	6.57	13.4
Magnesium	mg/kg dw	1,530	1,280	4,600	2,840	7,020	6,100	4,800	6,450	4,328	2,221	1,280	4,700	7,020
Manganese	mg/kg dw	284	296	1,190	264	1,200	1,150	1,490	2,500	1,047	767	264	1,170	2,500
Mercury	mg/kg dw	0.0450	0.0350	0.0377	0.0530	0.0637	0.0580	0.0450	0.0578	0.0494	0.0103	0.0350	0.0490	0.0637
Molybdenum	mg/kg dw	0.478	0.659	3.54	0.379	1.44	1.30	1.72	1.88	1.42	1.03	0.379	1.37	3.54
Nickel	mg/kg dw	10.0	9.82	47.7	10.2	25.4	24.2	16.8	16.6	20.1	12.7	9.82	16.7	47.7
Phosphorus	mg/kg dw	696	860	1,770	716	1,860	1,670	2,930	2,020	1,565	773	696	1,720	2,930
Potassium	mg/kg dw	1,300	1,520	3,470	1,200	2,420	2,430	6,040	3,690	2,759	1,624	1,200	2,425	6,040
Rubidium	mg/kg dw	3.42	2.98	8.10	3.12	10.4	8.75	11.4	8.97	7.14	3.44	2.98	8.43	11.4
Selenium	mg/kg dw	0.270	0.410	1.08	0.300	0.940	1.16	0.830	1.98	0.871	0.569	0.270	0.885	1.98
Silver	mg/kg dw	0.0224	0.0193	0.133	0.0267	0.129	0.115	0.0709	0.149	0.0832	0.0548	0.0193	0.0930	0.149
Sodium	mg/kg dw	206	194	293	249	447	372	351	430	318	97.5	194	322	447
Strontium	mg/kg dw	17.5	14.8	83.1	67.3	87.1	200	87.7	292	106	94.3	14.8	85.1	292
Tellurium	mg/kg dw	<0.020	<0.020	0.0210	<0.020	0.0320	0.0310	<0.020	0.0330	0.0246	0.00618	<0.020	0.0205	0.0330
Thallium	mg/kg dw	0.0265	0.0217	0.0737	0.0191	0.0766	0.0692	0.0649	0.0554	0.0509	0.0245	0.0191	0.0602	0.0766
Tin	mg/kg dw	<0.10	<0.10	0.230	0.120	0.280	0.330	0.220	0.420	0.225	0.113	<0.10	0.225	0.420
Titanium	mg/kg dw	147	112	266	405	647	662	386	554	397	213	112	396	662
Uranium	mg/kg dw	0.134	0.120	2.73	0.130	0.544	0.552	0.386	0.449	0.631	0.868	0.120	0.418	2.73
Vanadium	mg/kg dw	12.0	11.1	62.4	20.9	59.5	60.2	34.7	49.7	38.8	22.0	11.1	42.2	62.4
Zinc	mg/kg dw	15.3	15.3	88.9	15.1	61.8	50.9	39.6	53.5	42.5	26.6	15.1	45.2	88.9
Zirconium	mg/kg dw	1.64	1.36	7.22	3.25	7.58	7.31	4.68	6.10	4.89	2.56	1.36	5.39	7.58

Notes: "-" = no data or summary statistic could not be calculated. Mg/kg dw = milligrams per kilogram dry weight. All summary statistics are reported to three significant digits for display purposes and were calculated using the Kaplan-Meier method.

Table D.5.10: Caddisfly Tissue Chemistry Data for Lower Hazeltine Creek (HAC-D; Exposed) and Lower Edney Creek (E1; Exposed and EDC-D; Reference), 2022

Analyte	Units	Reference												
		Lower Edney Creek (EDC-D)												
		EDC-D-1	EDC-D-2	EDC-D-3	EDC-D-4	EDC-D-5	EDC-D-6	EDC-D-7	EDC-D-8	Mean	Standard Deviation	Minimum	Median	Maximum
		4-Aug-22	4-Aug-22	3-Aug-22	3-Aug-22	3-Aug-22	3-Aug-22	3-Aug-22	3-Aug-22					
Moisture	mg/kg dw	81.5	83.9	78.7	66.6	83.0	85.8	74.9	73.5	78.5	6.45	66.6	80.1	85.8
Aluminum	mg/kg dw	650	497	1,610	3,400	1,120	565	6,900	344	1,886	2,258	344	885	6,900
Antimony	mg/kg dw	0.0190	0.0240	0.0600	0.0330	0.0380	0.0310	0.0300	<0.010	0.0306	0.0134	<0.010	0.0305	0.0600
Arsenic	mg/kg dw	2.91	2.16	7.44	4.20	3.36	1.50	5.24	0.901	3.46	2.14	0.901	3.14	7.44
Barium	mg/kg dw	31.0	13.9	90.3	22.9	64.8	26.7	112	6.34	46	38.6	6.34	28.8	112
Beryllium	mg/kg dw	0.0230	0.0140	0.0820	0.0900	0.0510	0.0180	0.132	0.0120	0.0528	0.0444	0.0120	0.0370	0.132
Bismuth	mg/kg dw	<0.010	0.124	0.0150	0.0320	0.0100	0.0360	0.0320	<0.010	0.0336	0.0391	<0.010	0.0235	0.124
Boron	mg/kg dw	<1.0	<1.0	1.50	1.00	2.40	<1.0	1.70	<1.0	1.32	0.556	<1.0	1.00	2.40
Cadmium	mg/kg dw	0.319	0.369	0.295	0.307	0.474	0.380	0.282	0.0530	0.310	0.121	0.0530	0.313	0.474
Calcium	mg/kg dw	1,570	903	2,110	2,210	2,350	1,170	3,090	1,310	1,839	728	903	1,840	3,090
Cesium	mg/kg dw	0.0789	0.0489	0.180	0.311	0.130	0.0979	0.388	0.0181	0.157	0.130	0.0181	0.114	0.388
Chromium	mg/kg dw	4.11	2.42	10.8	32.9	15.7	5.27	9.95	2.50	10.5	10.2	2.42	7.61	32.9
Cobalt	mg/kg dw	1.16	0.585	3.02	3.83	1.99	1.05	4.40	0.257	2.04	1.55	0.257	1.58	4.40
Copper	mg/kg dw	17.2	23.1	19.7	19.4	23.1	19.9	22.9	12.7	19.8	3.56	12.7	19.8	23.1
Iron	mg/kg dw	1,320	913	4,450	7,210	2,560	1,080	11,300	831	3,708	3,788	831	1,940	11,300
Lead	mg/kg dw	0.324	0.548	1.33	1.18	0.563	0.363	1.23	0.150	0.711	0.464	0.150	0.556	1.33
Lithium	mg/kg dw	0.620	<0.50	1.52	3.74	1.10	<0.50	5.41	<0.50	1.74	1.89	<0.50	0.860	5.41
Magnesium	mg/kg dw	1,490	1,280	1,760	3,950	1,700	1,440	4,030	1,440	2,136	1,154	1,280	1,595	4,030
Manganese	mg/kg dw	474	257	1,100	270	870	466	569	82.9	511	336	82.9	470	1,100
Mercury	mg/kg dw	0.0591	0.102	0.0548	0.0579	0.0698	0.0769	0.0853	0.0295	0.0669	0.0219	0.0295	0.0644	0.102
Molybdenum	mg/kg dw	5.60	2.65	4.56	2.12	2.28	2.91	3.90	3.69	3.46	1.21	2.12	3.30	5.60
Nickel	mg/kg dw	3.88	5.88	8.01	21.5	10.9	4.59	9.34	1.46	8.20	6.19	1.46	6.94	21.5
Phosphorus	mg/kg dw	9,140	7,970	7,430	5,700	7,840	8,680	8,490	8,210	7,932	1,045	5,700	8,090	9,140
Potassium	mg/kg dw	9,200	7,880	8,790	5,100	8,780	7,960	7,120	5,490	7,540	1,534	5,100	7,920	9,200
Rubidium	mg/kg dw	3.14	2.02	3.96	2.93	3.67	2.20	2.94	1.29	2.77	0.886	1.29	2.94	3.96
Selenium	mg/kg dw	1.21	1.77	1.51	1.10	1.97	1.85	1.63	0.670	1.46	0.440	0.670	1.57	1.97
Silver	mg/kg dw	0.0343	0.0480	0.0406	0.0566	0.0502	0.0368	0.119	0.0117	0.0496	0.0311	0.0117	0.0443	0.119
Sodium	mg/kg dw	3,280	2,840	2,520	1,910	2,980	3,100	5,760	2,580	3,121	1,147	1,910	2,910	5,760
Strontium	mg/kg dw	11.9	5.60	22.4	12.8	17.3	7.92	24.5	7.65	13.8	7.02	5.60	12.4	24.5
Tellurium	mg/kg dw	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.0550	<0.020	0.0244	-	<0.020	0.0200	0.0550
Thallium	mg/kg dw	0.0111	0.00750	0.0193	0.0166	0.0188	0.00830	0.0140	0.00360	0.0124	0.00572	0.00360	0.0126	0.0193
Tin	mg/kg dw	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	-	<0.10	<0.10	<0.10
Titanium	mg/kg dw	27.2	17.9	80.7	160	43.6	22.1	252	31.1	79.3	84.3	17.9	37.4	252
Uranium	mg/kg dw	0.0567	0.0400	0.160	0.182	0.178	0.0434	0.149	0.0166	0.103	0.0701	0.0166	0.103	0.182
Vanadium	mg/kg dw	2.40	1.69	9.81	17.1	5.32	2.60	34.0	2.85	9.47	11.2	1.69	4.08	34.0
Zinc	mg/kg dw	98.8	106	110	73.2	138	160	114	80.6	110	28.4	73.2	108	160
Zirconium	mg/kg dw	0.530	0.330	1.47	2.30	0.920	0.520	2.52	0.200	1.10	0.902	0.200	0.725	2.52

Value exceeds the British Columbia interim guideline for selenium in invertebrate tissue (4 mg/kg dw; BCMOE 2014).

Notes: "-" = no data or summary statistic could not be calculated. mg/kg dw = milligrams per kilogram dry weight. All summary statistics are reported to three significant digits for display purposes and were calculated using the Kaplan-Meier method.

Table D.5.10: Caddisfly Tissue Chemistry Data for Lower Hazeltine Creek (HAC-D; Exposed) and Lower Edney Creek (E1; Exposed and EDC-D; Reference), 2022

Analyte	Units	Exposed												
		Lower Hazeltine Creek (HAC-D)												
		HAC-D-1	HAC-D-2	HAC-D-3	HAC-D-4	HAC-D-5	HAC-D-6	HAC-D-7	HAC-D-8	Mean	Standard Deviation	Minimum	Median	Maximum
		5-Aug-22	5-Aug-22	5-Aug-22	5-Aug-22	5-Aug-22	5-Aug-22	5-Aug-22	5-Aug-22					
Moisture	mg/kg dw	75.7	71.6	74.0	72.6	76.2	73.6	70.1	75.0	73.6	2.09	70.1	73.8	76.2
Aluminum	mg/kg dw	222	311	357	339	2,040	130	186	56.9	455	649	56.9	266	2,040
Antimony	mg/kg dw	0.0290	0.0250	0.0350	0.0270	0.0490	0.0220	0.0190	0.0150	0.0276	0.0106	0.0150	0.0260	0.0490
Arsenic	mg/kg dw	0.758	0.874	0.946	0.982	1.90	0.644	0.782	0.512	0.925	0.423	0.512	0.828	1.90
Barium	mg/kg dw	17.7	20.0	23.5	42.9	14.6	8.07	12.7	3.44	17.9	12.0	3.44	16.2	42.9
Beryllium	mg/kg dw	<0.010	<0.010	0.0150	0.0110	0.0440	<0.010	<0.010	<0.010	0.0150	0.0132	<0.010	0.0100	0.0440
Bismuth	mg/kg dw	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	-	<0.010	<0.010	<0.010
Boron	mg/kg dw	<1.0	<1.0	1.40	<1.0	1.50	<1.0	<1.0	<1.0	1.11	0.0468	<1.0	1.00	1.50
Cadmium	mg/kg dw	0.457	0.638	0.528	0.592	0.181	0.156	0.193	0.0580	0.350	0.227	0.0580	0.325	0.638
Calcium	mg/kg dw	934	1,230	2,240	1,120	3,580	712	980	549	1,418	1,011	549	1,050	3,580
Cesium	mg/kg dw	0.0352	0.0375	0.0458	0.0498	0.0689	0.0220	0.0269	0.0130	0.0374	0.0176	0.0130	0.0364	0.0689
Chromium	mg/kg dw	0.510	1.18	1.22	1.29	2.59	0.500	0.860	<0.20	1.04	0.704	<0.20	1.02	2.59
Cobalt	mg/kg dw	0.493	0.626	0.960	0.882	1.04	0.573	0.488	0.227	0.661	0.277	0.227	0.600	1.04
Copper	mg/kg dw	30.4	39.0	45.6	41.1	30.1	27.3	28.3	18.3	32.5	8.82	18.3	30.2	45.6
Iron	mg/kg dw	437	565	754	672	2,370	356	396	229	722	687	229	501	2,370
Lead	mg/kg dw	0.178	0.202	0.250	0.238	3.94	0.122	0.130	0.0580	0.640	1.34	0.0580	0.190	3.94
Lithium	mg/kg dw	<0.50	<0.50	<0.50	<0.50	0.880	<0.50	<0.50	<0.50	0.548	-	<0.50	0.500	0.880
Magnesium	mg/kg dw	1,340	1,460	1,240	1,300	1,680	1,220	1,070	987	1,287	217	987	1,270	1,680
Manganese	mg/kg dw	575	492	777	873	539	472	534	223	561	197	223	536	873
Mercury	mg/kg dw	0.0466	0.0482	0.0673	0.0586	0.0472	0.0500	0.0353	0.0433	0.0496	0.00968	0.0353	0.0477	0.0673
Molybdenum	mg/kg dw	4.15	3.07	3.25	3.55	3.88	3.88	4.15	3.99	3.74	0.408	3.07	3.88	4.15
Nickel	mg/kg dw	0.760	1.12	1.44	1.36	1.95	0.670	0.860	0.330	1.06	0.513	0.330	0.990	1.95
Phosphorus	mg/kg dw	7,730	8,340	7,180	7,440	6,790	7,220	6,340	6,450	7,186	666	6,340	7,200	8,340
Potassium	mg/kg dw	7,000	7,790	7,040	7,460	6,790	7,220	6,210	6,480	6,999	511	6,210	7,020	7,790
Rubidium	mg/kg dw	1.33	1.60	1.42	1.41	1.47	1.14	1.38	1.08	1.35	0.171	1.08	1.40	1.60
Selenium	mg/kg dw	5.56	5.59	5.43	5.13	4.04	3.86	3.21	3.84	4.58	0.944	3.21	4.58	5.59
Silver	mg/kg dw	0.00940	0.0131	0.0201	0.0186	0.0281	0.00680	0.00650	<0.0050	0.0134	0.00803	<0.0050	0.0112	0.0281
Sodium	mg/kg dw	2,410	2,600	1,970	2,080	2,760	2,790	2,170	2,240	2,378	312	1,970	2,325	2,790
Strontium	mg/kg dw	7.03	9.27	11.1	7.22	14.1	5.18	7.72	4.12	8.22	3.22	4.12	7.47	14.1
Tellurium	mg/kg dw	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	-	<0.020	<0.020	<0.020
Thallium	mg/kg dw	0.00480	0.00410	0.00460	0.00440	0.00550	0.00220	0.00400	<0.0020	0.00395	0.00120	<0.0020	0.00425	0.00550
Tin	mg/kg dw	<0.10	<0.10	<0.10	<0.10	0.110	<0.10	0.100	<0.10	0.101	0.00468	<0.10	0.100	0.110
Titanium	mg/kg dw	11.3	15.7	20.2	17.7	145	7.54	11.0	3.41	29.0	47.2	3.41	13.5	145
Uranium	mg/kg dw	0.0270	0.0371	0.0828	0.0485	0.0765	0.0261	0.0190	0.00800	0.0406	0.0269	0.00800	0.0320	0.0828
Vanadium	mg/kg dw	1.01	1.36	1.90	1.61	12.2	0.860	1.02	0.420	2.55	3.93	0.420	1.19	12.2
Zinc	mg/kg dw	168	146	147	140	87.3	100	84.3	70.7	118	36.3	70.7	120	168
Zirconium	mg/kg dw	<0.20	0.240	0.280	0.260	2.30	0.290	<0.20	<0.20	0.496	0.756	<0.20	0.250	2.30

Value exceeds the British Columbia interim guideline for selenium in invertebrate tissue (4 mg/kg dw; BCMOE 2014).

Notes: "-" = no data or summary statistic could not be calculated. mg/kg dw = milligrams per kilogram dry weight. All summary statistics are reported to three significant digits for display purposes and were calculated using the Kaplan-Meier method.

Table D.5.10: Caddisfly Tissue Chemistry Data for Lower Hazeltine Creek (HAC-D; Exposed) and Lower Edney Creek (E1; Exposed and EDC-D; Reference), 2022

Analyte	Units	Exposed												
		Lower Edney Creek (E1)												
		E1-1	E1-2	E1-3	E1-4	E1-5	E1-6	E1-7	E1-8	Mean	Standard Deviation	Minimum	Median	Maximum
		5-Aug-22	5-Aug-22	5-Aug-22	4-Aug-22	4-Aug-22	4-Aug-22	4-Aug-22	4-Aug-22					
Moisture	mg/kg dw	77.6	81.3	82.2	78.5	80.4	83.0	76.8	78.4	79.8	2.27	76.8	79.5	83.0
Aluminum	mg/kg dw	89.5	2,030	2,900	5,990	4,140	2,980	4,520	980	2,954	1,929	89.5	2,940	5,990
Antimony	mg/kg dw	<0.010	0.0460	0.0850	0.0800	0.0730	0.0700	0.0760	0.0270	0.0584	0.0239	<0.010	0.0715	0.0850
Arsenic	mg/kg dw	0.592	4.88	4.69	7.54	6.05	5.22	6.24	1.86	4.63	2.31	0.592	5.05	7.54
Barium	mg/kg dw	4.75	86.9	129	187	163	175	179	55.6	123	67	4.75	146	187
Beryllium	mg/kg dw	<0.010	0.0630	0.116	0.202	0.148	0.121	0.164	0.0360	0.108	0.0617	<0.010	0.118	0.202
Bismuth	mg/kg dw	<0.010	0.0180	0.0270	0.0430	0.0320	0.0260	0.0330	<0.010	0.0249	0.00917	<0.010	0.0265	0.0430
Boron	mg/kg dw	<1.0	2.10	3.90	6.50	5.30	4.70	4.40	1.40	3.66	1.91	<1.0	4.15	6.50
Cadmium	mg/kg dw	0.0950	0.319	1.44	0.962	0.903	1.24	0.923	0.695	0.822	0.446	0.0950	0.913	1.44
Calcium	mg/kg dw	1,030	1,890	3,370	4,520	3,120	2,810	3,530	1,770	2,755	1,129	1,030	2,965	4,520
Cesium	mg/kg dw	0.0137	0.214	0.318	0.587	0.392	0.265	0.447	0.0956	0.292	0.187	0.0137	0.292	0.587
Chromium	mg/kg dw	0.460	12.1	26.4	30.0	23.2	9.81	13.8	4.60	15.0	10.5	0.460	13.0	30.0
Cobalt	mg/kg dw	0.158	3.19	5.47	7.77	6.32	5.34	6.06	1.62	4.49	2.59	0.158	5.40	7.77
Copper	mg/kg dw	14.4	34.0	81.4	127	118	117	130	57.5	84.9	45.1	14.4	99.2	130
Iron	mg/kg dw	237	4,060	6,440	12,100	8,410	6,570	9,370	2,050	6,155	3,915	237	6,505	12,100
Lead	mg/kg dw	0.0630	0.998	1.60	2.78	1.96	1.69	2.05	0.510	1.46	0.885	0.0630	1.64	2.78
Lithium	mg/kg dw	<0.50	2.18	2.78	5.71	4.09	2.72	4.20	0.940	2.89	1.67	<0.50	2.75	5.71
Magnesium	mg/kg dw	1,270	2,120	2,760	4,070	3,240	2,830	3,240	1,680	2,651	917	1,270	2,795	4,070
Manganese	mg/kg dw	103	717	1,080	1,420	1,310	1,680	1,650	591	1,069	558	103	1,195	1,680
Mercury	mg/kg dw	0.0421	0.0417	0.0658	0.0613	0.0480	0.0577	0.0489	0.0743	0.0550	0.0117	0.0417	0.0533	0.0743
Molybdenum	mg/kg dw	3.80	2.36	1.14	1.39	1.86	1.42	1.84	3.94	2.22	1.09	1.14	1.85	3.94
Nickel	mg/kg dw	0.630	9.45	20.2	21.7	16.8	10.4	12.2	4.03	11.9	7.43	0.630	11.3	21.7
Phosphorus	mg/kg dw	8,190	7,960	8,370	7,210	6,890	8,010	6,870	10,300	7,975	1,108	6,870	7,985	10,300
Potassium	mg/kg dw	6,810	10,500	15,600	15,100	13,700	17,000	13,200	10,500	12,801	3,342	6,810	13,450	17,000
Rubidium	mg/kg dw	2.20	4.78	7.33	9.39	6.10	6.25	6.40	4.37	5.85	2.13	2.20	6.18	9.39
Selenium	mg/kg dw	0.910	1.31	1.75	1.52	1.44	1.73	1.59	1.78	1.50	0.290	0.910	1.56	1.78
Silver	mg/kg dw	0.0254	0.0361	0.130	0.131	0.0882	0.0968	0.0919	0.0704	0.0837	0.0387	0.0254	0.0900	0.131
Sodium	mg/kg dw	3,040	3,080	3,840	3,510	3,380	3,870	2,690	3,460	3,359	406	2,690	3,420	3,870
Strontium	mg/kg dw	6.50	14.9	20.4	36.3	27.0	22.0	26.5	12.7	20.8	9.39	6.50	21.2	36.3
Tellurium	mg/kg dw	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	-	<0.020	<0.020	<0.020
Thallium	mg/kg dw	0.00290	0.0203	0.0358	0.0511	0.0351	0.0357	0.0306	0.0145	0.0282	0.0150	0.00290	0.0328	0.0511
Tin	mg/kg dw	<0.10	<0.10	<0.10	0.160	0.120	<0.10	0.110	<0.10	0.111	0.0201	<0.10	0.100	0.160
Titanium	mg/kg dw	4.17	96.4	158	327	224	152	232	54.2	156	105	4.17	155	327
Uranium	mg/kg dw	0.0130	0.151	0.428	0.527	0.383	0.403	0.352	0.0922	0.294	0.183	0.0130	0.368	0.527
Vanadium	mg/kg dw	0.420	8.60	16.0	30.9	19.3	15.0	24.6	4.56	14.9	10.2	0.420	15.5	30.9
Zinc	mg/kg dw	89.6	126	167	138	154	157	137	128	137	24.0	89.6	138	167
Zirconium	mg/kg dw	<0.20	1.54	2.47	4.09	3.12	2.57	3.45	0.850	2.29	1.21	<0.20	2.52	4.09

Value exceeds the British Columbia interim guideline for selenium in invertebrate tissue (4 mg/kg dw; BCMOE 2014).

Notes: "-" = no data or summary statistic could not be calculated. mg/kg dw = milligrams per kilogram dry weight. All summary statistics are reported to three significant digits for display purposes and were calculated using the Kaplan-Meier method.

Table D.5.11: Composite-Taxa Benthic Invertebrate Tissue Chemistry Data for Lower Hazeltine Creek (HAC-D; Exposed) and Lower Edney Creek Exposed (E1) and Reference (EDC-D) Areas, 2022

Analyte	Units	Reference												
		Lower Edney Creek (EDC-D)												
		EDC-D-1	EDC-D-2	EDC-D-3	EDC-D-4	EDC-D-5	EDC-D-6	EDC-D-7	EDC-D-8	Mean	Standard Deviation	Minimum	Median	Maximum
		4-Aug-22	4-Aug-22	3-Aug-22	3-Aug-22	3-Aug-22	3-Aug-22	3-Aug-22	3-Aug-22					
Moisture	mg/kg dw	73.2	78.5	80.1	73.8	80.3	79.0	80.1	80.9	78.2	3.02	73.2	79.5	80.9
Aluminum	mg/kg dw	424	274	1,180	221	658	2,140	880	396	772	641	221	541	2,140
Antimony	mg/kg dw	0.0200	0.0180	0.0390	0.0110	0.0210	0.0330	0.0290	0.0210	0.0240	0.00902	0.0110	0.0210	0.0390
Arsenic	mg/kg dw	1.96	1.24	3.23	1.30	1.90	2.32	2.44	1.29	1.96	0.695	1.24	1.93	3.23
Barium	mg/kg dw	8.50	9.84	25.9	5.28	24.3	25.6	29.1	13.6	17.8	9.42	5.28	19.0	29.1
Beryllium	mg/kg dw	0.0140	<0.010	0.0370	<0.010	0.0240	0.0450	0.0290	0.0120	0.0226	0.0132	<0.010	0.0190	0.0450
Bismuth	mg/kg dw	<0.010	<0.010	0.0150	<0.010	<0.010	0.0100	<0.010	0.0760	0.0189	0.0265	<0.010	0.0100	0.0760
Boron	mg/kg dw	<1.0	<1.0	1.20	<1.0	<1.0	2.00	1.80	<1.0	1.25	0.376	<1.0	1.00	2.00
Cadmium	mg/kg dw	0.946	0.878	2.69	0.595	1.06	0.522	1.16	0.717	1.07	0.690	0.522	0.912	2.69
Calcium	mg/kg dw	1,800	1,480	2,390	2,570	1,430	3,130	1,500	1,440	1,968	649	1,430	1,650	3,130
Cesium	mg/kg dw	0.0625	0.0439	0.170	0.0379	0.0892	0.0911	0.116	0.0520	0.0828	0.0442	0.0379	0.0758	0.170
Chromium	mg/kg dw	2.02	1.60	3.77	1.04	2.36	2.26	2.89	1.76	2.21	0.837	1.04	2.14	3.77
Cobalt	mg/kg dw	0.896	0.666	1.85	0.626	1.02	1.32	1.41	0.732	1.06	0.430	0.626	0.958	1.85
Copper	mg/kg dw	38.0	29.6	39.4	38.8	30.8	33.8	32.1	26.6	33.6	4.71	26.6	33.0	39.4
Iron	mg/kg dw	848	591	2,260	460	1,340	2,830	1,720	896	1,368	843	460	1,118	2,830
Lead	mg/kg dw	0.198	0.170	0.596	0.106	0.341	0.666	0.443	0.312	0.354	0.202	0.106	0.326	0.666
Lithium	mg/kg dw	<0.50	<0.50	1.16	<0.50	0.640	0.980	0.830	<0.50	0.701	0.218	<0.50	0.570	1.16
Magnesium	mg/kg dw	1,300	1,640	1,540	1,900	1,610	1,820	1,500	1,340	1,581	210	1,300	1,575	1,900
Manganese	mg/kg dw	238	179	504	188	345	370	421	210	307	121	179	292	504
Mercury	mg/kg dw	0.120	0.103	0.110	0.0730	0.121	0.121	0.121	0.114	0.110	0.0165	0.0730	0.117	0.121
Molybdenum	mg/kg dw	0.670	0.659	0.811	0.583	0.950	0.791	1.02	0.613	0.762	0.160	0.583	0.730	1.02
Nickel	mg/kg dw	2.47	3.44	4.41	5.32	2.13	3.85	2.59	6.67	3.86	1.56	2.13	3.64	6.67
Phosphorus	mg/kg dw	7,140	8,510	7,770	9,310	8,800	8,010	8,880	8,960	8,422	725	7,140	8,655	9,310
Potassium	mg/kg dw	7,040	8,000	6,720	7,080	8,830	8,910	9,750	8,600	8,116	1,085	6,720	8,300	9,750
Rubidium	mg/kg dw	2.88	3.49	5.23	2.74	3.49	1.90	3.93	2.44	3.26	1.03	1.90	3.18	5.23
Selenium	mg/kg dw	1.76	1.80	1.98	1.65	2.03	1.71	2.12	1.52	1.82	0.205	1.52	1.78	2.12
Silver	mg/kg dw	0.164	0.122	0.173	0.184	0.142	0.151	0.153	0.134	0.153	0.0205	0.122	0.152	0.184
Sodium	mg/kg dw	3,190	4,000	3,090	3,470	3,670	3,930	4,110	4,050	3,689	400	3,090	3,800	4,110
Strontium	mg/kg dw	9.63	8.80	14.0	10.3	7.69	16.5	9.36	12.0	11.0	2.95	7.69	9.96	16.5
Tellurium	mg/kg dw	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	-	<0.020	<0.020	<0.020
Thallium	mg/kg dw	0.0143	0.00960	0.0260	0.00720	0.0155	0.0135	0.0166	0.00970	0.0140	0.00582	0.00720	0.0139	0.0260
Tin	mg/kg dw	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	-	<0.10	<0.10	<0.10
Titanium	mg/kg dw	18.2	11.2	50.6	9.28	27.7	27.7	36.0	15.2	24.5	14.0	9.28	23.0	50.6
Uranium	mg/kg dw	0.0448	0.0296	0.0908	0.0264	0.0598	0.0846	0.0856	0.0389	0.0576	0.0264	0.0264	0.0523	0.0908
Vanadium	mg/kg dw	1.52	1.04	4.32	0.920	2.61	8.64	3.44	1.47	3.00	2.58	0.920	2.06	8.64
Zinc	mg/kg dw	119	291	172	129	149	148	129	155	162	55.0	119	148	291
Zirconium	mg/kg dw	0.640	0.210	0.790	<0.20	0.460	0.760	0.610	0.280	0.494	0.242	<0.20	0.535	0.790

Value exceeds the British Columbia interim guideline for selenium in invertebrate tissue (4 mg/kg dw; BCMOE 2014).

Notes: "-" = no data or summary statistic could not be calculated. mg/kg dw = milligrams per kilogram dry weight. All summary statistics are reported to three significant digits for display purposes and were calculated using the Kaplan-Meier method.

Table D.5.11: Composite-Taxa Benthic Invertebrate Tissue Chemistry Data for Lower Hazeltine Creek (HAC-D; Exposed) and Lower Edney Creek Exposed (E1) and Reference (EDC-D) Areas, 2022

Analyte	Units	Exposed												
		Lower Hazeltine Creek (HAC-D)												
		HAC-D-1	HAC-D-2	HAC-D-3	HAC-D-4	HAC-D-5	HAC-D-6	HAC-D-7	HAC-D-8	Mean	Standard Deviation	Minimum	Median	Maximum
		5-Aug-22	5-Aug-22	5-Aug-22	5-Aug-22	5-Aug-22	5-Aug-22	5-Aug-22	5-Aug-22					
Moisture	mg/kg dw	69.9	68.8	75.4	75.9	73.4	73.0	79.6	79.7	74.5	4.02	68.8	74.4	79.7
Aluminum	mg/kg dw	3,070	132	870	540	1,240	286	541	1,010	961	928	132	706	3,070
Antimony	mg/kg dw	0.0820	0.0230	0.0290	0.0280	0.0350	0.0180	0.0300	0.0390	0.0355	0.0199	0.0180	0.0295	0.0820
Arsenic	mg/kg dw	7.19	0.999	2.11	1.31	2.26	1.02	2.10	1.82	2.35	2.02	0.999	1.96	7.19
Barium	mg/kg dw	43.8	20.2	22.6	25.3	53.4	19.7	31.7	45.1	32.7	13.0	19.7	28.5	53.4
Beryllium	mg/kg dw	0.124	<0.010	0.0290	0.0220	0.0640	0.0110	0.0210	0.0360	0.0396	0.0384	<0.010	0.0255	0.124
Bismuth	mg/kg dw	0.0230	<0.010	0.0110	<0.010	<0.010	<0.010	<0.010	0.0100	0.0118	0.00522	<0.010	0.0100	0.0230
Boron	mg/kg dw	3.30	<1.0	1.40	2.60	1.80	<1.0	4.00	2.40	2.19	1.00	<1.0	2.10	4.00
Cadmium	mg/kg dw	1.31	0.548	0.958	1.01	1.53	0.772	2.31	0.744	1.15	0.566	0.548	0.984	2.31
Calcium	mg/kg dw	7,350	920	2,360	2,980	3,570	1,700	4,840	3,380	3,388	2,000	920	3,180	7,350
Cesium	mg/kg dw	0.362	0.0250	0.111	0.0879	0.121	0.0601	0.0860	0.122	0.122	0.102	0.0250	0.0994	0.362
Chromium	mg/kg dw	6.21	0.480	11.0	1.65	1.58	0.950	2.29	1.90	3.26	3.58	0.480	1.78	11.0
Cobalt	mg/kg dw	3.51	1.24	1.70	1.14	1.65	0.809	1.61	1.73	1.67	0.811	0.809	1.63	3.51
Copper	mg/kg dw	104	34.4	77.2	74.8	81.6	55.0	81.5	75.2	73	20.5	34.4	76.2	104
Iron	mg/kg dw	6,910	283	1,770	1,110	1,580	677	1,270	2,370	1,996	2,087	283	1,425	6,910
Lead	mg/kg dw	1.57	0.141	0.611	0.332	1.49	0.196	0.350	0.498	0.648	0.565	0.141	0.424	1.57
Lithium	mg/kg dw	2.64	<0.50	0.920	0.540	0.740	<0.50	0.560	1.05	0.931	0.731	<0.50	0.650	2.64
Magnesium	mg/kg dw	2,580	952	1,590	1,310	1,540	1,100	1,500	1,610	1,523	490	952	1,520	2,580
Manganese	mg/kg dw	702	538	454	836	1,230	820	1,390	1,140	889	335	454	828	1,390
Mercury	mg/kg dw	0.0906	0.0664	0.0633	0.0829	0.0810	0.0646	0.0842	0.0739	0.0759	0.0103	0.0633	0.0774	0.0906
Molybdenum	mg/kg dw	1.44	4.22	1.66	1.41	1.66	2.23	1.79	2.24	2.08	0.920	1.41	1.72	4.22
Nickel	mg/kg dw	6.27	0.930	87.8	1.75	6.03	1.51	2.23	2.92	13.7	30.0	0.930	2.58	87.8
Phosphorus	mg/kg dw	7,010	6,460	8,470	8,240	8,630	7,370	9,300	7,150	7,829	971	6,460	7,805	9,300
Potassium	mg/kg dw	6,770	4,500	6,390	7,050	7,440	6,130	8,210	6,450	6,618	1,084	4,500	6,610	8,210
Rubidium	mg/kg dw	4.08	1.07	2.92	2.78	3.49	2.24	3.35	2.04	2.75	0.948	1.07	2.85	4.08
Selenium	mg/kg dw	6.69	5.42	4.87	4.85	4.43	4.72	4.23	4.30	4.94	0.804	4.23	4.78	6.69
Silver	mg/kg dw	0.108	0.00910	0.0338	0.0271	0.0238	0.0230	0.0296	0.0341	0.0361	0.0301	0.00910	0.0284	0.108
Sodium	mg/kg dw	2,440	2,350	2,930	3,220	2,940	3,600	8,240	5,490	3,901	2,011	2,350	3,080	8,240
Strontium	mg/kg dw	47.8	6.12	14.5	14.1	22.1	11.6	19.2	18.4	19.2	12.6	6.12	16.4	47.8
Tellurium	mg/kg dw	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	-	<0.020	<0.020	<0.020
Thallium	mg/kg dw	0.0507	0.00360	0.0115	0.00960	0.0122	0.00750	0.0120	0.0123	0.0149	0.0148	0.00360	0.0118	0.0507
Tin	mg/kg dw	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	-	<0.10	<0.10	<0.10
Titanium	mg/kg dw	135	6.62	47.4	26.2	35.5	20.3	34.4	65.7	46.4	39.9	6.62	35.0	135
Uranium	mg/kg dw	0.228	0.0348	0.0808	0.0621	0.0838	0.0438	0.0721	0.0894	0.0868	0.0602	0.0348	0.0764	0.228
Vanadium	mg/kg dw	19.2	0.770	5.40	2.77	4.70	2.14	3.94	7.38	5.79	5.79	0.770	4.32	19.2
Zinc	mg/kg dw	152	177	125	126	135	106	142	124	136	21.5	106	130	177
Zirconium	mg/kg dw	1.86	<0.20	0.510	0.460	0.400	0.250	0.420	0.680	0.598	0.532	<0.20	0.440	1.86

Value exceeds the British Columbia interim guideline for selenium in invertebrate tissue (4 mg/kg dw; BCMOE 2014).

Notes: "-" = no data or summary statistic could not be calculated. mg/kg dw = milligrams per kilogram dry weight. All summary statistics are reported to three significant digits for display purposes and were calculated using the Kaplan-Meier method.

Table D.5.11: Composite-Taxa Benthic Invertebrate Tissue Chemistry Data for Lower Hazeltine Creek (HAC-D; Exposed) and Lower Edney Creek Exposed (E1) and Reference (EDC-D) Areas, 2022

Analyte	Units	Exposed												
		Lower Edney Creek (E1)												
		E1-1	E1-2	E1-3	E1-4	E1-5	E1-6	E1-7	E1-8	Mean	Standard Deviation	Minimum	Median	Maximum
		5-Aug-22	5-Aug-22	5-Aug-22	4-Aug-22	4-Aug-22	4-Aug-22	4-Aug-22	4-Aug-22					
Moisture	mg/kg dw	79.5	84.4	84.8	75.0	84.3	82.4	77.4	79.5	80.9	3.63	75.0	81	84.8
Aluminum	mg/kg dw	1,000	1,360	360	271	1,730	1,380	356	2,280	1,092	730	271	1,180	2,280
Antimony	mg/kg dw	0.0230	0.0390	0.0140	0.0110	0.0440	0.0300	0.0160	0.0460	0.0279	0.0139	0.0110	0.0265	0.0460
Arsenic	mg/kg dw	2.34	2.02	1.12	1.13	3.03	2.52	1.44	4.72	2.29	1.20	1.12	2.18	4.72
Barium	mg/kg dw	10.9	15.8	5.34	5.53	87.6	57.9	11.7	37.7	29.1	29.9	5.34	13.8	87.6
Beryllium	mg/kg dw	0.0260	0.0440	0.0120	<0.010	0.0590	0.0500	0.0120	0.0680	0.0351	0.0230	<0.010	0.0350	0.0680
Bismuth	mg/kg dw	<0.010	0.0110	<0.010	<0.010	0.0140	0.0100	<0.010	0.0160	0.0114	0.00251	<0.010	0.0100	0.0160
Boron	mg/kg dw	1.60	1.00	<1.0	<1.0	1.70	1.50	<1.0	1.90	1.34	0.395	1.00	1.25	1.90
Cadmium	mg/kg dw	1.08	2.35	0.996	0.793	2.22	1.58	0.786	3.56	1.67	0.978	0.786	1.33	3.56
Calcium	mg/kg dw	2,040	2,170	1,600	1,470	2,350	2,110	1,050	4,990	2,222	1,198	1,050	2,075	4,990
Cesium	mg/kg dw	0.0966	0.141	0.0434	0.0433	0.210	0.117	0.0440	0.242	0.117	0.0769	0.0433	0.107	0.242
Chromium	mg/kg dw	3.84	3.51	0.770	1.04	5.06	5.41	1.14	4.74	3.19	1.93	0.770	3.68	5.41
Cobalt	mg/kg dw	1.69	2.17	0.910	1.04	3.03	2.27	1.01	4.00	2.02	1.09	0.910	1.93	4.00
Copper	mg/kg dw	35.0	27.6	22.8	56.2	77.4	74.5	34.8	128	57.0	35.4	22.8	45.6	128
Iron	mg/kg dw	1,760	2,860	618	537	3,610	2,540	671	4,220	2,102	1,431	537	2,150	4,220
Lead	mg/kg dw	0.373	0.709	0.139	0.135	0.881	0.751	0.190	0.911	0.511	0.337	0.135	0.541	0.911
Lithium	mg/kg dw	0.930	1.45	<0.50	<0.50	1.60	1.26	<0.50	2.04	1.10	0.432	<0.50	1.10	2.04
Magnesium	mg/kg dw	1,830	2,170	1,570	1,830	2,420	2,310	1,480	2,470	2,010	384	1,480	2,000	2,470
Manganese	mg/kg dw	378	209	101	125	597	407	206	600	328	199	101	294	600
Mercury	mg/kg dw	0.0537	0.0758	0.0463	0.0545	0.0780	0.102	0.0642	0.127	0.0752	0.0274	0.0463	0.0700	0.127
Molybdenum	mg/kg dw	0.491	0.606	0.262	0.325	0.815	1.05	2.52	0.895	0.870	0.721	0.262	0.710	2.52
Nickel	mg/kg dw	6.21	10.5	20.1	1.64	3.18	5.61	6.54	4.82	7.32	5.78	1.64	5.91	20.1
Phosphorus	mg/kg dw	9,460	9,510	9,860	9,640	9,580	9,980	8,080	9,210	9,415	589	8,080	9,545	9,980
Potassium	mg/kg dw	9,130	8,540	9,570	9,240	11,100	12,200	7,720	9,460	9,620	1,416	7,720	9,350	12,200
Rubidium	mg/kg dw	5.41	4.92	4.69	4.61	5.52	4.38	3.18	8.15	5.11	1.43	3.18	4.80	8.15
Selenium	mg/kg dw	1.20	1.98	2.18	1.71	1.91	2.20	1.74	2.55	1.93	0.404	1.20	1.94	2.55
Silver	mg/kg dw	0.104	0.158	0.0558	0.0907	0.108	0.185	0.0362	0.0778	0.102	0.0496	0.0362	0.0974	0.185
Sodium	mg/kg dw	5,690	12,900	11,400	4,260	9,590	9,570	3,110	3,680	7,525	3,792	3,110	7,630	12,900
Strontium	mg/kg dw	12.6	11.8	5.54	6.83	13.3	13.8	5.93	19.0	11.1	4.68	5.54	12.2	19.0
Tellurium	mg/kg dw	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	-	<0.020	<0.020	<0.020
Thallium	mg/kg dw	0.0176	0.0247	0.0135	0.00890	0.0240	0.0193	0.00630	0.0266	0.0176	0.00752	0.00630	0.0184	0.0266
Tin	mg/kg dw	<0.10	<0.10	<0.10	0.130	<0.10	<0.10	<0.10	<0.10	0.104	-	<0.10	0.100	0.130
Titanium	mg/kg dw	45.8	59.4	28.3	14.4	105	77.0	17.8	119	58.3	39.4	14.4	52.6	119
Uranium	mg/kg dw	0.0601	0.114	0.0268	0.0251	0.157	0.130	0.0321	0.160	0.0881	0.0585	0.0251	0.0870	0.160
Vanadium	mg/kg dw	4.04	7.49	1.73	1.32	9.79	6.75	1.46	11.4	5.50	3.94	1.32	5.40	11.4
Zinc	mg/kg dw	112	137	106	124	143	128	106	121	122	13.7	106	122	143
Zirconium	mg/kg dw	0.600	0.800	0.300	<0.20	1.34	1.12	0.280	1.43	0.759	0.485	<0.20	0.700	1.43

Value exceeds the British Columbia interim guideline for selenium in invertebrate tissue (4 mg/kg dw; BCMOE 2014).

Notes: "-" = no data or summary statistic could not be calculated. mg/kg dw = milligrams per kilogram dry weight. All summary statistics are reported to three significant digits for display purposes and were calculated using the Kaplan-Meier method.

APPENDIX E
STATISTICAL ANALYSES – LAKES

APPENDIX E.1
SEDIMENT QUALITY

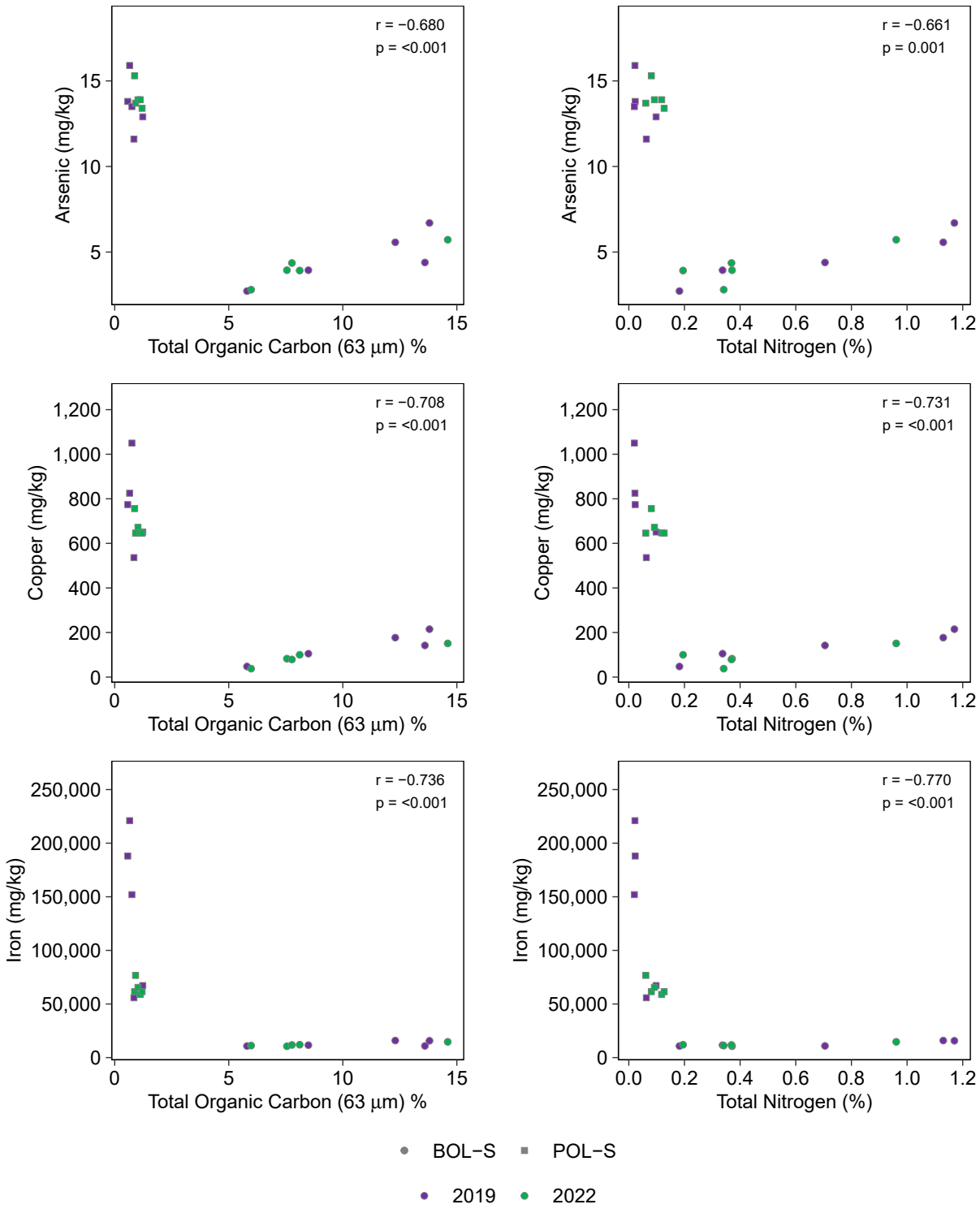

Figure E.1.1: Scatterplots of Significant Spearman's Correlation Relationships (p < 0.0125, Bonferroni Corrected) Between Analyte of Interest Concentrations (<63 µm Fraction) and Sediment Physical and Chemical Parameters for Polley Lake (POL-S; Exposed) and Bootjack Lake (BOL-B2; Reference) Shallow Areas, 2019 to 2022

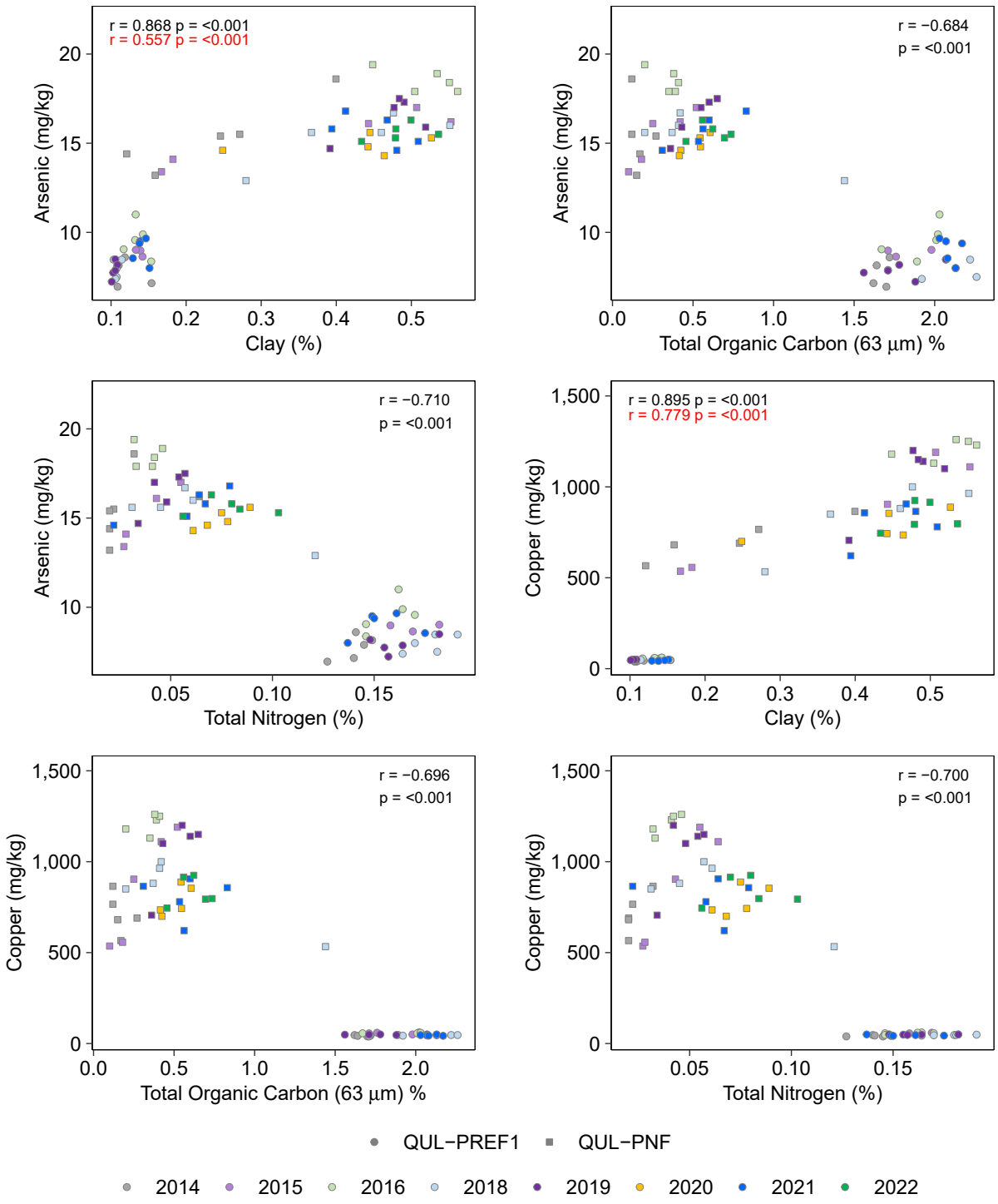

Figure E.1.2: Scatterplots of Significant Spearman's Correlation Relationships (p < 0.0125, Bonferroni Corrected) Between Analyte of Interest Concentrations (<63 µm Fraction) and Sediment Physical and Chemical Parameters for Quesnel Lake at QUL-PNF (Exposed) and QUL-PREF1 (Reference) Deep Areas, 2014 to 2022

Notes: Results of correlations that evaluated data from deep exposed and reference sampling areas of Quesnel Lake (QUL−PNF, QUL-PREF1) are shown in black font on each plot. Results of correlations that only evaluated data from the deep exposed area of Quesnel Lake (QUL−PNF) are shown in red font. An absence of results in red font on a plot indicates the displayed variables were not significantly correlated when only exposed sediment results were considered.

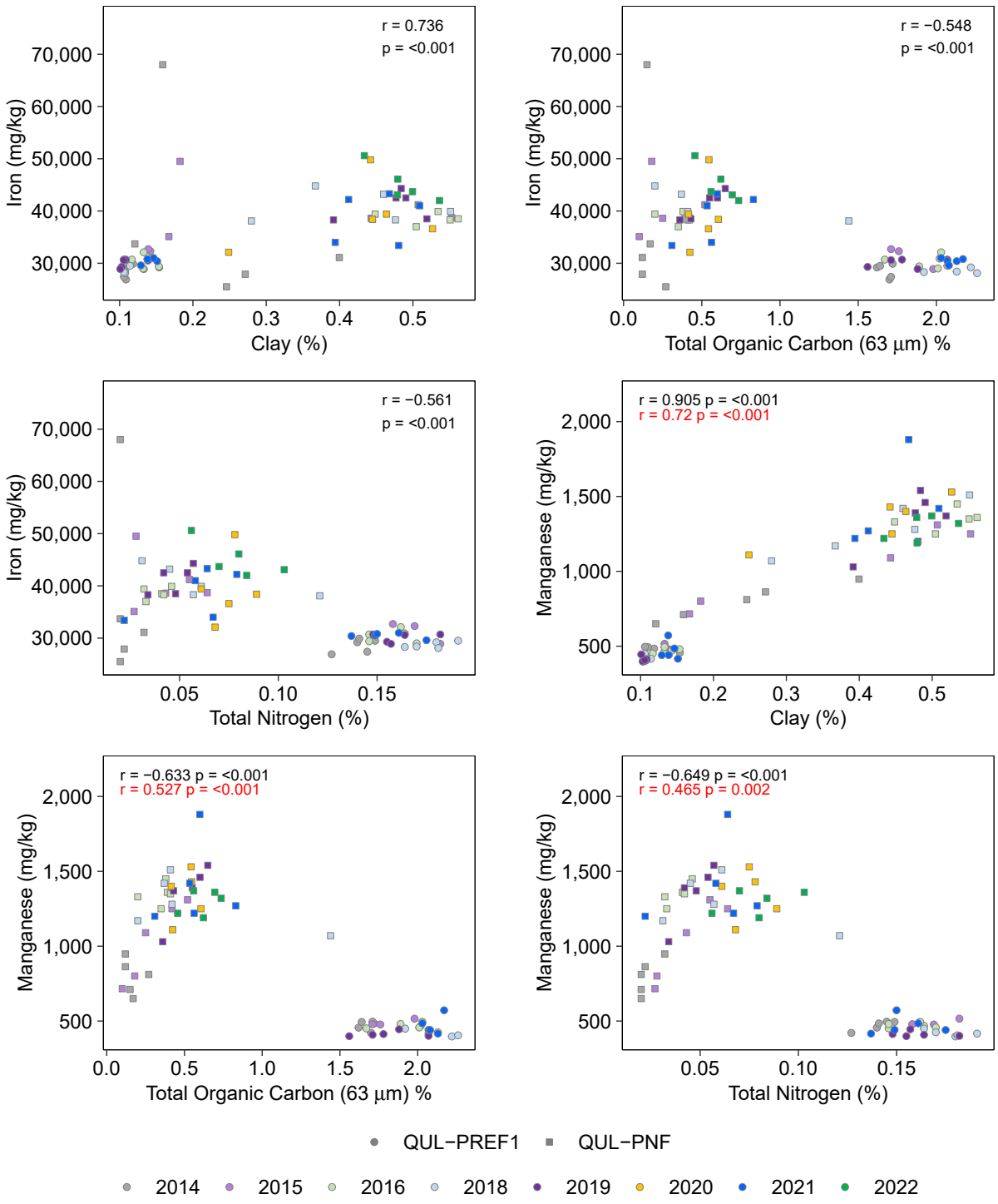

Figure E.1.2: Scatterplots of Significant Spearman's Correlation Relationships (p < 0.0125, Bonferroni Corrected) Between Analyte of Interest Concentrations (<63 µm Fraction) and Sediment Physical and Chemical Parameters for Quesnel Lake at QUL-PNF (Exposed) and QUL-PREF1 (Reference) Deep Areas, 2014 to 2022

Notes: Results of correlations that evaluated data from deep exposed and reference sampling areas of Quesnel Lake (QUL−PNF, QUL-PREF1) are shown in black font on each plot. Results of correlations that only evaluated data from the deep exposed area of Quesnel Lake (QUL−PNF) are shown in red font. An absence of results in red font on a plot indicates the displayed variables were not significantly correlated when only exposed sediment results were considered.

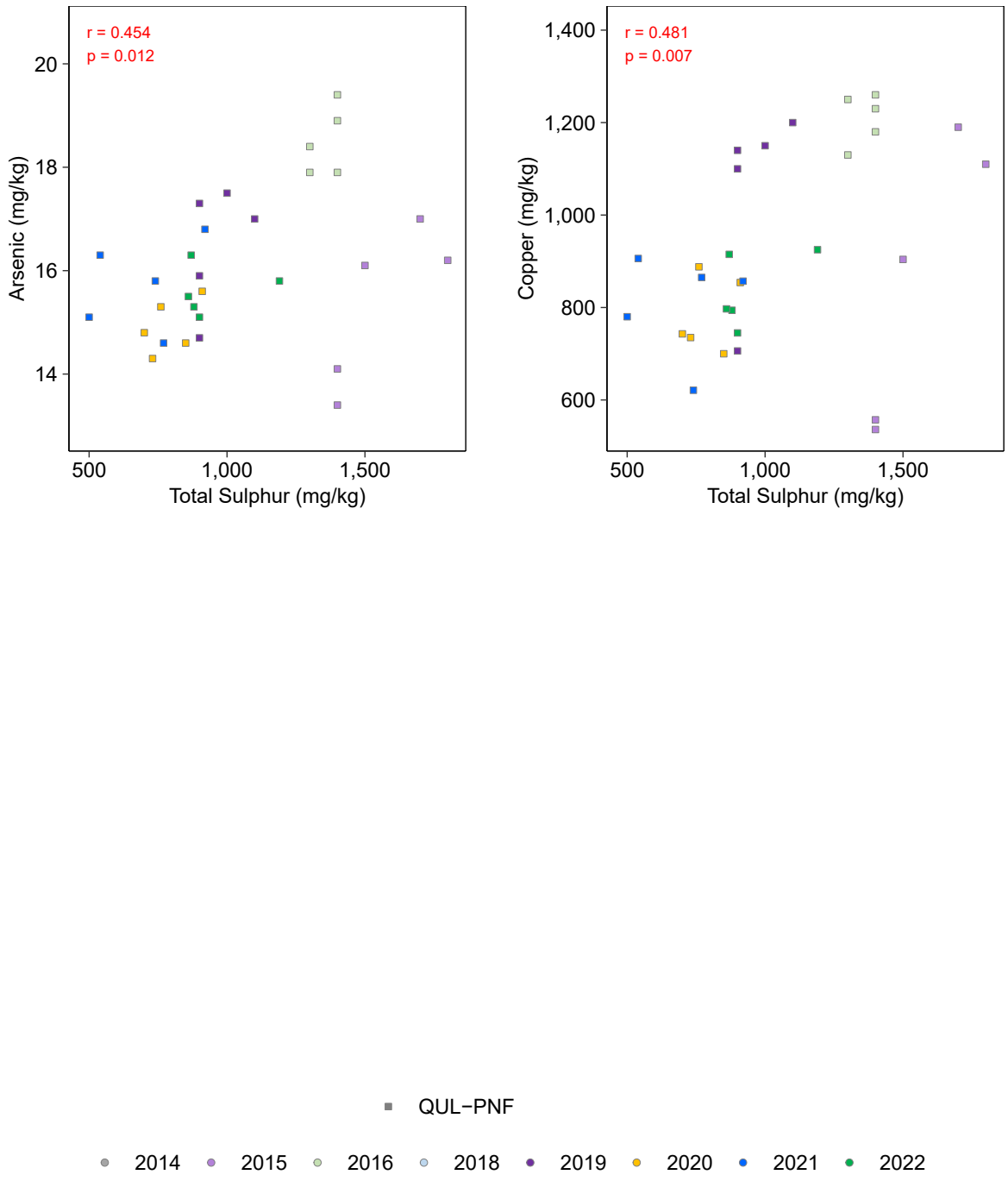

Figure E.1.2: Scatterplots of Significant Spearman's Correlation Relationships (p < 0.0125, Bonferroni Corrected) Between Analyte of Interest Concentrations (<63 µm Fraction) and Sediment Physical and Chemical Parameters for Quesnel Lake at QUL-PNF (Exposed) and QUL-PREF1 (Reference) Deep Areas, 2014 to 2022

Notes: Results of correlations that evaluated data from deep exposed and reference sampling areas of Quesnel Lake (QUL−PNF, QUL-PREF1) are shown in black font on each plot. Results of correlations that only evaluated data from the deep exposed area of Quesnel Lake (QUL−PNF) are shown in red font. An absence of results in red font on a plot indicates the displayed variables were not significantly correlated when only exposed sediment results were considered.

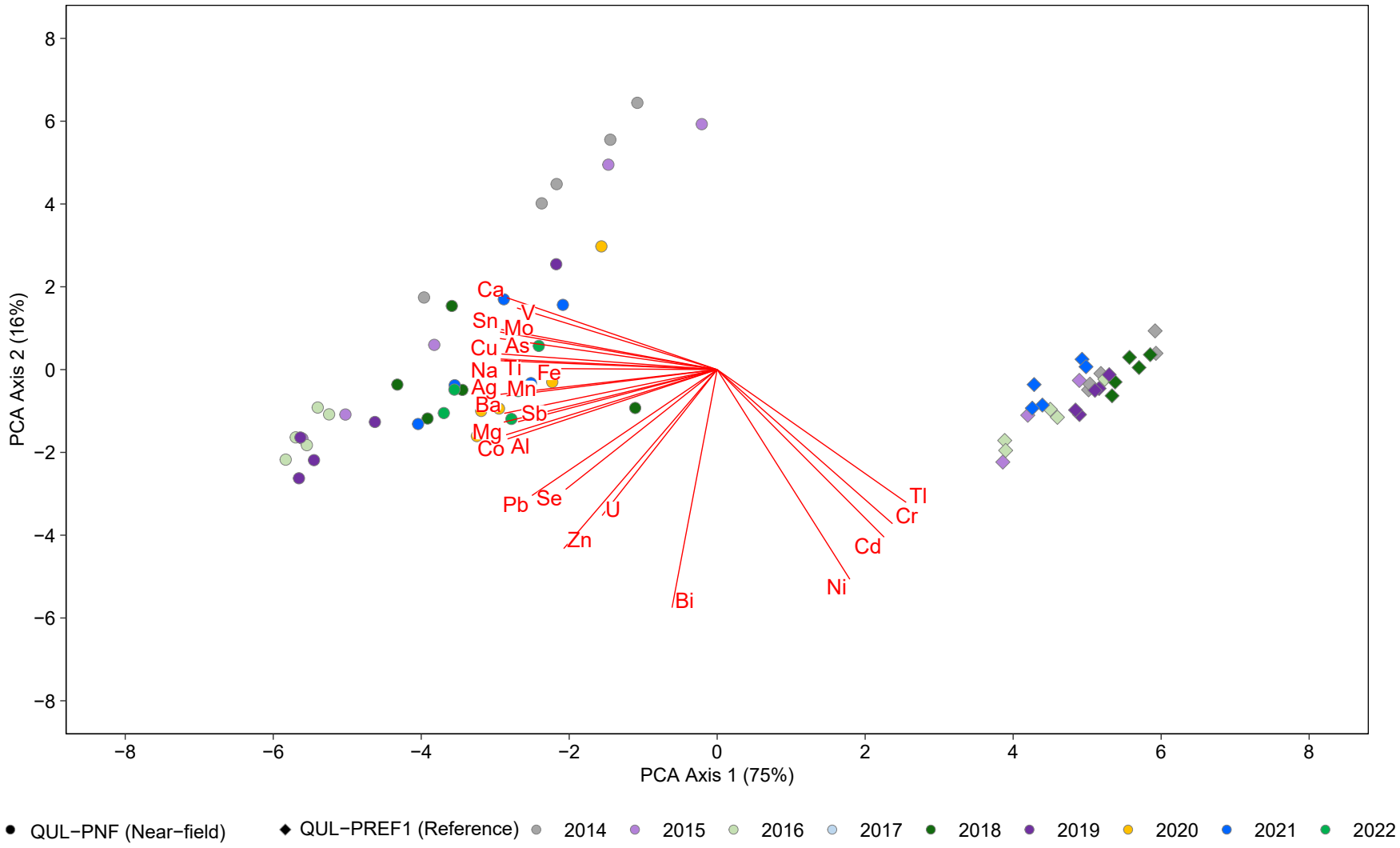

Figure E.1.3: Biplot of Principal Components Analysis (PCA) Axis Scores (PC-1, PC-2) for Metal Concentrations in Sediment (<63 µm Fraction) for Quesnel Lake at QUL-PNF (Exposed) and QUL-PREF1 (Reference) Deep Areas, 2014 to 2022

Notes: PCA conducted on correlation matrix with $\log_{10}$−transformed concentrations. Vectors represent the PC loadings for each parameter (scaled). Parameters that had more than 25% censored data were excluded from the analyses.

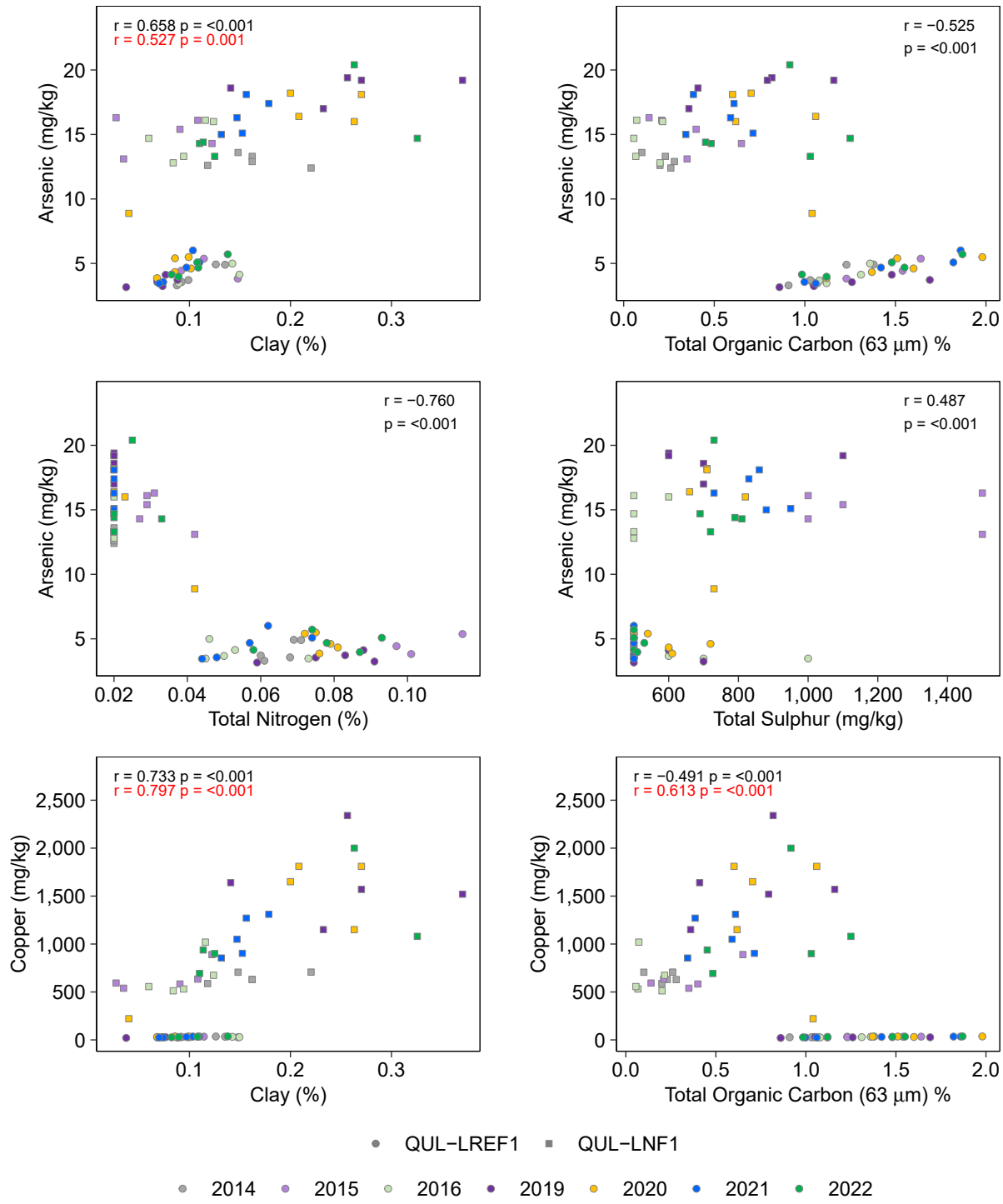

Figure E.1.4: Scatterplots of Significant Spearman's Correlation Relationships (p < 0.0125, Bonferroni Corrected) Between Analyte of Interest Concentrations (<63 µm Fraction) and Sediment Physical and Chemical Parameters for Quesnel Lake at QUL-LNF1 (Exposed) and QUL-LREF1 (Reference) Shallow Areas, 2014 to 2022

Notes: Results of correlations that evaluated data from shallow exposed and reference sampling areas of Quesnel Lake (QUL −LREF1, QUL−LNF1) are shown in black font on each plot. Results of correlations that only evaluated data from the shallow exposed area of Quesnel Lake (QUL−LNF1) are shown in red font. An absence of results in red font on a plot indicates the displayed variables were not significantly correlated when only exposed sediment results were considered.

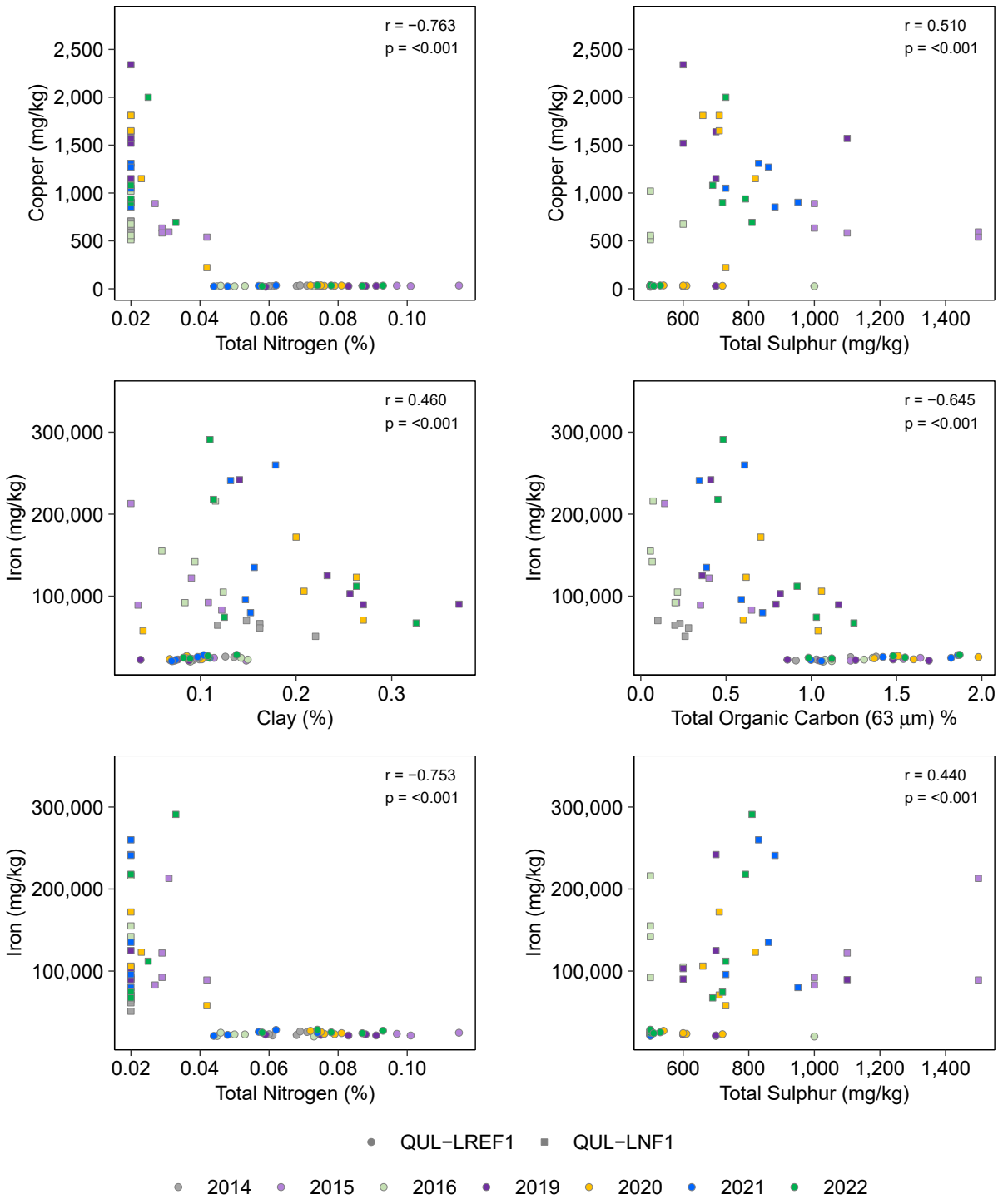

Figure E.1.4: Scatterplots of Significant Spearman's Correlation Relationships (p < 0.0125, Bonferroni Corrected) Between Analyte of Interest Concentrations (<63 µm Fraction) and Sediment Physical and Chemical Parameters for Quesnel Lake at QUL-LNF1 (Exposed) and QUL-LREF1 (Reference) Shallow Areas, 2014 to 2022

Notes: Results of correlations that evaluated data from shallow exposed and reference sampling areas of Quesnel Lake (QUL−LREF1, QUL−LNF1) are shown in black font on each plot. Results of correlations that only evaluated data from the shallow exposed area of Quesnel Lake (QUL−LNF1) are shown in red font. An absence of results in red font on a plot indicates the displayed variables were not significantly correlated when only exposed sediment results were considered.

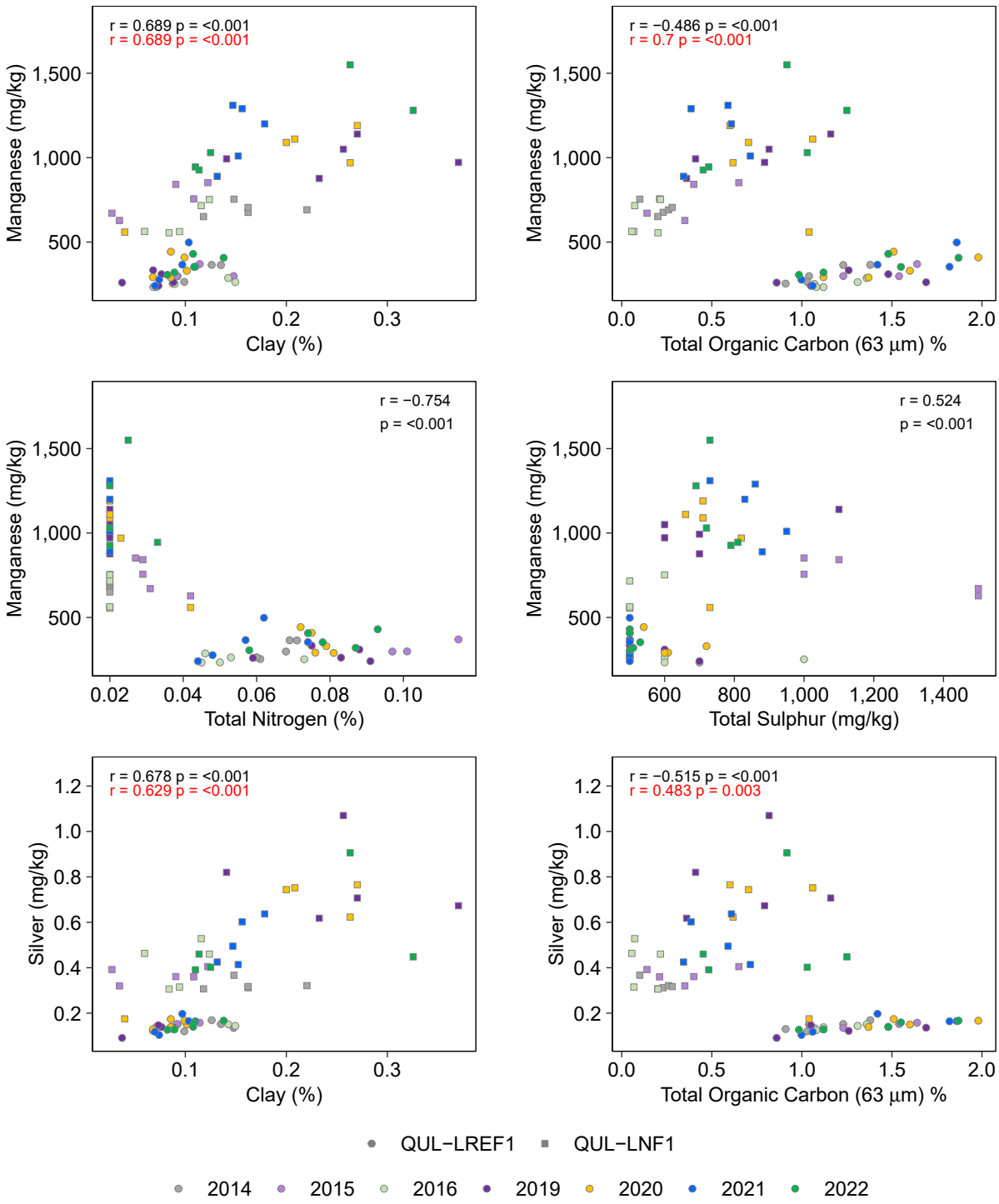

Figure E.1.4: Scatterplots of Significant Spearman's Correlation Relationships (p < 0.0125, Bonferroni Corrected) Between Analyte of Interest Concentrations (<63 µm Fraction) and Sediment Physical and Chemical Parameters for Quesnel Lake at QUL-LNF1 (Exposed) and QUL-LREF1 (Reference) Shallow Areas, 2014 to 2022

Notes: Results of correlations that evaluated data from shallow exposed and reference sampling areas of Quesnel Lake (QUL−LREF1, QUL−LNF1) are shown in black font on each plot. Results of correlations that only evaluated data from the shallow exposed area of Quesnel Lake (QUL−LNF1) are shown in red font. An absence of results in red font on a plot indicates the displayed variables were not significantly correlated when only exposed sediment results were considered.

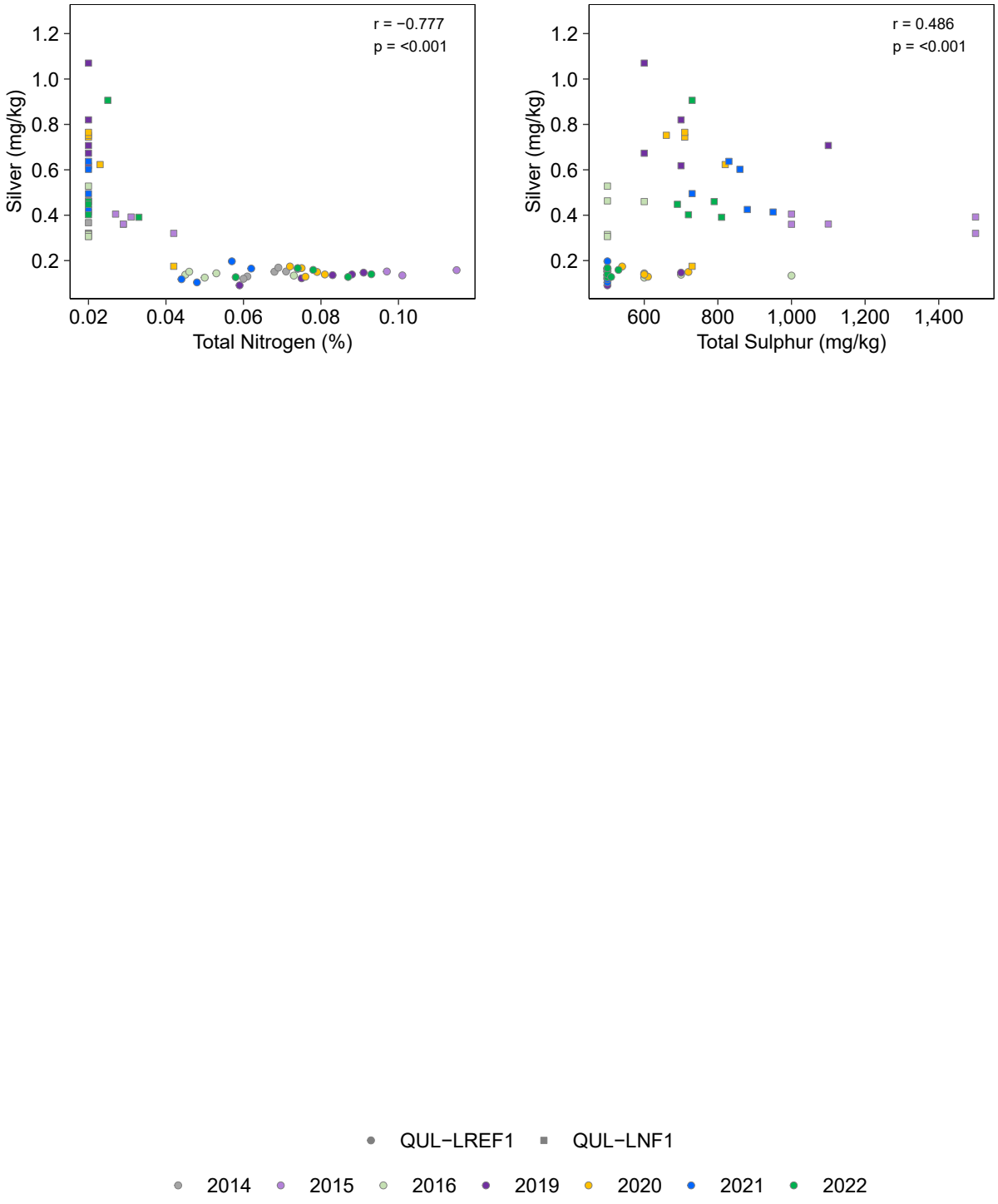

Figure E.1.4: Scatterplots of Significant Spearman's Correlation Relationships (p < 0.0125, Bonferroni Corrected) Between Analyte of Interest Concentrations (<63 µm Fraction) and Sediment Physical and Chemical Parameters for Quesnel Lake at QUL-LNF1 (Exposed) and QUL-LREF1 (Reference) Shallow Areas, 2014 to 2022

Notes: Results of correlations that evaluated data from shallow exposed and reference sampling areas of Quesnel Lake (QUL−LREF1, QUL−LNF1) are shown in black font on each plot. Results of correlations that only evaluated data from the shallow exposed area of Quesnel Lake (QUL−LNF1) are shown in red font. An absence of results in red font on a plot indicates the displayed variables were not significantly correlated when only exposed sediment results were considered.

Table E.1.1: Statistical Comparisons of Exposed - Reference Relative Differences of Sediment Analyte of Interest Concentrations (<63 µm Fraction) for Polley Lake (POL-S; Exposed) and Bootjack Lake (BOL-B2; Reference) Shallow Areas, 2019 to 2022

ANOVA Model						(Exposed - Reference) Relative Differences Among Years[a]		Relative MOD for Exposed - Reference Over Time (%)[b]
Parameter	Units	Transformation	Area	Year	Area x Year	2019	2022	2022
Total Organic Carbon	%	none	<0.001	0.424	0.324	A	A	ns
Arsenic	mg/kg	log10	<0.001	0.779	0.500	A	A	ns
Copper	mg/kg	log10	<0.001	0.188	0.441	A	A	ns
Iron	mg/kg	log10	<0.001	0.039	0.088	A	A	ns

P-value < 0.05

Indicates negative MOD

Indicates positive MOD

Notes: "-" indicates no data; "ns" indicates not significant; MOD = Magnitude of Difference; mg/kg = milligrams per kilogram.

[a] Years that share a letter are not significantly different among years.

[b] MOD calculated as $(Exp_{observed} - Exp_{predicted}) / (Exp_{predicted})x100\%$, where $Exp_{predicted} = Ref_{observed} + (Exp_{observed\ 2019} - Ref_{observed\ 2019})$. Exp = Exposed (POL-S); Ref = Reference (BOL-S).

Table E.1.2: Statistical Comparisons of Exposed - Reference Relative Differences of Sediment Analyte of Interest Concentrations (<63 µm Fraction) for Polley Lake (POL-S; Exposed) and Bootjack Lake (BOL-B2; Reference) Shallow Areas, 2019 to 2022

ANOVA Model						Area	Pairwise Differences Among Years for Each Area[a]		Do Concentrations Differ from 2019?	Do Concentrations Differ Between the Areas?
Parameter	Units	Transformation	Area	Year	Area x Year		2019	2022	Magnitude of Difference (MOD)[b]	Magnitude of Difference (MOD)[c]
Total Organic Carbon	%	none	<0.001	0.424	0.324	BOL-S	A	A	ns	-91
						POL-S				
Arsenic	mg/kg	log10	<0.001	0.779	0.500	BOL-S	A	A	ns	224
						POL-S				
Copper	mg/kg	log10	<0.001	0.188	0.441	BOL-S	A	A	ns	609
						POL-S				
Iron	mg/kg	log10	<0.001	0.039	0.088	BOL-S	A	A	ns	608
						POL-S				

P-value < 0.05
Indicates negative MOD
Indicates positive MOD

Notes: "-" indicates no data; "ns" indicates not significant; MOD = Magnitude of Difference; mg/kg = milligrams per kilogram.

[a] Years that do not share a letter are significantly different for that area.

[b] MOD is calculated as ([$year_{2022}$ - $year_{2019}$] / $year_{2019}$)*100.

[c] MOD calculated as ((POL-S - BOL-S) / BOL-S)*100.

Table E.1.3: Spearman's Correlation Relationships Between Analyte of Interest Concentrations (<63 µm Fraction) and Sediment Physical and Chemical Parameters for Polley Lake (POL-S; Exposed) and Bootjack Lake (BOL-B2; Reference) Shallow Areas, 2019 to 2022[a]

Analyte of Interest	Correlation Parameter	Data used in Correlation: POL-S and BOL-S				Data used in Correlation: POL-S			
		Clay (%)[b]	Total Organic Carbon (%)	Total Nitrogen (%)	Total Sulphur (mg/kg)	Clay (%)[b]	Total Organic Carbon (%)	Total Nitrogen (%)	Total Sulphur (mg/kg)
Arsenic (mg/kg)	Correlation Coefficient	0.158	-0.68	-0.661	-0.315	-0.097	-0.316	-0.188	0.141
	Sig. (2-tailed)	0.506	<0.001	0.001	0.176	0.789	0.374	0.602	0.698
Copper (mg/kg)	Correlation Coefficient	0.066	-0.708	-0.731	-0.425	-0.389	-0.559	-0.614	-0.495
	Sig. (2-tailed)	0.782	<0.001	<0.001	0.062	0.266	0.093	0.059	0.145
Iron (mg/kg)	Correlation Coefficient	-0.011	-0.736	-0.770	-0.481	-0.894	-0.529	-0.699	-0.563
	Sig. (2-tailed)	0.962	<0.001	<0.001	0.032	<0.001	0.116	0.024	0.09

Significant correlation; p-value < 0. 0125 (p<0.05, Bonferroni corrected for 4 independent variables).

Notes: n=20 for all correlations. Analyte of Interest was defined as an analyte at the exposed areas with a mean concentration that exceeded guidelines as well as reference/pre-breach 95th values. mg/kg = milligrams per kilogram. % = percent.

[a] Results below the Laboratory Reporting Limit (LRL) were used at the LRL for calculations.

[b] % clay represents the clay proportion of the < 63 µm (silt and clay) sediment fraction that was used for metals analysis. % clay was calculated as: [% clay] / [% silt and clay].

Table E.1.4: Statistical Comparisons of Exposed - Reference Relative Differences of Sediment Analyte of Interest Concentrations (<63 µm Fraction) for Quesnel Lake at QUL-PNF (Exposed) and QUL-PREF1 (Reference) Deep Areas, 2014 to 2022

ANOVA Model						(Exposed - Reference) Relative Differences Among Years[a]						Relative MOD for Exposed - Reference Over Time (%)[b]				
Parameter	Units	Transformation	Area	Year	Area x Year	2014	2015	2016	2018	2019	2021	2015	2016	2018	2019	2021
Total Organic Carbon	%	none	<0.001	<0.001	0.509	A	A	A	A	A	A	ns	ns	ns	ns	ns
Arsenic	mg/kg	log10	<0.001	<0.001	0.078	A	A	A	A	A	A	ns	ns	ns	ns	ns
Copper	mg/kg	log10	<0.001	<0.001	0.132	A	A	A	A	A	A	ns	ns	ns	ns	ns
Iron	mg/kg	log10	<0.001	0.203	0.796	A	A	A	A	A	A	ns	ns	ns	ns	ns
Manganese	mg/kg	log10	<0.001	<0.001	<0.001	B	B	A	A	A	A	ns	70	82	94	75

P-value < 0.05
Indicates negative MOD
Indicates positive MOD

Notes: "-" indicates comparison not-relevant; "ns" indicates not significant; MOD = Magnitude of Difference; mg/kg = milligrams per kilogram. QUL-PREF1 was not sampled in 2022, therefore displayed data include to 2021 only.

[a] Years that share a letter are not significantly different among years.

[b] MOD calculated as $(Exp_{observed} - Exp_{predicted})/(Exp_{predicted})x100\%$, where $Exp_{predicted} = Ref_{observed} + (Exp_{observed\ 2014} - Ref_{observed\ 2014})$. Exp = Exposed (QUL-PNF); Ref = Reference (QUL-PREF1)

Table E.1.5: **Statistical Comparisons of Spatial and Temporal Differences of Sediment Analyte of Interest Concentrations (<63 µm Fraction) for Quesnel Lake at QUL-PNF (Exposed) and QUL-PREF1 (Reference) Deep Areas, 2014 to 2022**

ANOVA Model						Area	Pairwise Differences Among Years for Each Area[a]								Do Concentrations Differ from 2014? MOD[b]							Do Concentrations Differ Between the Areas? QUL-PNF vs QUL-PREF1[c]							
Parameter	Units	Transformation	Area	Year	Area x Year		2014	2015	2016	2018	2019	2020	2021	2022	2015	2016	2018	2019	2020	2021	2022	2014	2015	2016	2018	2019	2020	2021	2022
Total Organic Carbon	%	none	<0.001	<0.001	0.509	QUL-PREF1	C	BC	ABC	A	ABC	AB[d]	A	AB[d]	ns	ns	46	ns	36[d]	44	48[d]	-77							
						QUL-PNF																							
Arsenic	mg/kg	log10	<0.001	<0.001	0.078	QUL-PREF1	B	B	A	B	B	B[d]	AB	B[d]	ns	22	ns	ns	ns[d]	ns	ns[d]	90							
						QUL-PNF																							
Copper	mg/kg	log10	<0.001	<0.001	0.132	QUL-PREF1	C	ABC	A	BC	AB	BC[d]	BC	ABC[d]	ns	51	ns	31	ns[d]	ns	ns[d]	1,735							
						QUL-PNF																							
Iron	mg/kg	log10	<0.001	0.203	0.796	QUL-PREF1	A								ns							30							
						QUL-PNF	A								ns														
Manganese	mg/kg	log10	<0.001	<0.001	<0.001	QUL-PREF1	A	A	A	A	A	-	A	-	ns	ns	ns	ns	-	ns	-	68	105	186	206	226	-	195	-
						QUL-PNF	C	BC	A	AB	A	A	A	AB	ns	71	62	70	69	75	63								

P-value < 0.05

Indicates negative MOD

Indicates positive MOD

Notes: "-" indicates no data; "ns" indicates not significant; MOD = Magnitude of Difference; mg/kg = milligrams per kilogram.

[a] Years that do not share a letter are significantly different for that area.

[b] MOD is calculated as $((year_{recent} - year_{2014})/year_{2014})*100$.

[c] MOD calculated as ((QUL-PNF - QUL-PREF1)/QUL-PREF1)*100.

[d] No data available for QUL-PREF1 in 2020 and 2022; statistical comparisons and MOD values calculated based on QUL-PNF data only.

Table E.1.6: Spearman's Correlation Relationships Between Analyte of Interest Concentrations (<63 µm Fraction) and Sediment Physical and Chemical Parameters for Quesnel Lake at QUL-PNF (Exposed) and QUL-PREF1 (Reference) Deep Areas, 2014 to 2022[a]

Analyte of Interest	Correlation Parameter	Data used in Correlation: QUL-PREF1, QUL-PNF				Data used in Correlation: QUL-PNF			
		Clay (%)[b]	Total Organic Carbon (%)	Total Nitrogen (%)	Total Sulphur (mg/kg)	Clay (%)[b]	Total Organic Carbon (%)	Total Nitrogen (%)	Total Sulphur (mg/kg)
Arsenic (mg/kg)	Correlation Coefficient	0.868	-0.684	-0.710	0.029	0.557	0.108	0.000	0.454
	Sig. (2-tailed)	<0.001	<0.001	<0.001	0.834	<0.001	0.506	1	0.012
Copper (mg/kg)	Correlation Coefficient	0.895	-0.696	-0.700	0.149	0.779	0.153	0.036	0.481
	Sig. (2-tailed)	<0.001	<0.001	<0.001	0.288	<0.001	0.344	0.827	0.007
Iron (mg/kg)	Correlation Coefficient	0.736	-0.548	-0.561	-0.083	0.132	0.338	0.254	-0.024
	Sig. (2-tailed)	<0.001	<0.001	<0.001	0.554	0.415	0.033	0.113	0.898
Manganese (mg/kg)	Correlation Coefficient	0.905	-0.633	-0.649	-0.290	0.720	0.527	0.465	-0.368
	Sig. (2-tailed)	<0.001	<0.001	<0.001	0.035	<0.001	<0.001	0.002	0.046

Significant correlation; p-value < 0.0125 (p<0.05, Bonferroni corrected for 4 independent variables).

Notes: n=70 for all correlations. Analyte of Interest was defined as an analyte at the exposed areas with a mean concentration that exceeded guidelines as well as reference 95th percentile values. mg/kg = milligrams per kilogram. % = percent.

[a] Results below the Laboratory Reporting Limit (LRL) were used at the LRL for calculations.

[b] % clay represents the clay proportion of the < 63 µm (silt and clay) sediment fraction that was used for metals analysis. % clay was calculated as: [% clay] / [% silt and clay].

Table E.1.7: Principal Components (PC) and Percentage of Variance Explained for the Principal Component Analysis (PCA) of Sediment Metal Concentrations (<63 µm Fraction) for Quesnel Lake at QUL-PNF (Exposed) and QUL-PREF1 (Reference) Deep Areas, 2014 to 2022

Year	Replicate Number	Reference		Exposed	
		QUL-PREF1		QUL-PNF	
		PC1 (75.2 %)	PC2 (15.6 %)	PC1 (75.2 %)	PC2 (15.6 %)
2014	1	5.02	-0.488	-2.37	4.02
	2	5.93	0.393	-3.96	1.74
	3	5.04	-0.352	-2.17	4.48
	4	5.19	-0.0945	-1.08	6.44
	5	5.92	0.935	-1.44	5.55
2015	1	3.86	-2.23	-5.02	-1.09
	2	nd	nd	-5.61	-1.67
	3	4.20	-1.10	-3.82	0.597
	4	nd	nd	-0.208	5.93
	5	4.89	-0.262	-1.47	4.95
2016	1	3.89	-1.71	-5.55	-1.82
	2	4.60	-1.15	-5.70	-1.64
	3	3.90	-1.95	-5.40	-0.916
	4	4.50	-0.960	-5.83	-2.17
	5	5.24	-0.232	-5.24	-1.08
2018	1	5.34	-0.632	-3.44	-0.491
	2	5.38	-0.300	-4.32	-0.363
	3	5.57	0.295	-3.59	1.54
	4	5.70	0.0492	-1.11	-0.927
	5	5.85	0.360	-3.91	-1.18
2019	1	4.90	-1.09	-5.63	-1.64
	2	4.84	-0.977	-5.45	-2.19
	3	5.16	-0.456	-2.18	2.55
	4	5.11	-0.501	-5.65	-2.63
	5	5.30	-0.123	-4.63	-1.27
2020	1	nd	nd	-1.56	2.98
	2	nd	nd	-3.19	-0.999
	3	nd	nd	-2.23	-0.301
	4	nd	nd	-2.95	-0.941
	5	nd	nd	-3.25	-1.61
2021	1	4.40	-0.858	-4.04	-1.31
	2	4.93	0.249	-3.55	-0.377
	3	4.26	-0.933	-2.88	1.70
	4	4.98	0.0689	-2.09	1.56
	5	4.28	-0.362	-2.52	-0.326
2022	1	nd	nd	-3.55	-0.484
	2	nd	nd	-2.69	-0.519
	3	nd	nd	-2.41	0.572
	4	nd	nd	-2.78	-1.19
	5	nd	nd	-3.69	-1.05

Note: "nd" indicates no data.

Table E.1.8: Pearson Correlations of Principal Components (PC) of Sediment Metal Concentrations (<63 µm Fraction) for Quesnel Lake at QUL-PNF (Exposed) and QUL-PREF1 (Reference) Deep Areas, 2014 to 2022

Variable	PC1 (75.2 %)		PC2 (15.6 %)	
	P-value	r_s	P-value	r_s
Aluminum	<0.001	-0.953	0.034	-0.257
Antimony	<0.001	-0.905	0.114	-0.193
Arsenic	<0.001	-0.980	0.640	0.0577
Barium	<0.001	-0.968	0.187	-0.162
Bismuth	0.093	-0.205	<0.001	-0.882
Cadmium	<0.001	0.759	<0.001	-0.620
Calcium	<0.001	-0.956	0.028	0.266
Chromium	<0.001	0.797	<0.001	-0.571
Cobalt	<0.001	-0.959	0.047	-0.242
Copper	<0.001	-0.987	0.351	0.115
Iron	<0.001	-0.732	0.978	0.00347
Lead	<0.001	-0.842	<0.001	-0.466
Magnesium	<0.001	-0.970	0.112	-0.195
Manganese	<0.001	-0.958	0.430	-0.0974
Molybdenum	<0.001	-0.987	0.258	0.139
Nickel	<0.001	0.603	<0.001	-0.776
Selenium	<0.001	-0.689	<0.001	-0.444
Silver	<0.001	-0.985	0.457	-0.0916
Sodium	<0.001	-0.984	0.752	0.0390
Thallium	<0.001	0.859	<0.001	-0.492
Tin	<0.001	-0.982	0.227	0.149
Titanium	<0.001	-0.984	0.790	0.0328
Uranium	<0.001	-0.523	<0.001	-0.541
Vanadium	<0.001	-0.910	0.061	0.228
Zinc	<0.001	-0.698	<0.001	-0.663

$r_s \geq 0.6$ or ≤ -0.6

significant correlation (p-value < 0.05).

Notes: PCA conducted on correlation matrix with log10 −transformed concentrations. Vectors represent the PC loadings for each parameter (scaled). Parameters that had more than 25% censored data were excluded from the analyses. Variables are in units of mg/kg dry weight.

Table E.1.9: Statistical Comparisons of Exposed - Reference Relative Differences of Sediment Analyte of Interest Concentrations (<63 µm Fraction) for Quesnel Lake at QUL-LNF1 (Exposed) and QUL-LREF1 (Reference) Shallow Areas, 2014 to 2022

ANOVA Model						(Exposed - Reference) Relative Differences Among Years[a]							Relative MOD for Exposed - Reference Over Time (%)[b]					
Parameter	Unit	Transformation	Area	Year	Area x Year	2014	2015	2016	2019	2020	2021	2022	2015	2016	2019	2020	2021	2022
Total Organic Carbon	%	none	<0.001	<0.001	0.139	A	A	A	A	A	A	A	ns	ns	ns	ns	ns	ns
Arsenic	mg/kg	log10	<0.001	0.162	0.010	B	B	B	A	B	B	B	ns	ns	64	ns	ns	ns
Copper	mg/kg	log10	<0.001	0.008	0.004	B	B	B	A	B	AB	B	ns	ns	181	ns	ns	ns
Iron	mg/kg	log10	<0.001	0.074	0.071	A	A	A	A	A	A	A	ns	ns	ns	ns	ns	ns
Manganese	mg/kg	log10	<0.001	<0.001	0.031	C	C	BC	A	ABC	AB	ABC	ns	ns	58	ns	47	ns
Silver	mg/kg	log10	<0.001	0.023	0.002	C	BC	BC	A	B	BC	BC	ns	ns	169	59	ns	ns

P-value < 0.05
Indicates negative MOD
Indicates positive MOD

Notes: "-" indicates comparison not-relevant; "ns" indicates not significant; MOD = Magnitude of Difference; mg/kg = milligrams per kilogram.

[a] Years that share a letter are not significantly different among years.

[b] MOD calculated as $(Exp_{observed} - Exp_{predicted})/(Exp_{predicted})x100\%$, where $Exp_{predicted} = Ref_{observed} + (Exp_{observed\ 2014} - Ref_{observed\ 2014})$. Exp = Exposed (QUL-LNF1); Ref = Reference (QUL-LREF1)

Table E.1.10: Statistical Comparisons of Spatial and Temporal Differences of Sediment Analyte of Interest Concentrations (<63 µm Fraction) for Quesnel Lake at QUL-LNF1 (Exposed) and QUL-LREF1 (Reference) Shallow Areas, 2014 to 2022

ANOVA Model						Area	Pairwise Differences Among Years for Each Area[a]							Do Concentrations Differ from 2014? MOD[b]						Do Concentrations Differ Between the Areas? QUL-LNF1 vs QUL-LREF1[c]						
Parameter	Unit	Transformation	Area	Year	Area x Year		2014	2015	2016	2019	2020	2021	2022	2015	2016	2019	2020	2021	2022	2014	2015	2016	2019	2020	2021	2022
Total Organic Carbon	%	none	<0.001	<0.001	0.139	QUL-LREF1	B	AB	B	AB	A	AB	A	ns	ns	ns	74	ns	67	-62						
						QUL-LNF1																				
Arsenic	mg/kg	log10	<0.001	0.162	0.010	QUL-LREF1	A	A	A	A	A	A	A	ns	ns	ns	ns	ns	ns	222	233	272	427	220	220	226
						QUL-LNF1	B	AB	AB	A	AB	AB	AB	ns	ns	44	ns	ns	ns							
Copper	mg/kg	log10	<0.001	0.008	0.004	QUL-LREF1	A	A	A	A	A	A	A	ns	ns	ns	ns	ns	ns	2,062	1,926	2,192	5,976	3,105	3,105	3,188
						QUL-LNF1	B	B	B	A	AB	AB	AB	ns	ns	146	ns	ns	ns							
Iron	mg/kg	log10	<0.001	0.074	0.071	QUL-LREF1	ns							ns						369						
						QUL-LNF1	ns							ns												
Manganese	mg/kg	log10	<0.001	<0.001	0.031	QUL-LREF1	AB	AB	B	AB	AB	AB	A	ns	ns	ns	ns	ns	ns	127	132	147	259	174	174	212
						QUL-LNF1	CD	BCD	D	AB	ABC	A	A	ns	ns	44	ns	62	62							
Silver	mg/kg	log10	<0.001	0.023	0.002	QUL-LREF1	A	A	A	A	A	A	A	ns	ns	ns	ns	ns	ns	126	148	193	509	259	259	245
						QUL-LNF1	C	BC	BC	A	AB	ABC	ABC	ns	ns	135	67	ns	ns							

P-value < 0.05

Indicates negative MOD

Indicates positive MOD

Notes: "-" indicates comparison not-relevant, "ns" indicates not significant, MOD = Magnitude of Difference, mg/kg = milligrams per kilogram.

[a] Years that do not share a letter are significantly different for that area.

[b] MOD is calculated as $((year_{recent} - year_{2014}) / year_{2014})*100$.

[c] MOD calculated as ((QUL-LNF1 - QUL-LREF1)/QUL-LREF1)*100.

Table E.1.11: Spearman's Correlation Relationships Between Analyte of Interest Concentrations (<63 µm Fraction) and Sediment Physical and Chemical Parameters for Quesnel Lake at QUL-LNF1 (Exposed) and QUL-LREF1 (Reference) Shallow Areas, 2014 to 2022[a]

Analyte of Interest	Correlation Parameter	Data used in Correlation: QUL-LREF1, QUL-LNF1				Data used in Correlation: QUL-LNF1			
		Clay (%)[b]	Total Organic Carbon (%)	Total Nitrogen (%)	Total Sulphur (mg/kg)	Clay (%)[b]	Total Organic Carbon (%)	Total Nitrogen (%)	Total Sulphur (mg/kg)
Arsenic (mg/kg)	Correlation Coefficient	0.658	-0.525	-0.760	0.487	0.527	0.377	-0.149	-0.039
	Sig. (2-tailed)	<0.001	<0.001	<0.001	<0.001	0.001	0.025	0.393	0.837
Copper (mg/kg)	Correlation Coefficient	0.733	-0.491	-0.763	0.510	0.797	0.613	-0.347	-0.132
	Sig. (2-tailed)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.041	0.487
Iron (mg/kg)	Correlation Coefficient	0.460	-0.645	-0.753	0.440	-0.200	-0.149	0.040	-0.043
	Sig. (2-tailed)	<0.001	<0.001	<0.001	<0.001	0.248	0.392	0.82	0.821
Manganese (mg/kg)	Correlation Coefficient	0.689	-0.486	-0.754	0.524	0.689	0.700	-0.232	0.105
	Sig. (2-tailed)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.18	0.581
Silver (mg/kg)	Correlation Coefficient	0.678	-0.515	-0.777	0.486	0.629	0.483	-0.289	-0.246
	Sig. (2-tailed)	<0.001	<0.001	<0.001	<0.001	<0.001	0.003	0.092	0.189

Significant correlation; p-value < 0.0125 (p<0.05, Bonferroni corrected for 4 independent variables).

Notes: n=68 for all correlations. Analyte of Interest was defined as an analyte at the exposed areas with a mean concentration that exceeded guidelines as well as reference 95th percentile values. mg/kg = milligrams per kilogram. % = percent.

[a] Results below the Laboratory Reporting Limit (LRL) were used at the LRL for calculations.

[b] % clay represents the clay proportion of the < 63 µm (silt and clay) sediment fraction that was used for metals analysis. % clay was calculated as: [% clay] / [% silt and clay].

APPENDIX E.2
PLANKTON COMMUNITY
& PRODUCTIVITY

APPENDIX E2 PLANKTON DATA COLLAPSING METHODS

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E2 PLANKTON DATA COLLAPSING METHODS

E2.1 Zooplankton

Zooplankton community densities were calculated by the laboratory, Biologica Environmental Services (Biologica; Appendix G). Biologica used sampling information (haul depth, net diameter; provided by Minnow) and zooplankton abundances in each sample to calculate densities for taxa within each sample using the following formula:

$$Density(\frac{\#}{L}) = \frac{Abundance}{Haul\ Depth\ (m) \times \left(0.25\pi \times \left(Net\ mouth\ diameter\ (m)\right)^2\right) * 1000}$$

Zooplankton taxa identified in samples from the vicinity of the Mount Polley Mine typically are part of four major taxonomic groups: Cladocera, Rotifera, Calanoida, and Cyclopoida. Cladocera and Rotifera are easier to identify than Calanoida and Cyclopoida and have better developed taxonomic classifications. Therefore, decisions regarding taxonomic resolution of Cladocera and Rotifera taxa were made using a decision key, as described in Appendix E.4 (i.e., Resolving mixed-levels of taxonomic resolution for benthic invertebrates). Calanoida and Cyclopoida are less consistently identified to lower (i.e., higher resolution) taxonomic levels than Cladocera and Rotifera, making them unsuitable for the decision key described above for resolving inconsistent taxonomic resolution. Thus, inconsistent taxonomic resolution with within the Calanoida and Cyclopoida orders was resolved by pooling results within their respective major taxonomic group level (i.e., higher taxonomic resolution) for analysis, with the Copepod Nauplii stage remaining as a separate taxon group.

E2.2 Phytoplankton

Phytoplankton taxa are commonly identified to genus level but are occasionally identified to species level / species complex level (i.e., higher resolution) or phylum level (i.e., lower resolution). Due to the high proportion of ambiguously resolved taxa within phytoplankton data, phytoplankton taxonomy is not suited for the decision key described in Appendix E.4.

As such phytoplankton data were processed prior to analysis as follows. Phytoplankton taxa identified to species were rolled up to genus, and taxa identified to genus remained at genus. Two morphological groups, centric and pennate Diatoms, were considered as genera for the purpose of resolving taxonomic resolution. For each sample, taxa at a higher taxonomic level (e.g., phylum) were proportionally assigned to a lower taxonomic level (i.e., genera) if taxa at a lower taxonomic level were present in that sample. In cases where taxa at a lower taxonomic level were not observed in a sample, the taxon was assigned to the most common lower taxonomic level present in samples from that monitoring station (e.g., QUL-ZOO-1) in the present sampling year. If a lower taxonomic level was not observed at that station, the original taxonomic level was retained.

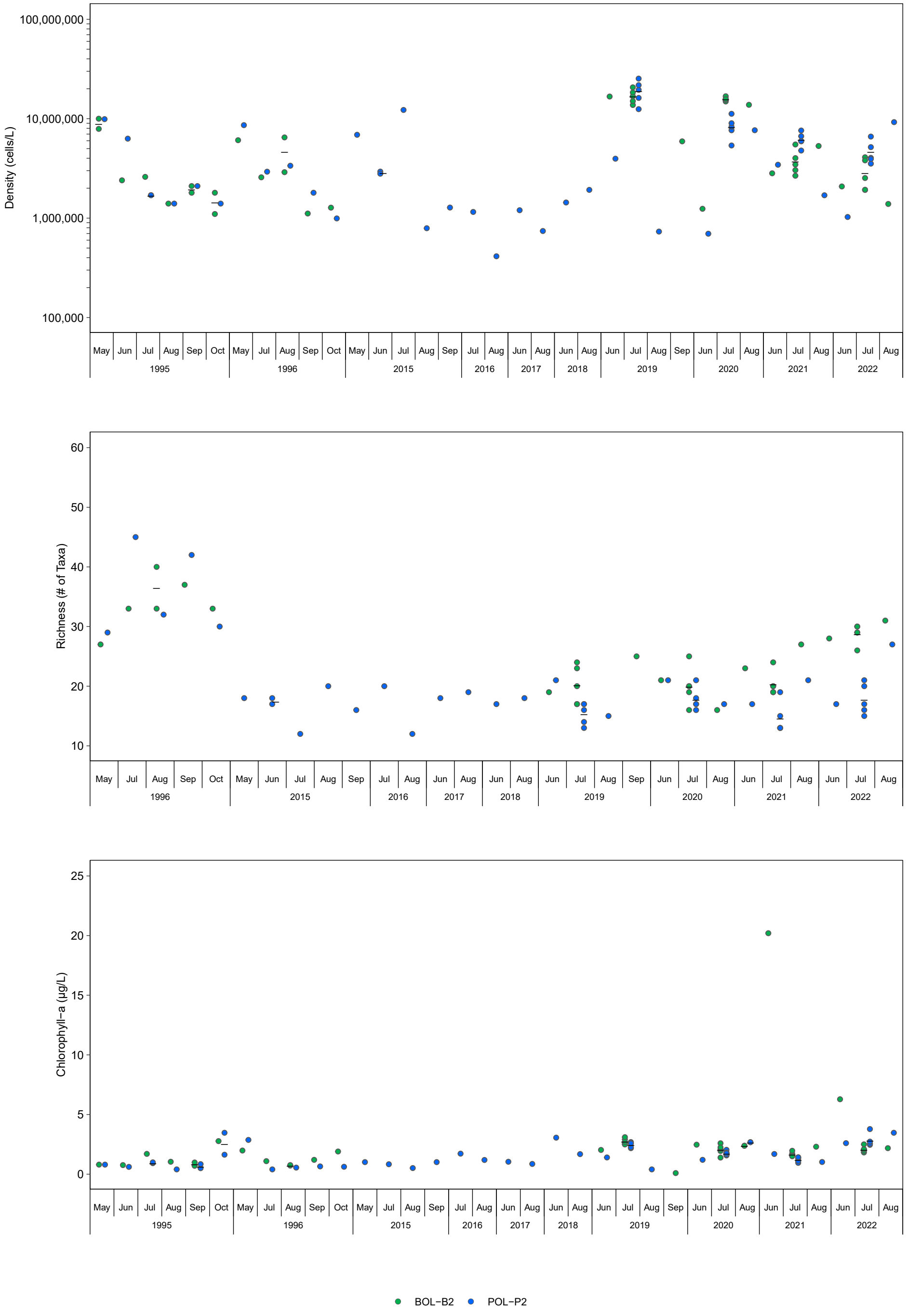

Figure E.2.1: Phytoplankton Community Endpoints for Polley Lake (POL–P2; Exposed) and Bootjack Lake (BOL–B2; Reference) Areas, 1995 to 2022

Notes: Black bars represent mean values.

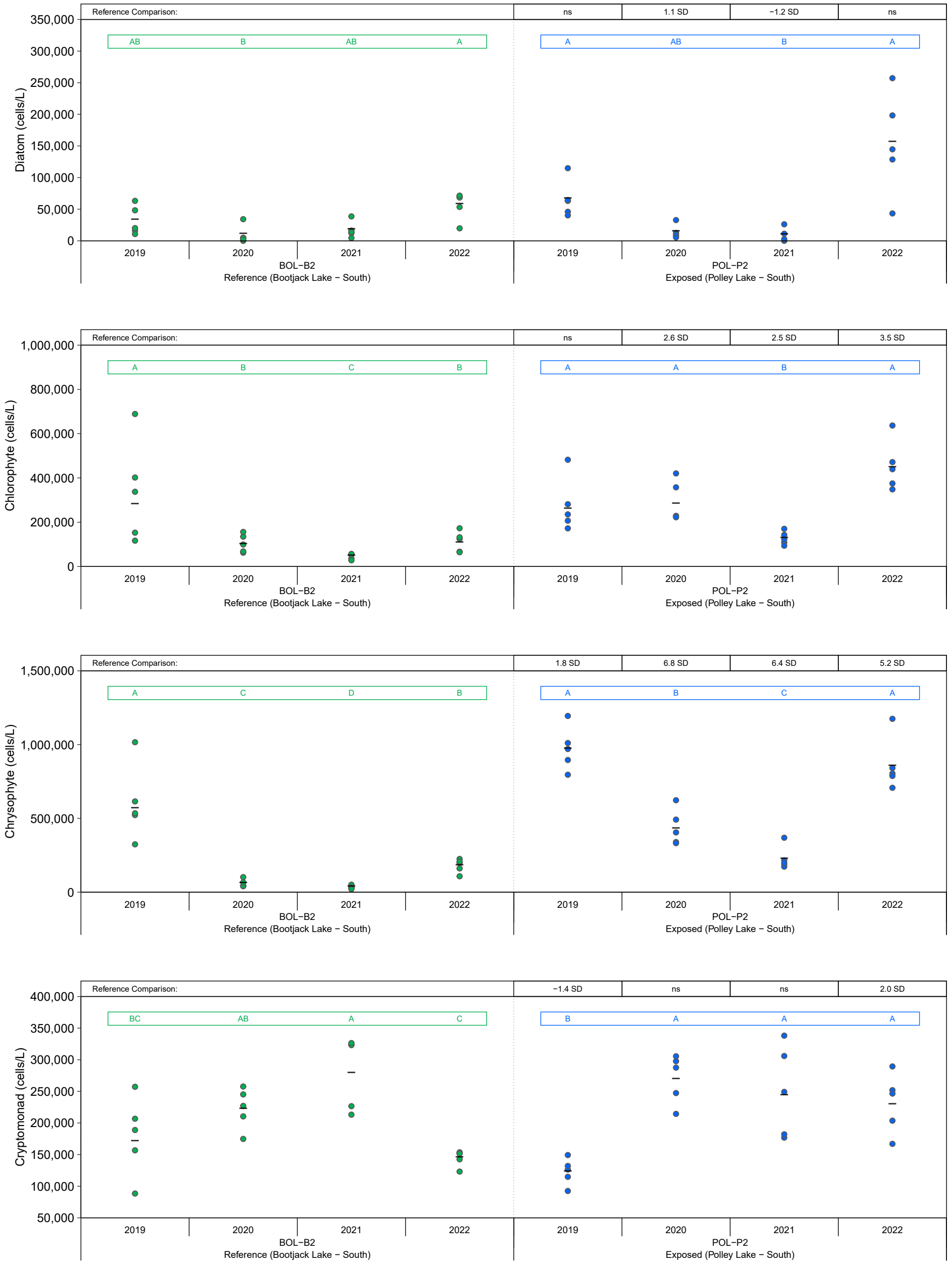

Figure E.2.2: Phytoplankton Community Endpoints for Polley Lake (POL−P2; Exposed) and Bootjack Lake (BOL−B2; Reference) Areas in July, 2019 to 2022

Notes: Black bars represent measures of central tendency (mean, geometric mean, or median depending on if analysis was conducted on untransformed, log10−transformed or rank−transformed data). Coloured letters represent significant (p−value <0.1) post−hoc comparisons within areas over time; years that share a letter of the same colour (e.g., A, B) within a box of the same colour do not differ significantly within an area. A number above the plot indicates significant exposed vs. reference post−hoc comparisons within a given year. The magnitude of difference (MOD) for these significant post−hoc comparisons are expressed in units of standard deviation (SD) or median absolute deviations (MAD; if the data were rank−transformed prior to analysis) relative to reference. 'nc' indicates no comparisons were possible; 'ns' indicates a non−significant contrast; 'nm' indicates that the MOD could not be calculated because MAD = 0. For plots of phytoplankton results prior to 2019, see Minnow 2019a, 2020a, 2021a. For unreplicated phytoplankton results collected in June and August 2022, see Appendix Table C.3.1.

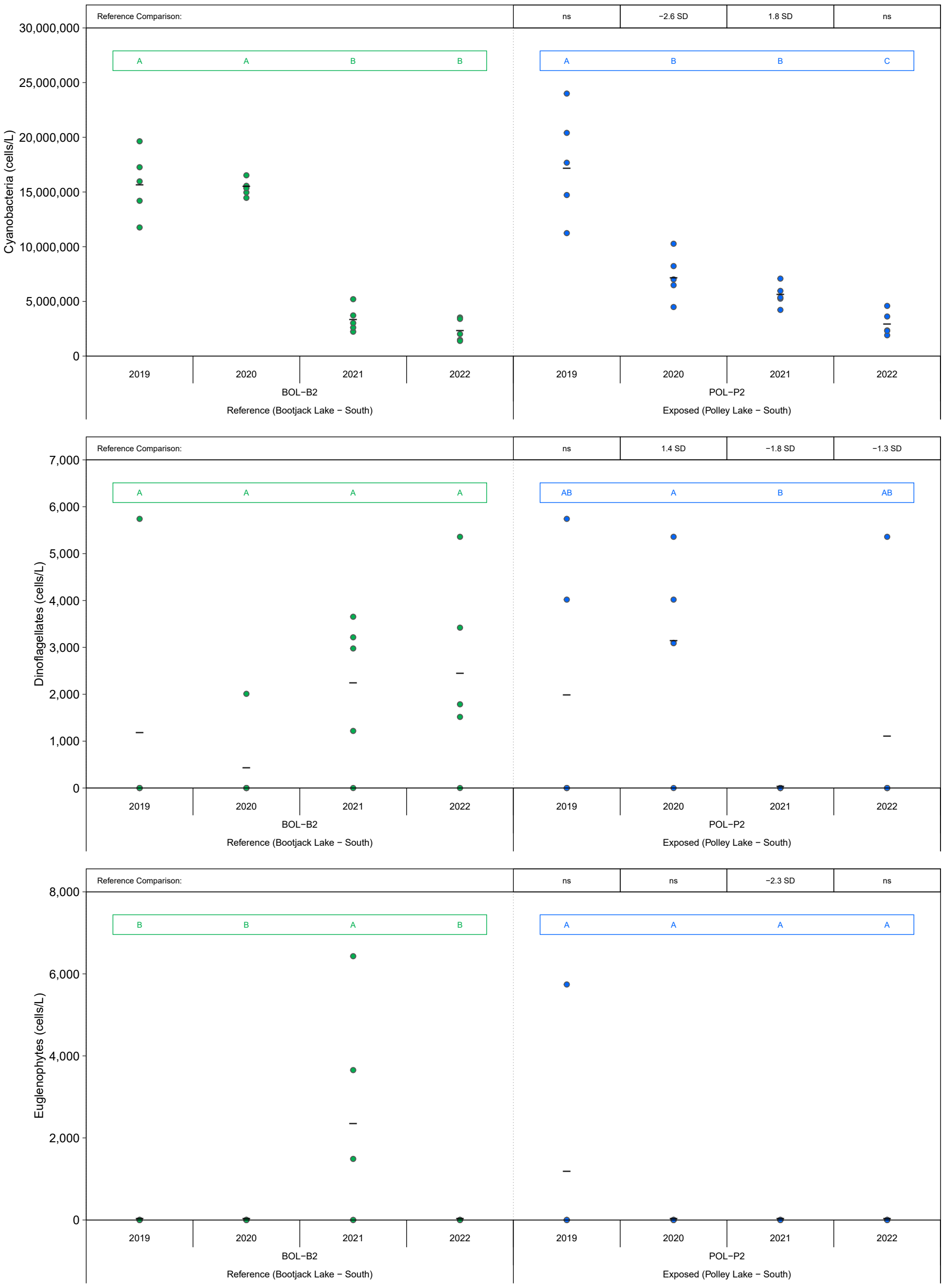

Figure E.2.2: Phytoplankton Community Endpoints for Polley Lake (POL−P2; Exposed) and Bootjack Lake (BOL−B2; Reference) Areas in July, 2019 to 2022

Notes: Black bars represent measures of central tendency (mean, geometric mean, or median depending on if analysis was conducted on untransformed, log10−transformed or rank−transformed data). Coloured letters represent significant (p−value <0.1) post−hoc comparisons within areas over time; years that share a letter of the same colour (e.g., A, B) within a box of the same colour do not differ significantly within an area. A number above the plot indicates significant exposed vs. reference post−hoc comparisons within a given year. The magnitude of difference (MOD) for these significant post−hoc comparisons are expressed in units of standard deviation (SD) or median absolute deviations (MAD; if the data were rank−transformed prior to analysis) relative to reference. 'nc' indicates no comparisons were possible; 'ns' indicates a non−significant contrast; 'nm' indicates that the MOD could not be calculated because MAD = 0. For plots of phytoplankton results prior to 2019, see Minnow 2019a, 2020a, 2021a. For unreplicated phytoplankton results collected in June and August 2022, see Appendix Table C.3.1.

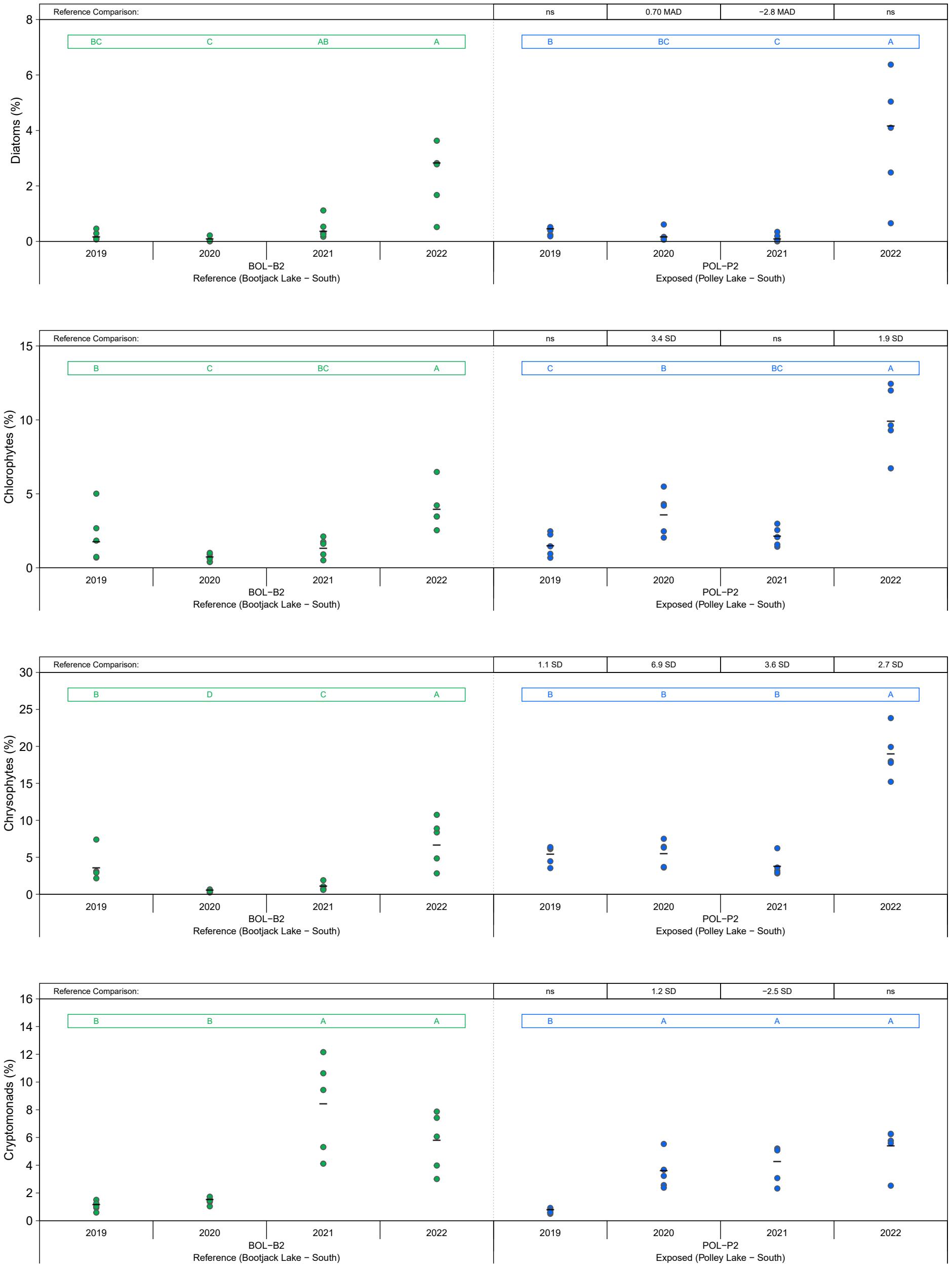

Figure E.2.2: Phytoplankton Community Endpoints for Polley Lake (POL−P2; Exposed) and Bootjack Lake (BOL−B2; Reference) Areas in July, 2019 to 2022

Notes: Black bars represent measures of central tendency (mean, geometric mean, or median depending on if analysis was conducted on untransformed, log10−transformed or rank−transformed data). Coloured letters represent significant (p−value <0.1) post−hoc comparisons within areas over time; years that share a letter of the same colour (e.g., A, B) within a box of the same colour do not differ significantly within an area. A number above the plot indicates significant exposed vs. reference post−hoc comparisons within a given year. The magnitude of difference (MOD) for these significant post−hoc comparisons are expressed in units of standard deviation (SD) or median absolute deviations (MAD; if the data were rank−transformed prior to analysis) relative to reference. 'nc' indicates no comparisons were possible; 'ns' indicates a non−significant contrast; 'nm' indicates that the MOD could not be calculated because MAD = 0. For plots of phytoplankton results prior to 2019, see Minnow 2019a, 2020a, 2021a. For unreplicated phytoplankton results collected in June and August 2022, see Appendix Table C.3.1.

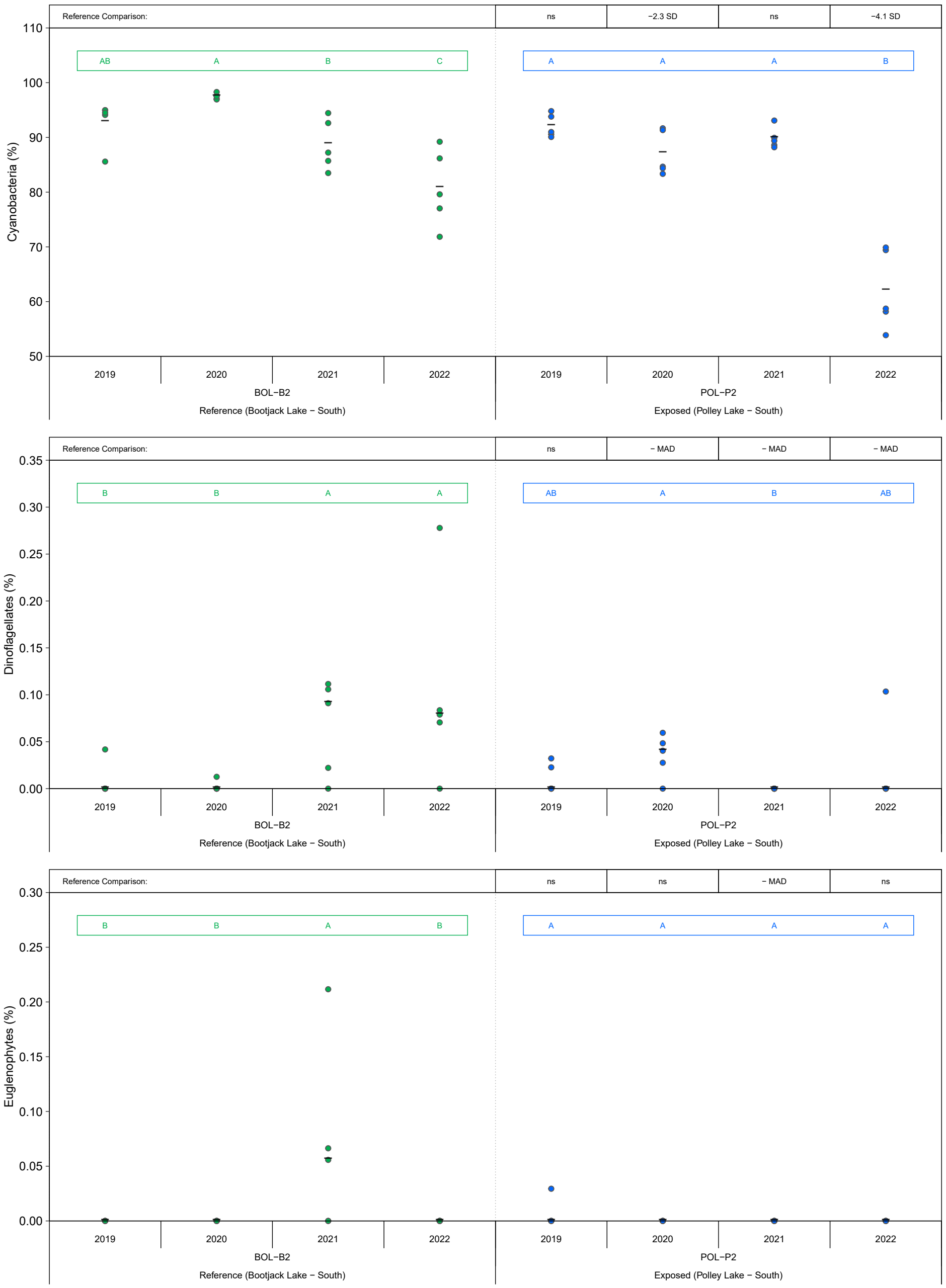

Figure E.2.2: Phytoplankton Community Endpoints for Polley Lake (POL−P2; Exposed) and Bootjack Lake (BOL−B2; Reference) Areas in July, 2019 to 2022

Notes: Black bars represent measures of central tendency (mean, geometric mean, or median depending on if analysis was conducted on untransformed, log10−transformed or rank−transformed data). Coloured letters represent significant (p−value <0.1) post−hoc comparisons within areas over time; years that share a letter of the same colour (e.g., A, B) within a box of the same colour do not differ significantly within an area. A number above the plot indicates significant exposed vs. reference post−hoc comparisons within a given year. The magnitude of difference (MOD) for these significant post−hoc comparisons are expressed in units of standard deviation (SD) or median absolute deviations (MAD; if the data were rank−transformed prior to analysis) relative to reference. 'nc' indicates no comparisons were possible; 'ns' indicates a non−significant contrast; 'nm' indicates that the MOD could not be calculated because MAD = 0. For plots of phytoplankton results prior to 2019, see Minnow 2019a, 2020a, 2021a. For unreplicated phytoplankton results collected in June and August 2022, see Appendix Table C.3.1.

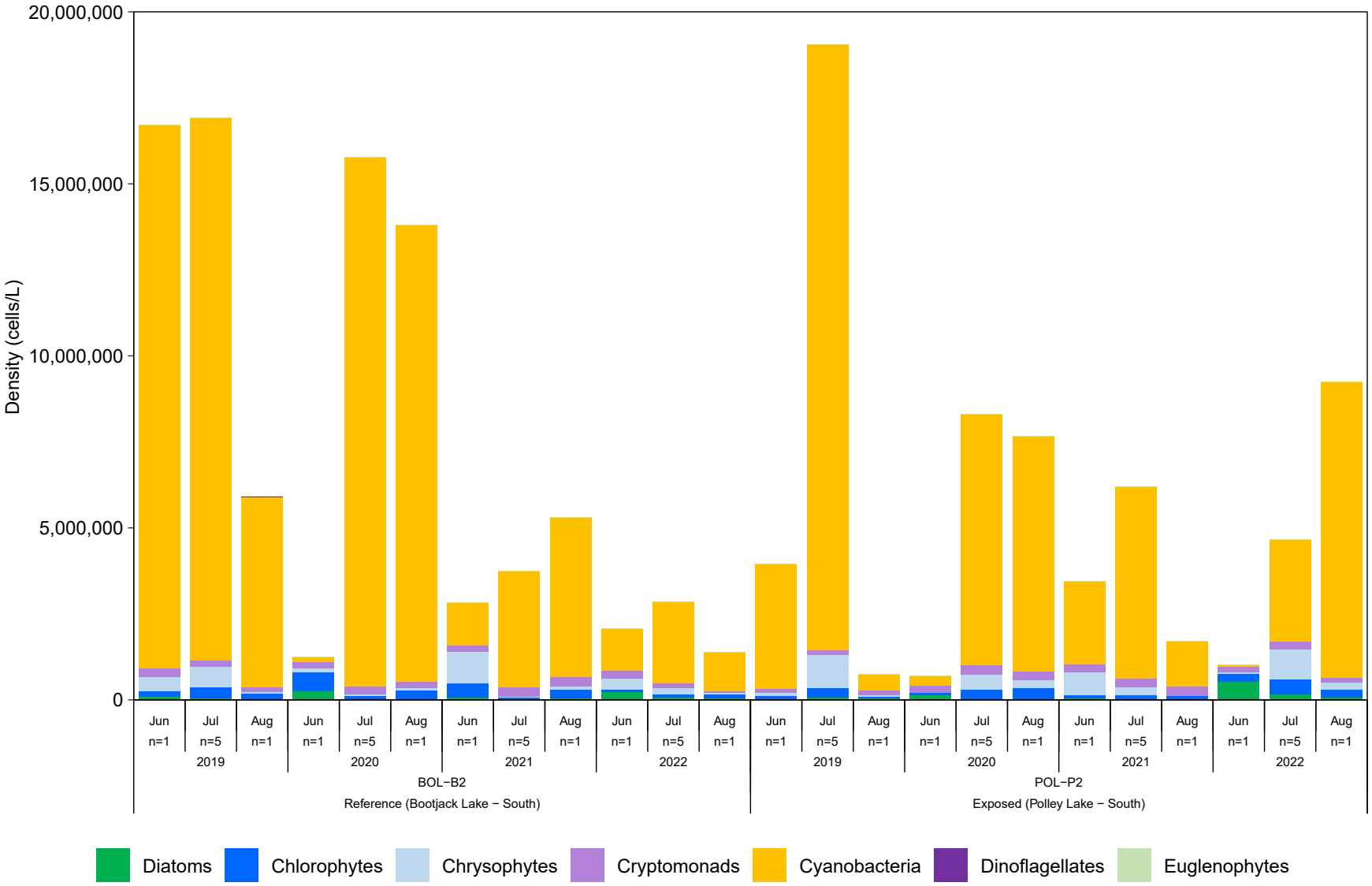

Figure E.2.3: Mean Densities of Major Phytoplankton Community Taxonomic Groups for Polley Lake (POL−P2; Exposed) and Bootjack Lake (BOL−B2; Reference) Areas, 2019 to 2022

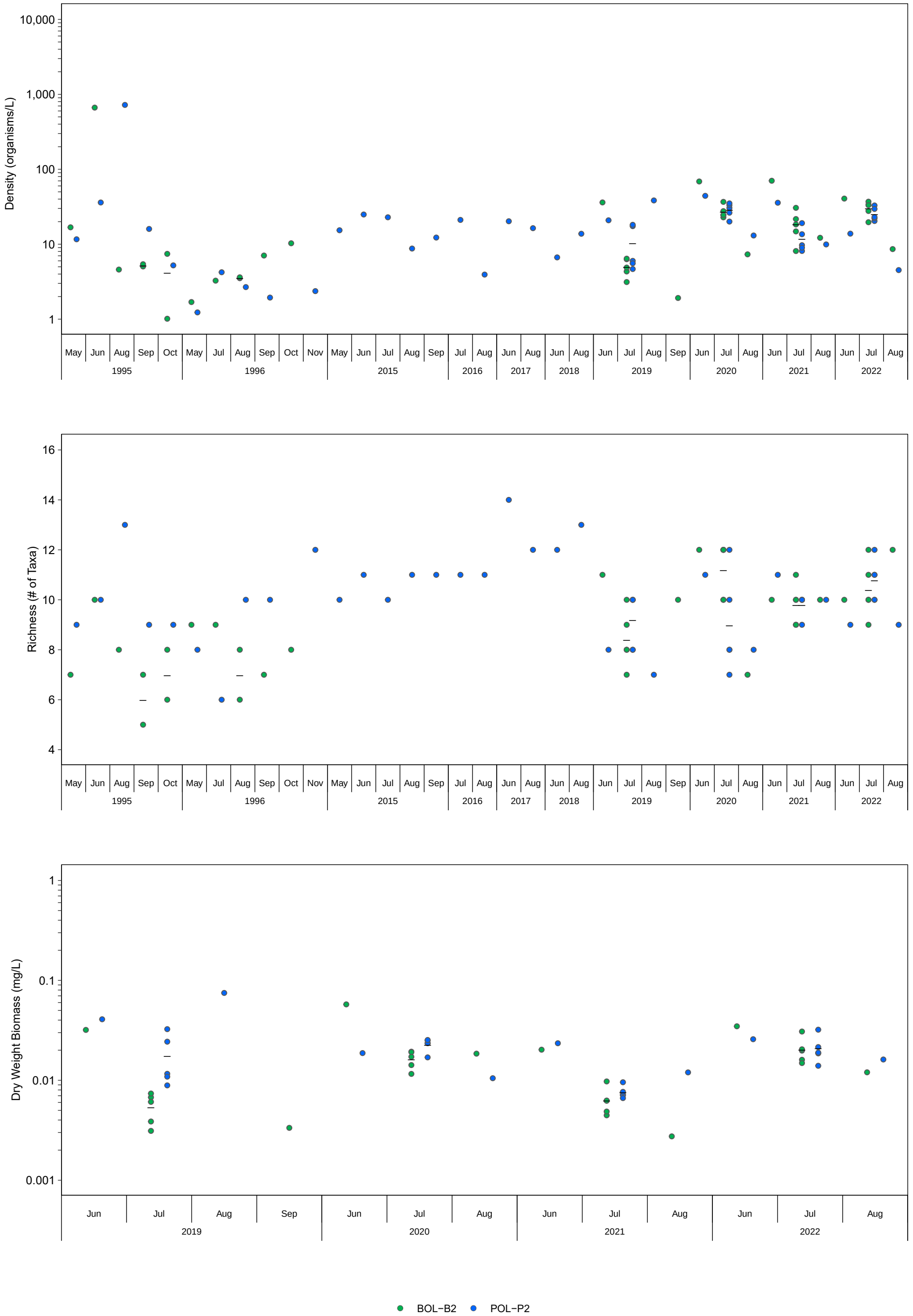

Figure E.2.4: Zooplankton Community Endpoints for Polley Lake (POL−P2; Exposed) and Bootjack Lake (BOL−B2; Reference) Areas, 1995 to 2022

Notes: Black bars represent mean values. Results displayed for POL-P2 (August 2019) in the current figure differ from those presented in previous reports (Minnow 2020a, 2021a, 2022a) for the same sampling area and date. This discrepancy is due to an incorrect calculation for these results in the prior reporting years.

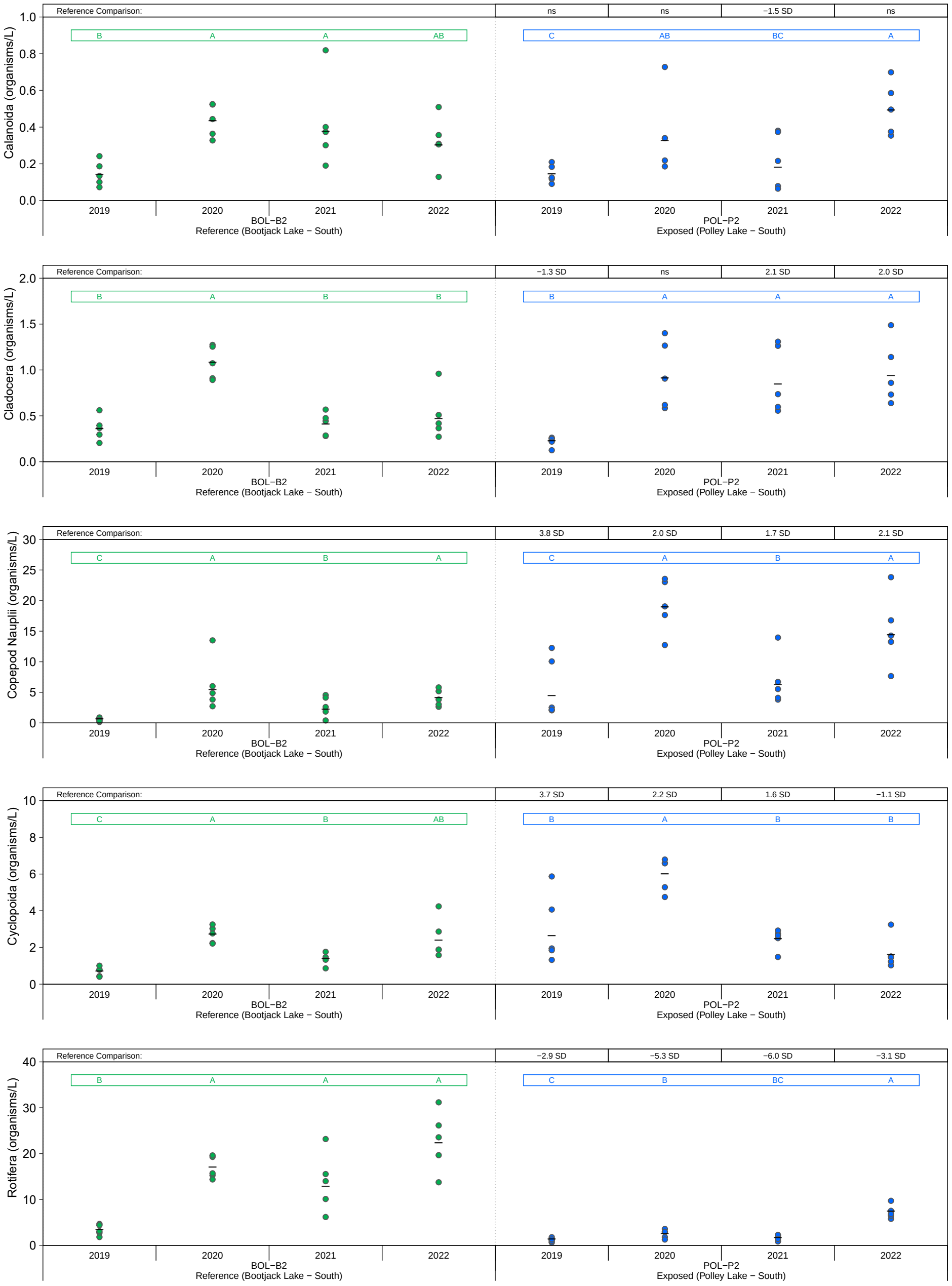

Figure E.2.5: Zooplankton Community Endpoints for Polley Lake (POL−P2; Exposed) and Bootjack Lake (BOL−B2; Reference Areas in July, 2019 to 2022

Notes: Black bars represent measures of central tendency (mean, geometric mean, or median depending on if analysis was conducted on untransformed, log10−transformed or rank−transformed data). Coloured letters represent significant (p−value <0.1) post−hoc comparisons within areas over time; years that share a letter of the same colour (e.g., A, B) within a box of the same colour do not differ significantly within an area. A number above the plot indicates significant exposed vs. reference post−hoc comparisons within a given year. The magnitude of difference (MOD) for these significant post−hoc comparisons are expressed in units of standard deviation (SD) or median absolute deviations (MAD; if the data were rank−transformed prior to analysis) relative to reference. 'nc' indicates no comparisons were possible; 'ns' indicates a non−significant contrast; 'nm' indicates that the MOD could not be calculated because MAD = 0. For plots of zooplankton results prior to 2019, see Minnow 2019a, 2020a, 2021a. For unreplicated zooplankton results collected in June and August 2022, see Appendix Table C.3.3.

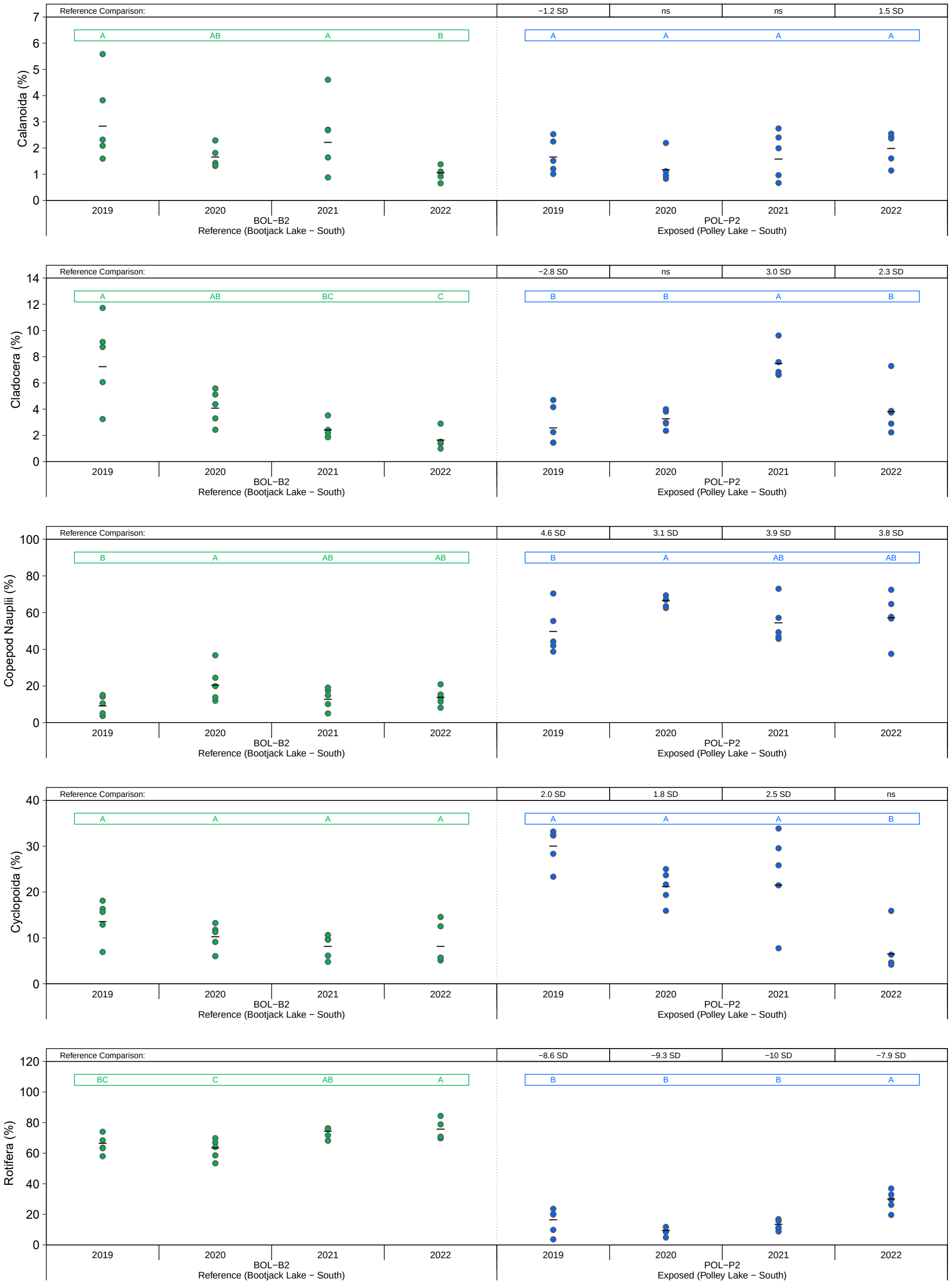

Figure E.2.5: Zooplankton Community Endpoints for Polley Lake (POL−P2; Exposed) and Bootjack Lake (BOL−B2; Reference) Areas in July, 2019 to 2022

Notes: Black bars represent measures of central tendency (mean, geometric mean, or median depending on if analysis was conducted on untransformed, log10−transformed or rank−transformed data). Coloured letters represent significant (p−value <0.1) post−hoc comparisons within areas over time; years that share a letter of the same colour (e.g., A, B) within a box of the same colour do not differ significantly within an area. A number above the plot indicates significant exposed vs. reference post−hoc comparisons within a given year. The magnitude of difference (MOD) for these significant post−hoc comparisons are expressed in units of standard deviation (SD) or median absolute deviations (MAD; if the data were rank−transformed prior to analysis) relative to reference. 'nc' indicates no comparisons were possible; 'ns' indicates a non−significant contrast; 'nm' indicates that the MOD could not be calculated because MAD = 0. For plots of zooplankton results prior to 2019, see Minnow 2019a, 2020a, 2021a. For unreplicated zooplankton results collected in June and August 2022, see Appendix Table C.3.3.

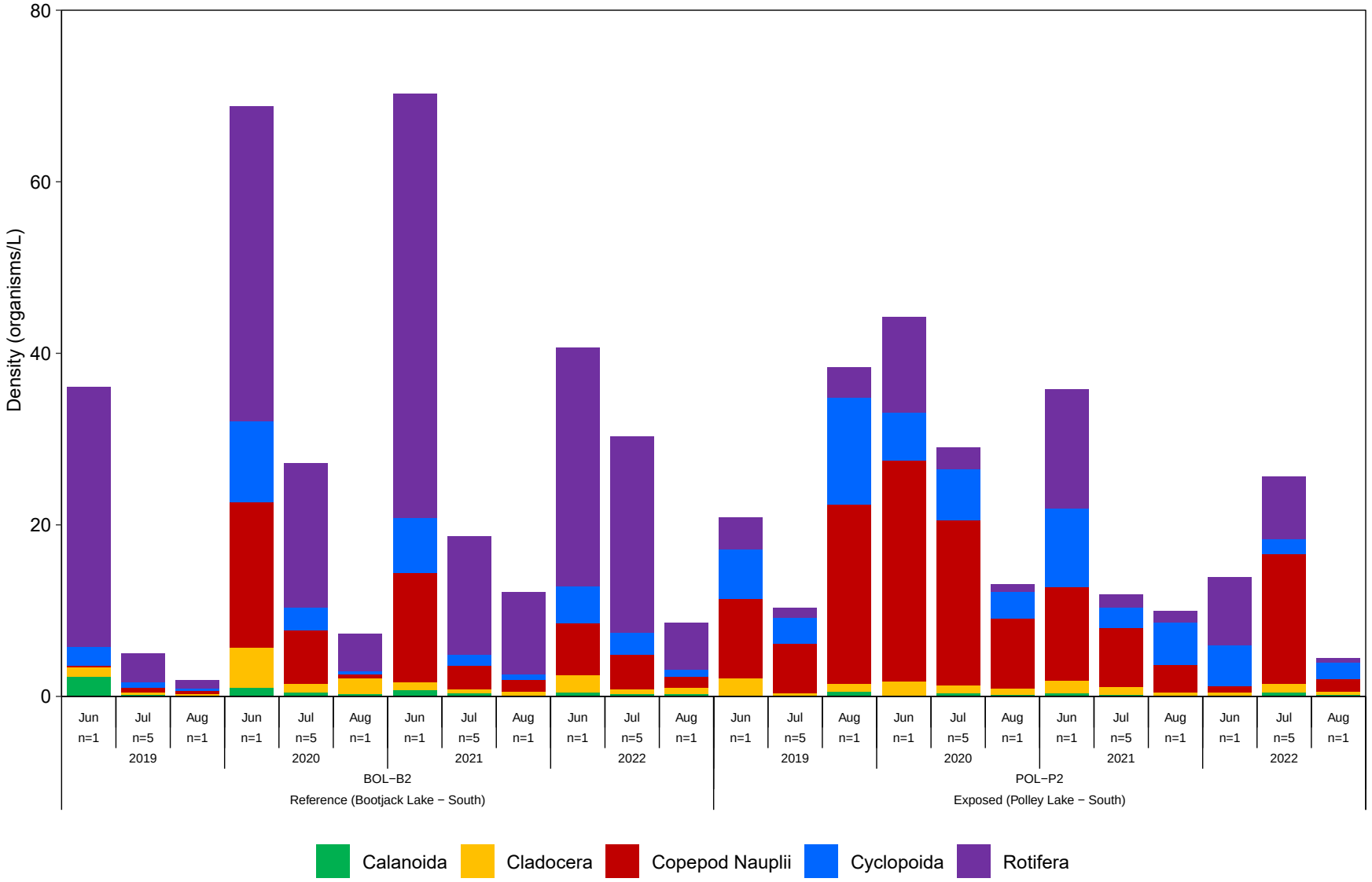

Figure E.2.6: Mean Densities of Major Zooplankton Community Taxonomic Groups for Polley Lake (POL−P2; Exposed) and Bootjack Lake (BOL−B2; Reference) Areas, 2019 to 2022

Notes: Results displayed for POL-P2 (August 2019) in the current figure differ from those presented in previous reports (Minnow 2020a, 2021a, 2022a) for the same sampling area and date. This discrepany is due to an incorrect calculation for these results in the prior reporting years.

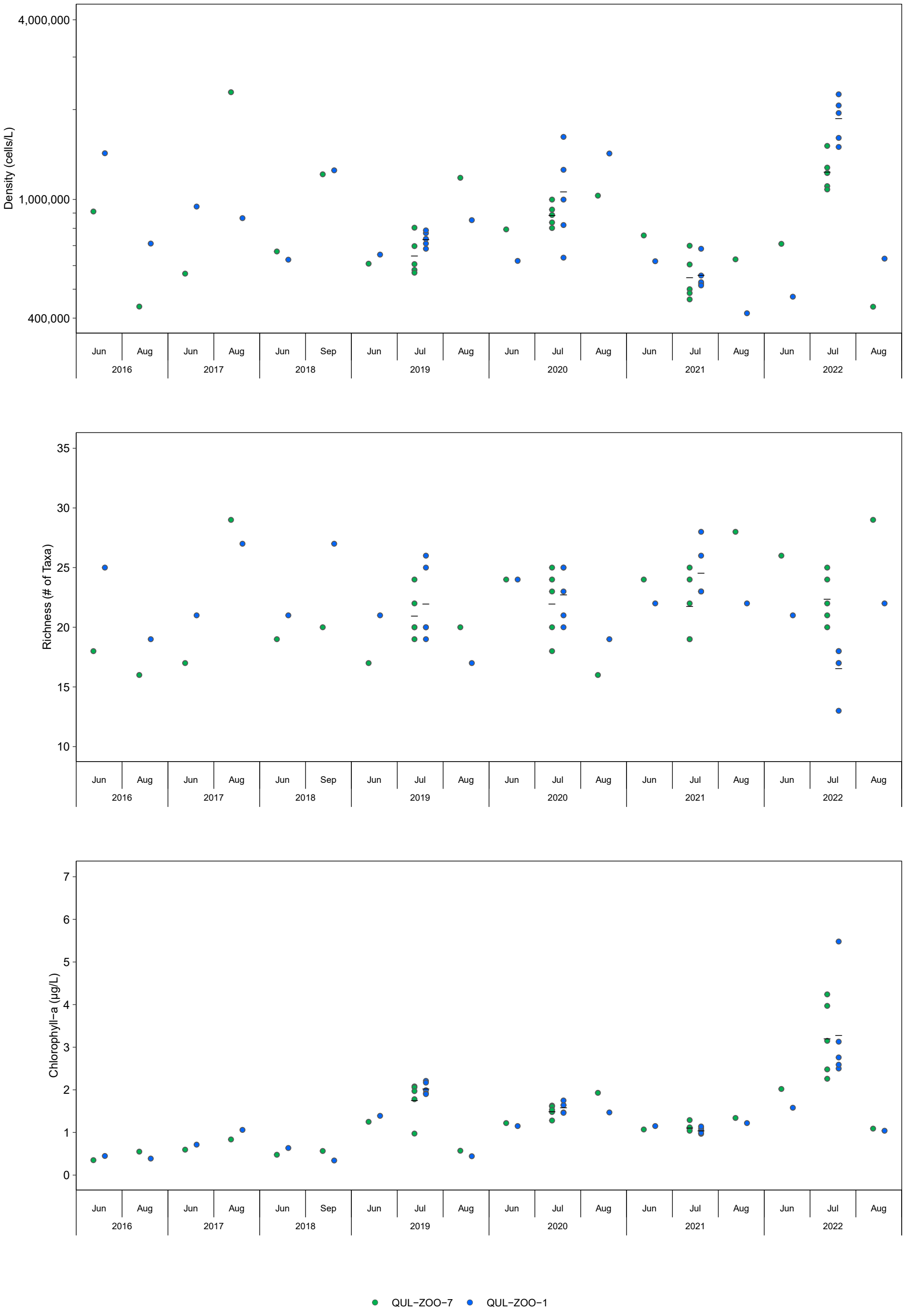

Figure E.2.7: Phytoplankton Community Endpoints for Quesnel Lake at QUL−ZOO−1 (Exposed) and QUL−ZOO−7 (Reference) Areas, 2016 to 2022

Notes: Black bars represent mean values.

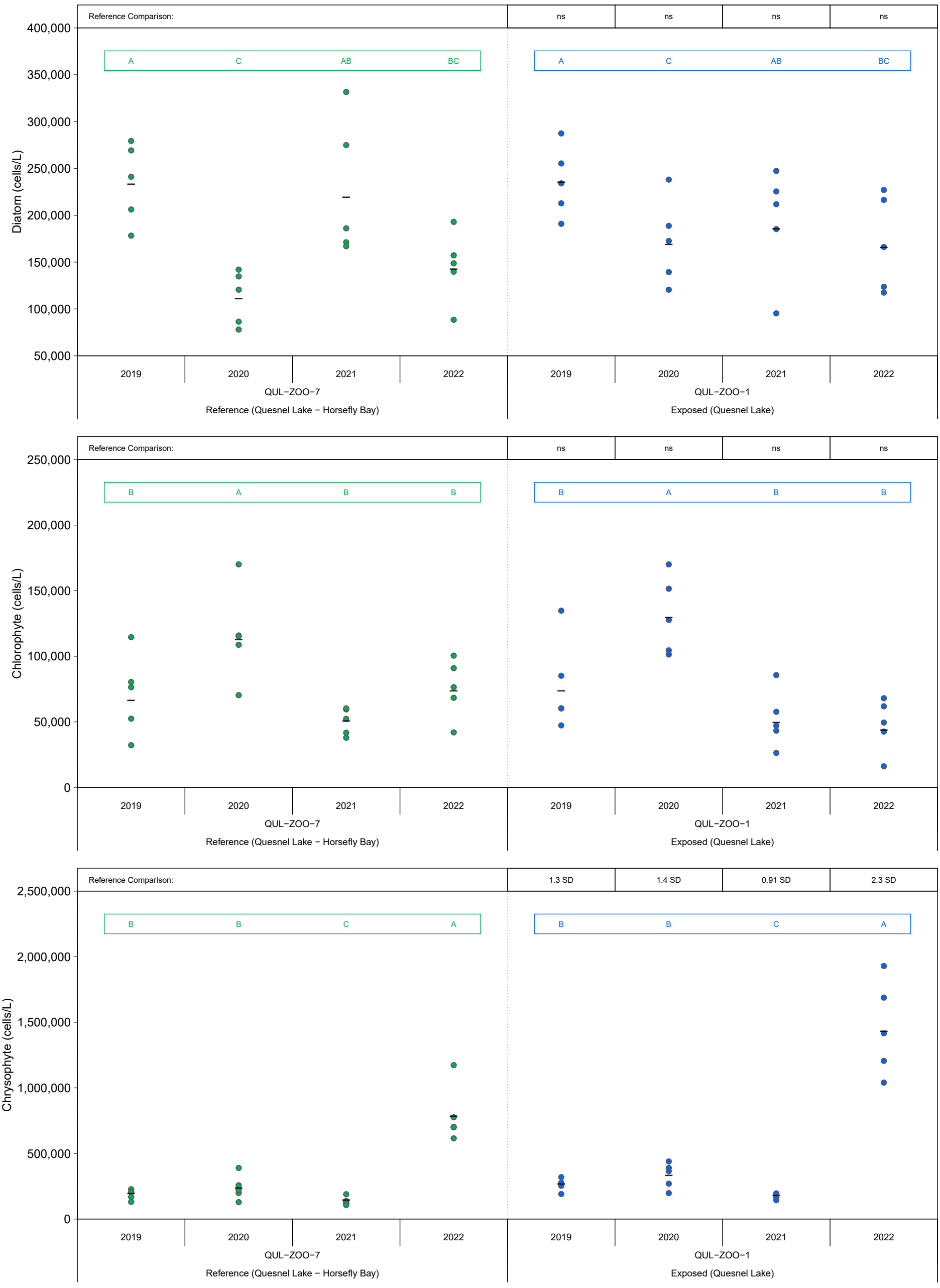

Figure E.2.8: Phytoplankton Community Endpoints for Quesnel Lake at QUL−ZOO−1 (Exposed) and QUL−ZOO−7 (Reference) Areas in July, 2019 to 2022

Notes: Black bars represent measures of central tendency (mean, geometric mean, or median depending on if analysis was conducted on untransformed, log10−transformed or rank−transformed data). Coloured letters represent significant (p−value <0.1) post−hoc comparisons within areas over time; years that share a letter of the same colour (e.g., A, B) within a box of the same colour do not differ significantly within an area. A number above the plot indicates significant exposed vs. reference post−hoc comparisons within a given year. The magnitude of difference (MOD) for these significant post−hoc comparisons are expressed in units of standard deviation (SD) or median absolute deviations (MAD; if the data were rank−transformed prior to analysis) relative to reference. 'nc' indicates no comparisons were possible; 'ns' indicates a non−significant contrast; 'nm' indicates that the MOD could not be calculated because MAD = 0. For plots of phytoplankton results prior to 2019, see Minnow 2019a, 2020a, 2021a. For unreplicated phytoplankton results collected in June and August 2022, see Appendix Table C.3.5.

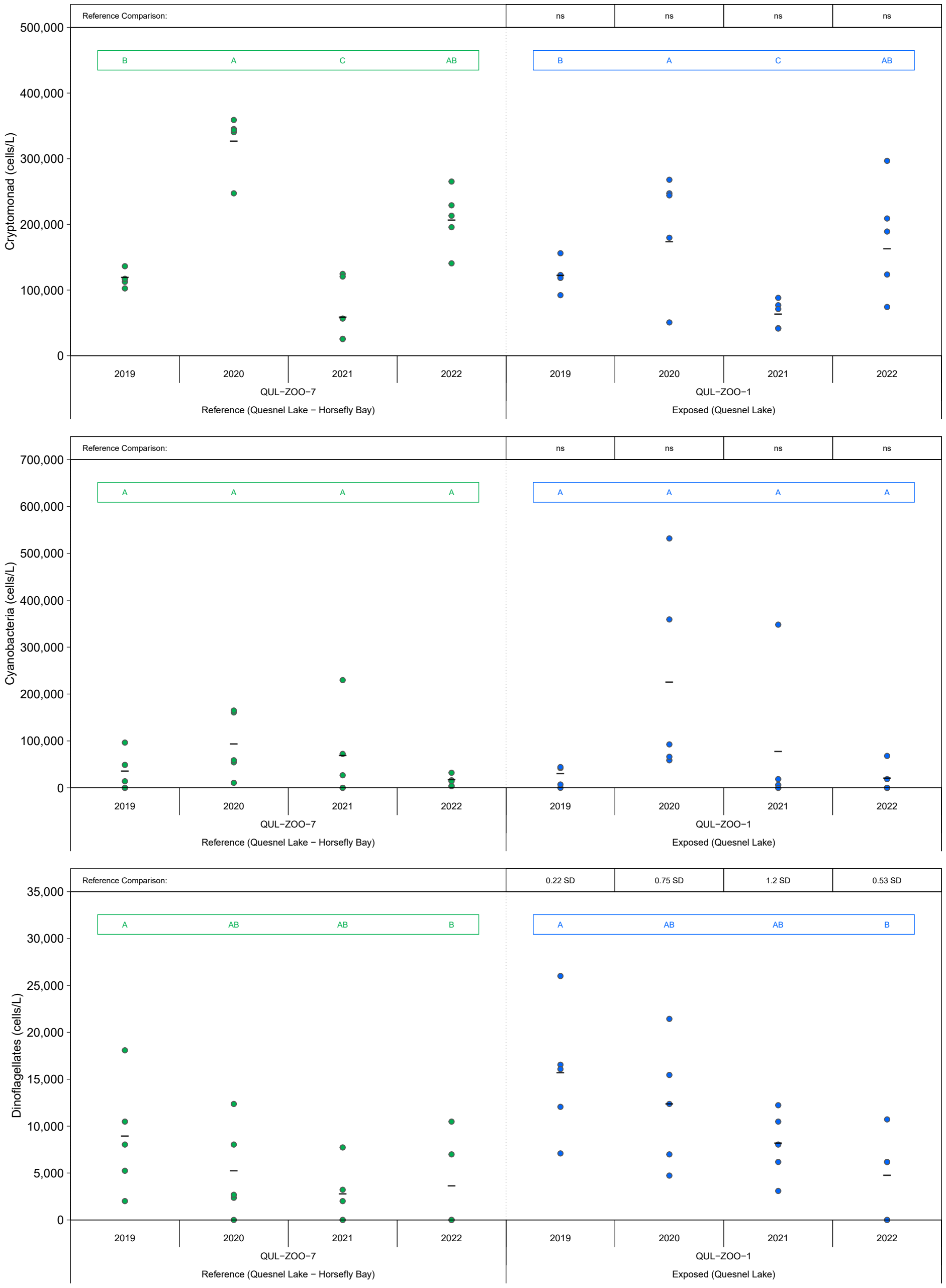

Figure E.2.8: Phytoplankton Community Endpoints for Quesnel Lake at QUL−ZOO−1 (Exposed) and QUL−ZOO−7 (Reference) Areas in July, 2019 to 2022

Notes: Black bars represent measures of central tendency (mean, geometric mean, or median depending on if analysis was conducted on untransformed, log10−transformed or rank−transformed data). Coloured letters represent significant (p−value <0.1) post−hoc comparisons within areas over time; years that share a letter of the same colour (e.g., A, B) within a box of the same colour do not differ significantly within an area. A number above the plot indicates significant exposed vs. reference post−hoc comparisons within a given year. The magnitude of difference (MOD) for these significant post−hoc comparisons are expressed in units of standard deviation (SD) or median absolute deviations (MAD; if the data were rank−transformed prior to analysis) relative to reference. 'nc' indicates no comparisons were possible; 'ns' indicates a non−significant contrast; 'nm' indicates that the MOD could not be calculated because MAD = 0. For plots of phytoplankton results prior to 2019, see Minnow 2019a, 2020a, 2021a. For unreplicated phytoplankton results collected in June and August 2022, see Appendix Table C.3.5.

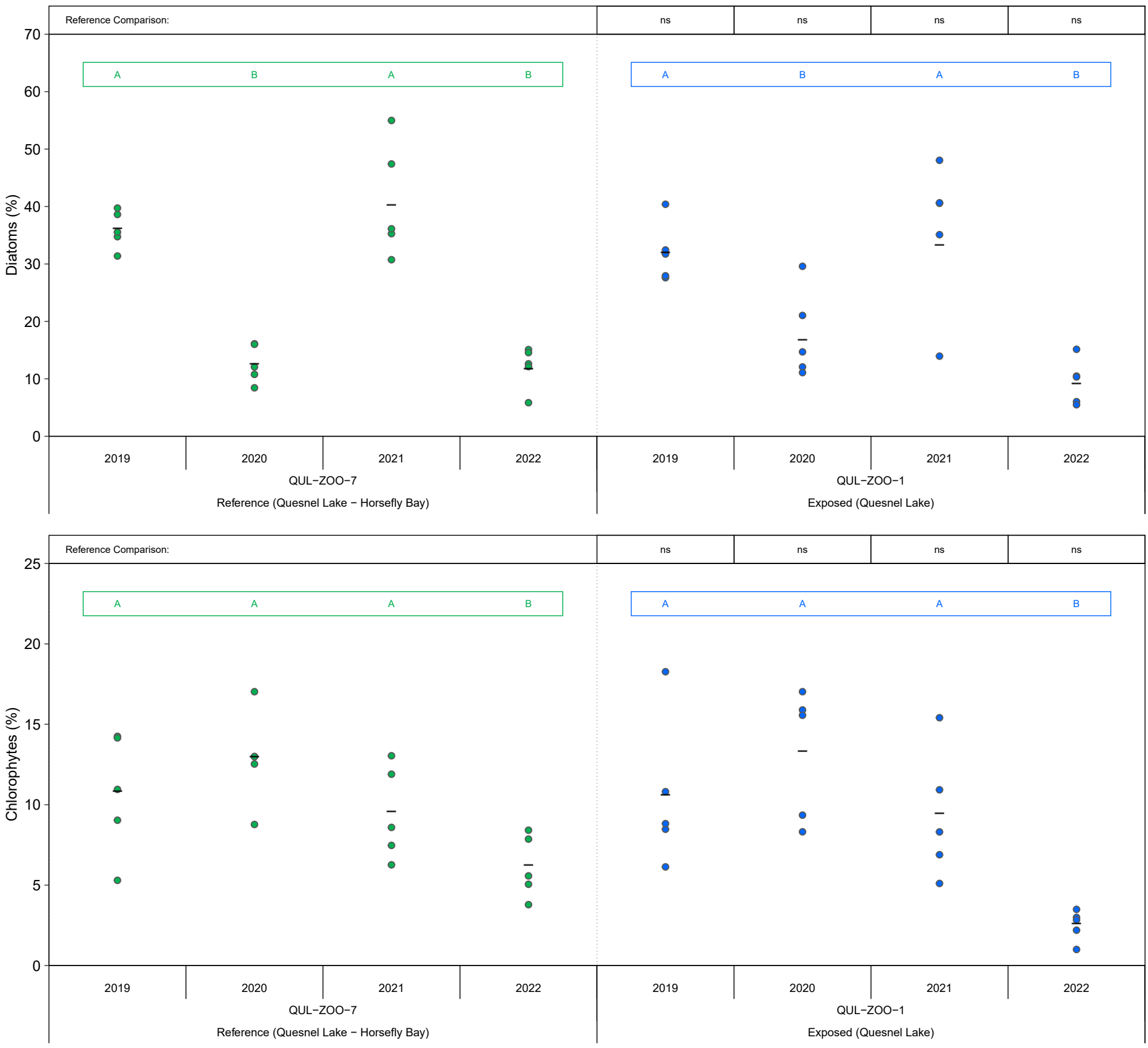

Figure E.2.8: Phytoplankton Community Endpoints for Quesnel Lake at QUL−ZOO−1 (Exposed) and QUL−ZOO−7 (Reference) Areas in July, 2019 to 2022

Notes: Black bars represent measures of central tendency (mean, geometric mean, or median depending on if analysis was conducted on untransformed, log10−transformed or rank−transformed data). Coloured letters represent significant (p−value <0.1) post−hoc comparisons within areas over time; years that share a letter of the same colour (e.g., A, B) within a box of the same colour do not differ significantly within an area. A number above the plot indicates significant exposed vs. reference post−hoc comparisons within a given year. The magnitude of difference (MOD) for these significant post−hoc comparisons are expressed in units of standard deviation (SD) or median absolute deviations (MAD; if the data were rank−transformed prior to analysis) relative to reference. 'nc' indicates no comparisons were possible; 'ns' indicates a non−significant contrast; 'nm' indicates that the MOD could not be calculated because MAD = 0. For plots of phytoplankton results prior to 2019, see Minnow 2019a, 2020a, 2021a. For unreplicated phytoplankton results collected in June and August 2022, see Appendix Table C.3.5.

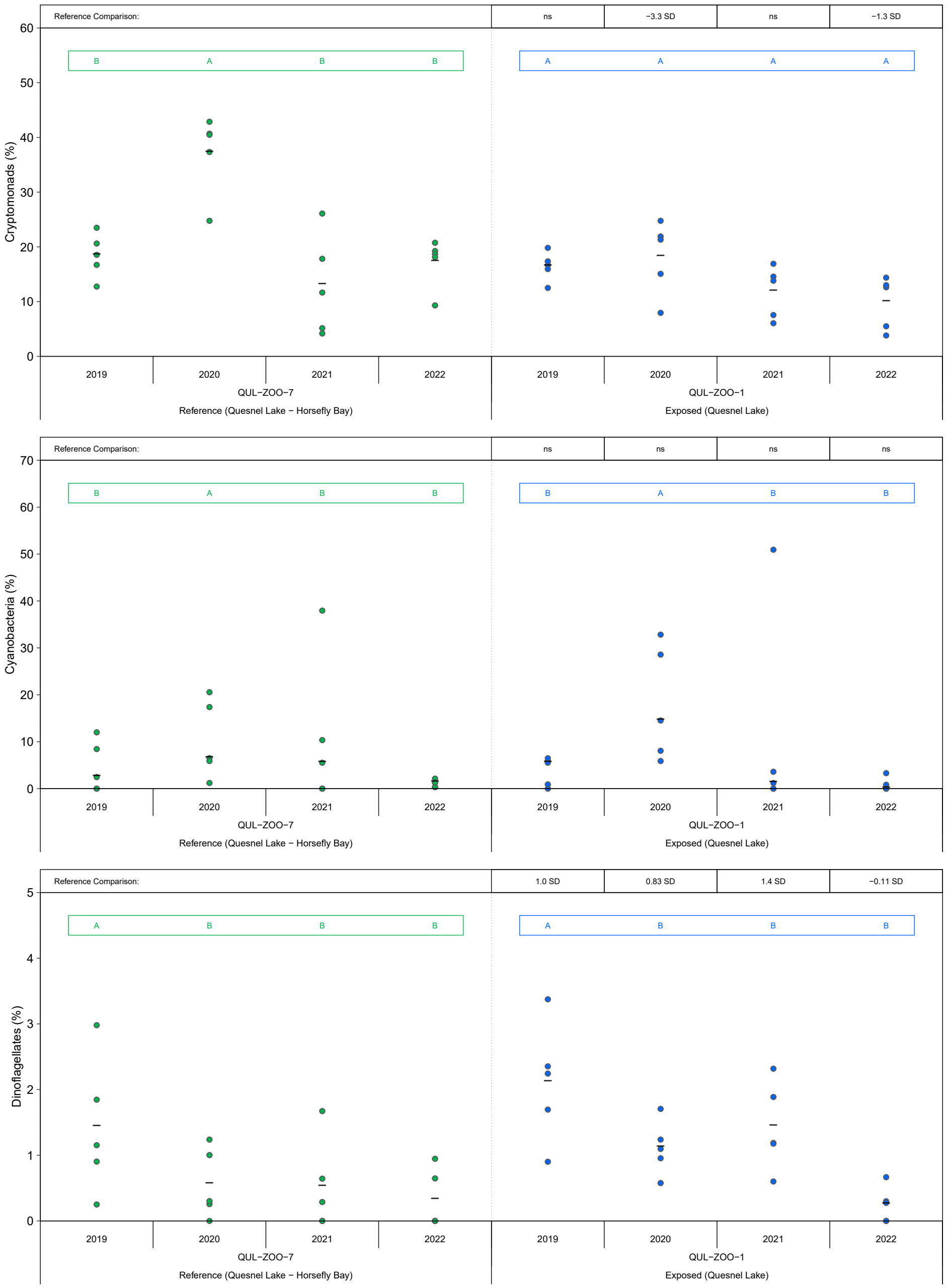

Figure E.2.8: Phytoplankton Community Endpoints for Quesnel Lake at QUL−ZOO−1 (Exposed) and QUL−ZOO−7 (Reference) Areas in July, 2019 to 2022

Notes: Black bars represent measures of central tendency (mean, geometric mean, or median depending on if analysis was conducted on untransformed, log10−transformed or rank−transformed data). Coloured letters represent significant (p−value <0.1) post−hoc comparisons within areas over time; years that share a letter of the same colour (e.g., A, B) within a box of the same colour do not differ significantly within an area. A number above the plot indicates significant exposed vs. reference post−hoc comparisons within a given year. The magnitude of difference (MOD) for these significant post−hoc comparisons are expressed in units of standard deviation (SD) or median absolute deviations (MAD; if the data were rank−transformed prior to analysis) relative to reference. 'nc' indicates no comparisons were possible; 'ns' indicates a non−significant contrast; 'nm' indicates that the MOD could not be calculated because MAD = 0. For plots of phytoplankton results prior to 2019, see Minnow 2019a, 2020a, 2021a. For unreplicated phytoplankton results collected in June and August 2022, see Appendix Table C.3.5.

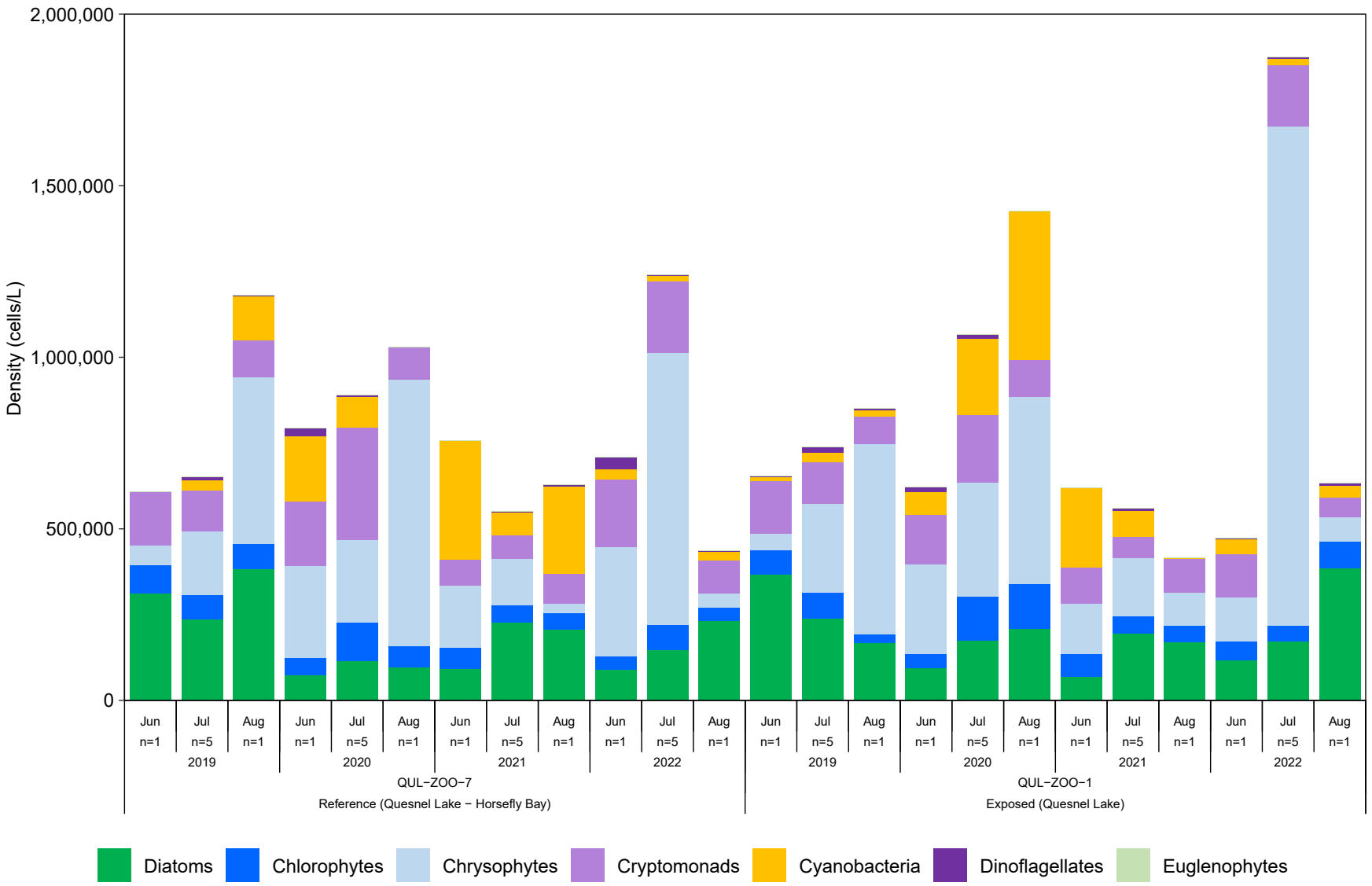

Figure E.2.9: Mean Densities of Major Phytoplankton Community Taxonomic Groups for Quesnel Lake at QUL−ZOO−1 (Exposed) and QUL−ZOO−7 (Reference) Areas, 2019 to 2022

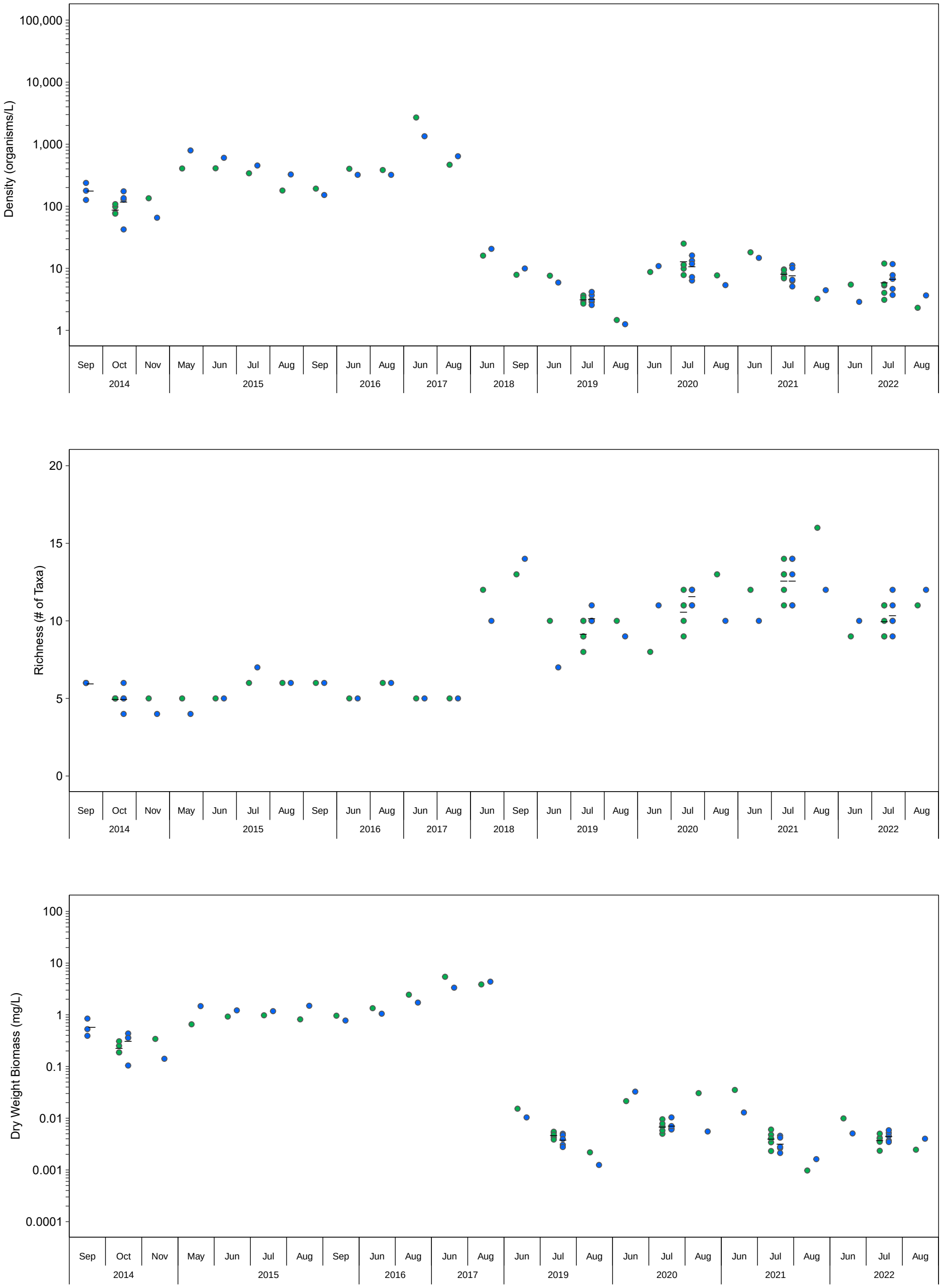

Figure E.2.10: Zooplankton Community Endpoints for Quesnel Lake at QUL−ZOO−1 (Exposed) and QUL−ZOO−7 (Reference) Areas, 2014 to 2022

Notes: Black bars represent mean values.

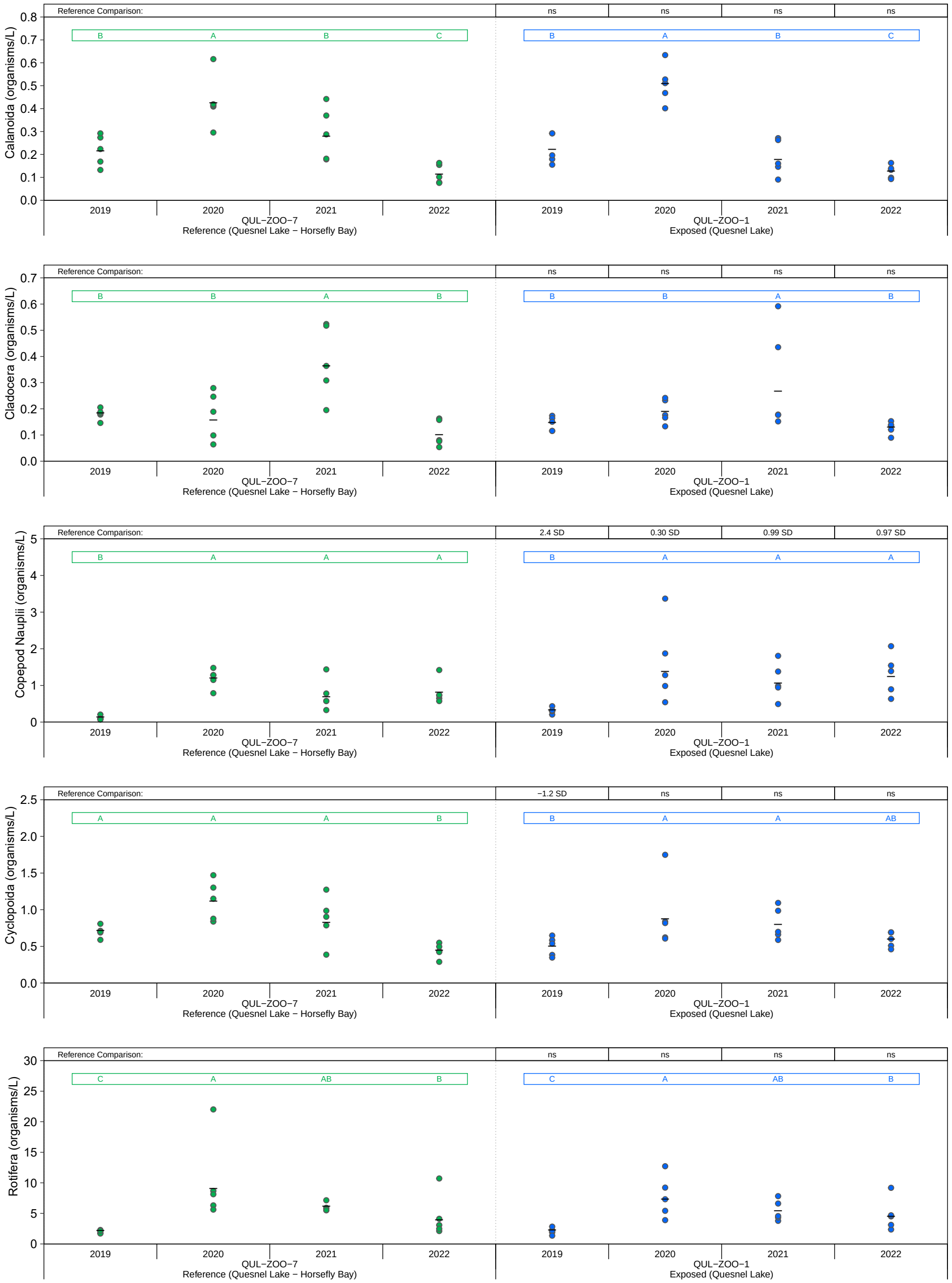

Figure E.2.11: Zooplankton Community Endpoints for Quesnel Lake at QUL−ZOO−1 (Exposed) and QUL−ZOO−7 (Reference) Areas in July, 2019 to 2022

Notes: Black bars represent measures of central tendency (mean, geometric mean, or median depending on if analysis was conducted on untransformed, log10−transformed or rank−transformed data). Coloured letters represent significant (p−value <0.1) post−hoc comparisons within areas over time; years that share a letter of the same colour (e.g., A, B) within a box of the same colour do not differ significantly within an area. A number above the plot indicates significant exposed vs. reference post−hoc comparisons within a given year. The magnitude of difference (MOD) for these significant post−hoc comparisons are expressed in units of standard deviation (SD) or median absolute deviations (MAD; if the data were rank−transformed prior to analysis) relative to reference. 'nc' indicates no comparisons were possible; 'ns' indicates a non−significant contrast; 'nm' indicates that the MOD could not be calculated because MAD = 0. For plots of zooplankton results prior to 2019, see Minnow 2019a, 2020a, 2021a. For unreplicated zooplankton results collected in June and August 2022, seeAppendix Table C.3.7.

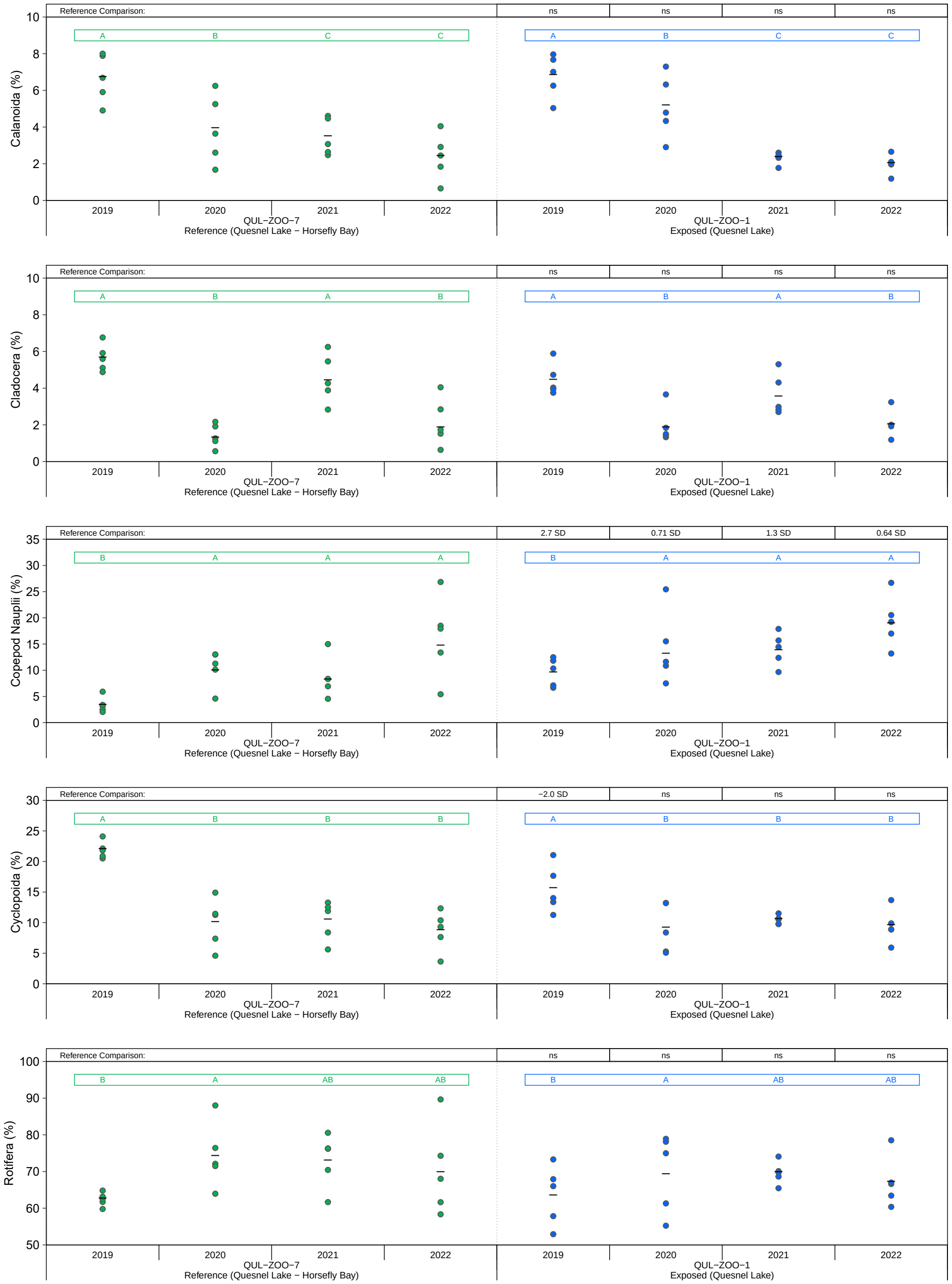

Figure E.2.11: Zooplankton Community Endpoints for Quesnel Lake at QUL−ZOO−1 (Exposed) and QUL−ZOO−7 (Reference) Areas in July, 2019 to 2022

Notes: Black bars represent measures of central tendency (mean, geometric mean, or median depending on if analysis was conducted on untransformed, log10−transformed or rank−transformed data). Coloured letters represent significant (p−value <0.1) post−hoc comparisons within areas over time; years that share a letter of the same colour (e.g., A, B) within a box of the same colour do not differ significantly within an area. A number above the plot indicates significant exposed vs. reference post−hoc comparisons within a given year. The magnitude of difference (MOD) for these significant post−hoc comparisons are expressed in units of standard deviation (SD) or median absolute deviations (MAD; if the data were rank−transformed prior to analysis) relative to reference. 'nc' indicates no comparisons were possible; 'ns' indicates a non−significant contrast; 'nm' indicates that the MOD could not be calculated because MAD = 0. For plots of zooplankton results prior to 2019, see Minnow 2019a, 2020a, 2021a. For unreplicated zooplankton results collected in June and August 2022, see Appendix Table C.3.7.

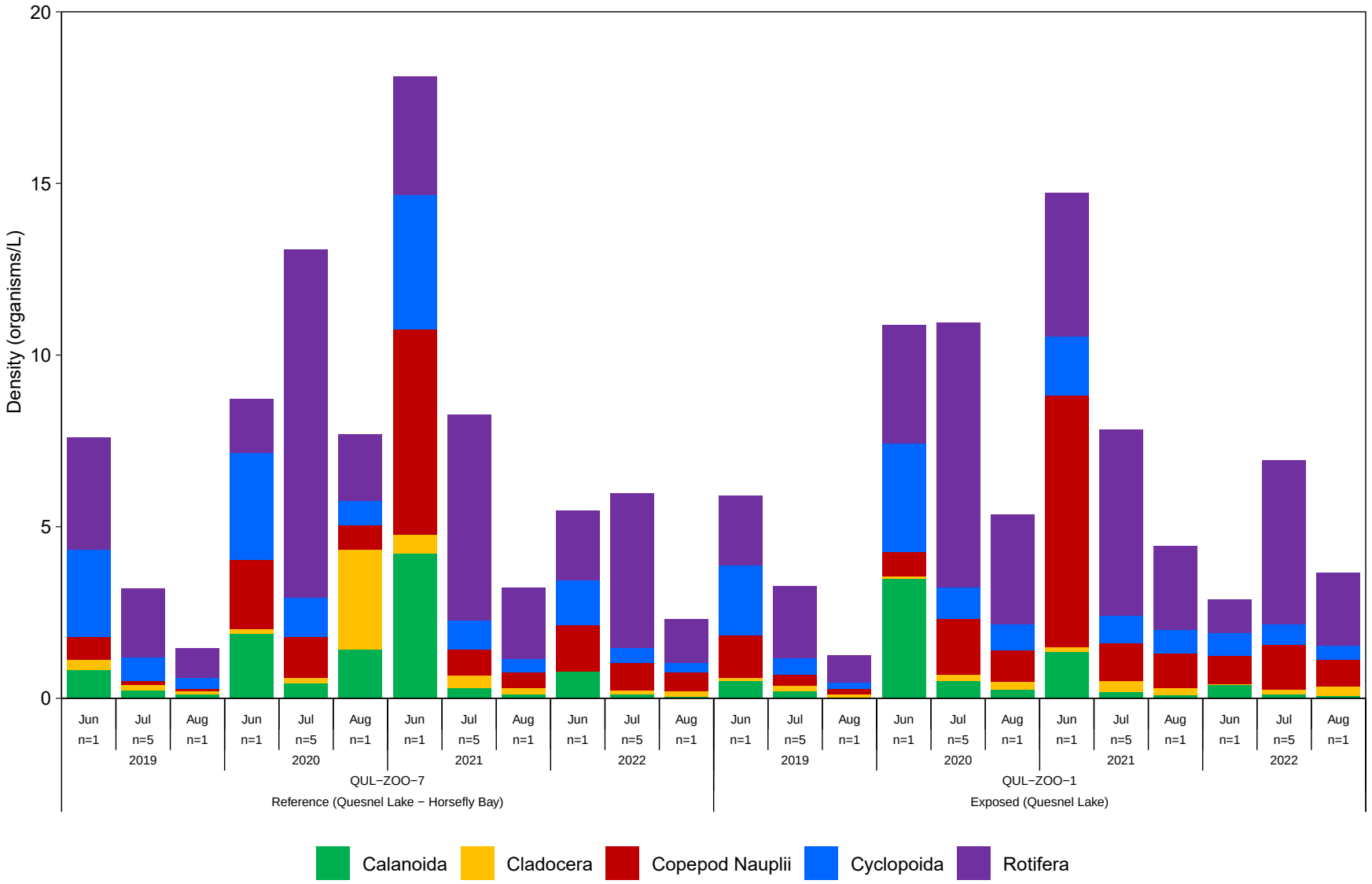

Figure E.2.12: Mean Densities of Major Zooplankton Community Taxonomic Groups for Quesnel Lake at QUL−ZOO−1 (Exposed) and QUL−ZOO−7 (Reference) Areas, 2019 to 2022

Table E.2.1: Results of Statistical Comparisons of Phytoplankton Community Endpoints for Polley Lake (POL-P2; Exposed) and Bootjack Lake (BOL-B2; Reference) Areas in July, 2019 to 2022

Endpoint	Transformation	2-Way ANOVA P-values			Area Type	Area	Year	Measures of Central Tendency[a]	Temporal Contrasts Within Sites								Spatial Comparison Within Years[b]
									Pairwise Comparisons Between Years				MOD Relative to Baseline[b]				
		Area	Year	Area x Year					2019	2020	2021	2022	2019	2020	2021	2022	POL-P2
Diatom (cells/L)	log10(x+1)	-	-	0.090	Reference	BOL-B2	2019	25,387	AB	B	AB	A	Baseline	ns	ns	ns	ns
							2020	1,125									1.1
							2021	13,521									-1.2
							2022	51,443									ns
					Exposed	POL-P2	2019	61,233	A	AB	B	A	Baseline	ns	-1.9	ns	
							2020	11,010									
							2021	1,102									
							2022	132,652									
Chlorophyte (cells/L)	log10	-	-	0.002	Reference	BOL-B2	2019	278,118	A	B	C	B	Baseline	-2.6	-4.5	-2.4	ns
							2020	280,330									2.6
							2021	44,413									2.5
							2022	104,106									3.5
					Exposed	POL-P2	2019	257,727	A	A	B	A	Baseline	ns	-1.8	ns	
							2020	280,330									
							2021	124,888									
							2022	443,934									
Chrysophyte (cells/L)	log10	-	-	<0.001	Reference	BOL-B2	2019	563,030	A	C	D	B	Baseline	-7.7	-9.5	-3.9	1.8
							2020	54,989									6.8
							2021	32,094									6.4
							2022	174,143									5.2
					Exposed	POL-P2	2019	964,479	A	B	C	A	Baseline	-2.7	-4.9	ns	
							2020	425,720									
							2021	219,571									
							2022	849,603									
Cryptomonad (cells/L)	log10	-	-	0.003	Reference	BOL-B2	2019	169,322	BC	AB	A	C	Baseline	ns	2.1	ns	-1.4
							2020	220,998									ns
							2021	277,719									ns
							2022	144,083									2.0
					Exposed	POL-P2	2019	121,456	B	A	A	A	Baseline	3.4	3.0	2.7	
							2020	268,135									
							2021	241,972									
							2022	227,598									
Cyanobacteria (cells/L)	log10	-	-	<0.001	Reference	BOL-B2	2019	15,531,745	A	A	B	B	Baseline	ns	-5.4	-6.7	ns
							2020	15,358,522									-2.6
							2021	3,205,966									1.8
							2022	2,182,678									ns
					Exposed	POL-P2	2019	17,030,989	A	B	B	C	Baseline	-3.0	-3.8	-6.1	
							2020	7,032,626									
							2021	5,494,837									
							2022	2,796,891									
Dinoflagellates (cells/L)	log10(x+1)	-	-	0.003	Reference	BOL-B2	2019	4.60	A	A	A	A	Baseline	ns	ns	ns	ns
							2020	3.60									1.4
							2021	531									-1.8
							2022	548									-1.3
					Exposed	POL-P2	2019	29.0	AB	A	B	AB	Baseline	ns	ns	ns	
							2020	728									
							2021	0									
							2022	4.60									

P-value < 0.05
Magnitude of Difference (MOD) < -2
Magnitude of Difference (MOD) > 2

Notes: "-" = no data available. "nc" = no comparison. "ns" = no significance. "nm" = Contrast MODs could not be calculated because the Median Absolute Deviation (MAD) =0. Cells/L = cells per Litre

[a] mean, geometric mean, or median depending on if analysis was conducted on untransformed, log_{10}-transformed, or rank-transformed data.

[b] Magnitude of difference (MOD) calculated for two-way ANOVA as (Exposed Mean - Reference Mean)/SD (or [Mean - Baseline Mean]/SD for temporal comparisons) on the transformed scale, where SD was the pooled standard deviation of the model residuals. MOD calculated for Kruskal-Wallis (i.e., rank-transformed data) as (Exposed Median - Reference Median)/MAD, where MAD was the pooled median absolute deviation.

Table E.2.1: Results of Statistical Comparisons of Phytoplankton Community Endpoints for Polley Lake (POL-P2; Exposed) and Bootjack Lake (BOL-B2; Reference) Areas in July, 2019 to 2022

Endpoint	Transformation	2-Way ANOVA P-values			Area Type	Area	Year	Measures of Central Tendency[a]	Temporal Contrasts Within Sites								Spatial Comparison Within Years[b]
									Pairwise Comparisons Between Years				MOD Relative to Baseline[b]				
		Area	Year	Area x Year					2019	2020	2021	2022	2019	2020	2021	2022	POL-P2
Euglenophytes (cells/L)	log10(x+1)	-	-	0.009	Reference	BOL-B2	2019	0	B	B	A	B	Baseline	ns	2.3	ns	ns
							2020	0									ns
							2021	127									-2.3
							2022	0									ns
					Exposed	POL-P2	2019	4.60	A	A	A	A	Baseline	ns	ns	ns	
							2020	0									
							2021	0									
							2022	0									
Diatoms (%)	rank	-	-	0.004	Reference	BOL-B2	2019	0.110	BC	C	AB	A	Baseline	ns	ns	28	ns
							2020	0.0310									0.70
							2021	0.300									-2.8
							2022	2.80									ns
					Exposed	POL-P2	2019	0.390	B	BC	C	A	Baseline	ns	-3.7	39	
							2020	0.0970									
							2021	0.0400									
							2022	4.10									
Chlorophytes (%)	log10	-	-	0.002	Reference	BOL-B2	2019	1.70	B	C	BC	A	Baseline	-2.0	ns	1.7	ns
							2020	0.620									3.4
							2021	1.20									ns
							2022	3.80									1.9
					Exposed	POL-P2	2019	1.40	C	B	BC	A	Baseline	1.8	ns	3.9	
							2020	3.50									
							2021	2.00									
							2022	9.80									
Chrysophytes (%)	log10	-	-	<0.001	Reference	BOL-B2	2019	3.40	B	D	C	A	Baseline	-5.8	-3.4	1.7	1.1
							2020	0.350									6.9
							2021	0.890									3.6
							2022	6.40									2.7
					Exposed	POL-P2	2019	5.20	B	B	B	A	Baseline	ns	ns	3.3	
							2020	5.30									
							2021	3.60									
							2022	19.0									
Cryptomonads (%)	none	-	-	0.003	Reference	BOL-B2	2019	1.10	B	B	A	A	Baseline	ns	4.3	2.7	ns
							2020	1.40									1.2
							2021	8.30									-2.5
							2022	5.70									ns
					Exposed	POL-P2	2019	0.670	B	A	A	A	Baseline	1.7	2.1	2.7	
							2020	3.50									
							2021	4.20									
							2022	5.30									
Cyanobacteria (%)	none	-	-	<0.001	Reference	BOL-B2	2019	93.0	AB	A	B	C	Baseline	ns	ns	-2.7	ns
							2020	97.0									-2.3
							2021	89.0									ns
							2022	81.0									-4.1
					Exposed	POL-P2	2019	92.0	A	A	A	B	Baseline	ns	ns	-6.6	
							2020	87.0									
							2021	90.0									
							2022	62.0									

P-value < 0.05
Magnitude of Difference (MOD) < -2
Magnitude of Difference (MOD) > 2

Notes: "-" = no data available. "nc" = no comparison. "ns" = no significance. "nm" = Contrast MODs could not be calculated because the Median Absolute Deviation (MAD) =0. Cells/L = cells per Litre

[a] mean, geometric mean, or median depending on if analysis was conducted on untransformed, log_{10}-transformed, or rank-transformed data.

[b] Magnitude of difference (MOD) calculated for two-way ANOVA as (Exposed Mean - Reference Mean)/SD (or [Mean - Baseline Mean]/SD for temporal comparisons) on the transformed scale, where SD was the pooled standard deviation of the model residuals. MOD calculated for Kruskal-Wallis (i.e., rank-transformed data) as (Exposed Median - Reference Median)/MAD, where MAD was the pooled median absolute deviation.

Table E.2.1: Results of Statistical Comparisons of Phytoplankton Community Endpoints for Polley Lake (POL-P2; Exposed) and Bootjack Lake (BOL-B2; Reference) Areas in July, 2019 to 2022

Endpoint	Transformation	2-Way ANOVA P-values			Area Type	Area	Year	Measures of Central Tendency[a]	Temporal Contrasts Within Sites								Spatial Comparison Within Years[b]
									Pairwise Comparisons Between Years				MOD Relative to Baseline[b]				
		Area	Year	Area x Year					2019	2020	2021	2022	2019	2020	2021	2022	POL-P2
Dinoflagellates (%)	rank	-	-	0.002	Reference	BOL-B2	2019	0	B	B	A	A	Baseline	ns	ns	ns	ns
							2020	0									nc
							2021	0.0910									nc
							2022	0.0790									nc
					Exposed	POL-P2	2019	0	AB	A	B	AB	Baseline	ns	ns	ns	
							2020	0.0400									
							2021	0									
							2022	0									
Euglenophytes (%)	rank	-	-	0.006	Reference	BOL-B2	2019	0	B	B	A	B	Baseline	ns	nm	nm	ns
							2020	0									nm
							2021	0.0560									nm
							2022	0									nm
					Exposed	POL-P2	2019	0	A	A	A	A	Baseline	ns	ns	ns	
							2020	0									
							2021	0									
							2022	0									

P-value < 0.05
Magnitude of Difference (MOD) < -2
Magnitude of Difference (MOD) > 2

Notes: "-" = no data available. "nc" = no comparison. "ns" = no significance. "nm" = Contrast MODs could not be calculated because the Median Absolute Deviation (MAD) =0. Cells/L = cells per Litre

[a] mean, geometric mean, or median depending on if analysis was conducted on untransformed, log_{10}-transformed, or rank-transformed data.

[b] Magnitude of difference (MOD) calculated for two-way ANOVA as (Exposed Mean - Reference Mean)/SD (or [Mean - Baseline Mean]/SD for temporal comparisons) on the transformed scale, where SD was the pooled standard deviation of the model residuals. MOD calculated for Kruskal-Wallis (i.e., rank-transformed data) as (Exposed Median - Reference Median)/MAD, where MAD was the pooled median absolute deviation.

Table E.2.2: Results of Statistical Comparisons of Zooplankton Community Endpoints for Polley Lake (POL-P2; Exposed) and Bootjack Lake (BOL-B2; Reference) Areas in July, 2019 to 2022

Endpoint	Transformation	2-Way ANOVA P-values			Area Type	Area	Year	Measures of Central Tendency[a]	Temporal Contrasts Within Sites								Spatial Comparison Within Years[b]
									Pairwise Comparisons Between Years				MOD Relative to Baseline[b]				
		Area	Year	Area x Year					2019	2020	2021	2022	2019	2020	2021	2022	POL-P2
Calanoida (organisms/L)	log10	-	-	0.055	Reference	BOL-B2	2019	0.130	B	A	A	AB	Baseline	2.3	2.0	ns	ns
							2020	0.430									ns
							2021	0.370									-1.5
							2022	0.290									ns
					Exposed	POL-P2	2019	0.140	C	AB	BC	A	Baseline	1.7	ns	2.5	
							2020	0.320									
							2021	0.170									
							2022	0.490									
Cladocera (organisms/L)	log10	-	-	<0.001	Reference	BOL-B2	2019	0.350	B	A	B	B	Baseline	3.1	ns	ns	-1.3
							2020	0.430									ns
							2021	0.390									2.1
							2022	0.460									2.0
					Exposed	POL-P2	2019	0.210	B	A	A	A	Baseline	4.0	3.8	4.1	
							2020	0.320									
							2021	0.830									
							2022	0.930									
Copepod Nauplii (organisms/L)	log10	<0.001	<0.001	0.118	Reference	BOL-B2	2019	0.410	C	A	B	A	Baseline	4.1	2.6	3.6	3.8
							2020	1.10									ns
							2021	2.10									1.7
							2022	3.90									2.1
					Exposed	POL-P2	2019	4.20	C	A	B	A	Baseline	2.4	0.57	1.9	
							2020	19.0									
							2021	6.10									
							2022	14.0									
Cyclopoida (organisms/L)	log10	-	-	<0.001	Reference	BOL-B2	2019	0.640	C	A	B	AB	Baseline	3.8	2.0	3.5	3.7
							2020	2.70									2.2
							2021	1.30									1.6
							2022	2.30									-1.1
					Exposed	POL-P2	2019	2.60	B	A	B	B	Baseline	2.3	ns	ns	
							2020	5.90									
							2021	2.40									
							2022	1.60									
Rotifera (organisms/L)	log10	-	-	0.002	Reference	BOL-B2	2019	3.20	B	A	A	A	Baseline	4.5	3.8	5.3	-2.9
							2020	17.0									-5.3
							2021	13.0									-6.0
							2022	22.0									-3.1
					Exposed	POL-P2	2019	1.10	C	B	BC	A	Baseline	2.0	ns	5.1	
							2020	2.30									
							2021	1.40									
							2022	7.10									
Calanoida (%)	log10	-	-	0.020	Reference	BOL-B2	2019	2.80	A	AB	A	B	Baseline	ns	ns	-2.3	-1.2
							2020	1.60									ns
							2021	2.20									ns
							2022	1.00									1.5
					Exposed	POL-P2	2019	1.60	A	A	A	A	Baseline	ns	ns	ns	
							2020	1.10									
							2021	1.50									
							2022	1.90									

P-value < 0.05
Magnitude of Difference (MOD) < -2
Magnitude of Difference (MOD) > 2

Notes: "-" = no data available. "nc" = no comparison. "ns" = no significance. "nm" = Contrast MODs could not be calculated because the Median Absolute Deviation (MAD) =0. organisms/L = organisms per Litre.

[a] Mean, geometric mean, or median depending on if analysis was conducted on untransformed, log_{10}-transformed, or rank-transformed data.

[b] Magnitude of difference (MOD) calculated for two-way ANOVA as (Exposed Mean - Reference Mean)/SD (or [Mean - Baseline Mean]/SD for temporal comparisons) on the transformed scale, where SD was the pooled standard deviation of the model residuals. MOD calculated for Kruskal-Wallis (i.e., rank-transformed data) as (Exposed Median - Reference Median)/MAD, where MAD was the pooled median absolute deviation.

Table E.2.2: Results of Statistical Comparisons of Zooplankton Community Endpoints for Polley Lake (POL-P2; Exposed) and Bootjack Lake (BOL-B2; Reference) Areas in July, 2019 to 2022

Endpoint	Transformation	2-Way ANOVA P-values			Area Type	Area	Year	Measures of Central Tendency[a]	Temporal Contrasts Within Sites								Spatial Comparison Within Years[b]
									Pairwise Comparisons Between Years				MOD Relative to Baseline[b]				
		Area	Year	Area x Year					2019	2020	2021	2022	2019	2020	2021	2022	POL-P2
Cladocera (%)	log10	-	-	<0.001	Reference	BOL-B2	2019	7.10	A	AB	BC	C	Baseline	ns	-2.9	-4.0	-2.8
							2020	4.00									ns
							2021	2.30									3.0
							2022	1.60									2.3
					Exposed	POL-P2	2019	2.50	B	B	A	B	Baseline	ns	2.9	ns	
							2020	3.10									
							2021	7.40									
							2022	3.70									
Copepod Nauplii (%)	log10	<0.001	0.018	0.467	Reference	BOL-B2	2019	8.40	B	A	AB	AB	Baseline	2.2	ns	ns	4.6
							2020	20.0									3.1
							2021	12.0									3.9
							2022	13.0									3.8
					Exposed	POL-P2	2019	49.0	B	A	AB	AB	Baseline	0.77	ns	ns	
							2020	66.0									
							2021	54.0									
							2022	56.0									
Cyclopoida (%)	log10	-	-	0.008	Reference	BOL-B2	2019	13.0	A	A	A	A	Baseline	ns	ns	ns	2.0
							2020	9.90									1.8
							2021	7.80									2.5
							2022	7.90									ns
					Exposed	POL-P2	2019	30.0	A	A	A	B	Baseline	ns	ns	-3.9	
							2020	21.0									
							2021	21.0									
							2022	6.20									
Rotifera (%)	none	-	-	0.039	Reference	BOL-B2	2019	65.0	BC	C	AB	A	Baseline	ns	ns	1.6	-8.6
							2020	63.0									-9.3
							2021	74.0									-10
							2022	75.0									-7.9
					Exposed	POL-P2	2019	15.0	B	B	B	A	Baseline	ns	ns	2.4	
							2020	8.50									
							2021	13.0									
							2022	29.0									

P-value < 0.05
Magnitude of Difference (MOD) < -2
Magnitude of Difference (MOD) > 2

Notes: "-" = no data available. "nc" = no comparison. "ns" = no significance. "nm" = Contrast MODs could not be calculated because the Median Absolute Deviation (MAD) =0. organisms/L = organisms per Litre.

[a] Mean, geometric mean, or median depending on if analysis was conducted on untransformed, $\log_{10}$-transformed, or rank-transformed data.

[b] Magnitude of difference (MOD) calculated for two-way ANOVA as (Exposed Mean - Reference Mean)/SD (or [Mean - Baseline Mean]/SD for temporal comparisons) on the transformed scale, where SD was the pooled standard deviation of the model residuals. MOD calculated for Kruskal-Wallis (i.e., rank-transformed data) as (Exposed Median - Reference Median)/MAD, where MAD was the pooled median absolute deviation.

Table E.2.3: Results of Statistical Comparisons of Phytoplankton Community Endpoints for Quesnel Lake at QUL-ZOO-1 (Exposed) and QUL-ZOO-7 (Reference) Areas in July, 2019 to 2022

Endpoint	Transformation	2-Way ANOVA P-values			Area Type	Area	Year	Measures of Central Tendency[a]	Temporal Contrasts Within Sites								Spatial Comparison Within Years[b]
									Pairwise Comparisons Between Years				MOD Relative to Baseline[b]				
		Area	Year	Area x Year					2019	2020	2021	2022	2019	2020	2021	2022	QUL-ZOO-1
Diatoms (cells/L)	log10	0.265	<0.001	0.130	Reference	QUL-ZOO-7	2019	231,616	A	C	AB	BC	Baseline	-2.7	ns	-1.8	ns
							2020	109,236									ns
							2021	217,305									ns
							2022	141,016									ns
					Exposed	QUL-ZOO-1	2019	233,728	A	C	AB	BC	Baseline	-1.2	ns	-1.3	
							2020	167,090									
							2021	183,565									
							2022	163,971									
Chlorophyte (cells/L)	log10	0.545	<0.001	0.220	Reference	QUL-ZOO-7	2019	65,274	B	A	B	B	Baseline	1.4	ns	ns	ns
							2020	111,660									ns
							2021	49,457									ns
							2022	72,460									ns
					Exposed	QUL-ZOO-1	2019	72,265	B	A	B	B	Baseline	1.5	ns	ns	
							2020	128,345									
							2021	48,356									
							2022	42,721									
Chrysophyte (cells/L)	log10	<0.001	<0.001	0.435	Reference	QUL-ZOO-7	2019	184,147	B	B	C	A	Baseline	ns	-1.3	5.5	1.3
							2020	224,375									1.4
							2021	132,320									0.91
							2022	772,584									2.3
					Exposed	QUL-ZOO-1	2019	256,472	B	B	C	A	Baseline	ns	-1.6	6.6	
							2020	319,246									
							2021	167,672									
							2022	1,420,457									
Cryptomonad (cells/L)	log10	0.196	<0.001	0.283	Reference	QUL-ZOO-7	2019	116,488	B	A	C	AB	Baseline	2.3	-1.6	ns	ns
							2020	324,272									ns
							2021	56,028									ns
							2022	204,382									ns
					Exposed	QUL-ZOO-1	2019	119,978	B	A	C	AB	Baseline	0.79	-1.5	ns	
							2020	171,268									
							2021	60,862									
							2022	160,839									
Cyanobacteria (cells/L)	log10(x+1)	0.628	0.061	0.360	Reference	QUL-ZOO-7	2019	580	A	A	A	A	Baseline	ns	ns	ns	ns
							2020	61,874									ns
							2021	850									ns
							2022	10,030									ns
					Exposed	QUL-ZOO-1	2019	3,548	A	A	A	A	Baseline	ns	ns	ns	
							2020	147,047									
							2021	524									
							2022	65.0									
Dinoflagellates (cells/L)	log10(x+1)	0.035	0.015	0.730	Reference	QUL-ZOO-7	2019	6,937	A	AB	AB	B	Baseline	ns	ns	-1.6	0.22
							2020	-									nc
							2021	137									1.2
							2022	36.0									0.53
					Exposed	QUL-ZOO-1	2019	14,270	A	AB	AB	B	Baseline	ns	ns	-1.3	
							2020	-									
							2021	7,226									
							2022	209									

P-value < 0.05
Magnitude of Difference (MOD) < -2
Magnitude of Difference (MOD) > 2

Notes: "-" = no data available. "nc" = no comparison. "ns" = no significance. "nm" = Contrast MODs could not be calculated because the Median Absolute Deviation (MAD) =0. Cells/L = Cells per Litre.

[a] Mean, geometric mean, or median depending on if analysis was conducted on untransformed, log_{10}-transformed, or rank-transformed data.

[b] Magnitude of difference (MOD) calculated for two-way ANOVA as (Exposed Mean - Reference Mean)/SD (or [Mean - Baseline Mean]/SD for temporal comparisons) on the transformed scale, where SD was the pooled standard deviation of the model residuals. MOD calculated for Kruskal-Wallis (i.e., rank-transformed data) as (Exposed Median - Reference Median)/MAD, where MAD was the pooled median absolute deviation.

Table E.2.3: Results of Statistical Comparisons of Phytoplankton Community Endpoints for Quesnel Lake at QUL-ZOO-1 (Exposed) and QUL-ZOO-7 (Reference) Areas in July, 2019 to 2022

Endpoint	Transformation	2-Way ANOVA P-values			Area Type	Area	Year	Measures of Central Tendency[a]	Temporal Contrasts Within Sites								Spatial Comparison Within Years[b]
									Pairwise Comparisons Between Years				MOD Relative to Baseline[b]				
		Area	Year	Area x Year					2019	2020	2021	2022	2019	2020	2021	2022	QUL-ZOO-1
Diatoms (%)	log10	0.518	<0.001	0.271	Reference	QUL-ZOO-7	2019	36.0	A	B	A	B	Baseline	-3.2	ns	-3.4	ns
							2020	12.0									ns
							2021	40.0									ns
							2022	11.0									ns
					Exposed	QUL-ZOO-1	2019	32.0	A	B	A	B	Baseline	-1.9	ns	-3.8	
							2020	17.0									
							2021	33.0									
							2022	8.90									
Chlorophytes (%)	none	0.394	<0.001	0.531	Reference	QUL-ZOO-7	2019	11.0	A	A	A	B	Baseline	ns	ns	-1.4	ns
							2020	13.0									ns
							2021	9.50									ns
							2022	6.10									ns
					Exposed	QUL-ZOO-1	2019	11.0	A	A	A	B	Baseline	ns	ns	-2.4	
							2020	13.0									
							2021	9.30									
							2022	2.50									
Chrysophytes (%)	log10	0.003	<0.001	0.999	Reference	QUL-ZOO-7	2019	29.0	B	B	B	A	Baseline	ns	ns	3.7	0.94
							2020	25.0									1.0
							2021	24.0									1.0
							2022	63.0									0.95
					Exposed	QUL-ZOO-1	2019	35.0	B	B	B	A	Baseline	ns	ns	3.7	
							2020	32.0									
							2021	30.0									
							2022	77.0									
Cryptomonads (%)	none	-	-	0.006	Reference	QUL-ZOO-7	2019	18.0	B	A	B	B	Baseline	3.2	ns	ns	ns
							2020	37.0									-3.3
							2021	13.0									ns
							2022	17.0									-1.3
					Exposed	QUL-ZOO-1	2019	16.0	A	A	A	A	Baseline	ns	ns	ns	
							2020	18.0									
							2021	12.0									
							2022	9.90									
Cyanobacteria (%)	rank	0.780	0.003	0.716	Reference	QUL-ZOO-7	2019	2.50	B	A	B	B	Baseline	1.5	ns	ns	ns
							2020	6.50									ns
							2021	5.50									ns
							2022	1.30									ns
					Exposed	QUL-ZOO-1	2019	5.50	B	A	B	B	Baseline	3.4	ns	ns	
							2020	15.0									
							2021	1.20									
							2022	0									
Dinoflagellates (%)	log10(x+1)	0.018	<0.001	0.406	Reference	QUL-ZOO-7	2019	1.40	A	B	B	B	Baseline	-1.3	-1.4	-1.7	1.0
							2020	0.560									0.83
							2021	0.520									1.4
							2022	0.320									-0.11
					Exposed	QUL-ZOO-1	2019	2.10	A	B	B	B	Baseline	-1.5	-1.0	-2.8	
							2020	1.10									
							2021	1.40									
							2022	0.250									

P-value < 0.05
Magnitude of Difference (MOD) < -2
Magnitude of Difference (MOD) > 2

Notes: "-" = no data available. "nc" = no comparison. "ns" = no significance. "nm" = Contrast MODs could not be calculated because the Median Absolute Deviation (MAD) =0. Cells/L = Cells per Litre.

[a] Mean, geometric mean, or median depending on if analysis was conducted on untransformed, log_{10}-transformed, or rank-transformed data.

[b] Magnitude of difference (MOD) calculated for two-way ANOVA as (Exposed Mean - Reference Mean)/SD (or [Mean - Baseline Mean]/SD for temporal comparisons) on the transformed scale, where SD was the pooled standard deviation of the model residuals. MOD calculated for Kruskal-Wallis (i.e., rank-transformed data) as (Exposed Median - Reference Median)/MAD, where MAD was the pooled median absolute deviation.

Table E.2.4: Results of Statistical Comparisons of Zooplankton Community Endpoints for Quesnel Lake at QUL-ZOO-1 (Exposed) and QUL-ZOO-7 (Reference) Areas in July, 2019 to 2022

Endpoint	Transformation	2-Way ANOVA P-values			Area Type	Area	Year	Measures of Central Tendency[a]	Temporal Contrasts Within Sites								Spatial Comparison Within Years[b]
									Pairwise Comparisons Between Years				MOD Relative to Baseline[b]				
		Area	Year	Area x Year					2019	2020	2021	2022	2019	2020	2021	2022	QUL-ZOO-1
Calanoida (organisms/L)	log10	0.762	<0.001	0.133	Reference	QUL-ZOO-7	2019	0.210	B	A	B	C	Baseline	2.1	ns	-2.0	ns
							2020	0.420									ns
							2021	0.270									ns
							2022	0.110									ns
					Exposed	QUL-ZOO-1	2019	0.220	B	A	B	C	Baseline	2.6	ns	-1.7	
							2020	0.500									
							2021	0.170									
							2022	0.120									
Cladocera (organisms/L)	log10	0.866	<0.001	0.298	Reference	QUL-ZOO-7	2019	0.180	B	B	A	B	Baseline	ns	1.7	ns	ns
							2020	0.420									ns
							2021	0.360									ns
							2022	0.0970									ns
					Exposed	QUL-ZOO-1	2019	0.140	B	B	A	B	Baseline	ns	1.5	ns	
							2020	0.500									
							2021	0.260									
							2022	0.130									
Copepod Nauplii (organisms/L)	log10	0.001	<0.001	0.137	Reference	QUL-ZOO-7	2019	0.100	B	A	A	A	Baseline	5.4	4.1	4.5	2.4
							2020	1.20									0.30
							2021	0.660									0.99
							2022	0.780									0.97
					Exposed	QUL-ZOO-1	2019	0.300	B	A	A	A	Baseline	3.3	2.7	3.1	
							2020	1.30									
							2021	1.00									
							2022	1.20									
Cyclopoida (organisms/L)	log10	-	-	0.078	Reference	QUL-ZOO-7	2019	0.700	A	A	A	B	Baseline	ns	ns	-1.6	-1.2
							2020	1.10									ns
							2021	0.810									ns
							2022	0.430									ns
					Exposed	QUL-ZOO-1	2019	0.490	B	A	A	AB	Baseline	1.9	1.6	ns	
							2020	0.850									
							2021	0.780									
							2022	0.580									
Rotifera (organisms/L)	log10	0.705	<0.001	0.768	Reference	QUL-ZOO-7	2019	2.00	C	A	AB	B	Baseline	3.6	2.7	1.5	ns
							2020	8.90									ns
							2021	6.00									ns
							2022	3.70									ns
					Exposed	QUL-ZOO-1	2019	2.00	C	A	AB	B	Baseline	3.0	2.3	1.8	
							2020	7.10									
							2021	5.20									
							2022	4.30									
Calanoida (%)	none	0.911	<0.001	0.210	Reference	QUL-ZOO-7	2019	6.70	A	B	C	C	Baseline	-2.2	-2.6	-3.4	ns
							2020	3.90									ns
							2021	3.50									ns
							2022	2.40									ns
					Exposed	QUL-ZOO-1	2019	6.80	A	B	C	C	Baseline	-1.3	-3.6	-3.8	
							2020	5.10									
							2021	2.30									
							2022	2.00									

P-value < 0.05
Magnitude of Difference (MOD) < -2
Magnitude of Difference (MOD) > 2

Notes: "-" = no data available. "nc" = no comparison. "ns" = no significance. "nm" = Contrast MODs could not be calculated because the Median Absolute Deviation (MAD) =0. organisms/L = organisms per Litre.

[a] Mean, geometric mean, or median depending on if analysis was conducted on untransformed, log_{10}-transformed, or rank-transformed data.
[b] Magnitude of difference (MOD) calculated for two-way ANOVA as (Exposed Mean - Reference Mean)/SD (or [Mean - Baseline Mean]/SD for temporal comparisons) on the transformed scale, where SD was the pooled standard deviation of the model residuals. MOD calculated for Kruskal-Wallis (i.e., rank-transformed data) as (Exposed

Table E.2.4: Results of Statistical Comparisons of Zooplankton Community Endpoints for Quesnel Lake at QUL-ZOO-1 (Exposed) and QUL-ZOO-7 (Reference) Areas in July, 2019 to 2022

Endpoint	Transformation	2-Way ANOVA P-values			Area Type	Area	Year	Measures of Central Tendency[a]	Temporal Contrasts Within Sites								Spatial Comparison Within Years[b]
									Pairwise Comparisons Between Years				MOD Relative to Baseline[b]				
		Area	Year	Area x Year					2019	2020	2021	2022	2019	2020	2021	2022	QUL-ZOO-1
Cladocera (%)	log10	0.946	<0.001	0.321	Reference	QUL-ZOO-7	2019	5.60	A	B	A	B	Baseline	-3.7	ns	-2.8	ns
							2020	3.90									ns
							2021	4.40									ns
							2022	1.80									ns
					Exposed	QUL-ZOO-1	2019	4.40	A	B	A	B	Baseline	-2.2	ns	-2.0	
							2020	5.10									
							2021	3.50									
							2022	2.00									
Copepod Nauplii (%)	log10	<0.001	<0.001	0.106	Reference	QUL-ZOO-7	2019	3.20	B	A	A	A	Baseline	2.8	2.3	3.7	2.7
							2020	9.80									0.71
							2021	8.00									1.3
							2022	15.0									0.64
					Exposed	QUL-ZOO-1	2019	9.40	B	A	A	A	Baseline	0.81	0.94	1.7	
							2020	13.0									
							2021	14.0									
							2022	19.0									
Cyclopoida (%)	none	-	-	0.060	Reference	QUL-ZOO-7	2019	22.0	A	B	B	B	Baseline	-3.8	-3.7	-4.2	-2.0
							2020	9.90									ns
							2021	10.0									ns
							2022	8.70									ns
					Exposed	QUL-ZOO-1	2019	15.0	A	B	B	B	Baseline	-2.1	-1.6	-1.9	
							2020	9.00									
							2021	10.0									
							2022	9.50									
Rotifera (%)	log10	0.330	0.051	0.881	Reference	QUL-ZOO-7	2019	62.0	B	A	AB	AB	Baseline	1.5	ns	ns	ns
							2020	74.0									ns
							2021	73.0									ns
							2022	70.0									ns
					Exposed	QUL-ZOO-1	2019	63.0	B	A	AB	AB	Baseline	0.76	ns	ns	
							2020	69.0									
							2021	70.0									
							2022	67.0									

P-value < 0.05
Magnitude of Difference (MOD) < -2
Magnitude of Difference (MOD) > 2

Notes: "-" = no data available. "nc" = no comparison. "ns" = no significance. "nm" = Contrast MODs could not be calculated because the Median Absolute Deviation (MAD) =0. organisms/L = organisms per Litre.

[a] Mean, geometric mean, or median depending on if analysis was conducted on untransformed, log_{10}-transformed, or rank-transformed data.

[b] Magnitude of difference (MOD) calculated for two-way ANOVA as (Exposed Mean - Reference Mean)/SD (or [Mean - Baseline Mean]/SD for temporal comparisons) on the transformed scale, where SD was the pooled standard deviation of the model residuals. MOD calculated for Kruskal-Wallis (i.e., rank-transformed data) as (Exposed Median - Reference Median)/MAD, where MAD was the pooled median absolute deviation.

APPENDIX E.3
ZOOPLANKTON TISSUE QUALITY

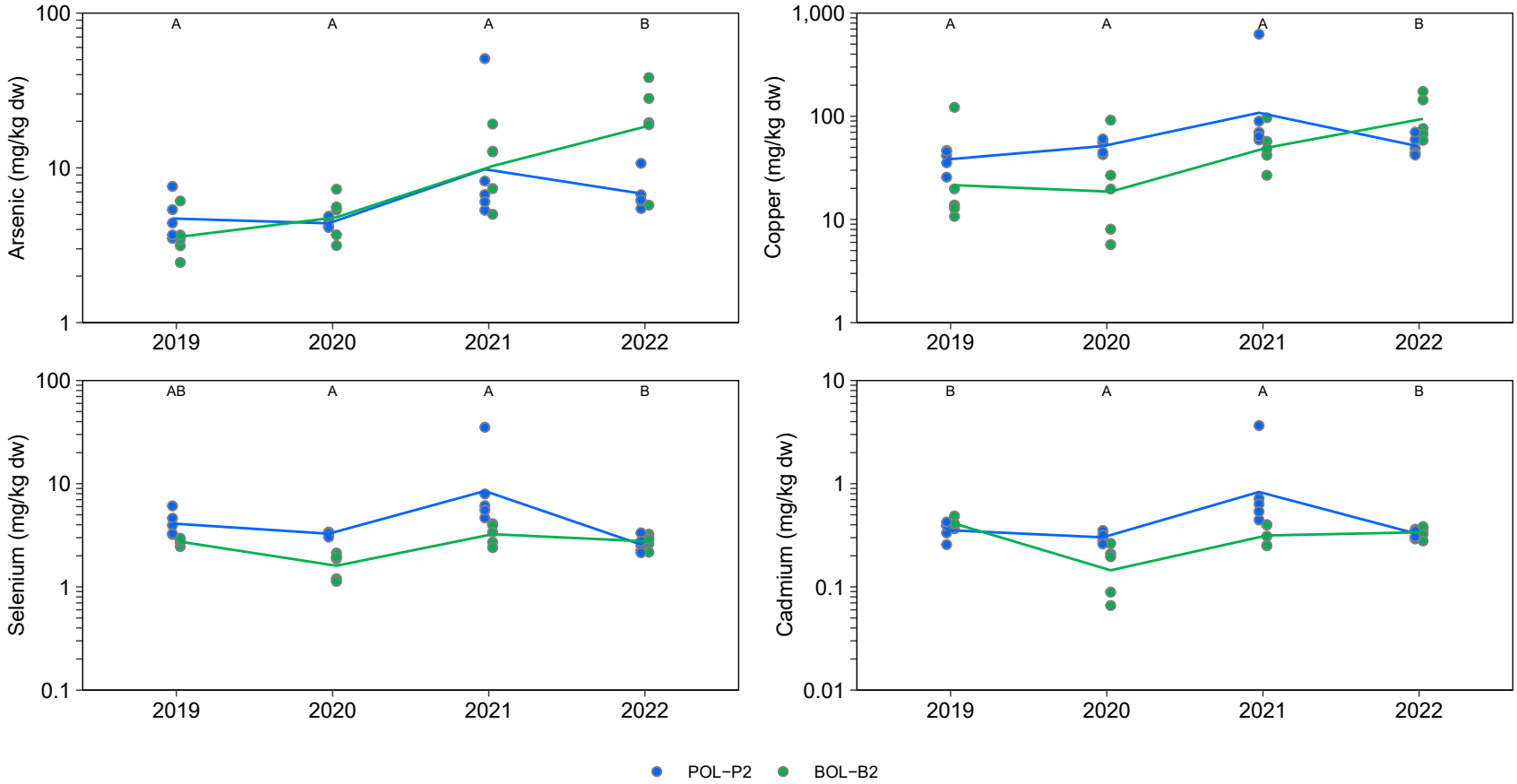

Figure E.3.1: Zooplankton Tissue Primary and Secondary Analyte Concentrations for Polley Lake (POL-P2; Exposed) and Bootjack Lake (BOL-B2; Reference) Areas for which a Significant Area x Year Effect was Detected in July, 2019 to 2022

Notes: dw = dry weight. Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed : Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed : Reference). Only years with samples from both reference and exposed areas are plotted.

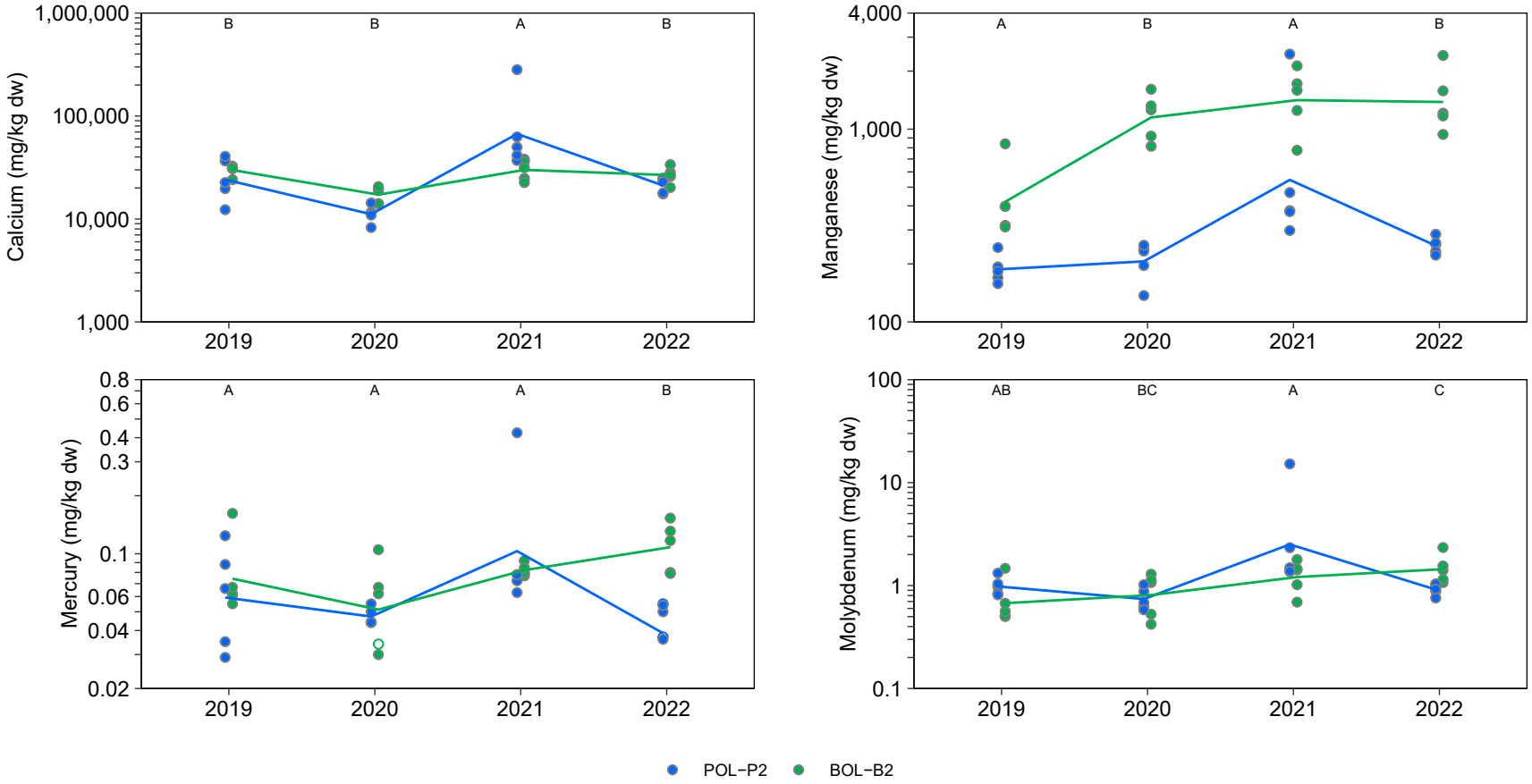

Figure E.3.1: Zooplankton Tissue Primary and Secondary Analyte Concentrations for Polley Lake (POL-P2; Exposed) and Bootjack Lake (BOL-B2; Reference) Areas for which a Significant Area x Year Effect was Detected in July, 2019 to 2022

Notes: dw = dry weight. Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed : Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed : Reference). Only years with samples from both reference and exposed areas are plotted.

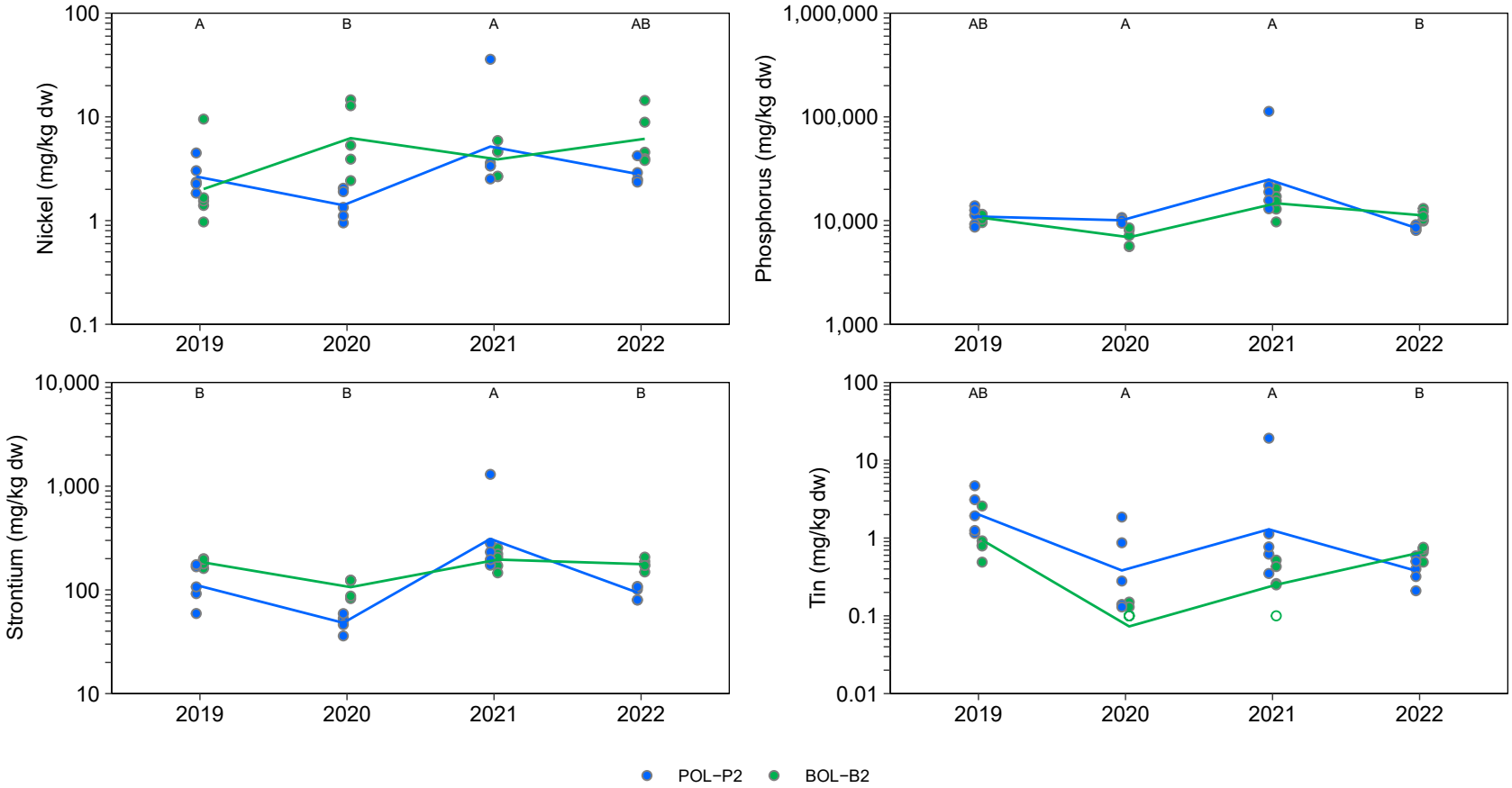

Figure E.3.1: Zooplankton Tissue Primary and Secondary Analyte Concentrations for Polley Lake (POL-P2; Exposed) and Bootjack Lake (BOL-B2; Reference) Areas for which a Significant Area x Year Effect was Detected in July, 2019 to 2022

Notes: dw = dry weight. Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed : Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed : Reference). Only years with samples from both reference and exposed areas are plotted.

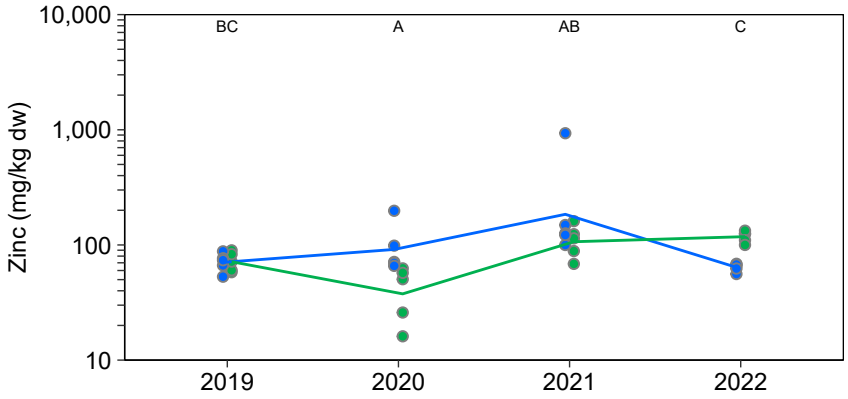

Figure E.3.1: Zooplankton Tissue Primary and Secondary Analyte Concentrations for Polley Lake (POL-P2; Exposed) and Bootjack Lake (BOL-B2; Reference) Areas for which a Significant Area x Year Effect was Detected in July, 2019 to 2022

Notes: dw = dry weight. Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed : Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed : Reference). Only years with samples from both reference and exposed areas are plotted.

Table E.3.1: Statistical Comparisons of Exposed - Reference Relative Differences of Metal Concentrations in Zooplankton Tissue for Polley Lake (POL-P2; Exposed) and Bootjack Lake (BOL-B2; Reference) Areas in July, 2019 to 2022

Parameter	Data Transformation	Two-way ANOVA P-values			(Exposed – Reference) Contrasts Among Periods[a]				Magnitude of Difference in (Exposed – Reference) Relative to Baseline Period (%)[b]				Magnitude of Difference for Polley Mean Relative to Bootjack (%)[c]			
					Post-Breach Period				Post-Breach Period				Post-Breach Period			
		Area	Year	Area × Year	2019	2020	2021	2022	2019	2020	2021	2022	2019	2020	2021	2022
Aluminum	MLE	0.328	<0.001	0.357	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns
Antimony	MLE	0.498	<0.001	0.004	BC	AB	A	C	baseline	ns	262	ns	ns	ns	194	-64
Arsenic	MLE	0.183	<0.001	0.021	A	A	A	B	baseline	ns	ns	-72	ns	ns	ns	-64
Barium	MLE	<0.001	<0.001	0.383	A	A	A	A	baseline	ns	ns	ns	-61			
Beryllium	MLE	0.093	<0.001	0.636	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns
Bismuth	MLE	0.099	0.770	0.062	<LRL	<LRL	A	A	<LRL	<LRL	baseline	ns	<LRL	<LRL	ns	ns
Boron	MLE	0.275	0.001	0.160	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns
Cadmium	MLE	0.006	<0.001	0.002	B	A	A	B	baseline	141	205	ns	ns	109	164	ns
Calcium	MLE	0.883	<0.001	<0.001	B	B	A	B	baseline	ns	177	ns	ns	-35	124	ns
Cesium	MLE	0.014	<0.001	0.223	A	A	A	A	baseline	ns	ns	ns	-42			
Chromium	MLE	0.061	<0.001	0.055	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns
Cobalt	MLE	0.165	<0.001	0.127	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns
Copper	MLE	0.047	0.003	0.027	A	A	A	B	baseline	ns	ns	-69	ns	177	ns	ns
Iron	MLE	0.005	<0.001	0.258	A	A	A	A	baseline	ns	ns	ns	-46			
Lead	MLE	0.457	0.005	0.096	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns
Lithium	MLE	0.279	0.651	0.028	<LRL	<LRL	A	B	<LRL	<LRL	baseline	-67	<LRL	<LRL	ns	-57
Magnesium	MLE	0.683	<0.001	0.026	AB	B	A	B	baseline	ns	ns	ns	ns	ns	80	ns
Manganese	MLE	<0.001	<0.001	0.010	A	B	A	B	baseline	-60	ns	-60	-55	-82	-61	-82
Mercury	MLE	0.085	0.048	0.016	A	A	A	B	baseline	ns	ns	-55	ns	ns	ns	-64
Molybdenum	MLE	0.367	0.002	0.022	AB	BC	A	C	baseline	ns	ns	-56	ns	ns	107	ns
Nickel	MLE	0.055	0.134	0.003	A	B	A	AB	baseline	-83	ns	ns	ns	-77	ns	-54
Phosphorus	MLE	0.137	<0.001	0.027	AB	A	A	B	baseline	ns	ns	ns	ns	ns	69	ns
Potassium	MLE	0.267	0.003	0.103	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns
Rubidium	MLE	0.173	0.008	0.122	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns
Selenium	MLE	<0.001	<0.001	0.004	AB	A	A	B	baseline	ns	ns	ns	50	104	162	ns
Silver	MLE	<0.001	0.002	0.271	A	A	A	A	baseline	ns	ns	ns	-46			
Sodium	MLE	0.036	<0.001	0.058	A	A	A	A	baseline	ns	ns	ns	28			
Strontium	MLE	0.006	<0.001	<0.001	B	B	A	B	baseline	ns	162	ns	-39	-55	58	-47
Tellurium	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Thallium	MLE	<0.001	0.007	0.013	C	AB	A	BC	baseline	178	285	ns	-87	-64	-49	-84
Tin	MLE	0.003	<0.001	0.009	AB	A	A	B	baseline	ns	ns	ns	ns	424	415	ns
Titanium	MLE	0.857	<0.001	0.347	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns
Uranium	MLE	<0.001	<0.001	0.192	A	A	A	A	baseline	ns	ns	ns	-66			
Vanadium	MLE	0.679	<0.001	0.529	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns
Zinc	MLE	0.197	0.002	<0.001	BC	A	AB	C	baseline	146	ns	ns	ns	143	73	-46
Zirconium	MLE	0.094	<0.001	0.745	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns

Area x Year or Area P-value < 0.05.

Contrast is significant (α = 0.05) and magnitude of difference is positive.

Contrast is significant (α = 0.05) and magnitude of difference is negative.

Notes: "-" = no data available, nt = not tested because all data were reported below the method detection limit (LRL) or because there were only data for a single time period, ns = not significant, baseline= first year of data included in analysis, <LRL = greater than 50% LRL data for both stations so the time period was omitted from the analysis, ANOVA = two way analysis of variance, MLE = censored regression using maximum likelihood estimation. Data were analysed in units of mg/kg dry weight. Merged cells across years indicate that the Area × Time term was not significant, therefore MOD is for all years combined. Only years with samples from both reference and exposed were included in the analysis.

[a] Years that share a letter (e.g., A,B,C) had ratios of concentrations (POL-P2:BOL-B2) that do not differ significantly among years. Letters are assigned such that A is assigned to the year with the highest ratio of concentrations (POL-P2:BOL-B2).

[b] Magnitude of difference (MOD) calculated on backtransformed least-squares means for the observed time period as $(Exp_{observed} - Exp_{predicted})/(Exp_{predicted}) \times 100\%$ where $Exp_{predicted} = Ref_{observed} + (Exp_{baseline} - Ref_{baseline})$.

[c] Magnitude of difference (MOD) calculated on backtransformed least-squares means as (Exp-Ref)/Ref x 100%.

Table E.3.2: Seasonal Kendall Trend Analysis of Primary and Secondary Analyte Concentrations in Post-Breach Surface Water for Polley Lake (POL-P1, POL-P2; Exposed) Monitoring Stations, 2015 to 2022

Analyte		Surface			
		POL-P1 (Exposed)		POL-P2 (Exposed)	
		P-Value	Slope	P-Value	Slope
Total Metals	Arsenic	<0.001	-10	<0.001	-9.7
	Barium	<0.001	-2.7	<0.001	-2.7
	Cadmium	-	-	-	-
	Calcium	<0.001	-2.2	<0.001	-2.3
	Cobalt	-	-	-	-
	Copper	0.047	1.6	0.030	2.0
	Iron	-	-	-	-
	Manganese	<0.001	-13	<0.001	-11
	Molybdenum	<0.001	-9.0	<0.001	-9.0
	Nickel	-	-	-	-
	Phosphorus	0.032	-5.0	0.013	-4.5
	Selenium	<0.001	-5.8	<0.001	-6.3
	Silver	-	-	-	-
	Sodium	<0.001	-3.9	<0.001	-3.8
	Strontium	<0.001	-3.6	<0.001	-4.0
	Tin	-	-	-	-
	Titanium	-	-	-	-
	Vanadium	<0.001	3.8	<0.001	4.0
	Uranium	<0.001	-5.7	<0.001	-6.4
	Zinc	-	-	-	-
Dissolved Metals	GEF Dissolved Copper Chronic	0.002	5.2	<0.001	6.2
	GEF Dissolved Copper Acute	0.002	4.7	<0.001	5.8
	Arsenic	<0.001	-9.0	<0.001	-8.9
	Barium	<0.001	-2.2	<0.001	-2.1
	Cadmium	-	-	-	-
	Calcium	<0.001	-2.4	<0.001	-2.2
	Cobalt	-	-	-	-
	Copper	<0.001	4.2	<0.001	3.4
	Iron	-	-	-	-
	Manganese	0.042	-15	0.020	-15
	Molybdenum	<0.001	-8.1	<0.001	-8.5
	Nickel	-	-	-	-
	Selenium	<0.001	-6.6	<0.001	-6.9
	Silver	-	-	-	-
	Sodium	<0.001	-3.6	<0.001	-3.6
	Strontium	<0.001	-3.7	<0.001	-3.4
	Tin	-	-	-	-
	Titanium	-	-	-	-
	Vanadium	<0.001	5.8	<0.001	5.6
	Uranium	<0.001	-4.4	<0.001	-4.6
	Zinc	-	-	-	-

P-Value < 0.05

Significant decreasing temporal trend (Seasonal Kendall test for monotonic trend at α = 0.05). Value reported is the Sen's slope reported as a percentage of the median concentration or value.

Significant increasing temporal trend (Seasonal Kendall test for monotonic trend at α = 0.05). Value reported is the Sen's slope reported as a percentage of the median concentration or value.

Notes: GEF = Guideline Exceedance Factor. NS = no significant temporal trend (Seasonal Kendall test for monotonic trend at α = 0.05). "-" not enough detected data to test for trend (> 75 % of values below laboratory reporting limit).

Table E.3.3: Statistical Comparisons of Exposed - Reference Relative Differences of Metal Concentrations in Zooplankton Tissue for Quesnel Lake at QUL-ZOO-1 (Exposed) and QUL-ZOO-7 (Reference) Areas in July, 2019 to 2022

Parameter	Data Transformation	Two-way ANOVA P-values			(Exposed ─ Reference) Contrasts Among Periods[a]				Magnitude of Difference in (Exposed ─ Reference) Relative to Baseline Period (%)[b]				Magnitude of Difference for QUL-ZOO-1 Mean Relative to QUL-ZOO-7 (%)[c]			
		Area	Year	Area × Year	Post-Breach Period				Post-Breach Period				Post-Breach Period			
					2019	2020	2021	2022	2019	2020	2021	2022	2019	2020	2021	2022
Aluminum	MLE	0.041	0.798	0.948	A	A	A	A	baseline	ns	ns	ns	-32			
Antimony	MLE	0.738	0.332	0.310	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns
Arsenic	MLE	0.301	0.015	0.511	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns
Barium	MLE	0.299	0.114	0.797	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns
Beryllium	MLE	0.006	0.723	0.097	A	A	A	A	baseline	ns	ns	ns	-40			
Bismuth	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Boron	MLE	0.098	<0.001	0.035	A	B	<LRL	AB	baseline	103	<LRL	ns	-44	ns	<LRL	ns
Cadmium	MLE	0.091	<0.001	0.385	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns
Calcium	MLE	0.709	0.002	0.265	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns
Cesium	MLE	0.026	0.911	0.952	A	A	A	A	baseline	ns	ns	ns	-29			
Chromium	MLE	0.042	0.093	0.954	A	A	A	A	baseline	ns	ns	ns	-31			
Cobalt	MLE	0.023	0.953	0.857	A	A	A	A	baseline	ns	ns	ns	-30			
Copper	MLE	0.202	0.139	0.713	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns
Iron	MLE	0.048	0.584	0.958	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns
Lead	MLE	0.005	<0.001	0.100	A	A	A	A	baseline	ns	ns	ns	-41			
Lithium	MLE	0.034	0.293	0.763	A	A	A	A	baseline	ns	ns	ns	-35			
Magnesium	MLE	0.451	0.008	0.547	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns
Manganese	MLE	0.031	0.241	0.640	A	A	A	A	baseline	ns	ns	ns	-27			
Mercury	MLE	0.505	0.056	0.970	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns
Molybdenum	MLE	0.472	0.182	0.292	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns
Nickel	MLE	0.264	0.355	0.777	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns
Phosphorus	MLE	0.739	<0.001	0.139	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns
Potassium	MLE	0.869	<0.001	0.071	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns
Rubidium	MLE	0.854	<0.001	0.066	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns
Selenium	MLE	0.397	<0.001	0.370	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns
Silver	MLE	0.334	<0.001	0.063	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns
Sodium	MLE	0.666	0.002	0.083	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns
Strontium	MLE	0.614	<0.001	0.423	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns
Tellurium	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Thallium	MLE	0.265	<0.001	0.408	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns
Tin	MLE	0.208	<0.001	0.868	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns
Titanium	MLE	0.026	0.606	0.959	A	A	A	A	baseline	ns	ns	ns	-38			
Uranium	MLE	0.082	0.555	0.879	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns
Vanadium	MLE	0.087	0.135	0.947	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns
Zinc	MLE	0.599	<0.001	0.434	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns
Zirconium	MLE	0.129	0.895	0.974	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns

Area x Year or Area P-value < 0.05.
Contrast is significant (α = 0.05) and magnitude of difference is positive.
Contrast is significant (α = 0.05) and magnitude of difference is negative.

Notes: "-" = no data available, nt = not tested because all data were reported below the method detection limit (LRL) or because there were only data for a single time period, ns = not significant, baseline= first year of data included in analysis, <LRL = greater than 50% LRL data for both stations so the time period was omitted from the analysis, ANOVA = two way analysis of variance, MLE = censored regression using maximum likelihood estimation. Data were analysed in units of mg/kg dry weight. Merged cells across years indicate that the Area × Time term was not significant, therefore MOD is for all years combined. Only years with samples from both reference and exposed were included in the analysis.

[a] Years that share a letter (e.g., A,B,C) had ratios of concentrations (QUL-ZOO-1 [Exposed] : QUL-ZOO-7 [Reference]) that do not differ significantly among years. Letters are assigned such that A is assigned to the year with the highest ratio of concentrations (QUL-ZOO-1 [Exposed]:QUL-ZOO-7 [Reference]).

[b] Magnitude of difference (MOD) calculated on backtransformed least-squares means for the observed time period as $(Exp_{observed} - Exp_{predicted})/(Exp_{predicted}) \times 100\%$ where $Exp_{predicted} = Ref_{observed} + (Exp_{baseline} - Ref_{baseline})$.

[c] Magnitude of difference (MOD) calculated on backtransformed least-squares means as (Exp-Ref)/Ref x 100%.

Table E.3.4: Seasonal Kendall Trend Analysis of Primary and Secondary Analyte Concentrations in Post-Breach Surface Water for Quesnel Lake at Exposed (QUL-18, QUL-2a) and Reference (QUL-120) Monitoring Stations, 2015 to 2022

	Analyte	Surface					
		QUL-18 (Exposed)		QUL-2a (Exposed)		QUL-120a (Reference)	
		P-Value	Slope	P-Value	Slope	P-Value	Slope
Total Metals	Arsenic	0.186	NS	NS	-	NS	-
	Barium	0.243	NS	0.307	NS	NS	-
	Cadmium	-	-	-	-	-	-
	Calcium	0.097	NS	0.040	-0.89	NS	-
	Cobalt	-	-	-	-	-	-
	Copper	0.384	NS	0.336	NS	NS	-
	Iron	-	-	-	-	-	-
	Manganese	0.032	5.2	0.303	NS	NS	-
	Molybdenum	0.559	NS	0.156	NS	NS	-
	Nickel	-	-	-	-	-	-
	Phosphorus	0.059	NS	<0.001	28	NS	-
	Selenium	0.080	NS	0.001	7.3	NS	-
	Silver	-	-	-	-	-	-
	Sodium	0.436	NS	0.307	NS	NS	-
	Strontium	0.023	-1.6	0.069	NS	NS	-
	Tin	-	-	-	-	-	-
	Titanium	-	-	-	-	-	-
	Vanadium	-	-	-	-	-	-
	Uranium	0.011	-2.2	0.149	NS	NS	-
	Zinc	-	-	-	-	-	-
Dissolved Metals	GEF Dissolved Copper Chronic	0.282	NS	0.223	NS	NS	-
	GEF Dissolved Copper Acute	0.208	NS	0.403	NS	NS	-
	Arsenic	0.387	NS	0.136	NS	NS	-
	Barium	0.146	NS	0.033	1.6	NS	-
	Cadmium	-	-	-	-	-	-
	Calcium	0.559	NS	0.060	NS	NS	-
	Cobalt	-	-	-	-	-	-
	Copper	0.256	NS	NS	-	NS	-
	Iron	-	-	-	-	-	-
	Manganese	0.771	NS	0.853	NS	NS	-
	Molybdenum	0.020	2.9	0.009	2.8	NS	-
	Nickel	-	-	-	-	-	-
	Selenium	0.002	7.3	0.009	6.8	NS	-
	Silver	-	-	-	-	-	-
	Sodium	0.173	NS	0.004	1.8	NS	-
	Strontium	0.777	NS	0.585	NS	NS	-
	Tin	-	-	-	-	-	-
	Titanium	-	-	-	-	-	-
	Vanadium	-	-	-	-	-	-
	Uranium	0.453	NS	0.174	NS	NS	-
	Zinc	-	-	-	-	-	-

P-Value < 0.05

Significant decreasing temporal trend (Seasonal Kendall test for monotonic trend at α = 0.05). Value reported is the Sen's slope reported as a percentage of the median concentration or value.

Significant increasing temporal trend (Seasonal Kendall test for monotonic trend at α = 0.05). Value reported is the Sen's slope reported as a percentage of the median concentration or value.

Notes: GEF = Guideline Exceedance Factor. NS = no significant temporal trend (Seasonal Kendall test for monotonic trend at α = 0.05). "-" not enough detected data to test for trend (> 75 % of values below laboratory reporting limit).

APPENDIX E.4
BENTHIC COMMUNITY

APPENDIX E4 RESOLVING MIXED-LEVELS OF TAXONOMIC RESOLUTION FOR BENTHIC INVERTEBRATES

E.4.1 INTRODUCTION 1
E.4.2 DECISION KEY 3
E.4.3 REFERENCES 4

E.4.1 INTRODUCTION

Processing of benthic invertebrate data for ecological assessment generally involves determining taxonomic richness (number of taxa present) as well as community composition, which is typically assessed using abundances (and/or density) of all taxa present and their relative proportion of the total community. Taxonomic richness and community composition can be informative metrics on their own, however they are also utilized in the calculation of diversity indices (e.g. Simpson's Evenness and Simpson's Diversity). Determination of taxonomic richness and community composition from taxonomic data can be complicated by inconsistencies in taxonomic data, relating to the taxonomic level to which organisms can practicably be identified by the laboratory ("resolution"). Taxonomists endeavour to classify organisms within the most specific taxon (a defined taxonomic identity of any rank) possible, generally Genus or Species, however specimens that are damaged or are in an early developmental stage may lack the morphological features necessary to confirm an identification to the same level that can be achieved for some adult specimens. Furthermore, the information needed to confirm the identification of specimens may not be available in taxonomic keys or other resources. When individuals of a single taxon are identified to different levels of resolution within a single sample they are considered redundant or "ambiguous" taxa. The presence of these ambiguous taxa may result in inflated estimates of richness or distorted patterns of diversity across sites. For example, some specimens may be identified to the genus level (e.g., *Baetis*) while others are identified to the species level (e.g., *Baetis tricaudatus*). If ambiguous taxa are not resolved, then the coarser-resolution taxon (i.e., the Genus-level, *Baetis*) is counted as a unique taxon when it may actually be the same species as the finer-level taxon (i.e., species-level, *B. tricaudatus*). Therefore, one consequence of the common practice of identifying organisms to the lowest practicable taxonomic level (LPL) is that the "species list" (complete list of taxa identified) from any site contains a mixture of taxa (or "mixed-level") wherein an individual taxon may have multiple specimens identified to several different levels of taxonomic resolution. As a result, benthic invertebrate data typically comprise a mixture of identification levels due to difficulties in achieving a uniform Species, Genus, or even Family-level identification for aquatic macroinvertebrates (Cranston 1990) and must undergo additional consolidation steps prior to data analysis.

At least four options are available for dealing with taxa identified to mixed-levels of taxonomic resolution:

1. remove data for any organisms identified to a level less-specific than the target resolution (i.e., anything not at the Genus or Species level);

2. group all data for any organisms identified to a level less-specific than the target resolution into an "Other" group, a standalone but undefined taxon;

3. proportionally distribute data for any organisms identified to a level less-specific than the target resolution into values for organisms positively identified to target resolution according to the ratios of those positively identified taxa (i.e. “rolling down” unidentified taxa to more specific taxonomic levels); or

4. combine all related taxa least-specific taxon to which consistent identification is possible (i.e. “rolling up” unidentified taxa to less-specific taxonomic levels – often family-level).

Option 1 (though sometimes used) is unsatisfactory because a bias is introduced into the sample (because difficult to identify taxa are not randomly distributed, but rather occur more frequently in particular Classes, Orders, and Families). The second option (also sometimes used) is unsatisfactory because organisms grouped as “Other” contribute no useful information (beyond increasing the total density estimate), and complicate further analyses. The third option assumes that the ratio of taxa among ambiguous taxa is the same as in specimens of identified decisively, which may or may not be accurate. The fourth option is most conservative but may lead to a significant loss of data. For example, specimens of the Genera *Baetis* and *Pseudocloeon* might be lumped together and analyzed as Baetidae. The preferred option for analysis depends on the distribution of the organisms among taxa. If identified specimens in the two genera above constitute only 10% of the total abundance, it may be most appropriate to lump them together with the other 90% in the less-specific taxon (Family: Baetidae). Conversely, if 90% of the identified organisms fall into the two Genera, it is more defensible to apportion the ambiguous taxa identified only to Baetidae (Family) into the values for specimens identified to Genus, and any resulting error may not seriously bias the analysis. In order to standardize the decision-making process, reduce subjectivity, and improve the efficiency of benthic community data processing, Minnow has developed and applied a decision key which is used in the processing of all benthic invertebrate community data.

E.4.2 DECISION KEY

Resolution of redundant or ambiguous taxa was achieved through implementation of a decision key that dictated criteria for data processing (Figure E.4.1). The first two options for dealing with taxa identified to mixed-levels of taxonomic resolution outlined in Section E.4.1 were considered unsatisfactory, therefore the decision key makes use of abundance and richness criteria to apply options 3 (roll-down) and 4 (roll-up) for each level of the taxonomic hierarchy. This method preserves as much detailed taxonomic information as possible, while addressing issues of taxonomic ambiguities. The decision key was modified from the Puget Sound Long-Term Marine Sediment Benthic Invertebrate Summary and is outlined below (Weakland et al. 2018).

The decision key rules are summarised as follows (see Figure E.4.1 for details).

- If identifications have not been taken to the same level consistently over multiple years of monitoring, data are rolled up to a less-specific taxonomic level. If identifications have been taken to the same level consistently over multiple years or only one year of data is available, they are kept at their respective taxonomic levels.
- If for a taxa identified to mixed-levels of resolution it is known that differentiating among specimens at more-specific levels of identification is notably challenging (e.g. due to inconsistencies in taxonomic keys or fragility of defining features) then all taxa are rolled up to a less-specific taxonomic level. If the difficulty of identifications are of mixed levels of difficulty, then easy-to-identify taxa are left at their respective level of identification, whereas difficult-to-identify taxa are rolled up to a less-specific level. If the identifications are easy, then they are kept at their respective taxonomic levels.
- For examples that have satisfied the above criteria, if there are no more-specific levels of identification or there are no organisms identified to a more-specific taxon, they are left at that level of identification.

E.4.3 REFERENCES

Cranston, P.S. 1990. Biomonitoring and invertebrate taxonomy. Environmental Monitoring and Assessment 14: 265-273

Weakland, S., V. Partridge, and M. Dutch. 2018. Sediment Quality in Puget Sound: Changes in chemistry, toxicity, and benthic invertebrates at multiple geographic scales, 1989–2015. Publication Number: 18-03-004.https://fortress.wa.gov/ecy/publications/SummaryPages/1803004.html

Identifications have NOT been taken to the same level consistently over multiple years

Identifications have been taken to the same level consistently over multiple years (or only 1 year of data available)

More specific identifications are not easily achievable

Mixed levels of difficulty to achieve identification at more specific levels

More specific identifications are easily achievable

Leave easy-to-identify levels separate and roll up levels that are difficult to identify into the less specific taxonomic level

Taxon is redundant (representatives of ≥1 more-specific taxon identified in samples)

Taxon is at most-specific identified level and there are no redundant more-specifically identified taxa

Roll Up to less-specific level

Taxon level contains only one more specific identification

Taxon level contains >1 more specific identification

Keep assigned identifications at their levels

Abundance at less-specifically identified level is ≤50% of the combined total abundance of that taxon and more specifically identified taxa (family/genus/species, etc.).

Abundance at less-specific level is >50% of the combined total abundance of that taxon and more-specifically identified taxa (family/genus/species, etc.)

Proportionally assign less-specifically identified abundance to more specifically identified taxa

Less-specifically identified taxon contains only 2 more specific identifications and ≥50% of the combined abundance of that taxon and more specifically identified taxa

Less-specifically identified taxon contains >2 more specific identifications and ≥50% of the combined abundance of that taxon and more specifically identified taxa

Roll to higher level

Leave the less AND more-specific levels of identification

Decision Key for Resolving Mixed Levels of Taxonomic Resolution

Date: March 2023
Project 2272202.0029

minnow environmental inc.

Figure E.4.1

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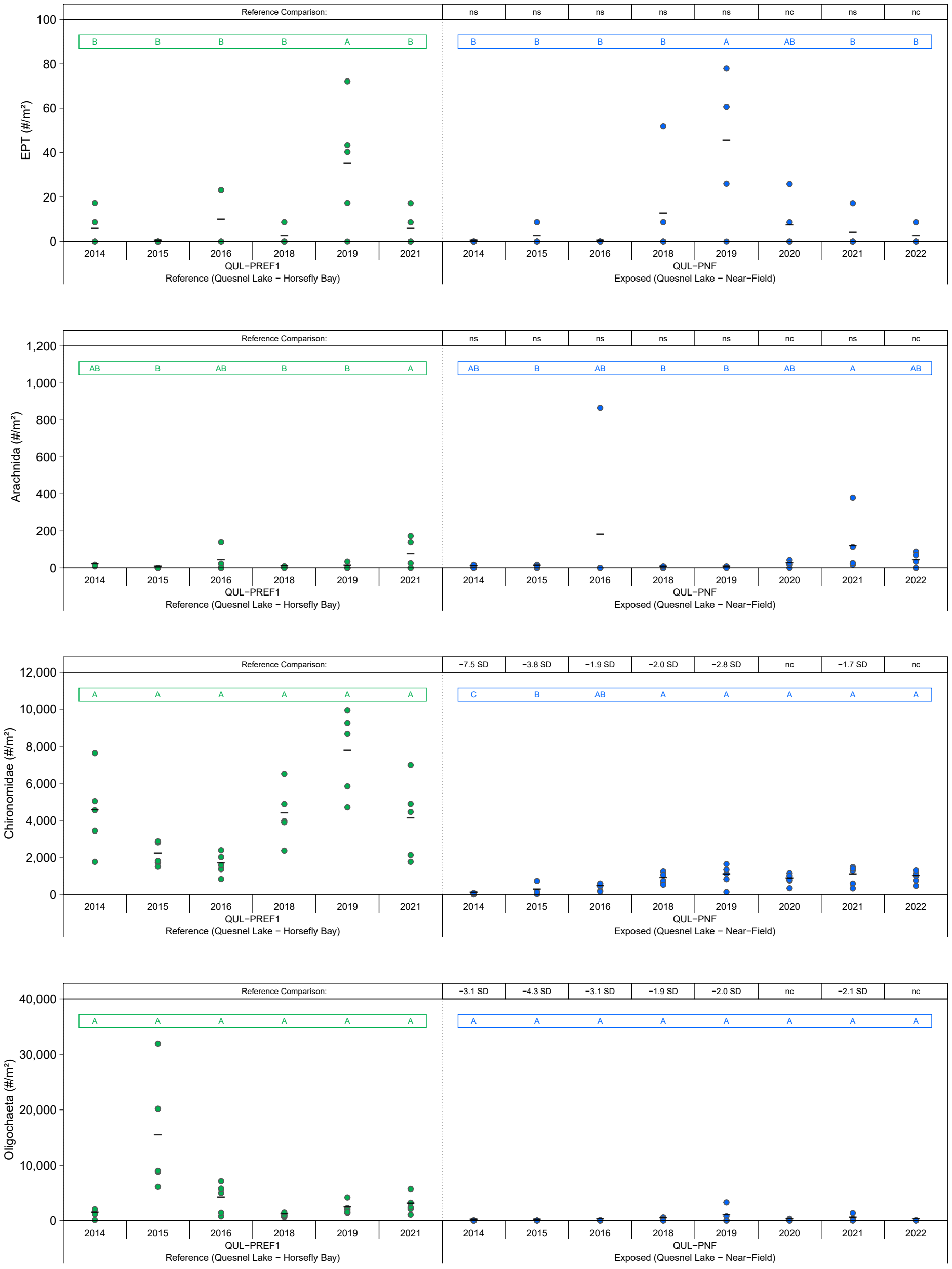
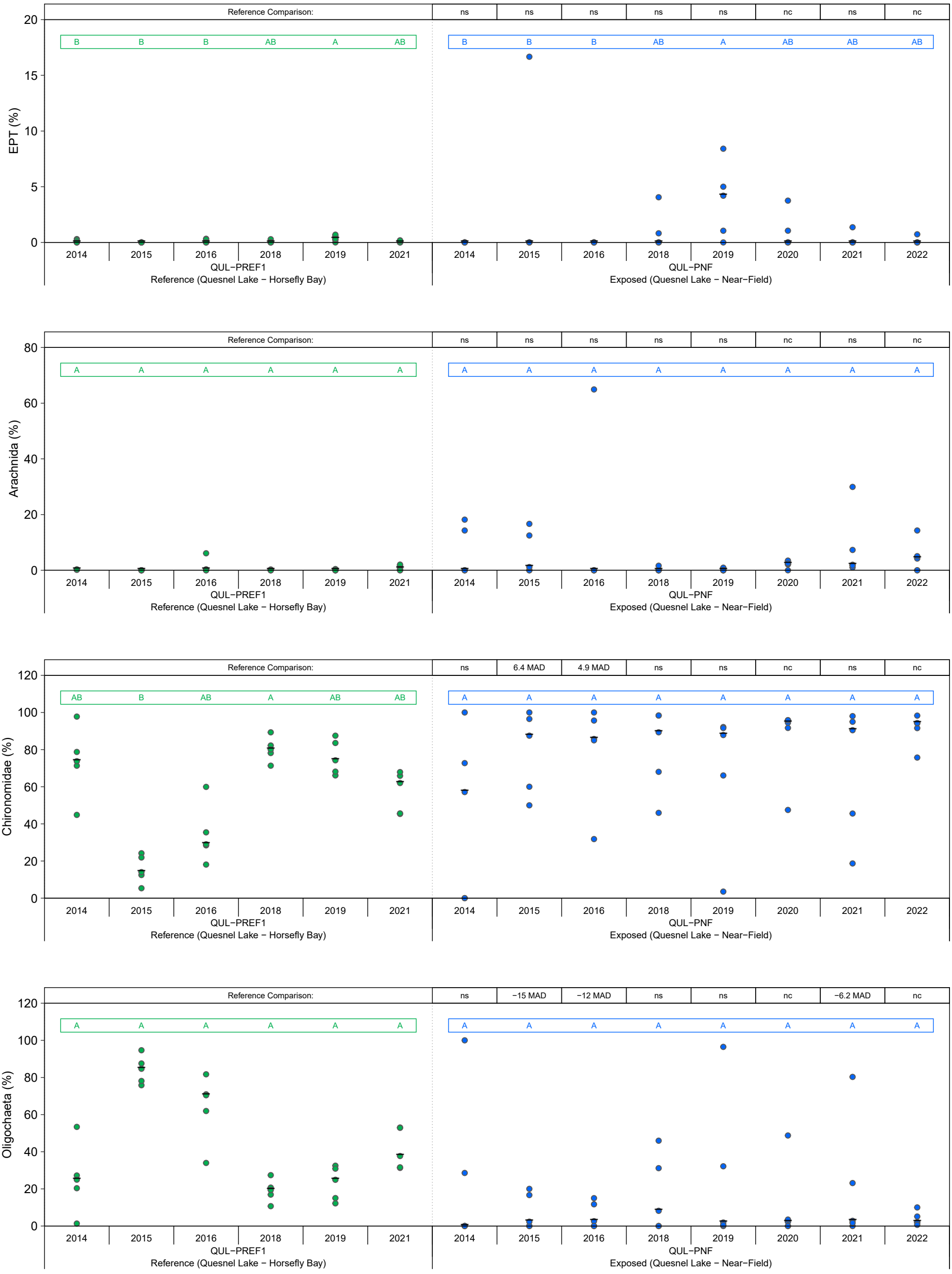


Figure E.4.2: Benthic Invertebrate Community Endpoints for Quesnel Lake at QUL−PNF (Exposed) and QUL−PREF1 (Reference) Deep Areas, 2014 to 2022

Notes: Black bars represent measures of central tendency (mean, geometric mean, or median depending on if analysis was conducted on untransformed, log10−transformed or rank−transformed data). Coloured letters represent significant (p−value <0.1) post−hoc comparisons within areas over time; years that share a letter of the same colour (e.g., A, B) within a box of the same colour do not differ significantly within an area. A number above the plot indicates significant exposed vs. reference post−hoc comparisons within a given year. The magnitude of difference (MOD) for these significant post−hoc comparisons is expressed in units of standard deviation (SD) or median absolute deviations (MAD; if the data were rank−transformed prior to analysis) relative to reference. 'nc' indicates no comparisons were possible; 'ns' indicates a non−significant contrast; 'nm' indicates that the MOD could not be calculated because MAD = 0.



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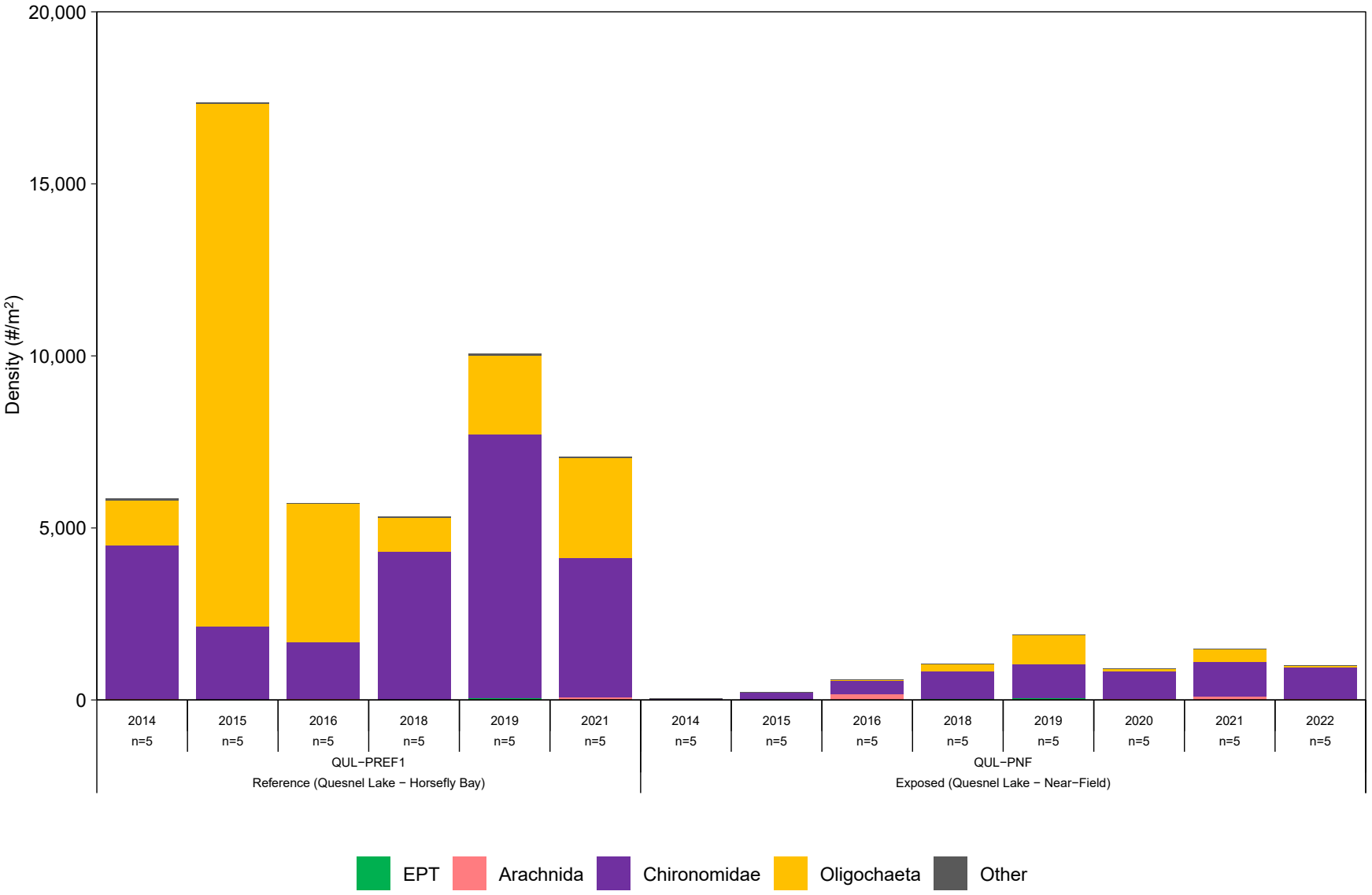


Figure E.4.3: Mean Densities of Major Benthic Invertebrate Community Taxonomic Groups for Quesnel Lake at QUL-PNF (Exposed) and QUL-PREF1 (Reference) Deep Areas, 2014 to 2022

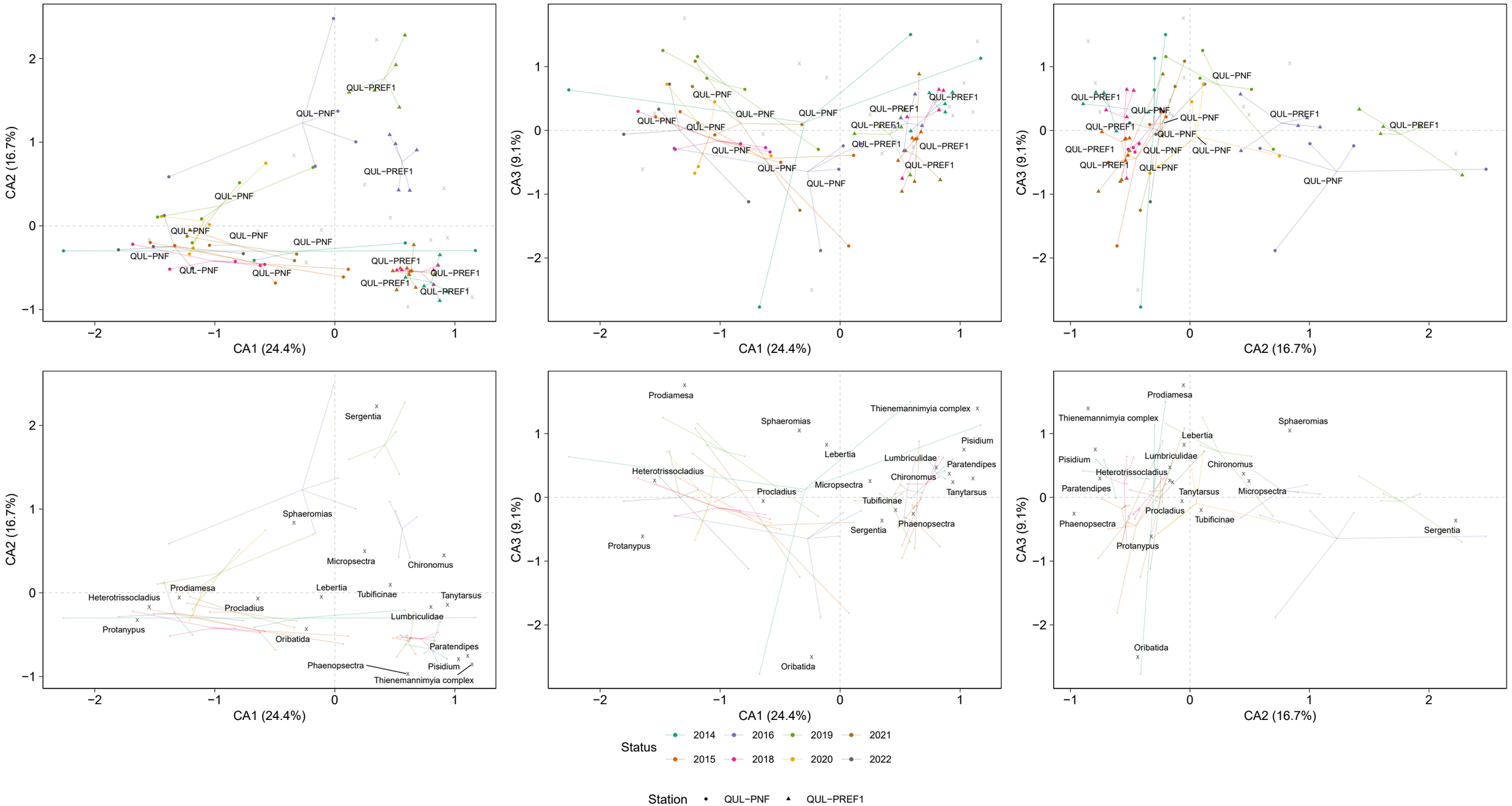


Figure E.4.4: Biplots of Correspondence Analysis Site and Taxa Scores of Benthic Invertebrate Community Data for Quesnel Lake at QUL-PNF (Exposed) and QUL-PREF1 (Reference) Deep Areas, 2014 to 2022

Notes: Analysis was completed using data at the Lowest Practicable Level (LPL). Taxa present at fewer than 1% of samples or less than 1% of total abundance were excluded from the analysis. Correspondence Analysis was conducted on ln(x+1)−transformed densities.

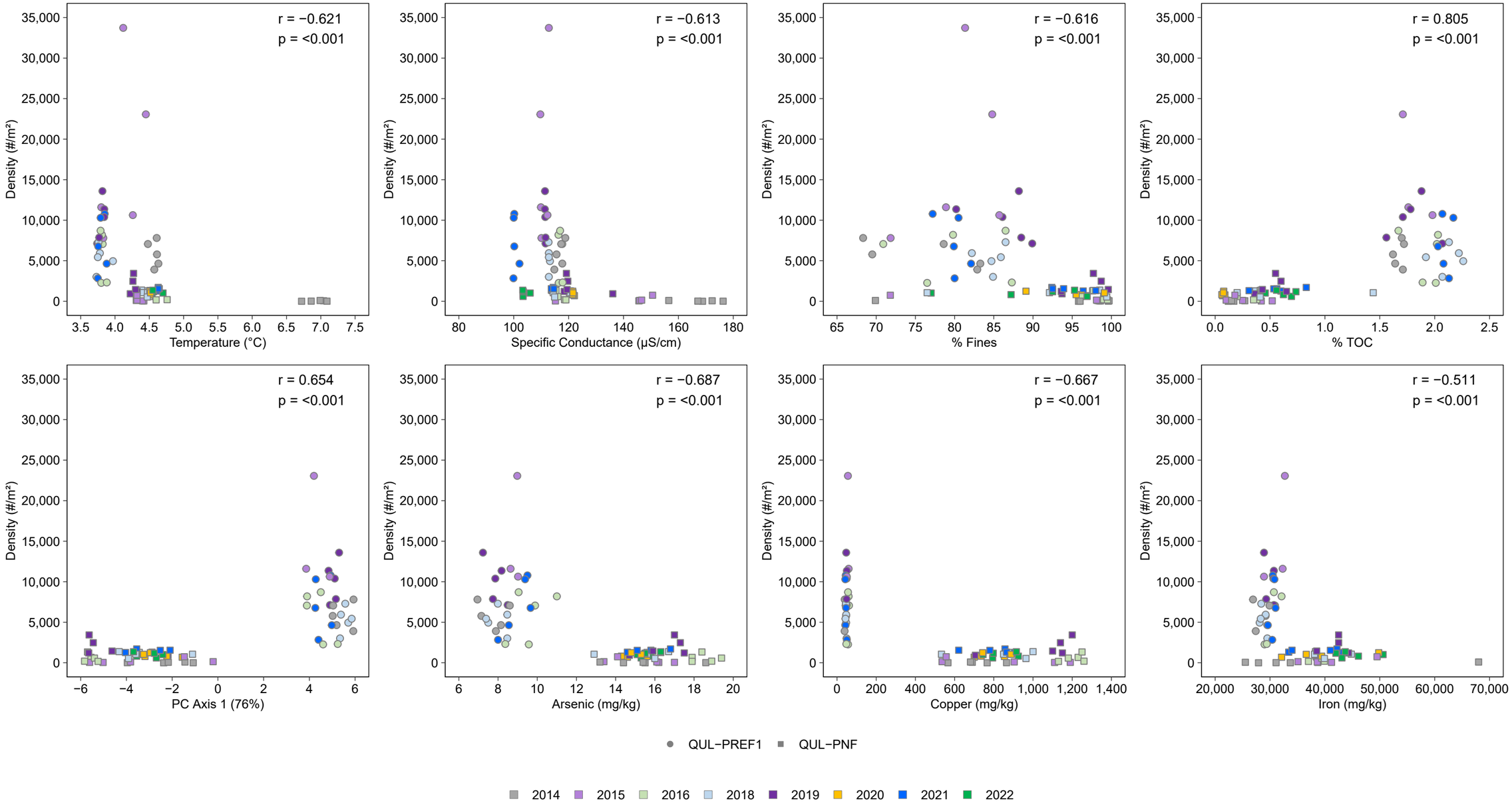
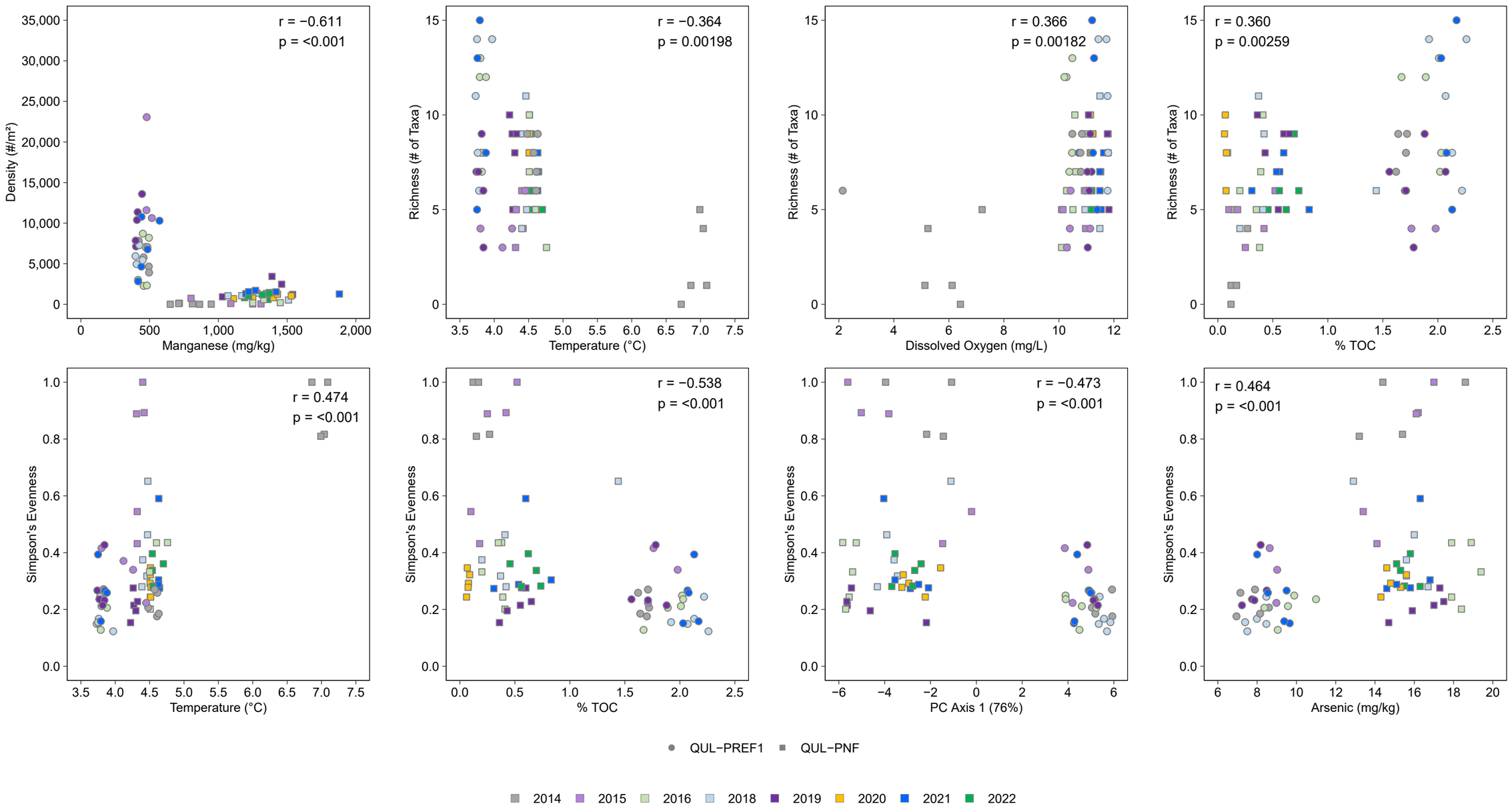


Figure E.4.5: Scatterplots of Significant Spearman's Correlation Relationships (p < 0.00357, Bonferroni Corrected) Between Benthic Invertebrate Community Metrics and Chemical and Physical Sediment Quality Parameters for Quesnel Lake at QUL-PNF (Exposed) and QUL-PREF1 (Reference) Deep Areas, 2014 to 2022

Notes: Correlations were completed using data from 2014 to 2022.



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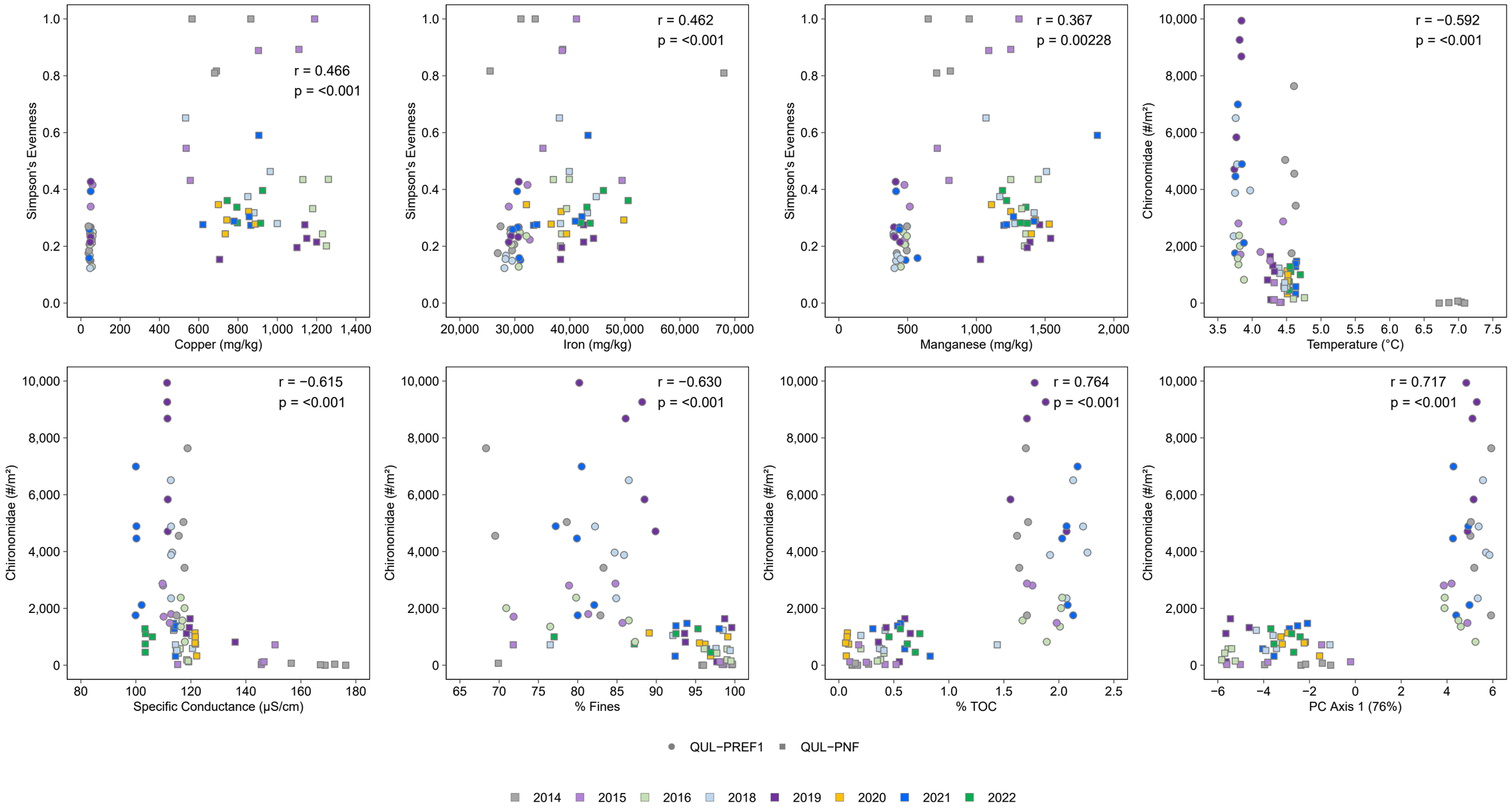

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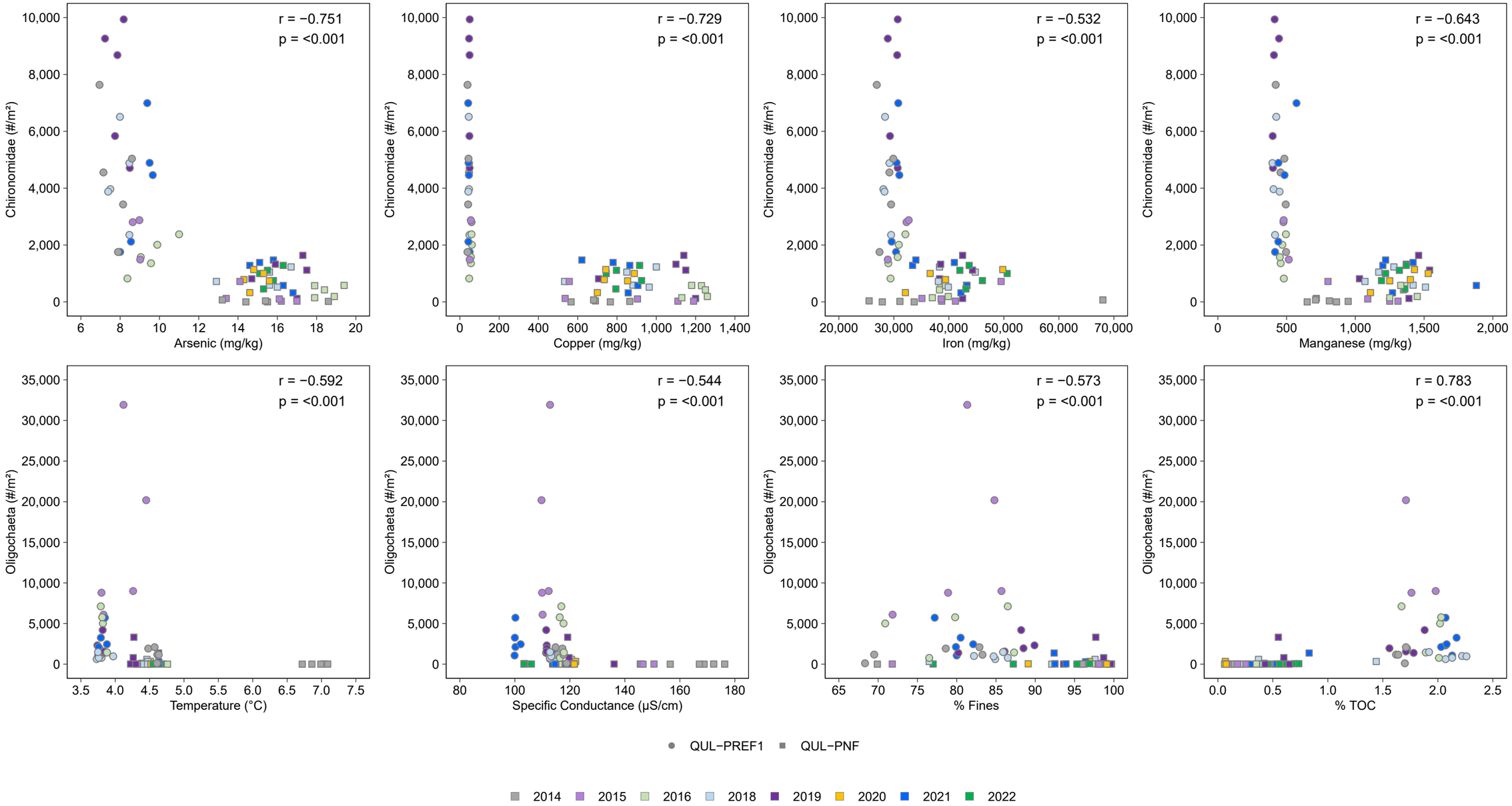

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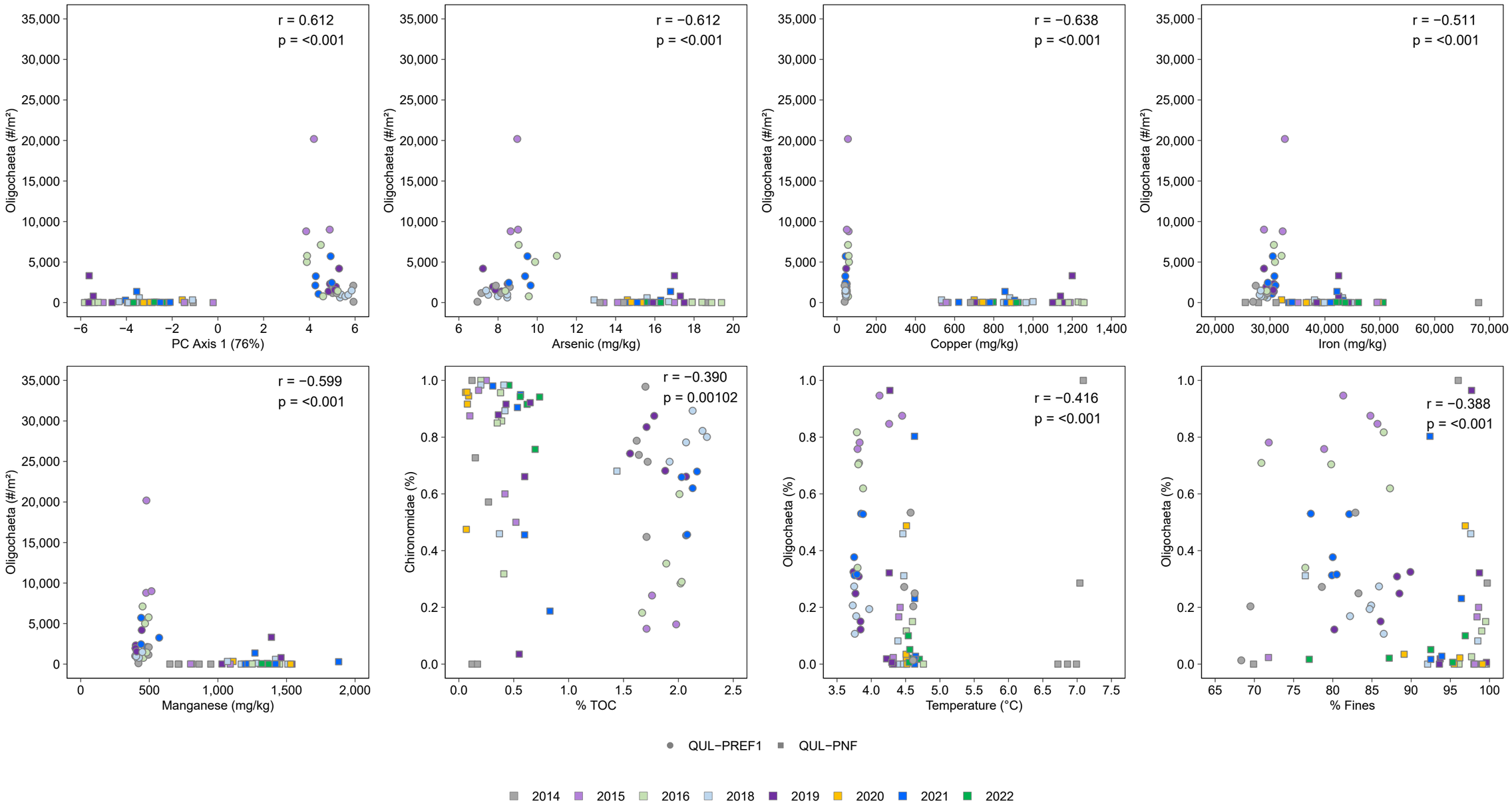

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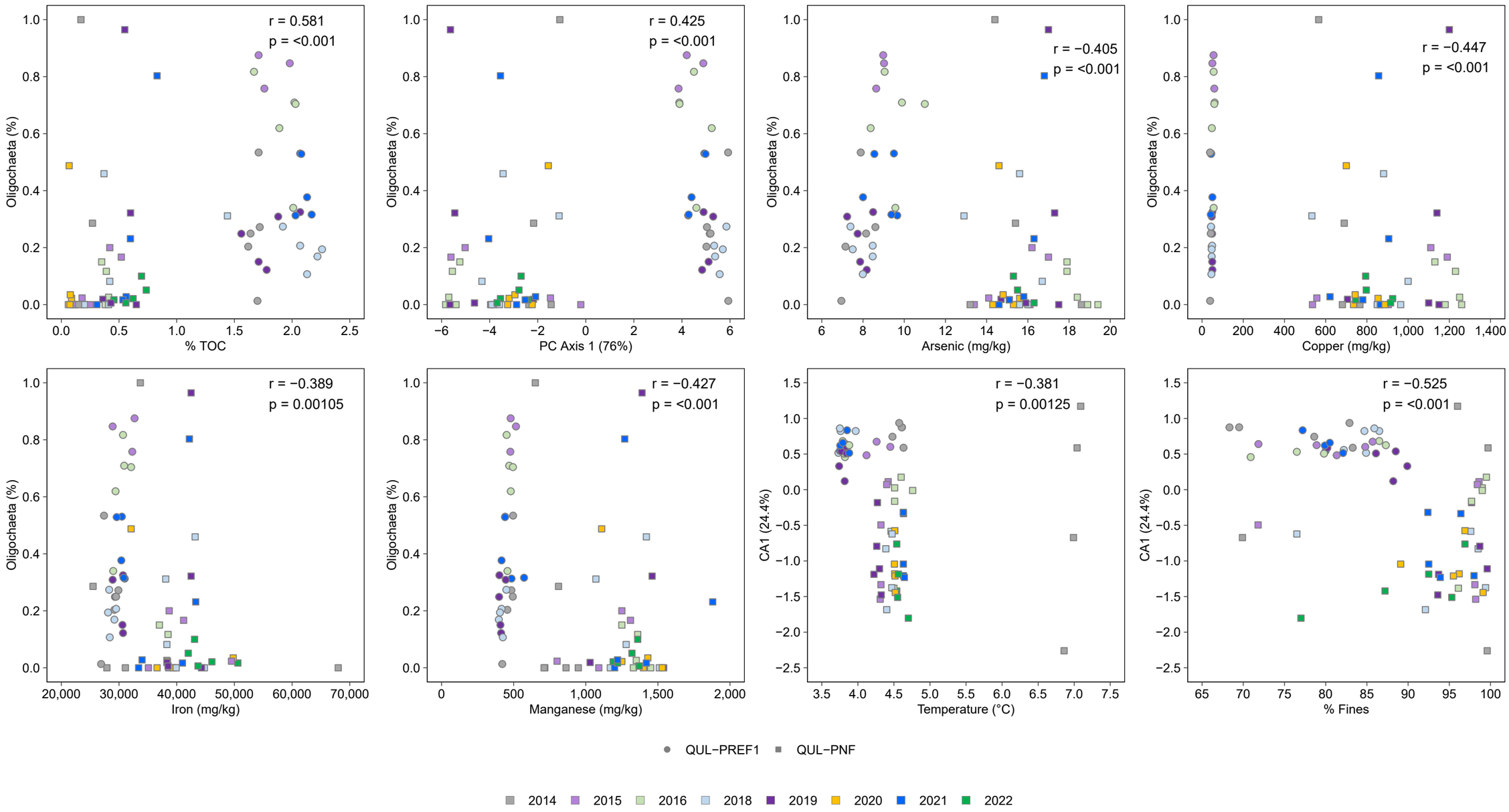

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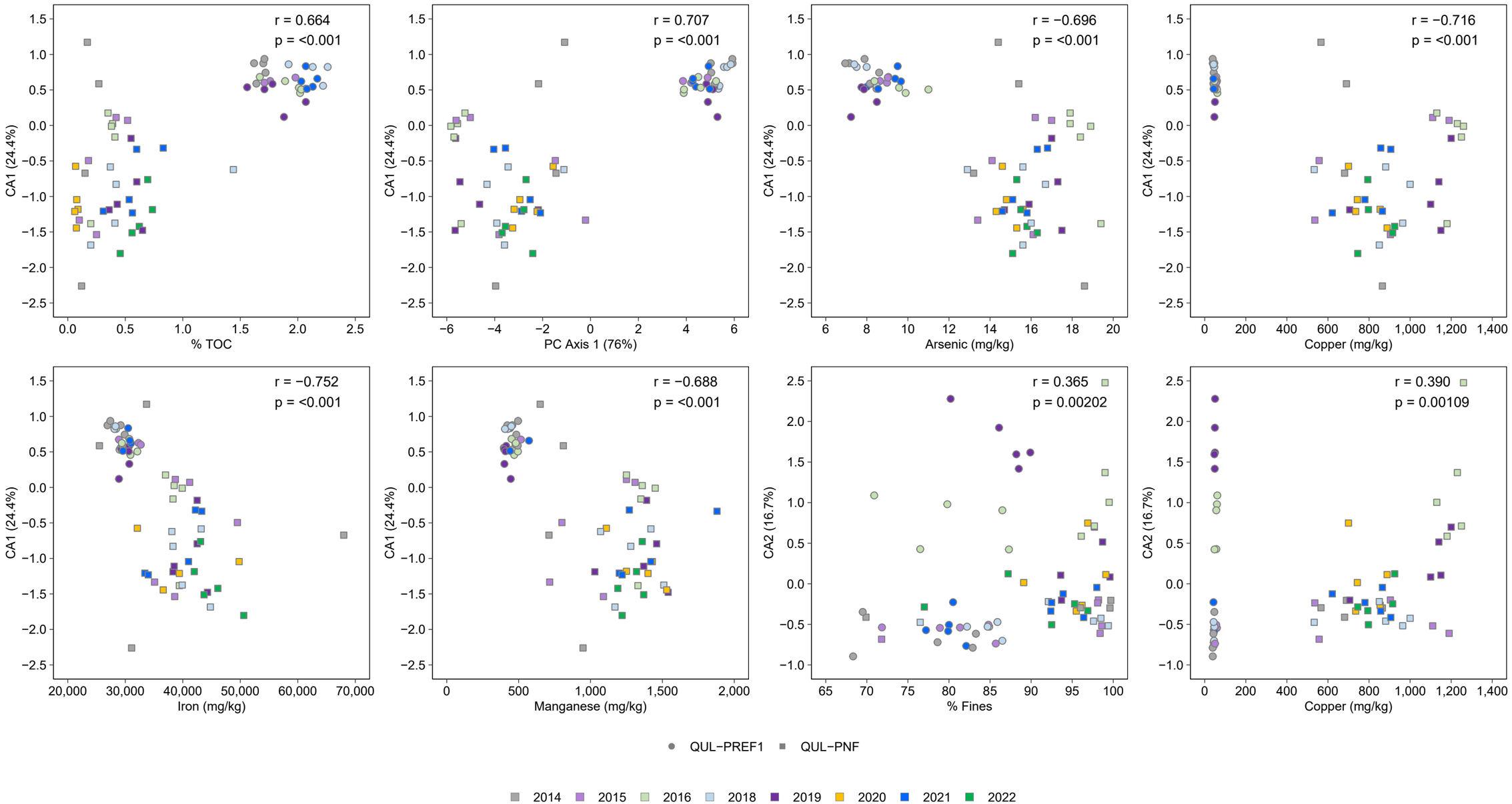
Notes: Correlations were completed using data from 2014 to 2022.



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Notes: Correlations were completed using data from 2014 to 2022.

Table E.4.1: Results of Statistical Comparisons of Benthic Invertebrate Community Endpoints for Quesnel Lake at QUL-PNF (Exposed) and QUL-PREF1 (Reference) Deep Areas, 2014 to 2022

Endpoint	Transformation	2-Way ANOVA P-values			Area Type	Area	Year	Measures of Central Tendency[a]	Temporal Contrasts Within Sites: Pairwise Comparisons Between Years								Temporal Contrasts Within Sites: MOD Relative to Baseline[b]								Spatial Comparison Within Years
		Area	Year	Area x Year					2014	2015	2016	2018	2019	2020	2021	2022	2014	2015	2016	2018	2019	2020	2021	2022	QUL-PNF
EPT (#/m²)	log10(x+1)	0.532	<0.001	0.409	Reference	QUL-PREF1	2014	1.82	B	B	B	B	A	nc	B	nc	Baseline	ns	ns	ns	1.5	nc	ns	nc	ns
							2015	0																	ns
							2016	2.57																	ns
							2018	0.574																	ns
							2019	18.0																	ns
							2021	1.81																	ns
					Exposed	QUL-PNF	2014	0	B	B	B	B	A	AB	B	B	Baseline	ns	ns	ns	ns	ns	ns	ns	
							2015	0.574																	
							2016	0																	
							2018	2.48																	
							2019	23.1																	
							2020	2.04																	
							2021	0.787																	
							2022	0.572																	
Arachnida (#/m²)	log10(x+1)	0.866	0.005	0.240	Reference	QUL-PREF1	2014	13.9	AB	B	AB	B	B	nc	A	nc	Baseline	ns	ns	ns	ns	nc	ns	nc	ns
							2015	0																	ns
							2016	8.59																	ns
							2018	1.48																	ns
							2019	1.04																	ns
							2021	13.5																	ns
					Exposed	QUL-PNF	2014	1.82	AB	B	AB	B	B	AB	A	AB	Baseline	ns	ns	ns	ns	ns	ns	ns	
							2015	3.43																	
							2016	2.87																	
							2018	0.574																	
							2019	0.574																	
							2020	12.2																	
							2021	55.2																	
							2022	10.7																	
Chironomidae (#/m²)	log10(x+1)	-	-	<0.001	Reference	QUL-PREF1	2014	4,023	A	A	A	A	A	nc	A	nc	Baseline	ns	ns	ns	ns	nc	ns	nc	-7.5
							2015	2,058																	-3.8
							2016	1,531																	-1.9
							2018	4,094																	-2.0
							2019	7,385																	-2.8
							2021	3,555																	-1.7
					Exposed	QUL-PNF	2014	7.56	C	B	AB	A	A	A	A	A	Baseline	2.9	4.4	5.5	5.4	5.4	5.6	5.6	
							2015	91.3																	
							2016	331																	
							2018	777																	
							2019	752																	
							2020	736																	
							2021	864																	
							2022	866																	

Area x Year or Area P-value < 0.05.
Magnitude of Difference (MOD) < -2
Magnitude of Difference (MOD) > 2

Note: "-" = no data available. "nc" = no comparison. "ns" = no significance. "nm" = Contrast MODs could not be calculated because the MAD=0 (MAD = Median Absolute Deviation).

[a] mean, geometric mean, or median depending on if analysis was conducted on untransformed, log_{10}-transformed, or rank-transformed data.

[b] Magnitude of difference (MOD) calculated for two-way ANOVA as (Exposed Mean - Reference Mean)/SD (or [Mean - Baseline Mean]/SD for temporal comparisons) on the transformed scale, where SD was the pooled standard deviation of the model residuals. MOD calculated for Kruskal-Wallis (i.e., rank-transformed data) as (Exposed Median - Reference Median)/MAD, where MAD was the pooled Median Absolute Deviation.

Table E.4.1: Results of Statistical Comparisons of Benthic Invertebrate Community Endpoints for Quesnel Lake at QUL-PNF (Exposed) and QUL-PREF1 (Reference) Deep Areas, 2014 to 2022

Endpoint	Transformation	2-Way ANOVA P-values			Area Type	Area	Year	Measures of Central Tendency[a]	Temporal Contrasts Within Sites: Pairwise Comparisons Between Years								Temporal Contrasts Within Sites: MOD Relative to Baseline[b]								Spatial Comparison Within Years
		Area	Year	Area x Year					2014	2015	2016	2018	2019	2020	2021	2022	2014	2015	2016	2018	2019	2020	2021	2022	QUL-PNF
Oligochaeta (#/m²)	log10(x+1)	-	-	0.060	Reference	QUL-PREF1	2014	895	A	A	A	A	A	nc	A	nc	Baseline	ns	ns	ns	ns	nc	ns	nc	-3.1
							2015	12,547																	-4.3
							2016	2,962																	-3.1
							2018	931																	-1.9
							2019	2,103																	-2.0
							2021	2,528																	-2.1
					Exposed	QUL-PNF	2014	1.82	A	A	A	A	A	A	A	A	Baseline	ns	ns	ns	ns	ns	ns	ns	
							2015	3.43																	
							2016	8.46																	
							2018	28.4																	
							2019	53.2																	
							2020	11.2																	
							2021	53.4																	
							2022	25.0																	
EPT (%)	rank	0.957	0.015	0.372	Reference	QUL-PREF1	2014	0	B	B	B	AB	A	nc	AB	nc	Baseline	ns	ns	ns	nm	nc	ns	nc	ns
							2015	0																	ns
							2016	0																	ns
							2018	0																	ns
							2019	0.318																	ns
							2021	0																	ns
					Exposed	QUL-PNF	2014	0	B	B	B	AB	A	AB	AB	AB	Baseline	ns	ns	ns	nm	ns	ns	ns	
							2015	0																	
							2016	0																	
							2018	0																	
							2019	4.19																	
							2020	0																	
							2021	0																	
							2022	0																	
Arachnida (%)	rank	0.240	0.022	0.184	Reference	QUL-PREF1	2014	25	A	A	A	A	A	nc	A	nc	Baseline	ns	ns	ns	ns	nc	ns	nc	ns
							2015	0																	ns
							2016	0.282																	ns
							2018	0																	ns
							2019	0																	ns
							2021	0.557																	ns
					Exposed	QUL-PNF	2014	0	A	A	A	A	A	A	A	A	Baseline	ns	ns	ns	ns	ns	ns	ns	
							2015	1.16																	
							2016	0																	
							2018	0																	
							2019	0																	
							2020	2.20																	
							2021	1.97																	
							2022	4.21																	

Area x Year or Area P-value < 0.05.
Magnitude of Difference (MOD) < -2
Magnitude of Difference (MOD) > 2

Note: "-" = no data available. "nc" = no comparison. "ns" = no significance. "nm" = Contrast MODs could not be calculated because the MAD=0 (MAD = Median Absolute Deviation).

[a] mean, geometric mean, or median depending on if analysis was conducted on untransformed, log_{10}-transformed, or rank-transformed data.

[b] Magnitude of difference (MOD) calculated for two-way ANOVA as (Exposed Mean - Reference Mean)/SD (or [Mean - Baseline Mean]/SD for temporal comparisons) on the transformed scale, where SD was the pooled standard deviation of the model residuals. MOD calculated for Kruskal-Wallis (i.e., rank-transformed data) as (Exposed Median - Reference Median)/MAD, where MAD was the pooled Median Absolute Deviation.

Table E.4.1: Results of Statistical Comparisons of Benthic Invertebrate Community Endpoints for Quesnel Lake at QUL-PNF (Exposed) and QUL-PREF1 (Reference) Deep Areas, 2014 to 2022

Endpoint	Transformation	2-Way ANOVA P-values			Area Type	Area	Year	Measures of Central Tendency[a]	Temporal Contrasts Within Sites: Pairwise Comparisons Between Years								Temporal Contrasts Within Sites: MOD Relative to Baseline[b]								Spatial Comparison Within Years
		Area	Year	Area x Year					2014	2015	2016	2018	2019	2020	2021	2022	2014	2015	2016	2018	2019	2020	2021	2022	QUL-PNF
Chironomidae (%)	rank	-	-	0.017	Reference	QUL-PREF1	2014	73.7	AB	B	AB	A	AB	nc	AB	nc	Baseline	ns	ns	ns	ns	nc	ns	nc	ns
							2015	14.0																	6.4
							2016	29.0																	4.9
							2018	80.1																	ns
							2019	74.2																	ns
							2021	62.0																	ns
					Exposed	QUL-PNF	2014	57.1	A	A	A	A	A	A	A	A	Baseline	ns	ns	ns	ns	ns	ns	ns	
							2015	87.5																	
							2016	85.7																	
							2018	89.3																	
							2019	87.9																	
							2020	94.5																	
							2021	90.4																	
							2022	94.2																	
Oligochaeta (%)	rank	-	-	0.049	Reference	QUL-PREF1	2014	25.0	A	A	A	A	A	nc	A	nc	Baseline	ns	ns	ns	ns	nc	ns	nc	ns
							2015	84.7																	-15
							2016	70.4																	-12
							2018	19.4																	ns
							2019	24.9																	ns
							2021	37.7																	-6.2
					Exposed	QUL-PNF	2014	0	A	A	A	A	A	A	A	A	Baseline	ns	ns	ns	ns	ns	ns	ns	
							2015	2.33																	
							2016	2.60																	
							2018	8.18																	
							2019	1.87																	
							2020	2.20																	
							2021	2.78																	
							2022	2.11																	
CA1 (24.4%)	rank	<0.001	0.012	0.442	Reference	QUL-PREF1	2014	0.875	A	AB	AB	AB	B	nc	AB	nc	Baseline	ns	ns	ns	-1.7	nc	ns	nc	-4.3
							2015	0.625																	-5.3
							2016	0.532																	-2.6
							2018	0.823																	-7.8
							2019	0.509																	-7.7
							2021	0.620																	-7.9
					Exposed	QUL-PNF	2014	-0.0427	A	AB	AB	AB	B	AB	AB	B	Baseline	ns	ns	ns	-5.1	ns	ns	-6.5	
							2015	-0.495																	
							2016	-0.0111																	
							2018	-0.830																	
							2019	-1.11																	
							2020	-1.18																	
							2021	-1.04																	
							2022	-1.42																	

Area x Year or Area P-value < 0.05.
Magnitude of Difference (MOD) < -2
Magnitude of Difference (MOD) > 2

Note: "-" = no data available. "nc" = no comparison. "ns" = no significance. "nm" = Contrast MODs could not be calculated because the MAD=0 (MAD = Median Absolute Deviation).

[a] mean, geometric mean, or median depending on if analysis was conducted on untransformed, log_{10}-transformed, or rank-transformed data.

[b] Magnitude of difference (MOD) calculated for two-way ANOVA as (Exposed Mean - Reference Mean)/SD (or [Mean - Baseline Mean]/SD for temporal comparisons) on the transformed scale, where SD was the pooled standard deviation of the model residuals. MOD calculated for Kruskal-Wallis (i.e., rank-transformed data) as (Exposed Median - Reference Median)/MAD, where MAD was the pooled Median Absolute Deviation.

Table E.4.1: Results of Statistical Comparisons of Benthic Invertebrate Community Endpoints for Quesnel Lake at QUL-PNF (Exposed) and QUL-PREF1 (Reference) Deep Areas, 2014 to 2022

Endpoint	Transformation	2-Way ANOVA P-values			Area Type	Area	Year	Measures of Central Tendency[a]	Temporal Contrasts Within Sites: Pairwise Comparisons Between Years								Temporal Contrasts Within Sites: MOD Relative to Baseline[b]								Spatial Comparison Within Years
		Area	Year	Area x Year					2014	2015	2016	2018	2019	2020	2021	2022	2014	2015	2016	2018	2019	2020	2021	2022	QUL-PNF
CA2 (16.7%)	rank	-	-	<0.001	Reference	QUL-PREF1	2014	-0.720	B	B	A	B	A	nc	B	nc	Baseline	ns	11	ns	16	nc	ns	nc	2.9
							2015	-0.539																	0.14
							2016	0.906																	ns
							2018	-0.529																	0.47
							2019	1.62																	-10
							2021	-0.572																	2.3
					Exposed	QUL-PNF	2014	-0.297	BCD	D	A	CD	AB	ABC	BCD	BCD	Baseline	ns	8.9	ns	ns	ns	ns	ns	
							2015	-0.519																	
							2016	1.00																	
							2018	-0.460																	
							2019	0.106																	
							2020	0.0147																	
							2021	-0.231																	
							2022	-0.286																	
CA3 (9.1%)	rank	-	-	0.072	Reference	QUL-PREF1	2014	0.415	A	A	A	A	A	nc	A	nc	Baseline	ns	ns	ns	ns	nc	ns	nc	ns
							2015	-0.130																	ns
							2016	0.0737																	-1.3
							2018	0.319																	ns
							2019	0.0513																	2.9
							2021	-0.776																	ns
					Exposed	QUL-PNF	2014	0.883	AB	AB	B	AB	A	AB	AB	AB	Baseline	ns	ns	ns	ns	ns	ns	ns	
							2015	-0.391																	
							2016	-0.282																	
							2018	-0.270																	
							2019	0.818																	
							2020	-0.400																	
							2021	0.0915																	
							2022	0.117																	

Area x Year or Area P-value < 0.05.
Magnitude of Difference (MOD) < -2
Magnitude of Difference (MOD) > 2

Note: "-" = no data available. "nc" = no comparison. "ns" = no significance. "nm" = Contrast MODs could not be calculated because the MAD=0 (MAD = Median Absolute Deviation).

[a] mean, geometric mean, or median depending on if analysis was conducted on untransformed, log_{10}-transformed, or rank-transformed data.

[b] Magnitude of difference (MOD) calculated for two-way ANOVA as (Exposed Mean - Reference Mean)/SD (or [Mean - Baseline Mean]/SD for temporal comparisons) on the transformed scale, where SD was the pooled standard deviation of the model residuals. MOD calculated for Kruskal-Wallis (i.e., rank-transformed data) as (Exposed Median - Reference Median)/MAD, where MAD was the pooled Median Absolute Deviation.

Table E.4.2: Station Scores from Correspondence Analysis (CA) of Benthic Invertebrate Community Results for Quesnel Lake at QUL-PNF (Exposed) and QUL-PREF1 (Reference) Deep Areas, 2014 to 2022

Year	Area	Area Type	Replicate	CA1 (24.4%)	CA2 (16.7%)	CA3 (9.1%)
2014	QUL-PNF	Exposed	1	-	-	-
			2	-2.26	-0.298	0.635
			3	0.587	-0.204	1.50
			4	1.17	-0.295	1.13
			5	-0.672	-0.412	-2.77
	QUL-PREF1	Reference	1	0.876	-0.347	0.287
			2	0.875	-0.894	0.415
			3	0.743	-0.720	0.587
			4	0.589	-0.616	-0.0112
			5	0.936	-0.788	0.596
2015	QUL-PNF	Exposed	1	0.112	-0.519	-0.391
			2	0.0714	-0.611	-1.81
			3	-1.54	-0.200	0.213
			4	-1.33	-0.236	0.293
			5	-0.495	-0.683	-0.501
	QUL-PREF1	Reference	1	0.625	-0.543	-0.138
			2	0.640	-0.537	-0.130
			3	0.601	-0.505	-0.120
			4	0.483	-0.539	-0.474
			5	0.674	-0.737	-0.0237
2016	QUL-PNF	Exposed	1	0.0256	1.37	-0.242
			2	-0.163	0.712	-1.88
			3	-1.38	0.586	-0.282
			4	-0.0111	2.48	-0.609
			5	0.175	1.00	-0.208
	QUL-PREF1	Reference	1	0.457	1.09	0.0511
			2	0.532	0.427	-0.320
			3	0.506	0.980	0.195
			4	0.683	0.906	0.0737
			5	0.624	0.423	0.567
2018	QUL-PNF	Exposed	1	-0.584	-0.460	-0.339
			2	-0.830	-0.425	-0.209
			3	-1.68	-0.220	0.298
			4	-0.621	-0.474	-0.270
			5	-1.38	-0.517	-0.297
	QUL-PREF1	Reference	1	0.517	-0.529	-0.753
			2	0.558	-0.529	0.210
			3	0.823	-0.702	0.319
			4	0.823	-0.528	0.641
			5	0.861	-0.471	0.626
2019	QUL-PNF	Exposed	1	-0.182	0.698	-0.297
			2	-0.794	0.515	0.643
			3	-1.19	-0.202	1.16
			4	-1.48	0.106	1.25
			5	-1.11	0.0838	0.818
	QUL-PREF1	Reference	1	0.331	1.62	0.0585
			2	0.585	2.28	-0.700
			3	0.538	1.42	0.331
			4	0.509	1.92	0.0513
			5	0.120	1.60	-0.0528
2020	QUL-PNF	Exposed	1	-0.575	0.748	-0.400
			2	-1.18	-0.265	-0.567
			3	-1.21	-0.336	-0.672
			4	-1.04	0.0147	0.449
			5	-1.44	0.113	0.725
2021	QUL-PNF	Exposed	1	-0.336	-0.415	-1.25
			2	-0.318	-0.337	0.0915
			3	-1.21	-0.0452	1.08
			4	-1.23	-0.124	0.689
			5	-1.04	-0.231	-0.0697
	QUL-PREF1	Reference	1	0.545	-0.506	-0.320
			2	0.834	-0.572	-0.776
			3	0.620	-0.583	-0.802
			4	0.515	-0.765	-0.957
			5	0.658	-0.227	0.883
2022	QUL-PNF	Exposed	1	-1.42	0.123	0.725
			2	-0.763	-0.331	-1.12
			3	-1.80	-0.286	-0.0611
			4	-1.19	-0.504	0.117
			5	-1.51	-0.247	0.332

Notes: Correspondence Analysis was conducted using ln(x+1)-transformed density benthic invertebrate results at the Lowest Practicable Level (LPL).
A "-" indicates that no organisms were present in all replicate samples from QUL-PFF1-1 and QUL-PFF1-2 in 2014, therefore CA site scores could not be calculated.

Table E.4.3: Taxon Scores from Correspondence Analysis (CA) of Benthic Invertebrate Community Results for Quesnel Lake at QUL-PNF (Exposed) and QUL-PREF1 (Reference) Deep Areas, 2014 to 2022

Phylum	Class	Order	Family	Taxa	CA1 (24.4%)	CA2 (16.7%)	CA3 (9.1%)
Annelida	Clitellata	Lumbriculida	Lumbriculidae	Lumbriculidae	0.800	-0.167	0.471
		Tubificida	Naididae	Tubificinae	0.464	0.0935	-0.200
Arthropoda	Euchelicerata	Sarcoptiformes	-	Oribatida	-0.237	-0.437	-2.50
		Trombidiformes	Lebertiidae	*Lebertia*	-0.111	-0.0491	0.824
	Insecta	Diptera	Ceratopogonidae	*Sphaeromias*	-0.339	0.836	1.05
			Chironomidae	*Chironomus*	0.911	0.450	0.373
			Chironomidae	*Heterotrissocladius*	-1.55	-0.168	0.265
			Chironomidae	*Micropsectra*	0.250	0.494	0.251
			Chironomidae	*Paratendipes*	1.11	-0.753	0.292
			Chironomidae	*Phaenopsectra*	0.609	-0.969	-0.261
			Chironomidae	*Procladius*	-0.640	-0.0664	-0.0576
			Chironomidae	*Prodiamesa*	-1.30	-0.0547	1.75
			Chironomidae	*Protanypus*	-1.65	-0.324	-0.614
			Chironomidae	*Sergentia*	0.349	2.22	-0.364
			Chironomidae	*Tanytarsus*	0.940	-0.145	0.234
			Chironomidae	*Thienemannimyia complex*	1.14	-0.852	1.39
Mollusca	Bivalvia	Veneroida	Pisidiidae	*Pisidium*	1.03	-0.792	0.746

Notes: Correspondence Analysis was conducted using ln(x+1)-transformed density benthic invertebrate results at the Lowest Practicable Level (LPL). "-" no applicable data.

Table E.4.4: **Spearman's Rank Correlations Between Benthic Invertebrate Community Metrics and Supporting Environmental Measures for Quesnel Lake at QUL-PNF (Exposed) and QUL-PREF1 (Reference) Deep Areas, 2014 to 2022**

Benthic Invertebrate Community Metric	Correlation Parameter	Station Depth (m)	Physical/Chemical Parameter									Sediment Concentration of Analytes of Interest			
			Bottom *In Situ* Water Quality					Sediment Parameters							
			Temp (°C)	DO (mg/L)	DO (%)	Specific Conductance (µS/cm)	pH (pH Units)	Fines (%)	Total Organic Carbon (%)	PCA 1 (79%)	PCA 2 (13%)	Arsenic (mg/kg)	Copper (mg/kg)	Iron (mg/kg)	Manganese (mg/kg)
Density (#/m²)	Correlation Coefficient	-0.0472	-0.621	0.237	0.148	-0.613	-0.0661	-0.616	0.805	0.654	-0.169	-0.687	-0.667	-0.511	-0.611
	Sig. (2-tailed)	0.698	<0.001	0.0483	0.223	<0.001	0.586	<0.001	<0.001	<0.001	0.169	<0.001	<0.001	<0.001	<0.001
Richness (# of Taxa)	Correlation Coefficient	-0.00853	-0.364	0.366	0.328	-0.161	-0.281	-0.143	0.360	0.297	-0.114	-0.279	-0.316	-0.202	-0.0985
	Sig. (2-tailed)	0.944	0.00198	0.00182	0.00553	0.184	0.0186	0.237	0.00259	0.0138	0.357	0.0214	0.00874	0.0981	0.424
Simpson's Evenness	Correlation Coefficient	0.0635	0.474	-0.307	-0.242	0.270	0.0551	0.307	-0.538	-0.473	0.0832	0.464	0.466	0.462	0.367
	Sig. (2-tailed)	0.604	<0.001	0.0103	0.0454	0.0249	0.653	0.0103	<0.001	<0.001	0.503	<0.001	<0.001	<0.001	0.00228
Simpson's Diversity	Correlation Coefficient	0.0423	0.100	-0.0222	-0.00693	0.186	-0.227	0.161	-0.221	-0.212	-0.00647	0.212	0.174	0.249	0.312
	Sig. (2-tailed)	0.73	0.412	0.856	0.955	0.126	0.0606	0.188	0.0725	0.0851	0.959	0.085	0.159	0.0421	0.0102
EPT (#/m²)	Correlation Coefficient	0.0716	-0.229	0.223	0.211	0.0294	0.120	-0.0120	0.151	0.0612	-0.223	-0.127	-0.0700	-0.00142	-0.0248
	Sig. (2-tailed)	0.556	0.0564	0.063	0.0798	0.809	0.322	0.921	0.22	0.62	0.0677	0.303	0.571	0.991	0.841
Arachnida (#/m²)	Correlation Coefficient	0.193	0.195	0.0519	0.0681	-0.0500	-0.0238	-0.138	0.00152	0.0666	0.0146	-0.0438	-0.0943	0.0623	0.0763
	Sig. (2-tailed)	0.11	0.106	0.669	0.575	0.681	0.845	0.255	0.99	0.589	0.906	0.723	0.444	0.614	0.536
Chironomidae (#/m²)	Correlation Coefficient	-0.0225	-0.592	0.296	0.206	-0.615	0.00108	-0.630	0.764	0.717	-0.0640	-0.751	-0.729	-0.532	-0.643
	Sig. (2-tailed)	0.853	<0.001	0.013	0.0866	<0.001	0.993	<0.001	<0.001	<0.001	0.604	<0.001	<0.001	<0.001	<0.001
Oligochaeta (#/m²)	Correlation Coefficient	0.0260	-0.592	0.0934	-0.00300	-0.544	-0.143	-0.573	0.783	0.612	-0.172	-0.612	-0.638	-0.511	-0.599
	Sig. (2-tailed)	0.831	<0.001	0.442	0.98	<0.001	0.239	<0.001	<0.001	<0.001	0.162	<0.001	<0.001	<0.001	<0.001
EPT (%)	Correlation Coefficient	0.0896	-0.159	0.231	0.233	0.0785	0.102	0.0356	0.0789	-0.0188	-0.243	-0.0455	0.00935	0.0770	0.0736
	Sig. (2-tailed)	0.461	0.188	0.0549	0.0522	0.518	0.401	0.77	0.522	0.879	0.0463	0.712	0.94	0.532	0.551
Arachnida (%)	Correlation Coefficient	0.127	0.287	-0.0169	0.0205	0.115	0.0284	0.0156	-0.186	-0.0654	0.0570	0.0818	0.0532	0.180	0.201
	Sig. (2-tailed)	0.296	0.0162	0.89	0.866	0.342	0.816	0.898	0.129	0.596	0.644	0.507	0.667	0.141	0.101
Chironomidae (%)	Correlation Coefficient	0.00240	0.255	0.133	0.207	0.127	0.0762	0.251	-0.390	-0.255	0.134	0.239	0.268	0.336	0.287
	Sig. (2-tailed)	0.984	0.0333	0.272	0.0856	0.295	0.531	0.0359	0.00102	0.0361	0.276	0.0495	0.0274	0.00503	0.0177
Oligochaeta (%)	Correlation Coefficient	0.0264	-0.416	0.00139	-0.0801	-0.312	-0.125	-0.388	0.581	0.425	-0.145	-0.405	-0.447	-0.389	-0.427
	Sig. (2-tailed)	0.828	<0.001	0.991	0.51	0.00853	0.302	<0.001	<0.001	<0.001	0.238	<0.001	<0.001	0.00105	<0.001
CA1 (24.4%)	Correlation Coefficient	-0.0438	-0.381	-0.165	-0.280	-0.280	-0.0716	-0.525	0.664	0.707	0.0640	-0.696	-0.716	-0.752	-0.688
	Sig. (2-tailed)	0.721	0.00125	0.175	0.0198	0.02	0.559	<0.001	<0.001	<0.001	0.607	<0.001	<0.001	<0.001	<0.001
CA2 (16.7%)	Correlation Coefficient	-0.0320	0.000146	-0.00897	0.00212	0.185	0.0482	0.365	-0.243	-0.325	-0.301	0.283	0.390	0.169	0.175
	Sig. (2-tailed)	0.794	0.999	0.942	0.986	0.128	0.694	0.00202	0.0478	0.00726	0.0133	0.0201	0.00109	0.172	0.156
CA3 (9.1%)	Correlation Coefficient	-0.202	0.0822	0.102	0.122	0.152	0.314	0.118	-0.00313	0.133	0.258	-0.0998	-0.128	-0.208	-0.0544
	Sig. (2-tailed)	0.0955	0.502	0.405	0.318	0.211	0.00862	0.335	0.98	0.283	0.035	0.421	0.303	0.0917	0.662

Significant correlation; p-value <0.00357 (p <0.05, Bonferroni corrected for 14 independent variables).

Correlation p-value <0.01.

Note: EPT = Ephemeroptera, Plecoptera, Trichoptera.

APPENDIX E.5
FISH POPULATION HEALTH

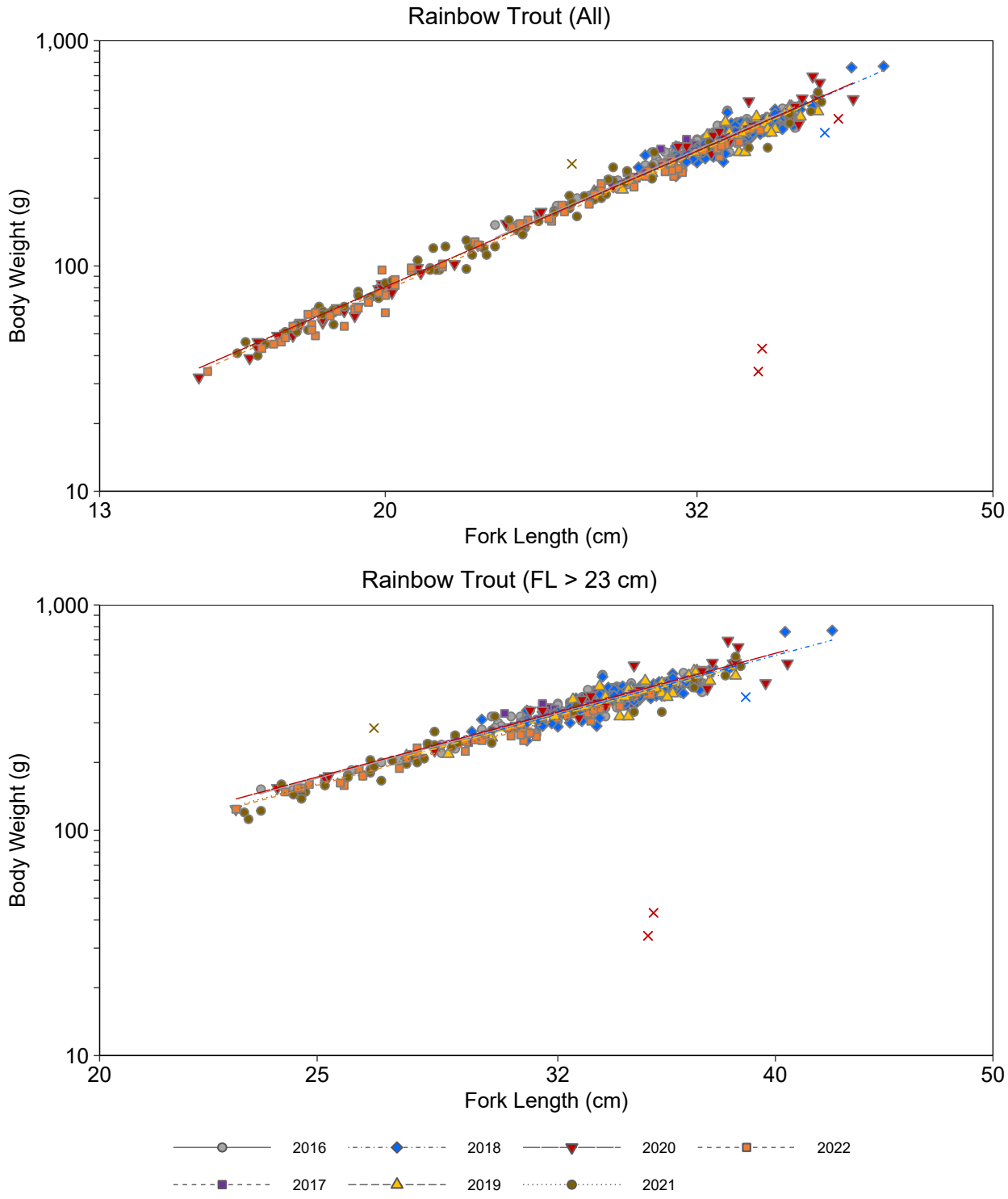


Figure E.5.1: Condition (Weight−at−Length) of a) All Rainbow Trout and b) Rainbow Trout With Fork Length Greater than 23 cm for Polley Lake in Spring, 2016 to 2022

Notes: FL = Fork Length. Outliers removed from the statistical analyses are plotted with an x through them.

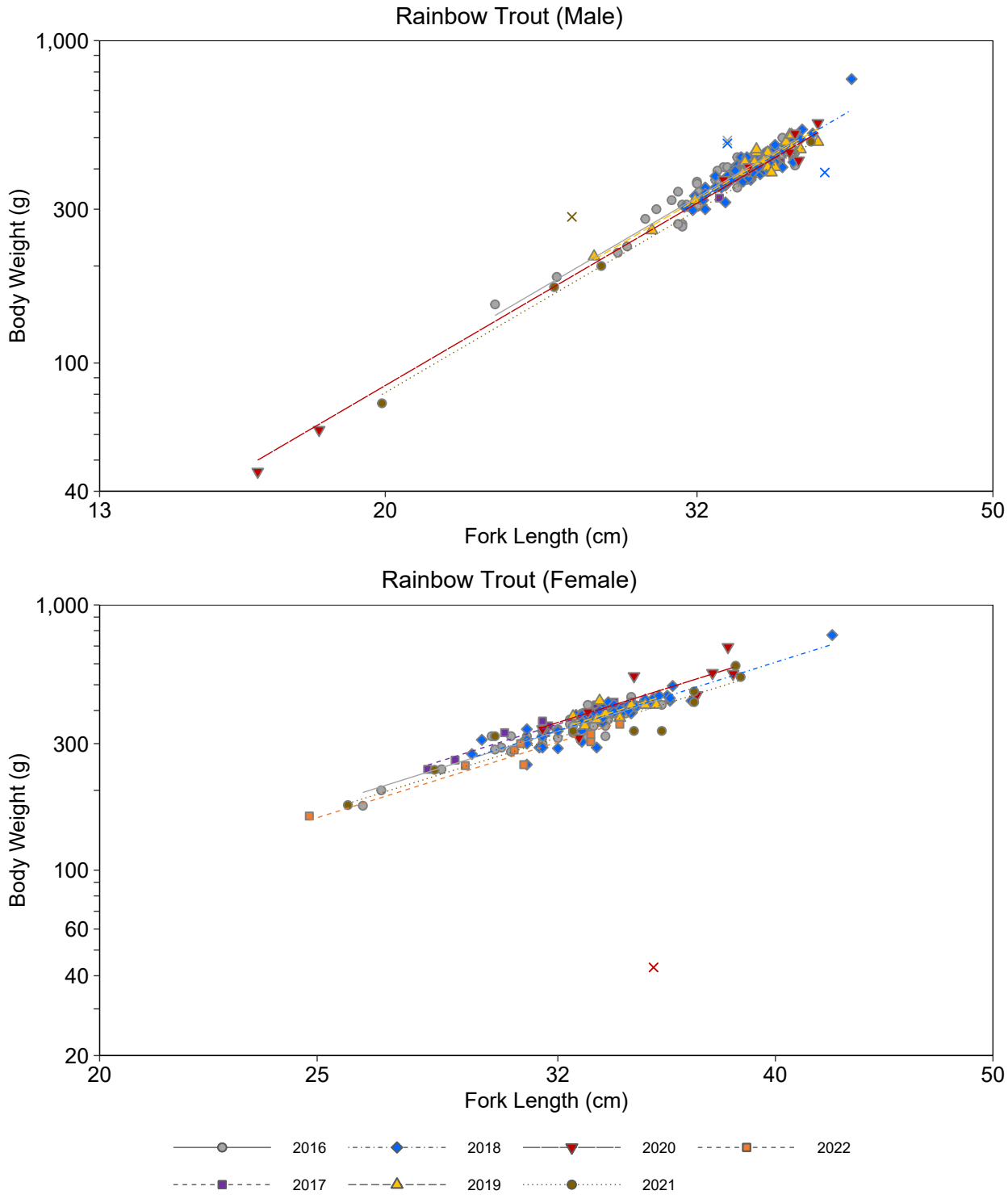


Figure E.5.1: Condition (Weight−at−Length) of a) Male Rainbow Trout and b) Female Rainbow Trout for Polley Lake in Spring, 2016 to 2022

Notes: FL = Fork Length. Outliers removed from the statistical analyses are plotted with an x through them.

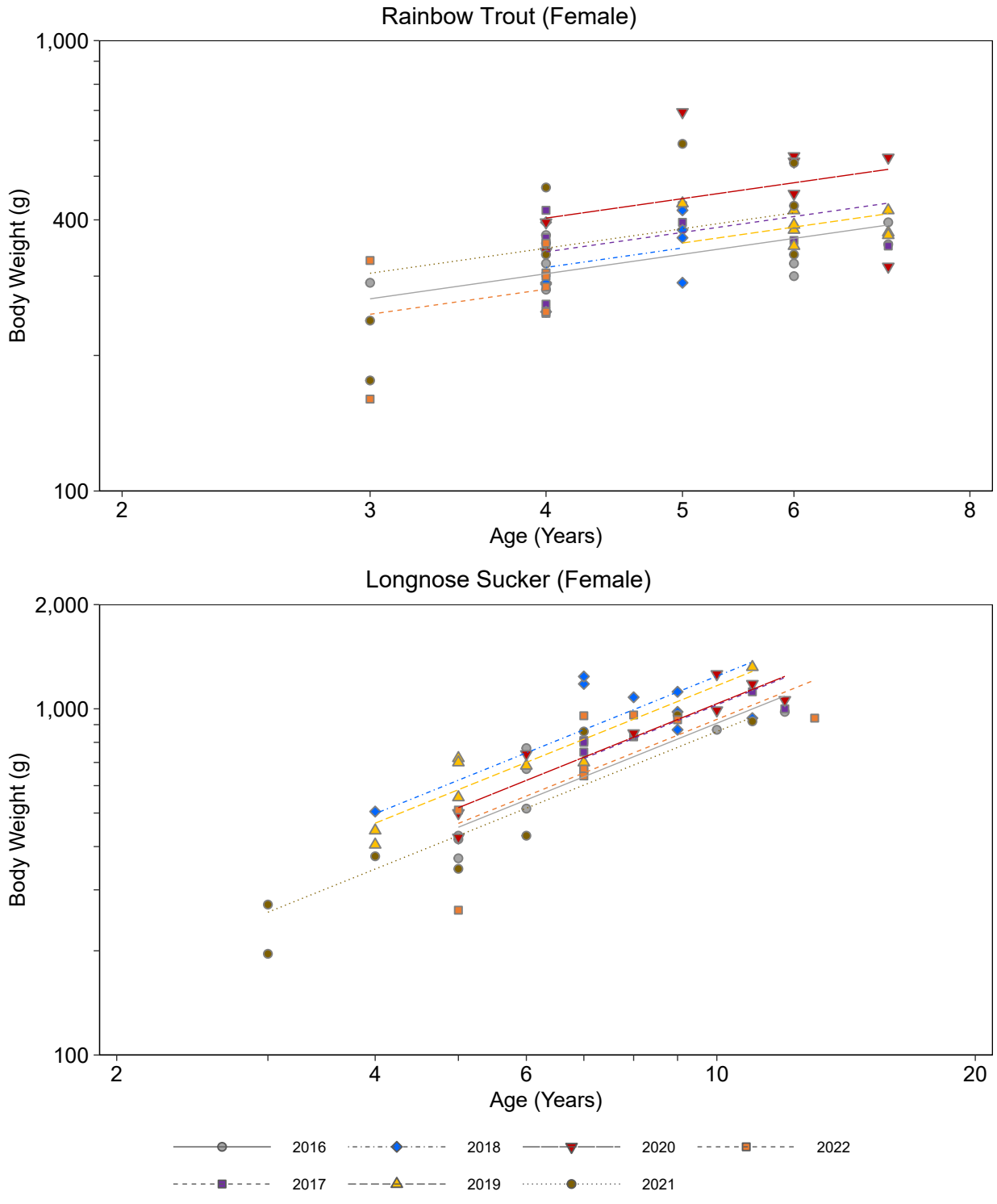


Figure E.5.2: Weight−at−Age of a) Female Rainbow Trout and b) Female Longnose Sucker for Polley Lake in Spring, 2016 to 2022

Note: Outliers removed from the statistical analyses are plotted with an x through them.

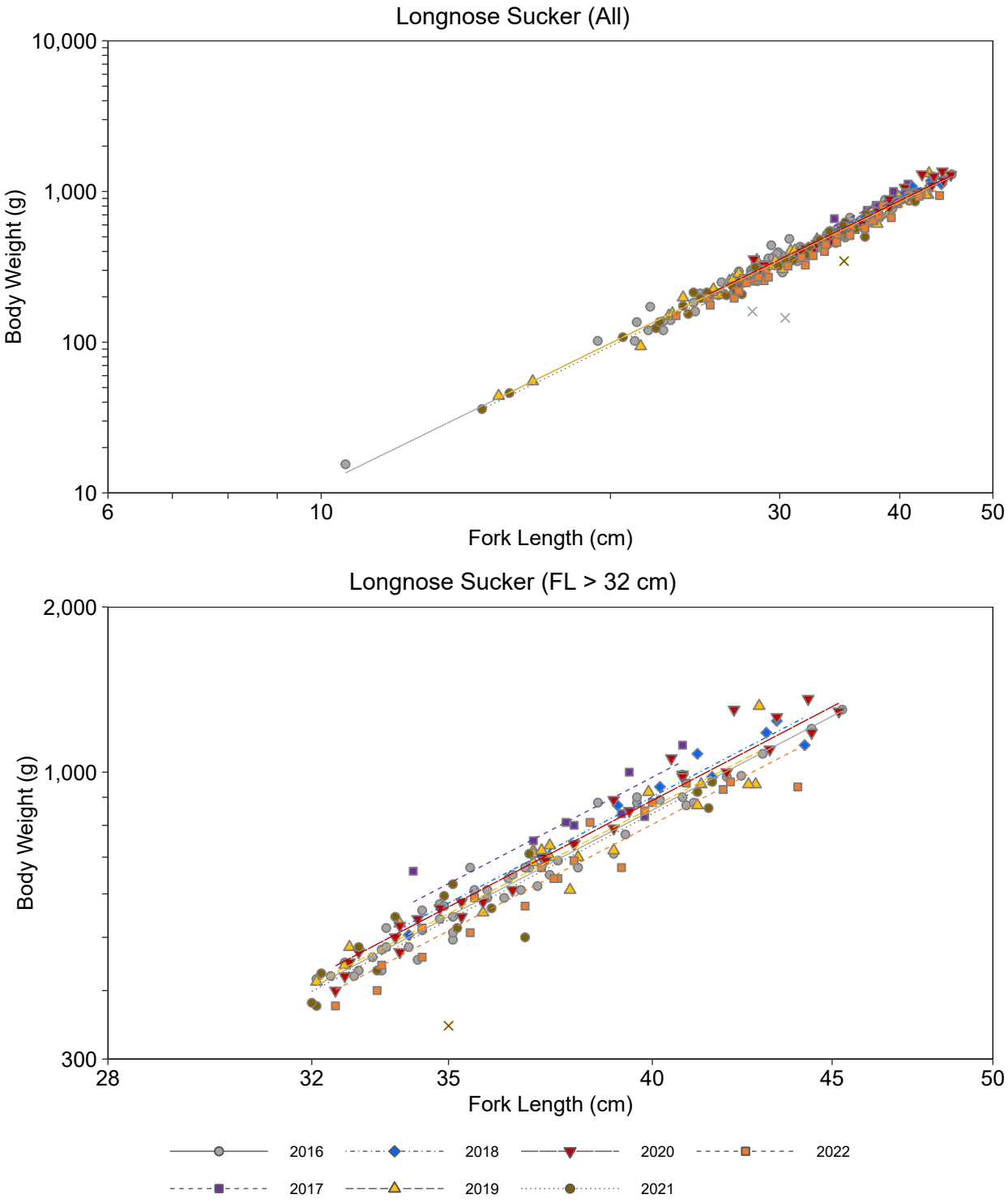


Figure E.5.3: Condition (Weight−at−Length) of a) All Longnose Sucker and b) Longnose Sucker With Fork Length Greater than 32 cm for Polley Lake in Spring, 2016 to 2022

Notes: FL = Fork Length. Outliers removed from the statistical analyses are plotted with an x through them.

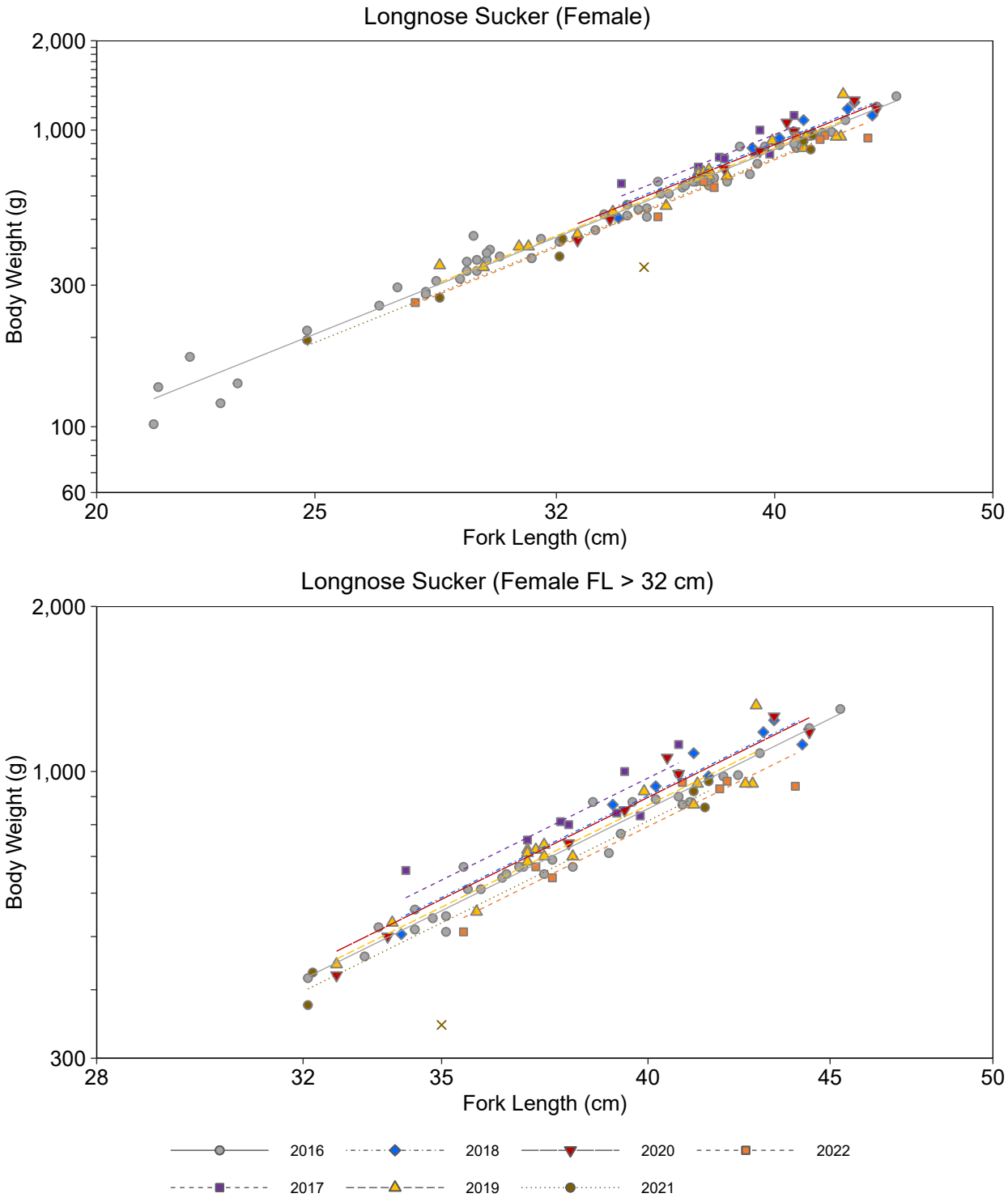


Figure E.5.3: Condition (Weight−at−Length) of a) Female Longnose Sucker and b) Female Longnose Sucker With Fork Length Greater than 32 cm for Polley Lake in Spring, 2016 to 2022

Notes: FL = Fork Length. Outliers removed from the statistical analyses are plotted with an x through them.

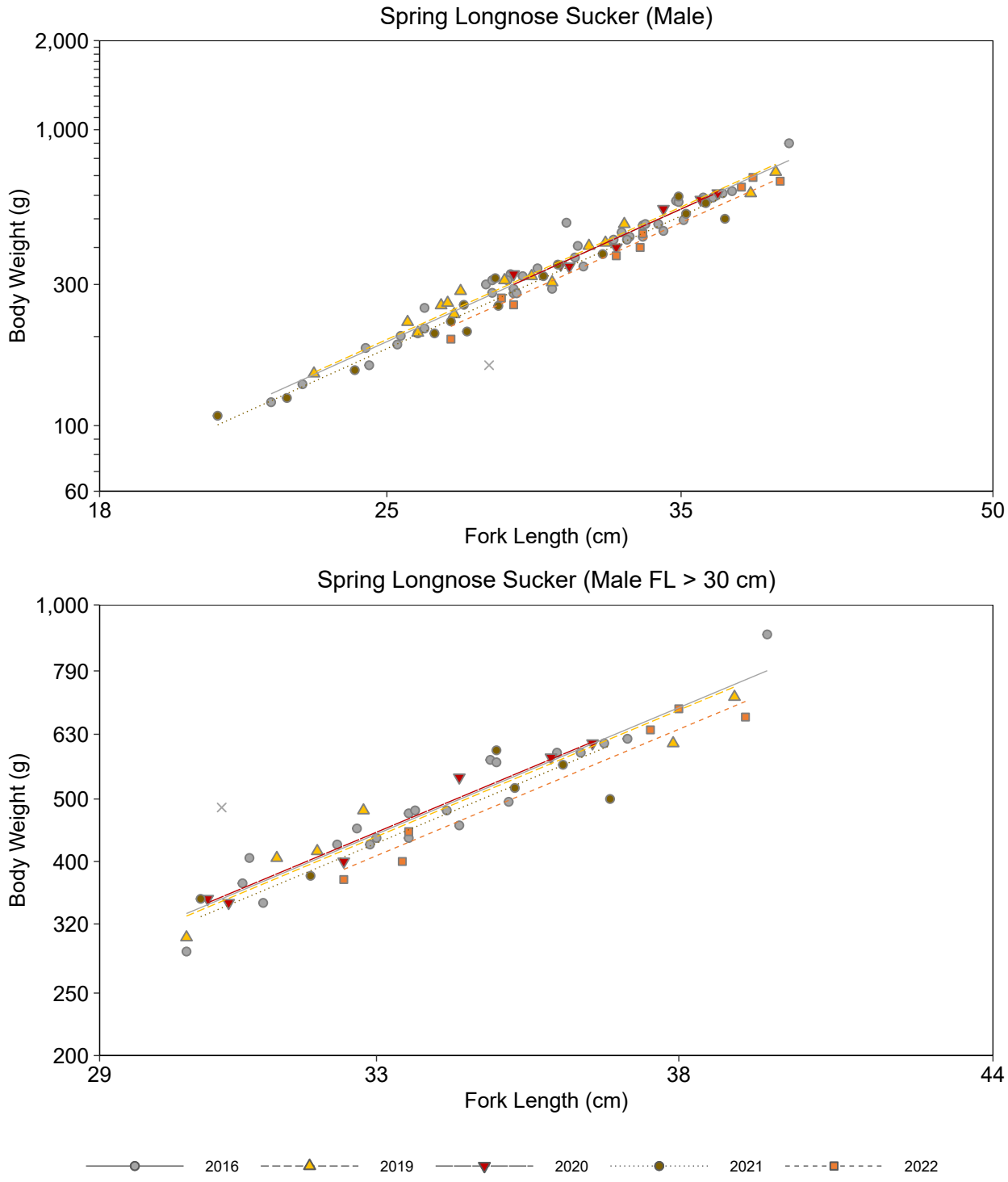


Figure E.5.3: Condition (Weight−at−Length) of a) Male Longnose Sucker and b) Male Longnose Sucker With Fork Length Greater than 30 cm for Polley Lake in Spring, 2016 to 2022

Notes: FL = Fork Length. Outliers removed from the statistical analyses are plotted with an x through them.

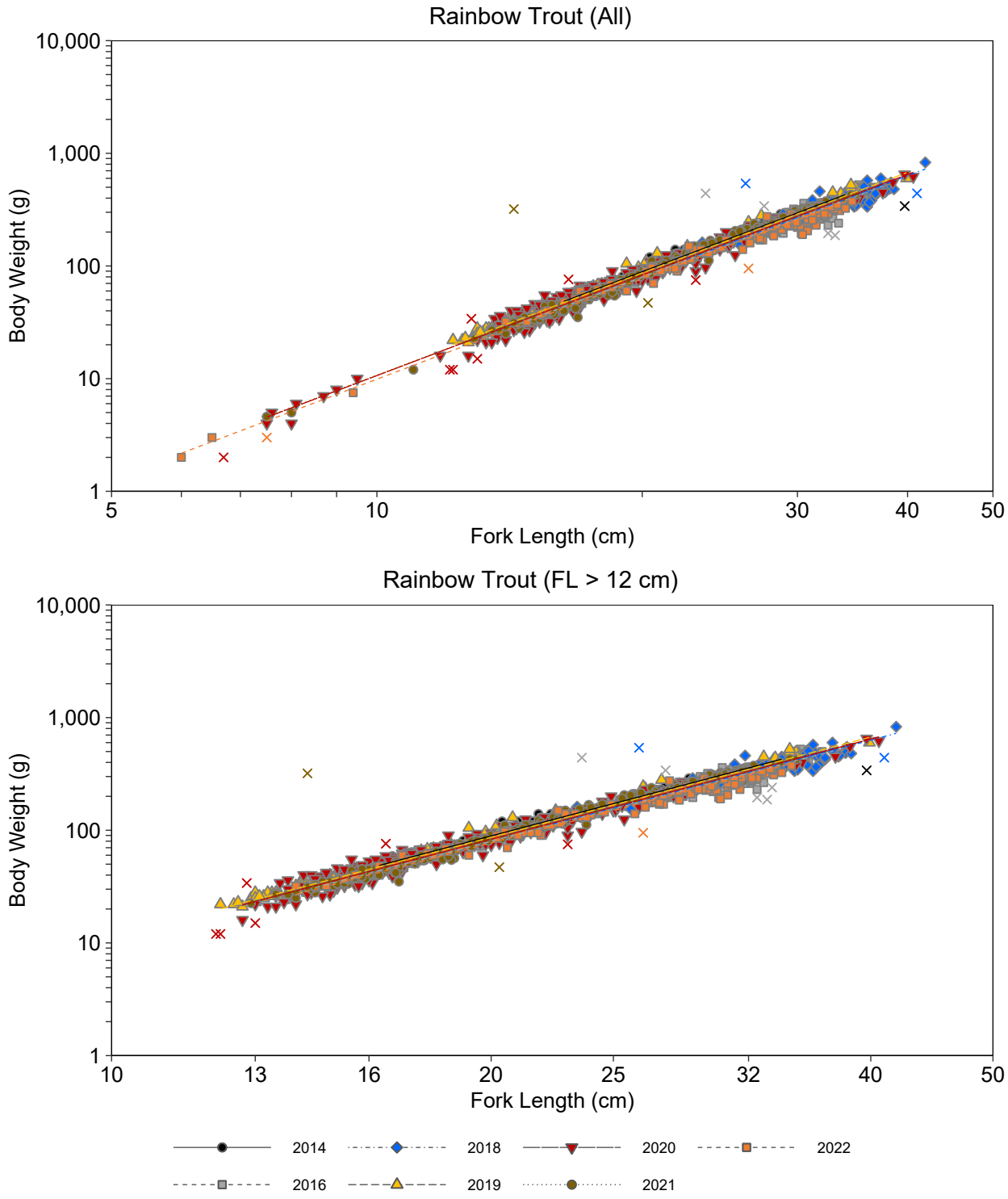


Figure E.5.4: Condition (Weight−at−Length) of a) All Rainbow Trout and b) Rainbow Trout With Fork Length Greater than 12 cm for Polley Lake in Fall, 2014 to 2022

Note: Note: FL = Fork Length. Outliers removed from the statistical analyses are plotted with an x through them.

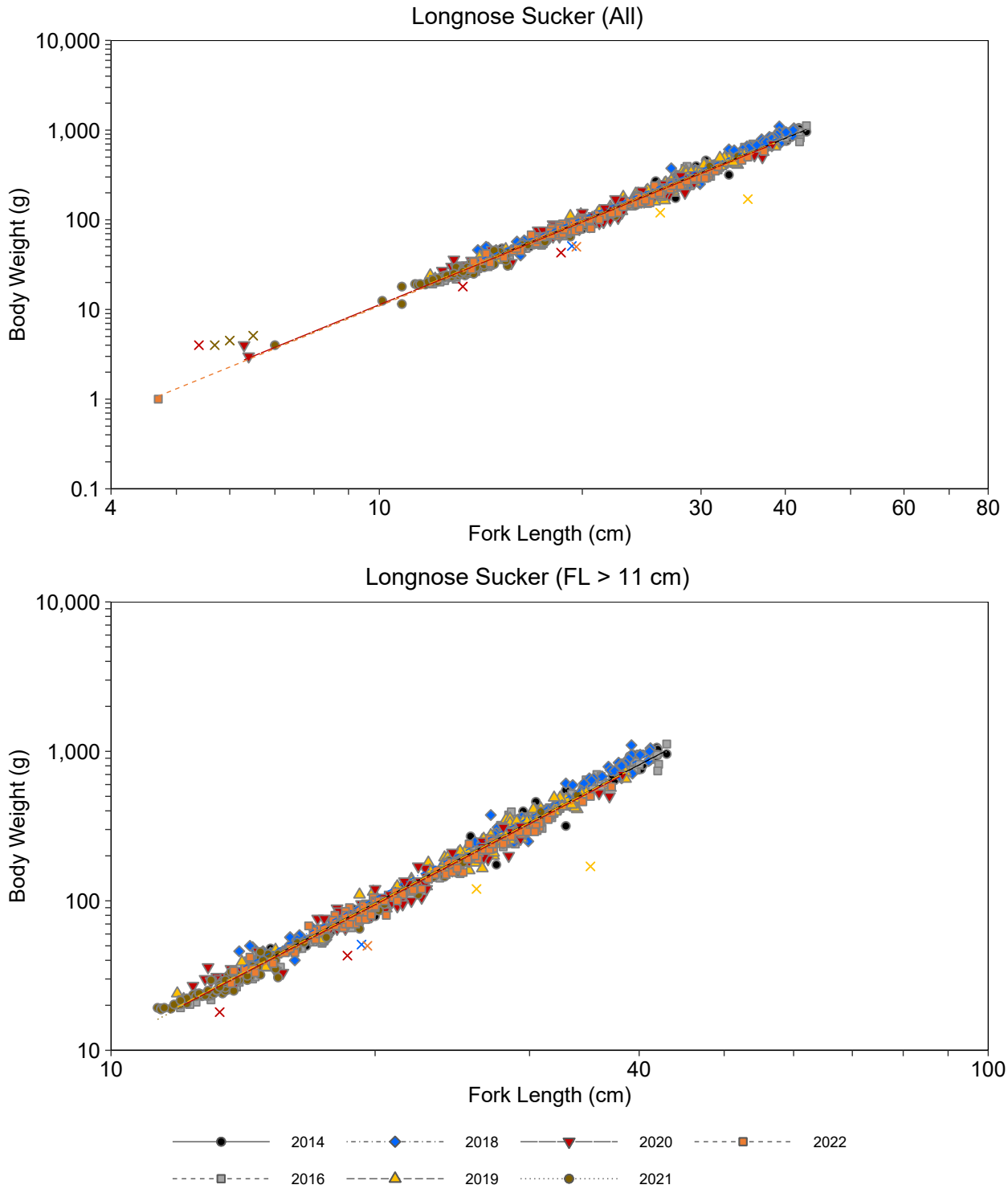


Figure E.5.4: Condition (Weight−at−Length) of a) All Longnose Sucker and b) Longnose Sucker With Fork Length Greater than 11 cm for Polley Lake in Fall, 2014 to 2022

Note: Note: FL = Fork Length. Outliers removed from the statistical analyses are plotted with an x through them.

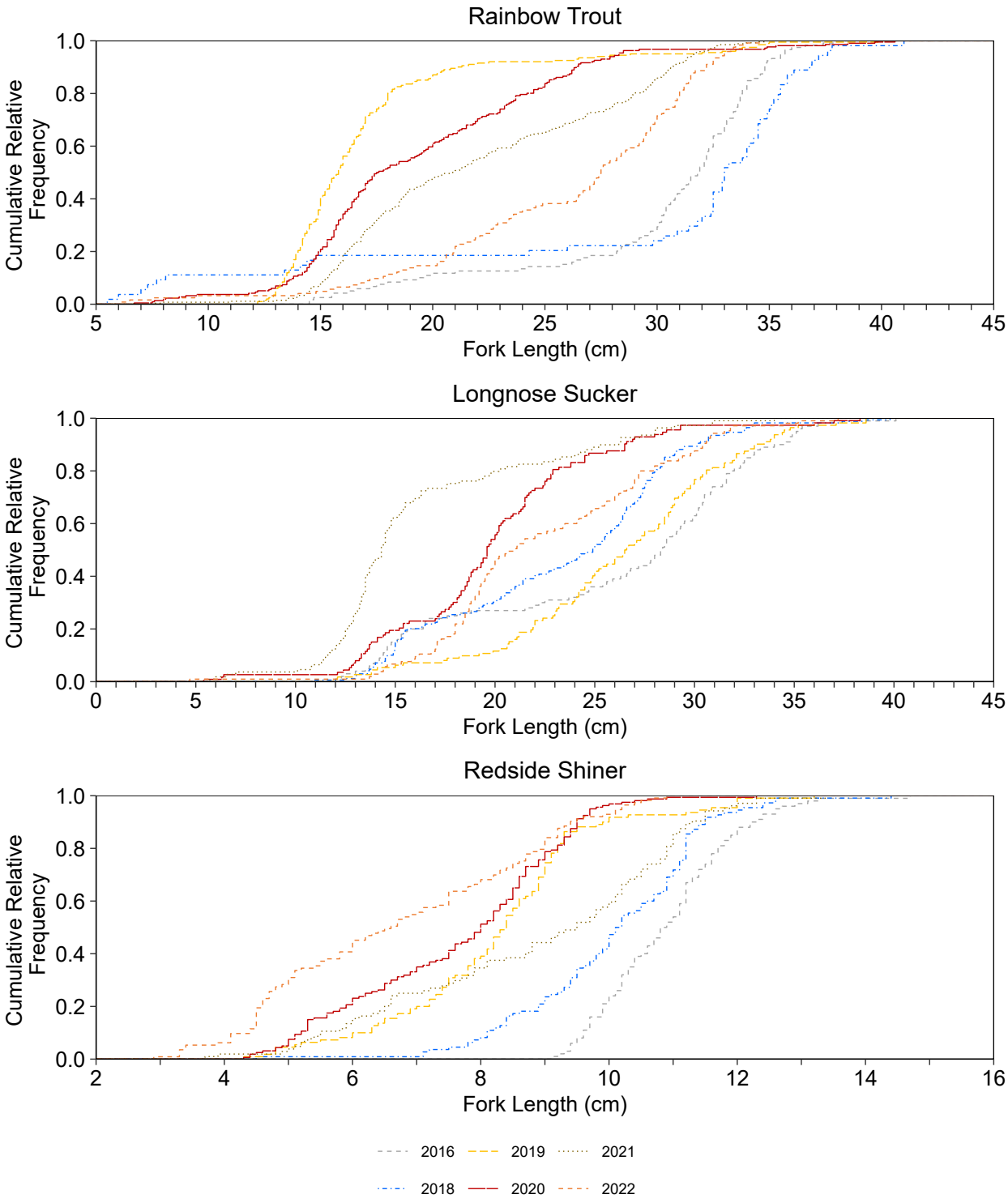


Figure E.5.5: Cumulative Relative Frequency Distributions of Rainbow Trout, Longnose Sucker, and Redside Shiner from Randomized Fall Hoop Netting in Polley Lake, 2016 to 2022

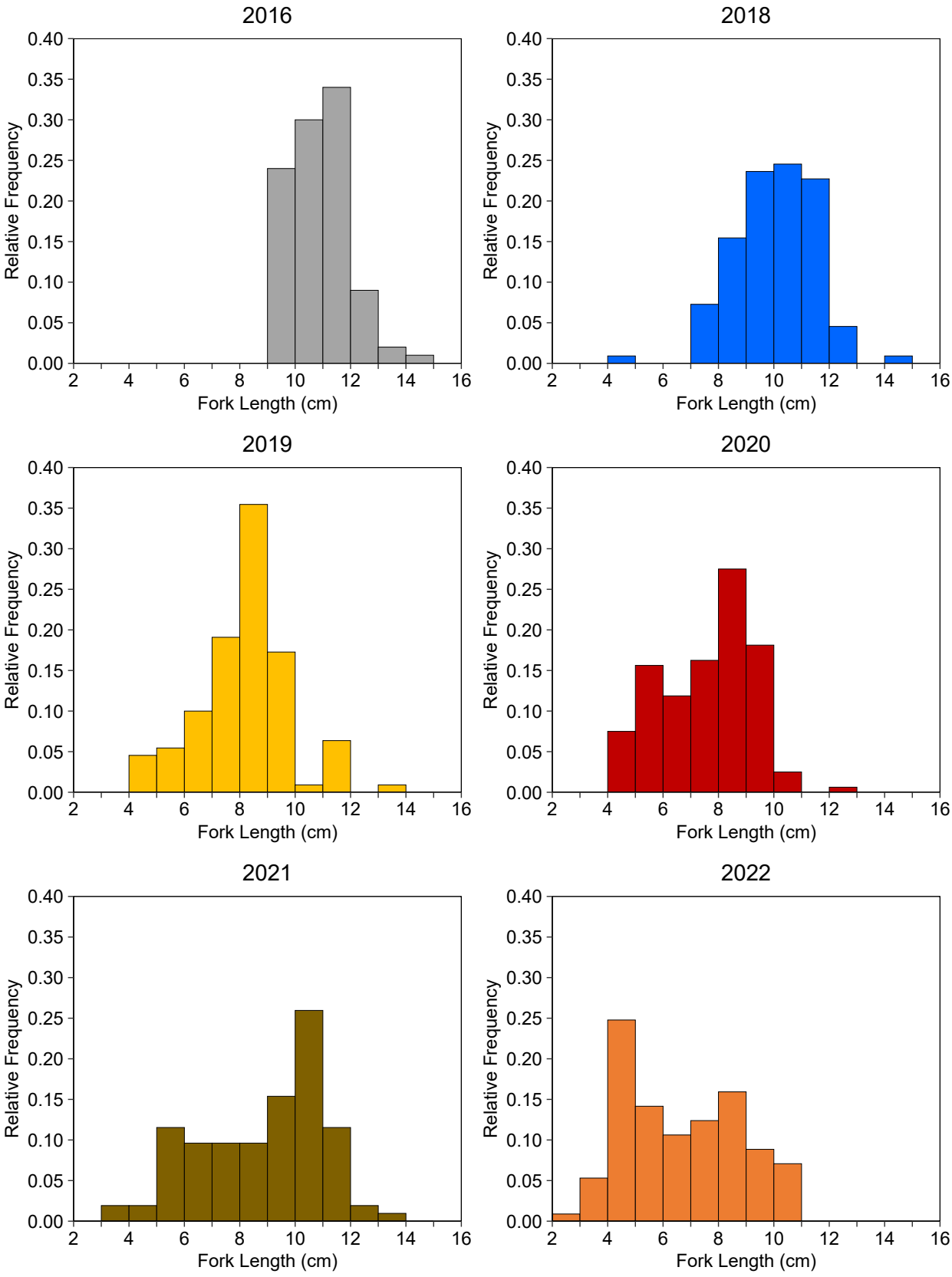


Figure E.5.6: Redside Shiner Length Frequency Distributions for Randomized Fall Hoop Netting in Polley Lake, 2016 to 2022

Table E.5.1: Statistical Comparisons of Condition and Weight-at-Age of Rainbow Trout and Longnose Sucker for Polley Lake in Spring and Fall, 2014 to 2022

Species	Indicator	Endpoint	Sex	Season	Variables		Sample Size								Test	ANCOVA Model Statistics[a]			
																Interaction Model	Parallel Slope Model	Covariate Value for Comparisons[b]	Test P-value (Year)
					Response	Covariate (Cov)	2014	2016	2017	2018	2019	2020	2021	2022		Cov×Year P-value	Cov P-value		
RBT	Energy Storage	Condition	All	Spring	log10[Body Weight (g)]	log10[Fork Length (cm)]	-	106	30	143[e]	34	54[e]	77[e]	68	ANCOVA	0.001[f]	0.001	29.6	0.001
	Energy Storage	Condition	All (FL > 23 cm)	Spring		log10[Fork Length (cm)]	-	106	30	143[e]	34	29[e]	41[e]	39	ANCOVA	0.401	0.001	32.6	0.001
	Energy Storage	Condition	All	Fall		log10[Fork Length (cm)]	82[e]	160[e]	-	94[e]	201	209[e]	266[e]	121[e]	ANCOVA	0.001[g]	0.001	22.3	0.001
	Energy Storage	Condition	All (FL > 12 cm)	Fall		log10[Fork Length (cm)]	82[e]	159[e]	-	94[e]	201	201[e]	263[e]	118[e]	ANCOVA	0.001[h]	0.001	22.5	0.001
	Energy Storage	Condition	Female	Spring		log10[Fork Length (cm)]	-	38	16	55	9	8[e]	10	8	ANCOVA	0.644	0.001	33.0	0.001
	Energy Usage	Weight-at-age	Female	Spring		log10[Age (years)]	-	9	8	8	8	8	8	8	ANCOVA	0.215	0.003	4.81	0.075
	Energy Storage	Condition	Male	Spring		log10[Fork Length (cm)]	-	62[e]	4	87[e]	21	9	4[e]	-	ANCOVA	0.192	0.001	34.0	0.054
LSU	Energy Storage	Condition	All	Spring	log10[Body Weight (g)]	log10[Fork Length (cm)]	-	100[e]	8	8	42	42	38[e]	38	ANCOVA	0.059[i]	0.001	32.0	0.001
	Energy Storage	Condition	All (FL > 32 cm)	Spring		log10[Fork Length (cm)]	-	49	8	8	20	30	15[e]	20	ANCOVA	0.230	0.001	37.3	0.001
	Energy Storage	Condition	All	Fall		log10[Fork Length (cm)]	78	157	-	91[e]	109[e]	110[e]	106[e]	104[e]	ANCOVA	0.001[j]	0.001	22.6	0.001
	Energy Storage	Condition	All (FL > 11 cm)	Fall		log10[Fork Length (cm)]	78	157	-	91[e]	109[e]	108[e]	102	103[e]	ANCOVA	0.001[k]	0.001	22.9	0.001
	Energy Storage	Condition	Female	Spring		log10[Fork Length (cm)]	-	56	8	8	21	8	7[e]	8	ANCOVA	0.509	0.001	35.2	0.001
	Energy Storage	Condition	Female (FL > 32 cm)	Spring		log10[Fork Length (cm)]	-	32	8	8	16	8	5[e]	7	ANCOVA	0.621	0.001	38.5	0.001
	Energy Usage	Weight-at-age	Female	Spring		log10[Age (years)]	-	8	8	8	8	8	8	8	ANCOVA	0.575	0.001	6.87	0.007
	Energy Storage	Condition	Male	Spring		log10[Fork Length (cm)]	-	41[e]	-	-	15	7	16	9	ANCOVA	0.378	0.001	30.3	0.002
	Energy Storage	Condition	Male (FL > 30 cm)	Spring		log10[Fork Length (cm)]	-	21[e]	-	-	6	6	6	6	ANCOVA	0.318	0.001	34.1	0.266

P-value < 0.1

Mean is significantly greater than baseline year

Mean is significantly lower than baseline year

Covariate was not significant therefore an ANOVA was conducted

Note: "-" = no data; RBT = rainbow trout; LSU = longnose sucker; ANCOVA = analysis of covariance; ANOVA = analysis of variance; nt = no test (not enough data to conduct comparisons); ns = not significant.

[a] Model: $Y = \beta_0 + \beta_1(Cov) + \beta_2(Year) + \beta_3(Cov \times Year) + \varepsilon$.

[b] The mean value of the covariate (that corresponds to the adjusted means for the response variable) for the parallel slope ANCOVA model or the minimum and maximum values of the overlap in covariate values for the interaction ANCOVA model.

[c] The median, mean (geometric mean for log10-transformed variables), and adjusted mean are reported for ANCOVA, and the predicted means of the regression line equations for minimum and maximum values of the covariate (where the data sets overlap) for ANCOVAs where a significant interaction (i.e., different slopes) occurs.

[d] Calculated as the difference in measure of central tendency (MCT) between years (i.e., 2022 minus baseline year), expressed as a percentage of the baseline year MCT.

[e] Outliers removed. See Table E.5.2 for details.

[f] ANCOVA proceeded under the assumption that the slopes are practically parallel (R^2 of interaction model = 0.9877 and R^2 of parallel slope model = 0.9868; a difference < 0.02) following Environment Canada (2012b).

[g] ANCOVA proceeded under the assumption that the slopes are practically parallel (R^2 of interaction model = 0.9893 and R^2 of parallel slope model = 0.9885; a difference < 0.02) following Environment Canada (2012b).

[h] ANCOVA proceeded under the assumption that the slopes are practically parallel (R^2 of interaction model = 0.9889 and R^2 of parallel slope model = 0.9882; a difference < 0.02) following Environment Canada (2012b).

[i] ANCOVA proceeded under the assumption that the slopes are practically parallel (R^2 of interaction model = 0.9845 and R^2 of parallel slope model = 0.9837; a difference < 0.02) following Environment Canada (2012b).

[j] ANCOVA proceeded under the assumption that the slopes are practically parallel (R^2 of interaction model = 0.9909 and R^2 of parallel slope model = 0.99; a difference < 0.02) following Environment Canada (2012b).

[k] ANCOVA proceeded under the assumption that the slopes are practically parallel (R^2 of interaction model = 0.9903 and R^2 of parallel slope model = 0.9894; a difference < 0.02) following Environment Canada (2012b).

Table E.5.1: Statistical Comparisons of Condition and Weight-at-Age of Rainbow Trout and Longnose Sucker for Polley Lake in Spring and Fall, 2014 to 2022

Species	Indicator	Endpoint	Sex	Season	Variables		Summary Statistics[c]								Multiple Comparisons Among Years								Magnitude of Difference[d]							
					Response	Covariate (Cov)	Statistic	2014	2016	2017	2018	2019	2020	2021	2022	2014	2016	2017	2018	2019	2020	2021	2022	Baseline Year	2016	2017	2018	2019	2020	2021	2022
RBT	Energy Storage	Condition	All	Spring	log10[Body Weight (g)]	log10[Fork Length (cm)]	Adjusted Mean	-	262	268	256	253	258	256	249	-	AB	A	BC	BC	ABC	ABC	C	2016	-	ns	ns	ns	ns	ns	-4.9
	Energy Storage	Condition	All (FL > 23 cm)	Spring		log10[Fork Length (cm)]		-	349	357	346	341	353	330	325	-	A	A	A	AB	A	B	B	2016	-	ns	ns	ns	ns	-5.5	-6.8
	Energy Storage	Condition	All	Fall		log10[Fork Length (cm)]		122	109	-	111	119	114	115	106	A	CD	-	BC	A	B	B	D	2014	-11	-	-8.8	ns	-6.5	-5.6	-13
	Energy Storage	Condition	All (FL > 12 cm)	Fall		log10[Fork Length (cm)]		127	114	-	116	123	118	119	110	A	CD	-	BC	A	B	B	D	2014	-10	-	-8.5	ns	-6.6	-5.6	-13
	Energy Storage	Condition	Female	Spring		log10[Fork Length (cm)]		-	361	384	363	368	390	342	329	-	AB	A	AB	AB	A	BC	C	2016	-	ns	ns	ns	ns	ns	-9.0
	Energy Usage	Weight-at-age	Female	Spring		log10[Age (years)]		-	330	369	341	349	438	376	305	-	AB	AB	AB	AB	A	AB	B	2016	-	ns	ns	ns	ns	ns	ns
	Energy Storage	Condition	Male	Spring		log10[Fork Length (cm)]		-	386	369	377	380	370	352	-	-	A	A	A	A	A	A	-	2016	-	ns	ns	ns	ns	ns	-
LSU	Energy Storage	Condition	All	Spring	log10[Body Weight (g)]	log10[Fork Length (cm)]	Adjusted Mean	-	427	485	453	430	434	408	388	-	B	A	AB	BC	B	CD	D	2016	-	14	ns	ns	ns	-4.5	-9.1
	Energy Storage	Condition	All (FL > 32 cm)	Spring		log10[Fork Length (cm)]		-	677	777	716	686	705	667	638	-	B	A	AB	B	B	BC	C	2016	-	15	ns	ns	ns	ns	-5.8
	Energy Storage	Condition	All	Fall		log10[Fork Length (cm)]		141	139	-	153	140	138	136	134	B	BC	-	A	B	BC	BC	C	2014	ns	-	8.5	ns	ns	ns	-5.3
	Energy Storage	Condition	All (FL > 11 cm)	Fall		log10[Fork Length (cm)]		145	143	-	158	145	142	140	138	B	BC	-	A	B	BC	BC	C	2014	ns	-	8.4	ns	ns	ns	-5.1
	Energy Storage	Condition	Female	Spring		log10[Fork Length (cm)]		-	580	652	612	587	603	543	536	-	BC	A	AB	BC	AB	BC	C	2016	-	12	ns	ns	ns	ns	ns
	Energy Storage	Condition	Female (FL > 32 cm)	Spring		log10[Fork Length (cm)]		-	755	859	799	767	793	718	701	-	BC	A	AB	BC	AB	BC	C	2016	-	14	ns	ns	ns	ns	ns
	Energy Usage	Weight-at-age	Female	Spring		log10[Age (years)]		-	624	705	854	801	711	591	641	-	BC	ABC	A	AB	ABC	C	BC	2016	-	ns	37	ns	ns	ns	ns
	Energy Storage	Condition	Male	Spring		log10[Fork Length (cm)]		-	346	-	-	352	346	328	311	-	A	-	-	A	A	AB	B	2016	-	-	-	ns	ns	ns	-10
	Energy Storage	Condition	Male (FL > 30 cm)	Spring		log10[Fork Length (cm)]		-	488	-	-	484	492	473	452	-	A	-	-	A	A	A	A	2016	-	-	-	ns	ns	ns	ns

P-value < 0.1
Mean is significantly greater than baseline year
Mean is significantly lower than baseline year
Covariate was not significant therefore an ANOVA was conducted

Note: "-" = no data; RBT = rainbow trout; LSU = longnose sucker; ANCOVA = analysis of covariance; ANOVA = analysis of variance; nt = no test (not enough data to conduct comparisons); ns = not significant.

[a] Model: $Y = \beta_0 + \beta_1(Cov) + \beta_2(Year) + \beta_3(Cov \times Year) + \varepsilon$.

[b] The mean value of the covariate (that corresponds to the adjusted means for the response variable) for the parallel slope ANCOVA model or the minimum and maximum values of the overlap in covariate values for the interaction ANCOVA model.

[c] The median, mean (geometric mean for log10-transformed variables), and adjusted mean are reported for ANCOVA, and the predicted means of the regression line equations for minimum and maximum values of the covariate (where the data sets overlap) for ANCOVAs where a significant interaction (i.e., different slopes) occurs.

[d] Calculated as the difference in measure of central tendency (MCT) between years (i.e., 2022 minus baseline year), expressed as a percentage of the baseline year MCT.

[e] Outliers removed. See Table E.5.2 for details.

[f] ANCOVA proceeded under the assumption that the slopes are practically parallel (R^2 of interaction model = 0.9877 and R^2 of parallel slope model = 0.9868; a difference < 0.02) following Environment Canada (2012b).

[g] ANCOVA proceeded under the assumption that the slopes are practically parallel (R^2 of interaction model = 0.9893 and R^2 of parallel slope model = 0.9885; a difference < 0.02) following Environment Canada (2012b).

[h] ANCOVA proceeded under the assumption that the slopes are practically parallel (R^2 of interaction model = 0.9889 and R^2 of parallel slope model = 0.9882; a difference < 0.02) following Environment Canada (2012b).

[i] ANCOVA proceeded under the assumption that the slopes are practically parallel (R^2 of interaction model = 0.9845 and R^2 of parallel slope model = 0.9837; a difference < 0.02) following Environment Canada (2012b).

[j] ANCOVA proceeded under the assumption that the slopes are practically parallel (R^2 of interaction model = 0.9909 and R^2 of parallel slope model = 0.99; a difference < 0.02) following Environment Canada (2012b).

[k] ANCOVA proceeded under the assumption that the slopes are practically parallel (R^2 of interaction model = 0.9903 and R^2 of parallel slope model = 0.9894; a difference < 0.02) following Environment Canada (2012b).

Table E.5.2: Outliers Excluded from Statistical Comparisons of Condition and Weight-at-Age of Rainbow Trout and Longnose Sucker for Polley Lake in Spring and Fall, 2014 to 2022

Taxa	Sex	Season	Year	Outliers (Student Residual)
RBT	All	Spring	2018	POL_RB_105_2018-05-15 (-4.14)
			2020	POL_RB_N41_2020-05-15(-15.755)); POL_RB_N42_2020-05-15 (-18.346)); POL_RB_N5_2020-05-15 (-4.025)
			2021	POL_RB_33_2021-05-15 (5.292)
	All (FL > 23 cm)	Spring	2018	POL_RB_105_2018-05-15 (-4.006)
			2020	POL_RB_N41_2020-05-15 (-14.743)); POL_RB_N42_2020-05-15 (-17.272)
			2021	POL_RB_33_2021-05-15 (5.149)
	All	Fall	2014	POL_RB_50_2014-09-15 (-4.03)
			2016	POL_RB_11L_2016-09-15 (-4.412); POL_RB_32L_2016-09-15 (8.551); POL_RB_11_2016-09-13 (-4.846); POL_RB_37L_2016-09-15 (4.54)
			2018	POL_RB_30_2018-09-15 (6.799); POL_RB_90_2018-09-15 (-4.09)
			2020	POL_RB_62_2020-10-05 (4.059); POL_RB_112_2020-10-05 (4.447); POL_RB_143_2020-10-06 (-4.084); POL_RB_151_2020-10-06 (-4.144); POL_RB_205_2020-10-07 (-4.688); POL_RB_12_2020-10-03 (-4.228); POL_RB_195_2020-10-07 (-4.128)
			2021	POL_RB_47_2021-09-24 (-4.406); POL_RB_173_2021-09-26 (18.823)
			2022	POL_RB-11_2022-09 (-4.245); POL_RB-6_2022-09 (-4.034)
	All (FL > 12 cm)	Fall	2014	POL_RB_50_2014-09-15 (-4.069)
			2016	POL_RB_11L_2016-09-15 (-4.455); POL_RB_32L_2016-09-15 (8.642); POL_RB_11_2016-09-13 (-4.952); POL_RB_37L_2016-09-15 (4.638); POL_RB_71_2016-09-16 (-4.002)
			2018	POL_RB_30_2018-09-15 (6.868); POL_RB_90_2018-09-15 (-4.109)
			2020	POL_RB_12_2020-10-03 (-4.15); POL_RB_112_2020-10-05 (4.467); POL_RB_143_2020-10-06 (-4.379); POL_RB_195_2020-10-07 (-4.036); POL_RB_205_2020-10-07 (-4.746); POL_RB_62_2020-10-05 (4.045)
			2021	POL_RB_47_2021-09-24 (-4.455); POL_RB_173_2021-09-26 (19.098)
			2022	POL_RB-11_2022-09 (-4.31)
	Female	Spring	2020	POL_RB_N41_2020-05-15 (-27.837)
	Male	Spring	2016	POL_RB_54_2016-04-15 (4.05);
			2018	POL_RB_105_2018-05-15 (-4.035); POL_RB_85_2018-05-15 (4.021)
			2021	POL_RB_33_2021-05-15 (5.671);
LSU	All	Spring	2016	POL_LSU_88_2016-04-15 (-9.341); POL_LSU_72_2016-04-15 (-5.315)
			2021	POL_LSU_36_2021-05-13 (-4.933)
	All (FL > 32 cm)	Spring	2021	POL_LSU_36_2021-05-13 (-5.724)
	All	Fall	2018	POL_LSU_32_2018-09-15 (-4.743)
			2019	POL_LSU_36_2019-09-25 (-4.616); POL_LSU_91_2019-09-26 (-9.42)
			2020	POL_LSU_10_2020-10-05 (4.642); POL_LSU_86_2020-10-05 (-4.561); POL_LSU_110_2020-10-05 (-4.335)
			2021	POL_LSU_45_2021-09-25 (4.558); POL_LSU_105_2021-09-26 (4.256); POL_LSU_106_2021-09-26 (4.3)
			2022	POL_LSU-7_2022-09 (-4.359)
	All (FL > 11 cm)	Fall	2018	POL_LSU_32_2018-09-15 (-4.986)
			2019	POL_LSU_36_2019-09-25 (-4.852); POL_LSU_91_2019-09-26 (-9.955)
			2020	POL_LSU_86_2020-10-05 (-4.725); POL_LSU_110_2020-10-05 (-4.547)
			2022	POL_LSU-7_2022-09 (-4.652)
	Male	Spring	2016	POL_LSU_72_2016-04-15 (-6.451)
	Male (FL > 30 cm)	Spring	2016	POL_LSU_91_2016-04-15 (4.41)
	Female	Spring	2021	POL_LSU_36_2021-05-13 (-4.935)
	Female (FL > 32 cm)	Spring	2021	POL_LSU_36_2021-05-13 (-5.253)

Notes: - = no outliers. RBT = rainbow trout. LSU = longnose sucker. FL = fork length.

Table E.5.3: Two-Sample Kolmogorov-Smirnov Test Results of Rainbow Trout, Longnose Sucker, and Redside Shiner Length Frequency Distributions for Polley Lake in Spring and Fall, 2016 to 2022

Species	Sample Size						P-Value					
	2016	2018	2019	2020	2021	2022	Baseline Year	2018	2019	2020	2021	2022
RBT	119	54	201	216	268	123	2016	0.008	<0.001	<0.001	<0.001	<0.001
LSU	100	169	112	113	109	105	2016	<0.001	0.088	<0.001	<0.001	<0.001
RSC	100	110	110	160	104	113	2016	0.001	<0.001	<0.001	<0.001	<0.001

P-Value < 0.1

Notes: RBT = rainbow trout; LSU = longnose sucker; RSC = redside shiner.

APPENDIX E.6
FISH TISSUE QUALITY

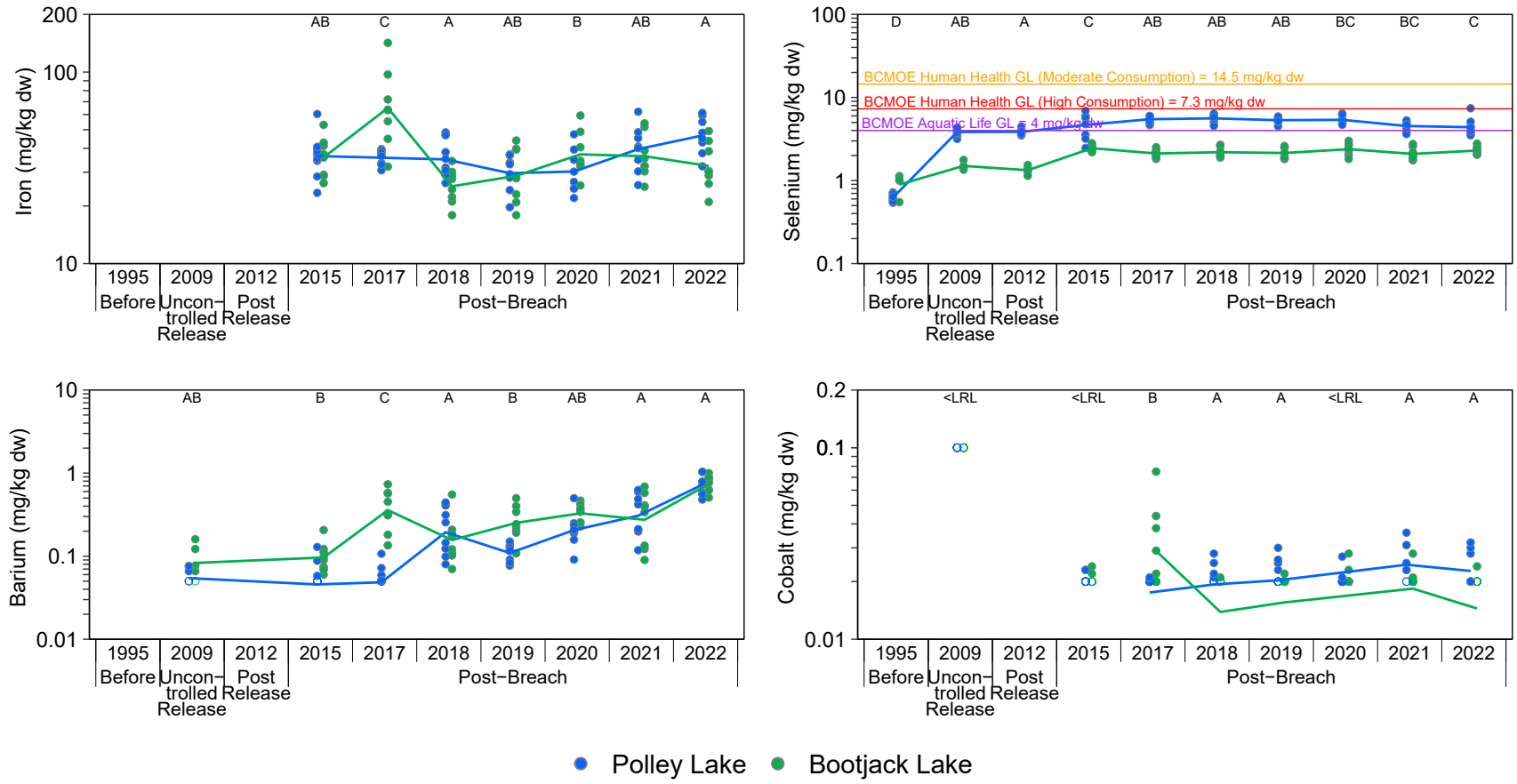


Figure E.6.1: Rainbow Trout Muscle Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Polley Lake (Exposed) and Bootjack Lake (Reference), 1995 to 2022

Notes: BCMOE = British Columbia Ministry of the Environment; GL = Guideline; dw = dry weight; ww = wet weight; <LRL = lower than the laboratory reporting limit. Concentrations <LRL are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Polley Lake:Bootjack Lake) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Polley Lake:Bootjack Lake). Only years with samples from both reference and exposed areas are plotted.

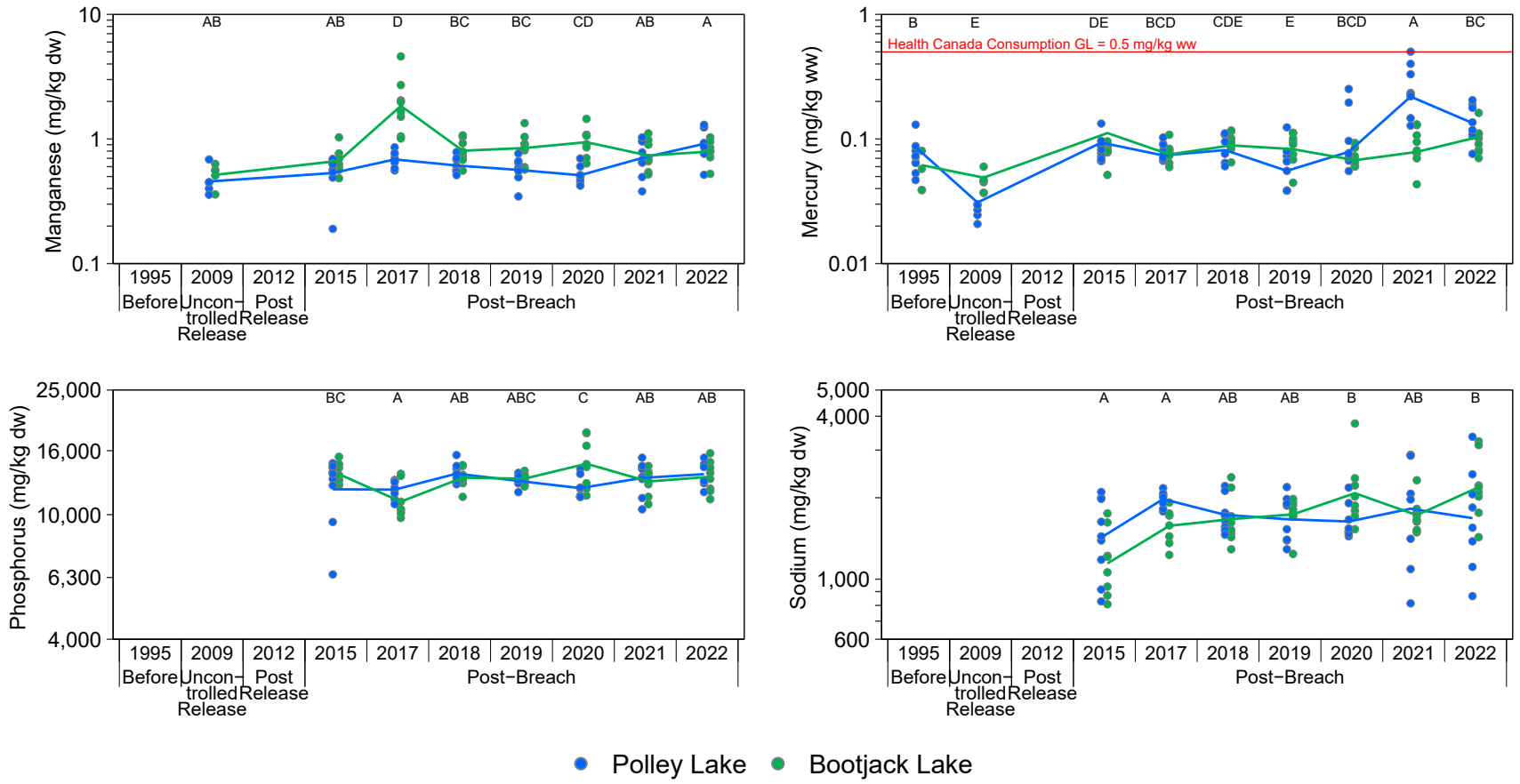


Figure E.6.1: Rainbow Trout Muscle Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Polley Lake (Exposed) and Bootjack Lake (Reference), 1995 to 2022

Notes: BCMOE = British Columbia Ministry of the Environment; GL = Guideline; dw = dry weight; ww = wet weight; <LRL = lower than the laboratory reporting limit. Concentrations <LRL are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Polley Lake:Bootjack Lake) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Polley Lake:Bootjack Lake). Only years with samples from both reference and exposed areas are plotted.

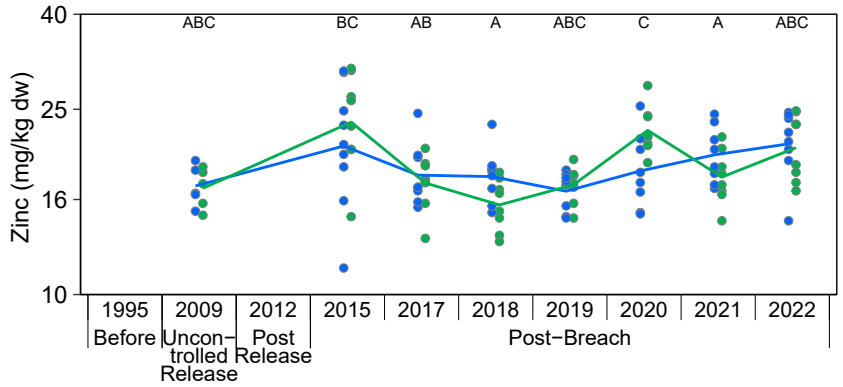


Figure E.6.1: Rainbow Trout Muscle Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Polley Lake (Exposed) and Bootjack Lake (Reference), 1995 to 2022

Notes: BCMOE = British Columbia Ministry of the Environment; GL = Guideline; dw = dry weight; ww = wet weight; <LRL = lower than the laboratory reporting limit. Concentrations <LRL are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Polley Lake:Bootjack Lake) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Polley Lake:Bootjack Lake). Only years with samples from both reference and exposed areas are plotted.

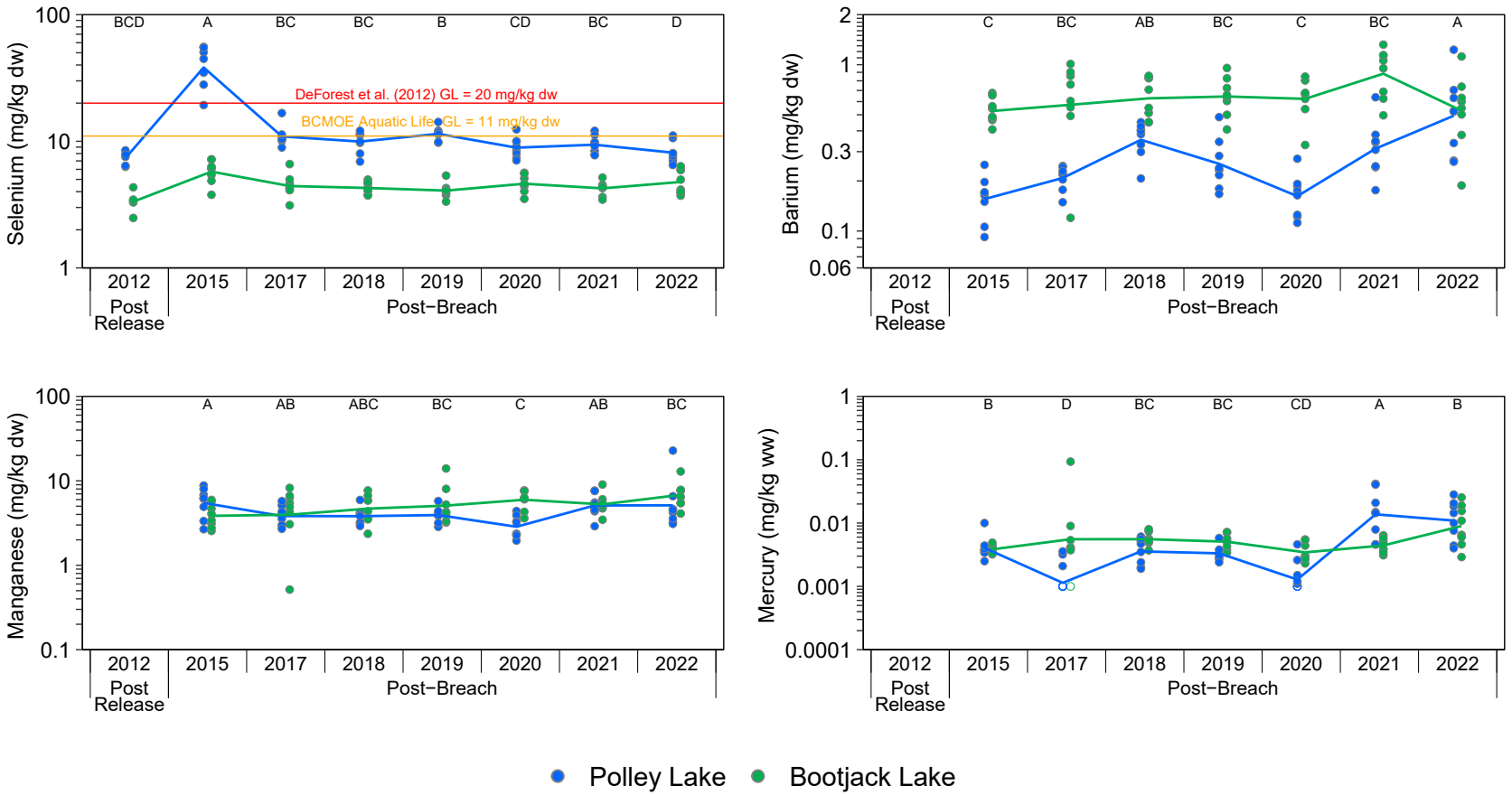


Figure E.6.2: Rainbow Trout Ovary Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Polley Lake (Exposed) and Bootjack Lake (Reference), 2012 to 2022

Notes: BCMOE = British Columbia Ministry of the Environment; GL = Guideline; dw = dry weight; ww = wet weight; <LRL = lower than the laboratory reporting limit. Concentrations <LRL are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Polley Lake:Bootjack Lake) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Polley Lake:Bootjack Lake). Only years with samples from both reference and exposed areas are plotted.

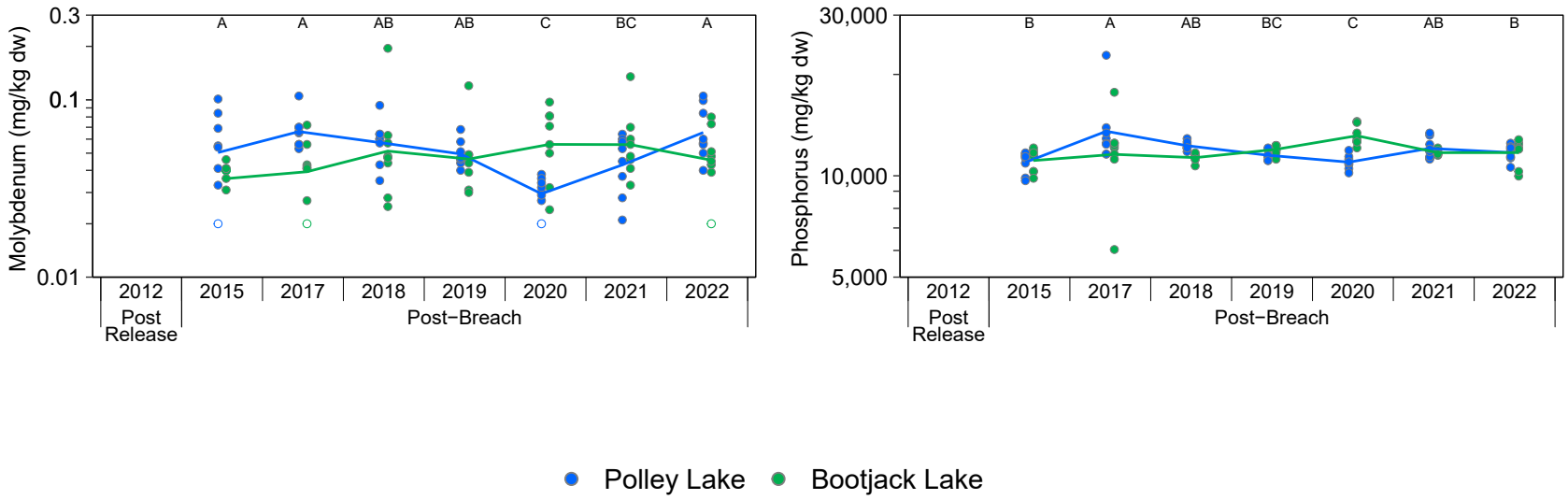


Figure E.6.2: Rainbow Trout Ovary Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Polley Lake (Exposed) and Bootjack Lake (Reference), 2012 to 2022

Notes: BCMOE = British Columbia Ministry of the Environment; GL = Guideline; dw = dry weight; ww = wet weight; <LRL = lower than the laboratory reporting limit. Concentrations <LRL are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Polley Lake:Bootjack Lake) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Polley Lake:Bootjack Lake). Only years with samples from both reference and exposed areas are plotted.

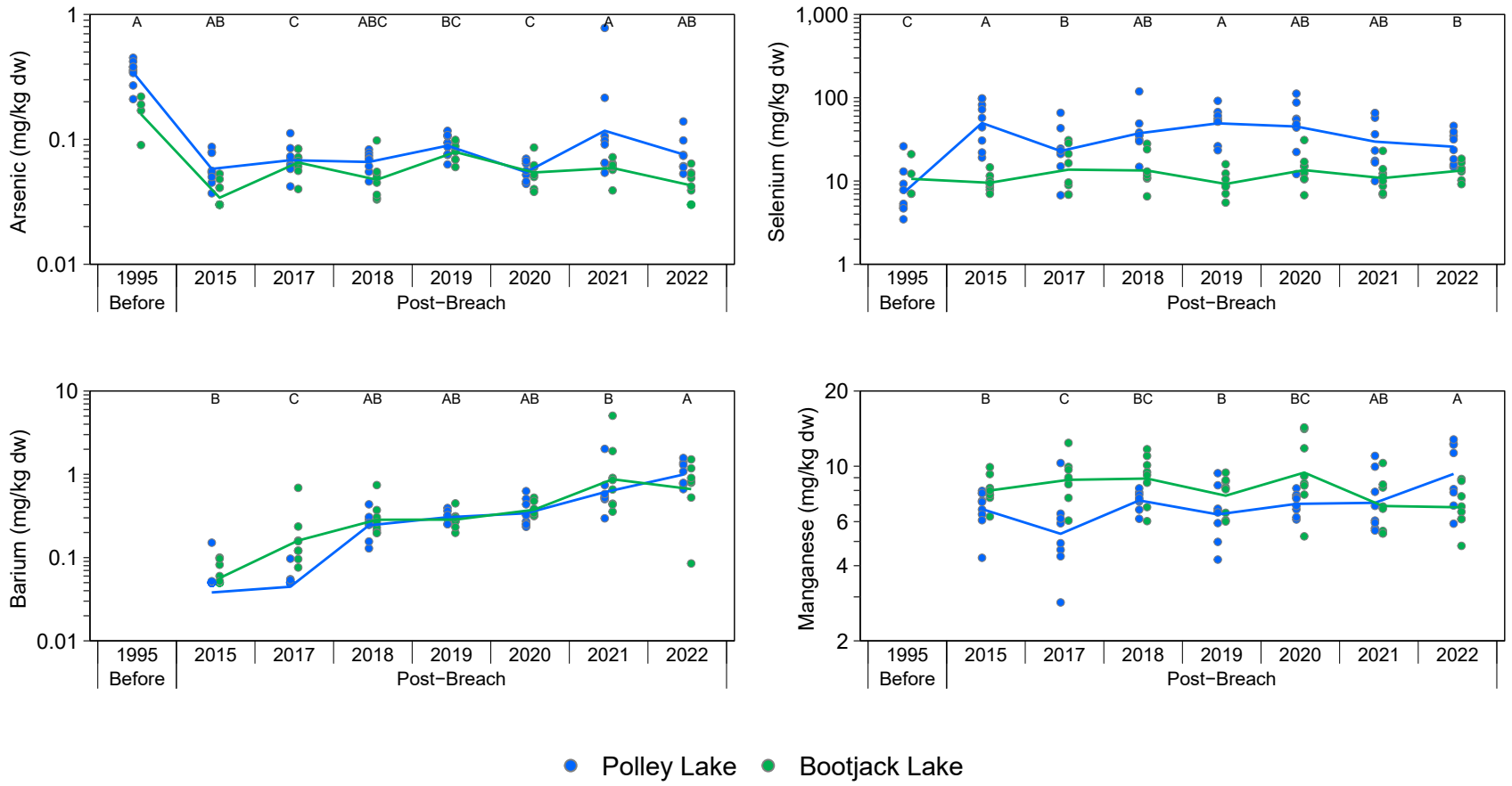


Figure E.6.3: Rainbow Trout Liver Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Polley Lake (Exposed) and Bootjack Lake (Reference), 1995 to 2022

Notes: GL = Guideline; dw = dry weight; ww = wet weight; <LRL = lower than the laboratory reporting limit. Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Polley Lake:Bootjack Lake) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Polley Lake:Bootjack Lake). Only years with samples from both reference and exposed areas are plotted.

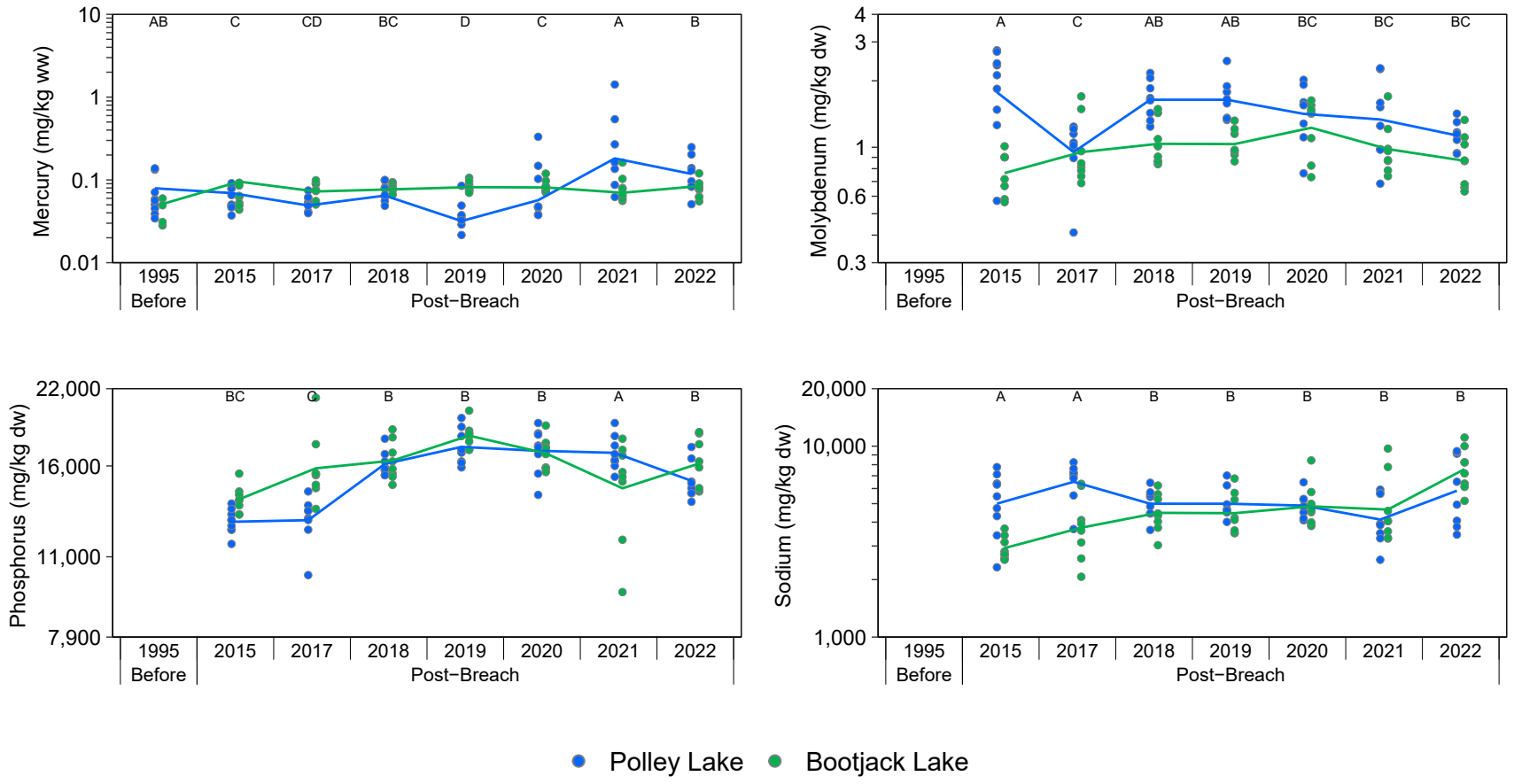


Figure E.6.3: Rainbow Trout Liver Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Polley Lake (Exposed) and Bootjack Lake (Reference), 1995 to 2022

Notes: GL = Guideline; dw = dry weight; ww = wet weight; <LRL = lower than the laboratory reporting limit. Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Polley Lake:Bootjack Lake) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Polley Lake:Bootjack Lake). Only years with samples from both reference and exposed areas are plotted.

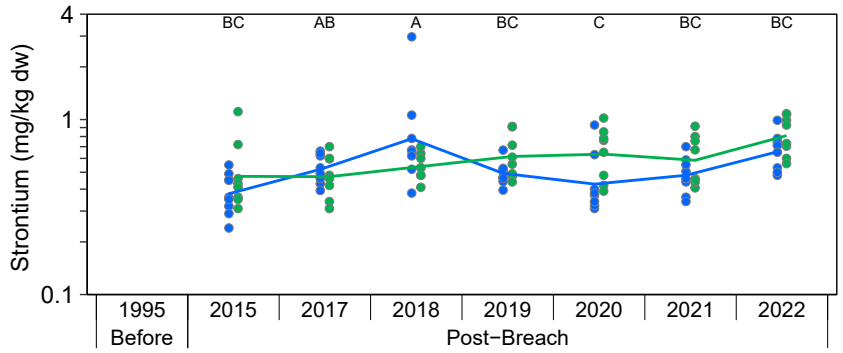


Figure E.6.3: Rainbow Trout Liver Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Polley Lake (Exposed) and Bootjack Lake (Reference), 1995 to 2022

Notes: GL = Guideline; dw = dry weight; ww = wet weight; <LRL = lower than the laboratory reporting limit. Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Polley Lake:Bootjack Lake) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Polley Lake:Bootjack Lake). Only years with samples from both reference and exposed areas are plotted.

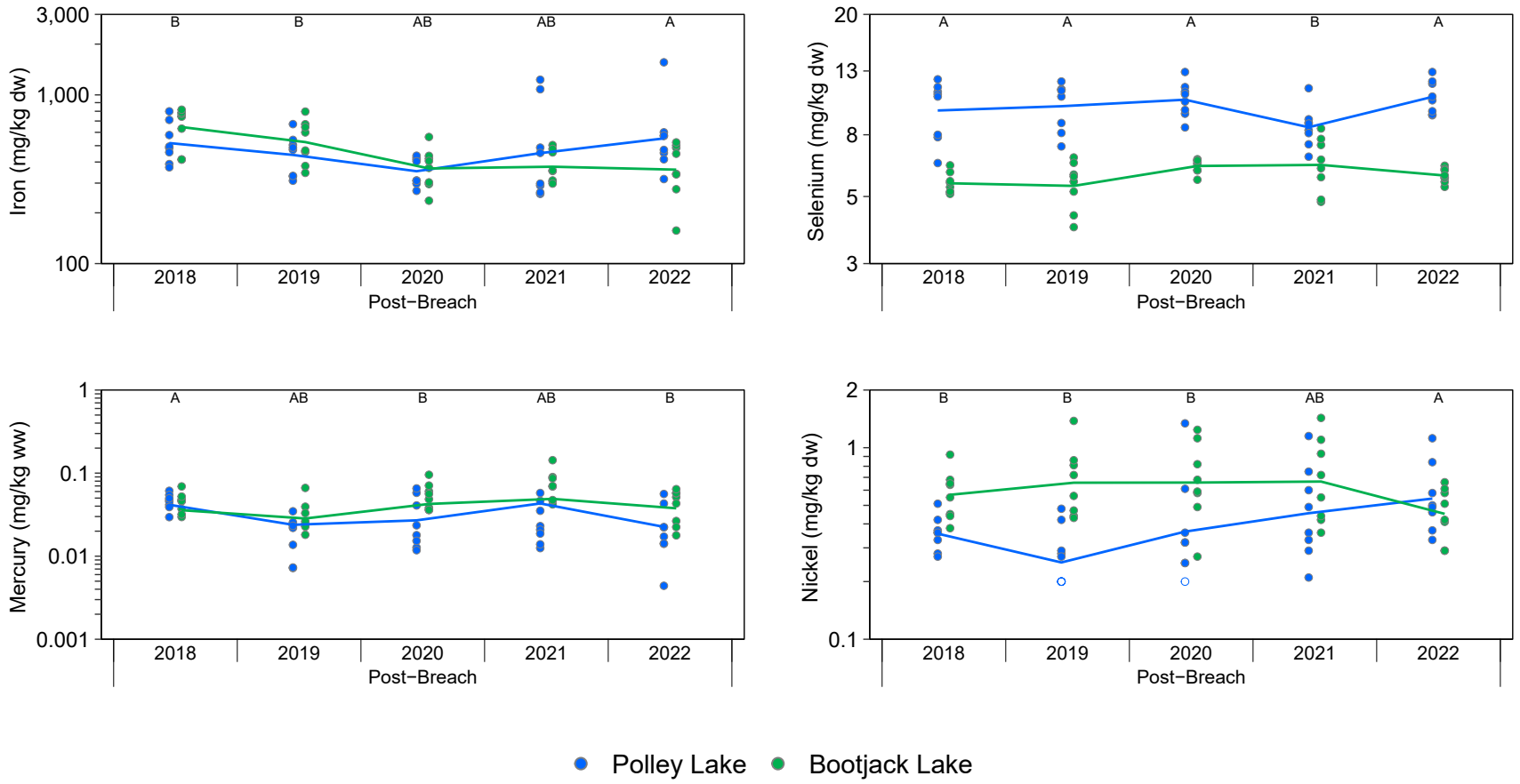


Figure E.6.4: Rainbow Trout Kidney Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Polley Lake (Exposed) and Bootjack Lake (Reference), 2018 to 2022

Notes: GL = Guideline; dw = dry weight; ww = wet weight; <LRL = lower than the laboratory reporting limit. Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Polley Lake:Bootjack Lake) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Polley Lake:Bootjack Lake). Only years with samples from both reference and exposed areas are plotted.

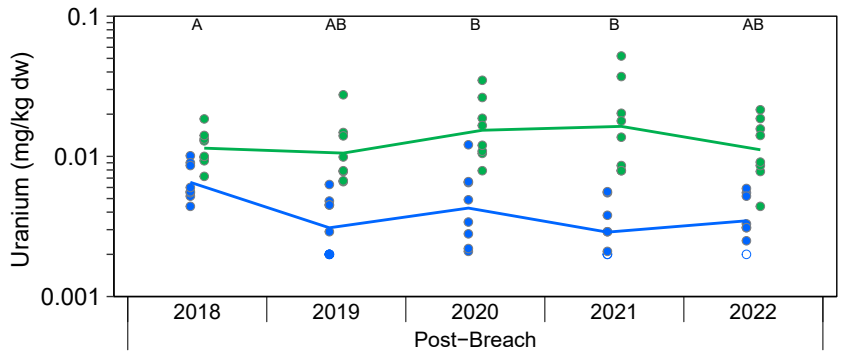


Figure E.6.4: Rainbow Trout Kidney Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Polley Lake (Exposed) and Bootjack Lake (Reference), 2018 to 2022

Notes: GL = Guideline; dw = dry weight; ww = wet weight; <LRL = lower than the laboratory reporting limit. Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Polley Lake:Bootjack Lake) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Polley Lake:Bootjack Lake). Only years with samples from both reference and exposed areas are plotted.

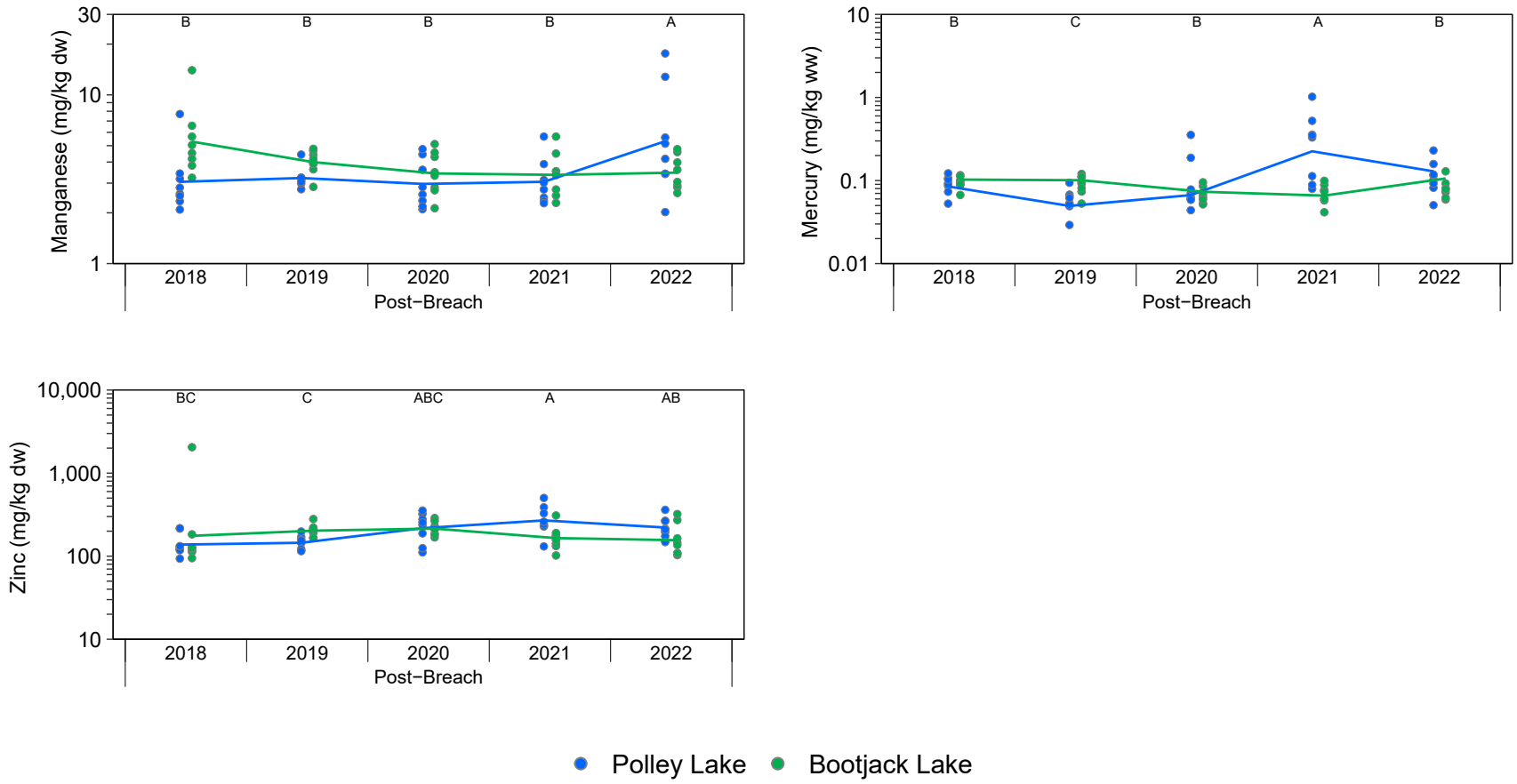


Figure E.6.5: Longnose Sucker Muscle Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Polley Lake (Exposed) and Bootjack Lake (Reference), 1995 to 2022

Notes: BCMOE = British Columbia Ministry of the Environment; GL = Guideline; dw = dry weight; ww = wet weight; <LRL = lower than the laboratory reporting limit. Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Polley Lake:Bootjack Lake) that do not differ significantly (p −value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Polley Lake:Bootjack Lake). Only years with samples from both reference and exposed areas are plotted.

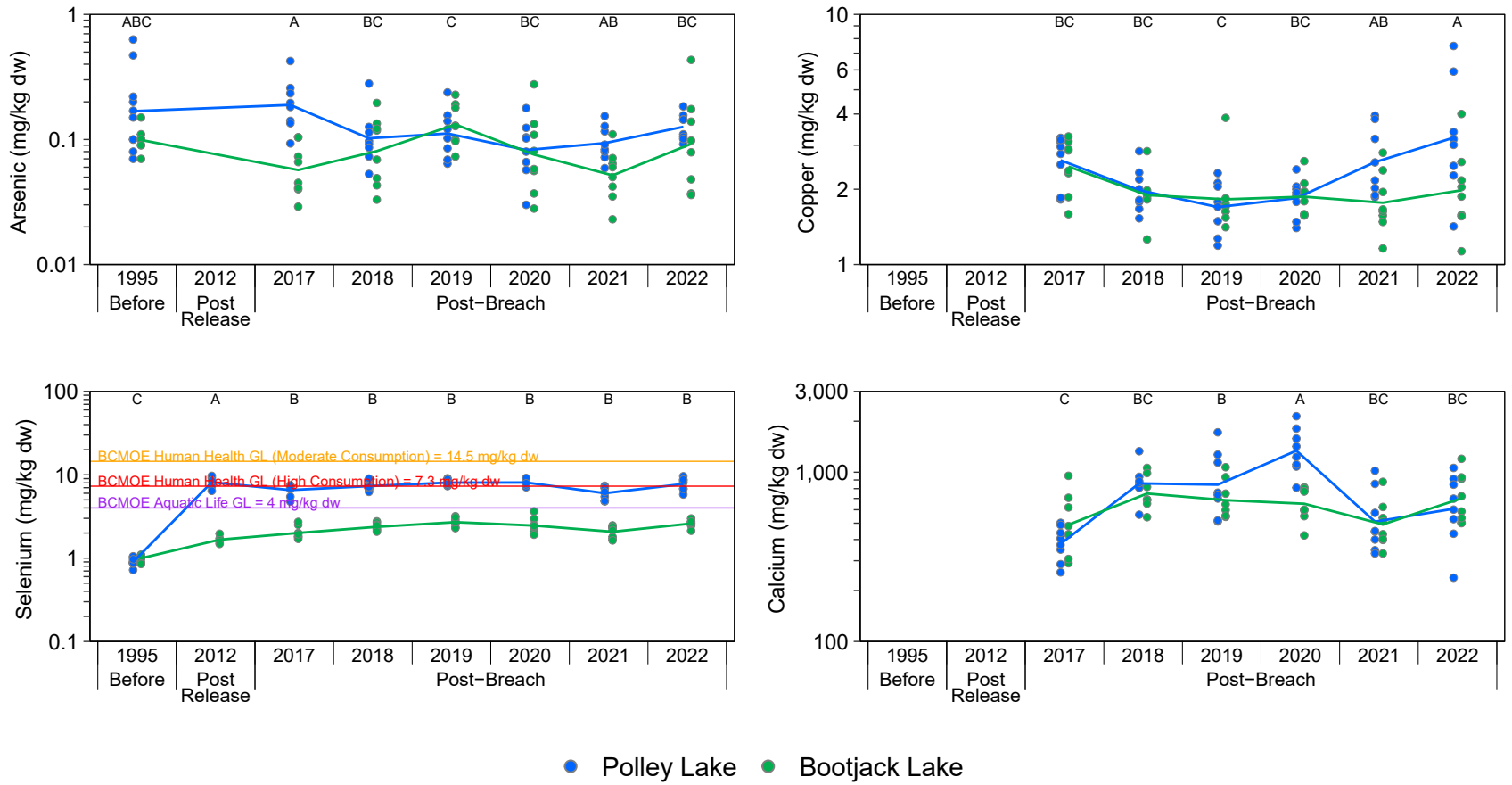


Figure E.6.6: Longnose Sucker Ovary Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Polley Lake (Exposed) and Bootjack Lake (Reference), 2012 to 2022

Notes: BCMOE = British Columbia Ministry of the Environment; GL = Guideline; dw = dry weight; ww = wet weight; <LRL = lower than the laboratory reporting limit. Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Polley Lake:Bootjack Lake) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Polley Lake:Bootjack Lake). Only years with samples from both reference and exposed areas are plotted.

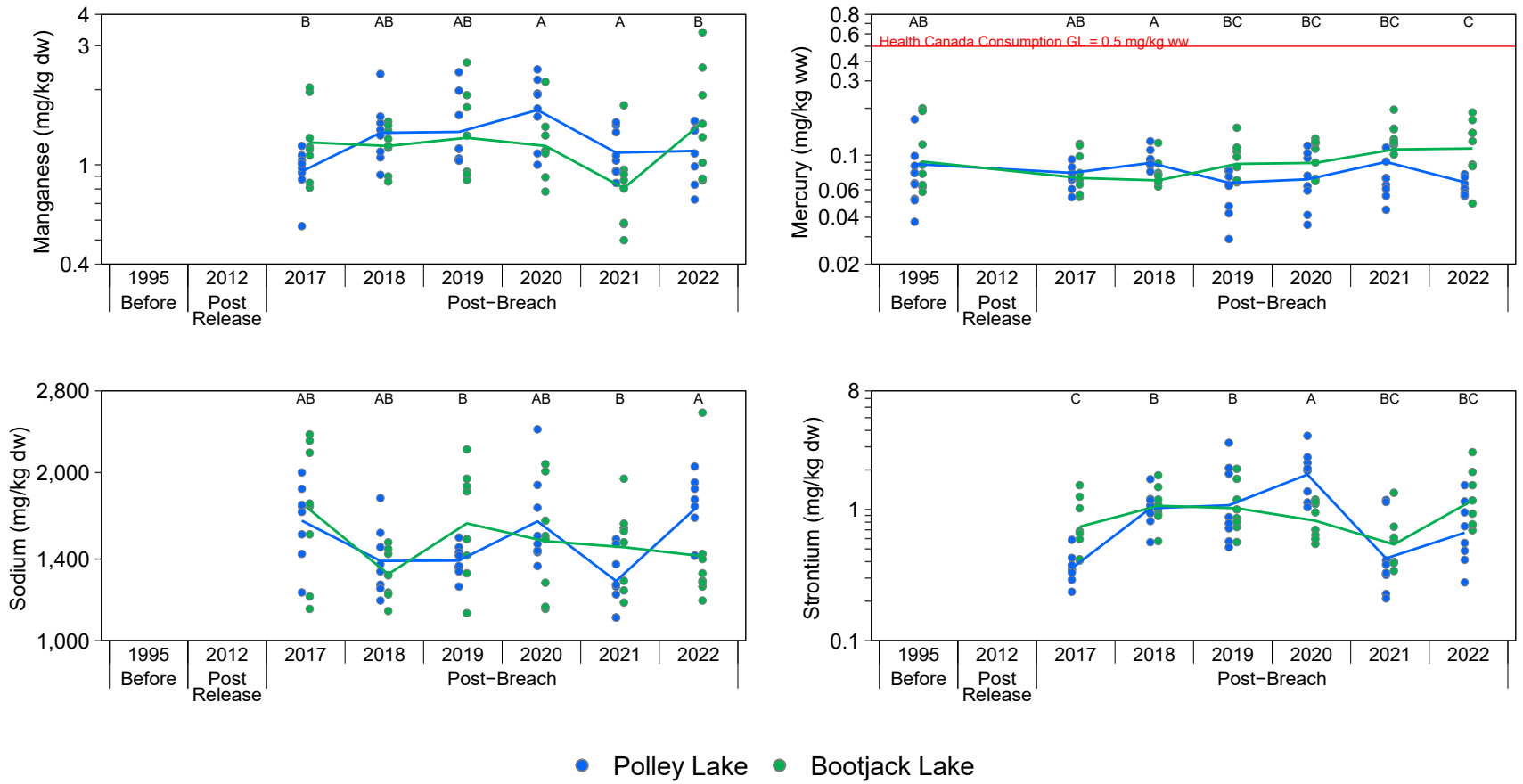


Figure E.6.6: Longnose Sucker Ovary Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Polley Lake (Exposed) and Bootjack Lake (Reference), 2012 to 2022

Notes: BCMOE = British Columbia Ministry of the Environment; GL = Guideline; dw = dry weight; ww = wet weight; <LRL = lower than the laboratory reporting limit. Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Polley Lake:Bootjack Lake) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Polley Lake:Bootjack Lake). Only years with samples from both reference and exposed areas are plotted.

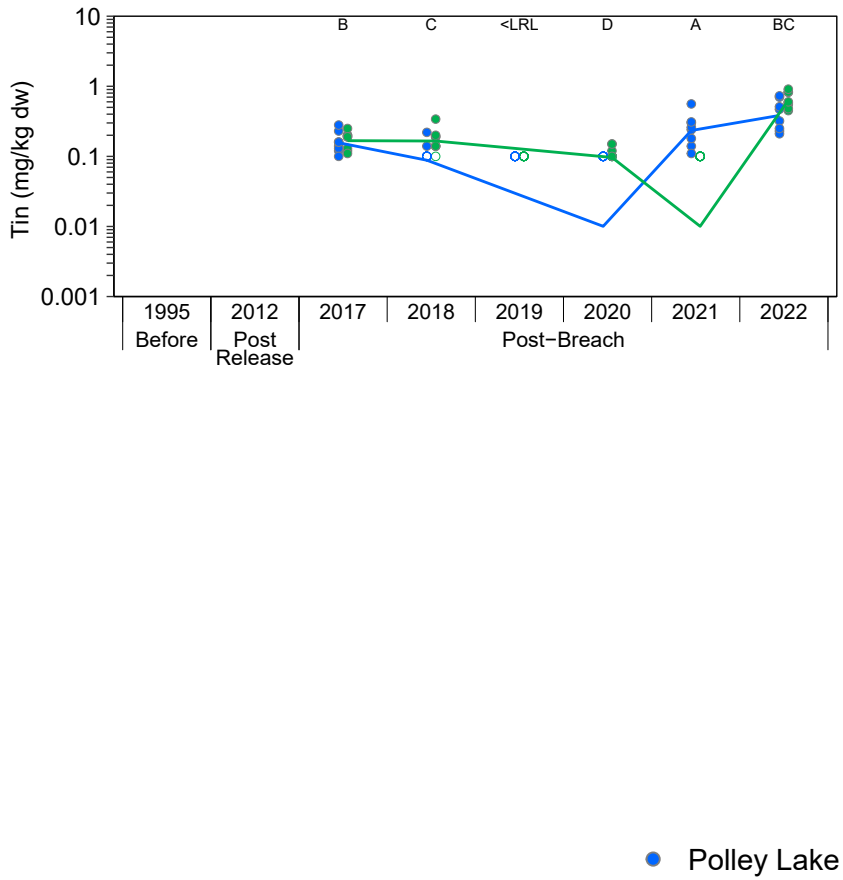


Figure E.6.6: Longnose Sucker Ovary Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Polley Lake (Exposed) and Bootjack Lake (Reference), 2012 to 2022

Notes: BCMOE = British Columbia Ministry of the Environment; GL = Guideline; dw = dry weight; ww = wet weight; <LRL = lower than the laboratory reporting limit. Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Polley Lake:Bootjack Lake) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Polley Lake:Bootjack Lake). Only years with samples from both reference and exposed areas are plotted.

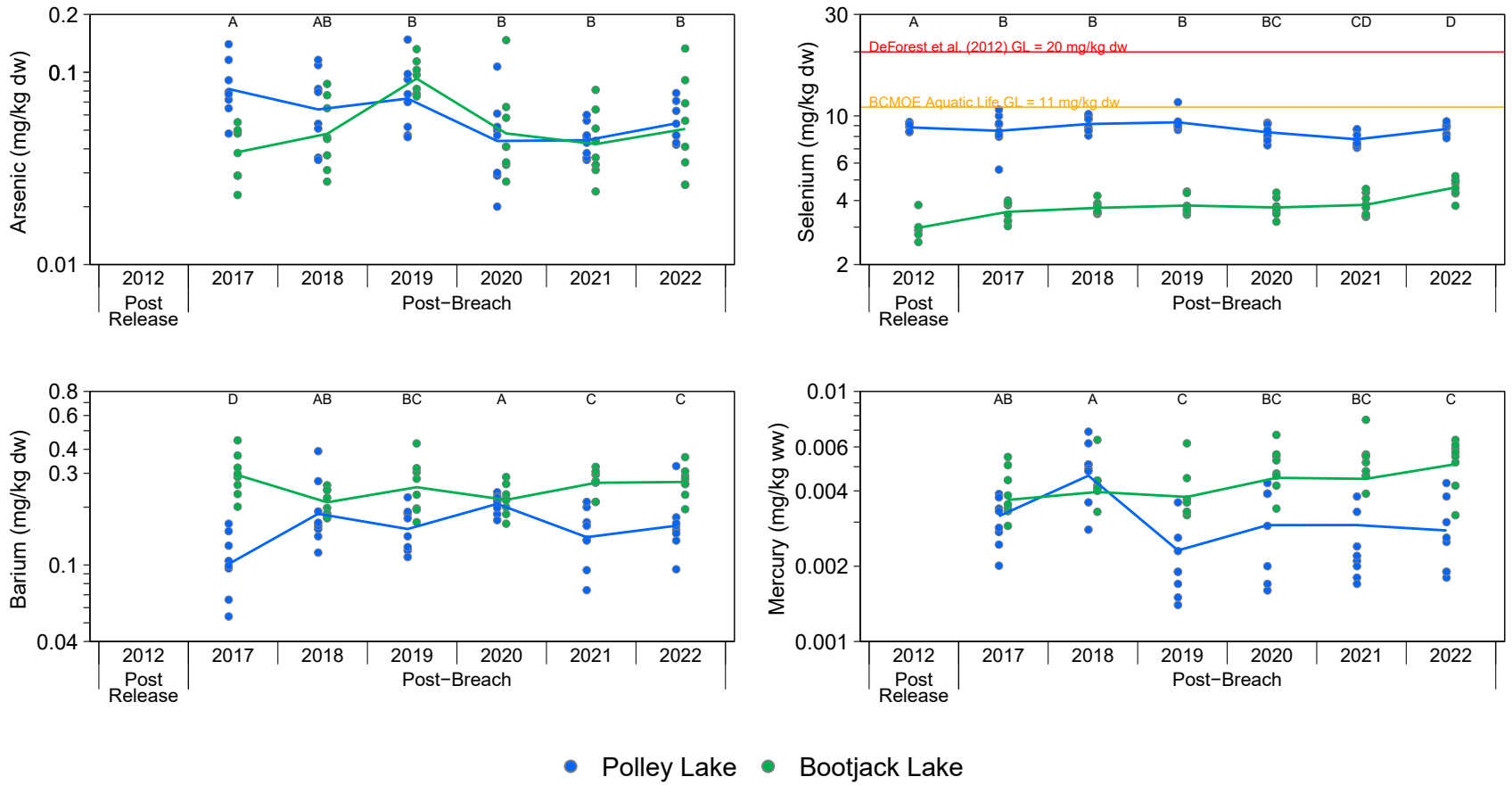


Figure E.6.7: Longnose Sucker Liver Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Polley Lake (Exposed) and Bootjack Lake (Reference), 1995 to 2022

Notes: GL = Guideline; dw = dry weight; ww = wet weight; <LRL = lower than the laboratory reporting limit. Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Polley Lake:Bootjack Lake) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Polley Lake:Bootjack Lake). Only years with samples from both reference and exposed areas are plotted.

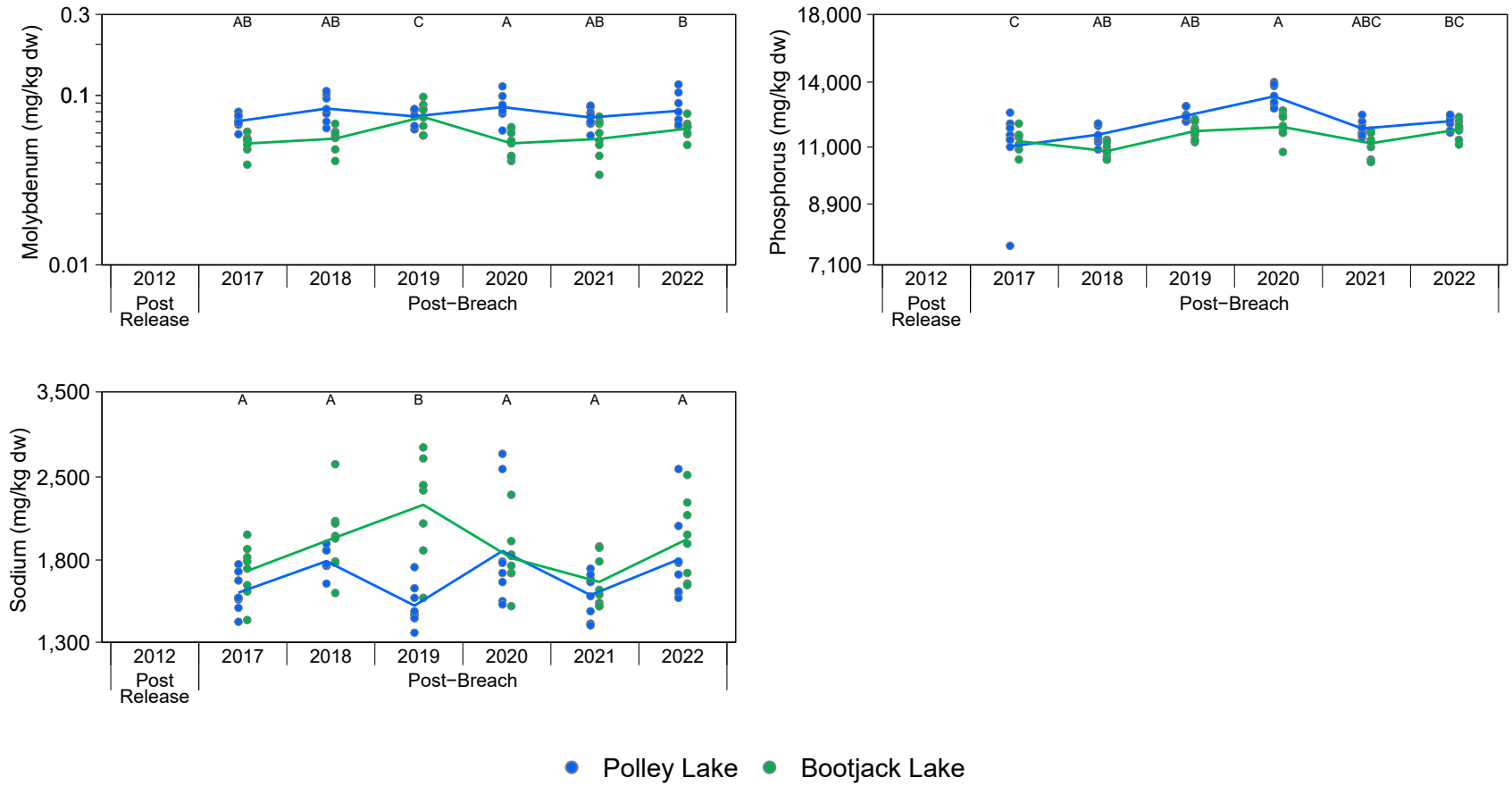


Figure E.6.7: Longnose Sucker Liver Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Polley Lake (Exposed) and Bootjack Lake (Reference), 1995 to 2022

Notes: GL = Guideline; dw = dry weight; ww = wet weight; <LRL = lower than the laboratory reporting limit. Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Polley Lake:Bootjack Lake) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Polley Lake:Bootjack Lake). Only years with samples from both reference and exposed areas are plotted.

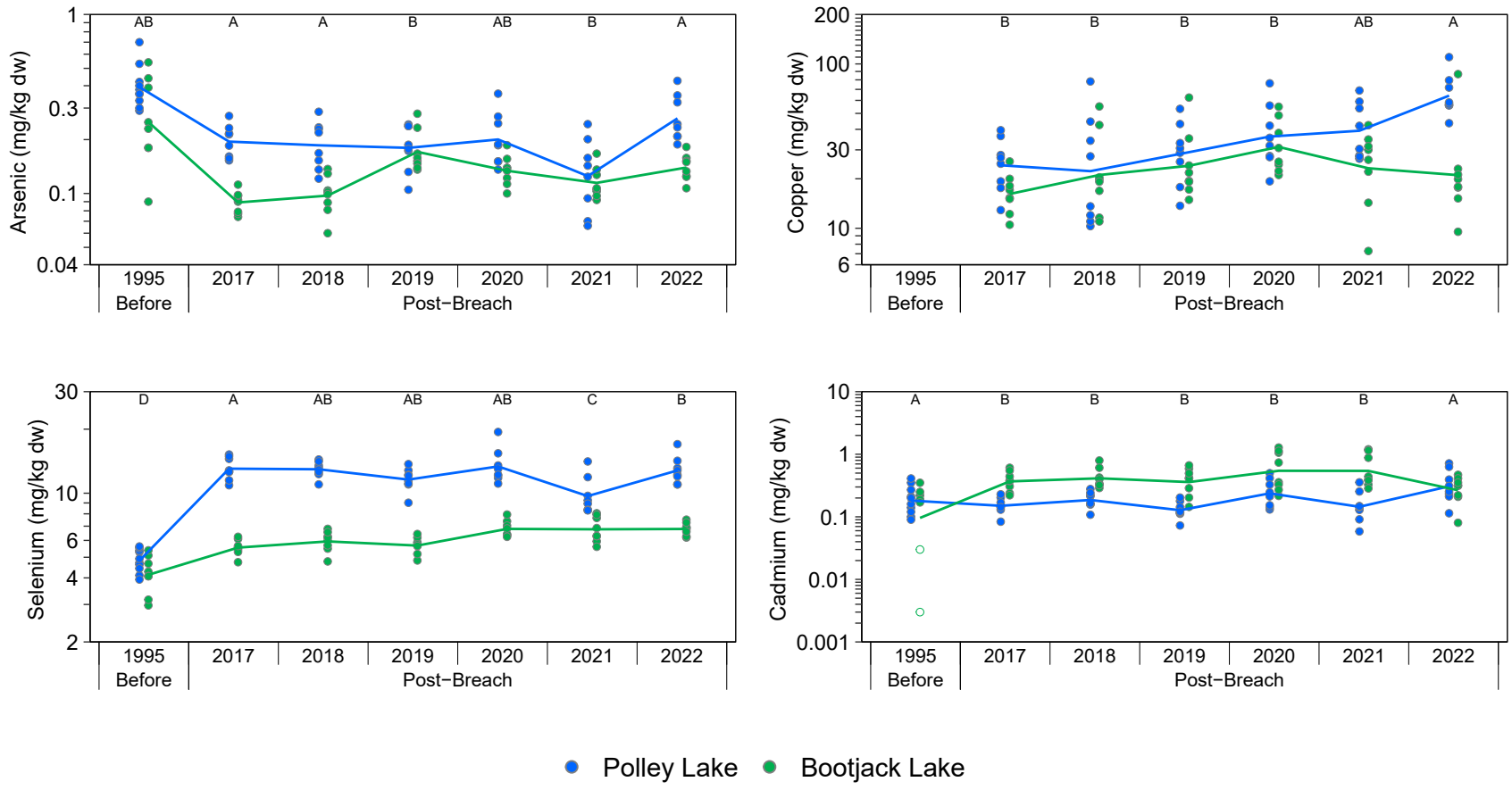


Figure E.6.8: Longnose Sucker Kidney Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Polley Lake (Exposed) and Bootjack Lake (Reference), 2018 to 2022

Notes: GL = Guideline; dw = dry weight; ww = wet weight; <LRL = lower than the laboratory reporting limit. Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Polley Lake:Bootjack Lake) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Polley Lake:Bootjack Lake). Only years with samples from both reference and exposed areas are plotted.

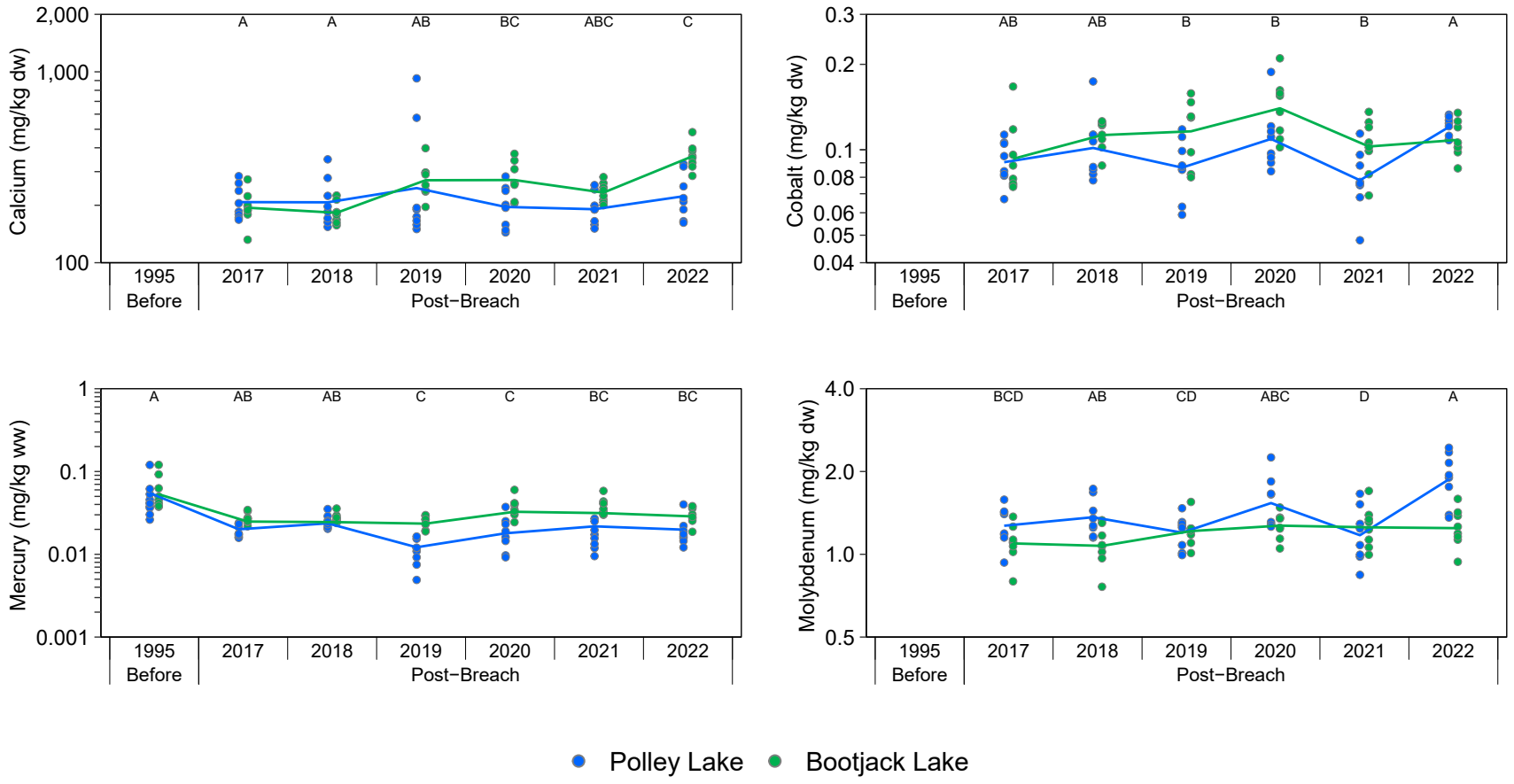


Figure E.6.8: Longnose Sucker Kidney Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Polley Lake (Exposed) and Bootjack Lake (Reference), 2018 to 2022

Notes: GL = Guideline; dw = dry weight; ww = wet weight; <LRL = lower than the laboratory reporting limit. Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Polley Lake:Bootjack Lake) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Polley Lake:Bootjack Lake). Only years with samples from both reference and exposed areas are plotted.

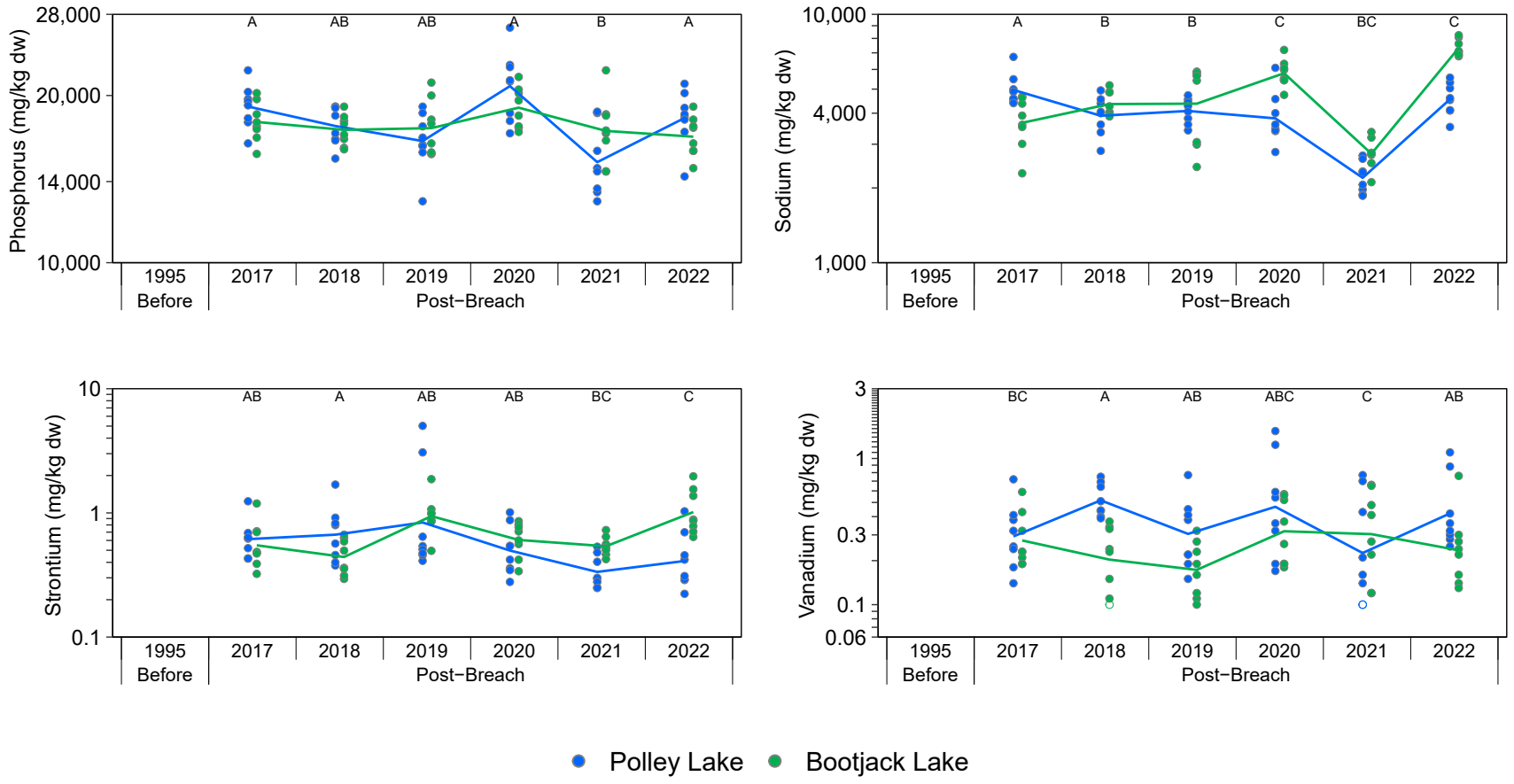


Figure E.6.8: Longnose Sucker Kidney Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Polley Lake (Exposed) and Bootjack Lake (Reference), 2018 to 2022

Notes: GL = Guideline; dw = dry weight; ww = wet weight; <LRL = lower than the laboratory reporting limit. Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Polley Lake:Bootjack Lake) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Polley Lake:Bootjack Lake). Only years with samples from both reference and exposed areas are plotted.

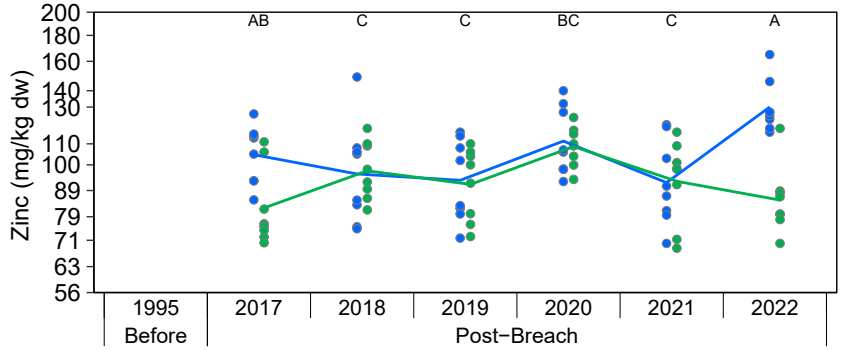


Figure E.6.8: Longnose Sucker Kidney Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Polley Lake (Exposed) and Bootjack Lake (Reference), 2018 to 2022

Notes: GL = Guideline; dw = dry weight; ww = wet weight; <LRL = lower than the laboratory reporting limit. Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Polley Lake:Bootjack Lake) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Polley Lake:Bootjack Lake). Only years with samples from both reference and exposed areas are plotted.

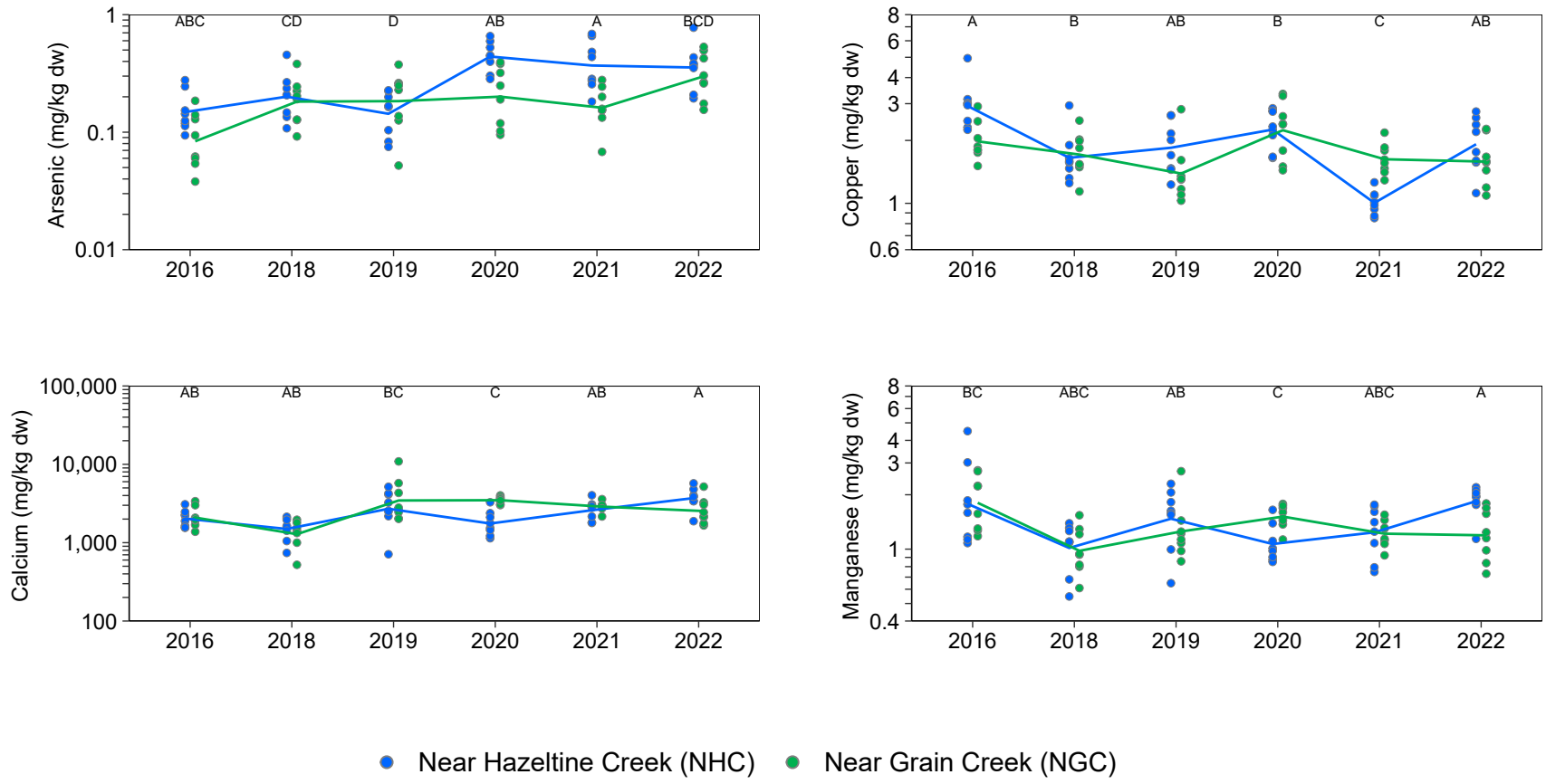


Figure E.6.9: Peamouth Chub Muscle Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Quesnel Lake near Hazeltine Creek (NHC; Exposed) and near Grain Creek (NGC; Reference), 2016 to 2022

Notes: GL = Guideline; dw = dry weight; ww = wet weight; <LRL = lower than the laboratory reporting limit. Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two −way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted.

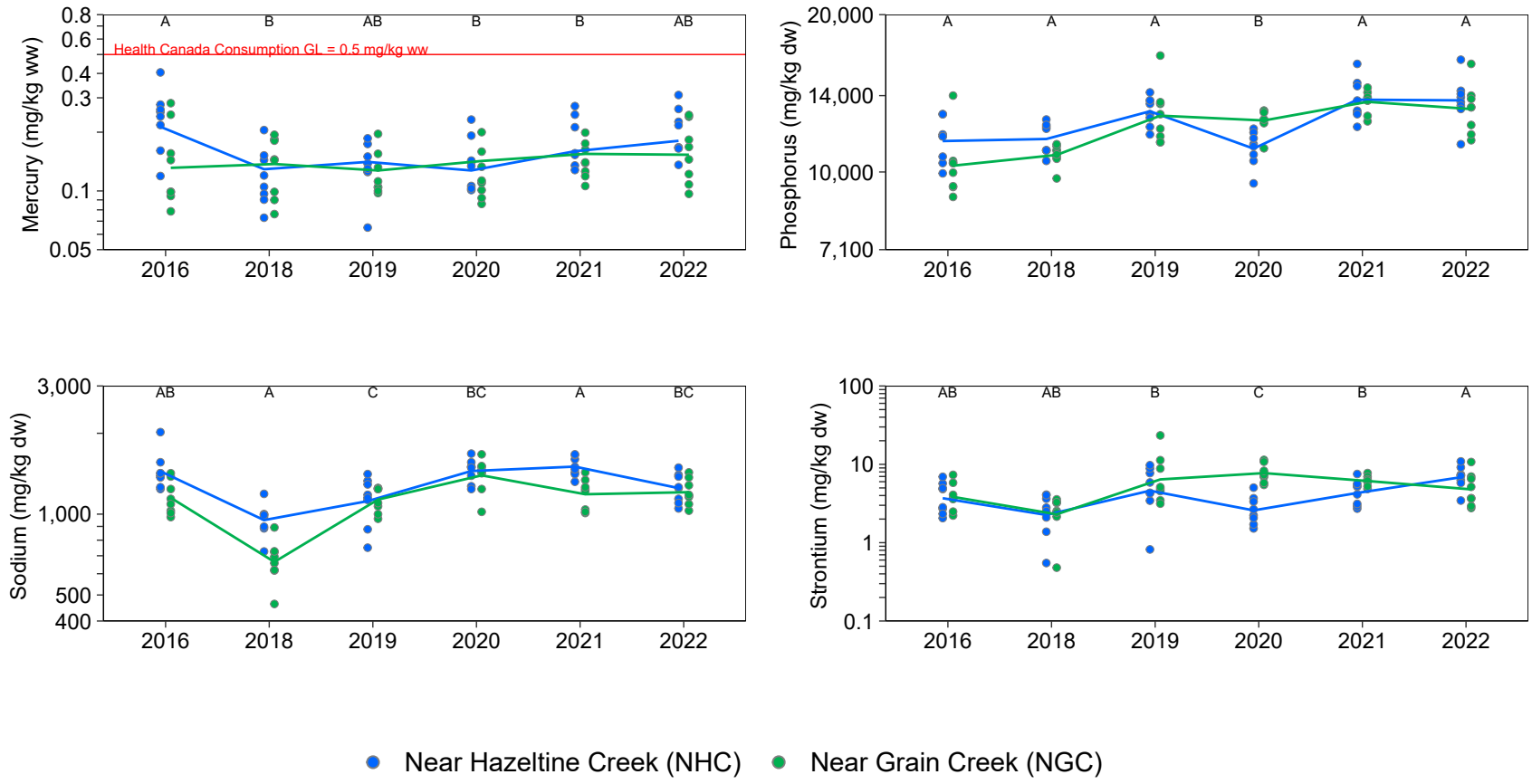


Figure E.6.9: Peamouth Chub Muscle Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Quesnel Lake near Hazeltine Creek (NHC; Exposed) and near Grain Creek (NGC; Reference), 2016 to 2022

Notes: GL = Guideline; dw = dry weight; ww = wet weight; <LRL = lower than the laboratory reporting limit. Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two −way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted.

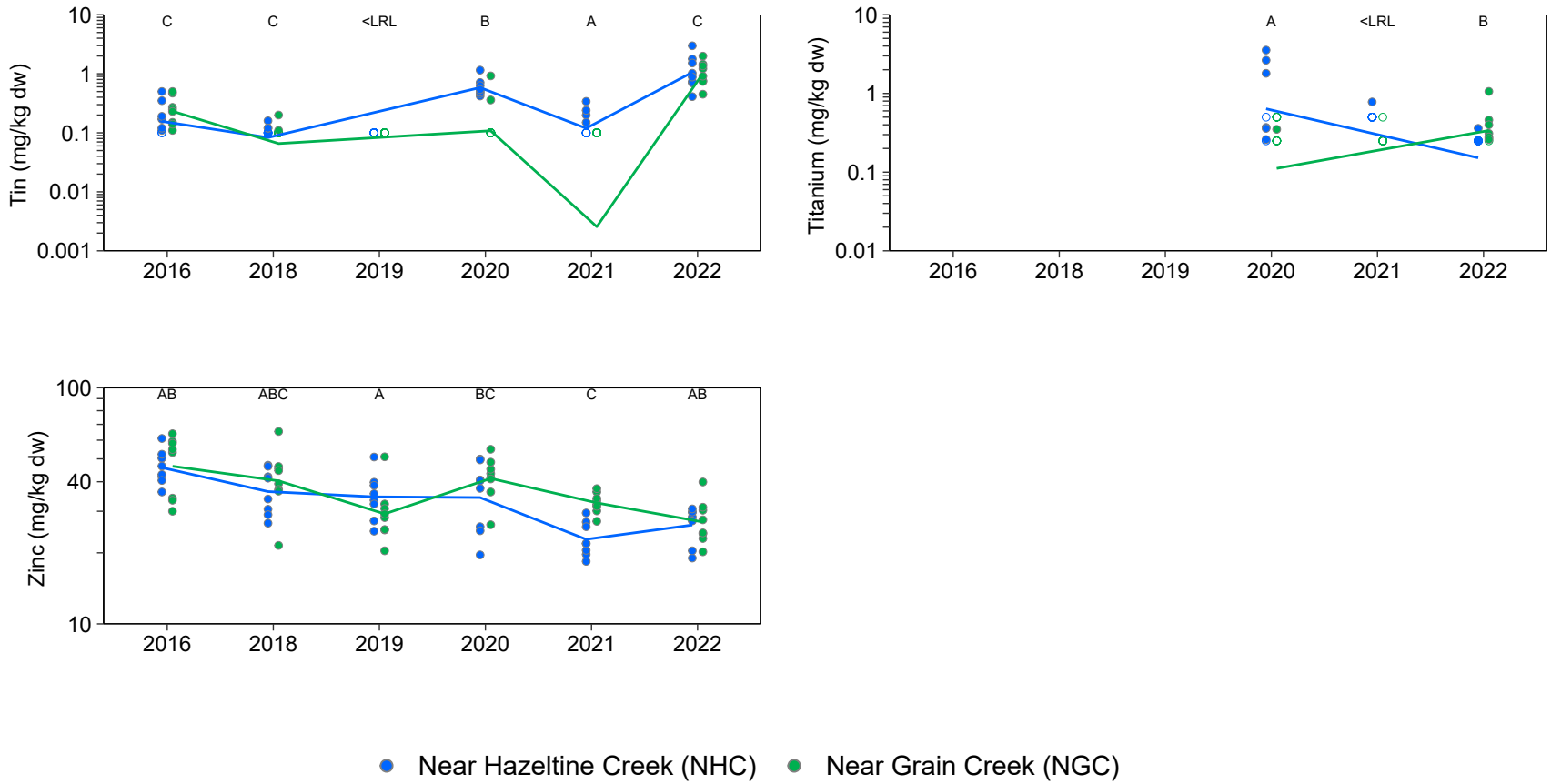


Figure E.6.9: Peamouth Chub Muscle Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Quesnel Lake near Hazeltine Creek (NHC; Exposed) and near Grain Creek (NGC; Reference), 2016 to 2022

Notes: GL = Guideline; dw = dry weight; ww = wet weight; <LRL = lower than the laboratory reporting limit. Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two −way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted.

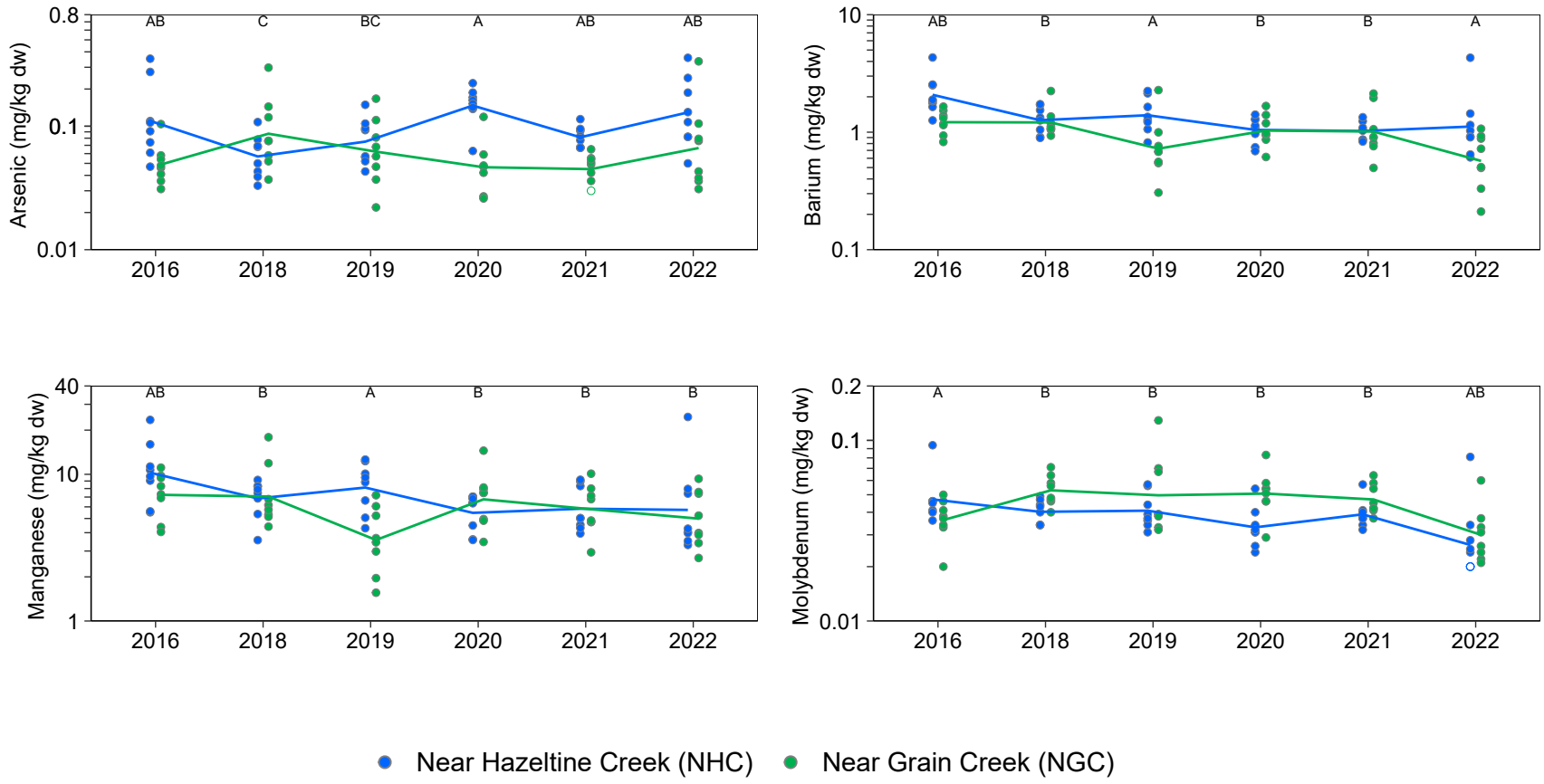


Figure E.6.10: Northern Pikeminnow Wholebody Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Quesnel Lake near Hazeltine Creek (NHC; Exposed) and near Grain Creek (NGC; Reference), 2016 to 2022

Notes: dw = dry weight; ww = wet weight; <LRL = lower than the laboratory reporting limit. Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Individual samples are plotted and lines join the least −squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted.

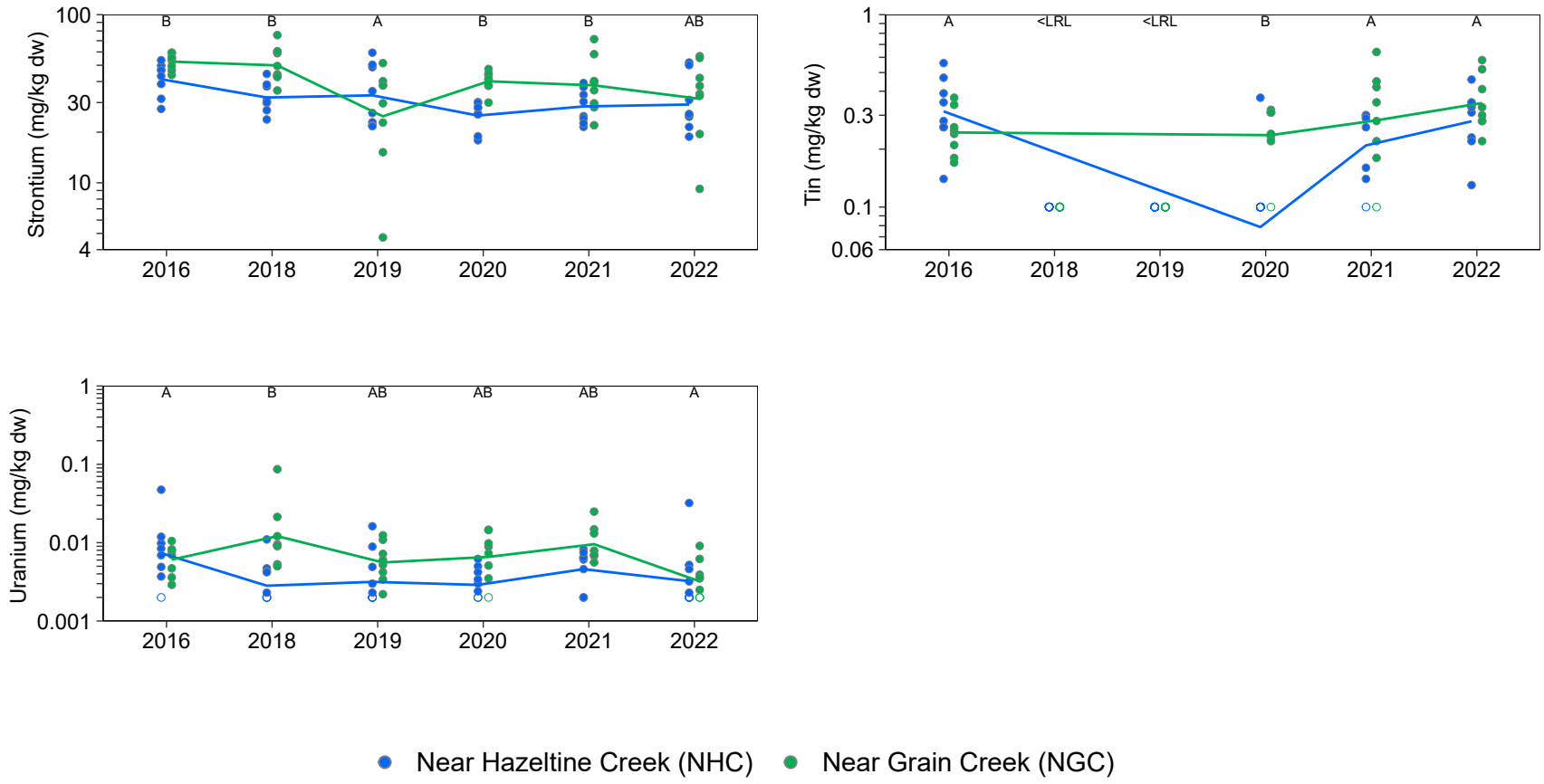


Figure E.6.10: Northern Pikeminnow Wholebody Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Quesnel Lake near Hazeltine Creek (NHC; Exposed) and near Grain Creek (NGC; Reference), 2016 to 2022

Notes: dw = dry weight; ww = wet weight; <LRL = lower than the laboratory reporting limit. Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Individual samples are plotted and lines join the least −squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted.

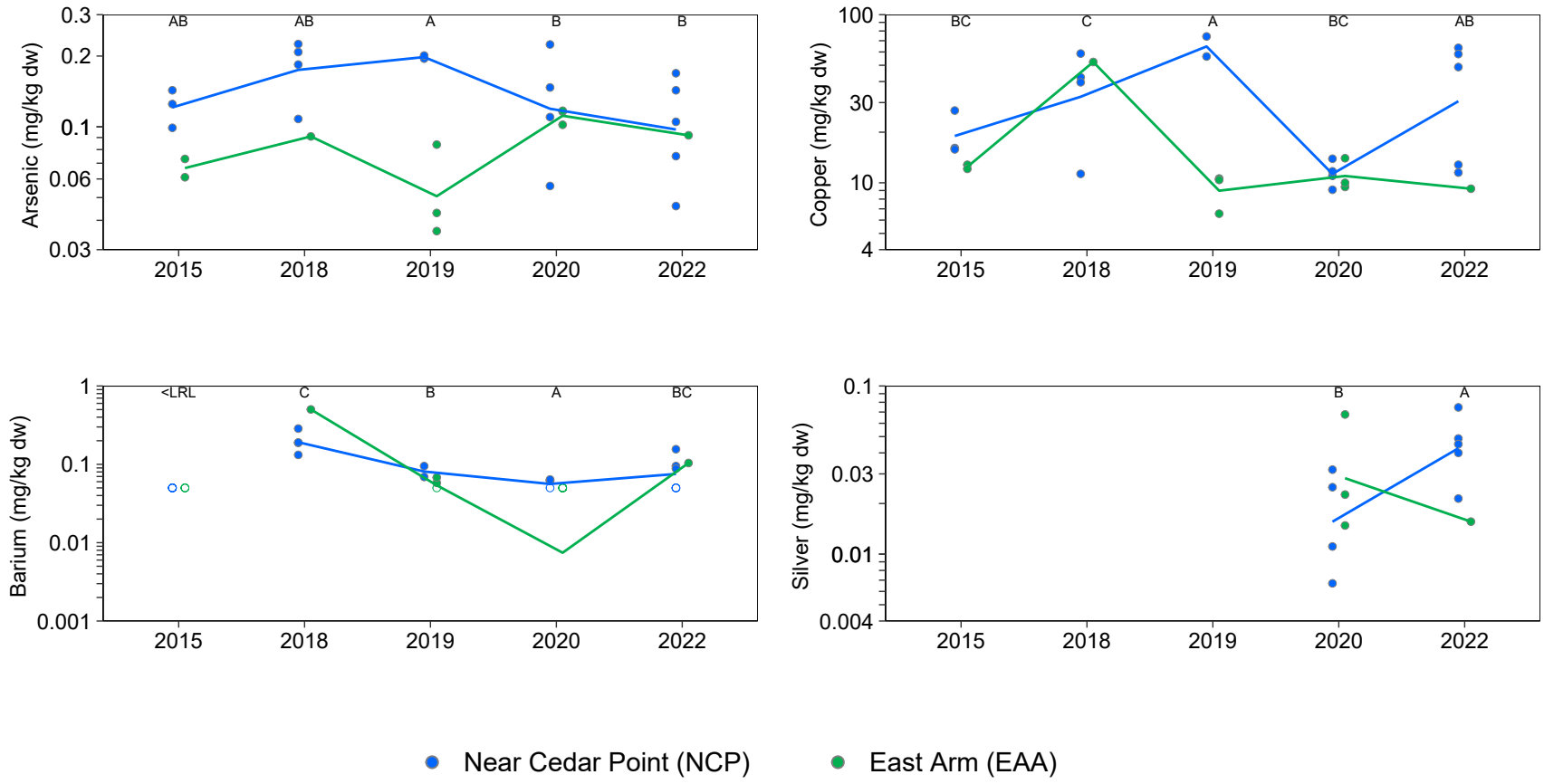


Figure E.6.11: Lake Trout Ovary Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Quesnel Lake near Cedar Point (NCP; Exposed) and East Arm (EAA; Reference), 2015 to 2022

Notes: dw = dry weight; ww = wet weight; <LRL = lower than the laboratory reporting limit. Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted.

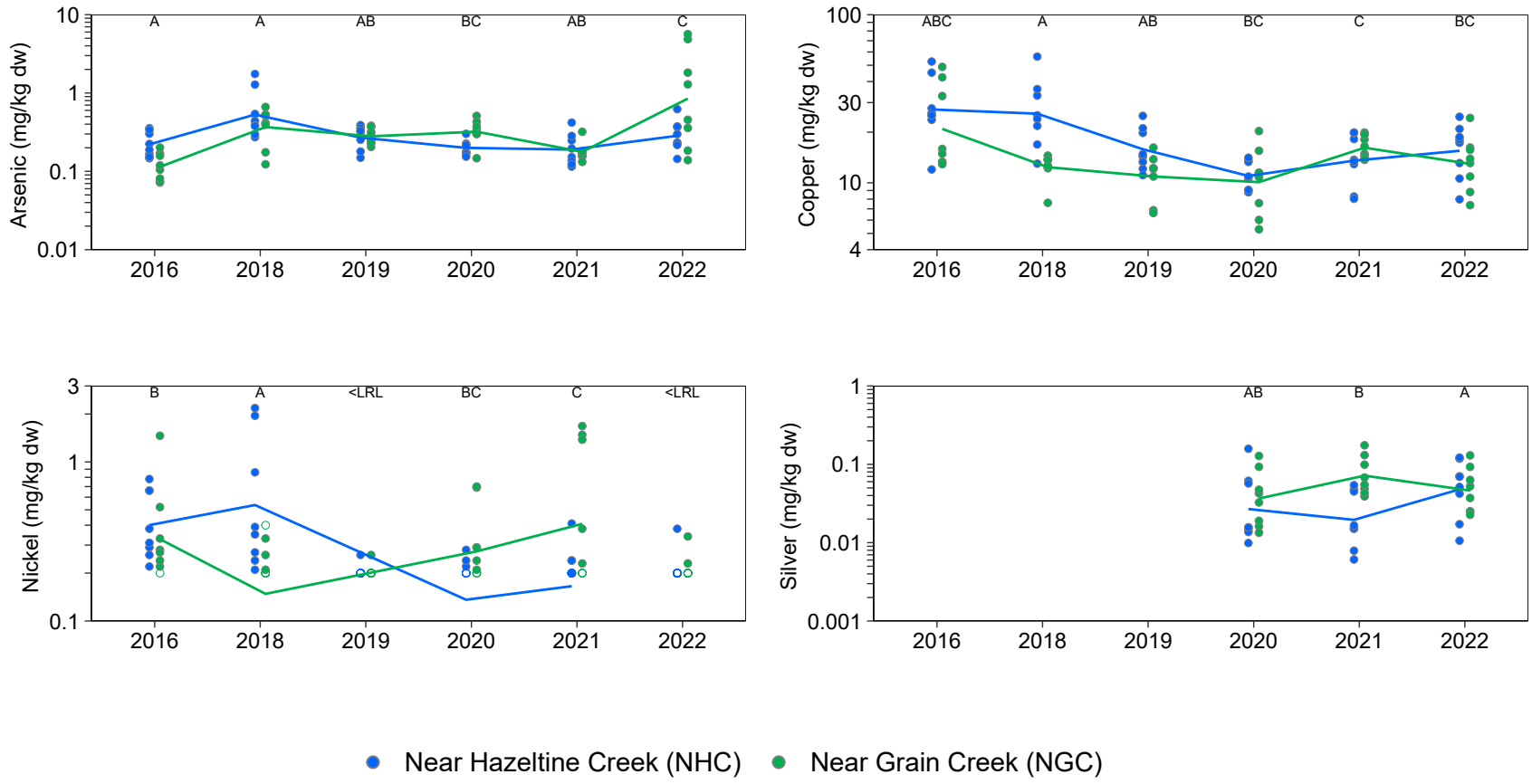


Figure E.6.12: Peamouth Chub Liver Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Quesnel Lake near Hazeltine Creek (NHC; Exposed) and near Grain Creek (NGC; Reference), 2016 to 2022

Notes: dw = dry weight; ww = wet weight; <LRL = lower than the laboratory reporting limit. Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Individual samples are plotted and lines join the least −squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted.

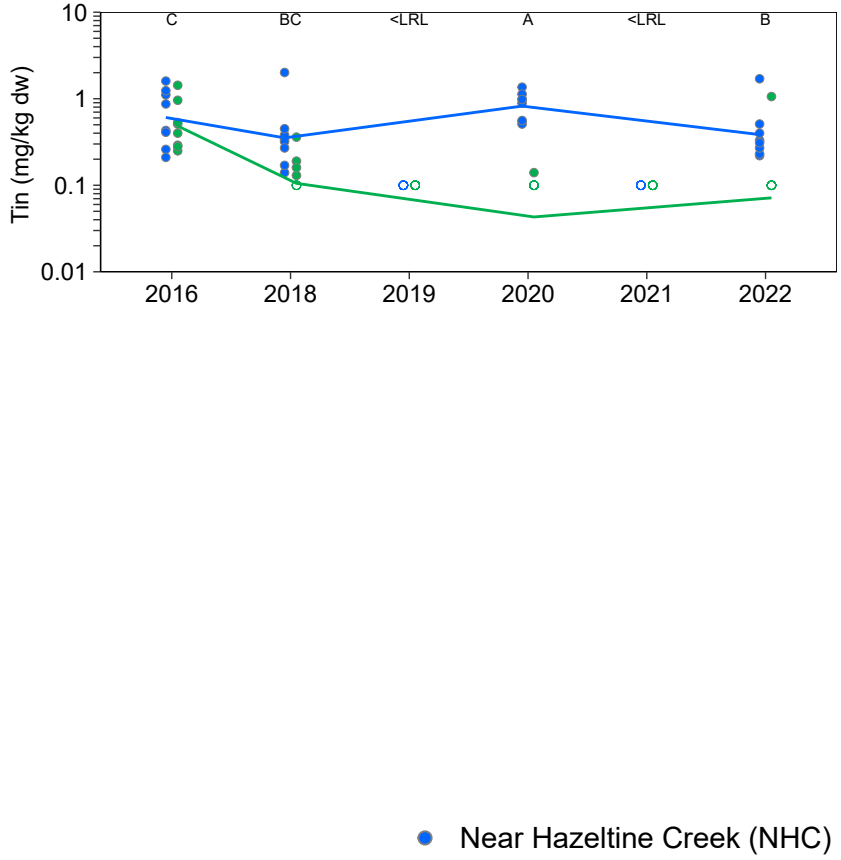


Figure E.6.12: Peamouth Chub Liver Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Quesnel Lake near Hazeltine Creek (NHC; Exposed) and near Grain Creek (NGC; Reference), 2016 to 2022

Notes: dw = dry weight; ww = wet weight; <LRL = lower than the laboratory reporting limit. Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Individual samples are plotted and lines join the least −squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted.

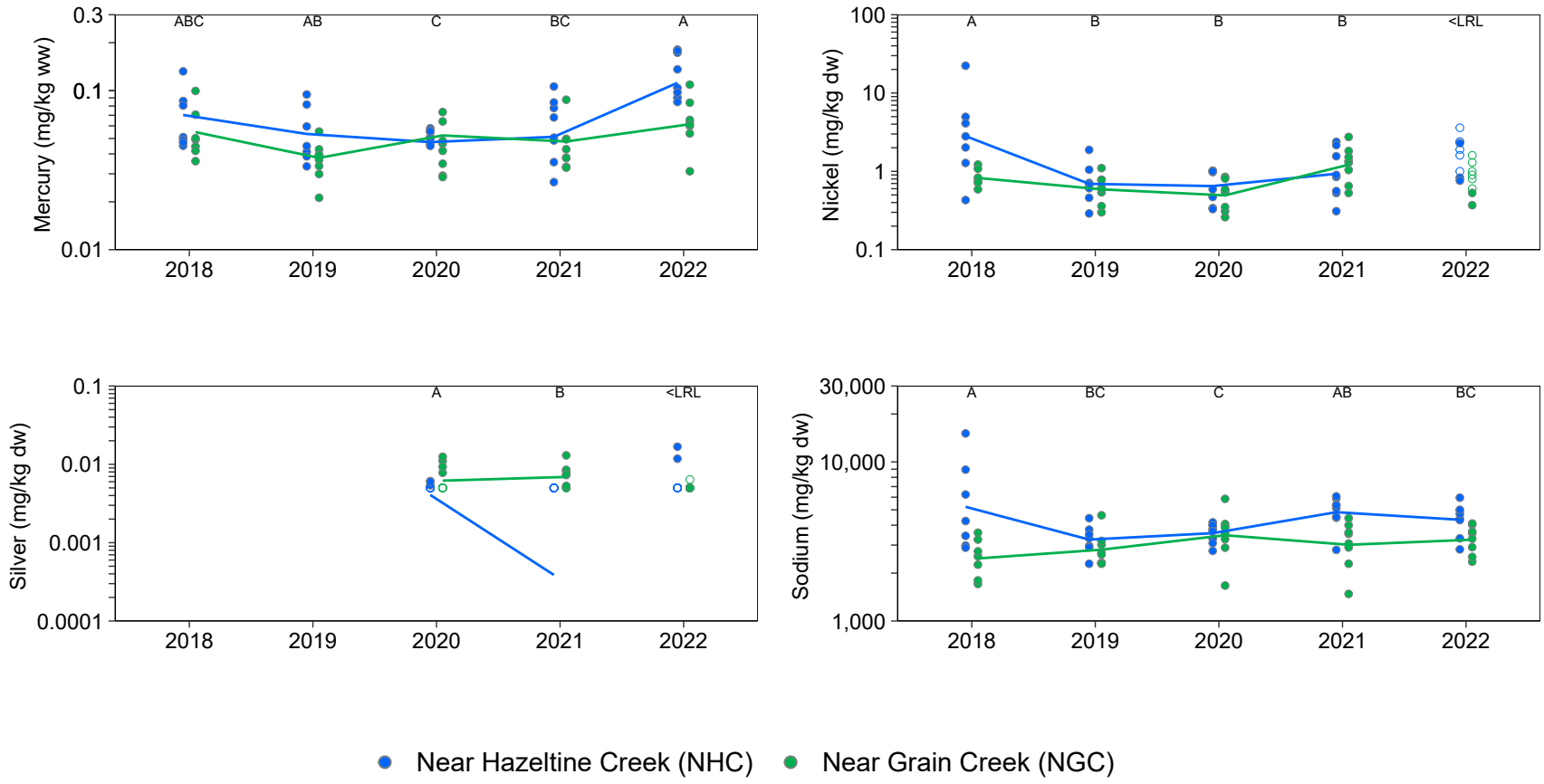


Figure E.6.13: Peamouth Chub Kidney Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Quesnel Lake near Hazeltine Creek (NHC; Exposed) and near Grain Creek (NGC; Reference), 2018 to 2022

Notes: GL = Guideline; dw = dry weight; ww = wet weight; <LRL = lower than the laboratory reporting limit. Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted.

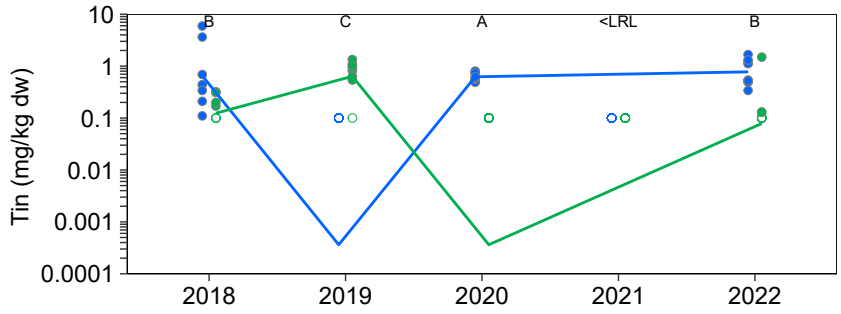


Figure E.6.13: Peamouth Chub Kidney Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Quesnel Lake near Hazeltine Creek (NHC; Exposed) and near Grain Creek (NGC; Reference), 2018 to 2022

Notes: GL = Guideline; dw = dry weight; ww = wet weight; <LRL = lower than the laboratory reporting limit. Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted.

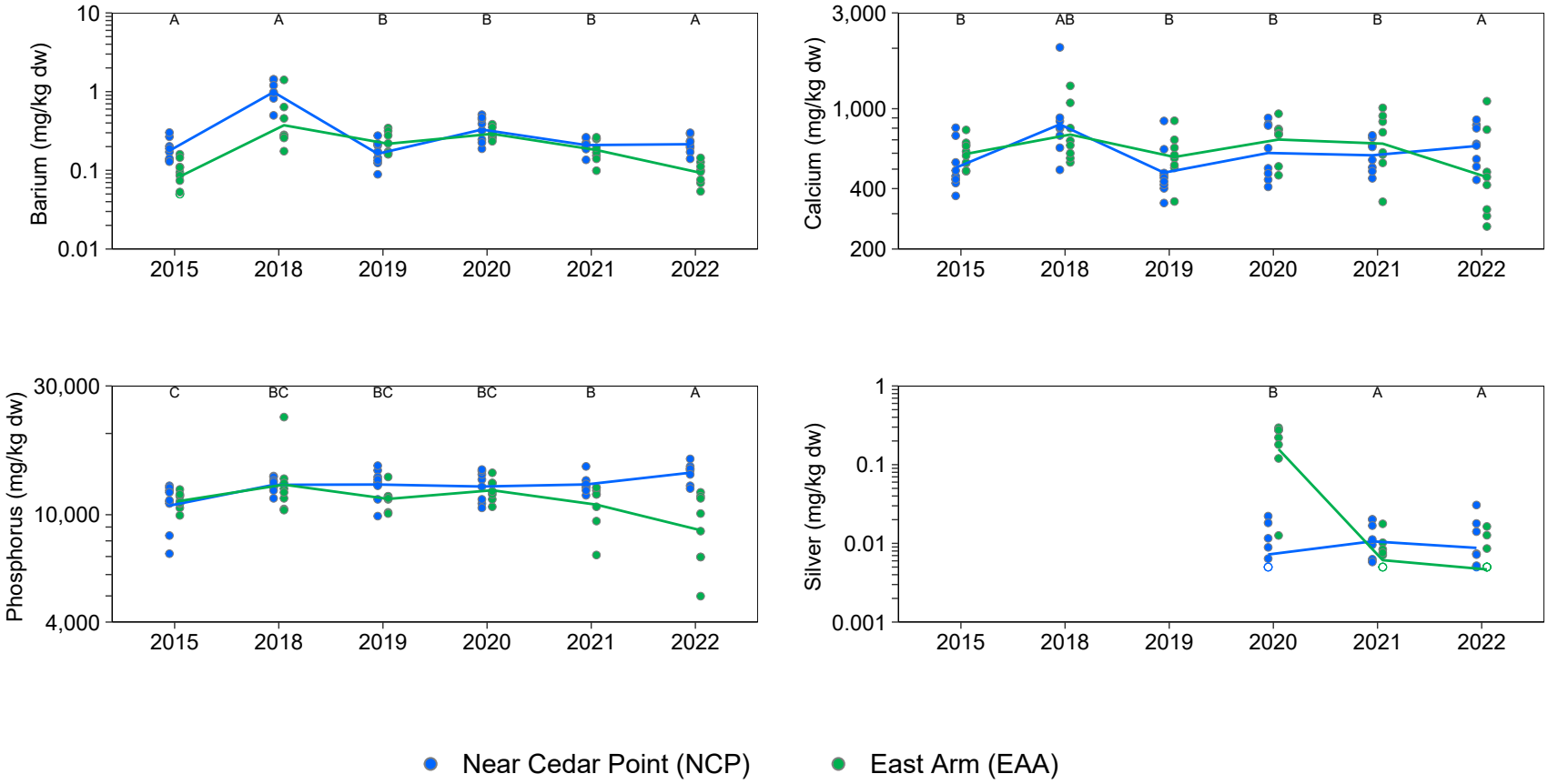


Figure E.6.14: Lake Trout Kidney Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Quesnel Lake near Cedar Point (NCP; Exposed) and East Arm (EAA; Reference), 2015 to 2022

Notes: dw = dry weight; ww = wet weight; <LRL = lower than the laboratory reporting limit. Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Individual samples are plotted and lines join the least −squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted.

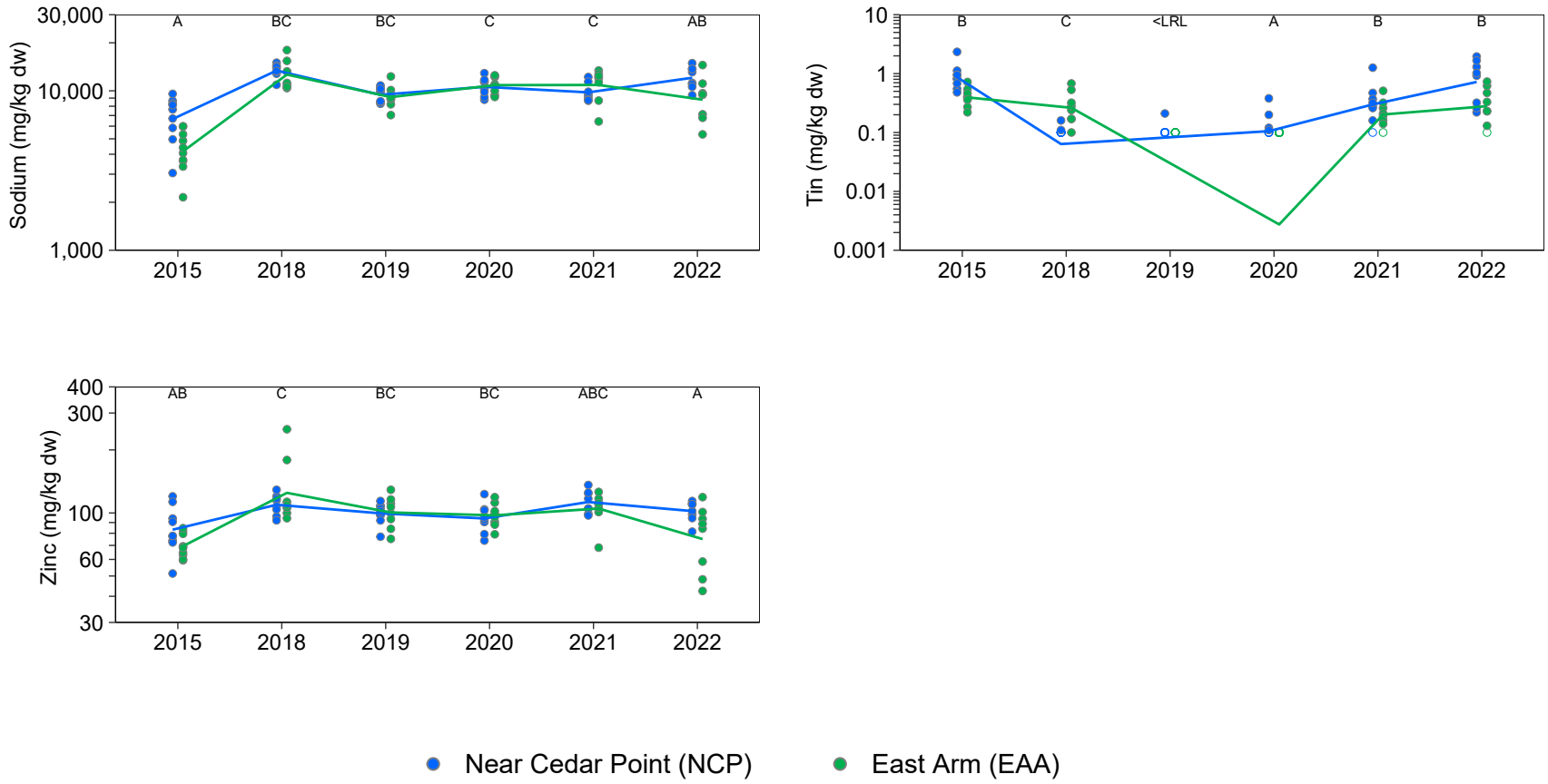


Figure E.6.14: Lake Trout Kidney Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Quesnel Lake near Cedar Point (NCP; Exposed) and East Arm (EAA; Reference), 2015 to 2022

Notes: dw = dry weight; ww = wet weight; <LRL = lower than the laboratory reporting limit. Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Individual samples are plotted and lines join the least −squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted.

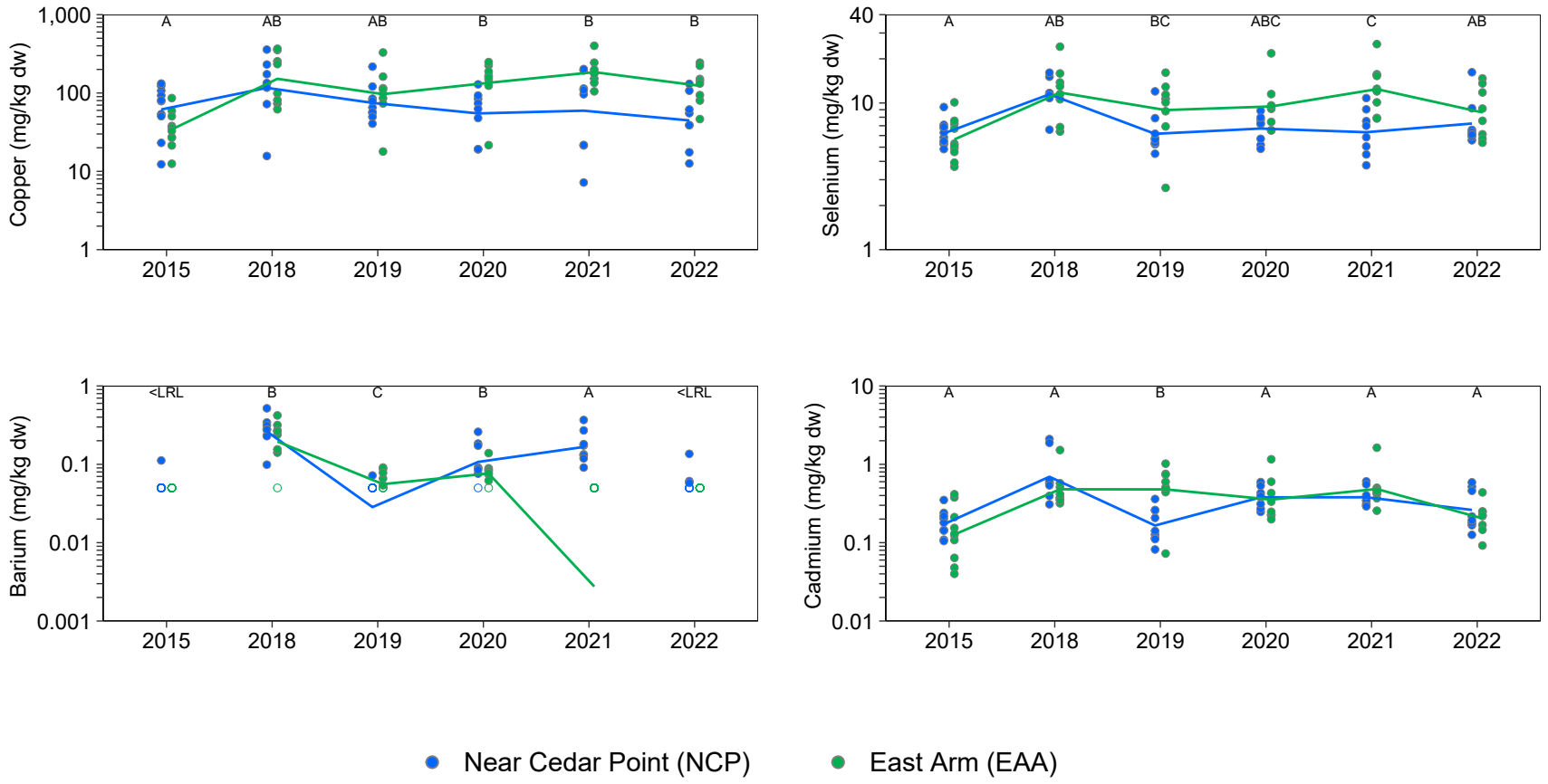


Figure E.6.15: Lake Trout Liver Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Quesnel Lake near Cedar Point (NCP; Exposed) and East Arm (EAA; Reference), 2015 to 2022

Notes: dw = dry weight; ww = wet weight; <LRL = lower than the laboratory reporting limit. Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Individual samples are plotted and lines join the least −squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted.

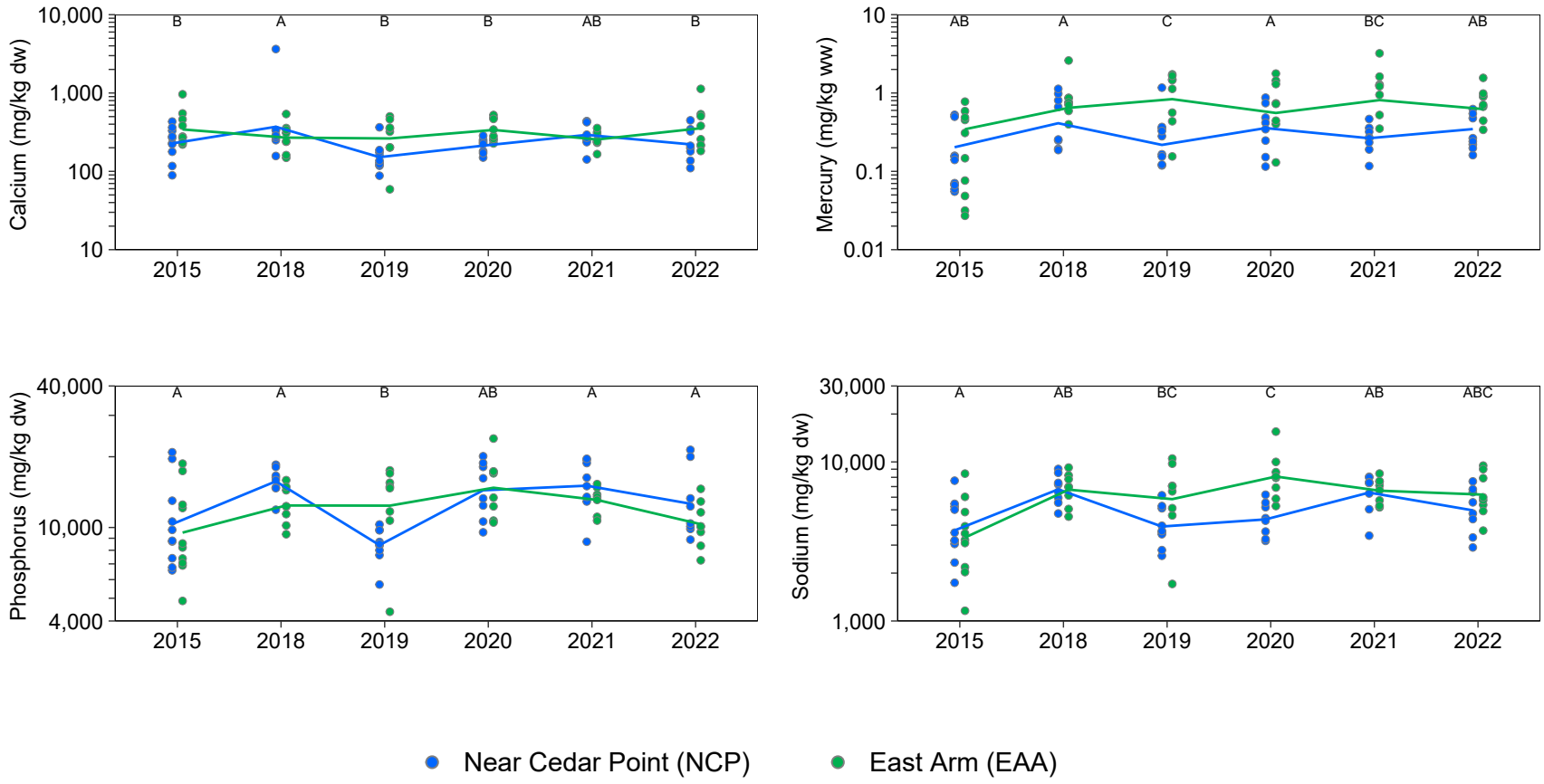


Figure E.6.15: Lake Trout Liver Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Quesnel Lake near Cedar Point (NCP; Exposed) and East Arm (EAA; Reference), 2015 to 2022

Notes: dw = dry weight; ww = wet weight; <LRL = lower than the laboratory reporting limit. Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Individual samples are plotted and lines join the least −squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted.

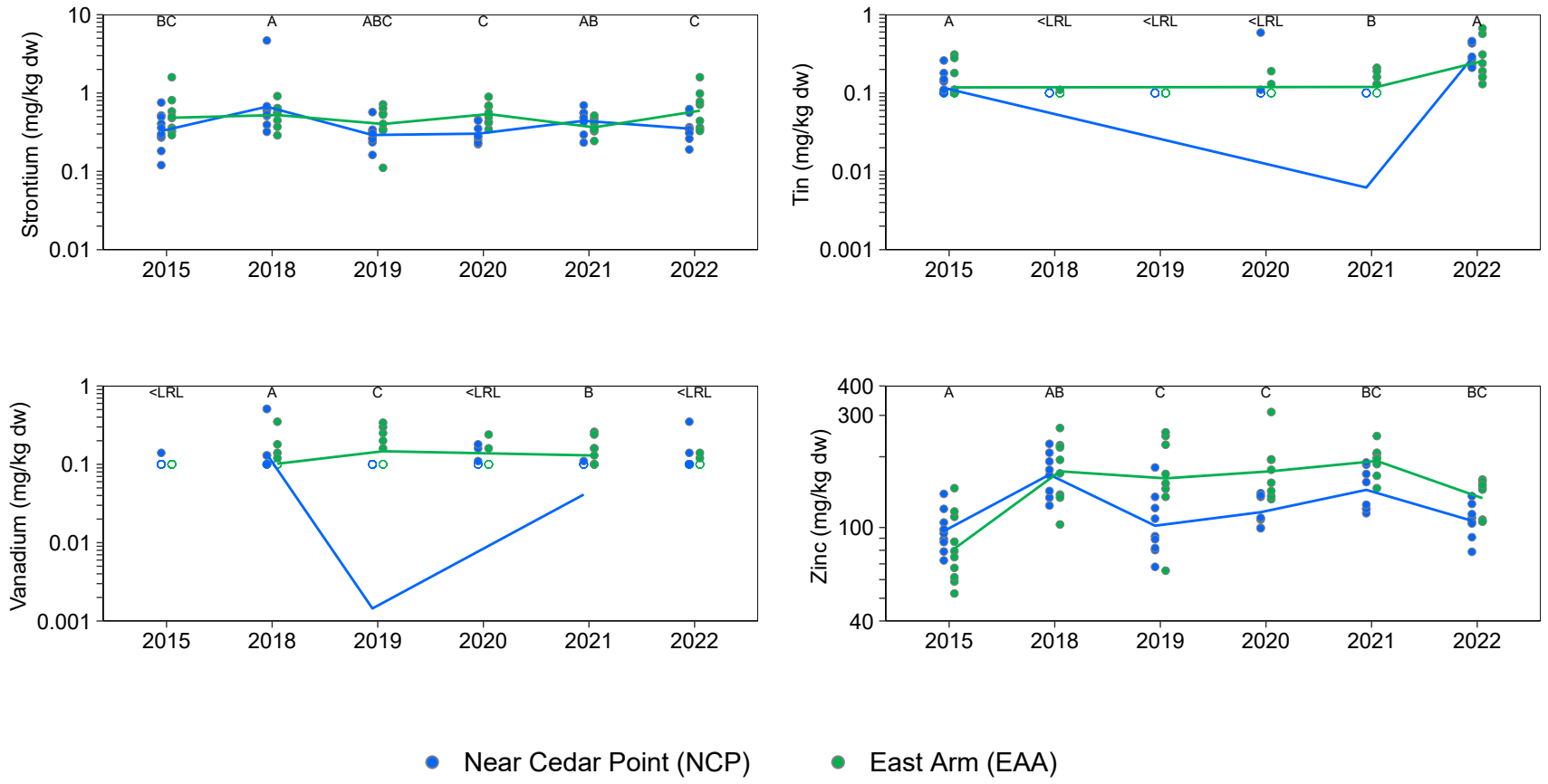


Figure E.6.15: Lake Trout Liver Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Quesnel Lake near Cedar Point (NCP; Exposed) and East Arm (EAA; Reference), 2015 to 2022

Notes: dw = dry weight; ww = wet weight; <LRL = lower than the laboratory reporting limit. Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Individual samples are plotted and lines join the least −squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted.

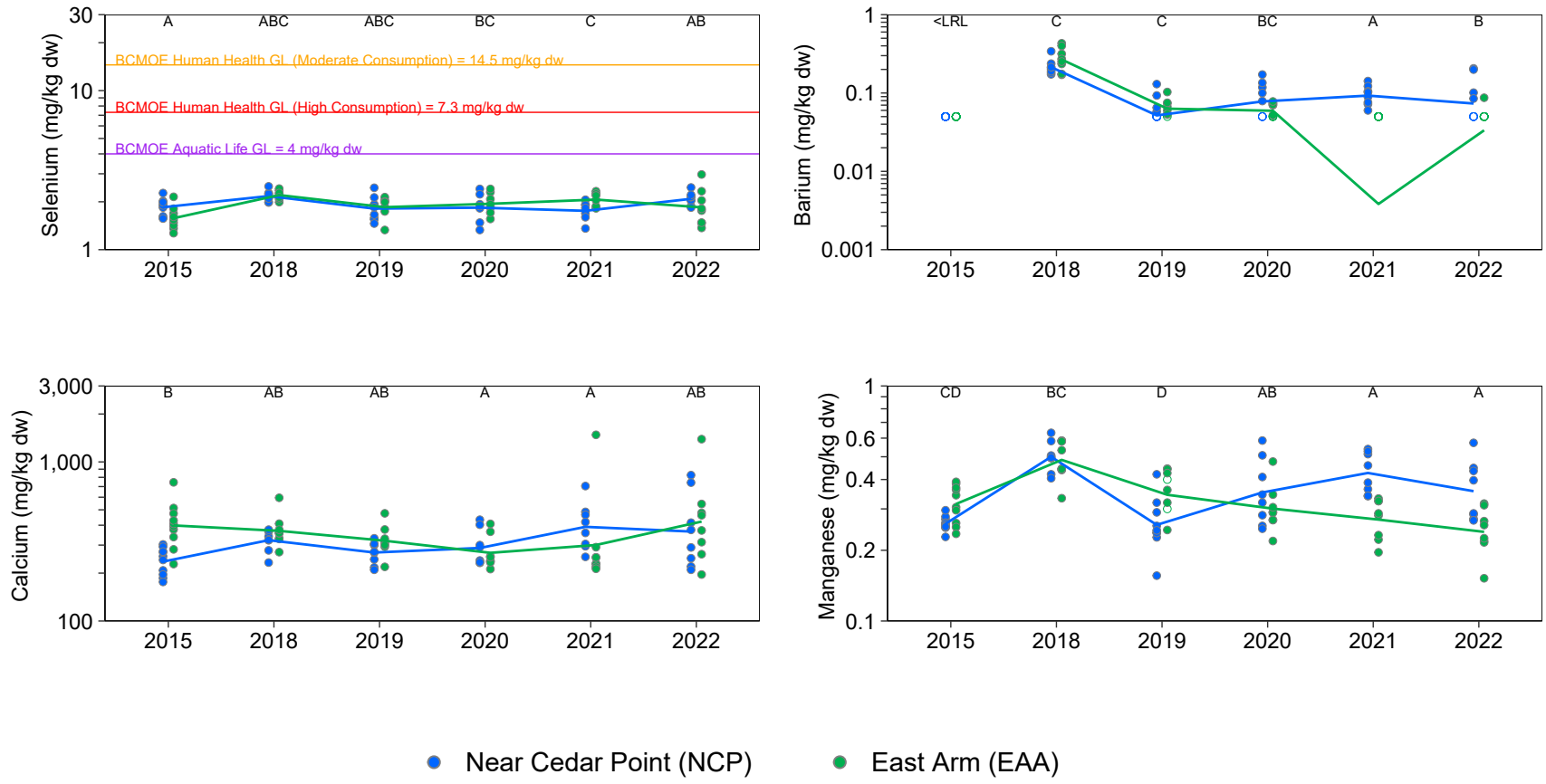


Figure E.6.16: Lake Trout Muscle Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Quesnel Lake near Cedar Point (NCP; Exposed) and East Arm (EAA; Reference), 2015 to 2022

Notes: BCMOE = British Columbia Ministry of the Environment; GL = Guideline; dw = dry weight; ww = wet weight; <LRL = lower than the laboratory reporting limit. Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted.

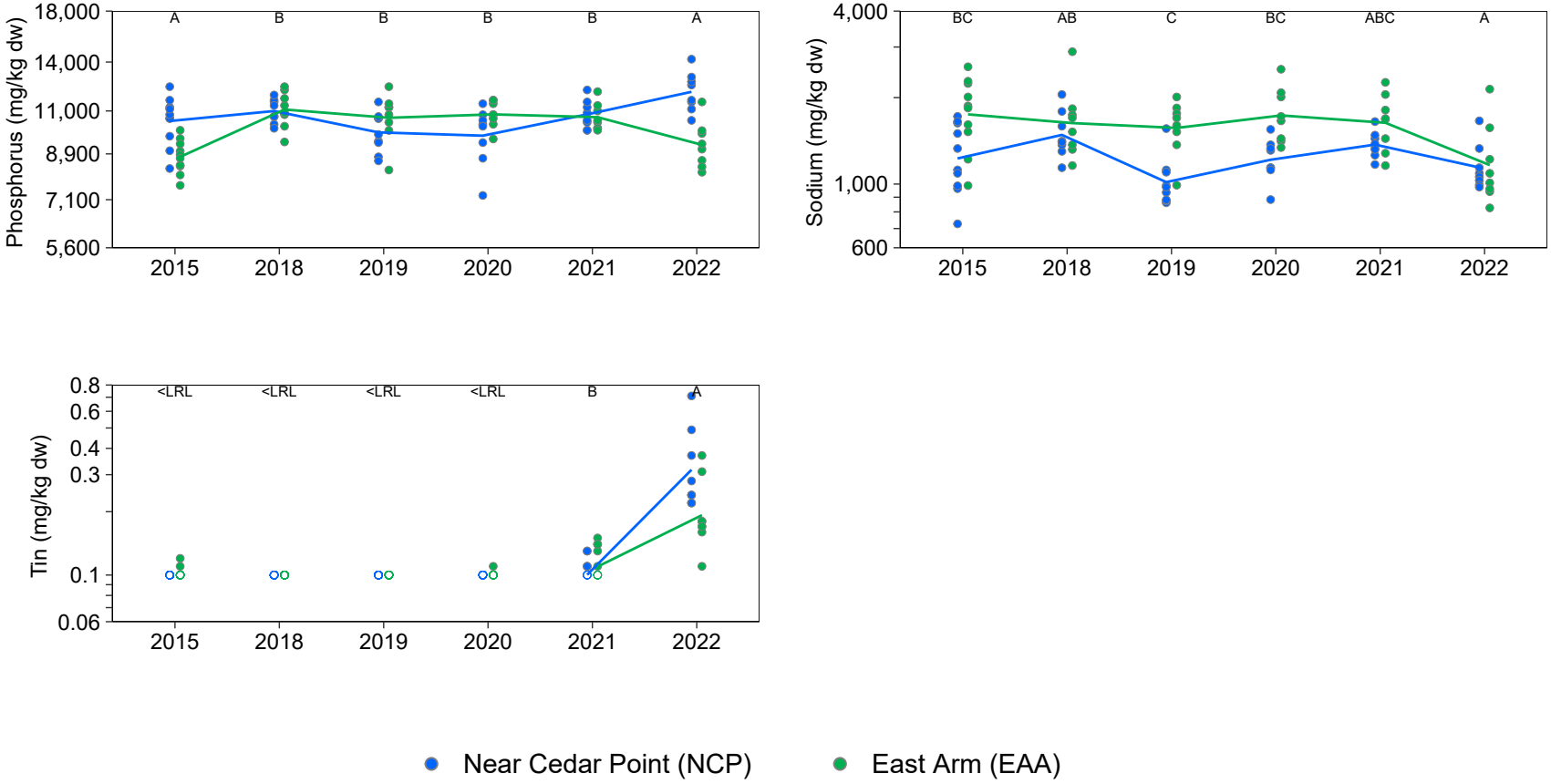


Figure E.6.16: Lake Trout Muscle Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Quesnel Lake near Cedar Point (NCP; Exposed) and East Arm (EAA; Reference), 2015 to 2022

Notes: BCMOE = British Columbia Ministry of the Environment; GL = Guideline; dw = dry weight; ww = wet weight; <LRL = lower than the laboratory reporting limit. Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted.

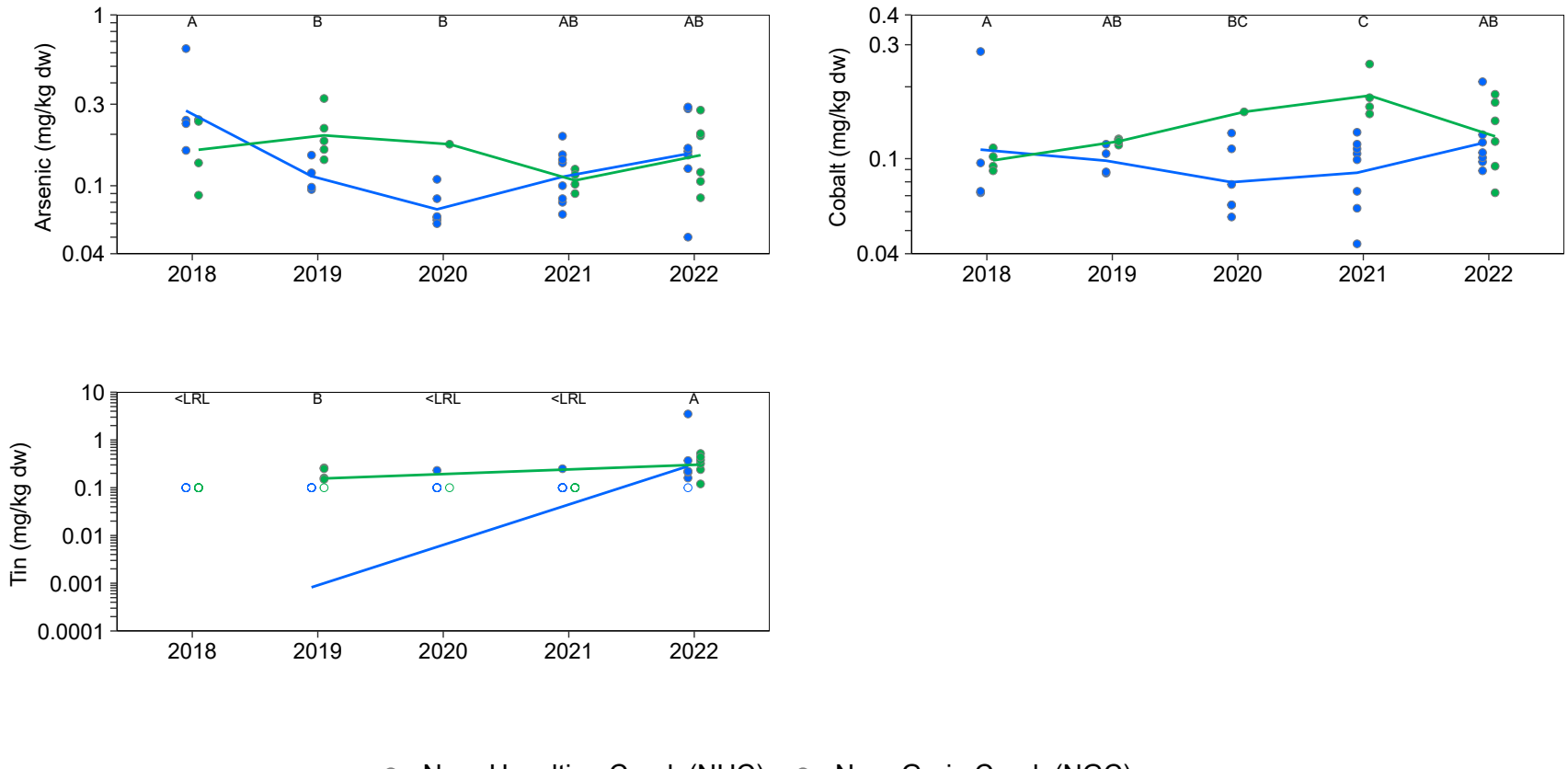


Figure E.6.17: Peamouth Chub Ovary Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Quesnel Lake near Hazeltine Creek (NHC; Exposed) and near Grain Creek (NGC; Reference), 2018 to 2022

Notes: dw = dry weight; ww = wet weight; <LRL = lower than the laboratory reporting limit. Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Individual samples are plotted and lines join the least −squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted.

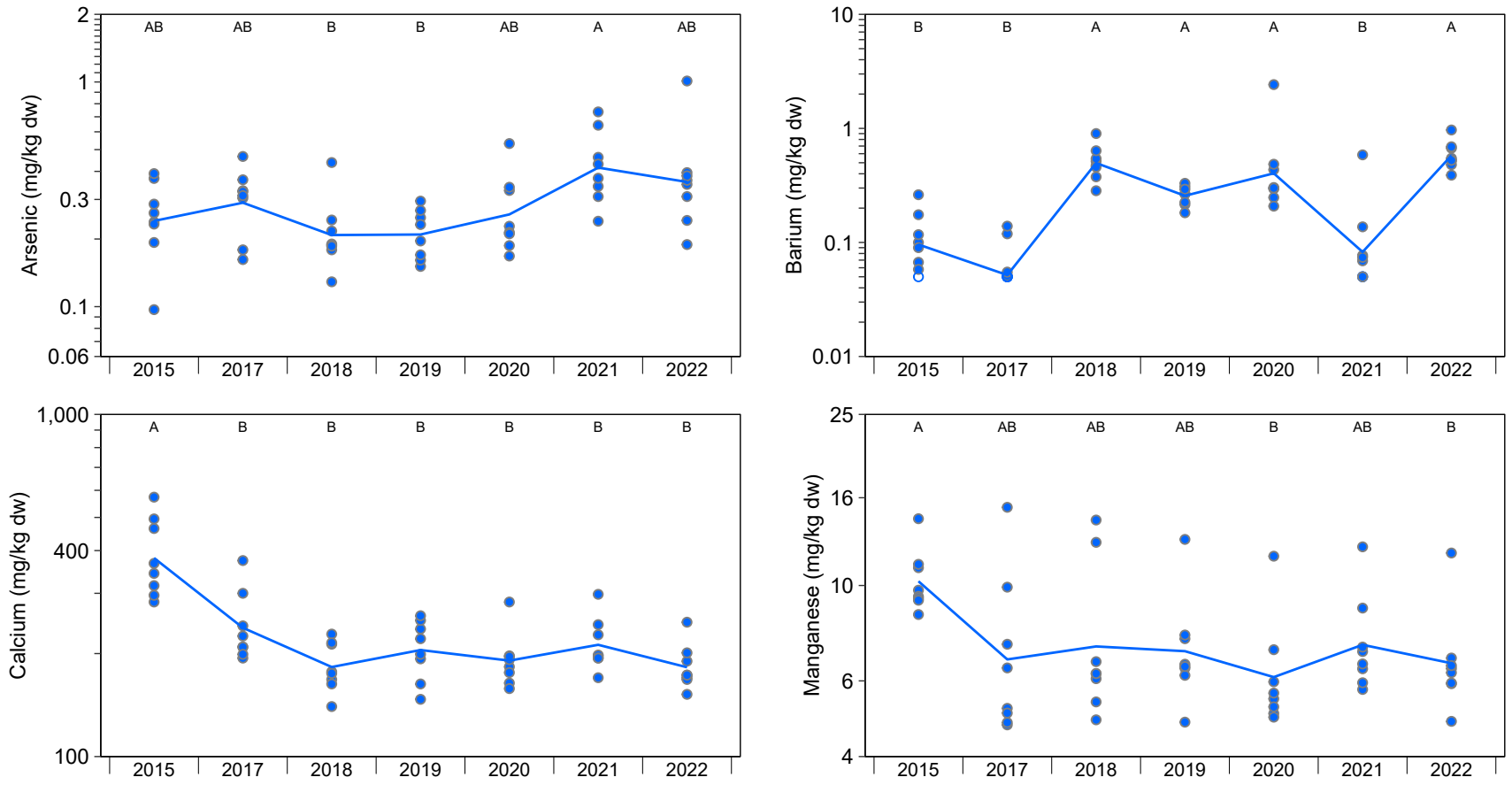


Figure E.6.18: Rainbow Trout Liver Tissue Primary and Secondary Analyte Concentrations with a Significant Year Effect for Quesnel River, 2015 to 2022

Notes: Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a one−way ANOVA with factor Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have concentrations that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations.

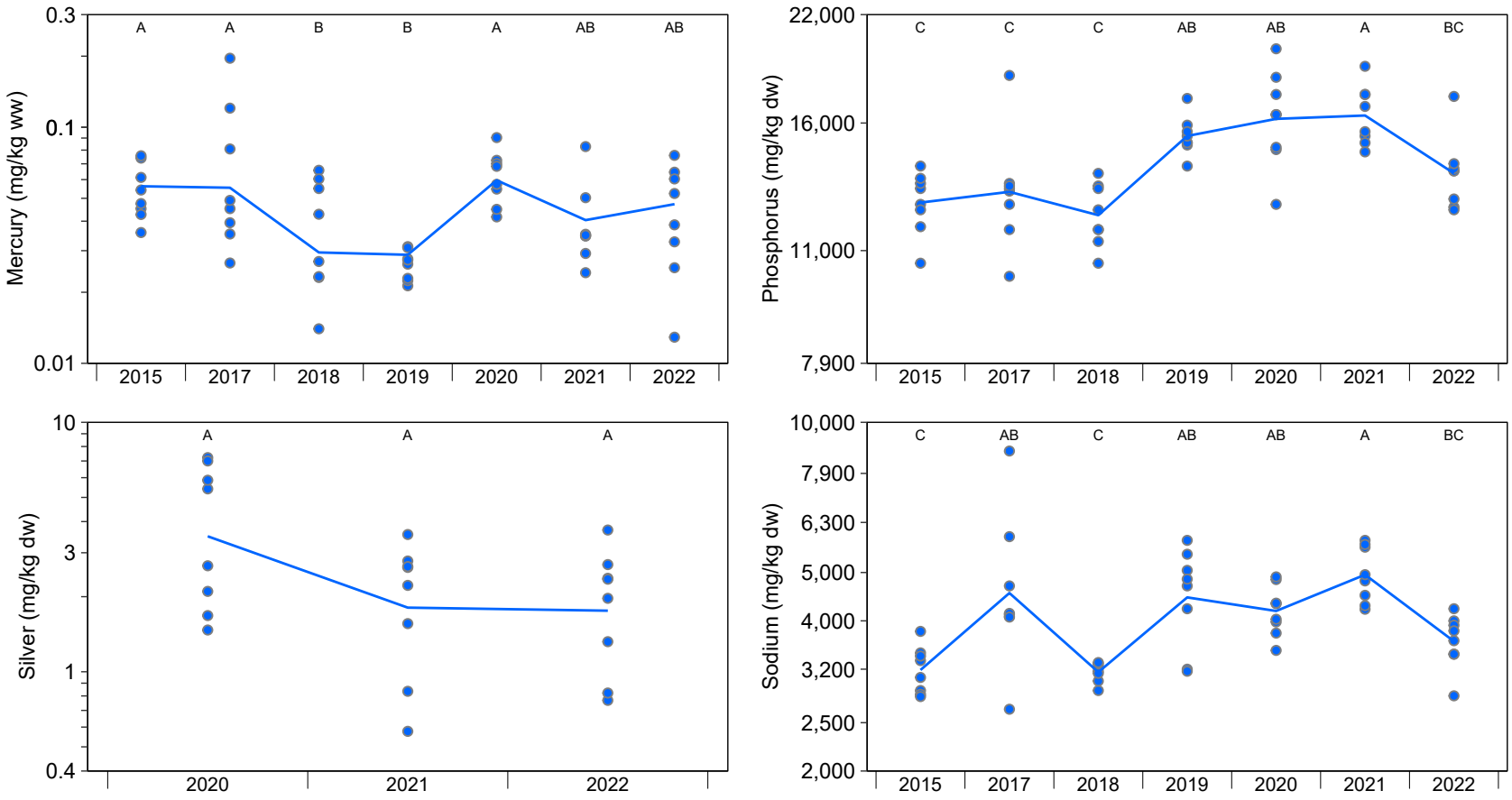


Figure E.6.18: Rainbow Trout Liver Tissue Primary and Secondary Analyte Concentrations with a Significant Year Effect for Quesnel River, 2015 to 2022

Notes: Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a one−way ANOVA with factor Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have concentrations that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations.

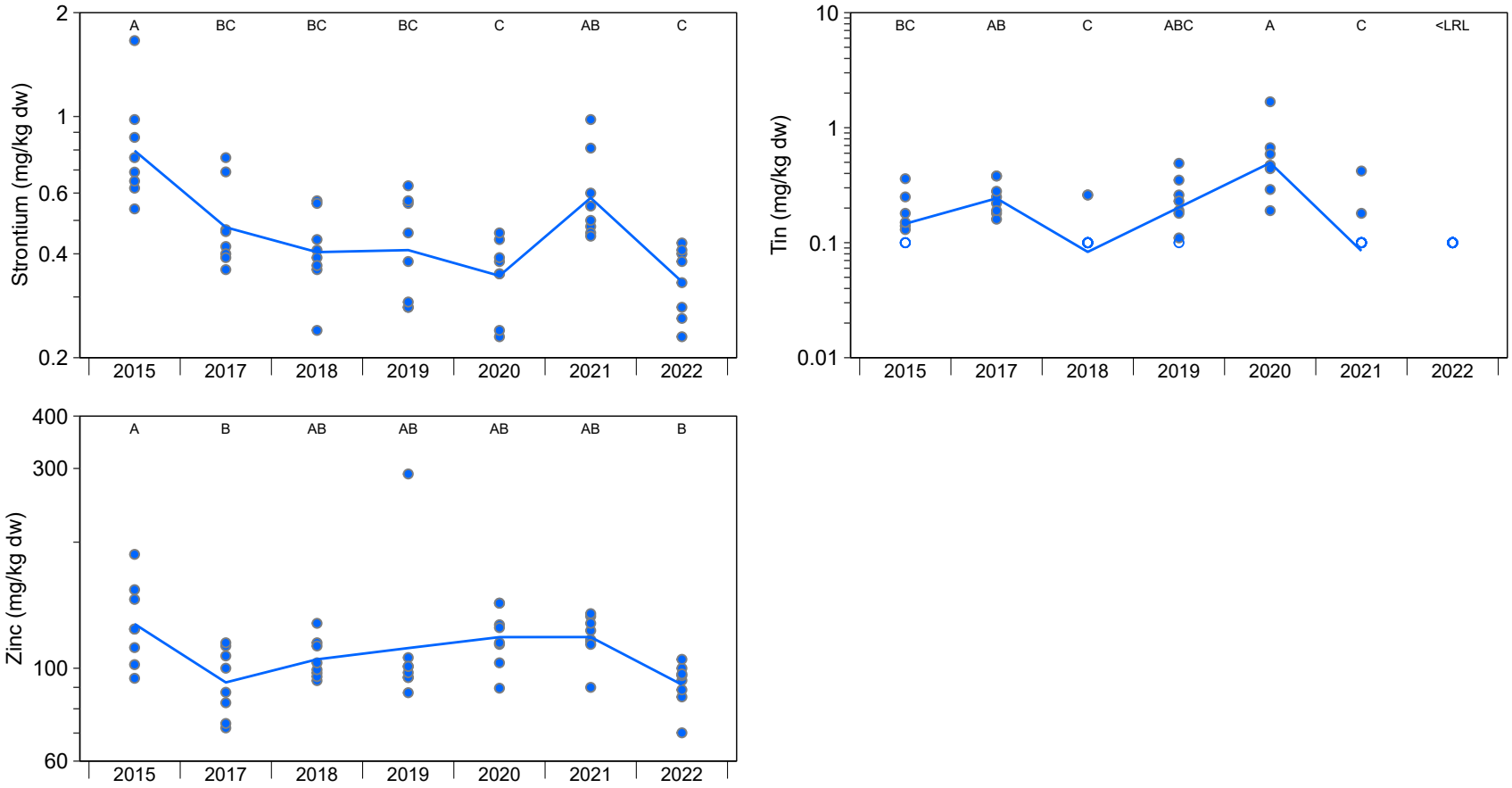


Figure E.6.18: Rainbow Trout Liver Tissue Primary and Secondary Analyte Concentrations with a Significant Year Effect for Quesnel River, 2015 to 2022

Notes: Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a one−way ANOVA with factor Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have concentrations that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations.

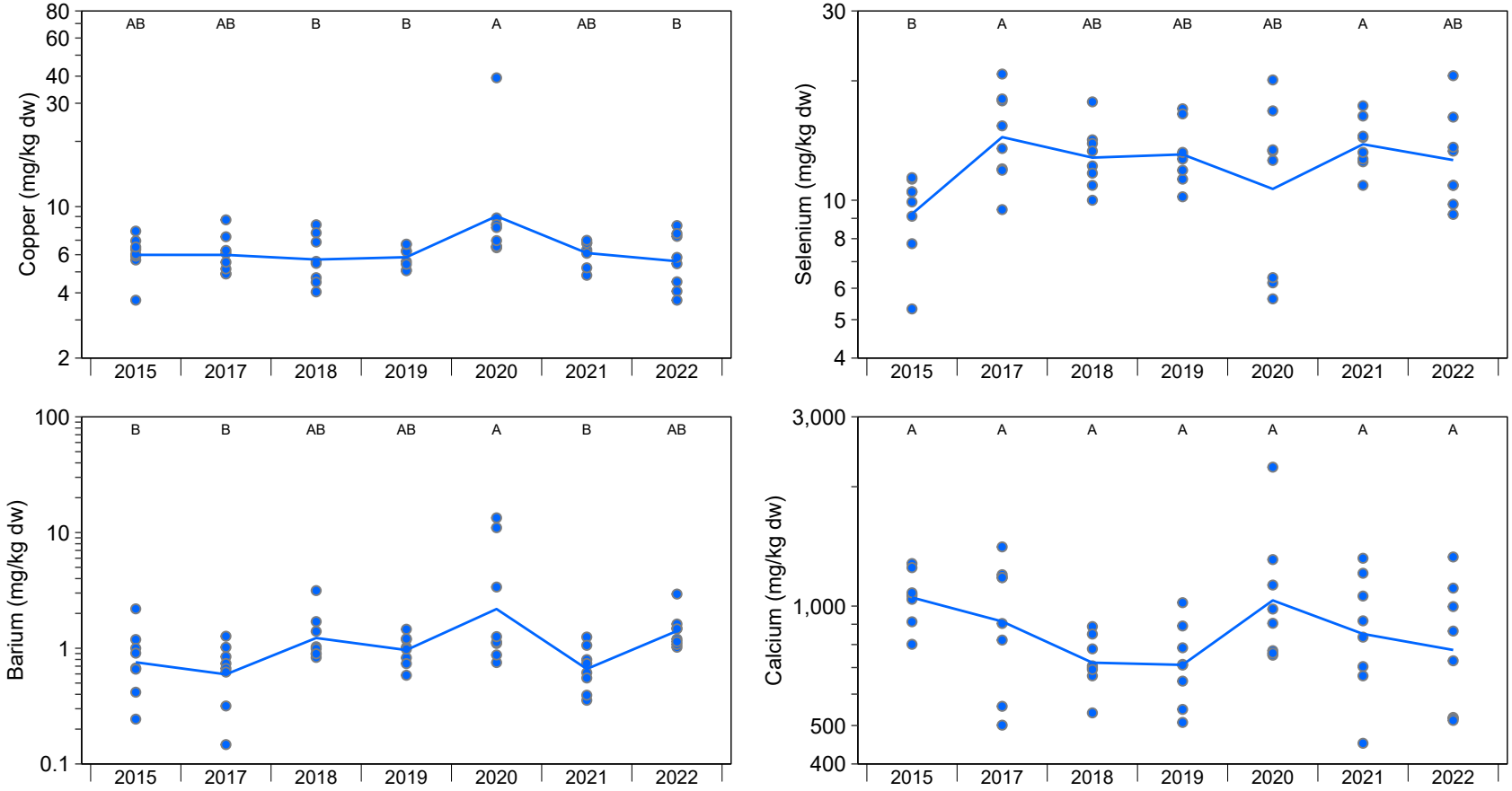


Figure E.6.19: Rainbow Trout Kidney Tissue Primary and Secondary Analyte Concentrations with a Significant Year Effect for Quesnel River, 2015 to 2022

Notes: Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a one−way ANOVA with factor Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have concentrations that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations.

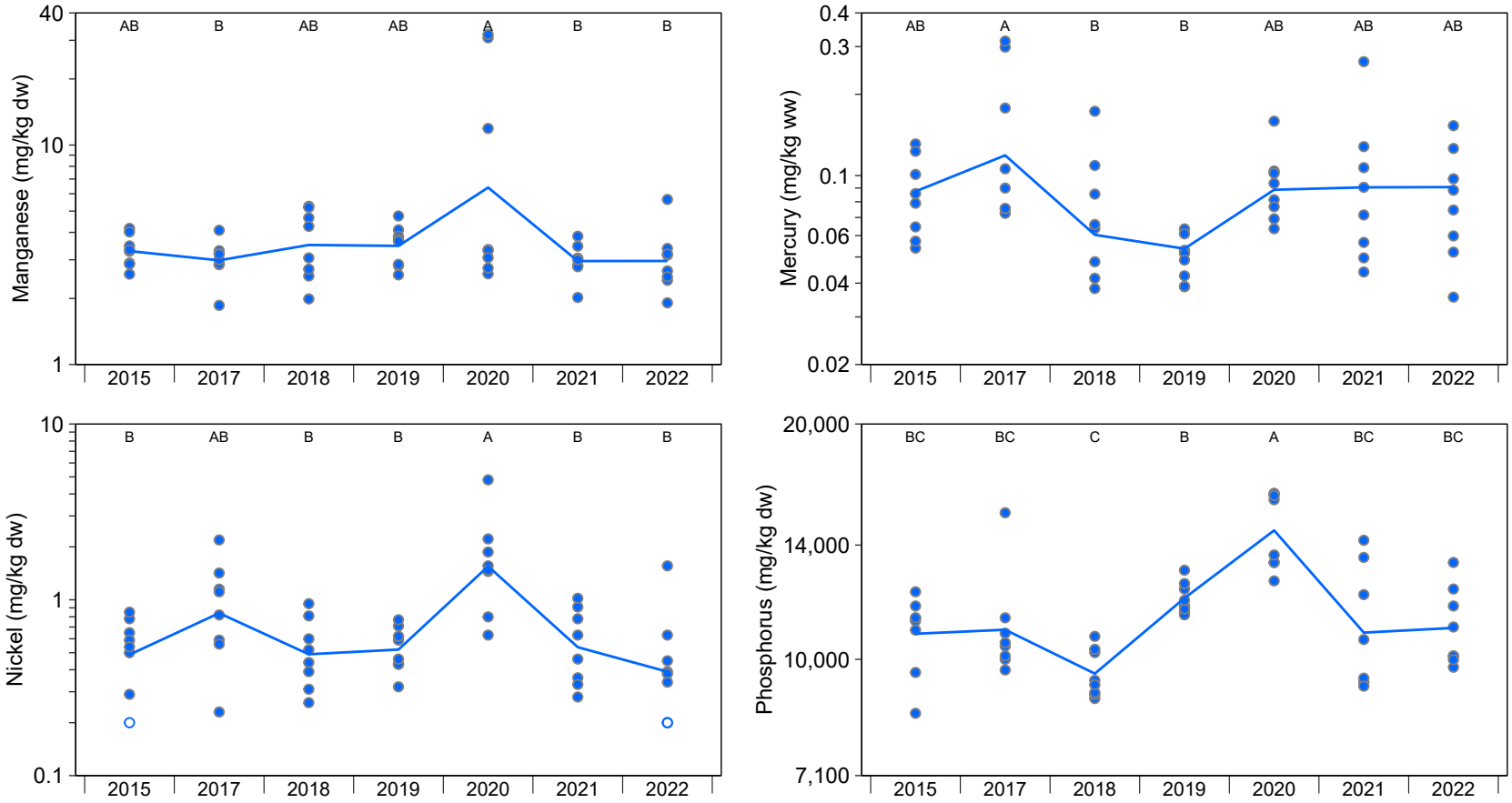


Figure E.6.19: Rainbow Trout Kidney Tissue Primary and Secondary Analyte Concentrations with a Significant Year Effect for Quesnel River, 2015 to 2022

Notes: Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a one−way ANOVA with factor Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have concentrations that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations.

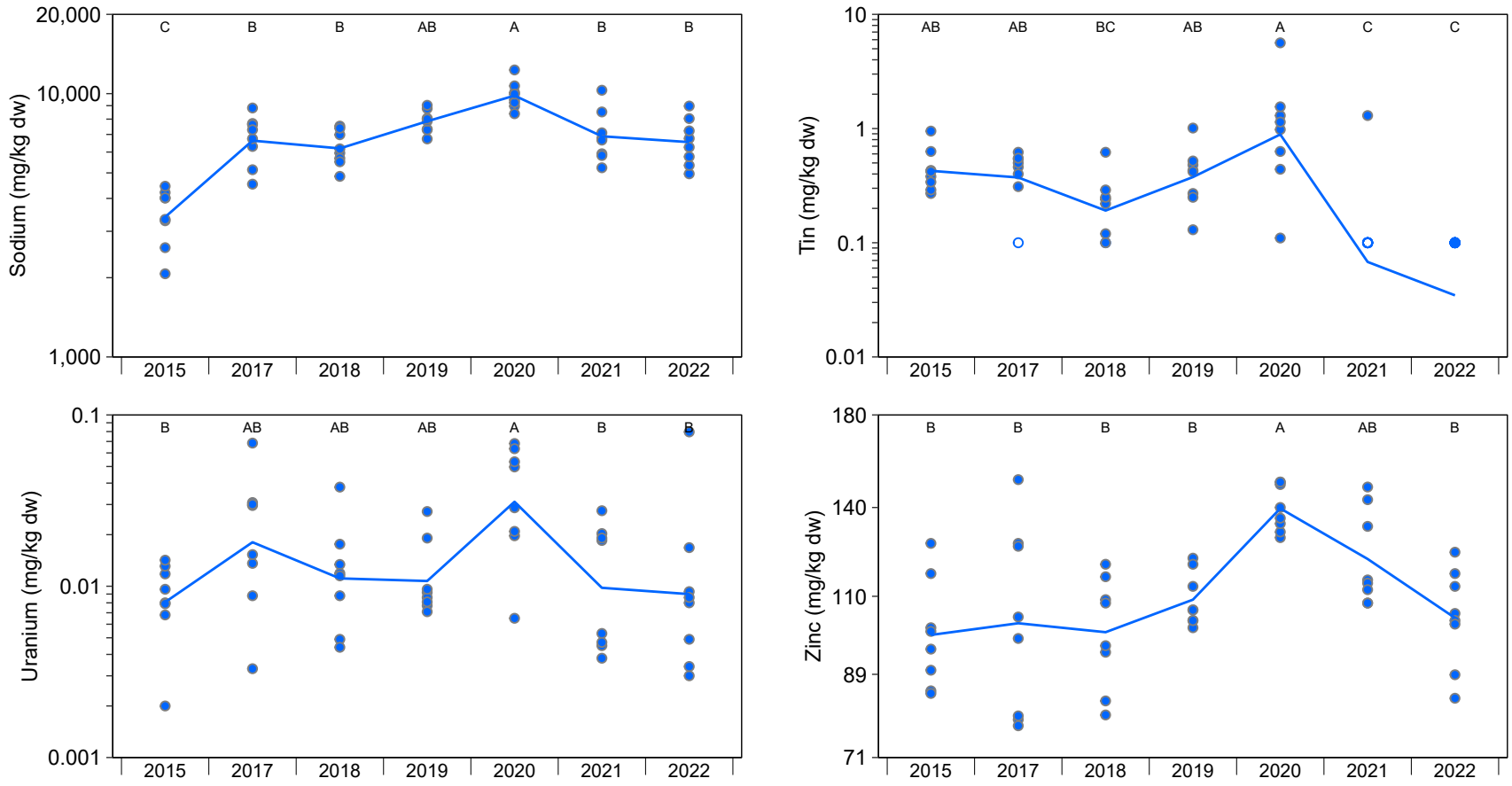


Figure E.6.19: Rainbow Trout Kidney Tissue Primary and Secondary Analyte Concentrations with a Significant Year Effect for Quesnel River, 2015 to 2022

Notes: Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a one−way ANOVA with factor Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have concentrations that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations.

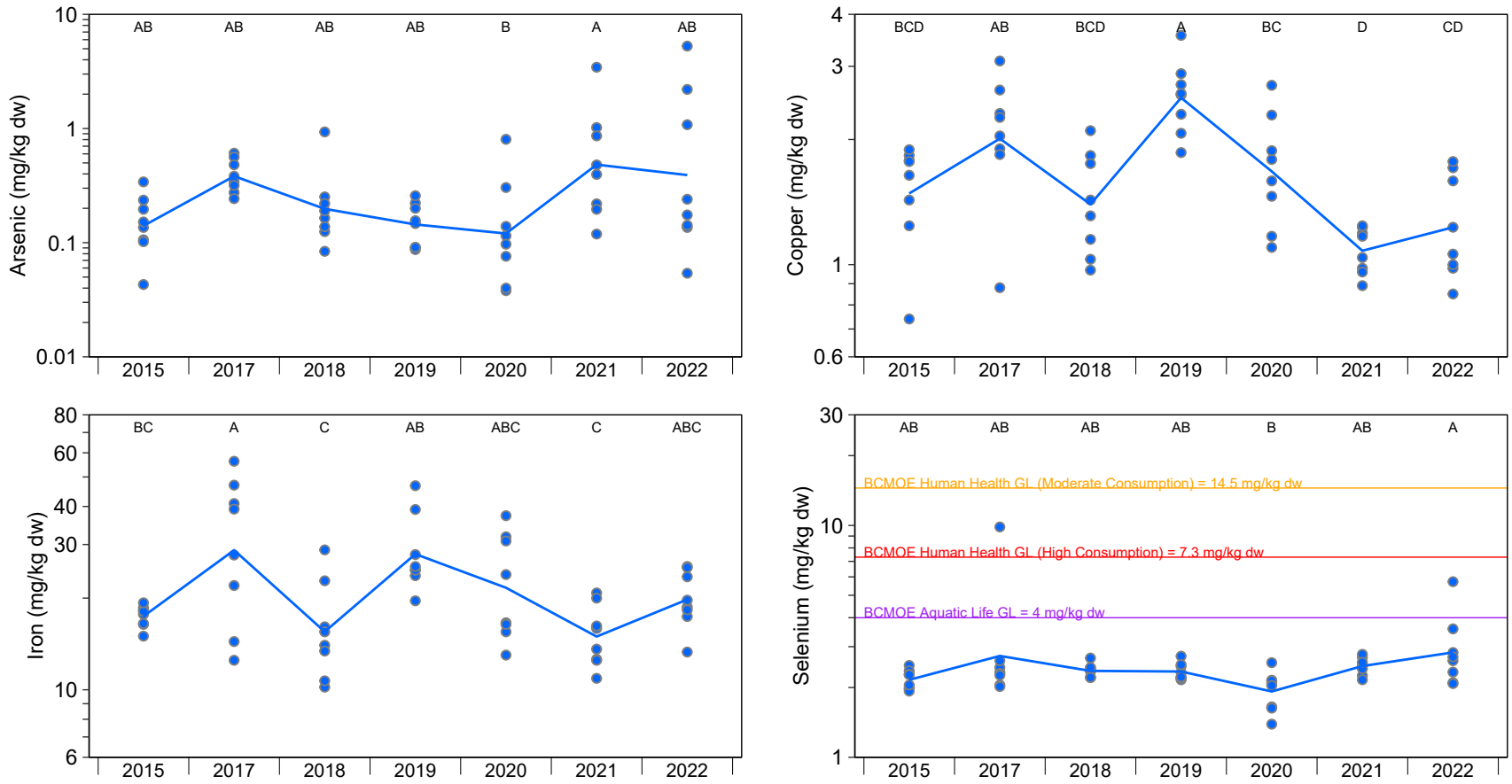


Figure E.6.20: Rainbow Trout Muscle Tissue Primary and Secondary Analyte Concentrations with a Significant Year Effect for Quesnel River, 2015 to 2022

Notes: BCMOE = British Columbia Ministry of the Environment; GL = Guideline; concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a one−way ANOVA with factor Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have concentrations that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations.

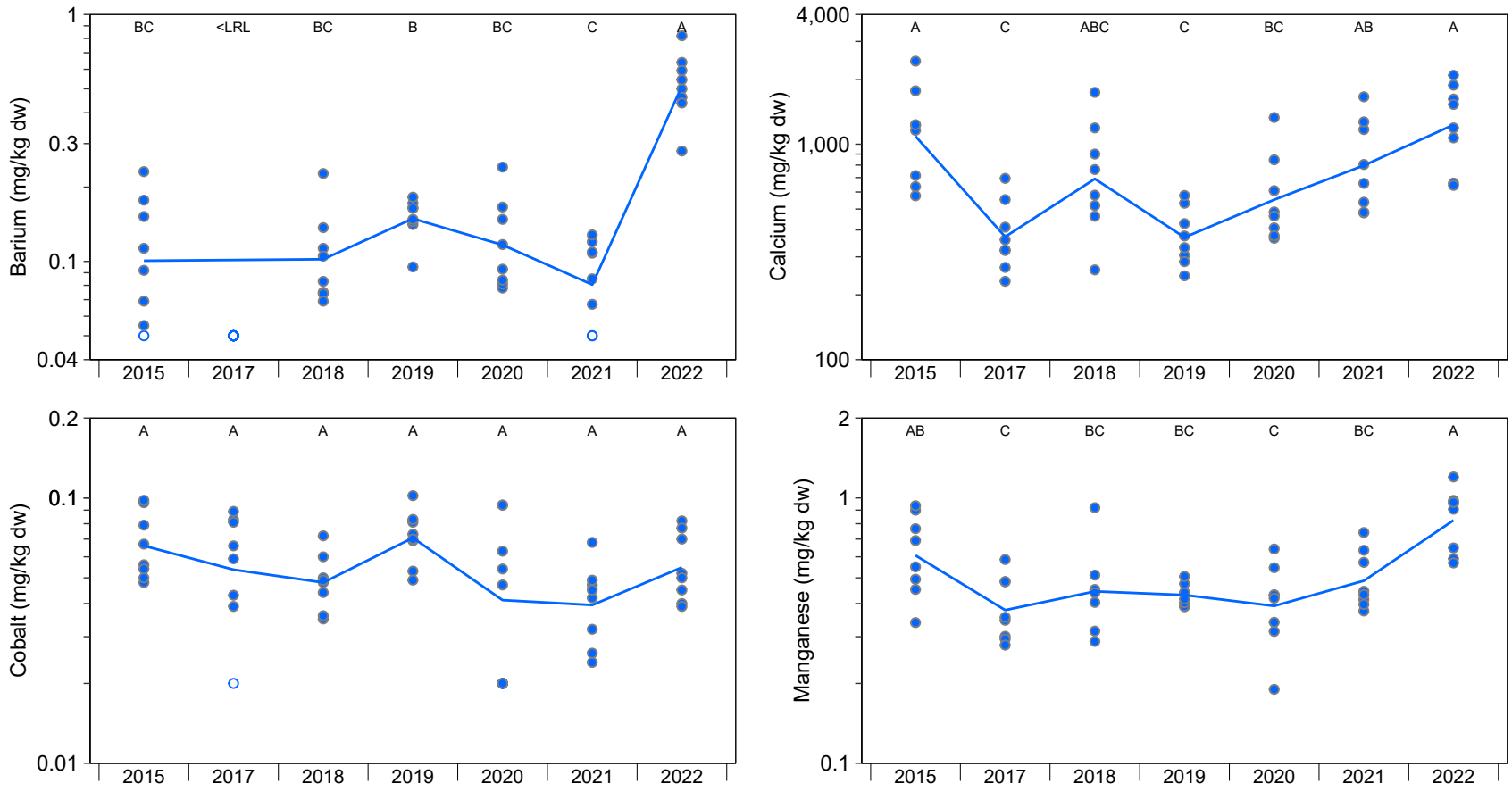


Figure E.6.20: Rainbow Trout Muscle Tissue Primary and Secondary Analyte Concentrations with a Significant Year Effect for Quesnel River, 2015 to 2022

Notes: BCMOE = British Columbia Ministry of the Environment; GL = Guideline; concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a one−way ANOVA with factor Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have concentrations that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations.

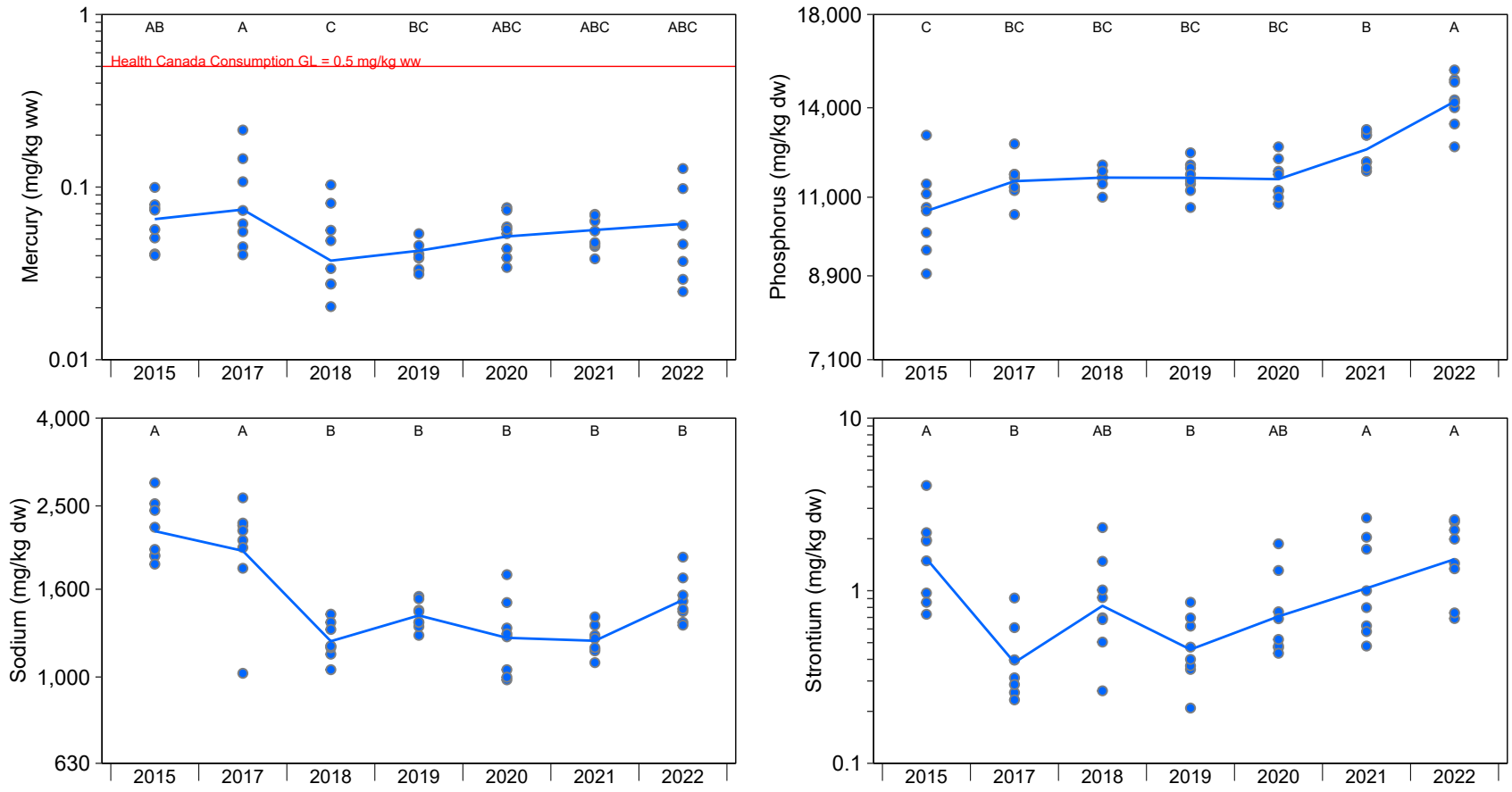


Figure E.6.20: Rainbow Trout Muscle Tissue Primary and Secondary Analyte Concentrations with a Significant Year Effect for Quesnel River, 2015 to 2022

Notes: BCMOE = British Columbia Ministry of the Environment; GL = Guideline; concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a one−way ANOVA with factor Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have concentrations that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations.

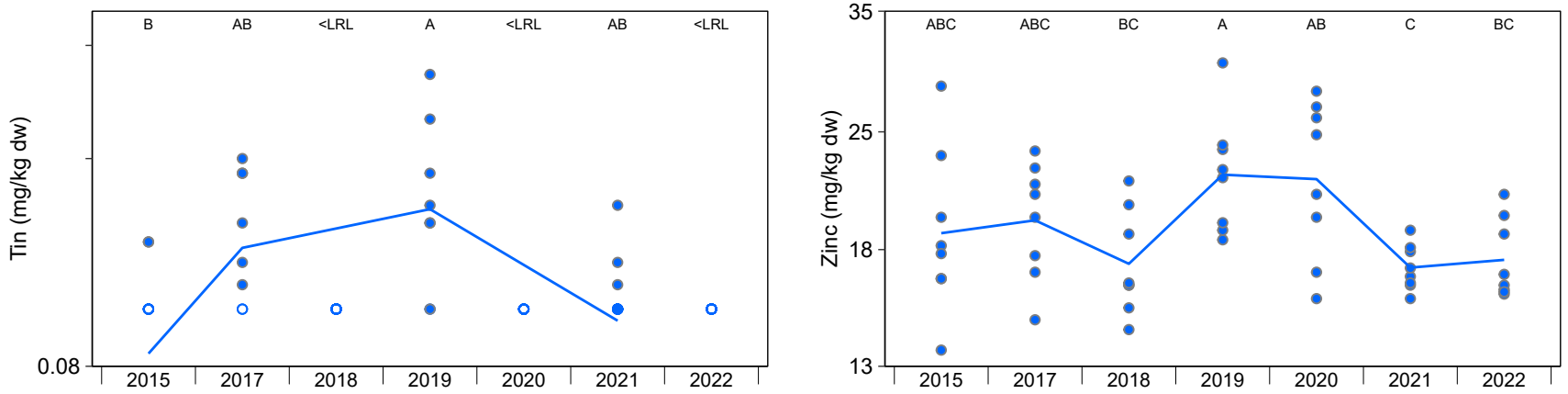


Figure E.6.20: Rainbow Trout Muscle Tissue Primary and Secondary Analyte Concentrations with a Significant Year Effect for Quesnel River, 2015 to 2022

Notes: BCMOE = British Columbia Ministry of the Environment; GL = Guideline; concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a one−way ANOVA with factor Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have concentrations that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations.

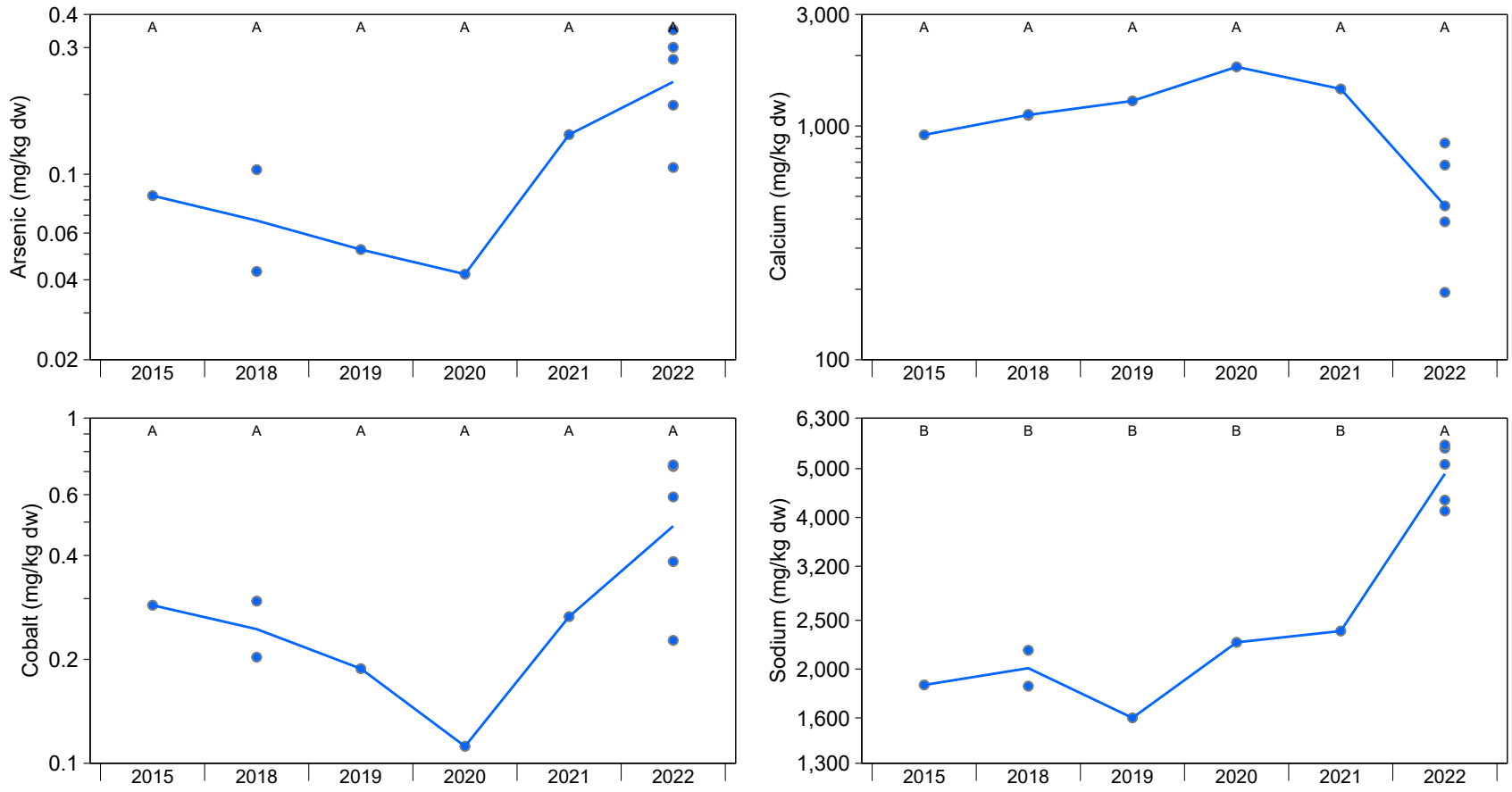


Figure E.6.21: Rainbow Trout Ovary Tissue Primary and Secondary Analyte Concentrations with a Significant Year Effect for Quesnel River, 2015 to 2022

Notes: Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a one−way ANOVA with factor Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have concentrations that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations.

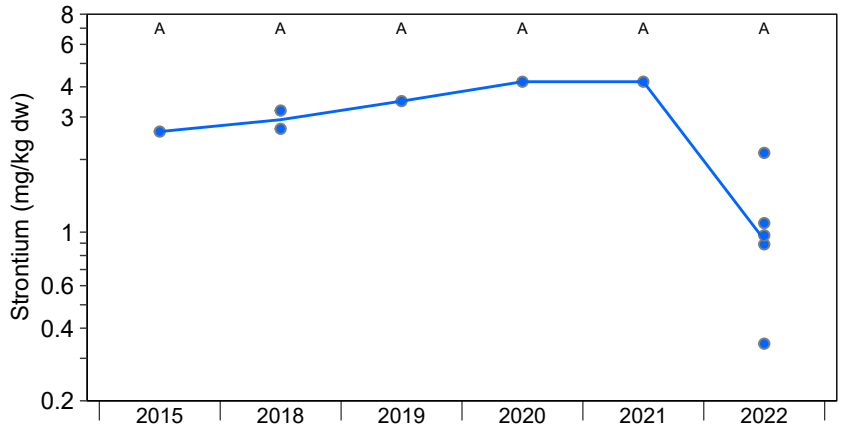


Figure E.6.21: Rainbow Trout Ovary Tissue Primary and Secondary Analyte Concentrations with a Significant Year Effect for Quesnel River, 2015 to 2022

Notes: Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a one−way ANOVA with factor Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have concentrations that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations.

Table E.6.1: **Statistical Comparisons of Exposed - Reference Relative Differences of Rainbow Trout Muscle Metal Concentrations for Polley Lake (Exposed) and Bootjack Lake (Reference), 1995 to 2022**

Parameter	Data Transformation	Two-way ANOVA P-values			(Exposed ─ Reference) Contrasts Among Periods[a]										Magnitude of Difference in (Exposed ─ Reference) Relative to Baseline Period (%)[b]										Magnitude of Difference for Polley Lake Mean Relative to Bootjack Lake (%)[c]									
		Area	Year	Area × Year	Before Period	Uncontrolled Release Period	Post-Release Period	Post-Breach Period							Before Period	Uncontrolled Release Period	Post-Release Period	Post-Breach Period							Before Period	Uncontrolled Release Period	Post-Release Period	Post-Breach Period						
					1995	2009	2012	2015	2017	2018	2019	2020	2021	2022	1995	2009	2012	2015	2017	2018	2019	2020	2021	2022	1995	2009	2012	2015	2017	2018	2019	2020	2021	2022
Aluminum	MLE	0.012	0.013	0.006	-	<LRL	-	<LRL	B	<LRL	A	<LRL	A	<LRL	-	<LRL	-	<LRL	baseline	<LRL	312	<LRL	804	<LRL	-	<LRL	-	<LRL	-86	<LRL	ns	<LRL	ns	<LRL
Antimony	MLE	nt	nt	nt	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Arsenic	MLE	<0.001	<0.001	0.393	A	A	-	A	A	A	A	A	A	A	baseline	ns	-	ns	ns	ns	ns	ns	ns	ns	66		-	66						
Barium	MLE	0.002	<0.001	<0.001	-	AB	-	B	C	A	B	AB	A	A	-	baseline	-	ns	-79	ns	ns	ns	ns	ns	-	ns	-	-53	-86	ns	-57	ns	ns	ns
Beryllium	MLE	nt	nt	nt	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Bismuth	MLE	nt	nt	nt	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Boron	MLE	nt	nt	nt	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Cadmium	MLE	nt	nt	nt	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Calcium	MLE	0.755	<0.001	0.088	-	A	-	A	A	A	A	A	A	A	-	baseline	-	ns	ns	ns	ns	ns	ns	ns	-	ns	-	ns	ns	ns	ns	ns	ns	ns
Cesium	MLE	<0.001	0.109	<0.001	-	-	-	C	A	A	AB	BC	BC	BC	-	-	-	baseline	79	65	41	ns	ns	ns	-	-	-	ns	78	65	41	ns	ns	ns
Chromium	MLE	0.092	<0.001	0.035	B	<LRL	-	<LRL	B	A	<LRL	AB	A	A	baseline	<LRL	-	<LRL	ns	217	<LRL	ns	180	305	-68	<LRL	-	<LRL	-64	ns	<LRL	ns	ns	ns
Cobalt	MLE	0.123	0.108	<0.001	-	<LRL	-	<LRL	B	A	A	<LRL	A	A	-	<LRL	-	<LRL	baseline	129	115	<LRL	120	159	-	<LRL	-	<LRL	-39	ns	ns	<LRL	ns	57
Copper	MLE	0.307	<0.001	0.437	-	A	-	A	A	A	A	A	A	A	-	baseline	-	ns	ns	ns	ns	ns	ns	ns	-	ns	-	ns	ns	ns	ns	ns	ns	ns
Iron	MLE	0.964	<0.001	<0.001	-	-	-	AB	C	A	AB	B	AB	A	-	-	-	baseline	-46	ns	ns	ns	ns	ns	-	-	-	ns	-45	38	ns	ns	ns	44
Lead	MLE	0.055	0.001	<0.001	A	<LRL	-	<LRL	C	<LRL	B	<LRL	<LRL	<LRL	baseline	<LRL	-	<LRL	-94	<LRL	-79	<LRL	<LRL	<LRL	ns	<LRL	-	<LRL	-88	<LRL	ns	<LRL	<LRL	<LRL
Lithium	MLE	nt	nt	nt	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Magnesium	MLE	0.052	0.100	<0.001	-	BCD	-	CD	A	AB	BCD	D	BC	AB	-	baseline	-	ns	22	ns	ns	ns	ns	ns	-	ns	-	-13	16	ns	-11	-18	ns	ns
Manganese	MLE	<0.001	<0.001	<0.001	-	AB	-	AB	D	BC	BC	CD	AB	A	-	baseline	-	ns	-58	ns	ns	-39	ns	ns	-	ns	-	ns	-63	-24	-33	-46	ns	ns
Mercury (ww)[d]	MLE	0.368	<0.001	<0.001	B	E	-	DE	BCD	CDE	E	BCD	A	BC	baseline	-55	-	-40	ns	-34	-52	ns	99	ns	40	-37	-	ns	ns	ns	-33	ns	178	ns
Molybdenum	MLE	nt	nt	nt	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Nickel	MLE	nt	nt	nt	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Phosphorus	MLE	0.382	0.011	0.020	-	-	-	BC	A	AB	ABC	C	AB	AB	-	-	-	baseline	22	ns	ns	ns	ns	ns	-	-	-	-11	ns	ns	ns	-16	ns	ns
Potassium	MLE	0.171	0.005	0.028	-	-	-	BC	AB	AB	BC	C	AB	A	-	-	-	baseline	ns	ns	ns	ns	ns	20	-	-	-	-11	ns	ns	-12	-14	ns	ns
Rubidium	MLE	0.003	0.001	0.170	-	-	-	A	A	A	A	A	A	A	-	-	-	baseline	ns	ns	ns	ns	ns	ns	-	-	-	-12						
Selenium	MLE	<0.001	<0.001	<0.001	D	AB	A	C	AB	AB	AB	BC	BC	C	baseline	268	316	173	271	267	257	224	211	174	-30	157	190	90	159	156	149	125	117	91
Silver	MLE	nt	nt	nt	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Sodium	MLE	0.941	<0.001	0.023	-	-	-	A	A	AB	AB	B	AB	B	-	-	-	baseline	ns	ns	ns	-37	ns	-38	-	-	-	ns	ns	ns	ns	ns	ns	-23
Strontium	MLE	0.165	<0.001	0.179	-	A	-	A	A	A	A	A	A	A	-	baseline	-	ns	ns	ns	ns	ns	ns	ns	-	ns	-	ns	ns	ns	ns	ns	ns	ns
Tellurium	MLE	nt	nt	nt	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Thallium	MLE	<0.001	0.043	0.003	-	<LRL	-	C	BC	AB	BC	AB	BC	A	-	<LRL	-	baseline	ns	54	ns	52	ns	115	-	<LRL	-	-72	-61	-57	-68	-58	-67	-40
Tin	MLE	0.931	<0.001	0.246	-	<LRL	-	<LRL	A	A	<LRL	<LRL	A	A	-	<LRL	-	<LRL	baseline	ns	<LRL	<LRL	ns	ns	-	<LRL	-	<LRL	ns	ns	<LRL	<LRL	ns	ns
Titanium	MLE	nt	nt	nt	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Uranium	MLE	nt	nt	nt	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Vanadium	MLE	nt	nt	nt	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Zinc	MLE	0.933	<0.001	0.048	-	ABC	-	BC	AB	A	ABC	C	A	ABC	-	baseline	-	ns	ns	ns	ns	ns	ns	ns	-	ns	-	ns	ns	ns	ns	-18	ns	ns
Zirconium	MLE	nt	nt	nt	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Age[e]	ANOVA	0.918	<0.001	0.134	A	A	A	A	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
Fork Length[e]	ANOVAlog	0.103	<0.001	0.006	BC	C	C	A	BC	BC	AB	AB	BC	BC	baseline	ns	ns	17	ns	ns	ns	ns	ns	ns	ns	ns	ns	17	ns	ns	8.0	12	ns	ns
Body Weight[e]	ANOVAlog	0.009	<0.001	0.045	ABCD	D	CD	AB	ABCD	BCD	ABC	A	BCD	ABCD	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	30	ns	ns	27	46	ns	ns

Area x Year or Area P-value < 0.05

Contrast is significant (α = 0.05) and magnitude of difference is positive

Contrast is significant (α = 0.05) and magnitude of difference is negative

Notes: "-" = no data available; "nt" = not tested because all data were reported below the method detection limit (LRL) or because there were only data for a single time period; "ns" = not significant; "baseline" = first year of data included in analysis; "<LRL" = greater than 50% LRL data for both stations so the time period was omitted from the analysis; "ww" = wet weight; "ANOVA" = two way analysis of variance; "MLE" = censored regression using maximum likelihood estimation; "ANCOVA" = two-way analysis of covariance, MOD = magnitude of difference. Data were analysed in units of mg/kg dry weight except mercury which was analysed in units of mg/kg wet weight. Merged cells across years indicate that the Area × Time term was not significant, therefore MOD is for all years combined. Only years with samples from both reference and exposed were included in the analysis.

[a] Years that share a letter (e.g., A,B,C) had ratios of concentrations (Polley Lake:Bootjack Lake) that do not differ significantly among years. Letters are assigned such that A is assigned to the year with the highest ratio of concentrations (Polley Lake:Bootjack Lake).

[b] Magnitude of difference (MOD) calculated on backtransformed least-squares means for the observed time period as $(Exp_{observed} - Exp_{predicted})/(Exp_{predicted})\times 100\%$ where $Exp_{predicted} = Ref_{observed} + (Exp_{baseline} - Ref_{baseline})$.

[c] Magnitude of difference (MOD) calculated on backtransformed least-squares means as (Exp-Ref)/Ref x 100%.

[d] Conducted as a two-way ANCOVA with $\log_{10}$(fork length) as a covariate. Because the covariate was significant, all contrasts were conducted at a $\log_{10}$(fork length) of 1.49.

[e] Results of statistical contrasts for age, fork length, and body weight may differ among tissue types for a given species due to different sample sizes or sampling years among tissue types. Only the results associated with muscle and ovary tissue types were used in data interpretation.

Table E.6.2: **Statistical Comparisons of Exposed - Reference Relative Differences of Longnose Sucker Muscle Metal Concentrations for Polley Lake (Exposed) and Bootjack Lake (Reference), 1995 to 2022**

Parameter	Data Transformation	Two-way ANOVA P-values			(Exposed ─ Reference) Contrasts Among Periods[a]								Magnitude of Difference in (Exposed ─ Reference) Relative to Baseline Period (%)[b]								Magnitude of Difference for Polley Lake Mean Relative to Bootjack Lake (%)[c]							
		Area	Year	Area × Year	Before Period	Post-Release Period	Post-Breach Period						Before Period	Post-Release Period	Post-Breach Period						Before Period	Post-Release Period	Post-Breach Period					
					1995	2012	2017	2018	2019	2020	2021	2022	1995	2012	2017	2018	2019	2020	2021	2022	1995	2012	2017	2018	2019	2020	2021	2022
Aluminum	MLE	0.098	0.800	0.264	-	-	A	<LRL	A	A	A	A	-	-	baseline	<LRL	ns	ns	ns	ns	-	-	ns	<LRL	ns	ns	ns	ns
Antimony	MLE	nt	nt	nt	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Arsenic	MLE	<0.001	0.013	0.010	ABC	-	A	BC	C	BC	AB	BC	baseline	-	ns	ns	ns	ns	ns	ns	70	-	231	ns	ns	ns	81	ns
Barium	MLE	0.400	<0.001	0.300	-	-	A	A	A	A	A	A	-	-	baseline	ns	ns	ns	ns	ns	-	-	ns	ns	ns	ns	ns	ns
Beryllium	MLE	nt	nt	nt	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Bismuth	MLE	nt	nt	nt	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Boron	MLE	nt	nt	nt	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Cadmium	MLE	nt	nt	nt	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Calcium	MLE	0.194	<0.001	<0.001	-	-	C	BC	B	A	BC	BC	-	-	baseline	ns	60	167	ns	ns	-	-	ns	ns	ns	106	ns	ns
Cesium	MLE	0.678	0.006	0.238	-	-	A	A	A	A	A	A	-	-	baseline	ns	ns	ns	ns	ns	-	-	ns	ns	ns	ns	ns	ns
Chromium	MLE	0.977	0.652	0.183	A	-	<LRL	<LRL	<LRL	<LRL	A	A	baseline	-	<LRL	<LRL	<LRL	<LRL	ns	ns	ns	-	<LRL	<LRL	<LRL	<LRL	ns	ns
Cobalt	MLE	nt	nt	nt	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Copper	MLE	0.029	<0.001	0.024	-	-	BC	BC	C	BC	AB	A	-	-	baseline	ns	ns	ns	ns	53	-	-	ns	ns	ns	ns	45	62
Iron	MLE	0.462	<0.001	0.080	-	-	A	A	A	A	A	A	-	-	baseline	ns	ns	ns	ns	ns	-	-	ns	ns	ns	ns	ns	ns
Lead	MLE	nt	nt	nt	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Lithium	MLE	nt	nt	nt	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Magnesium	MLE	0.209	<0.001	0.645	-	-	A	A	A	A	A	A	-	-	baseline	ns	ns	ns	ns	ns	-	-	ns	ns	ns	ns	ns	ns
Manganese	MLE	0.488	0.011	0.014	-	-	B	AB	AB	A	A	B	-	-	baseline	ns	ns	82	81	ns	-	-	ns	ns	ns	39	39	ns
Mercury (ww)[d]	MLE	0.031	0.042	0.001	AB	-	AB	A	BC	BC	BC	C	baseline	-	ns	ns	ns	ns	ns	-37	ns	-	ns	29	-24	ns	ns	-39
Molybdenum	MLE	<0.001	0.129	0.733	-	-	A	<LRL	<LRL	A	A	A	-	-	baseline	<LRL	<LRL	ns	ns	ns	-	-	120[e]	<LRL	<LRL	120[e]		
Nickel	MLE	nt	nt	nt	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Phosphorus	MLE	0.804	<0.001	0.262	-	-	A	A	A	A	A	A	-	-	baseline	ns	ns	ns	ns	ns	-	-	ns	ns	ns	ns	ns	ns
Potassium	MLE	0.858	<0.001	0.277	-	-	A	A	A	A	A	A	-	-	baseline	ns	ns	ns	ns	ns	-	-	ns	ns	ns	ns	ns	ns
Rubidium	MLE	<0.001	<0.001	0.695	-	-	A	A	A	A	A	A	-	-	baseline	ns	ns	ns	ns	ns	-	-	25					
Selenium	MLE	<0.001	<0.001	<0.001	C	A	B	B	B	B	B	B	baseline	440	261	240	230	263	221	229	ns	389	227	208	198	229	190	198
Silver	MLE	nt	nt	nt	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Sodium	MLE	0.976	0.008	0.036	-	-	AB	AB	B	AB	B	A	-	-	baseline	ns	ns	ns	ns	ns	-	-	ns	ns	ns	ns	ns	21
Strontium	MLE	0.348	<0.001	<0.001	-	-	C	B	B	A	BC	BC	-	-	baseline	99	118	366	ns	ns	-	-	-52	ns	ns	125	ns	-43
Tellurium	MLE	nt	nt	nt	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Thallium	MLE	<0.001	0.921	0.268	-	-	<LRL	A	A	<LRL	A	<LRL	-	-	<LRL	baseline	ns	<LRL	ns	<LRL	-	-	<LRL	-50[e]		<LRL	-50	<LRL
Tin[e]	MLE	0.754	<0.001	<0.001	-	-	B	C	<LRL	D	A	BC	-	-	baseline	-43	<LRL	-89[e]	2,392[e]	ns	-	-	ns	-47	<LRL	ns	ns	-39
Titanium	MLE	nt	nt	nt	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Uranium	MLE	nt	nt	nt	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Vanadium	MLE	nt	nt	nt	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Zinc	MLE	<0.001	0.005	0.073	-	-	A	A	A	A	A	A	-	-	baseline	ns	ns	ns	ns	ns	-	-	85					
Zirconium	MLE	nt	nt	nt	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Age[f]	ANOVA	0.005	<0.001	0.070	-	A	A	A	A	A	A	A	-	baseline	ns	ns	ns	ns	ns	ns	-	-90						
Fork Length[f]	ANOVAlog	<0.001	0.002	0.025	AB	A	A	A	A	A	B	A	baseline	ns	ns	ns	ns	ns	ns	ns	-13	ns	ns	ns	-9.6	ns	-22	ns
Body Weight[f]	ANOVAlog	<0.001	0.001	0.014	A	A	A	A	A	A	B	A	baseline	ns	ns	ns	ns	ns	-41	ns	-30	ns	-26	ns	-33	ns	-59	-30

Area x Year or Area P-value < 0.05

Contrast is significant (α = 0.05) and magnitude of difference is positive

Contrast is significant (α = 0.05) and magnitude of difference is negative

Notes: "-" = no data available; "nt" = not tested because all data were reported below the method detection limit (LRL) or because there were only data for a single time period; "ns" = not significant; "baseline" = first year of data included in analysis; "<LRL" = greater than 50% LRL data for both stations so the time period was omitted from the analysis; "ww" = wet weight; "ANOVA" = two way analysis of variance; "MLE" = censored regression using maximum likelihood estimation; "ANCOVA" = two-way analysis of covariance, MOD = magnitude of difference. Data were analysed in units of mg/kg dry weight except mercury which was analysed in units of mg/kg wet weight. Merged cells across years indicate that the Area × Time term was not significant, therefore MOD is for all years combined. Only years with samples from both reference and exposed were included in the analysis.

[a] Years that share a letter (e.g., A,B,C) had ratios of concentrations (Polley Lake:Bootjack Lake) that do not differ significantly among years. Letters are assigned such that A is assigned to the year with the highest ratio of concentrations (Polley Lake:Bootjack Lake).

[b] Magnitude of difference (MOD) calculated on backtransformed least-squares means for the observed time period as $(Exp_{observed} - Exp_{predicted})/(Exp_{predicted}) \times 100\%$ where $Exp_{predicted} = Ref_{observed} + (Exp_{baseline} - Ref_{baseline})$.

[c] Magnitude of difference (MOD) calculated on backtransformed least-squares means as (Exp-Ref)/Ref x 100%.

[d] Conducted as a two-way ANCOVA with $\log_{10}$(fork length) as a covariate. Because the covariate was significant, all contrasts were conducted at a $\log_{10}$(fork length) of 1.60.

[e] MOD may be inflated because data for one of the groups for two consecutive years in the comparison (2020, Polley Lake; 2021, Bootjack Lake) were entirely < LRL, leading to an underestimate of the mean for the <LRL result and a consequent increase in MOD between the two groups.

[f] Results of statistical contrasts for age, fork length, and body weight may differ among tissue types for a given species due to different sample sizes or sampling years among tissue types. Only the results associated with muscle and ovary tissue types were used in data interpretation.

Table E.6.3: **Statistical Comparisons of Exposed - Reference Relative Differences of Rainbow Trout Ovary Metal Concentrations for Polley Lake (Exposed) and Bootjack Lake (Reference), 2012 to 2022**

Parameter	Data Transformation	Two-way ANOVA P-values			(Exposed – Reference) Contrasts Among Periods[a]								Magnitude of Difference in (Exposed – Reference) Relative to Baseline Period (%)[b]								Magnitude of Difference for Polley Lake Mean Relative to Bootjack Lake (%)[c]							
		Area	Year	Area × Year	Post-Release Period	Post-Breach Period							Post-Release Period	Post-Breach Period							Post-Release Period	Post-Breach Period						
					2012	2015	2017	2018	2019	2020	2021	2022	2012	2015	2017	2018	2019	2020	2021	2022	2012	2015	2017	2018	2019	2020	2021	2022
Aluminum	MLE	nt	nt	nt	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Antimony	MLE	nt	nt	nt	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Arsenic	MLE	0.034	<0.001	0.068	-	A	A	A	A	A	A	A	-	baseline	ns	ns	ns	ns	ns	ns	-	22						
Barium	MLE	<0.001	<0.001	<0.001	-	C	BC	AB	BC	C	BC	A	-	baseline	ns	91	ns	ns	ns	216	-	-70	-64	-44	-61	-74	-65	ns
Beryllium	MLE	nt	nt	nt	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Bismuth	MLE	nt	nt	nt	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Boron	MLE	nt	nt	nt	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Cadmium	MLE	nt	nt	nt	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Calcium	MLE	0.692	0.124	0.167	-	A	A	A	A	A	A	A	-	baseline	ns	ns	ns	ns	ns	ns	-	ns	ns	ns	ns	ns	ns	ns
Cesium	MLE	<0.001	<0.001	0.172	-	A	A	A	A	A	A	A	-	baseline	ns	ns	ns	ns	ns	ns	-	41						
Chromium	MLE	nt	nt	nt	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Cobalt	MLE	<0.001	0.003	0.218	-	A	A	A	A	A	A	A	-	baseline	ns	ns	ns	ns	ns	ns	-	29						
Copper	MLE	0.036	0.608	0.527	-	A	A	A	A	A	A	A	-	baseline	ns	ns	ns	ns	ns	ns	-	11						
Iron	MLE	0.865	<0.001	0.474	-	A	A	A	A	A	A	A	-	baseline	ns	ns	ns	ns	ns	ns	-	ns	ns	ns	ns	ns	ns	ns
Lead	MLE	nt	nt	nt	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Lithium	MLE	nt	nt	nt	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Magnesium	MLE	0.419	0.013	0.169	-	A	A	A	A	A	A	A	-	baseline	ns	ns	ns	ns	ns	ns	-	ns	ns	ns	ns	ns	ns	ns
Manganese	MLE	0.043	0.103	0.016	-	A	AB	ABC	BC	C	AB	BC	-	baseline	ns	ns	-46	-66	ns	-47	-	ns	ns	ns	ns	-52	ns	ns
Mercury (ww)[d]	MLE	0.089	<0.001	<0.001	-	B	D	BC	BC	CD	A	B	-	baseline	-81	ns	ns	-65	195	ns	-	ns	-80	ns	ns	-63	210	ns
Molybdenum	MLE	0.401	0.353	<0.001	-	A	A	AB	AB	C	BC	A	-	baseline	ns	ns	ns	-62	-45	ns	-	ns	68	ns	ns	-47	ns	ns
Nickel	MLE	nt	nt	nt	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Phosphorus	MLE	0.821	0.131	0.001	-	B	A	AB	BC	C	AB	B	-	baseline	19	ns	ns	-15	ns	ns	-	ns	17	ns	ns	-17	ns	ns
Potassium	MLE	0.619	<0.001	0.052	-	A	A	A	A	A	A	A	-	baseline	ns	ns	ns	ns	ns	ns	-	ns	ns	ns	ns	ns	ns	ns
Rubidium	MLE	0.160	<0.001	0.112	-	A	A	A	A	A	A	A	-	baseline	ns	ns	ns	ns	ns	ns	-	ns	ns	ns	ns	ns	ns	ns
Selenium	MLE	<0.001	<0.001	<0.001	BCD	A	BC	BC	B	CD	BC	D	baseline	201	ns	ns	ns	ns	ns	ns	121	564	146	133	180	93	121	70
Silver	MLE	<0.001	0.068	0.316	-	-	-	-	-	A	A	A	-	-	-	-	-	baseline	ns	ns	-	-	-	-	-	-65[f]		
Sodium	MLE	0.563	<0.001	0.281	-	A	A	A	A	A	A	A	-	baseline	ns	ns	ns	ns	ns	ns	-	ns	ns	ns	ns	ns	ns	ns
Strontium	MLE	0.118	0.160	0.059	-	A	A	A	A	A	A	A	-	baseline	ns	ns	ns	ns	ns	ns	-	ns	ns	ns	ns	ns	ns	ns
Tellurium	MLE	nt	nt	nt	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Thallium	MLE	nt	nt	nt	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Tin	MLE	nt	nt	nt	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Titanium	MLE	nt	nt	nt	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Uranium	MLE	nt	nt	nt	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Vanadium	MLE	nt	nt	nt	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Zinc	MLE	0.269	<0.001	0.541	-	A	A	A	A	A	A	A	-	baseline	ns	ns	ns	ns	ns	ns	-	ns	ns	ns	ns	ns	ns	ns
Zirconium	MLE	nt	nt	nt	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Age[e]	ANOVA	0.367	<0.001	0.107	A	A	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
Fork Length[e]	ANOVAlog	0.003	<0.001	0.019	C	A	BC	BC	AB	AB	BC	BC	baseline	22	ns	ns	13	17	ns	ns	ns	17	ns	ns	8.0	12	ns	ns
Body Weight[e]	ANOVAlog	<0.001	<0.001	0.059	A	A	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns	15							

Area x Year or Area P-value < 0.05

Contrast is significant (α = 0.05) and magnitude of difference is positive

Contrast is significant (α = 0.05) and magnitude of difference is negative

Notes: "-" = no data available; "nt" = not tested because all data were reported below the method detection limit (LRL) or because there were only data for a single time period; "ns" = not significant; "baseline" = first year of data included in analysis; "<LRL" = greater than 50% LRL data for both stations so the time period was omitted from the analysis; "ww" = wet weight; "ANOVA" = two way analysis of variance; "MLE" = censored regression using maximum likelihood estimation; "ANCOVA" = two-way analysis of covariance, MOD = magnitude of difference. Data were analysed in units of mg/kg dry weight except mercury which was analysed in units of mg/kg wet weight. Merged cells across years indicate that the Area × Time term was not significant, therefore MOD is for all years combined. Only years with samples from both reference and exposed were included in the analysis.

[a] Years that share a letter (e.g., A,B,C) had ratios of concentrations (Polley Lake:Bootjack Lake) that do not differ significantly among years. Letters are assigned such that A is assigned to the year with the highest ratio of concentrations (Polley Lake:Bootjack Lake).

[b] Magnitude of difference (MOD) calculated on backtransformed least-squares means for the observed time period as $(Exp_{observed} - Exp_{predicted})/(Exp_{predicted}) \times 100\%$ where $Exp_{predicted} = Ref_{observed} + (Exp_{baseline} - Ref_{baseline})$.

[c] Magnitude of difference (MOD) calculated on backtransformed least-squares means as (Exp-Ref)/Ref x 100%.

[d] Conducted first as a two-way ANCOVA with $\log_{10}$(fork length) as a covariate, but the covariate was not a significant predictor of mercury concentration. Analysis proceeded as a two-way ANOVA on Mercury in units of wet weight (ww).

[e] Results of statistical contrasts for age, fork length, and body weight may differ among tissue types for a given species due to different sample sizes or sampling years among tissue types. Only the results associated with muscle and ovary tissue types were used in data interpretation.

[f] MOD is inflated because data for one of the groups in the comparison were entirely < LRL, leading to an underestimate of the mean for the <LRL result and a consequent increase in MOD between the two groups.

Table E.6.4: Statistical Comparisons of Exposed - Reference Relative Differences of Rainbow Trout Liver Metal Concentrations for Polley Lake (Exposed) and Bootjack Lake (Reference), 1995 to 2022

Parameter	Data Transformation	Two-way ANOVA P-values			(Exposed – Reference) Contrasts Among Periods[a]								Magnitude of Difference in (Exposed – Reference) Relative to Baseline Period (%)[b]								Magnitude of Difference for Polley Lake Mean Relative to Bootjack Lake (%)[c]							
		Area	Year	Area × Year	Before Period	Post-Breach Period							Before Period	Post-Breach Period							Before Period	Post-Breach Period						
					1995	2015	2017	2018	2019	2020	2021	2022	1995	2015	2017	2018	2019	2020	2021	2022	1995	2015	2017	2018	2019	2020	2021	2022
Aluminum	MLE	0.991	0.016	0.026	-	<LRL	B	<LRL	A	<LRL	A	A	-	<LRL	baseline	<LRL	181	<LRL	151	221	-	<LRL	-57	<LRL	ns	<LRL	ns	ns
Antimony	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Arsenic	MLE	<0.001	<0.001	0.003	A	AB	C	ABC	BC	C	A	AB	baseline	ns	-52	ns	-48	-53	ns	ns	116	70	ns	39	ns	ns	99	77
Barium	MLE	0.180	<0.001	<0.001	-	B	C	AB	AB	AB	B	A	-	baseline	-59	ns	ns	ns	ns	122	-	ns	-72	ns	ns	ns	ns	ns
Beryllium	MLE	nt	nt	nt	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Bismuth	MLE	nt	nt	nt	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Boron	MLE	nt	nt	nt	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Cadmium	MLE	0.043	<0.001	0.128	A	A	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
Calcium	MLE	0.702	0.001	0.509	-	A	A	A	A	A	A	A	-	baseline	ns	ns	ns	ns	ns	ns	-	ns	ns	ns	ns	ns	ns	ns
Cesium	MLE	<0.001	<0.001	0.169	-	A	A	A	A	A	A	A	-	baseline	ns	ns	ns	ns	ns	ns	-	48						
Chromium	MLE	0.204	<0.001	0.018	B	<LRL	<LRL	<LRL	AB	<LRL	A	A	baseline	<LRL	<LRL	<LRL	ns	<LRL	342	342	-71	<LRL	<LRL	<LRL	ns	<LRL	ns	ns
Cobalt	MLE	<0.001	<0.001	0.068	-	A	A	A	A	A	A	A	-	baseline	ns	ns	ns	ns	ns	ns	-	30						
Copper	MLE	0.035	0.028	0.148	-	A	A	A	A	A	A	A	-	baseline	ns	ns	ns	ns	ns	ns	-	45						
Iron	MLE	<0.001	0.012	0.234	-	A	A	A	A	A	A	A	-	baseline	ns	ns	ns	ns	ns	ns	-	42						
Lead	MLE	0.315	<0.001	0.014	A	<LRL	B	<LRL	A	<LRL	<LRL	<LRL	baseline	<LRL	-99[f]	<LRL	ns	<LRL	<LRL	<LRL	ns	<LRL	ns	<LRL	ns	<LRL	<LRL	<LRL
Lithium	MLE	nt	nt	nt	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Magnesium	MLE	0.116	<0.001	<0.001	-	DE	E	BCD	CDE	AB	A	BC	-	baseline	ns	ns	ns	24	45	20	-	-16	-20	ns	-13	ns	23	ns
Manganese	MLE	0.004	0.217	<0.001	-	B	C	BC	B	BC	AB	A	-	baseline	-28	ns	ns	ns	ns	61	-	ns	-39	ns	ns	-25	ns	36
Mercury (ww)[d]	MLE	0.547	<0.001	<0.001	AB	C	CD	BC	D	C	A	B	baseline	-53	-56	ns	-75	-55	ns	ns	ns	ns	-32	ns	-61	ns	160	ns
Molybdenum	MLE	<0.001	0.010	0.002	-	A	C	AB	AB	BC	BC	BC	-	baseline	-57	ns	ns	-50	-41	-44	-	132	ns	58	59	ns	36	ns
Nickel	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Phosphorus	MLE	0.099	<0.001	<0.001	-	BC	C	B	B	B	A	B	-	baseline	ns	ns	ns	ns	27	ns	-	-8.9	-19	ns	ns	ns	16	ns
Potassium	MLE	0.481	<0.001	0.004	-	BC	C	BC	BC	AB	A	BC	-	baseline	ns	ns	ns	ns	25	ns	-	ns	-11	ns	ns	ns	19	ns
Rubidium	MLE	0.050	<0.001	0.001	-	C	BC	AB	AB	A	A	A	-	baseline	ns	38	38	64	80	59	-	-35	-23	ns	ns	ns	ns	ns
Selenium	MLE	<0.001	<0.001	<0.001	C	A	B	AB	A	AB	AB	B	baseline	672	148	314	690	394	306	186	ns	422	67	180	434	234	174	93
Silver	MLE	<0.001	0.649	0.442	-	-	-	-	-	A	A	A	-	-	-	-	-	baseline	ns	ns	-	-	-	-	-	-68		
Sodium	MLE	0.040	<0.001	<0.001	-	A	A	B	B	B	B	B	-	baseline	ns	-35	-34	-41	-48	-55	-	71	74	ns	ns	ns	ns	ns
Strontium	MLE	0.085	<0.001	0.013	-	BC	AB	A	BC	C	BC	BC	-	baseline	ns	81	ns	ns	ns	ns	-	ns	ns	44	ns	-33	ns	ns
Tellurium	MLE	nt	nt	nt	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Thallium	MLE	<0.001	<0.001	<0.001	-	BC	C	A	AB	A	A	A	-	baseline	ns	83	ns	92	124	85	-	-77	-84	-59	-68	-57	-49	-58
Tin	MLE	0.846	<0.001	0.082	-	<LRL	A	A	A	A	A	A	-	<LRL	baseline	ns	ns	ns	ns	ns	-	<LRL	ns	ns	ns	ns	ns	ns
Titanium	MLE	nt	nt	nt	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Uranium	MLE	0.892	<0.001	0.719	-	A	A	A	A	A	A	A	-	baseline	ns	ns	ns	ns	ns	ns	-	ns	ns	ns	ns	ns	ns	ns
Vanadium	MLE	<0.001	0.048	0.206	-	A	A	A	A	A	A	A	-	baseline	ns	ns	ns	ns	ns	ns	-	164						
Zinc	MLE	0.045	<0.001	0.078	-	A	A	A	A	A	A	A	-	baseline	ns	ns	ns	ns	ns	ns	-	11						
Zirconium	MLE	0.001	0.345	0.077	-	<LRL	<LRL	<LRL	<LRL	<LRL	A	A	-	<LRL	<LRL	<LRL	<LRL	<LRL	baseline	ns	-	<LRL	<LRL	<LRL	<LRL	<LRL	75	
Age[e]	ANOVA	0.782	<0.001	0.094	A	A	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
Fork Length[e]	ANOVAlog	0.018	<0.001	0.090	A	A	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns	6.2							
Body Weight[e]	ANOVAlog	<0.001	<0.001	0.212	A	A	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns	18							

Area x Year or Area P-value < 0.05
Contrast is significant (α = 0.05) and magnitude of difference is positive
Contrast is significant (α = 0.05) and magnitude of difference is negative

Notes: "-" = no data available; "nt" = not tested because all data were reported below the method detection limit (LRL) or because there were only data for a single time period; "ns" = not significant; "baseline" = first year of data included in analysis; "<LRL" = greater than 50% LRL data for both stations so the time period was omitted from the analysis; "ww" = wet weight; "ANOVA" = two way analysis of variance; "MLE" = censored regression using maximum likelihood estimation; "ANCOVA" = two-way analysis of covariance, MOD = magnitude of difference. Data were analysed in units of mg/kg dry weight except mercury which was analysed in units of mg/kg wet weight. Merged cells across years indicate that the Area × Time term was not significant, therefore MOD is for all years combined. Only years with samples from both reference and exposed were included in the analysis.

[a] Years that share a letter (e.g., A,B,C) had ratios of concentrations (Polley Lake:Bootjack Lake) that do not differ significantly among years. Letters are assigned such that A is assigned to the year with the highest ratio of concentrations (Polley Lake:Bootjack Lake).

[b] Magnitude of difference (MOD) calculated on backtransformed least-squares means for the observed time period as $(Exp_{observed} - Exp_{predicted})/(Exp_{predicted})\times 100\%$ where $Exp_{predicted} = Ref_{observed} + (Exp_{baseline} - Ref_{baseline})$.

[c] Magnitude of difference (MOD) calculated on backtransformed least-squares means as (Exp-Ref)/Ref x 100%.

[d] Conducted first as a two-way ANCOVA with $\log_{10}$(fork length) as a covariate, but the covariate was not a significant predictor of mercury concentration. Analysis proceeded as a two-way ANOVA on Mercury in units of wet weight (ww).

[e] Results of statistical contrasts for age, fork length, and body weight may differ among tissue types for a given species due to different sample sizes or sampling years among tissue types. Only the results associated with muscle and ovary tissue types were used in data interpretation.

[f] MOD is inflated because data for one of the groups in the comparison were entirely < LRL, leading to an underestimate of the mean for the <LRL result and a consequent increase in MOD between the two groups.

Table E.6.5: Statistical Comparisons of Exposed - Reference Relative Differences of Longnose Sucker Ovary Metal Concentrations for Polley Lake (Exposed) and Bootjack Lake (Reference), 2012 to 2022

Parameter	Data Transformation	Two-way ANOVA P-values			(Exposed – Reference) Contrasts Among Periods[a]							Magnitude of Difference in (Exposed – Reference) Relative to Baseline Period (%)[b]							Magnitude of Difference for Polley Lake Mean Relative to Bootjack Lake (%)[c]						
		Area	Year	Area × Year	Post-Release Period	Post-Breach Period						Post-Release Period	Post-Breach Period						Post-Release Period	Post-Breach Period					
					2012	2017	2018	2019	2020	2021	2022	2012	2017	2018	2019	2020	2021	2022	2012	2017	2018	2019	2020	2021	2022
Aluminum	MLE	<0.001	0.162	0.524	-	A	<LRL	A	<LRL	<LRL	<LRL	-	baseline	<LRL	ns	<LRL	<LRL	<LRL	-	-64[d]	<LRL	-64	<LRL	<LRL	<LRL
Antimony	MLE	nt	nt	nt	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Arsenic	MLE	0.144	<0.001	0.008	-	A	AB	B	B	B	B	-	baseline	ns	-63	-57	-51	-50	-	113	ns	ns	ns	ns	ns
Barium	MLE	<0.001	0.482	<0.001	-	D	AB	BC	A	C	C	-	baseline	153	76	177	51	72	-	-66	ns	-39	ns	-48	-41
Beryllium	MLE	nt	nt	nt	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Bismuth	MLE	nt	nt	nt	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Boron	MLE	nt	nt	nt	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Cadmium	MLE	nt	nt	nt	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Calcium	MLE	<0.001	<0.001	0.217	-	A	A	A	A	A	A	-	baseline	ns	ns	ns	ns	ns	-	-21	-21	-21	-21	-21	-21
Cesium	MLE	<0.001	0.394	0.129	-	A	A	A	A	A	A	-	baseline	ns	ns	ns	ns	ns	-	-23	-23	-23	-23	-23	-23
Chromium	MLE	nt	nt	nt	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Cobalt	MLE	0.006	0.386	0.062	-	A	A	A	A	A	A	-	baseline	ns	ns	ns	ns	ns	-	17	17	17	17	17	17
Copper	MLE	0.638	0.044	0.343	-	A	A	A	A	A	A	-	baseline	ns	ns	ns	ns	ns	-	ns	ns	ns	ns	ns	ns
Iron	MLE	<0.001	0.691	0.247	-	A	A	A	A	A	A	-	baseline	ns	ns	ns	ns	ns	-	-24	-24	-24	-24	-24	-24
Lead	MLE	nt	nt	nt	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Lithium	MLE	nt	nt	nt	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Magnesium	MLE	<0.001	0.001	0.848	-	A	A	A	A	A	A	-	baseline	ns	ns	ns	ns	ns	-	-11	-11	-11	-11	-11	-11
Manganese	MLE	0.070	0.233	0.263	-	A	A	A	A	A	A	-	baseline	ns	ns	ns	ns	ns	-	ns	ns	ns	ns	ns	ns
Mercury (ww)[e]	MLE	<0.001	0.007	<0.001	-	AB	A	C	BC	BC	C	-	baseline	ns	-29	ns	ns	-37	-	ns	ns	-39	-35	-35	-46
Molybdenum	MLE	<0.001	0.015	0.001	-	AB	AB	C	A	AB	B	-	baseline	ns	-26	ns	ns	ns	-	36	50	ns	64	34	27
Nickel	MLE	nt	nt	nt	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Phosphorus	MLE	<0.001	<0.001	0.024	-	C	AB	AB	A	ABC	BC	-	baseline	8.4	8.0	14	ns	ns	-	ns	6.3	5.9	12	5.7	ns
Potassium	MLE	<0.001	<0.001	0.100	-	A	A	A	A	A	A	-	baseline	ns	ns	ns	ns	ns	-	-10	-10	-10	-10	-10	-10
Rubidium	MLE	<0.001	0.012	0.961	-	A	A	A	A	A	A	-	baseline	ns	ns	ns	ns	ns	-	16	16	16	16	16	16
Selenium	MLE	<0.001	<0.001	<0.001	A	B	B	B	BC	CD	D	baseline	-19	-16	-17	-24	-31	-37	197	140	148	146	126	103	88
Silver	MLE	<0.001	0.818	>0.999	-	-	-	-	<LRL	A	A	-	-	-	-	<LRL	baseline	ns	-	-	-	-	<LRL	ns	ns
Sodium	MLE	<0.001	0.006	<0.001	-	A	A	B	A	A	A	-	baseline	ns	-27	ns	ns	ns	-	ns	ns	-33	ns	ns	ns
Strontium	MLE	<0.001	0.039	0.186	-	A	A	A	A	A	A	-	baseline	ns	ns	ns	ns	ns	-	-32	-32	-32	-32	-32	-32
Tellurium	MLE	nt	nt	nt	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Thallium	MLE	nt	nt	nt	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Tin	MLE	nt	nt	nt	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Titanium	MLE	nt	nt	nt	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Uranium	MLE	nt	nt	nt	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Vanadium	MLE	nt	nt	nt	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Zinc	MLE	<0.001	0.009	0.463	-	A	A	A	A	A	A	-	baseline	ns	ns	ns	ns	ns	-	9.4	9.4	9.4	9.4	9.4	9.4
Zirconium	MLE	nt	nt	nt	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Age[f]	ANOVA	0.005	<0.001	0.070	A	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	-90	-90	-90	-90	-90	-90	-90
Fork Length[f]	ANOVAlog	<0.001	0.009	0.024	A	A	A	A	A	B	A	baseline	ns	ns	ns	ns	-16	ns	ns	ns	ns	-9.6	ns	-22	ns
Body Weight[f]	ANOVAlog	<0.001	0.003	0.011	A	A	A	A	A	B	A	baseline	ns	ns	ns	ns	-53	ns	ns	-26	ns	-33	ns	-59	-30

Area x Year or Area P-value < 0.05

Contrast is significant (α = 0.05) and magnitude of difference is positive

Contrast is significant (α = 0.05) and magnitude of difference is negative

Notes: "-" = no data available; "nt" = not tested because all data were reported below the method detection limit (LRL) or because there were only data for a single time period; "ns" = not significant; "baseline" = first year of data included in analysis; "ww" = wet weight; "ANOVA" = two way analysis of variance; "MLE" = censored regression using maximum likelihood estimation; "ANCOVA" = two-way analysis of covariance, MOD = magnitude of difference. Merged cells across years indicate that the Area × Time term was not significant, therefore MOD is for all years combined. Only years with samples from both reference and exposed were included in the analysis.

[a] Years that share a letter (e.g., A,B,C) had ratios of concentrations (Polley Lake:Bootjack Lake) that do not differ significantly among years. Letters are assigned such that A is assigned to the year with the highest ratio of concentrations (Polley Lake:Bootjack Lake). <LRL = all of the concentrations were reported as <LRL for at least one area so the time period was omitted from the analysis.

[b] Magnitude of difference (MOD) calculated on backtransformed least-squares means for the observed time period as $(Exp_{observed} - Exp_{predicted})/(Exp_{predicted}) \times 100\%$ where $Exp_{predicted} = Ref_{observed} + (Exp_{baseline} - Ref_{baseline})$.

[c] Magnitude of difference (MOD) calculated on backtransformed least-squares means as (Exp-Ref)/Ref x 100%.

[d] MOD is inflated because data for one of the groups in the comparison were entirely < LRL, leading to an underestimate of the mean for the <LRL result and a consequent increase in MOD between the two groups.

[e] Conducted as a two-way ANCOVA with $\log_{10}$(fork length) as a covariate. Because the covariate was significant, all contrasts were conducted at a $\log_{10}$(fork length) of 1.60.

[f] Results of statistical contrasts for age, fork length, and body weight may differ among tissue types for a given species due to different sample sizes or sampling years among tissue types. Only the results associated with muscle and ovary tissue types were used in data interpretation.

Table E.6.6: Statistical Comparisons of Exposed - Reference Relative Differences of Longnose Sucker Liver Metal Concentrations for Polley Lake (Exposed) and Bootjack Lake (Reference), 1995 to 2022

Parameter	Data Transformation	Two-way ANOVA P-values			(Exposed – Reference) Contrasts Among Periods[a]							Magnitude of Difference in (Exposed – Reference) Relative to Baseline Period (%)[b]							Magnitude of Difference for Polley Lake Mean Relative to Bootjack Lake (%)[c]						
		Area	Year	Area × Year	Before Period	Post-Breach Period						Before Period	Post-Breach Period						Before Period	Post-Breach Period					
					1995	2017	2018	2019	2020	2021	2022	1995	2017	2018	2019	2020	2021	2022	1995	2017	2018	2019	2020	2021	2022
Aluminum	MLE	0.762	0.298	0.147	-	A	A	A	A	A	A	-	baseline	ns	ns	ns	ns	ns	-	ns	ns	ns	ns	ns	ns
Antimony	MLE	0.058	0.011	0.014	<LRL	B	A	B	AB	B	A	<LRL	baseline	155	ns	ns	ns	148	<LRL	-44	ns	-42	ns	-37	ns
Arsenic	MLE	<0.001	<0.001	0.002	AB	A	A	B	AB	B	A	baseline	ns	ns	ns	ns	ns	ns	57	119	91	ns	50	ns	88
Barium	MLE	0.519	<0.001	0.235	-	A	A	A	A	A	A	-	baseline	ns	ns	ns	ns	ns	-	ns	ns	ns	ns	ns	ns
Beryllium	MLE	nt	nt	nt	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Bismuth	MLE	nt	nt	nt	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Boron	MLE	nt	nt	nt	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Cadmium	MLE	<0.001	0.008	<0.001	A	B	B	B	B	B	A	baseline	-78	-76	-81	-77	-86	ns	89	-59	-55	-65	-56	-73	ns
Calcium	MLE	0.020	0.001	0.013	-	A	A	AB	BC	ABC	C	-	baseline	ns	ns	-32	ns	-42	-	ns	ns	ns	-28	ns	-38
Cesium	MLE	0.455	0.555	0.170	-	A	A	A	A	A	A	-	baseline	ns	ns	ns	ns	ns	-	ns	ns	ns	ns	ns	ns
Chromium	MLE	0.914	<0.001	0.029	B	<LRL	<LRL	A	AB	A	A	baseline	<LRL	<LRL	241	ns	237	305	-58	<LRL	<LRL	ns	ns	ns	ns
Cobalt	MLE	0.007	<0.001	0.049	-	AB	AB	B	B	B	A	-	baseline	ns	ns	ns	ns	ns	-	ns	ns	-26	-22	-24	ns
Copper	MLE	<0.001	0.002	0.016	-	B	B	B	B	AB	A	-	baseline	ns	ns	ns	ns	104	-	ns	ns	ns	ns	69	204
Iron	MLE	0.045	0.021	0.181	-	A	A	A	A	A	A	-	baseline	ns	ns	ns	ns	ns	-	-19					
Lead	MLE	0.345	<0.001	0.012	A	BC	AB	C	<LRL	<LRL	<LRL	baseline	-67	ns	-74	<LRL	<LRL	<LRL	135	ns	ns	ns	<LRL	<LRL	<LRL
Lithium	MLE	nt	nt	nt	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Magnesium	MLE	0.205	<0.001	0.214	-	A	A	A	A	A	A	-	baseline	ns	ns	ns	ns	ns	-	ns	ns	ns	ns	ns	ns
Manganese	MLE	0.426	0.072	0.264	-	A	A	A	A	A	A	-	baseline	ns	ns	ns	ns	ns	-	ns	ns	ns	ns	ns	ns
Mercury (ww)[d]	MLE	<0.001	<0.001	<0.001	A	AB	AB	C	C	BC	BC	baseline	ns	ns	-50	-47	-33	-33	ns	ns	ns	-48	-45	-31	-31
Molybdenum	MLE	<0.001	<0.001	<0.001	-	BCD	AB	CD	ABC	D	A	-	baseline	ns	ns	ns	ns	30	-	ns	27	ns	21	ns	50
Nickel	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Phosphorus	MLE	0.680	<0.001	0.019	-	A	AB	AB	A	B	A	-	baseline	ns	ns	ns	-18	ns	-	ns	ns	ns	ns	-12	ns
Potassium	MLE	0.161	<0.001	0.087	-	A	A	A	A	A	A	-	baseline	ns	ns	ns	ns	ns	-	ns	ns	ns	ns	ns	ns
Rubidium	MLE	<0.001	<0.001	0.849	-	A	A	A	A	A	A	-	baseline	ns	ns	ns	ns	ns	-	25					
Selenium	MLE	<0.001	<0.001	<0.001	D	A	AB	AB	AB	C	B	baseline	102	87	75	69	23	62	17	135	118	104	97	43	88
Silver	MLE	0.030	0.871	0.078	-	-	-	-	A	A	A	-	-	-	-	baseline	ns	ns	-	-	-	-	-36		
Sodium	MLE	0.018	<0.001	<0.001	-	A	B	B	C	BC	C	-	baseline	-34	-31	-51	-41	-54	-	36	ns	ns	-34	-20	-38
Strontium	MLE	0.075	0.002	0.001	-	AB	A	AB	AB	BC	C	-	baseline	ns	ns	ns	ns	-64	-	ns	ns	ns	ns	-38	-60
Tellurium	MLE	nt	nt	nt	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Thallium	MLE	<0.001	0.194	0.662	-	A	A	A	<LRL	A	<LRL	-	baseline	ns	ns	<LRL	ns	<LRL	-	-64			<LRL	-64	<LRL
Tin	MLE	0.004	<0.001	0.068	-	A	A	<LRL	<LRL	<LRL	A	-	baseline	ns	<LRL	<LRL	<LRL	ns	-	76		<LRL	<LRL	<LRL	76
Titanium	MLE	nt	nt	nt	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Uranium	MLE	<0.001	0.706	0.125	-	A	A	A	A	A	A	-	baseline	ns	ns	ns	ns	ns	-	-65					
Vanadium	MLE	0.003	0.197	0.041	-	BC	A	AB	ABC	C	AB	-	baseline	139	ns	ns	ns	ns	-	ns	154	76	ns	ns	79
Zinc	MLE	0.003	0.016	<0.001	-	AB	C	C	BC	C	A	-	baseline	-23	-20	ns	-22	ns	-	27	ns	ns	ns	ns	53
Zirconium	MLE	nt	nt	nt	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Age[e]	ANOVA	0.012	0.044	0.056	-	A	A	A	A	A	A	-	baseline	ns	ns	ns	ns	ns	ns	-	ns	ns	ns	ns	ns	ns
Fork Length[e]	ANOVAlog	<0.001	0.080	0.017	AB	A	A	A	A	B	A	baseline	ns	ns	ns	ns	ns	ns	-13	ns	ns	-9.6	ns	-22	ns
Body Weight[e]	ANOVAlog	<0.001	0.008	0.019	A	A	A	A	A	B	A	baseline	ns	ns	ns	ns	-41	ns	-30	-26	ns	-33	ns	-59	-30

Area x Year or Area P-value < 0.05

Contrast is significant (α = 0.05) and magnitude of difference is positive

Contrast is significant (α = 0.05) and magnitude of difference is negative

Notes: "-" = no data available; "nt" = not tested because all data were reported below the method detection limit (LRL) or because there were only data for a single time period; "ns" = not significant; "baseline" = first year of data included in analysis; "<LRL" = greater than 50% LRL data for both stations so the time period was omitted from the analysis; "ww" = wet weight; "ANOVA" = two way analysis of variance; "MLE" = censored regression using maximum likelihood estimation; "ANCOVA" = two-way analysis of covariance, MOD = magnitude of difference. Data were analysed in units of mg/kg dry weight except mercury which was analysed in units of mg/kg wet weight. Merged cells across years indicate that the Area × Time term was not significant, therefore MOD is for all years combined. Only years with samples from both reference and exposed were included in the analysis.

[a] Years that share a letter (e.g., A,B,C) had ratios of concentrations (Polley Lake:Bootjack Lake) that do not differ significantly among years. Letters are assigned such that A is assigned to the year with the highest ratio of concentrations (Polley Lake:Bootjack Lake

[b] Magnitude of difference (MOD) calculated on backtransformed least-squares means for the observed time period as $(Exp_{observed} - Exp_{predicted})/(Exp_{predicted})\times 100\%$ where $Exp_{predicted} = Ref_{observed} + (Exp_{baseline} - Ref_{baseline})$.

[c] Magnitude of difference (MOD) calculated on backtransformed least-squares means as (Exp-Ref)/Ref x 100%.

[d] Conducted as a two-way ANCOVA with $\log_{10}$(fork length) as a covariate. Because the covariate was significant, all contrasts were conducted at a $\log_{10}$(fork length) of 1.60.

[e] Results of statistical contrasts for age, fork length, and body weight may differ among tissue types for a given species due to different sample sizes or sampling years among tissue types. Only the results associated with muscle and ovary tissue types were used in data interpretation.

Table E.6.7: Statistical Comparisons of Exposed - Reference Relative Differences of Longnose Sucker Kidney Metal Concentrations for Polley Lake (Exposed) and Bootjack Lake (Reference), 2018 to 2022

Parameter	Data Transformation	Two-way ANOVA P-values			(Exposed – Reference) Contrasts Among Periods[a]					Magnitude of Difference in (Exposed – Reference) Relative to Baseline Period (%)[b]					Magnitude of Difference for Polley Lake Mean Relative to Bootjack Lake (%)[c]				
		Area	Year	Area × Year	Post-Breach Period					Post-Breach Period					Post-Breach Period				
					2018	2019	2020	2021	2022	2018	2019	2020	2021	2022	2018	2019	2020	2021	2022
Aluminum	MLE	0.773	<0.001	0.105	<LRL	A	A	A	<LRL	<LRL	baseline	ns	ns	<LRL	<LRL	ns	ns	ns	<LRL
Antimony	MLE	0.038	0.004	0.015	A	B	<LRL	B	<LRL	baseline	-97[f]	<LRL	-97[f]	<LRL	ns	ns	<LRL	ns	<LRL
Arsenic	MLE	<0.001	0.005	0.300	A	A	A	A	A	baseline	ns	ns	ns	ns	36				
Barium	MLE	<0.001	<0.001	0.292	A	A	A	A	A	baseline	ns	ns	ns	ns	-37				
Beryllium	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Bismuth	MLE	nt	nt	nt	<LRL		<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Boron	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Cadmium	MLE	0.004	0.031	0.462	A	A	A	A	A	baseline	ns	ns	ns	ns	-32				
Calcium	MLE	<0.001	0.735	0.290	A	A	A	A	A	baseline	ns	ns	ns	ns	-50				
Cesium	MLE	0.005	0.844	0.987	A	A	A	A	A	baseline	ns	ns	ns	ns	-21				
Chromium	MLE	0.004	<0.001	0.021	<LRL	B	B	AB	A	<LRL	baseline	ns	ns	366	<LRL	ns	ns	152	417
Cobalt	MLE	0.358	0.736	0.069	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns
Copper	MLE	0.070	0.004	0.339	A	A	A	A	A	baseline	ns	ns	ns	ns	8.0				
Iron	MLE	0.676	0.005	0.041	B	B	AB	AB	A	baseline	ns	ns	ns	91	ns	ns	ns	ns	53
Lead	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Lithium	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Magnesium	MLE	0.260	<0.001	0.637	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns
Manganese	MLE	<0.001	0.846	0.062	A	A	A	A	A	baseline	ns	ns	ns	ns	-57				
Mercury (dw)	MLE	<0.001	<0.001	0.023	A	AB	AB	B	AB	baseline	ns	ns	-70	ns	ns	-55	-52	-74	-51
Mercury (ww)[d]	MLE	0.038	<0.001	0.038	A	AB	B	AB	B	baseline	ns	-45	ns	-49	ns	ns	-37	ns	-40
Molybdenum	MLE	<0.001	0.221	0.896	A	A	A	A	A	baseline	ns	ns	ns	ns	76				
Nickel	MLE	<0.001	0.445	0.006	B	B	B	AB	A	baseline	ns	ns	ns	92	-37	-62	-45	ns	ns
Phosphorus	MLE	0.293	<0.001	0.676	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns
Potassium	MLE	0.466	0.001	0.147	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns
Rubidium	MLE	<0.001	0.138	0.097	A	A	A	A	A	baseline	ns	ns	ns	ns	27				
Selenium	MLE	<0.001	0.166	0.014	A	A	A	B	A	baseline	ns	ns	-23	ns	74	83	66	33	82
Silver	MLE	nt	nt	nt	-	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL
Sodium	MLE	<0.001	<0.001	0.398	A	A	A	A	A	baseline	ns	ns	ns	ns	-25				
Strontium	MLE	<0.001	0.474	0.124	A	A	A	A	A	baseline	ns	ns	ns	ns	-54				
Tellurium	MLE	0.261	0.021	0.106	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns
Thallium	MLE	<0.001	0.231	0.103	A	A	A	A	A	baseline	ns	ns	ns	ns	-81				
Tin	MLE	0.705	<0.001	0.185	A	A	A	<LRL	A	baseline	ns	ns	<LRL	ns	ns	ns	ns	<LRL	ns
Titanium	MLE	0.687	0.815	0.187	-	-	A	A	<LRL	-	-	baseline	ns	<LRL	-	-	ns	ns	<LRL
Uranium	MLE	<0.001	0.136	0.024	A	AB	B	B	AB	baseline	ns	-51	-69	ns	-43	-71	-72	-82	-69
Vanadium	MLE	<0.001	0.068	0.269	A	A	A	A	A	baseline	ns	ns	ns	ns	99				
Zinc	MLE	<0.001	<0.001	0.735	A	A	A	A	A	baseline	ns	ns	ns	ns	42				
Zirconium	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Age[e]	ANOVA	0.014	0.116	0.055	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns
Fork Length[e]	ANOVAlog	<0.001	0.160	0.017	A	A	A	B	A	baseline	ns	ns	-20	ns	ns	-9.6	ns	-22	ns
Body Weight[e]	ANOVAlog	<0.001	0.038	0.019	A	A	A	B	A	baseline	ns	ns	-52	ns	ns	-33	ns	-59	-30

Area x Year or Area P-value < 0.05.

Contrast is significant (α = 0.05) and magnitude of difference is positive.

Contrast is significant (α = 0.05) and magnitude of difference is negative.

Notes: "-" = no data available; "nt" = not tested because all data were reported below the method detection limit (LRL) or because there were only data for a single time period; "ns" = not significant; "baseline" = first year of data included in analysis; "<LRL" = greater than 50% LRL data for both stations so the time period was omitted from the analysis; "ww" = wet weight; "ANOVA" = two way analysis of variance; "MLE" = censored regression using maximum likelihood estimation; "ANCOVA" = two-way analysis of covariance, MOD = magnitude of difference. Data were analysed in units of mg/kg dry weight except mercury which was analysed in units of mg/kg wet weight. Merged cells across years indicate that the Area × Time term was not significant, therefore MOD is for all years combined. Only years with samples from both reference and exposed were included in the analysis.

[a] Years that share a letter (e.g.. A.B.C) had ratios of concentrations (Polley Lake:Bootjack Lake) that do not differ significantly among years. Letters are assigned such that A is assigned to the year with the highest ratio of concentrations (Polley Lake:Bootjack Lake).

[b] Magnitude of difference (MOD) calculated on backtransformed least-squares means for the observed time period as $(Exp_{observed} - Exp_{predicted})/(Exp_{predicted})\times 100\%$ where $Exp_{predicted} = Ref_{observed} + (Exp_{baseline} - Ref_{baseline})$.

[c] Magnitude of difference (MOD) calculated on backtransformed least-squares means as (Exp-Ref)/Ref x 100%

[d] Conducted as a two-way ANCOVA with $\log_{10}$(fork length) as a covariate. Because the covariate was significant. all contrasts were conducted at a $\log_{10}$(fork length) of 1.60.

[e] Results of statistical contrasts for age, fork length, and body weight may differ among tissue types for a given species due to different sample sizes or sampling years among tissue types. Only the results associated with muscle and ovary tissue types were used in data interpretatio

[f] MOD is inflated because data for one of the groups in the comparison were entirely < LRL, leading to an underestimate of the mean for the <LRL result and a consequent increase in MOD between the two groups

Table E.6.8: **Statistical Comparisons of Exposed - Reference Relative Differences of Rainbow Trout Kidney Metal Concentrations for Polley Lake (Exposed) and Bootjack Lake (Reference), 2018 to 2022**

Parameter	Data Transformation	Two-way ANOVA P-values			(Exposed ─ Reference) Contrasts Among Periods[a]					Magnitude of Difference in (Exposed ─ Reference) Relative to Baseline Period (%)[b]					Magnitude of Difference for Polley Lake Mean Relative to Bootjack Lake (%)[c]				
		Area	Year	Area × Year	Post-Breach Period					Post-Breach Period					Post-Breach Period				
					2018	2019	2020	2021	2022	2018	2019	2020	2021	2022	2018	2019	2020	2021	2022
Aluminum	MLE	<0.001	0.016	0.641	A	A	A	A	A	baseline	ns	ns	ns	ns			62		
Antimony	MLE	0.441	0.258	0.454	A	A	<LRL	A	<LRL	baseline	ns	<LRL	ns	<LRL	ns	ns	<LRL	ns	<LRL
Arsenic	MLE	<0.001	0.011	0.820	A	A	A	A	A	baseline	ns	ns	ns	ns			68		
Barium	MLE	0.007	0.049	0.639	A	A	A	A	A	baseline	ns	ns	ns	ns			-27		
Beryllium	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Bismuth	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Boron	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Cadmium	MLE	0.465	0.091	0.247	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns
Calcium	MLE	0.426	0.250	0.357	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns
Cesium	MLE	<0.001	0.010	0.054	A	A	A	A	A	baseline	ns	ns	ns	ns			32		
Chromium	MLE	0.425	0.006	0.016	A	C	BC	AB	ABC	baseline	-73	-64	ns	ns	121	ns	ns	ns	ns
Cobalt	MLE	<0.001	0.830	0.056	A	A	A	A	A	baseline	ns	ns	ns	ns			171		
Copper	MLE	0.042	0.384	0.738	A	A	A	A	A	baseline	ns	ns	ns	ns			11		
Iron	MLE	<0.001	<0.001	0.088	A	A	A	A	A	baseline	ns	ns	ns	ns			21		
Lead	MLE	0.572	0.322	0.974	A	A	<LRL	<LRL	<LRL	baseline	ns	<LRL	<LRL	<LRL	ns	ns	<LRL	<LRL	<LRL
Lithium	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Magnesium	MLE	0.691	<0.001	0.361	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns
Manganese	MLE	0.197	0.110	0.004	B	B	B	B	A	baseline	ns	ns	ns	166	-42	ns	ns	ns	53
Mercury (ww)[d]	MLE	0.265	0.001	<0.001	B	C	B	A	B	baseline	-41	ns	313	ns	ns	-51	ns	242	ns
Molybdenum	MLE	0.419	0.402	0.625	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns
Nickel	MLE	<0.001	0.085	0.499	A	A	A	A	A	baseline	ns	ns	ns	ns			33		
Phosphorus	MLE	0.499	<0.001	0.502	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns
Potassium	MLE	0.239	<0.001	0.265	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns
Rubidium	MLE	0.024	0.500	0.345	A	A	A	A	A	baseline	ns	ns	ns	ns			-10		
Selenium	MLE	<0.001	0.163	0.106	A	A	A	A	A	baseline	ns	ns	ns	ns			71		
Silver	MLE	0.015	0.041	0.723	-	-	A	A	A	-	-	baseline	ns	ns	-	-		-46	
Sodium	MLE	0.496	<0.001	0.052	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns
Strontium	MLE	0.656	0.195	0.248	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns
Tellurium	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Thallium	MLE	0.002	0.018	0.488	A	A	A	A	A	baseline	ns	ns	ns	ns			-20		
Tin	MLE	0.594	<0.001	0.055	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns
Titanium	MLE	0.060	0.676	0.601	-	-	A	A	A	-	-	baseline	ns	ns	-	-	ns	ns	ns
Uranium	MLE	0.080	0.665	0.494	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns
Vanadium	MLE	<0.001	0.440	0.737	A	A	A	A	A	baseline	ns	ns	ns	ns			97		
Zinc	MLE	0.590	0.193	0.021	BC	C	ABC	A	AB	baseline	ns	ns	108	ns	ns	ns	ns	63	ns
Zirconium	MLE	0.352	<0.001	0.058	A	<LRL	<LRL	A	A	baseline	<LRL	<LRL	ns	ns	ns	<LRL	<LRL	ns	ns
Age[e]	ANOVA	0.286	<0.001	0.071	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns
Fork Length[e]	ANOVAlog	0.005	0.005	0.479	A	A	A	A	A	baseline	ns	ns	ns	ns			5.8		
Body Weight[e]	ANOVAlog	0.005	<0.001	0.112	A	A	A	A	A	baseline	ns	ns	ns	ns			16		

Area x Year or Area P-value < 0.05

Contrast is significant (α = 0.05) and magnitude of difference is positive

Contrast is significant (α = 0.05) and magnitude of difference is negative

Notes: "-" = no data available; "nt" = not tested because all data were reported below the method detection limit (LRL) or because there were only data for a single time period; "ns" = not significant; "baseline" = first year of data included in analysis; "<LRL" = greater than 50% LRL data for both stations so the time period was omitted from the analysis; "ww" = wet weight; "ANOVA" = two way analysis of variance; "MLE" = censored regression using maximum likelihood estimation; "ANCOVA" = two-way analysis of covariance, MOD = magnitude of difference. Data were analysed in units of mg/kg dry weight except mercury which was analysed in units of mg/kg wet weight. Merged cells across years indicate that the Area × Time term was not significant, therefore MOD is for all years combined. Only years with samples from both reference and exposed were included in the analysis.

[a] Years that share a letter (e.g., A,B,C) had ratios of concentrations (Polley Lake:Bootjack Lake) that do not differ significantly among years. Letters are assigned such that A is assigned to the year with the highest ratio of concentrations (Polley Lake:Bootjack Lake).

[b] Magnitude of difference (MOD) calculated on backtransformed least-squares means for the observed time period as $(Exp_{observed} - Exp_{predicted})/(Exp_{predicted})\times 100\%$ where $Exp_{predicted} = Ref_{observed} + (Exp_{baseline} - Ref_{baseline})$.

[c] Magnitude of difference (MOD) calculated on backtransformed least-squares means as (Exp-Ref)/Ref x 100%.

[d] Conducted as a two-way ANCOVA with $\log_{10}$(fork length) as a covariate. Because the covariate was significant, all contrasts were conducted at a $\log_{10}$(fork length) of 1.51.

[e] Results of statistical contrasts for age, fork length, and body weight may differ among tissue types for a given species due to different sample sizes or sampling years among tissue types. Only the results associated with muscle and ovary tissue types were used in data interpretation.

Table E.6.9: **Statistical Comparisons of Exposed - Reference Relative Differences of Lake Trout Ovary Tissue Metal Concentrations for Quesnel Lake near Cedar Point (NCP; Exposed) and East Arm (EAA; Reference), 2015 to 2022**

Parameter	Data Transfor-mation	Two-way ANOVA P-values			(Exposed ─ Reference) Contrasts Among Periods[a]					Magnitude of Difference in (Exposed ─ Reference) Relative to Baseline Period (%)[b]					Magnitude of Difference for Exposed Mean Relative to Reference Mean (%)[c]				
					Post-Breach Period					Post-Breach Period					Post-Breach Period				
		Area	Year	Area × Year	2015	2018	2019	2020	2022	2015	2018	2019	2020	2022	2015	2018	2019	2020	2022
Aluminum	MLE	0.346	0.572	<0.001	<LRL	B	A	<LRL	<LRL	<LRL	baseline	229	<LRL	<LRL	<LRL	-66	ns	<LRL	<LRL
Antimony	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Arsenic	MLE	0.003	0.315	0.027	AB	AB	A	B	B	baseline	ns	ns	ns	ns	ns	ns	291	ns	ns
Barium	MLE	0.308	<0.001	0.008	<LRL	C	B	A	BC	<LRL	baseline	293	1,877[e]	ns	<LRL	-62	ns	ns	ns
Beryllium	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Bismuth	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Boron	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Cadmium	MLE	0.924	0.112	0.281	A	A	A	<LRL	A	baseline	ns	ns	<LRL	ns	ns	ns	ns	<LRL	ns
Calcium	MLE	0.137	0.089	0.945	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns
Cesium	MLE	0.481	0.017	0.207	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns
Chromium	MLE	0.613	0.709	0.675	<LRL	A	A	<LRL	A	<LRL	baseline	ns	<LRL	ns	<LRL	ns	ns	<LRL	ns
Cobalt	MLE	0.083	0.001	0.279	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns
Copper	MLE	0.011	0.061	0.002	BC	C	A	BC	AB	baseline	ns	373	ns	ns	ns	ns	621	ns	231
Iron	MLE	0.271	<0.001	0.139	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns
Lead	MLE	0.751	0.970	<0.001	<LRL	B	A	<LRL	<LRL	<LRL	baseline	101,897[e]	<LRL	<LRL	<LRL	ns	ns	<LRL	<LRL
Lithium	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Magnesium	MLE	0.422	0.058	0.908	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns
Manganese	MLE	0.157	0.003	0.531	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns
Mercury (ww)[d]	MLE	0.897	0.006	0.054	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns
Molybdenum	MLE	0.921	0.937	0.330	<LRL	A	A	<LRL	A	<LRL	baseline	ns	<LRL	ns	<LRL	ns	ns	<LRL	ns
Nickel	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Phosphorus	MLE	0.854	0.218	0.423	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns
Potassium	MLE	0.767	<0.001	0.377	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns
Rubidium	MLE	0.817	0.005	0.192	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns
Selenium	MLE	0.012	0.018	0.081	A	A	A	A	A	baseline	ns	ns	ns	ns	45				
Silver	MLE	0.787	0.113	0.037	-	-	-	B	A	-	-	-	baseline	395	-	-	-	ns	ns
Sodium	MLE	0.667	<0.001	0.088	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns
Strontium	MLE	0.979	0.393	0.742	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns
Tellurium	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Thallium	MLE	0.352	0.012	0.194	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns
Tin	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Titanium	MLE	nt	nt	nt	-	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL
Uranium	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Vanadium	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Zinc	MLE	0.178	<0.001	0.099	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns
Zirconium	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Age[f]	ANOVA	0.611	0.010	0.003	AB	ABC	C	A	BC	baseline	ns	-62	ns	ns	ns	ns	-52	150	ns
Fork Length[f]	ANOVAlog	0.636	0.484	0.080	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns
Body Weight[f]	ANOVAlog	0.528	0.297	0.145	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns

Area x Year or Area P-value < 0.05

Contrast is significant (α = 0.05) and magnitude of difference is positive

Contrast is significant (α = 0.05) and magnitude of difference is negative

Notes: "-" = no data available; "nt" = not tested because all data were reported below the method detection limit (LRL) or because there were only data for a single time period; "ns" = not significant; "baseline" = first year of data included in analysis; "ww" = wet weight; "ANOVA" = two way analysis of variance; "MLE" = censored regression using maximum likelihood estimation; "ANCOVA" = two-way analysis of covariance, MOD = magnitude of difference. Data were analysed in units of mg/kg dry weight except mercury which was analysed in units of mg/kg wet weight. Merged cells across years indicate that the Area × Time term was not significant, therefore MOD is for all years combined. Only years with samples from both reference and exposed were included in the analysis. No female lake trout were collected from the Quesnel Lake reference area in 2021, so 2021 was excluded fron analyses.

[a] Years that share a letter (e.g., A,B,C) had ratios of concentrations (Exposed:Reference) that do not differ significantly among years. Letters are assigned such that A is assigned to the year with the highest ratio of concentrations (Exposed:Reference).

[b] Magnitude of difference (MOD) calculated on backtransformed least-squares means for the observed time period as $(Exp_{observed} - Exp_{predicted})/(Exp_{predicted})\times 100\%$ where $Exp_{predicted} = Ref_{observed} + (Exp_{baseline} - Ref_{baseline})$.

[c] Magnitude of difference (MOD) calculated on backtransformed least-squares means as (Exp-Ref)/Ref x 100%.

[d] Conducted as a two-way ANCOVA with $\log_{10}$(fork length) as a covariate. Because the covariate was significant, all contrasts were conducted at a $\log_{10}$(fork length) of 1.76.

[e] MOD is inflated because data for one of the groups in the comparison were entirely < LRL, leading to an underestimate of the mean for the <LRL result and a consequent increase in MOD between the two groups.

[f] Results of statistical contrasts for age, fork length, and body weight may differ among tissue types for a given species due to different sample sizes or sampling years among tissue types. Only the results associated with muscle and ovary tissue types were used in data interpretation.

Table E.6.10: Statistical Comparisons of Exposed - Reference Relative Differences of Peamouth Chub Muscle Tissue Metal Concentrations for Quesnel Lake near Hazeltine Creek (NHC; Exposed) and near Grain Creek (NGC; Reference), 2016 to 2022

Parameter	Data Transformation	Two-way ANOVA P-values			(Exposed – Reference) Contrasts Among Periods[a]						Magnitude of Difference in (Exposed – Reference) Relative to Baseline Period (%)[b]						Magnitude of Difference for Exposed Mean Relative to Reference Mean (%)[c]					
		Area	Year	Area × Year	Post-Breach Period						Post-Breach Period						Post-Breach Period					
					2016	2018	2019	2020	2021	2022	2016	2018	2019	2020	2021	2022	2016	2018	2019	2020	2021	2022
Aluminum	MLE	0.853	<0.001	<0.001	BC	B	<LRL	A	<LRL	C	baseline	ns	<LRL	43,815[e]	<LRL	ns	ns	ns	<LRL	ns	<LRL	-67
Antimony	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Arsenic	MLE	0.004	<0.001	0.004	ABC	CD	D	AB	A	BCD	baseline	ns	-56	ns	ns	ns	77	ns	ns	119	129	ns
Barium	MLE	0.097	<0.001	0.053	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	14					
Beryllium	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Bismuth	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Boron	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Cadmium	MLE	<0.001	0.002	0.850	A	<LRL	<LRL	A	A	A	baseline	<LRL	<LRL	ns	ns	ns	128	<LRL	<LRL	128		
Calcium	MLE	0.366	<0.001	0.001	AB	AB	BC	C	AB	A	baseline	ns	ns	-48	ns	ns	ns	ns	ns	-50	ns	46
Cesium	MLE	<0.001	<0.001	0.025	AB	AB	A	BC	C	ABC	baseline	ns	ns	ns	-30	ns	-38	-38	-29	-56	-56	-47
Chromium	MLE	0.907	0.185	0.005	<LRL	A	<LRL	B	<LRL	A	<LRL	baseline	<LRL	-83	<LRL	ns	<LRL	ns	<LRL	-60	<LRL	ns
Cobalt	MLE	0.847	<0.001	0.413	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
Copper	MLE	0.405	<0.001	<0.001	A	B	AB	B	C	AB	baseline	-35	ns	-32	-58	ns	48	ns	33	ns	-38	ns
Iron	MLE	0.455	<0.001	0.580	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
Lead	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Lithium	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Magnesium	MLE	0.173	<0.001	<0.001	BC	A	A	C	AB	BC	baseline	22	19	ns	ns	ns	ns	18	15	ns	ns	ns
Manganese	MLE	0.523	<0.001	0.020	BC	ABC	AB	C	ABC	A	baseline	ns	ns	ns	ns	57	ns	ns	ns	-29	ns	55
Mercury (ww)[d]	MLE	0.166	0.053	0.042	A	B	AB	B	B	AB	baseline	-42	ns	-45	-36	ns	62	ns	ns	ns	ns	ns
Molybdenum	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Nickel	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Phosphorus	MLE	0.440	<0.001	0.006	A	A	A	B	A	A	baseline	ns	ns	-21	ns	ns	11	ns	ns	-12	ns	ns
Potassium	MLE	0.411	<0.001	0.006	AB	A	AB	C	BC	BC	baseline	ns	ns	-16	ns	ns	8.7	11	ns	-8.4	ns	ns
Rubidium	MLE	0.046	<0.001	0.073	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	-10					
Selenium	MLE	<0.001	<0.001	0.157	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	79					
Silver	MLE	nt	nt	nt	-	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL
Sodium	MLE	0.004	<0.001	<0.001	AB	A	C	BC	A	BC	baseline	ns	-21	ns	ns	ns	26	43	ns	ns	27	ns
Strontium	MLE	0.050	<0.001	0.002	AB	AB	B	C	B	A	baseline	ns	ns	-65	ns	ns	ns	ns	ns	-67	ns	ns
Tellurium	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Thallium	MLE	0.074	<0.001	0.043	A	A	A	B	AB	A	baseline	ns	ns	-50	ns	ns	ns	ns	ns	-51	ns	ns
Tin	MLE	0.074	<0.001	<0.001	C	C	<LRL	B	A	C	baseline	ns	<LRL	700	6,823[e]	ns	ns	ns	<LRL	438	ns	ns
Titanium	MLE	0.351	0.512	<0.001	-	-	-	A	<LRL	B	-	-	-	baseline	<LRL	-92	-	-	-	472	<LRL	ns
Uranium	MLE	0.589	0.004	0.054	A	<LRL	A	A	<LRL	A	baseline	<LRL	ns	ns	<LRL	ns	ns	<LRL	ns	ns	<LRL	ns
Vanadium	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Zinc	MLE	0.168	<0.001	0.037	AB	ABC	A	BC	C	AB	baseline	ns	ns	ns	-29	ns	ns	ns	ns	ns	-30	ns
Zirconium	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Age[f]	ANOVA	0.278	0.027	0.094	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
Fork Length[f]	ANOVAlog	0.012	0.052	0.013	BC	C	C	A	AB	ABC	baseline	ns	ns	19	ns	ns	ns	ns	ns	23	15	ns
Body Weight[f]	ANOVAlog	0.009	0.066	0.009	BC	C	BC	A	AB	AB	baseline	ns	ns	89	ns	ns	ns	ns	ns	102	56	ns

Area x Year or Area P-value < 0.05

Contrast is significant (α = 0.05) and magnitude of difference is positive

Contrast is significant (α = 0.05) and magnitude of difference is negative

Notes: "-" = no data available; "nt" = not tested because all data were reported below the method detection limit (LRL) or because there were only data for a single time period; "ns" = not significant; "baseline" = first year of data included in analysis; "ww" = wet weight; "ANOVA" = two way analysis of variance; "MLE" = censored regression using maximum likelihood estimation; "ANCOVA" = two-way analysis of covariance, MOD = magnitude of difference. Data were analysed in units of mg/kg dry weight except mercury which was analysed in units of mg/kg wet weight. Merged cells across years indicate that the Area × Time term was not significant, therefore MOD is for all years combined. Only years with samples from both reference and exposed were included in the analysis.

[a] Years that share a letter (e.g., A,B,C) had ratios of concentrations (Exposed:Reference) that do not differ significantly among years. Letters are assigned such that A is assigned to the year with the highest ratio of concentrations (Exposed:Reference).

[b] Magnitude of difference (MOD) calculated on backtransformed least-squares means for the observed time period as $(Exp_{observed} - Exp_{predicted})/(Exp_{predicted})\times 100\%$ where $Exp_{predicted} = Ref_{observed} + (Exp_{baseline} - Ref_{baseline})$.

[c] Magnitude of difference (MOD) calculated on backtransformed least-squares means as (Exp-Ref)/Ref x 100%.

[d] Conducted as a two-way ANCOVA with $\log_{10}$(fork length) as a covariate. Because the covariate was significant, all contrasts were conducted at a $\log_{10}$(fork length) of 1.30.

[e] MOD is inflated because data for one of the groups in the comparison were entirely < LRL, leading to an underestimate of the mean for the <LRL result and a consequent increase in MOD between the two groups.

[f] Results of statistical contrasts for age, fork length, and body weight may differ among tissue types for a given species due to different sample sizes or sampling years among tissue types. Only the results associated with muscle and ovary tissue types were used in data interpretation.

Table E.6.11: Statistical Comparisons of Exposed - Reference Relative Differences of Northern Pikeminnow Wholebody Metal Concentrations for Quesnel Lake near Hazeltine Creek (NHC; Exposed) and near Grain Creek (NGC; Reference), 2016 to 2022

Parameter	Data Transfor-mation	Two-way ANOVA P-values			(Exposed – Reference) Contrasts Among Periods[a]						Magnitude of Difference in (Exposed – Reference) Relative to Baseline Period (%)[b]						Magnitude of Difference for Exposed Mean Relative to Reference Mean (%)[c]					
					Post-Breach Period						Post-Breach Period						Post-Breach Period					
		Area	Year	Area × Year	2016	2018	2019	2020	2021	2022	2016	2018	2019	2020	2021	2022	2016	2018	2019	2020	2021	2022
Aluminum	MLE	0.317	<0.001	0.161	A	A	A	A	A	<LRL	baseline	ns	ns	ns	ns	<LRL	ns	ns	ns	ns	ns	<LRL
Antimony	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Arsenic	MLE	<0.001	0.335	<0.001	AB	C	BC	A	AB	AB	baseline	-71	ns	ns	ns	ns	125	ns	ns	216	81	94
Barium	MLE	<0.001	<0.001	0.012	AB	B	A	B	B	A	baseline	ns	ns	ns	ns	ns	71	ns	93	ns	ns	96
Beryllium	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Bismuth	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Boron	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Cadmium	MLE	<0.001	<0.001	0.546	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	119					
Calcium	MLE	0.805	<0.001	0.066	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
Cesium	MLE	<0.001	0.203	0.205	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	-56					
Chromium	MLE	0.793	<0.001	0.047	AB	B	<LRL	B	<LRL	A	baseline	ns	<LRL	ns	<LRL	ns	ns	ns	<LRL	ns	<LRL	ns
Cobalt	MLE	0.323	0.015	0.136	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
Copper	MLE	0.865	0.004	0.462	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
Iron	MLE	0.317	<0.001	0.374	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
Lead	MLE	0.006	0.645	0.030	<LRL	A	<LRL	B	<LRL	A	<LRL	baseline	<LRL	-71	<LRL	ns	<LRL	ns	<LRL	-75	<LRL	ns
Lithium	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Magnesium	MLE	0.026	0.029	0.904	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	-7.5					
Manganese	MLE	0.068	0.027	0.013	AB	B	A	B	B	B	baseline	ns	ns	ns	ns	ns	ns	ns	128	ns	ns	ns
Mercury (ww)[d]	MLE	0.662	<0.001	0.249	-	A	A	A	A	A	-	baseline	ns	ns	ns	ns	-	ns	ns	ns	ns	ns
Molybdenum	MLE	0.027	<0.001	0.032	A	B	B	B	B	AB	baseline	-42	-37	-50	-36	ns	ns	ns	ns	-35	ns	ns
Nickel	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Phosphorus	MLE	0.149	<0.001	0.212	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
Potassium	MLE	0.105	<0.001	0.438	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
Rubidium	MLE	0.004	0.042	0.052	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	-15					
Selenium	MLE	<0.001	0.084	0.083	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	70					
Silver	MLE	0.333	0.771	0.883	-	-	-	A	A	<LRL	-	-	-	baseline	ns	<LRL	-	-	-	ns	ns	<LRL
Sodium	MLE	0.487	<0.001	0.098	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
Strontium	MLE	0.016	0.003	0.037	B	B	A	B	B	AB	baseline	ns	70	ns	ns	ns	ns	-36	ns	-37	ns	ns
Tellurium	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Thallium	MLE	0.785	<0.001	0.340	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
Tin	MLE	0.040	<0.001	0.002	A	<LRL	<LRL	B	A	A	baseline	<LRL	<LRL	-74	ns	ns	ns	<LRL	<LRL	-67	ns	ns
Titanium	MLE	0.885	0.823	0.436	-	-	-	A	A	<LRL	-	-	-	baseline	ns	<LRL	-	-	-	ns	ns	<LRL
Uranium	MLE	0.001	0.066	0.041	A	B	AB	AB	AB	A	baseline	-81	ns	ns	ns	ns	ns	-77	ns	-56	ns	ns
Vanadium	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Zinc	MLE	0.038	<0.001	0.492	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	-8.3					
Zirconium	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Age[e]	ANOVA	0.580	<0.001	0.004	ABC	C	C	AB	BC	A	baseline	ns	ns	ns	ns	ns	ns	-27	-26	ns	ns	43
Fork Length[e]	ANOVAlog	0.372	<0.001	0.035	BC	ABC	C	A	ABC	AB	baseline	ns	ns	23	ns	ns	ns	ns	ns	21	ns	16
Body Weight[e]	ANOVAlog	0.219	<0.001	0.022	BC	BC	C	A	BC	AB	baseline	ns	ns	94	ns	ns	ns	ns	ns	95	ns	ns

Area x Year or Area P-value < 0.05

Contrast is significant (α = 0.05) and magnitude of difference is positive

Contrast is significant (α = 0.05) and magnitude of difference is negative

Notes: "-" = no data available; "nt" = not tested because all data were reported below the method detection limit (LRL) or because there were only data for a single time period; "ns" = not significant; "baseline" = first year of data included in analysis; "ww" = wet weight; "ANOVA" = two way analysis of variance; "MLE" = censored regression using maximum likelihood estimation; "ANCOVA" = two-way analysis of covariance, MOD = magnitude of difference. Data were analysed in units of mg/kg dry weight except mercury which was analysed in units of mg/kg wet weight. Merged cells across years indicate that the Area × Time term was not significant, therefore MOD is for all years combined. Only years with samples from both reference and exposed were included in the analysis.

[a] Years that share a letter (e.g., A,B,C) had ratios of concentrations (Exposed:Reference) that do not differ significantly among years. Letters are assigned such that A is assigned to the year with the highest ratio of concentrations (Exposed:Reference). <LRL = all of the concentrations were reported as <LRL for at least one area so the time period was omitted from the analysis.

[b] Magnitude of difference (MOD) calculated on backtransformed least-squares means for the observed time period as $(Exp_{observed} - Exp_{predicted})/(Exp_{predicted}) \times 100\%$ where $Exp_{predicted} = Ref_{observed} + (Exp_{baseline} - Ref_{baseline})$.

[c] Magnitude of difference (MOD) calculated on backtransformed least-squares means as (Exp-Ref)/Ref x 100%.

[d] Conducted as a two-way ANCOVA with $\log_{10}$(fork length) as a covariate. Because the covariate was significant, all contrasts were conducted at a $\log_{10}$(fork length) of 1.20.

[e] Results of statistical contrasts for age, fork length, and body weight may differ among tissue types for a given species due to different sample sizes or sampling years among tissue types. Only the results associated with muscle and ovary tissue types were used in data interpretation.

Table E.6.12: **Statistical Comparisons of Exposed - Reference Relative Differences of Peamouth Chub Liver Tissue Metal Concentrations for Quesnel Lake near Hazeltine Creek (NHC; Exposed) and near Grain Creek (NGC; Reference), 2016 to 2022**

Parameter	Data Transfor-mation	Two-way ANOVA P-values			(Exposed – Reference) Contrasts Among Periodsa						Magnitude of Difference in (Exposed – Reference) Relative to Baseline Period (%)[b]						Magnitude of Difference for Exposed Mean Relative to Reference Mean (%)[c]					
		Area	Year	Area × Year	Post-Breach Period						Post-Breach Period						Post-Breach Period					
					2016	2018	2019	2020	2021	2022	2016	2018	2019	2020	2021	2022	2016	2018	2019	2020	2021	2022
Aluminum	MLE	0.726	<0.001	0.485	A	<LRL	A	A	A	A	baseline	<LRL	ns	ns	ns	ns	ns	<LRL	ns	ns	ns	ns
Antimony	MLE	0.014	0.175	0.089	A	<LRL	<LRL	<LRL	<LRL	A	baseline	<LRL	<LRL	<LRL	<LRL	ns	85[e]	<LRL	<LRL	<LRL	<LRL	85
Arsenic	MLE	0.570	<0.001	<0.001	A	A	AB	BC	AB	C	baseline	ns	ns	-68	ns	-83	94	ns	ns	ns	ns	-66
Barium	MLE	0.252	<0.001	0.370	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
Beryllium	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Bismuth	MLE	<0.001	<0.001	0.817	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	-44					
Boron	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Cadmium	MLE	<0.001	0.012	0.901	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	141					
Calcium	MLE	0.326	0.008	0.286	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
Cesium	MLE	<0.001	<0.001	0.101	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	-36					
Chromium	MLE	0.816	0.044	<0.001	B	A	BC	C	BC	B	baseline	191	ns	-75	ns	ns	ns	268	ns	-68	ns	ns
Cobalt	MLE	0.225	0.003	0.526	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
Copper	MLE	0.010	<0.001	0.014	ABC	A	AB	BC	C	BC	baseline	ns	ns	ns	ns	ns	ns	108	45	ns	ns	ns
Iron	MLE	<0.001	<0.001	0.987	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	55					
Lead	MLE	0.299	0.550	0.001	A	<LRL	<LRL	B	<LRL	<LRL	baseline	<LRL	<LRL	-88	<LRL	<LRL	ns	<LRL	<LRL	-77	<LRL	<LRL
Lithium	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Magnesium	MLE	0.047	<0.001	0.569	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	15					
Manganese	MLE	0.045	<0.001	0.972	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	20					
Mercury (ww)[d]	MLE	<0.001	<0.001	0.055	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	59					
Molybdenum	MLE	<0.001	0.053	0.637	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	34					
Nickel	MLE	0.951	0.220	<0.001	B	A	<LRL	BC	C	<LRL	baseline	195	<LRL	ns	-67	<LRL	ns	262	<LRL	ns	-59	<LRL
Phosphorus	MLE	0.016	<0.001	0.734	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	17					
Potassium	MLE	0.083	<0.001	0.760	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	12					
Rubidium	MLE	0.637	0.019	0.799	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
Selenium	MLE	<0.001	0.003	0.276	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	30					
Silver	MLE	0.030	0.360	0.040	-	-	-	AB	B	A	-	-	-	baseline	ns	ns	-	-	-	ns	-73	ns
Sodium	MLE	0.039	<0.001	0.163	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	20					
Strontium	MLE	0.235	0.007	0.379	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
Tellurium	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Thallium	MLE	0.458	0.020	0.647	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
Tin	MLE	<0.001	<0.001	<0.001	C	BC	<LRL	A	<LRL	B	baseline	ns	<LRL	1,424[e]	<LRL	329	ns	235	<LRL	1,811	<LRL	438
Titanium	MLE	0.506	0.360	0.099	-	-	-	A	A	<LRL	-	-	-	baseline	ns	<LRL	-	-	-	ns	ns	<LRL
Uranium	MLE	0.135	<0.001	0.663	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
Vanadium	MLE	<0.001	<0.001	0.081	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	136					
Zinc	MLE	0.002	<0.001	0.692	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	19					
Zirconium	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Age[e]	ANOVA	0.278	0.027	0.094	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
Fork Length[e]	ANOVAlog	0.012	0.052	0.013	BC	C	C	A	AB	ABC	baseline	ns	ns	19	ns	ns	ns	ns	ns	23	15	ns
Body Weight[e]	ANOVAlog	0.009	0.066	0.009	BC	C	BC	A	AB	AB	baseline	ns	ns	89	ns	ns	ns	ns	ns	102	56	ns

Area x Year or Area P-value < 0.05

Contrast is significant (α = 0.05) and magnitude of difference is positive

Contrast is significant (α = 0.05) and magnitude of difference is negative

Notes: "-" = no data available; "nt" = not tested because all data were reported below the method detection limit (LRL) or because there were only data for a single time period; "ns" = not significant; "baseline" = first year of data included in analysis; "ww" = wet weight; "ANOVA" = two way analysis of variance; "MLE" = censored regression using maximum likelihood estimation; "ANCOVA" = two-way analysis of covariance, MOD = magnitude of difference. Data were analysed in units of mg/kg dry weight except mercury which was analysed in units of mg/kg wet weight. Merged cells across years indicate that the Area × Time term was not significant, therefore MOD is for all years combined. Only years with samples from both reference and exposed were included in the analysis.

[a] Years that share a letter (e.g., A,B,C) had ratios of concentrations (Exposed:Reference) that do not differ significantly among years. Letters are assigned such that A is assigned to the year with the highest ratio of concentrations (Exposed:Reference).

[b] Magnitude of difference (MOD) calculated on backtransformed least-squares means for the observed time period as $(Exp_{observed} - Exp_{predicted})/(Exp_{predicted})\times 100\%$ where $Exp_{predicted} = Ref_{observed} + (Exp_{baseline} - Ref_{baseline})$.

[c] Magnitude of difference (MOD) calculated on backtransformed least-squares means as (Exp-Ref)/Ref x 100%.

[d] Conducted as a two-way ANCOVA with $\log_{10}$(fork length) as a covariate. Because the covariate was significant, all contrasts were conducted at a $\log_{10}$(fork length) of 1.30.

[e] MOD is inflated because data for one of the groups in the comparison were entirely < LRL, leading to an underestimate of the mean for the <LRL result and a consequent increase in MOD between the two groups.

[f] Results of statistical contrasts for age, fork length, and body weight may differ among tissue types for a given species due to different sample sizes or sampling years among tissue types. Only the results associated with muscle and ovary tissue types were used in data interpretation.

Table E.6.13: Statistical Comparisons of Exposed - Reference Relative Differences of Peamouth Chub Kidney Tissue Metal Concentrations for Quesnel Lake near Hazeltine Creek (NHC; Exposed) and near Grain Creek (NGC; Reference), 2018 to 2022

Parameter	Data Transformation	Two-way ANOVA P-values			(Exposed – Reference) Contrasts Among Periods[a]					Magnitude of Difference in (Exposed – Reference) Relative to Baseline Period (%)[b]					Magnitude of Difference for Exposed Mean Relative to Reference Mean (%)[c]				
					Post-Breach Period					Post-Breach Period					Post-Breach Period				
		Area	Year	Area × Year	2018	2019	2020	2021	2022	2018	2019	2020	2021	2022	2018	2019	2020	2021	2022
Aluminum	MLE	0.090	0.094	0.096	A	<LRL	<LRL	A	A	baseline	<LRL	<LRL	ns	ns	ns	<LRL	<LRL	ns	ns
Antimony	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Arsenic	MLE	<0.001	<0.001	0.964	A	A	A	A	A	baseline	ns	ns	ns	ns	32				
Barium	MLE	<0.001	<0.001	0.387	A	A	A	A	A	baseline	ns	ns	ns	ns	92				
Beryllium	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Bismuth	MLE	<0.001	<0.001	0.935	A	A	A	A	A	baseline	ns	ns	ns	ns	-40				
Boron	MLE	0.014	<0.001	0.019	A	B	<LRL	<LRL	B	baseline	-71	<LRL	<LRL	-78	439	ns	<LRL	<LRL	ns
Cadmium	MLE	<0.001	0.020	0.444	A	A	A	A	A	baseline	ns	ns	ns	ns	173				
Calcium	MLE	0.009	0.006	0.228	A	A	A	A	A	baseline	ns	ns	ns	ns	64				
Cesium	MLE	0.002	<0.001	0.018	A	AB	B	A	A	baseline	ns	-54	ns	ns	ns	-29	-53	ns	ns
Chromium	MLE	0.050	<0.001	<0.001	A	B	BC	C	BC	baseline	-69	-83	-90	-78	496	ns	ns	ns	ns
Cobalt	MLE	0.123	<0.001	0.535	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns
Copper	MLE	0.007	<0.001	0.660	A	A	A	A	A	baseline	ns	ns	ns	ns	24				
Iron	MLE	0.029	<0.001	0.545	A	A	A	A	A	baseline	ns	ns	ns	ns	20				
Lead	MLE	0.001	0.002	0.047	B	A	<LRL	B	B	baseline	1,775[e]	<LRL	ns	ns	ns	ns	<LRL	ns	125
Lithium	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Magnesium	MLE	0.004	<0.001	0.197	A	A	A	A	A	baseline	ns	ns	ns	ns	21				
Manganese	MLE	<0.001	<0.001	0.806	A	A	A	A	A	baseline	ns	ns	ns	ns	45				
Mercury (ww)[d]	MLE	0.014	<0.001	0.016	ABC	AB	C	BC	A	baseline	ns	ns	ns	ns	ns	41	ns	ns	82
Molybdenum	MLE	<0.001	0.032	0.475	A	A	A	A	A	baseline	ns	ns	ns	ns	56				
Nickel	MLE	0.090	<0.001	0.010	A	B	B	B	<LRL	baseline	-66	-62	-78	<LRL	242	ns	ns	ns	<LRL
Phosphorus	MLE	<0.001	0.020	0.181	A	A	A	A	A	baseline	ns	ns	ns	ns	28				
Potassium	MLE	0.001	0.149	0.093	A	A	A	A	A	baseline	ns	ns	ns	ns	22				
Rubidium	MLE	0.425	0.005	0.191	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns
Selenium	MLE	<0.001	0.001	0.309	A	A	A	A	A	baseline	ns	ns	ns	ns	45				
Silver	MLE	<0.001	0.533	0.046	-	-	A	B	<LRL	-	-	baseline	-91[e]	<LRL	-	-	ns	ns	<LRL
Sodium	MLE	<0.001	0.307	0.012	A	BC	C	AB	BC	baseline	-45	-51	ns	-37	111	ns	ns	60	ns
Strontium	MLE	0.008	0.003	0.194	A	A	A	A	A	baseline	ns	ns	ns	ns	68				
Tellurium	MLE	0.015	0.044	0.563	<LRL	<LRL	A	A	A	<LRL	<LRL	baseline	ns	ns	<LRL	<LRL	49		
Thallium	MLE	0.052	0.225	0.815	A	A	A	A	A	baseline	ns	ns	ns	ns	20				
Tin	MLE	0.003	0.655	<0.001	B	C	A	<LRL	B	baseline	-100[e]	32,347[e]	<LRL	ns	428	ns	ns	<LRL	888
Titanium	MLE	nt	nt	nt	-	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL
Uranium	MLE	0.012	0.021	0.597	A	A	A	A	A	baseline	ns	ns	ns	ns	56				
Vanadium	MLE	<0.001	0.001	0.144	A	A	A	A	A	baseline	ns	ns	ns	ns	110				
Zinc	MLE	0.019	0.031	0.409	A	A	A	A	A	baseline	ns	ns	ns	ns	17				
Zirconium	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Age[f]	ANOVA	0.231	0.744	0.128	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns
Fork Length[f]	ANOVAlog	0.004	0.225	0.041	C	BC	A	AB	ABC	baseline	ns	28	19	ns	ns	ns	23	15	ns
Body Weight[f]	ANOVAlog	0.002	0.152	0.026	C	BC	A	AB	ABC	baseline	ns	142	86	ns	ns	ns	102	56	ns

Area x Year or Area P-value < 0.05

Contrast is significant (α = 0.05) and magnitude of difference is positive

Contrast is significant (α = 0.05) and magnitude of difference is negative

Notes: "-" = no data available; "nt" = not tested because all data were reported below the method detection limit (LRL) or because there were only data for a single time period; "ns" = not significant; "baseline" = first year of data included in analysis; "ww" = wet weight; "ANOVA" = two way analysis of variance; "MLE" = censored regression using maximum likelihood estimation; "ANCOVA" = two-way analysis of covariance, MOD = magnitude of difference. Data were analysed in units of mg/kg dry weight except mercury which was analysed in units of mg/kg wet weight. Merged cells across years indicate that the Area × Time term was not significant, therefore MOD is for all years combined. Only years with samples from both reference and exposed were included in the analysis.

[a] Years that share a letter (e.g., A,B,C) had ratios of concentrations (Exposed:Reference) that do not differ significantly among years. Letters are assigned such that A is assigned to the year with the highest ratio of concentrations (Exposed:Reference).

[b] Magnitude of difference (MOD) calculated on backtransformed least-squares means for the observed time period as $(Exp_{observed} - Exp_{predicted})/(Exp_{predicted})\times 100\%$ where $Exp_{predicted} = Ref_{observed} + (Exp_{baseline} - Ref_{baseline})$.

[c] Magnitude of difference (MOD) calculated on backtransformed least-squares means as (Exp-Ref)/Ref x 100%.

[d] Conducted as a two-way ANCOVA with $\log_{10}$(fork length) as a covariate. Because the covariate was significant, all contrasts were conducted at a $\log_{10}$(fork length) of 1.30.

[e] MOD is inflated because data for one of the groups in the comparison were entirely < LRL, leading to an underestimate of the mean for the <LRL result and a consequent increase in MOD between the two groups.

[f] Results of statistical contrasts for age, fork length, and body weight may differ among tissue types for a given species due to different sample sizes or sampling years among tissue types. Only the results associated with muscle and ovary tissue types were used in data interpretation.

Table E.6.14: Statistical Comparisons of Exposed - Reference Relative Differences of Lake Trout Kidney Tissue Metal Concentrations for Quesnel Lake near Cedar Point (NCP; Exposed) and East Arm (EAA; Reference), 2015 to 2022

Parameter	Data Transformation	Two-way ANOVA P-values			(Exposed – Reference) Contrasts Among Periods[a]						Magnitude of Difference in (Exposed – Reference) Relative to Baseline Period (%)[b]						Magnitude of Difference for Exposed Mean Relative to Reference Mean (%)[c]					
		Area	Year	Area × Year	Post-Breach Period						Post-Breach Period						Post-Breach Period					
					2015	2018	2019	2020	2021	2022	2015	2018	2019	2020	2021	2022	2015	2018	2019	2020	2021	2022
Aluminum	MLE	0.776	0.002	0.005	BC	AB	C	AB	BC	A	baseline	ns	ns	ns	ns	190	ns	ns	-64	ns	ns	120
Antimony	MLE	0.277	0.786	0.004	<LRL	<LRL	B	A	<LRL	<LRL	<LRL	<LRL	baseline	418	<LRL	<LRL	<LRL	<LRL	ns	244	<LRL	<LRL
Arsenic	MLE	<0.001	0.002	0.522	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	40					
Barium	MLE	0.002	<0.001	<0.001	A	A	B	B	B	A	baseline	ns	-65	-47	-46	ns	113	164	ns	ns	ns	131
Beryllium	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Bismuth	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Boron	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Cadmium	MLE	0.069	<0.001	0.259	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	29					
Calcium	MLE	0.629	0.002	0.046	B	AB	B	B	B	A	baseline	ns	ns	ns	ns	68	ns	ns	ns	ns	ns	43
Cesium	MLE	<0.001	<0.001	<0.001	C	B	B	AB	AB	A	baseline	45	57	91	68	136	-54	-34	-28	ns	-23	ns
Chromium	MLE	0.146	<0.001	0.493	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
Cobalt	MLE	0.673	0.005	0.081	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
Copper	MLE	0.685	0.061	0.454	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
Iron	MLE	<0.001	<0.001	0.403	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	-36					
Lead	MLE	0.850	0.001	<0.001	A	C	C	BC	B	B	baseline	-100	-100	-99	-99	-98	ns	-58	-62	ns	ns	ns
Lithium	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Magnesium	MLE	0.482	0.224	0.002	C	BC	AB	BC	AB	A	baseline	ns	38	ns	33	62	-18	ns	ns	ns	ns	33
Manganese	MLE	<0.001	<0.001	0.110	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	52					
Mercury (ww)[d]	MLE	<0.001	0.374	0.161	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	-37					
Molybdenum	MLE	0.923	0.001	0.287	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
Nickel	MLE	0.845	0.001	0.526	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
Phosphorus	MLE	<0.001	0.079	<0.001	C	BC	BC	BC	B	A	baseline	ns	ns	ns	24	70	ns	ns	ns	ns	19	63
Potassium	MLE	0.437	0.071	<0.001	C	B	B	B	B	A	baseline	28	48	32	51	119	-27	ns	ns	ns	ns	60
Rubidium	MLE	0.119	<0.001	0.001	B	B	B	B	B	A	baseline	ns	ns	ns	ns	57	ns	ns	ns	ns	ns	53
Selenium	MLE	0.163	<0.001	0.092	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
Silver	MLE	0.169	<0.001	<0.001	-	-	-	B	A	A	-	-	-	baseline	3,674	3,989	-	-	-	-95	ns	ns
Sodium	MLE	0.056	<0.001	<0.001	A	BC	BC	C	C	AB	baseline	-34	-35	-39	-44	ns	59	ns	ns	ns	ns	37
Strontium	MLE	0.062	<0.001	0.461	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	-18					
Tellurium	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Thallium	MLE	0.089	<0.001	0.036	A	B	AB	AB	B	A	baseline	-35	ns	ns	-33	ns	32	ns	ns	ns	ns	41
Tin	MLE	0.238	<0.001	<0.001	B	C	<LRL	A	B	B	baseline	-89	<LRL	1,641[e]	ns	ns	120	-76	<LRL	ns	ns	158
Titanium	MLE	<0.001	0.285	0.500	-	-	-	A	A	A	-	-	-	baseline	ns	ns	-	-	-	235		
Uranium	MLE	0.984	0.072	0.183	<LRL	A	A	A	A	A	<LRL	baseline	ns	ns	ns	ns	<LRL	ns	ns	ns	ns	ns
Vanadium	MLE	0.704	0.612	0.086	<LRL	A	A	A	A	<LRL	<LRL	baseline	ns	ns	ns	<LRL	<LRL	ns	ns	ns	ns	<LRL
Zinc	MLE	0.149	<0.001	0.021	AB	C	BC	BC	ABC	A	baseline	-27	ns	ns	ns	ns	20	ns	ns	ns	ns	36
Zirconium	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Age[f]	ANOVA	<0.001	<0.001	0.202	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	-32					
Fork Length[f]	ANOVAlog	0.525	<0.001	0.666	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
Body Weight[f]	ANOVAlog	0.635	<0.001	0.419	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns

Area x Year or Area P-value < 0.05

Contrast is significant (α = 0.05) and magnitude of difference is positive

Contrast is significant (α = 0.05) and magnitude of difference is negative

Notes: "-" = no data available; "nt" = not tested because all data were reported below the method detection limit (LRL) or because there were only data for a single time period; "ns" = not significant; "baseline" = first year of data included in analysis; "ww" = wet weight; "ANOVA" = two way analysis of variance; "MLE" = censored regression using maximum likelihood estimation; "ANCOVA" = two-way analysis of covariance, MOD = magnitude of difference. Data were analysed in units of mg/kg dry weight except mercury which was analysed in units of mg/kg wet weight. Merged cells across years indicate that the Area × Time term was not significant, therefore MOD is for all years combined. Only years with samples from both reference and exposed were included in the analysis.

[a] Years that share a letter (e.g., A,B,C) had ratios of concentrations (Exposed:Reference) that do not differ significantly among years. Letters are assigned such that A is assigned to the year with the highest ratio of concentrations (Exposed:Reference).

[b] Magnitude of difference (MOD) calculated on backtransformed least-squares means for the observed time period as $(Exp_{observed} - Exp_{predicted})/(Exp_{predicted}) \times 100\%$ where $Exp_{predicted} = Ref_{observed} + (Exp_{baseline} - Ref_{baseline})$.

[c] Magnitude of difference (MOD) calculated on backtransformed least-squares means as (Exp-Ref)/Ref x 100%.

[d] Conducted as a two-way ANCOVA with $\log_{10}$(fork length) as a covariate. Because the covariate was significant, all contrasts were conducted at a $\log_{10}$(fork length) of 1.75.

[e] MOD is inflated because data for one of the groups in the comparison were entirely < LRL, leading to an underestimate of the mean for the <LRL result and a consequent increase in MOD between the two groups.

[f] Results of statistical contrasts for age, fork length, and body weight may differ among tissue types for a given species due to different sample sizes or sampling years among tissue types. Only the results associated with muscle and ovary tissue types were used in data interpretation.

Table E.6.15: Statistical Comparisons of Exposed - Reference Relative Differences of Peamouth Chub Ovary Tissue Metal Concentrations for Quesnel Lake near Hazeltine Creek (NHC; Exposed) and near Grain Creek (NGC; Reference), 2018 to 2022

Parameter	Data Transformation	Two-way ANOVA P-values			(Exposed – Reference) Contrasts Among Periods[a]					Magnitude of Difference in (Exposed – Reference) Relative to Baseline Period (%)[b]					Magnitude of Difference for Exposed Mean Relative to Reference Mean (%)[c]				
					Post-Breach Period					Post-Breach Period					Post-Breach Period				
		Area	Year	Area × Year	2018	2019	2020	2021	2022	2018	2019	2020	2021	2022	2018	2019	2020	2021	2022
Aluminum	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Antimony	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Arsenic	MLE	0.164	0.002	0.018	A	B	B	AB	AB	baseline	-66	-75	ns	ns	ns	-42	-58	ns	ns
Barium	MLE	0.070	0.003	0.795	A	A	A	A	A	baseline	ns	ns	ns	ns	37				
Beryllium	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Bismuth	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Boron	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Cadmium	MLE	0.169	<0.001	0.719	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns
Calcium	MLE	0.009	0.015	0.479	A	A	A	A	A	baseline	ns	ns	ns	ns	-21				
Cesium	MLE	<0.001	0.005	0.519	A	A	A	A	A	baseline	ns	ns	ns	ns	-51				
Chromium	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Cobalt	MLE	0.005	0.594	0.016	A	AB	BC	C	AB	baseline	ns	-54	-57	ns	ns	ns	-49	-52	ns
Copper	MLE	0.162	0.257	0.182	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns
Iron	MLE	0.925	0.030	0.430	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns
Lead	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Lithium	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Magnesium	MLE	0.114	<0.001	0.044	A	AB	AB	B	B	baseline	ns	ns	-38	-32	ns	ns	ns	-25	-18
Manganese	MLE	0.089	0.021	0.657	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns
Mercury (ww)[d]	MLE	0.800	0.003	0.306	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns
Molybdenum	MLE	0.027	0.034	0.517	A	A	A	A	A	baseline	ns	ns	ns	ns	-17				
Nickel	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Phosphorus	MLE	0.456	0.066	0.170	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns
Potassium	MLE	0.107	0.020	0.473	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns
Rubidium	MLE	<0.001	0.717	0.302	A	A	A	A	A	baseline	ns	ns	ns	ns	-25				
Selenium	MLE	0.190	0.003	0.394	A	A	A	A	A	baseline	ns	ns	ns	ns	24				
Silver	MLE	0.015	0.006	0.929	-	-	A	A	A	-	-	baseline	ns	ns	-	-	-27		
Sodium	MLE	0.628	0.003	0.267	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns
Strontium	MLE	0.005	<0.001	0.860	A	A	A	A	A	baseline	ns	ns	ns	ns	-22				
Tellurium	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Thallium	MLE	0.043	0.051	0.228	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns
Tin	MLE	0.351	0.003	0.032	<LRL	B	<LRL	<LRL	A	<LRL	baseline	<LRL	<LRL	17,495[e]	<LRL	ns	<LRL	<LRL	ns
Titanium	MLE	nt	nt	nt	-	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL
Uranium	MLE	0.626	0.044	0.756	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns
Vanadium	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Zinc	MLE	0.006	0.010	0.166	A	A	A	A	A	baseline	ns	ns	ns	ns	-17				
Zirconium	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Age[e]	ANOVA	0.974	0.789	0.526	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns
Fork Length[e]	ANOVAlog	0.003	0.427	0.948	A	A	A	A	A	baseline	ns	ns	ns	ns	6.5				
Body Weight[e]	ANOVAlog	0.003	0.377	0.962	A	A	A	A	A	baseline	ns	ns	ns	ns	26				

Area x Year or Area P-value < 0.05

Contrast is significant (α = 0.05) and magnitude of difference is positive

Contrast is significant (α = 0.05) and magnitude of difference is negative

Notes: "-" = no data available; "nt" = not tested because all data were reported below the method detection limit (LRL) or because there were only data for a single time period; "ns" = not significant; "baseline" = first year of data included in analysis; "ww" = wet weight; "ANOVA" = two way analysis of variance; "MLE" = censored regression using maximum likelihood estimation; "ANCOVA" = two-way analysis of covariance, MOD = magnitude of difference. Data were analysed in units of mg/kg dry weight except mercury which was analysed in units of mg/kg wet weight. Merged cells across years indicate that the Area × Time term was not significant, therefore MOD is for all years combined. Only years with samples from both reference and exposed were included in the analysis.

[a] Years that share a letter (e.g., A,B,C) had ratios of concentrations (Exposed:Reference) that do not differ significantly among years. Letters are assigned such that A is assigned to the year with the highest ratio of concentrations (Exposed:Reference).

[b] Magnitude of difference (MOD) calculated on backtransformed least-squares means for the observed time period as $(Exp_{observed} - Exp_{predicted})/(Exp_{predicted})\times 100\%$ where $Exp_{predicted} = Ref_{observed} + (Exp_{baseline} - Ref_{baseline})$.

[c] Magnitude of difference (MOD) calculated on backtransformed least-squares means as (Exp-Ref)/Ref x 100%.

[d] Conducted as a two-way ANCOVA with $\log_{10}$(fork length) as a covariate. Because the covariate was significant, all contrasts were conducted at a $\log_{10}$(fork length) of 1.33.

[e] MOD is inflated because data for one of the groups in the comparison were entirely < LRL, leading to an underestimate of the mean for the <LRL result and a consequent increase in MOD between the two groups.

[f] Results of statistical contrasts for age, fork length, and body weight may differ among tissue types for a given species due to different sample sizes or sampling years among tissue types. Only the results associated with muscle and ovary tissue types were used in data interpretation.

Table E.6.16: Statistical Comparisons of Exposed - Reference Relative Differences of Lake Trout Muscle Tissue Metal Concentrations for Quesnel Lake near Cedar Point (NCP; Exposed) and East Arm (EAA; Reference), 2015 to 2022

Parameter	Data Transformation	Two-way ANOVA P-values			(Exposed – Reference) Contrasts Among Periods[a]						Magnitude of Difference in (Exposed – Reference) Relative to Baseline Period (%)[b]						Magnitude of Difference for Exposed Mean Relative to Reference Mean (%)[c]					
					Post-Breach Period						Post-Breach Period						Post-Breach Period					
		Area	Year	Area × Year	2015	2018	2019	2020	2021	2022	2015	2018	2019	2020	2021	2022	2015	2018	2019	2020	2021	2022
Aluminum	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Antimony	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Arsenic	MLE	<0.001	0.350	0.165	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	65					
Barium	MLE	0.112	<0.001	<0.001	<LRL	C	C	BC	A	B	<LRL	baseline	ns	ns	2,926[e]	175	<LRL	ns	ns	ns	ns	120
Beryllium	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Bismuth	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Boron	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Cadmium	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Calcium	MLE	0.094	0.083	0.023	B	AB	AB	A	A	AB	baseline	ns	ns	81	119	ns	-41	ns	ns	ns	ns	ns
Cesium	MLE	<0.001	0.002	0.247	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	-27					
Chromium	MLE	0.791	0.733	0.342	<LRL	<LRL	A	A	<LRL	A	<LRL	<LRL	baseline	ns	<LRL	ns	<LRL	<LRL	ns	ns	<LRL	ns
Cobalt	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Copper	MLE	0.061	<0.001	0.101	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	-12					
Iron	MLE	<0.001	0.083	0.604	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	-35					
Lead	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Lithium	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Magnesium	MLE	0.414	<0.001	0.002	B	B	B	B	B	A	baseline	ns	ns	ns	ns	18	ns	ns	ns	ns	ns	21
Manganese	MLE	0.204	<0.001	<0.001	CD	BC	D	AB	A	A	baseline	ns	ns	42	92	81	-18	ns	-26	ns	58	49
Mercury (ww)[d]	MLE	<0.001	0.129	0.142	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	-36					
Molybdenum	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Nickel	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Phosphorus	MLE	0.049	0.007	<0.001	A	B	B	B	B	A	baseline	-17	-22	-25	-15	ns	19	ns	ns	-10	ns	30
Potassium	MLE	0.192	<0.001	<0.001	A	BC	C	C	AB	A	baseline	-15	-23	-21	ns	ns	15	ns	-12	ns	ns	24
Rubidium	MLE	0.363	<0.001	<0.001	A	BC	BC	C	AB	A	baseline	-16	-20	-27	ns	ns	15	ns	ns	-16	ns	23
Selenium	MLE	0.766	<0.001	0.011	A	ABC	ABC	BC	C	AB	baseline	ns	ns	-19	-27	ns	17	ns	ns	ns	-15	ns
Silver	MLE	nt	nt	nt	-	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL
Sodium	MLE	<0.001	0.002	0.045	BC	AB	C	BC	ABC	A	baseline	ns	ns	ns	ns	40	-30	ns	-35	-30	ns	ns
Strontium	MLE	0.190	0.002	0.105	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
Tellurium	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Thallium	MLE	0.232	0.275	0.020	A	AB	AB	B	AB	A	baseline	ns	ns	-42	ns	ns	31	ns	ns	-24	ns	37
Tin	MLE	0.309	<0.001	0.022	<LRL	<LRL	<LRL	<LRL	B	A	<LRL	<LRL	<LRL	<LRL	baseline	80	<LRL	<LRL	<LRL	<LRL	ns	64
Titanium	MLE	nt	nt	nt	-	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL
Uranium	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Vanadium	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Zinc	MLE	0.237	0.040	0.149	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
Zirconium	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Age[f]	ANOVA	<0.001	<0.001	0.172	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	-31					
Fork Length[f]	ANOVAlog	0.548	<0.001	0.560	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
Body Weight[f]	ANOVAlog	0.645	<0.001	0.331	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns

Area x Year or Area P-value < 0.05

Contrast is significant (α = 0.05) and magnitude of difference is positive

Contrast is significant (α = 0.05) and magnitude of difference is negative

Notes: "-" = no data available; "nt" = not tested because all data were reported below the method detection limit (LRL) or because there were only data for a single time period; "ns" = not significant; "baseline" = first year of data included in analysis; "ww" = wet weight; "ANOVA" = two way analysis of variance; "MLE" = censored regression using maximum likelihood estimation; "ANCOVA" = two-way analysis of covariance, MOD = magnitude of difference. Data were analysed in units of mg/kg dry weight except mercury which was analysed in units of mg/kg wet weight. Merged cells across years indicate that the Area × Time term was not significant, therefore MOD is for all years combined. Only years with samples from both reference and exposed were included in the analysis.

[a] Years that share a letter (e.g., A,B,C) had ratios of concentrations (Exposed:Reference) that do not differ significantly among years. Letters are assigned such that A is assigned to the year with the highest ratio of concentrations (Exposed:Reference).

[b] Magnitude of difference (MOD) calculated on backtransformed least-squares means for the observed time period as $(Exp_{observed} - Exp_{predicted})/(Exp_{predicted})\times 100\%$ where $Exp_{predicted} = Ref_{observed} + (Exp_{baseline} - Ref_{baseline})$.

[c] Magnitude of difference (MOD) calculated on backtransformed least-squares means as (Exp-Ref)/Ref x 100%.

[d] Conducted as a two-way ANCOVA with $\log_{10}$(fork length) as a covariate. Because the covariate was significant, all contrasts were conducted at a $\log_{10}$(fork length) of 1.75.

[e] MOD is inflated because data for one of the groups in the comparison were entirely < LRL, leading to an underestimate of the mean for the <LRL result and a consequent increase in MOD between the two groups.

[f] Results of statistical contrasts for age, fork length, and body weight may differ among tissue types for a given species due to different sample sizes or sampling years among tissue types. Only the results associated with muscle and ovary tissue types were used in data interpretation.

Table E.6.17: Statistical Comparisons of Exposed - Reference Relative Differences of Lake Trout Liver Tissue Metal Concentrations for Quesnel Lake near Cedar Point (NCP; Exposed) and East Arm (EAA; Reference), 2015 to 2022

Parameter	Data Transformation	Two-way ANOVA P-values			(Exposed – Reference) Contrasts Among Periods[a]						Magnitude of Difference in (Exposed – Reference) Relative to Baseline Period (%)[b]						Magnitude of Difference for Exposed Mean Relative to Reference Mean (%)[c]					
					Post-Breach Period						Post-Breach Period						Post-Breach Period					
		Area	Year	Area × Year	2015	2018	2019	2020	2021	2022	2015	2018	2019	2020	2021	2022	2015	2018	2019	2020	2021	2022
Aluminum	MLE	0.432	0.013	0.004	<LRL	A	B	A	AB	A	<LRL	baseline	-70	ns	ns	ns	<LRL	ns	-60	117	ns	ns
Antimony	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Arsenic	MLE	0.476	0.022	0.211	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
Barium	MLE	0.047	<0.001	<0.001	<LRL	B	C	B	A	<LRL	<LRL	baseline	-62	ns	4,402[e]	<LRL	<LRL	ns	-49	ns	ns	<LRL
Beryllium	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Bismuth	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Boron	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Cadmium	MLE	0.734	<0.001	0.001	A	A	B	A	A	A	baseline	ns	-74	ns	ns	ns	ns	ns	-65	ns	ns	ns
Calcium	MLE	0.017	0.178	0.045	B	A	B	B	AB	B	baseline	108	ns	ns	ns	ns	ns	ns	-42	ns	ns	ns
Cesium	MLE	0.010	0.012	0.603	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	-23					
Chromium	MLE	<0.001	0.031	0.033	<LRL	A	B	A	AB	A	<LRL	baseline	-72	ns	ns	ns	<LRL	ns	-76	ns	-50	ns
Cobalt	MLE	<0.001	<0.001	0.168	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	-27					
Copper	MLE	0.008	0.003	0.004	A	AB	AB	B	B	B	baseline	ns	ns	-77	-82	-80	ns	ns	ns	-59	-68	-64
Iron	MLE	<0.001	<0.001	0.648	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	-57					
Lead	MLE	0.129	0.051	0.005	<LRL	B	B	<LRL	A	<LRL	<LRL	baseline	ns	<LRL	288	<LRL	<LRL	-52	ns	<LRL	ns	<LRL
Lithium	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Magnesium	MLE	0.721	0.003	0.048	AB	A	B	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns	-31	ns	ns	ns
Manganese	MLE	0.440	<0.001	0.097	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
Mercury (ww)[d]	MLE	<0.001	0.004	0.013	AB	A	C	A	BC	AB	baseline	ns	-56	ns	ns	ns	-41	-36	-74	ns	-67	-44
Molybdenum	MLE	0.164	<0.001	0.150	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
Nickel	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Phosphorus	MLE	0.603	<0.001	0.026	A	A	B	AB	A	A	baseline	ns	-37	ns	ns	ns	ns	ns	-32	ns	ns	ns
Potassium	MLE	0.118	<0.001	0.015	A	A	B	A	A	A	baseline	ns	-42	ns	ns	ns	ns	ns	-32	ns	ns	42
Rubidium	MLE	0.002	<0.001	0.054	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	36					
Selenium	MLE	0.004	<0.001	0.018	A	AB	BC	ABC	C	AB	baseline	ns	-37	ns	-54	ns	ns	ns	-31	-29	-49	ns
Silver	MLE	<0.001	0.336	0.950	-	-	-	A	A	A	-	-	-	baseline	ns	ns	-	-	-	-64		
Sodium	MLE	0.033	<0.001	0.026	A	AB	BC	C	AB	ABC	baseline	ns	-39	-51	ns	ns	ns	ns	-33	-46	ns	ns
Strontium	MLE	0.017	0.035	0.029	BC	A	ABC	C	AB	C	baseline	89	ns	ns	ns	ns	ns	ns	ns	-44	ns	-41
Tellurium	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Thallium	MLE	0.610	0.003	0.723	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
Tin	MLE	0.408	<0.001	0.010	A	<LRL	<LRL	<LRL	B	A	baseline	<LRL	<LRL	<LRL	-95[e]	ns	ns	<LRL	<LRL	<LRL	ns	ns
Titanium	MLE	nt	nt	nt	-	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL
Uranium	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Vanadium	MLE	0.011	0.275	0.002	<LRL	A	C	<LRL	B	<LRL	<LRL	baseline	-99[e]	<LRL	-76	<LRL	<LRL	ns	ns	<LRL	-68	<LRL
Zinc	MLE	0.007	<0.001	0.002	A	AB	C	C	BC	BC	baseline	ns	-47	-44	-37	-32	ns	ns	-37	-33	-25	ns
Zirconium	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Age[f]	ANOVA	<0.001	<0.001	0.172	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	-31					
Fork Length[f]	ANOVAlog	0.548	<0.001	0.560	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
Body Weight[f]	ANOVAlog	0.645	<0.001	0.331	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns

Area x Year or Area P-value < 0.05

Contrast is significant (α = 0.05) and magnitude of difference is positive

Contrast is significant (α = 0.05) and magnitude of difference is negative

Notes: "-" = no data available; "nt" = not tested because all data were reported below the method detection limit (LRL) or because there were only data for a single time period; "ns" = not significant; "baseline" = first year of data included in analysis; "ww" = wet weight; "ANOVA" = two way analysis of variance; "MLE" = censored regression using maximum likelihood estimation; "ANCOVA" = two-way analysis of covariance, MOD = magnitude of difference. Data were analysed in units of mg/kg dry weight except mercury which was analysed in units of mg/kg wet weight. Merged cells across years indicate that the Area × Time term was not significant, therefore MOD is for all years combined. Only years with samples from both reference and exposed were included in the analysis.

[a] Years that share a letter (e.g., A,B,C) had ratios of concentrations (Exposed:Reference) that do not differ significantly among years. Letters are assigned such that A is assigned to the year with the highest ratio of concentrations (Exposed:Reference).

[b] Magnitude of difference (MOD) calculated on backtransformed least-squares means for the observed time period as $(Exp_{observed} - Exp_{predicted})/(Exp_{predicted})\times 100\%$ where $Exp_{predicted} = Ref_{observed} + (Exp_{baseline} - Ref_{baseline})$.

[c] Magnitude of difference (MOD) calculated on backtransformed least-squares means as (Exp-Ref)/Ref x 100%.

[d] Conducted as a two-way ANCOVA with $\log_{10}$(fork length) as a covariate. Because the covariate was significant, all contrasts were conducted at a $\log_{10}$(fork length) of 1.75.

[e] MOD is inflated because data for one of the groups in the comparison were entirely < LRL, leading to an underestimate of the mean for the <LRL result and a consequent increase in MOD between the two groups.

[f] Results of statistical contrasts for age, fork length, and body weight may differ among tissue types for a given species due to different sample sizes or sampling years among tissue types. Only the results associated with muscle and ovary tissue types were used in data interpretation.

Table E.6.18: Statistical Comparisons of Temporal Differences of Rainbow Trout Liver Metal Concentrations for Quesnel River, 2015 to 2022

Parameter	Test	One-way ANOVA Year P-values	Temporal Contrasts Among Periods[a]							Magnitude of Difference Relative to Baseline Period (%)[b]						
			2015	2017	2018	2019	2020	2021	2022	2015	2017	2018	2019	2020	2021	2022
Aluminum	MLE	0.144	A	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns
Antimony	MLE	0.889	<LRL	A	<LRL	A	A	<LRL	A	<LRL	baseline	<LRL	ns	ns	<LRL	ns
Arsenic	MLE	0.002	AB	AB	B	B	AB	A	AB	baseline	ns	ns	ns	ns	ns	ns
Barium	MLE	<0.001	B	B	A	A	A	B	A	baseline	ns	418	168	321	ns	503
Beryllium	MLE	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Bismuth	MLE	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Boron	MLE	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Cadmium	MLE	0.723	A	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns
Calcium	MLE	<0.001	A	B	B	B	B	B	B	baseline	-37	-52	-46	-50	-44	-52
Cesium	MLE	0.013	A	AB	AB	AB	B	AB	AB	baseline	ns	ns	ns	-44	ns	ns
Chromium	MLE	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Cobalt	MLE	0.349	A	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns
Copper	MLE	0.057	A	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns
Iron	MLE	0.586	A	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns
Lead	MLE	0.141	<LRL	A	<LRL	<LRL	A	A	A	<LRL	baseline	<LRL	<LRL	ns	ns	ns
Lithium	MLE	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Magnesium	MLE	0.001	AB	AB	B	AB	AB	A	B	baseline	ns	ns	ns	ns	ns	ns
Manganese	MLE	0.028	A	AB	AB	AB	B	AB	B	baseline	ns	ns	ns	-40	ns	-36
Mercury (dw)	MLE	0.001	ABC	A	BC	C	AB	ABC	ABC	baseline	ns	ns	ns	ns	ns	ns
Mercury (ww)[c]	MLE	<0.001	A	A	B	B	A	AB	AB	baseline	ns	-48	-49	ns	ns	ns
Molybdenum	MLE	0.510	A	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns
Nickel	MLE	0.533	A	<LRL	<LRL	<LRL	A	A	A	baseline	<LRL	<LRL	<LRL	ns	ns	ns
Phosphorus	MLE	<0.001	C	C	C	AB	AB	A	BC	baseline	ns	ns	22	28	29	ns
Potassium	MLE	<0.001	D	ABC	C	BC	AB	A	C	baseline	47	34	45	72	74	39
Rubidium	MLE	<0.001	B	A	A	A	AB	A	AB	baseline	61	78	77	ns	75	ns
Selenium	MLE	0.642	A	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns
Silver	MLE	0.046	-	-	-	-	A	A	A	-	-	-	-	-	ns	ns
Sodium	MLE	<0.001	C	AB	C	AB	AB	A	BC	baseline	43	ns	40	31	55	ns
Strontium	MLE	<0.001	A	BC	BC	BC	C	AB	C	baseline	-40	-49	-49	-57	ns	-58
Tellurium	MLE	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Thallium	MLE	0.797	A	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns
Tin	MLE	<0.001	BC	AB	C	ABC	A	C	<LRL	baseline	ns	ns	ns	238	ns	<LRL
Titanium	MLE	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Uranium	MLE	0.786	A	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns
Vanadium	MLE	0.529	A	A	A	<LRL	A	A	A	baseline	ns	ns	<LRL	ns	ns	ns
Zinc	MLE	0.008	A	B	AB	AB	AB	AB	B	baseline	-27	ns	ns	ns	ns	-28
Zirconium	MLE	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Age	ANOVA	0.019	AB	AB	A	AB	AB	B	AB	baseline	ns	ns	ns	ns	ns	ns
Fork Length	ANOVAlog	0.315	A	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns
Body Weight	ANOVAlog	0.345	A	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns

Year P-value < 0.05.

Contrast is significant (α = 0.05) and magnitude of difference is positive.

Contrast is significant (α = 0.05) and magnitude of difference is negative.

Notes: "-" = no data available, nt = not tested because all data were reported below the method detection limit (LRL) or because there were only data for a single time period, ns = not significant, baseline= first year of data included in analysis, <LRL = all of the concentrations were reported as < LRL so the time period was omitted from the analysis, ww = wet weight, ANOVA = one way analysis of variance, MOD = Magnitude of Difference, MLE = censored regression using maximum likelihood estimation. Data were analysed in units of mg/kg dry weight except mercury which was analysed in units of mg/kg wet weight.

[a] Years that share a letter (e.g., A,B,C) had concentrations that do not differ significantly among years. Letters are assigned such that A is assigned to the year with the highest concentrations. <LRL = all of the concentrations were reported as <LRL for at least one area so the time period was omitted from the analysis.

[b] Magnitude of difference (MOD) calculated on backtransformed least-squares means as $(year - year_{baseline})/year_{baseline} \times 100\%$.

[c] Assessed as a one-way ANCOVA with log10(fork length) as a covariate. Post-hoc comparisons made at a log10 fork length of 1.48

Table E.6.19: Statistical Comparisons of Temporal Differences of Rainbow Trout Kidney Metal Concentrations for Quesnel River, 2015 to 2022

Parameter	Test	One-way ANOVA Year P-values	Temporal Contrasts Among Periods[a]							Magnitude of Difference Relative to Baseline Period (%)[b]						
			2015	2017	2018	2019	2020	2021	2022	2015	2017	2018	2019	2020	2021	2022
Aluminum	MLE	0.018	B	AB	B	AB	A	AB	AB	baseline	ns	ns	ns	903	ns	ns
Antimony	MLE	0.032	A	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns
Arsenic	MLE	0.112	A	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns
Barium	MLE	<0.001	B	B	AB	AB	A	B	AB	baseline	ns	ns	ns	189	ns	ns
Beryllium	MLE	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Bismuth	MLE	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Boron	MLE	0.016	<LRL	<LRL	A	A	A	<LRL	A	<LRL	<LRL	by	ns	ns	<LRL	ns
Cadmium	MLE	0.127	A	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns
Calcium	MLE	0.034	A	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns
Cesium	MLE	<0.001	A	AB	B	B	AB	B	B	baseline	ns	-51	-51	ns	-48	-52
Chromium	MLE	<0.001	C	BC	BC	BC	A	AB	BC	baseline	ns	ns	ns	649	240	ns
Cobalt	MLE	0.408	A	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns
Copper	MLE	0.025	AB	AB	B	B	A	AB	B	baseline	ns	ns	ns	ns	ns	ns
Iron	MLE	0.068	A	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns
Lead	MLE	0.058	A	A	A	<LRL	A	A	A	baseline	ns	ns	<LRL	ns	ns	ns
Lithium	MLE	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Magnesium	MLE	<0.001	AB	C	C	BC	A	C	C	baseline	-22	-30	ns	ns	-21	-25
Manganese	MLE	0.015	AB	B	AB	AB	A	B	B	baseline	ns	ns	ns	ns	ns	ns
Mercury (ww)[c]	MLE	<0.001	AB	A	B	B	AB	AB	AB	baseline	ns	ns	ns	ns	ns	ns
Molybdenum	MLE	0.263	A	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns
Nickel	MLE	<0.001	B	AB	B	B	A	B	B	baseline	ns	ns	ns	218	ns	ns
Phosphorus	MLE	<0.001	BC	BC	C	B	A	BC	BC	baseline	ns	ns	ns	36	ns	ns
Potassium	MLE	<0.001	B	B	B	B	A	B	B	baseline	ns	ns	ns	23	ns	ns
Rubidium	MLE	0.234	A	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns
Selenium	MLE	0.018	B	A	AB	AB	AB	A	AB	baseline	56	ns	ns	ns	50	ns
Silver	MLE	0.126	-	-	-	-	A	A	A	-	-	-	-	baseline	ns	ns
Sodium	MLE	<0.001	C	B	B	AB	A	B	B	baseline	95	82	131	189	103	93
Strontium	MLE	0.055	A	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns
Tellurium	MLE	0.330	A	A	A	<LRL	A	A	A	baseline	ns	ns	<LRL	ns	ns	ns
Thallium	MLE	0.769	A	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns
Tin	MLE	<0.001	AB	AB	BC	AB	A	C	C	baseline	ns	ns	ns	ns	-84	-92
Titanium	MLE	0.065	-	-	-	-	A	A	A	-	-	-	-	baseline	ns	ns
Uranium	MLE	0.009	B	AB	AB	AB	A	B	B	baseline	ns	ns	ns	285	ns	ns
Vanadium	MLE	0.124	A	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns
Zinc	MLE	<0.001	B	B	B	B	A	AB	B	baseline	ns	ns	ns	41	ns	ns
Zirconium	MLE	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Age	ANOVA	0.019	AB	AB	A	AB	AB	B	AB	baseline	ns	ns	ns	ns	ns	ns
Fork Length	ANOVAlog	0.315	A	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns
Body Weight	ANOVAlog	0.345	A	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns

Year P-value < 0.05.

Contrast is significant (α = 0.05) and magnitude of difference is positive.

Contrast is significant (α = 0.05) and magnitude of difference is negative.

Notes: "-" = no data available, nt = not tested because all data were reported below the method detection limit (LRL) or because there were only data for a single time period, ns = not significant, baseline= first year of data included in analysis, <LRL = all of the concentrations were reported as < LRL so the time period was omitted from the analysis, ww = wet weight, ANOVA = one way analysis of variance, MOD = Magnitude of Difference, MLE = censored regression using maximum likelihood estimation. Data were analysed in units of mg/kg dry weight except mercury which was analysed in units of mg/kg wet weight.

[a] Years that share a letter (e.g., A,B,C) had concentrations that do not differ significantly among years. Letters are assigned such that A is assigned to the year with the highest concentrations. <LRL = all of the concentrations were reported as <LRL for at least one area so the time period was omitted from the analysis.

[b] Magnitude of difference (MOD) calculated on backtransformed least-squares means as $(year_t\text{-}year_{baseline})/year_{baseline}$ x 100%.

[c] Assessed as a one-way ANCOVA with log10(fork length) as a covariate. Post-hoc comparisons made at a log10 fork length of 1.48

Table E.6.20: Statistical Comparisons of Temporal Differences of Rainbow Trout Muscle Metal Concentrations for Quesnel River, 2015 to 2022

Parameter	Test	One-way ANOVA Year P-values	Temporal Contrasts Among Periods[a]							Magnitude of Difference Relative to Baseline Period (%)[b]						
			2015	2017	2018	2019	2020	2021	2022	2015	2017	2018	2019	2020	2021	2022
Aluminum	MLE	0.011	<LRL	A	<LRL	A	A	<LRL	A	<LRL	baseline	<LRL	ns	ns	<LRL	ns
Antimony	MLE	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Arsenic	MLE	0.006	AB	AB	AB	AB	B	A	AB	baseline	ns	ns	ns	ns	ns	ns
Barium	MLE	<0.001	BC	<LRL	BC	B	BC	C	A	baseline	<LRL	ns	ns	ns	ns	410
Beryllium	MLE	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Bismuth	MLE	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Boron	MLE	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Cadmium	MLE	0.971	A	A	<LRL	A	A	A	A	baseline	ns	<LRL	ns	ns	ns	ns
Calcium	MLE	<0.001	A	C	ABC	C	BC	AB	A	baseline	-66	ns	-66	-49	ns	ns
Cesium	MLE	0.112	A	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns
Chromium	MLE	0.007	<LRL	B	<LRL	AB	AB	<LRL	A	<LRL	baseline	<LRL	ns	ns	<LRL	714
Cobalt	MLE	0.038	A	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns
Copper	MLE	<0.001	BCD	AB	BCD	A	BC	D	CD	baseline	ns	ns	70	ns	ns	ns
Iron	MLE	<0.001	BC	A	C	AB	ABC	C	ABC	baseline	65	ns	ns	ns	ns	ns
Lead	MLE	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Lithium	MLE	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Magnesium	MLE	<0.001	C	C	C	C	C	B	A	baseline	ns	ns	ns	ns	16	29
Manganese	MLE	<0.001	AB	C	BC	BC	C	BC	A	baseline	-38	ns	ns	-36	ns	ns
Mercury (ww)[c]	MLE	0.001	AB	A	C	BC	ABC	ABC	ABC	baseline	ns	-43	ns	ns	ns	ns
Molybdenum	MLE	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Nickel	MLE	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Phosphorus	MLE	<0.001	C	BC	BC	BC	BC	B	A	baseline	ns	ns	ns	ns	18	34
Potassium	MLE	<0.001	C	BC	BC	BC	B	B	A	baseline	ns	ns	ns	13	15	39
Rubidium	MLE	0.016	AB	AB	AB	AB	B	AB	A	baseline	ns	ns	ns	ns	ns	ns
Selenium	MLE	0.038	AB	AB	AB	AB	B	AB	A	baseline	ns	ns	ns	ns	ns	ns
Silver	MLE	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Sodium	MLE	<0.001	A	A	B	B	B	B	B	baseline	ns	-45	-36	-44	-44	-31
Strontium	MLE	<0.001	A	B	AB	B	AB	A	A	baseline	-75	ns	-70	ns	ns	ns
Tellurium	MLE	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Thallium	MLE	0.045	A	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns
Tin	MLE	0.006	B	AB	<LRL	A	<LRL	AB	<LRL	baseline	ns	<LRL	76	<LRL	ns	<LRL
Titanium	MLE	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Uranium	MLE	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Vanadium	MLE	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Zinc	MLE	0.003	ABC	ABC	BC	A	AB	C	BC	baseline	ns	ns	ns	ns	ns	ns
Zirconium	MLE	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Age	ANOVA	0.019	AB	AB	A	AB	AB	B	AB	baseline	ns	ns	ns	ns	ns	ns
Fork Length	ANOVAlog	0.315	A	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns
Body Weight	ANOVAlog	0.345	A	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns

Year P-value < 0.05.

Contrast is significant (α = 0.05) and magnitude of difference is positive.

Contrast is significant (α = 0.05) and magnitude of difference is negative.

Notes: "-" = no data available, nt = not tested because all data were reported below the method detection limit (LRL) or because there were only data for a single time period, ns = not significant, baseline= first year of data included in analysis, <LRL = all of the concentrations were reported as < LRL so the time period was omitted from the analysis, ww = wet weight, ANOVA = one way analysis of variance, MOD = Magnitude of Difference, MLE = censored regression using maximum likelihood estimation. Data were analysed in units of mg/kg dry weight except mercury which was analysed in units of mg/kg wet weight.

[a] Years that share a letter (e.g., A,B,C) had concentrations that do not differ significantly among years. Letters are assigned such that A is assigned to the year with the highest concentrations. <LRL = all of the concentrations were reported as <LRL for at least one area so the time period was omitted from the analysis.

[b] Magnitude of difference (MOD) calculated on backtransformed least-squares means as $(year_t - year_{baseline})/year_{baseline} \times 100\%$.

[c] Assessed as a one-way ANCOVA with log10(fork length) as a covariate. Post-hoc comparisons made at a log10 fork length of 1.48

Table E.6.21: Statistical Comparisons of Temporal Differences of Rainbow Trout Ovary Metal Concentrations for Quesnel River, 2015 to 2022

Parameter	Test	One-way ANOVA Year P-values	Temporal Contrasts Among Periods[a]						Magnitude of Difference Relative to Baseline Period (%)[b]					
			2015	2018	2019	2020	2021	2022	2015	2018	2019	2020	2021	2022
Aluminum	MLE	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Antimony	MLE	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Arsenic	MLE	0.006	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns
Barium	MLE	0.086	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns
Beryllium	MLE	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Bismuth	MLE	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Boron	MLE	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Cadmium	MLE	0.555	A	A	<LRL	<LRL	<LRL	A	baseline	ns	<LRL	<LRL	<LRL	ns
Calcium	MLE	0.021	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns
Cesium	MLE	0.003	AB	B	AB	B	AB	A	baseline	ns	ns	ns	ns	ns
Chromium	MLE	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Cobalt	MLE	0.023	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns
Copper	MLE	0.800	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns
Iron	MLE	0.754	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns
Lead	MLE	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Lithium	MLE	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Magnesium	MLE	0.080	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns
Manganese	MLE	0.966	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns
Mercury (ww)[c]	MLE	0.134	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns
Molybdenum	MLE	0.064	<LRL	A	A	A	<LRL	A	<LRL	by	ns	ns	<LRL	ns
Nickel	MLE	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Phosphorus	MLE	0.119	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns
Potassium	MLE	0.001	AB	B	AB	AB	AB	A	baseline	ns	ns	ns	ns	ns
Rubidium	MLE	<0.001	AB	B	AB	B	B	A	baseline	ns	ns	ns	ns	ns
Selenium	MLE	0.654	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns
Silver	MLE	0.454	-	-	-	A	A	A	-	-	-	baseline	ns	ns
Sodium	MLE	<0.001	B	B	B	B	B	A	baseline	ns	ns	ns	ns	163
Strontium	MLE	0.013	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns
Tellurium	MLE	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Thallium	MLE	0.014	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns
Tin	MLE	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Titanium	MLE	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL
Uranium	MLE	0.647	A	A	A	A	<LRL	A	baseline	ns	ns	ns	<LRL	ns
Vanadium	MLE	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Zinc	MLE	0.728	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns
Zirconium	MLE	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Age	ANOVA	0.626	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns
Fork Length	ANOVAlog	0.764	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns
Body Weight	ANOVAlog	0.616	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns

Year P-value < 0.05.

Contrast is significant (α = 0.05) and magnitude of difference is positive.

Contrast is significant (α = 0.05) and magnitude of difference is negative.

Notes: "-" = no data available, nt = not tested because all data were reported below the method detection limit (LRL) or because there were only data for a single time period, ns = not significant, baseline= first year of data included in analysis, <LRL = all of the concentrations were reported as < LRL so the time period was omitted from the analysis, ww = wet weight, ANOVA = one way analysis of variance, MOD = Magnitude of Difference, MLE = censored regression using maximum likelihood estimation. Data were analysed in units of mg/kg dry weight except mercury which was analysed in units of mg/kg wet weight.

[a] Years that share a letter (e.g., A,B,C) had concentrations that do not differ significantly among years. Letters are assigned such that A is assigned to the year with the highest concentrations. <LRL = all of the concentrations were reported as <LRL for at least one area so the time period was omitted from the analysis.

[b] Magnitude of difference (MOD) calculated on backtransformed least-squares means as $(year_i - year_{baseline})/year_{baseline} \times 100\%$.

[c] Assessed first as a one-way ANCOVA with log10(fork length) as a covariate, but the covariate was not a significant predictor of mercury concentration. Analysis proceeded as a one-way ANOVA on Mercury in units of wet weight (ww).

Table E.6.22: Tissue Accumulation of Focus Metals

Metal	Tissue Reported to Accumulate	Reference
Arsenic (non-essential)	liver, kidney	McIntyre, D.O., and T.K. Linton. 2012. Arsenic. In: C.M. Wood, A.P. Farrell and C.J. Brauner (eds.), pp. 297-349, Homeostasis and Toxicology of Non-Essential Metals. Elsevier/Academic Press, New York, NY.
		Kumari, B., V. Kumar, A.K. Sinha, J. Ahsan, A.K. Ghosh, H. Wang, and G. DeBoeck. 2016. Toxicology of Arsenic in Fish and Aquatic Systems. Environmental Chemistry Letters 15(1): 1–22.
Copper (essential)	liver, kidney	Miller, P.A., R.P. Lanno, M.E.McMaster and D.G. Dixon. 1993. Relative contributions of dietary and waterborne copper to tissue copper burdens and waterborne-copper tolerance in rainbow trout (Oncorhynchus mykiss). Canadian Journal of Fisheries and Aquatic Sciences. 50:1683-1689.
		Clearwater, S.J., S. Baskin, C.M. Wood, D.G. McDonald. 2000. Gastrointestinal uptake and distribution of copper in rainbow trout. Journal of Experimental Biology 203:2455-2466.
		Kamunde, C., M. Grosell, D. Higgs, C.M. Wood (2002). Copper metabolism in actively growing rainbow trout (*Oncorhynchus mykiss*): interactions between dietary and waterborne copper uptake. Journal of Experimental Biology 205:279-290.
		Grosell, M. 2012. Copper. In: C.M. Wood, A.P. Farrell and C.J. Brauner (eds.), pp. 53-133, Homeostasis and Toxicology of Essential Metals. Elsevier / Academic Press, New York, NY.
Iron (essential)	liver, kidney	Bury, N.R., D. Boyle and C.A. Cooper. 2012. Iron. In: C.M. Wood, A.P. Farrell and C.J. Brauner (eds.). Homeostasis and Toxicology of Essential Metals. Elsevier /Academic Press, New York. pp. 201-251.
		Desjardins, L. M., B.D. Hicks, and J.W. Hilton. 1987. Iron Catalyzed Oxidation of Trout Diets and its Effect on the Growth and Physiological Response of Rainbow Trout. Fish Physiol. Biochem. 3(4): 173–182.
Selenium (essential)	liver, kidney, ovary	Sato, T., Ose, Y., and Sakai, T. 1980. Toxicological effect of selenium on fish. Environmental Pollution Series A, Ecological and Biological 21(3): 217–224.
		Janz, D.M. 2012. Selenium. In: C.M. Wood, A.P. Farrell, and C.J. Brauner (Eds.), pp. 327-374, Homeostasis and Toxicology of Essential Metals. Elsevier/Academic Press, New York, NY.

APPENDIX F
STATISTICAL ANALYSES – CREEK HABITAT

APPENDIX F.1
SEDIMENT QUALITY

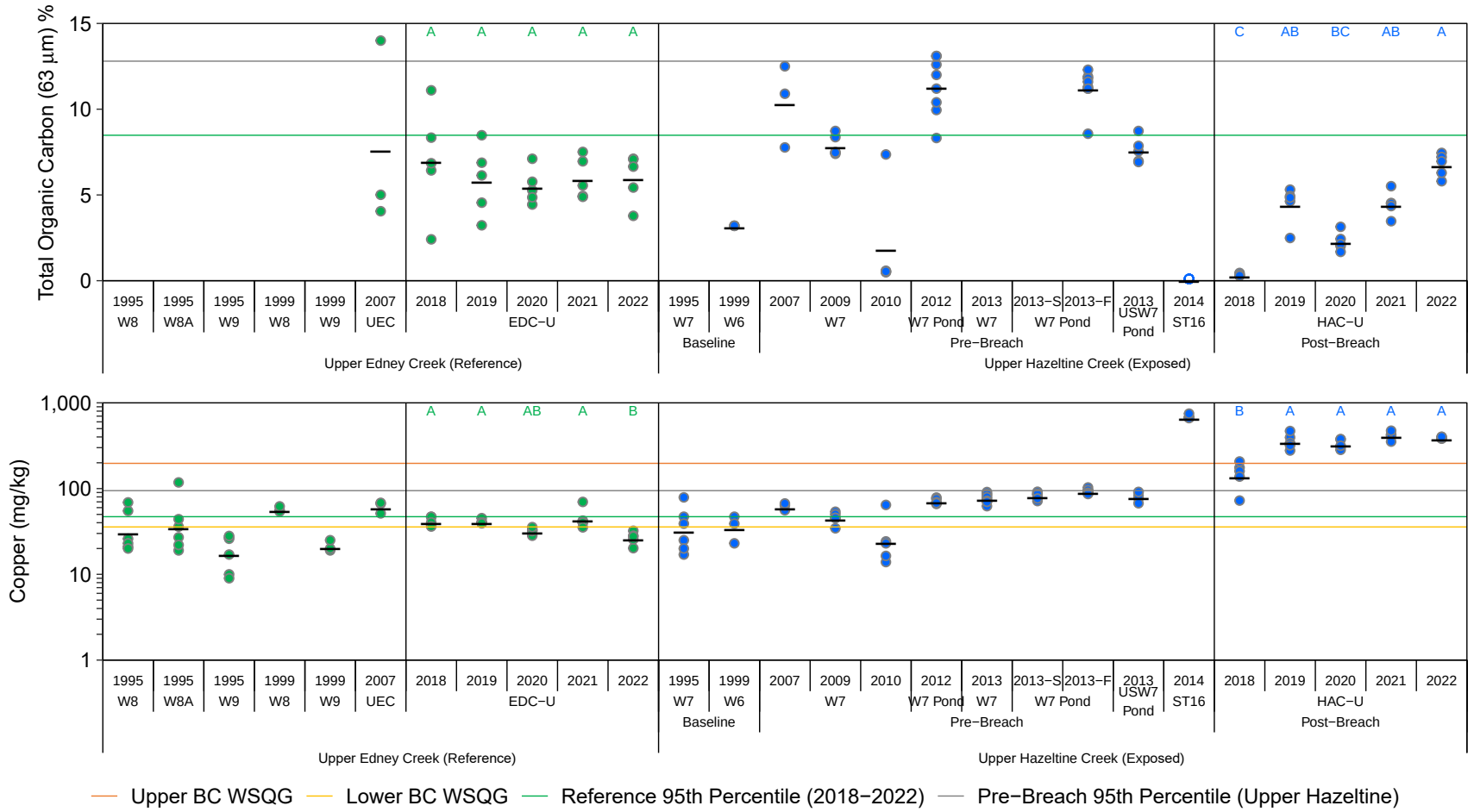


Figure F.1.1: Sediment Analyte of Interest Concentrations (<63 µm Fraction) for Upper Hazeltine Creek (HAC-U; Exposed) and Upper Edney Creek (EDC-U; Reference), 1995 to 2022

Notes: Data not available for all analytes in all years (particularly baseline). Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Means are plotted as horizontal bars. Years that share a letter within an area (i.e., EDC−U [green] and HAC−U [blue]) do not differ significantly. Statistical differences among years were evaluated from 2018 to 2022. Reference 95th Percentile was calculated with EDC−U data from 2018 to 2022. S and F following the sampling years = Spring and Fall, respectively. British Columbia Working Sediment Guidelines (BCMOECCS 2021a) and approved BC Sediment Quality Guideline for Selenium (BCMOECCS 2021b). Some sediment metal concentrations reported for 1996 (HKP 1997a) were unusually high and are suspected errors (see Appendix Table D.2.1 and D.2.2), data from 1996 were therefore not plotted, selenium was the only parameter measured in 2012 (Minnow 2013a), therefore concentrations of analytes of interest are not plotted for this year.

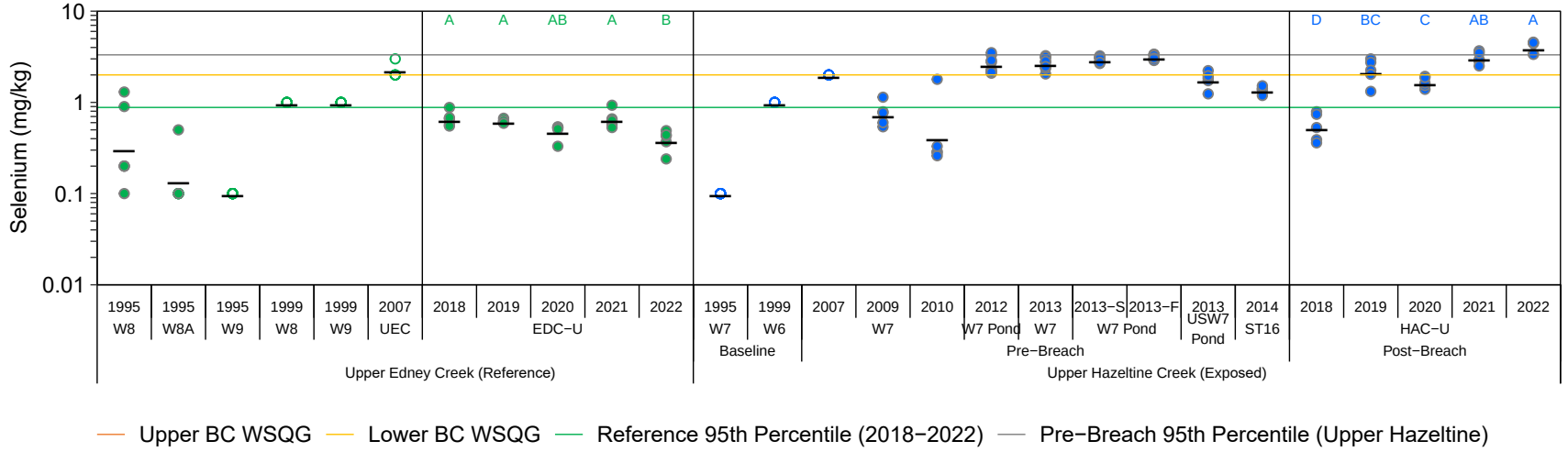


Figure F.1.1: Sediment Analyte of Interest Concentrations (<63 µm Fraction) for Upper Hazeltine Creek (HAC-U; Exposed) and Upper Edney Creek (EDC-U; Reference), 1995 to 2022

Notes: Data not available for all analytes in all years (particularly baseline). Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Means are plotted as horizontal bars. Years that share a letter within an area (i.e., EDC−U [green] and HAC−U [blue]) do not differ significantly. Statistical differences among years were evaluated from 2018 to 2022. Reference 95th Percentile was calculated with EDC−U data from 2018 to 2022. S and F following the sampling years = Spring and Fall, respectively. British Columbia Working Sediment Guidelines (BCMOECCS 2021a) and approved BC Sediment Quality Guideline for Selenium (BCMOECCS 2021b). Some sediment metal concentrations reported for 1996 (HKP 1997a) were unusually high and are suspected errors (see Appendix Table D.2.1 and D.2.2), data from 1996 were therefore not plotted, selenium was the only parameter measured in 2012 (Minnow 2013a), therefore concentrations of analytes of interest are not plotted for this year.

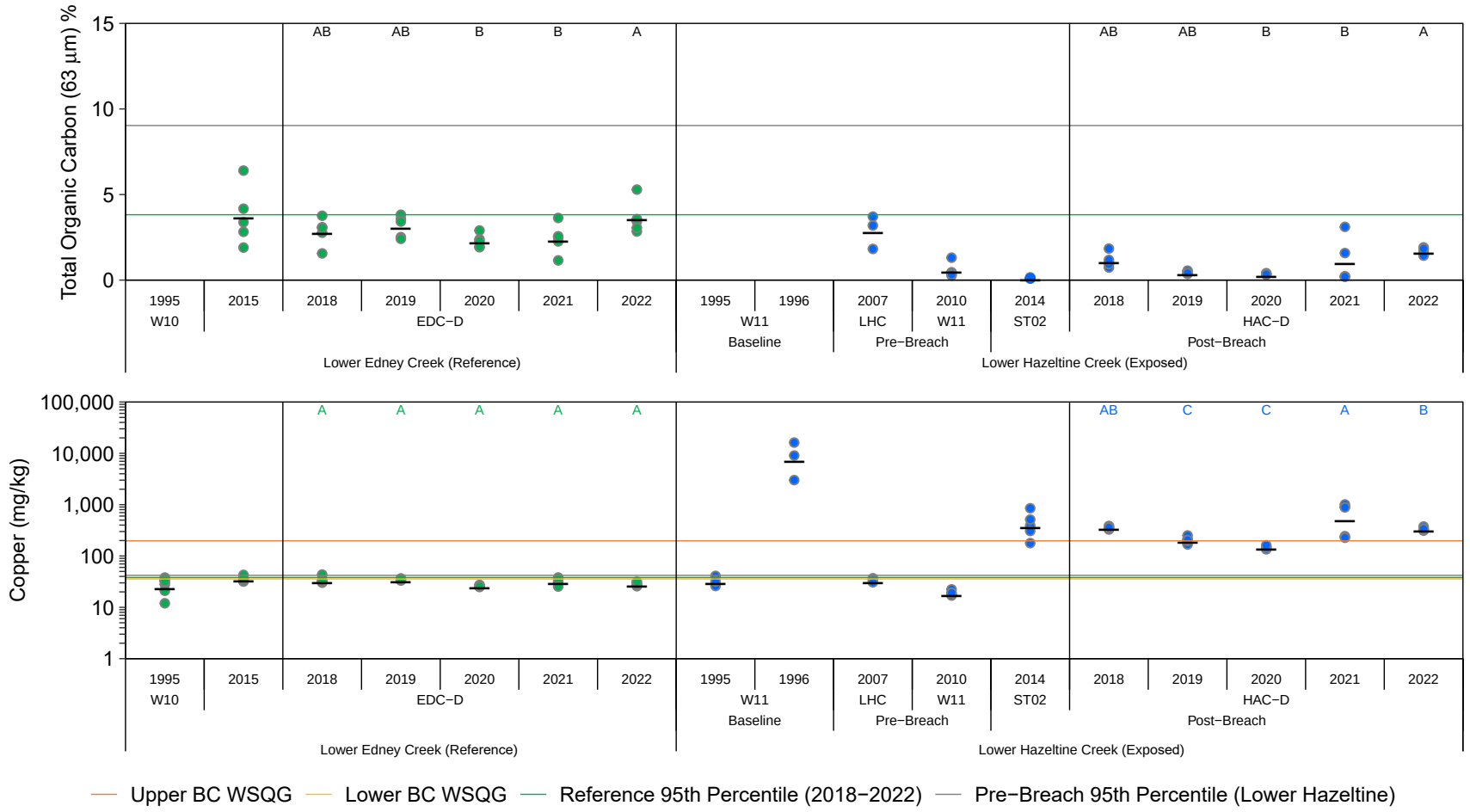


Figure F.1.2: Sediment Analyte of Interest Concentrations (<63 µm Fraction) for Lower Hazeltine Creek (HAC-D; Exposed) and Lower Edney Creek (EDC-D; Reference), 1995 to 2022

Notes: Data not available for all analytes in all years (particularly baseline). Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Means are plotted as horizontal bars. Years that share a letter within an area (i.e., EDC−D [green] and HAC−D [blue]) do not differ significantly. Statistical differences among years were evaluated from 2018 to 2022. Reference 95th Percentile was calculated with EDC−D data from 2018 to 2022. British Columbia Working Sediment Guidelines (BCMOECCS 2021a) and approved BC Sediment Quality Guideline for Selenium (BCMOECCS 2021b). Some sediment metal concentrations reported for 1996 (HKP 1997a) were unusually high and are suspected errors (see Appendix Table D.2.1 and D.2.4), data from 1996 were therefore not plotted, selenium was the only parameter measured in 2012 (Minnow 2013a), therefore concentrations of analytes of interest are not plotted for this year.

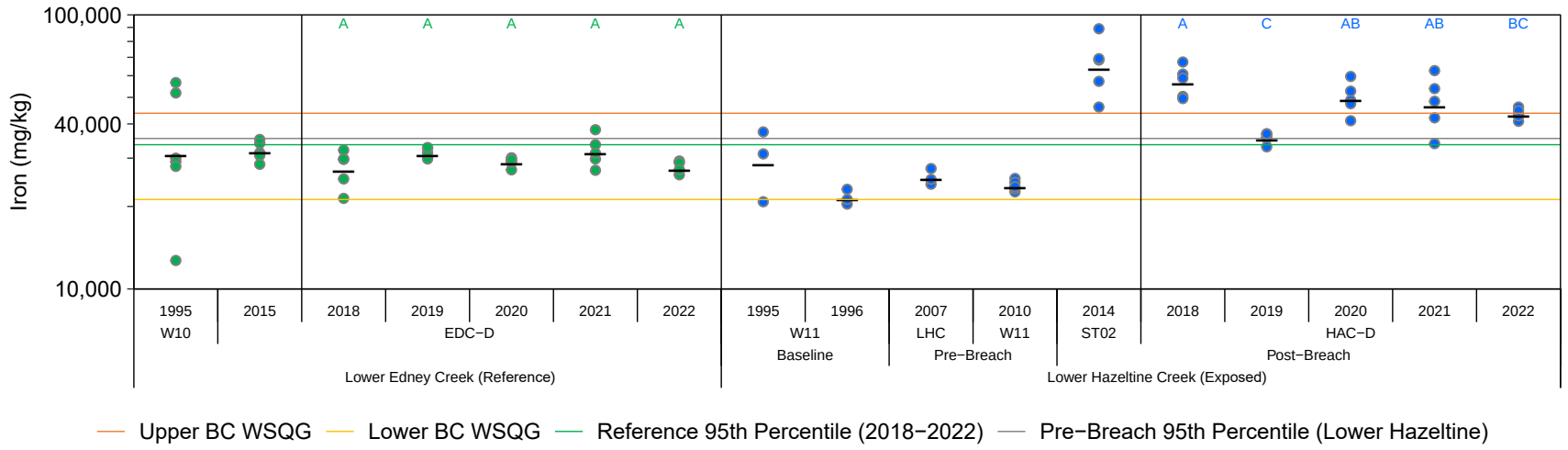


Figure F.1.2: Sediment Analyte of Interest Concentrations (<63 µm Fraction) for Lower Hazeltine Creek (HAC-D; Exposed) and Lower Edney Creek (EDC-D; Reference), 1995 to 2022

Notes: Data not available for all analytes in all years (particularly baseline). Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Means are plotted as horizontal bars. Years that share a letter within an area (i.e., EDC−D [green] and HAC−D [blue]) do not differ significantly. Statistical differences among years were evaluated from 2018 to 2022. Reference 95th Percentile was calculated with EDC−D data from 2018 to 2022. British Columbia Working Sediment Guidelines (BCMOECCS 2021a) and approved BC Sediment Quality Guideline for Selenium (BCMOECCS 2021b). Some sediment metal concentrations reported for 1996 (HKP 1997a) were unusually high and are suspected errors (see Appendix Table D.2.1 and D.2.4), data from 1996 were therefore not plotted, selenium was the only parameter measured in 2012 (Minnow 2013a), therefore concentrations of analytes of interest are not plotted for this year.

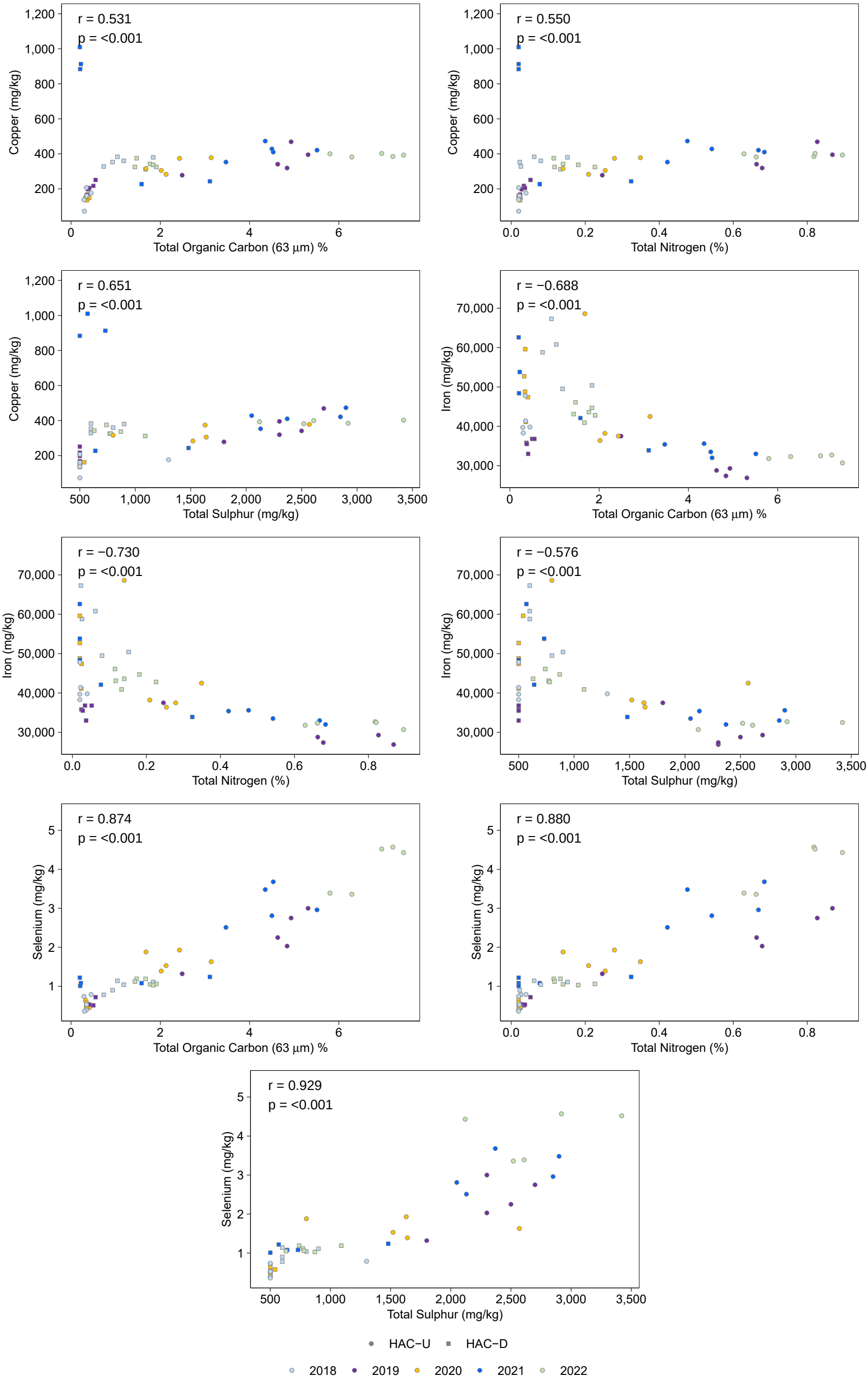


Figure F.1.3: Scatterplots of Significant Spearman's Correlation Relationships (p < 0.0125, Bonferroni Corrected) Between Analyte of Interest Concentrations (<63 µm Fraction) and Sediment Physical and Chemical Parameters for Upper (HAC−U; Exposed) and Lower (HAC−D; Exposed) Hazeltine Creek, 2018 to 2022

Table F.1.1: Statistical Comparisons of Exposed - Reference Relative Differences of Sediment Analyte of Interest Concentrations (<63 µm Fraction) for Upper Hazeltine Creek (HAC-U; Exposed) and Upper Edney Creek (EDC-U; Reference), 2018 to 2022

ANOVA Model						(Exposed - Reference) Relative Differences Among Years[a]					Relative MOD for Exposed - Reference Over Time (%)[b]			
Parameter	Units	Transformation	Area	Year	Area x Year	2018	2019	2020	2021	2022	2019	2020	2021	2022
Total Organic Carbon	%	none	<0.001	<0.001	<0.001	C	AB	B	AB	A	639	292	730	1,107
Copper	mg/kg	log10	<0.001	<0.001	<0.001	C	B	B	B	A	151	196	172	331
Selenium	mg/kg	log10	<0.001	<0.001	<0.001	C	B	B	B	A	333	326	479	1,192

P-value < 0.05

Indicates negative MOD

Indicates positive MOD

Notes: "-" indicates comparison not-relevant, "ns" indicates not significant, MOD = Magnitude of Difference, ANOVA = analysis of variance.

[a] Years that share a letter are not significantly different among years.

[b] MOD calculated as $((Observed_{HAC\text{-}U} - Predicted_{EDC\text{-}U})/Predicted_{EDC\text{-}U})*100$. $Predicted_{EDC\text{-}U} = Observed_{EDC\text{-}U} + (Observed_{HAC\text{-}U\ 2018} - Observed_{EDC\text{-}U\ 2018})$.

Table F.1.2: Statistical Comparisons of Spatial and Temporal Differences of Sediment Analyte of Interest Concentrations (<63 µm Fraction) for Upper Hazeltine Creek (HAC-U; Exposed) and Upper Edney Creek (EDC-U; Reference), 2018 to 2022

ANOVA Model						Area	Pairwise Differences Among Years for Each Area[a]					Do Concentrations Differ Over Time? MOD[b]				Do Concentrations Differ Between the Areas? HAC-U vs EDC-U[c]				
Parameter	Units	Transformation	Area	Year	Area x Year		2018	2019	2020	2021	2022	2019 vs 2018	2020 vs 2018	2021 vs 2018	2022 vs 2018	2018	2019	2020	2021	2022
Total Organic Carbon	%	none	<0.001	<0.001	<0.001	EDC-U	A	A	A	A	A	ns	ns	ns	ns	-	-	-	-	-
						HAC-U	C	AB	BC	AB	A	1,181	ns	1,190	1,845	-95	ns	-58	ns	ns
Copper	mg/kg	log10	<0.001	<0.001	<0.001	EDC-U	A	A	AB	A	B	ns	ns	ns	ns	-	-	-	-	-
						HAC-U	B	A	A	A	A	149	131	192	176	244	765	921	838	1,384
Selenium	mg/kg	log10	<0.001	<0.001	<0.001	EDC-U	A	A	AB	A	B	ns	ns	ns	ns	-	-	-	-	-
						HAC-U	D	BC	C	AB	A	309	211	472	651	ns	252	246	370	948

P-value < 0.05

Indicates negative MOD

Indicates positive MOD

Notes: "-" indicates comparison not-relevant, "ns" indicates not significant, MOD = Magnitude of Difference, ANOVA = analysis of variance.

[a] Years that do not share a letter are significantly different for that area.

[b] MOD is calculated as $((year_{recent} - year_{older})/year_{older})*100$.

[c] MOD calculated as ((HAC-U - EDC-U)/EDC-U)*100.

Table F.1.3: Statistical Comparisons of Exposed - Reference Relative Differences of Sediment Analyte of Interest Concentrations (<63 µm Fraction) for Lower Hazeltine Creek (HAC-D; Exposed) and Lower Edney Creek (EDC-D; Reference) Areas, 2018 to 2022

ANOVA Model						(Exposed - Reference) Relative Differences Among Years[a]					Relative MOD for Exposed - Reference Over Time (%)[b]			
Parameter	Units	Transformation	Area	Year	Area x Year	2018	2019	2020	2021	2022	2019	2020	2021	2022
Total Organic Carbon	%	none	<0.001	0.001	0.288	A	A	A	A	A	ns	ns	ns	ns
Copper	mg/kg	log10	<0.001	<0.001	<0.001	A	B	B	A	A	-45	-46	ns	ns
Iron	mg/kg	log10	<0.001	0.009	<0.001	A	C	AB	B	B	-45	ns	-29	-25

P-value < 0.05

Indicates negative MOD

Indicates positive MOD

Notes: "-" indicates comparison not-relevant, "ns" indicates not significant, MOD = Magnitude of Difference, ANOVA = analysis of variance.

[a] Years that share a letter are not significantly different among years.

[b] MOD calculated as $((Observed_{HAC\text{-}D} - Predicted_{EDC\text{-}D})/Predicted_{EDC\text{-}D})*100$. $Predicted_{EDC\text{-}D} = Observed_{EDC\text{-}D} + (Observed_{HAC\text{-}D\ 2018} - Observed_{EDC\text{-}D\ 2018})$.

Table F.1.4: Statistical Comparisons of Spatial and Temporal Differences of Sediment Analyte of Interest Concentrations (<63 µm Fraction) for Lower Hazeltine Creek (HAC-D; Exposed) and Lower Edney Creek (EDC-D; Reference), 2018 to 2022

ANOVA Model						Area	Pairwise Differences Among Years for Each Area[a]					Do Concentrations Differ Over Time? MOD[b]				Do Concentrations Differ Between Areas? HAC-D vs EDC-D[c]				
Parameter	Units	Transformation	Area	Year	Area x Year		2018	2019	2020	2021	2022	2019 vs 2018	2020 vs 2018	2021 vs 2018	2022 vs 2018	2018	2019	2020	2021	2022
Total Organic Carbon	%	none	<0.001	0.001	0.288	EDC-D	AB	AB	B	B	A	ns	ns	ns	ns	-	-	-	-	-
						HAC-D	AB	AB	B	B	A					-67				
Copper	mg/kg	log10	<0.001	<0.001	<0.001	EDC-D	A	A	A	A	A	ns	ns	ns	ns	-	-	-	-	-
						HAC-D	AB	C	C	A	B	-43	-59	ns	ns	966	489	471	1,580	1,089
Iron	mg/kg	log10	<0.001	0.009	<0.001	EDC-D	A	A	A	A	A	ns	ns	ns	ns	-	-	-	-	-
						HAC-D	A	C	AB	AB	BC	-38	ns	ns	-24	108	ns	71	48	57

P-value < 0.05

Indicates negative MOD

Indicates positive MOD

Notes: "-" indicates comparison not-relevant, "ns" indicates not significant, MOD = Magnitude of Difference, ANOVA = analysis of variance.

[a] Years that do not share a letter are significantly different for that area.

[b] MOD is calculated as $((year_{recent} - year_{older})/year_{older})*100$.

[c] MOD calculated as ((HAC-D - EDC-D)/EDC-D)*100.

Table F.1.5: Spearman's Correlation Relationships Between Analyte of Interest Concentrations (<63 µm Fraction) and Sediment Physical and Chemical Parameters for Upper (HAC-U; Exposed) and Lower (HAC-D; Exposed) Hazeltine Creek, 2018 to 2022

Analyte of Interest	Correlation Parameter	Clay (%)[b]	Total Organic Carbon (%)	Total Nitrogen (%)	Total Sulphur (mg/kg)
Copper (mg/kg)	Correlation Coefficient	0.02880	0.531	0.550	0.651
	Sig. (2-tailed)	0.841	<0.001	<0.001	<0.001
Iron (mg/kg)	Correlation Coefficient	0.0925	-0.688	-0.730	-0.576
	Sig. (2-tailed)	0.519	<0.001	<0.001	<0.001
Selenium (mg/kg)	Correlation Coefficient	-0.08310	0.874	0.880	0.929
	Sig. (2-tailed)	0.562	<0.001	<0.001	<0.001

Significant correlation; p-value < 0. 0125 (p<0.05, Bonferroni corrected for 4 independent variables).

Notes: n=51 for all correlations. Analyte of Interest was defined as an analyte at the exposed areas with a mean concentration that exceeded guidelines as well as reference 95th percentile values. Mg/kg = milligrams per kilogram.

[a] Results below the Laboratory Reporting Limit (LRL) were used at the LRL for calculations.

[b] % clay represents the clay proportion of the < 63 µm (silt and clay) sediment fraction that was used for metals analysis. % clay was calculated as: [% clay] / [% silt and clay].

APPENDIX F.2
PERIPHYTON COMMUNITY
& PRODUCTIVITY

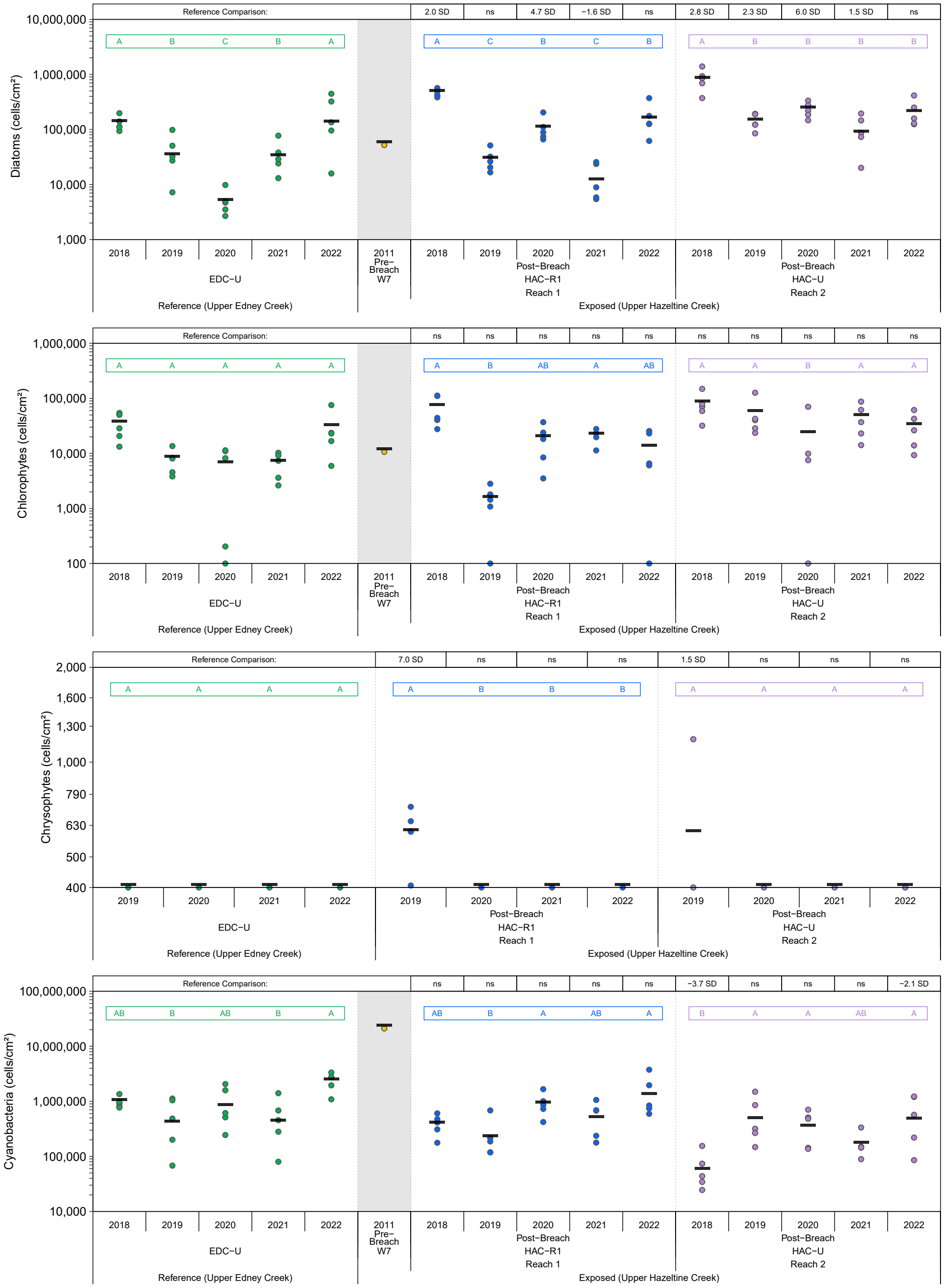


Figure F.2.1: Periphyton Community Endpoints for Upper Hazeltine Creek (HAC−R1, HAC−U; Exposed) and Upper Edney Creek (EDC−U; Reference), 1995 to 2022

Notes: Black bars represent measures of central tendency (mean, geometric mean, or median depending on if analysis was conducted on untransformed, log10−transformed or rank−transformed data). Coloured letters represent significant (p−value <0.1) post−hoc comparisons within areas over time; years that share a letter of the same colour (e.g., A, B) within a box of the same colour do not differ significantly within an area. A number above the plot indicates significant exposed vs. reference post−hoc comparisons within a given year. The magnitude of difference (MOD) for these significant post−hoc comparisons is expressed in units of standard deviation (SD) or median absolute deviations (MAD; if the data were rank−transformed prior to analysis) relative to reference. 'nc' indicates no comparisons were possible; 'ns' indicates a non−significant contrast; 'nm' indicates that the MOD could not be calculated because MAD = 0. Grey shading indicates semi− quantitative data that were not included in statistical comparisons but are shown for visual comparison only. Periphyton data were classified as "Other" taxa in laboratory results issued in 2018 but the taxonomic groups contained in this category were unknown (i.e., unknown taxonomic idenification of these organisms), but suspected to include Phaeophytes, Chrysophytes, and Rhodophytes. Temporal statistical contrasts therefore excluded 2018 data for these taxon groups (Phaeophytes, Chrysophytes, and Rhodophytes) which were reported as absent from all samples in 2018 data. See Minnow 2019a for detailed laboratory results for 2018. Data reported in 2018 for this "Other" category has therefore excluded from data presentation and analyses in the present report. Periphyton taxonomy results have not been reported in an "Other" category by the laboratory since 2018. See report Section 4.2.3.1 for details.

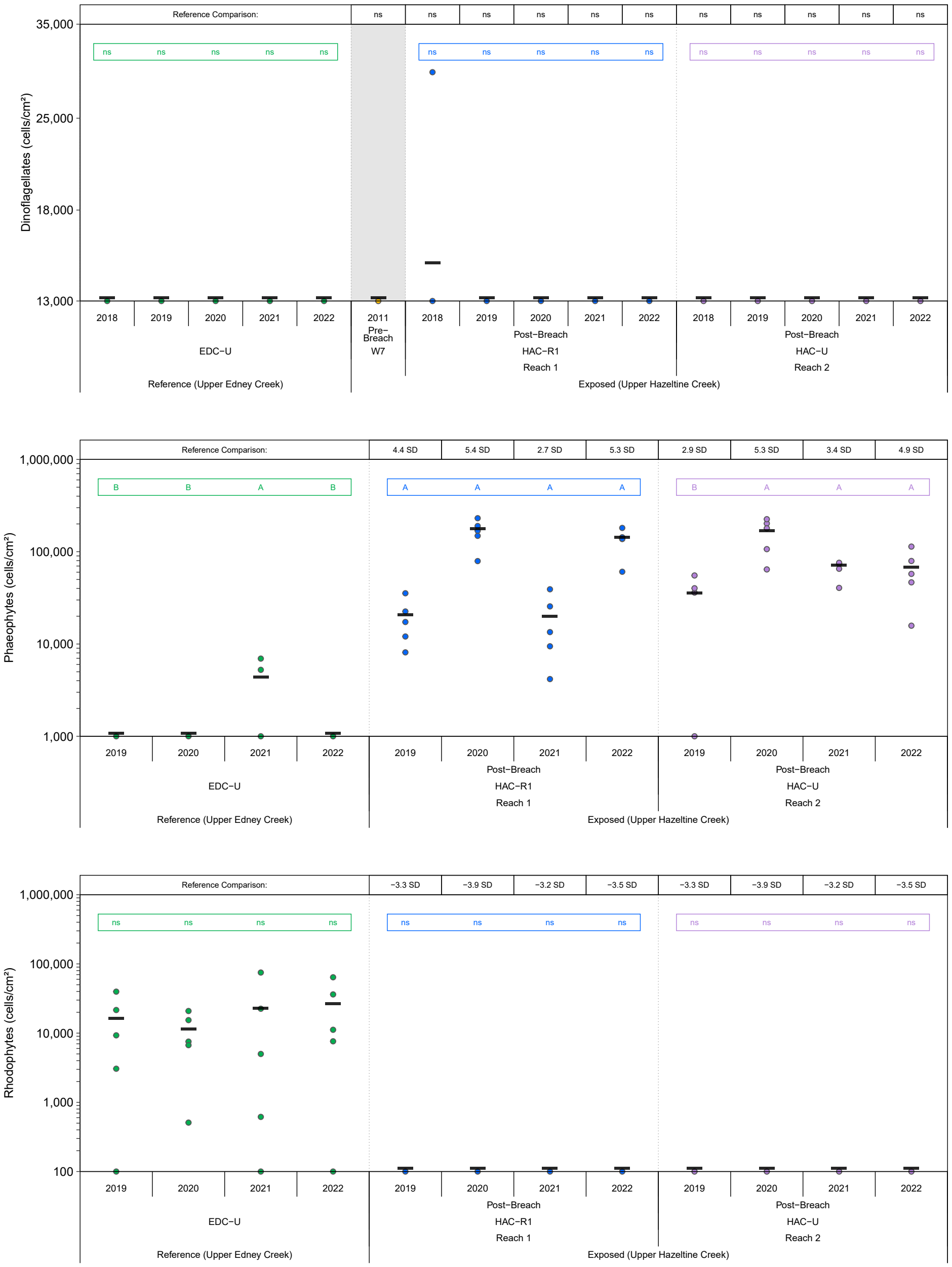


Figure F.2.1: Periphyton Community Endpoints for Upper Hazeltine Creek (HAC−R1, HAC−U; Exposed) and Upper Edney Creek (EDC−U; Reference), 1995 to 2022

Notes: Black bars represent measures of central tendency (mean, geometric mean, or median depending on if analysis was conducted on untransformed, log10−transformed or rank−transformed data). Coloured letters represent significant (p−value <0.1) post−hoc comparisons within areas over time; years that share a letter of the same colour (e.g., A, B) within a box of the same colour do not differ significantly within an area. A number above the plot indicates significant exposed vs. reference post−hoc comparisons within a given year. The magnitude of difference (MOD) for these significant post−hoc comparisons is expressed in units of standard deviation (SD) or median absolute deviations (MAD; if the data were rank−transformed prior to analysis) relative to reference. 'nc' indicates no comparisons were possible; 'ns' indicates a non−significant contrast; 'nm' indicates that the MOD could not be calculated because MAD = 0. Grey shading indicates semi− quantitative data that were not included in statistical comparisons but are shown for visual comparison only. Periphyton data were classified as "Other" taxa in laboratory results issued in 2018 but the taxonomic groups contained in this category were unknown (i.e., unknown taxonomic idenification of these organisms), but suspected to include Phaeophytes, Chrysophytes, and Rhodophytes. Temporal statistical contrasts therefore excluded 2018 data for these taxon groups (Phaeophytes, Chrysophytes, and Rhodophytes) which were reported as absent from all samples in 2018 data. See Minnow 2019a for detailed laboratory results for 2018. Data reported in 2018 for this "Other" category has therefore excluded from data presentation and analyses in the present report. Periphyton taxonomy results have not been reported in an "Other" category by the laboratory since 2018. See report Section 4.2.3.1 for details.

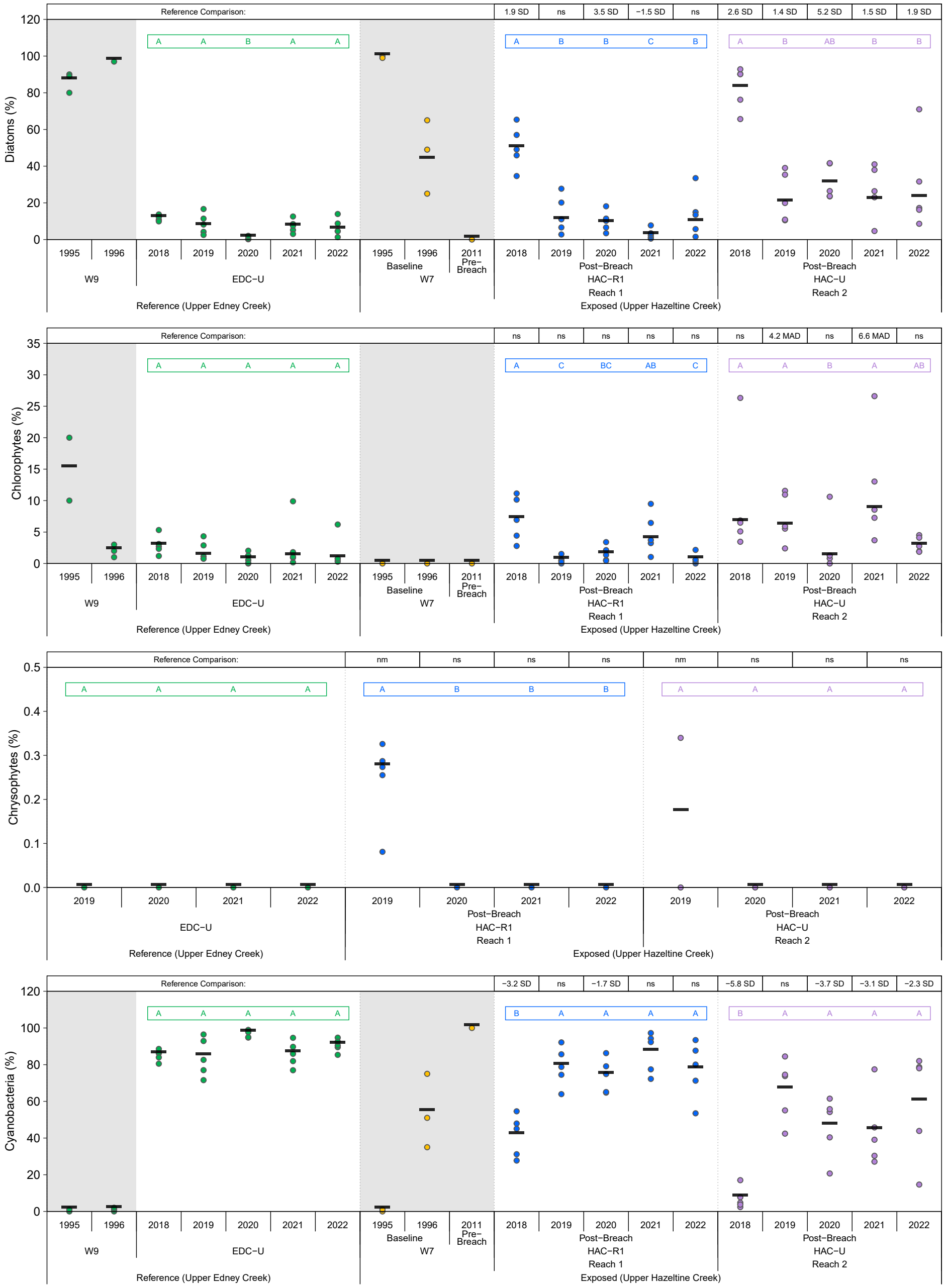


Figure F.2.1: Periphyton Community Endpoints for Upper Hazeltine Creek (HAC−R1, HAC−U; Exposed) and Upper Edney Creek (EDC−U; Reference), 1995 to 2022

Notes: Black bars represent measures of central tendency (mean, geometric mean, or median depending on if analysis was conducted on untransformed, log10−transformed or rank−transformed data). Coloured letters represent significant (p−value <0.1) post−hoc comparisons within areas over time; years that share a letter of the same colour (e.g., A, B) within a box of the same colour do not differ significantly within an area. A number above the plot indicates significant exposed vs. reference post−hoc comparisons within a given year. The magnitude of difference (MOD) for these significant post−hoc comparisons is expressed in units of standard deviation (SD) or median absolute deviations (MAD; if the data were rank−transformed prior to analysis) relative to reference. 'nc' indicates no comparisons were possible; 'ns' indicates a non−significant contrast; 'nm' indicates that the MOD could not be calculated because MAD = 0. Grey shading indicates semi− quantitative data that were not included in statistical comparisons but are shown for visual comparison only. Periphyton data were classified as "Other" taxa in laboratory results issued in 2018 but the taxonomic groups contained in this category were unknown (i.e., unknown taxonomic idenification of these organisms), but suspected to include Phaeophytes, Chrysophytes, and Rhodophytes. Temporal statistical contrasts therefore excluded 2018 data for these taxon groups (Phaeophytes, Chrysophytes, and Rhodophytes) which were reported as absent from all samples in 2018 data. See Minnow 2019a for detailed laboratory results for 2018. Data reported in 2018 for this "Other" category has therefore excluded from data presentation and analyses in the present report. Periphyton taxonomy results have not been reported in an "Other" category by the laboratory since 2018. See report Section 4.2.3.1 for details.

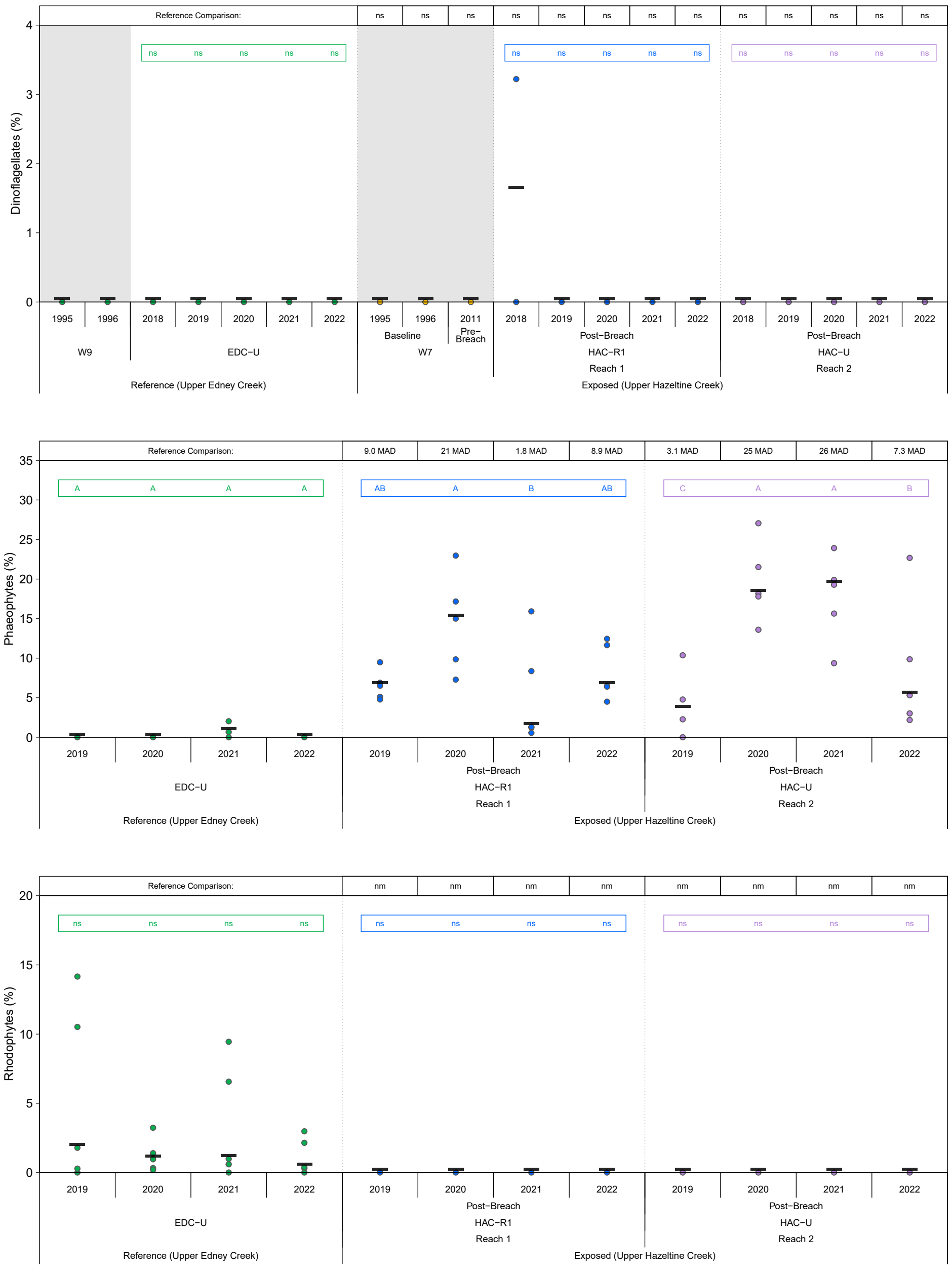


Figure F.2.1: Periphyton Community Endpoints for Upper Hazeltine Creek (HAC−R1, HAC−U; Exposed) and Upper Edney Creek (EDC−U; Reference), 1995 to 2022

Notes: Black bars represent measures of central tendency (mean, geometric mean, or median depending on if analysis was conducted on untransformed, log10−transformed or rank−transformed data). Coloured letters represent significant (p−value <0.1) post−hoc comparisons within areas over time; years that share a letter of the same colour (e.g., A, B) within a box of the same colour do not differ significantly within an area. A number above the plot indicates significant exposed vs. reference post−hoc comparisons within a given year. The magnitude of difference (MOD) for these significant post−hoc comparisons is expressed in units of standard deviation (SD) or median absolute deviations (MAD; if the data were rank−transformed prior to analysis) relative to reference. 'nc' indicates no comparisons were possible; 'ns' indicates a non−significant contrast; 'nm' indicates that the MOD could not be calculated because MAD = 0. Grey shading indicates semi− quantitative data that were not included in statistical comparisons but are shown for visual comparison only. Periphyton data were classified as "Other" taxa in laboratory results issued in 2018 but the taxonomic groups contained in this category were unknown (i.e., unknown taxonomic idenification of these organisms), but suspected to include Phaeophytes, Chrysophytes, and Rhodophytes. Temporal statistical contrasts therefore excluded 2018 data for these taxon groups (Phaeophytes, Chrysophytes, and Rhodophytes) which were reported as absent from all samples in 2018 data. See Minnow 2019a for detailed laboratory results for 2018. Data reported in 2018 for this "Other" category has therefore excluded from data presentation and analyses in the present report. Periphyton taxonomy results have not been reported in an "Other" category by the laboratory since 2018. See report Section 4.2.3.1 for details.

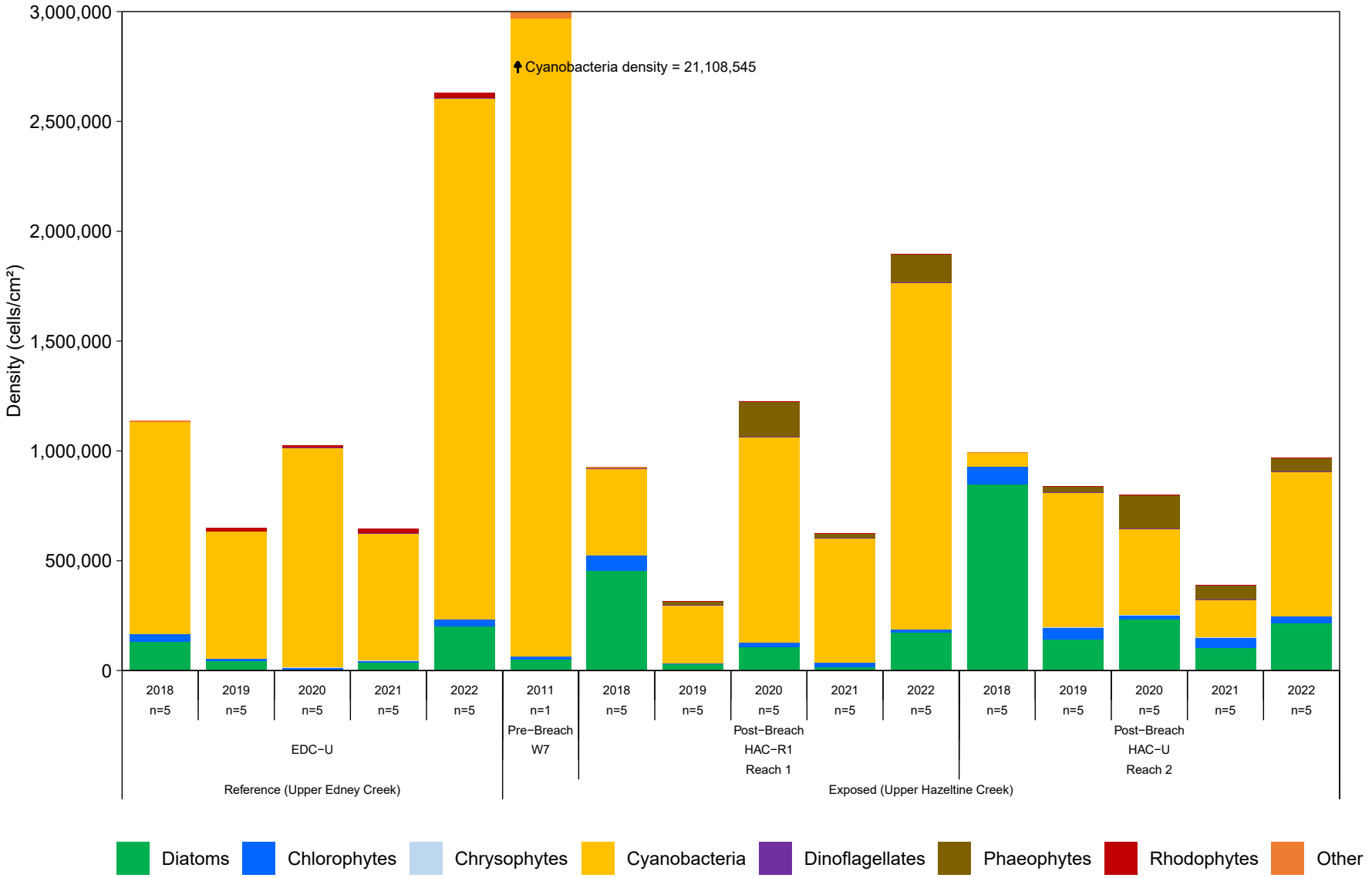


Figure F.2.2: Mean Densities of Major Periphyton Community Taxonomic Groups for Upper Hazeltine Creek (HAC-R1, HAC-U; Exposed) and Upper Edney Creek (EDC-U; Reference), 2011 to 2022

Notes: The sampling area W7 (2011) is the pre-breach equivalent of the post-breach sampling areas HAC-R1 and HAC-U (2018 to 2022). Densities of taxonomic groups are not displayed for baseline (1995 and 1996) results due to the qualitative nature of these data. In 2018 and earlier, Chrysophytes, Phaeophytes, and Rhodophytes are grouped into the 'Other' category. Periphyton data were classified as "Other" taxa in laboratory results issued in 2018 but the taxonomic groups contained in this category were unknown (i.e., unknown taxonomic idenification of these organisms), but suspected to include Phaeophytes, Chrysophytes, and Rhodophytes. See Minnow 2019a for detailed laboratory results for 2018. Periphyton taxonomy results have not been reported in an "Other" category by the laboratory since 2018. See report Section 4.2.3.1 for details.

Table F.2.1: Results of Statistical Comparisons of Periphyton Community Endpoints for Upper Hazeltine Creek (HAC-R1, HAC-U; Exposed) and Upper Edney Creek (EDC-U; Reference), 2018 to 2022

Endpoint	Transformation	2-Way ANOVA P-values			Area Type	Area	Year	MCT[a]	Temporal Contrasts Within Sites										Spatial Comparison Within Years	
									Pairwise Comparisons Between Years					MOD Relative to Baseline[b]						
		Area	Year	Area x Year					2018	2019	2020	2021	2022	2018	2019	2020	2021	2022	HAC-R1	HAC-U
Diatoms (cells/cm²)	log10	-	-	<0.001	Reference	EDC-U	2018	126,176	A	B	C	B	A	Baseline	-2.1	-5.1	-2.2	ns	2.0	2.8
							2019	31,531											ns	2.3
							2020	4,644											4.7	6.0
							2021	30,567											-1.6	1.5
							2022	123,963											ns	ns
					Exposed	HAC-R1	2018	450,027	A	C	B	C	B	Baseline	-4.3	-2.3	-5.7	-1.8			ns
							2019	27,089												2.5
							2020	99,548												ns
							2021	11,119												3.1
							2022	145,276												ns
					Exposed	HAC-U	2018	778,654	A	B	B	B	B	Baseline	-2.7	-1.9	-3.5	-2.2			
							2019	135,723												
							2020	223,317												
							2021	81,504												
							2022	192,176												
Chlorophytes (cells/cm²)	log10(x+1)	-	-	0.014	Reference	EDC-U	2018	29,250	A	A	A	A	A	Baseline	ns	ns	ns	ns	ns	ns
							2019	6,913											ns	ns
							2020	731											ns	ns
							2021	5,798											ns	ns
							2022	20,992											ns	ns
					Exposed	HAC-R1	2018	57,246	A	B	AB	A	AB	Baseline	-2.2	ns	ns	ns			ns
							2019	379												2.0
							2020	13,681												-1.6
							2021	20,221												ns
							2022	1,879												ns
					Exposed	HAC-U	2018	68,990	A	A	B	A	A	Baseline	ns	-2.3	ns	ns			
							2019	42,943												
							2020	349												
							2021	36,554												
							2022	24,563												
Chrysophytes (cells/cm²)	log10(x+1)	-	-	<0.001	Reference	EDC-U	2018	-	-	A	A	A	A	-	Baseline	ns	ns	ns	-		
							2019	0											7.0	1.5
							2020	0											ns	ns
							2021	0											ns	ns
							2022	0											ns	ns
					Exposed	HAC-R1	2018	-	-	A	B	B	B	-	Baseline	-7.0	-7.0	-7.0			-
							2019	586												-5.4
							2020	0												ns
							2021	0												ns
							2022	0												ns
					Exposed	HAC-U	2018	-	-	A	A	A	A	-	Baseline	ns	ns	ns			
							2019	3.10												
							2020	0												
							2021	0												
							2022	0												

P-value < 0.1.
Magnitude of Difference (MOD) < -2.
Magnitude of Difference (MOD) > 2.

Notes: "-" = no data available. "nc" = no comparison. "ns" = no significance. "nm" = Contrast MODs could not be calculated because the Median Absolute Deviation (MAD)=0. Results are only displayed for periphyton community endpoints with sufficient data available to complete statistical analyses. Periphyton data were classified as "Other" taxa in laboratory results issued in 2018 but the taxonomic groups contained in this category were unknown (i.e., unknown taxonomic idenification of these organisms), but suspected to include Phaeophytes, Chrysophytes, and Rhodophytes. Temporal statistical contrasts therefore excluded 2018 data for these taxon groups (Phaeophytes, Chrysophytes, and Rhodophytes) which were reported as absent from all samples in 2018 data. See Minnow 2019a for detailed laboratory results for 2018. Data reported in 2018 for this "Other" category has therefore excluded from data presentation and analyses in the present report. Periphyton taxonomy results have not been reported in an "Other" category by the laboratory since 2018. See report Section 4.2.3.1 for details.

[a] MCT = Measure of Central Tendency, which is the mean, geometric mean, or median depending on if analysis was conducted on untransformed, log_{10}-transformed, or rank-transformed data.

[b] Magnitude of difference (MOD) calculated for two-way ANOVA as (Exposed Mean - Reference Mean)/SD (or [Mean - Baseline Mean]/SD for temporal comparisons) on the transformed scale, where SD was the pooled standard deviation of the model residuals. MOD calculated for Kruskal-Wallis (i.e., rank-transformed data) as (Exposed Median - Reference Median)/MAD, where MAD was the pooled median absolute deviation.

Table F.2.1: Results of Statistical Comparisons of Periphyton Community Endpoints for Upper Hazeltine Creek (HAC-R1, HAC-U; Exposed) and Upper Edney Creek (EDC-U; Reference), 2018 to 2022

Endpoint	Transformation	2-Way ANOVA P-values			Area Type	Area	Year	MCT[a]	Temporal Contrasts Within Sites										Spatial Comparison Within Years	
									Pairwise Comparisons Between Years					MOD Relative to Baseline[b]						
		Area	Year	Area x Year					2018	2019	2020	2021	2022	2018	2019	2020	2021	2022	HAC-R1	HAC-U
Cyanobacteria (cells/cm²)	log10	-	-	0.004	Reference	EDC-U	2018	948,559	AB	B	AB	B	A	Baseline	ns	ns	ns	ns	ns	-3.7
							2019	378,869											ns	ns
							2020	758,872											ns	ns
							2021	396,551											ns	ns
							2022	2,217,139											ns	-2.1
					Exposed	HAC-R1	2018	364,886	AB	B	A	AB	A	Baseline	ns	ns	ns	ns		-2.5
							2019	207,639												ns
							2020	849,061												ns
							2021	461,427												-1.4
							2022	1,223,298												ns
					Exposed	HAC-U	2018	53,085	B	A	A	AB	A	Baseline	2.7	2.3	ns	2.7		
							2019	437,074												
							2020	320,667												
							2021	156,406												
							2022	436,124												
Dinoflagellates (cells/cm²)	log10(x+1)	0.373	0.414	0.446	Reference	EDC-U	2018	0	ns	ns	ns	ns	ns	Baseline	ns	ns	ns	ns	ns	ns
							2019	0											ns	ns
							2020	0											ns	ns
							2021	0											ns	ns
							2022	0											ns	ns
					Exposed	HAC-R1	2018	6.80	ns	ns	ns	ns	ns	Baseline	ns	ns	ns	ns		ns
							2019	0												ns
							2020	0												ns
							2021	0												ns
							2022	0												ns
					Exposed	HAC-U	2018	0	ns	ns	ns	ns	ns	Baseline	ns	ns	ns	ns		
							2019	0												
							2020	0												
							2021	0												
							2022	0												
Phaeophytes (cells/cm²)	log10(x+1)	-	-	0.012	Reference	EDC-U	2018	-	-	B	B	A	B	-	Baseline	ns	1.6	ns	-	
							2019	0											4.4	2.9
							2020	0											5.4	5.3
							2021	32.0											2.7	3.4
							2022	0											5.3	4.9
					Exposed	HAC-R1	2018	-	-	A	A	A	A	-	Baseline	ns	ns	ns		-
							2019	16,835												-1.5
							2020	154,113												ns
							2021	13,960												ns
							2022	124,398												ns
					Exposed	HAC-U	2018	-	-	B	A	A	A	-	Baseline	2.5	2.1	2.0		
							2019	603												
							2020	141,111												
							2021	64,349												
							2022	52,018												

P-value < 0.1.
Magnitude of Difference (MOD) < -2.
Magnitude of Difference (MOD) > 2.

Notes: "-" = no data available. "nc" = no comparison. "ns" = no significance. "nm" = Contrast MODs could not be calculated because the Median Absolute Deviation (MAD)=0. Results are only displayed for periphyton community endpoints with sufficient data available to complete statistical analyses. Periphyton data were classified as "Other" taxa in laboratory results issued in 2018 but the taxonomic groups contained in this category were unknown (i.e., unknown taxonomic idenification of these organisms), but suspected to include Phaeophytes, Chrysophytes, and Rhodophytes. Temporal statistical contrasts therefore excluded 2018 data for these taxon groups (Phaeophytes, Chrysophytes, and Rhodophytes) which were reported as absent from all samples in 2018 data. See Minnow 2019a for detailed laboratory results for 2018. Data reported in 2018 for this "Other" category has therefore excluded from data presentation and analyses in the present report. Periphyton taxonomy results have not been reported in an "Other" category by the laboratory since 2018. See report Section 4.2.3.1 for details.

[a] MCT = Measure of Central Tendency, which is the mean, geometric mean, or median depending on if analysis was conducted on untransformed, $\log_{10}$-transformed, or rank-transformed data.

[b] Magnitude of difference (MOD) calculated for two-way ANOVA as (Exposed Mean - Reference Mean)/SD (or [Mean - Baseline Mean]/SD for temporal comparisons) on the transformed scale, where SD was the pooled standard deviation of the model residuals. MOD calculated for Kruskal-Wallis (i.e., rank-transformed data) as (Exposed Median - Reference Median)/MAD, where MAD was the pooled median absolute deviation.

Table F.2.1: Results of Statistical Comparisons of Periphyton Community Endpoints for Upper Hazeltine Creek (HAC-R1, HAC-U; Exposed) and Upper Edney Creek (EDC-U; Reference), 2018 to 2022

Endpoint	Transformation	2-Way ANOVA P-values			Area Type	Area	Year	MCT[a]	Temporal Contrasts Within Sites										Spatial Comparison Within Years	
									Pairwise Comparisons Between Years					MOD Relative to Baseline[b]						
		Area	Year	Area x Year					2018	2019	2020	2021	2022	2018	2019	2020	2021	2022	HAC-R1	HAC-U
Rhodophytes (cells/cm²)	log10(x+1)	<0.001	0.931	0.991	Reference	EDC-U	2018	-	-	ns	ns	ns	ns	-	Baseline	ns	ns	ns	-	
							2019	1,893											-3.3	-3.3
							2020	6,077											-3.9	-3.9
							2021	1,390											-3.2	-3.2
							2022	2,878											-3.5	-3.5
					Exposed	HAC-R1	2018	-	-	ns	ns	ns	ns	-	Baseline	ns	ns	ns		-
							2019	0												ns
							2020	0												ns
							2021	0												ns
							2022	0												ns
					Exposed	HAC-U	2018	-	-	ns	ns	ns	ns	-	Baseline	ns	ns	ns		
							2019	0												
							2020	0												
							2021	0												
							2022	0												
Diatoms (%)	log10	-	-	<0.001	Reference	EDC-U	2018	0.110	A	A	B	A	A	Baseline	ns	-3.9	ns	ns	1.9	2.6
							2019	0.0700											ns	1.4
							2020	0.00590											3.5	5.2
							2021	0.0660											-1.5	1.5
							2022	0.0510											ns	1.9
					Exposed	HAC-R1	2018	0.490	A	B	B	C	B	Baseline	-2.1	-2.3	-4.2	-2.2		ns
							2019	0.100												ns
							2020	0.0860												1.7
							2021	0.0210												3.1
							2022	0.0900												ns
					Exposed	HAC-U	2018	0.820	A	B	AB	B	B	Baseline	-1.9	ns	-1.8	-1.7		
							2019	0.200												
							2020	0.300												
							2021	0.210												
							2022	0.220												
Chlorophytes (%)	rank	-	-	0.015	Reference	EDC-U	2018	0.0270	A	A	A	A	A	Baseline	ns	ns	ns	ns	ns	ns
							2019	0.0110											ns	4.2
							2020	0.00550											ns	ns
							2021	0.0110											ns	6.6
							2022	0.00740											ns	ns
					Exposed	HAC-R1	2018	0.0690	A	C	BC	AB	C	Baseline	-5.7	-4.9	ns	-5.6		ns
							2019	0.00460												4.8
							2020	0.0140												ns
							2021	0.0370												ns
							2022	0.00570												1.9
					Exposed	HAC-U	2018	0.0650	A	A	B	A	AB	Baseline	ns	-5.0	ns	ns		
							2019	0.0590												
							2020	0.00800												
							2021	0.0850												
							2022	0.0280												

P-value < 0.1.
Magnitude of Difference (MOD) < -2.
Magnitude of Difference (MOD) > 2.

Notes: "-" = no data available. "nc" = no comparison. "ns" = no significance. "nm" = Contrast MODs could not be calculated because the Median Absolute Deviation (MAD)=0. Results are only displayed for periphyton community endpoints with sufficient data available to complete statistical analyses. Periphyton data were classified as "Other" taxa in laboratory results issued in 2018 but the taxonomic groups contained in this category were unknown (i.e., unknown taxonomic idenification of these organisms), but suspected to include Phaeophytes, Chrysophytes, and Rhodophytes. Temporal statistical contrasts therefore excluded 2018 data for these taxon groups (Phaeophytes, Chrysophytes, and Rhodophytes) which were reported as absent from all samples in 2018 data. See Minnow 2019a for detailed laboratory results for 2018. Data reported in 2018 for this "Other" category has therefore excluded from data presentation and analyses in the present report. Periphyton taxonomy results have not been reported in an "Other" category by the laboratory since 2018. See report Section 4.2.3.1 for details.

[a] MCT = Measure of Central Tendency, which is the mean, geometric mean, or median depending on if analysis was conducted on untransformed, log_{10}-transformed, or rank-transformed data.

[b] Magnitude of difference (MOD) calculated for two-way ANOVA as (Exposed Mean - Reference Mean)/SD (or [Mean - Baseline Mean]/SD for temporal comparisons) on the transformed scale, where SD was the pooled standard deviation of the model residuals. MOD calculated for Kruskal-Wallis (i.e., rank-transformed data) as (Exposed Median - Reference Median)/MAD, where MAD was the pooled median absolute deviation.

Table F.2.1: Results of Statistical Comparisons of Periphyton Community Endpoints for Upper Hazeltine Creek (HAC-R1, HAC-U; Exposed) and Upper Edney Creek (EDC-U; Reference), 2018 to 2022

Endpoint	Transformation	2-Way ANOVA P-values			Area Type	Area	Year	MCT[a]	Temporal Contrasts Within Sites										Spatial Comparison Within Years	
									Pairwise Comparisons Between Years					MOD Relative to Baseline[b]						
		Area	Year	Area x Year					2018	2019	2020	2021	2022	2018	2019	2020	2021	2022	HAC-R1	HAC-U
Chrysophytes (%)	rank	-	-	<0.001	Reference	EDC-U	2018	-	-	A	A	A	A	-	Baseline	ns	ns	ns	-	
							2019	0											nm	nm
							2020	0											ns	ns
							2021	0											ns	ns
							2022	0											ns	ns
					Exposed	HAC-R1	2018	-	-	A	B	B	B	-	Baseline	nm	nm	nm		-
							2019	0.00270												nm
							2020	0												ns
							2021	0												ns
							2022	0												ns
					Exposed	HAC-U	2018	-	-	A	A	A	A	-	Baseline	ns	ns	ns		
							2019	0												
							2020	0												
							2021	0												
							2022	0												
Cyanobacteria (%)	none	-	-	<0.001	Reference	EDC-U	2018	0.850	A	A	A	A	A	Baseline	ns	ns	ns	ns	-3.2	-5.8
							2019	0.840											ns	ns
							2020	0.970											-1.7	-3.7
							2021	0.860											ns	-3.1
							2022	0.910											ns	-2.3
					Exposed	HAC-R1	2018	0.410	B	A	A	A	A	Baseline	2.8	2.4	3.4	2.7		-2.5
							2019	0.790												ns
							2020	0.740												-2.0
							2021	0.870												-3.2
							2022	0.770												ns
					Exposed	HAC-U	2018	0.0710	B	A	A	A	A	Baseline	4.4	2.9	2.7	3.9		
							2019	0.660												
							2020	0.460												
							2021	0.440												
							2022	0.590												
Dinoflagellates (%)	rank	0.373	0.414	0.446	Reference	EDC-U	2018	0	ns	ns	ns	ns	ns	Baseline	ns	ns	ns	ns	ns	ns
							2019	0											ns	ns
							2020	0											ns	ns
							2021	0											ns	ns
							2022	0											ns	ns
					Exposed	HAC-R1	2018	0	ns	ns	ns	ns	ns	Baseline	ns	ns	ns	ns		ns
							2019	0												ns
							2020	0												ns
							2021	0												ns
							2022	0												ns
					Exposed	HAC-U	2018	0	ns	ns	ns	ns	ns	Baseline	ns	ns	ns	ns		
							2019	0												
							2020	0												
							2021	0												
							2022	0												

P-value < 0.1.
Magnitude of Difference (MOD) < -2.
Magnitude of Difference (MOD) > 2.

Notes: "-" = no data available. "nc" = no comparison. "ns" = no significance. "nm" = Contrast MODs could not be calculated because the Median Absolute Deviation (MAD)=0. Results are only displayed for periphyton community endpoints with sufficient data available to complete statistical analyses. Periphyton data were classified as "Other" taxa in laboratory results issued in 2018 but the taxonomic groups contained in this category were unknown (i.e., unknown taxonomic idenification of these organisms), but suspected to include Phaeophytes, Chrysophytes, and Rhodophytes. Temporal statistical contrasts therefore excluded 2018 data for these taxon groups (Phaeophytes, Chrysophytes, and Rhodophytes) which were reported as absent from all samples in 2018 data. See Minnow 2019a for detailed laboratory results for 2018. Data reported in 2018 for this "Other" category has therefore excluded from data presentation and analyses in the present report. Periphyton taxonomy results have not been reported in an "Other" category by the laboratory since 2018. See report Section 4.2.3.1 for details.

[a] MCT = Measure of Central Tendency, which is the mean, geometric mean, or median depending on if analysis was conducted on untransformed, $\log_{10}$-transformed, or rank-transformed data.

[b] Magnitude of difference (MOD) calculated for two-way ANOVA as (Exposed Mean - Reference Mean)/SD (or [Mean - Baseline Mean]/SD for temporal comparisons) on the transformed scale, where SD was the pooled standard deviation of the model residuals. MOD calculated for Kruskal-Wallis (i.e., rank-transformed data) as (Exposed Median - Reference Median)/MAD, where MAD was the pooled median absolute deviation.

Table F.2.1: Results of Statistical Comparisons of Periphyton Community Endpoints for Upper Hazeltine Creek (HAC-R1, HAC-U; Exposed) and Upper Edney Creek (EDC-U; Reference), 2018 to 2022

Endpoint	Transformation	2-Way ANOVA P-values			Area Type	Area	Year	MCT[a]	Temporal Contrasts Within Sites										Spatial Comparison Within Years	
									Pairwise Comparisons Between Years					MOD Relative to Baseline[b]						
		Area	Year	Area x Year					2018	2019	2020	2021	2022	2018	2019	2020	2021	2022	HAC-R1	HAC-U
Phaeophytes (%)	rank	-	-	<0.001	Reference	EDC-U	2018	-	-	A	A	A	A	-	Baseline	ns	ns	ns	-	
							2019	0											9.0	3.1
							2020	0											21	25
							2021	0											1.8	26
							2022	0											8.9	7.3
					Exposed	HAC-R1	2018	-	-	AB	A	B	AB	-	Baseline	ns	ns	ns		-
							2019	0.0650												ns
							2020	0.150												ns
							2021	0.0130												25
							2022	0.0650												ns
					Exposed	HAC-U	2018	-	-	C	A	A	B	-	Baseline	22	23	4.2		
							2019	0.0230												
							2020	0.180												
							2021	0.190												
							2022	0.0530												
Rhodophytes (%)	rank	<0.001	0.942	0.994	Reference	EDC-U	2018	-	-	ns	ns	ns	ns	-	Baseline	ns	ns	ns	-	
							2019	0.0180											nm	nm
							2020	0.00960											nm	nm
							2021	0.00980											nm	nm
							2022	0.00370											nm	nm
					Exposed	HAC-R1	2018	-	-	ns	ns	ns	ns	-	Baseline	ns	ns	ns		-
							2019	0												ns
							2020	0												ns
							2021	0												ns
							2022	0												ns
					Exposed	HAC-U	2018	-	-	ns	ns	ns	ns	-	Baseline	ns	ns	ns		
							2019	0												
							2020	0												
							2021	0												
							2022	0												

P-value < 0.1.
Magnitude of Difference (MOD) < -2.
Magnitude of Difference (MOD) > 2.

Notes: "-" = no data available. "nc" = no comparison. "ns" = no significance. "nm" = Contrast MODs could not be calculated because the Median Absolute Deviation (MAD)=0. Results are only displayed for periphyton community endpoints with sufficient data available to complete statistical analyses. Periphyton data were classified as "Other" taxa in laboratory results issued in 2018 but the taxonomic groups contained in this category were unknown (i.e., unknown taxonomic idenification of these organisms), but suspected to include Phaeophytes, Chrysophytes, and Rhodophytes. Temporal statistical contrasts therefore excluded 2018 data for these taxon groups (Phaeophytes, Chrysophytes, and Rhodophytes) which were reported as absent from all samples in 2018 data. See Minnow 2019a for detailed laboratory results for 2018. Data reported in 2018 for this "Other" category has therefore excluded from data presentation and analyses in the present report. Periphyton taxonomy results have not been reported in an "Other" category by the laboratory since 2018. See report Section 4.2.3.1 for details.

[a] MCT = Measure of Central Tendency, which is the mean, geometric mean, or median depending on if analysis was conducted on untransformed, $\log_{10}$-transformed, or rank-transformed data.

[b] Magnitude of difference (MOD) calculated for two-way ANOVA as (Exposed Mean - Reference Mean)/SD (or [Mean - Baseline Mean]/SD for temporal comparisons) on the transformed scale, where SD was the pooled standard deviation of the model residuals. MOD calculated for Kruskal-Wallis (i.e., rank-transformed data) as (Exposed Median - Reference Median)/MAD, where MAD was the pooled median absolute deviation.

Table F.2.2: Results of Statistical Comparisons of Periphyton Productivity Endpoints for Upper Hazeltine Creek (HAC-R1, HAC-U) and Upper Edney Creek (EDC-U; Reference), 2018 to 2022

Endpoint	Transformation	2-Way ANOVA P-values			Area Type	Area	Year[a]	MCT[a]	Temporal Contrasts Within Sites: Pairwise Comparisons Between Years									Temporal Contrasts Within Sites: MOD Relative to Baseline[c,b]									Spatial Comparison Within Years[c]	
		Area	Year	Area x Year					1995 [d]	1996 [d]	2011 [d]	2017	2018	2019	2020	2021	2022	1995	1996	2011	2017	2018	2019	2020	2021	2022	HAC-R1	HAC-U
Chlorophyll-a (mg/m²)	log10	-	-	<0.001	Reference	EDC-U	1995	9.30	BCD	ABC	nc	nc	BCD	AB	CD	D	A	Baseline	ns	nc	nc	ns	ns	ns	ns	2.8	ns	
							1996	16.0																			ns	
							2018	11.0																			ns	ns
							2019	20.0																			1.7	ns
							2020	7.00																			4.1	ns
							2021	5.00																			3.6	3.1
							2022	36.0																			1.7	ns
					Exposed	HAC-R1	1995	8.80	D	BCD	BCD	D	CD	AB	AB	BC	A	Baseline	ns	ns	ns	ns	3.4	3.7	2.5	4.6		nc[e]
							1996	19.0																				nc[e]
							2011	15.0																				nc[e]
							2018	16.0																				ns
							2019	46.0																				ns
							2020	52.0																				-3.0
							2021	29.0																				ns
							2022	82.0																				-2.4
					Exposed	HAC-U	1995	8.80	C	ABC	ABC	nc	BC	A	BC	AB	AB	Baseline	ns	ns	nc	ns	2.8	ns	ns	2.2		
							1996	19.0																				
							2011	15.0																				
							2018	12.0																				
							2019	35.0																				
							2020	12.0																				
							2021	22.0																				
							2022	26.0																				
Ash Free Dry Mass (g/m²)	log10	-	-	<0.001	Reference	EDC-U	1995	-	-	-	-	-	A	A	A	A	A	-	-	-	-	Baseline	ns	ns	ns	ns	-	-
							1996	-																			-	-
							2018	6.00																			ns	ns
							2019	7.90																			3.6	2.4
							2020	7.60																			5.1	3.7
							2021	4.40																			2.2	3.6
							2022	9.20																			4.2	2.3
					Exposed	HAC-R1	1995	-	-	-	-	C	BC	A	A	B	A	-	-	-	Baseline	ns	4.6	6.0	2.1	5.5		-
							1996	-																				-
							2011	-																				-
							2018	11.0																				ns
							2019	55.0																				ns
							2020	121																				-1.4
							2021	14.0																				1.4
							2022	91.0																				-1.9
					Exposed	HAC-U	1995	-	-	-	-	-	B	A	A	A	A	-	-	-	-	Baseline	2.0	3.2	2.1	2.2		
							1996	-																				
							2011	-																				
							2018	9.90																				
							2019	30.0																				
							2020	57.0																				
							2021	31.0																				
							2022	32.0																				

P-value < 0.1.
Magnitude of Difference (MOD) < -2.
Magnitude of Difference (MOD) > 2.

Notes: "-" = no data available. "nc" = no comparison. "ns" = no significance. "nm" = Contrast MODs could not be calculated because the Median Absolute Deviation (MAD) =0.

[a] 1995, 1996 and 2011 data from UHC (W7).

[b] MCT = Measure of Central Tendency, which is the mean, geometric mean, or median depending on if analysis was conducted on untransformed, log_{10}-transformed, or rank-transformed data.

[c] Magnitude of difference (MOD) calculated for two-way ANOVA as (Exposed Mean - Reference Mean)/SD (or [Mean - Baseline Mean]/SD for temporal comparisons) on the transformed scale, where SD was the

[d] Pairwise contrasts of post-breach (2017 to 2022) data from HAC-R1 and HAC-U against baseline (1995 and 1996) and pre-breach (2011) data from W7 are indicated with an * for contrasts to 1995 data , † for contrasts to 1996 data, and ‡ for contrasts to 2011 data in Figure 6.5.

[e] Spatial pairwise contrasts between HAC-R1 and HAC-U in 1995, 1996, and 2011 were not calculated because W7 data from these years represents baseline or pre-breach conditions for both HAC-R1 and HAC-U.

APPENDIX F.3
BENTHIC COMMUNITY
AND PRODUCTIVITY

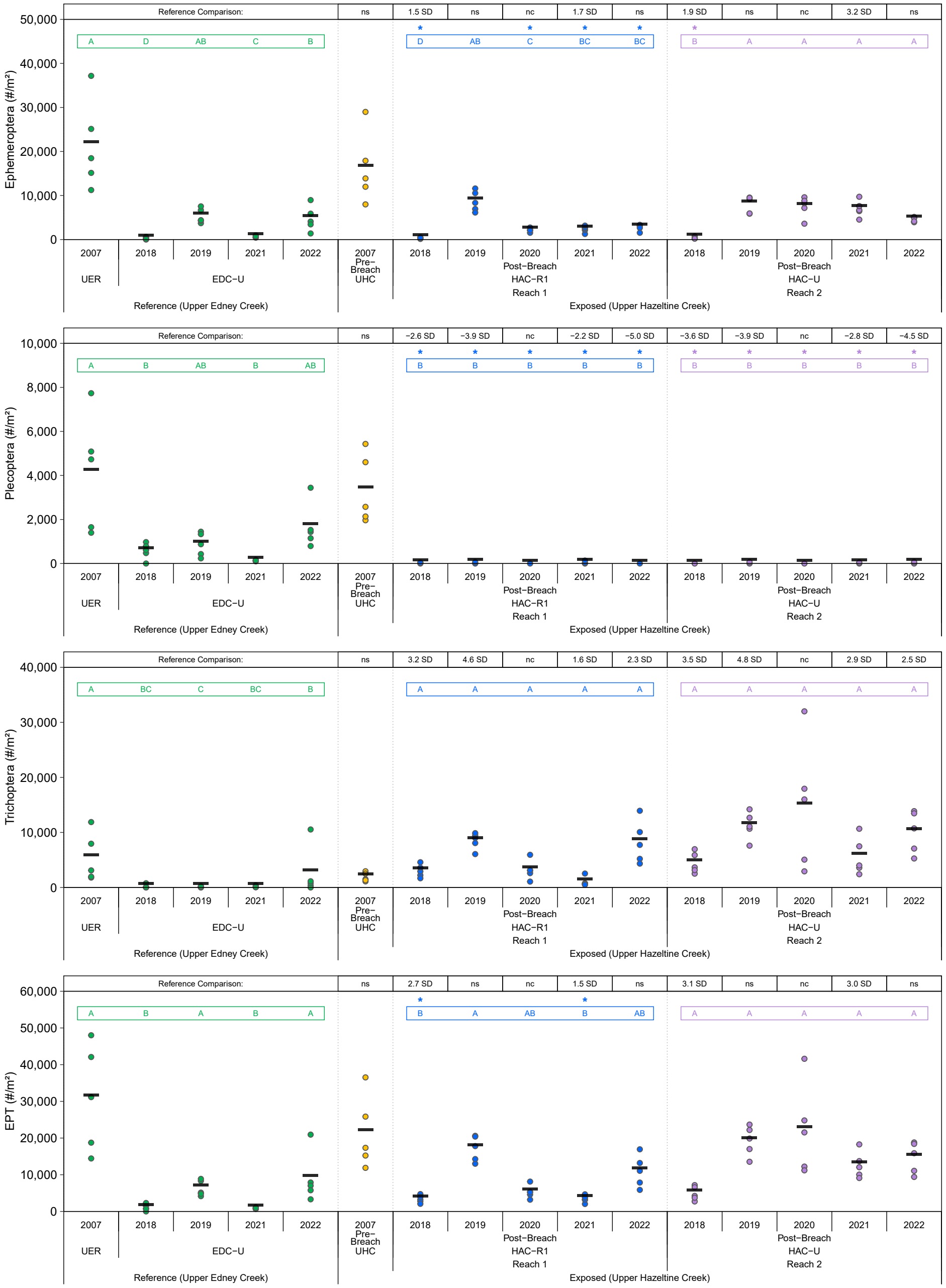


Figure F.3.1: Benthic Invertebrate Community Endpoints for Upper Hazeltine Creek (HAC−R1, HAC−U; Exposed) and Upper Edney Creek (EDC−U; Reference), 2007 to 2022

Notes: Reference area EDC−U was not sampled in 2020 due to habitat differences (in water depth and flow) relative to the remediated areas HAC−R1 and HAC−U. See Section 4.3 for details. Black bars represent measures of central tendency (mean, geometric mean, or median depending on if analysis was conducted on untransformed, log10− transformed or rank−transformed data). Coloured letters represent significant (p−value <0.1) post−hoc comparisons within areas over time; years that share a letter of the same colour (e.g., A, B) within a box of the same colour do not differ significantly within an area. Data from 2007 were used in the analyses to compare post−breach (2018 to 2022) to pre−breach conditions (2007). Post−breach data from HAC−R1 and HAC−U were compared to pre−breach data from UHC, and post −breach data from EDC−U was compared to pre−breach data from UER. An * indicates a significant difference between HAC−R1 or HAC−U and UHC in 2007. A number above the plot indicates significant exposed vs. reference post−hoc comparisons within a given year. The magnitude of difference (MOD) for these significant post−hoc comparisons is expressed in units of standard deviation (SD) or median absolute deviations (MAD; if the data were rank−transformed prior to analysis) relative to reference. 'nc' indicates no comparisons were possible; 'ns' indicates a non−significant contrast; 'nm' indicates that the MOD could not be calculated because MAD = 0.

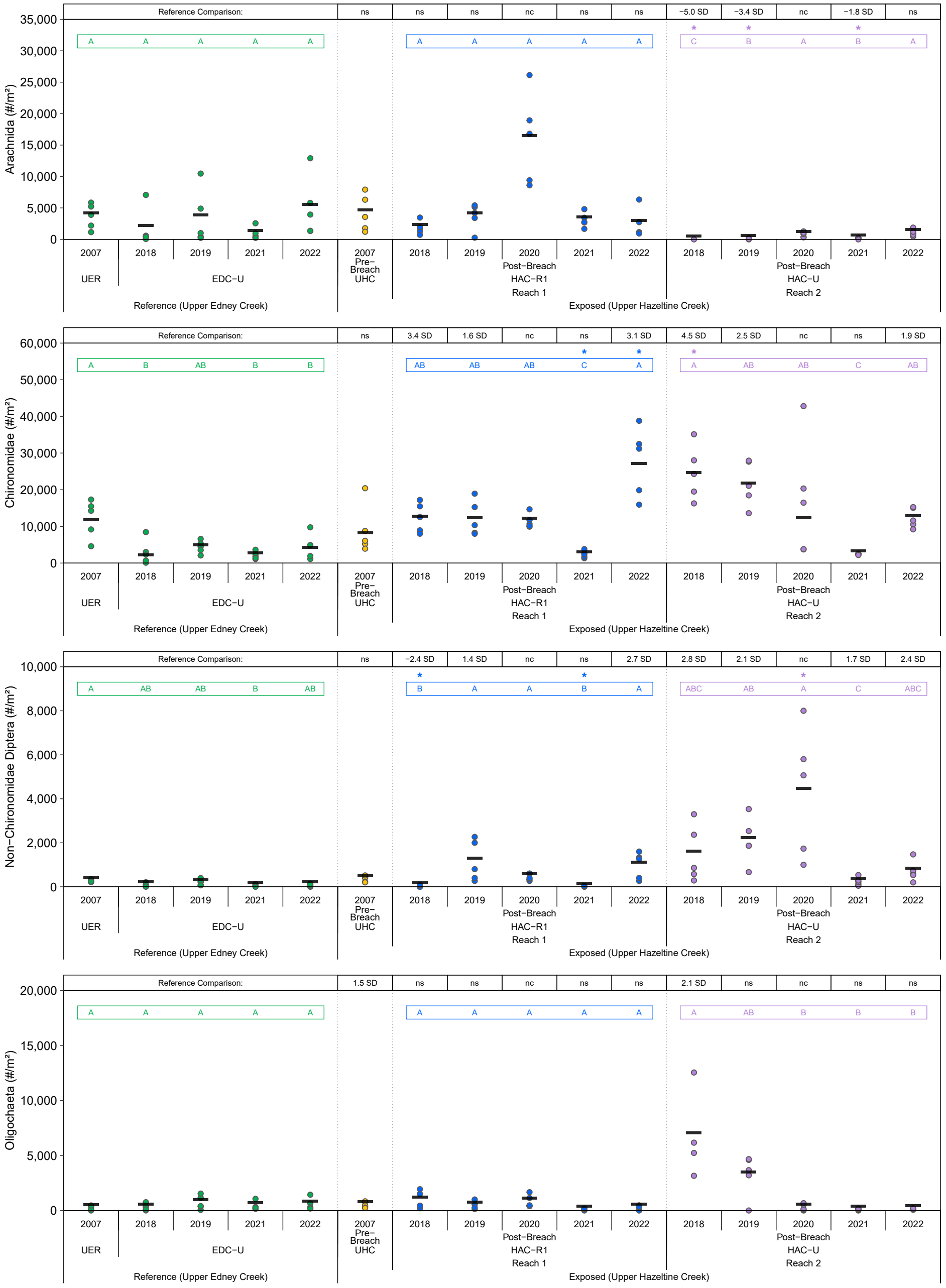


Figure F.3.1: Benthic Invertebrate Community Endpoints for Upper Hazeltine Creek (HAC−R1, HAC−U; Exposed) and Upper Edney Creek (EDC−U; Reference), 2007 to 2022

Notes: Reference area EDC−U was not sampled in 2020 due to habitat differences (in water depth and flow) relative to the remediated areas HAC−R1 and HAC−U. See Section 4.3 for details. Black bars represent measures of central tendency (mean, geometric mean, or median depending on if analysis was conducted on untransformed, log10− transformed or rank−transformed data). Coloured letters represent significant (p−value <0.1) post−hoc comparisons within areas over time; years that share a letter of the same colour (e.g., A, B) within a box of the same colour do not differ significantly within an area. Data from 2007 were used in the analyses to compare post−breach (2018 to 2022) to pre−breach conditions (2007). Post−breach data from HAC−R1 and HAC−U were compared to pre−breach data from UHC, and post −breach data from EDC−U was compared to pre−breach data from UER. An * indicates a significant difference between HAC−R1 or HAC−U and UHC in 2007. A number above the plot indicates significant exposed vs. reference post−hoc comparisons within a given year. The magnitude of difference (MOD) for these significant post−hoc comparisons is expressed in units of standard deviation (SD) or median absolute deviations (MAD; if the data were rank−transformed prior to analysis) relative to reference. 'nc' indicates no comparisons were possible; 'ns' indicates a non−significant contrast; 'nm' indicates that the MOD could not be calculated because MAD = 0.

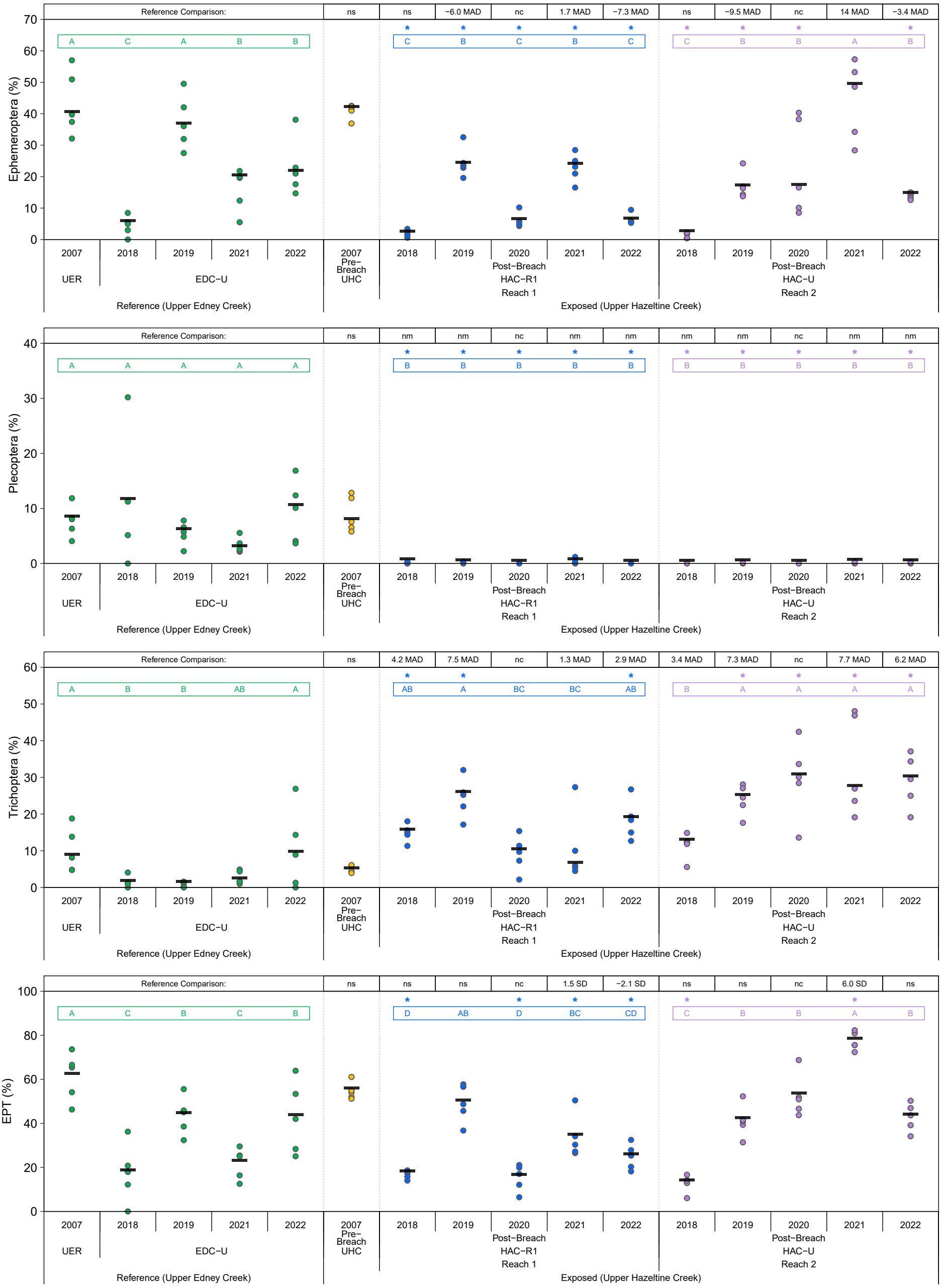


Figure F.3.1: Benthic Invertebrate Community Endpoints for Upper Hazeltine Creek (HAC−R1, HAC−U; Exposed) and Upper Edney Creek (EDC−U; Reference), 2007 to 2022

Notes: Reference area EDC−U was not sampled in 2020 due to habitat differences (in water depth and flow) relative to the remediated areas HAC−R1 and HAC−U. See Section 4.3 for details. Black bars represent measures of central tendency (mean, geometric mean, or median depending on if analysis was conducted on untransformed, log10− transformed or rank−transformed data). Coloured letters represent significant (p−value <0.1) post−hoc comparisons within areas over time; years that share a letter of the same colour (e.g., A, B) within a box of the same colour do not differ significantly within an area. Data from 2007 were used in the analyses to compare post−breach (2018 to 2022) to pre−breach conditions (2007). Post−breach data from HAC−R1 and HAC−U were compared to pre−breach data from UHC, and post −breach data from EDC−U was compared to pre−breach data from UER. An * indicates a significant difference between HAC−R1 or HAC−U and UHC in 2007. A number above the plot indicates significant exposed vs. reference post−hoc comparisons within a given year. The magnitude of difference (MOD) for these significant post−hoc comparisons is expressed in units of standard deviation (SD) or median absolute deviations (MAD; if the data were rank−transformed prior to analysis) relative to reference. 'nc' indicates no comparisons were possible; 'ns' indicates a non−significant contrast; 'nm' indicates that the MOD could not be calculated because MAD = 0.

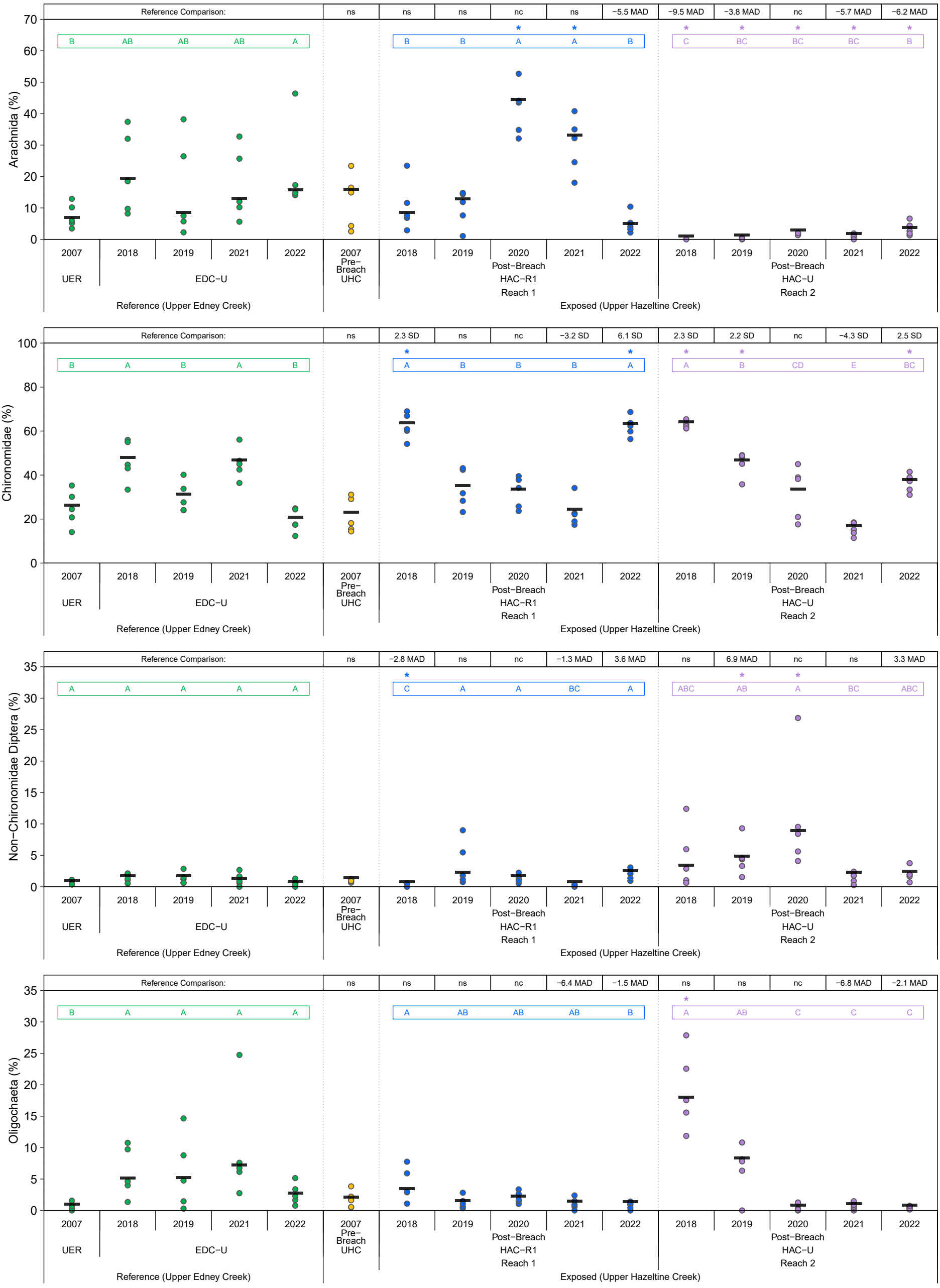


Figure F.3.1: Benthic Invertebrate Community Endpoints for Upper Hazeltine Creek (HAC−R1, HAC−U; Exposed) and Upper Edney Creek (EDC−U; Reference), 2007 to 2022

Notes: Reference area EDC−U was not sampled in 2020 due to habitat differences (in water depth and flow) relative to the remediated areas HAC−R1 and HAC−U. See Section 4.3 for details. Black bars represent measures of central tendency (mean, geometric mean, or median depending on if analysis was conducted on untransformed, log10− transformed or rank−transformed data). Coloured letters represent significant (p−value <0.1) post−hoc comparisons within areas over time; years that share a letter of the same colour (e.g., A, B) within a box of the same colour do not differ significantly within an area. Data from 2007 were used in the analyses to compare post−breach (2018 to 2022) to pre−breach conditions (2007). Post−breach data from HAC−R1 and HAC−U were compared to pre−breach data from UHC, and post −breach data from EDC−U was compared to pre−breach data from UER. An * indicates a significant difference between HAC−R1 or HAC−U and UHC in 2007. A number above the plot indicates significant exposed vs. reference post−hoc comparisons within a given year. The magnitude of difference (MOD) for these significant post−hoc comparisons is expressed in units of standard deviation (SD) or median absolute deviations (MAD; if the data were rank−transformed prior to analysis) relative to reference. 'nc' indicates no comparisons were possible; 'ns' indicates a non−significant contrast; 'nm' indicates that the MOD could not be calculated because MAD = 0.

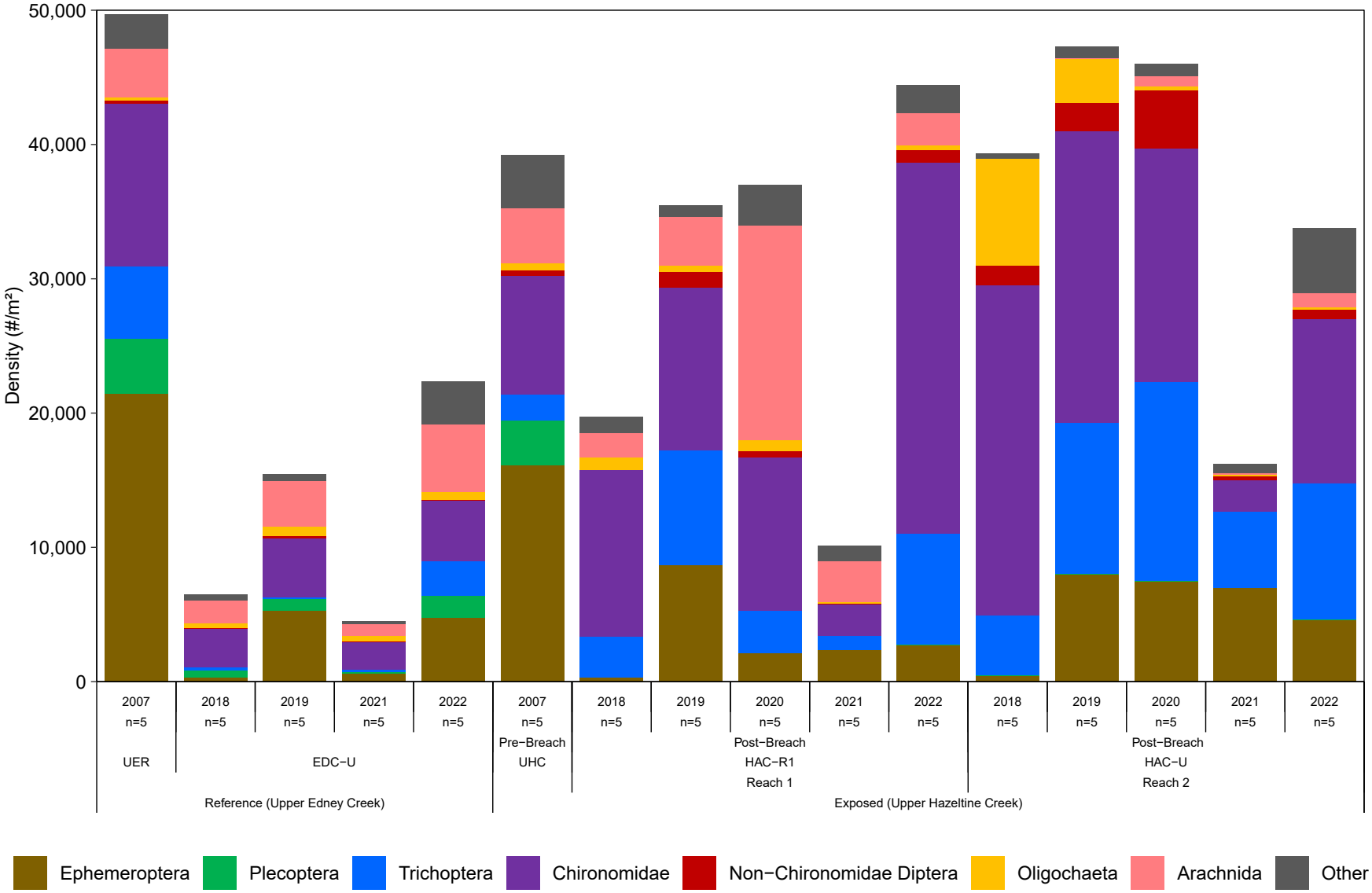


Figure F.3.2: Mean Densities of Major Benthic Invertebrate Community Taxonomic Groups for Upper Hazeltine Creek (HAC-R1, HAC-U; Exposed) and Upper Edney Creek (EDC-U; Reference), 2007 to 2022

Notes: The sampling area UHC (2007) is the pre-breach equivalent of the post-breach sampling areas HAC-R1 and HAC-U (2018 to 2022). The sampling area UER (2007) is the pre-breach equivalent of the post-breach sampling area EDC-U (2018 to 2022).

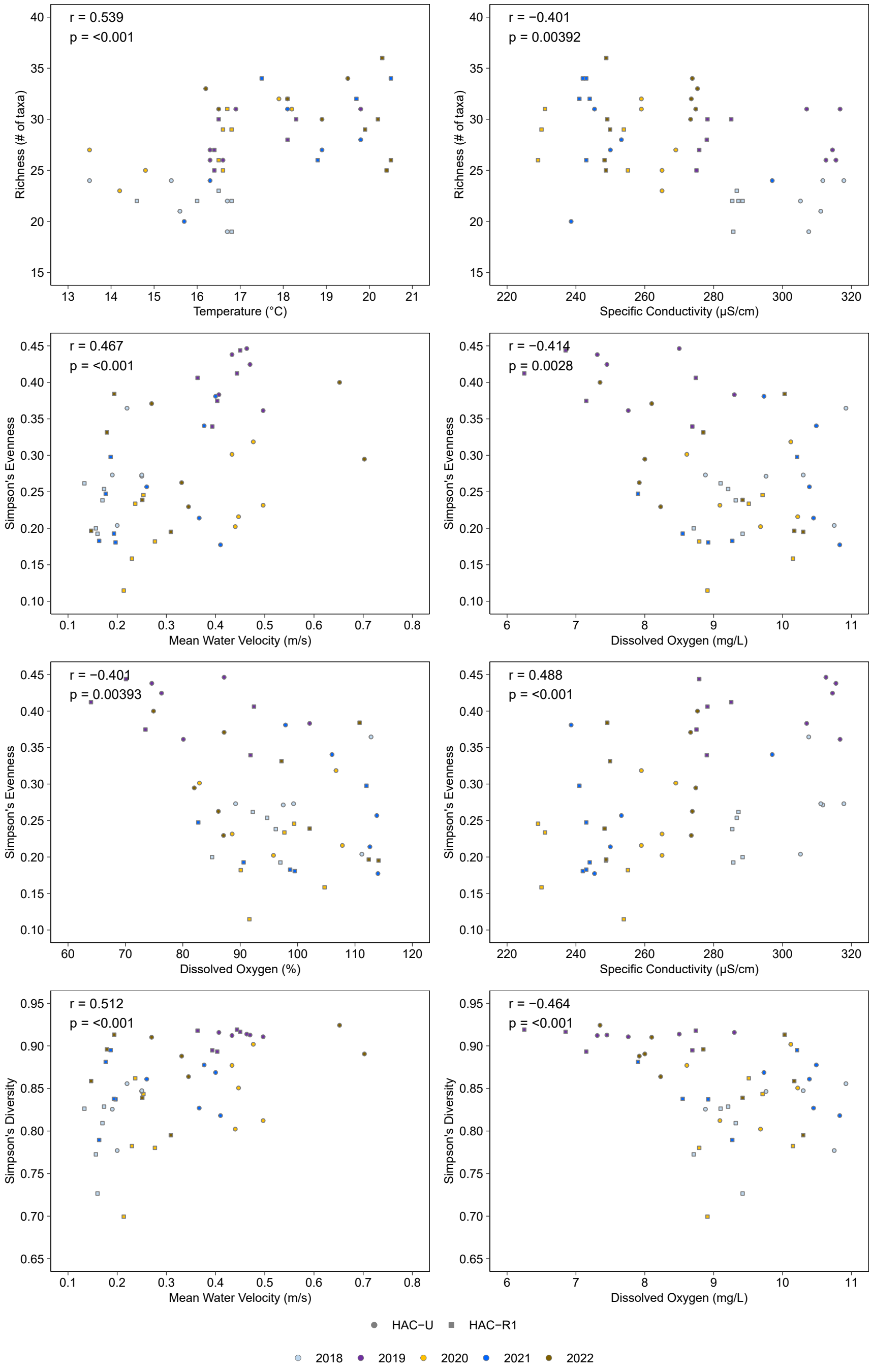


Figure F.3.3: Scatterplots of Spearman's Correlation Relationships (p < 0.05, Bonferroni Corrected) Between Benthic Invertebrate Community Metrics and Supporting In Situ Measures in Upper Hazeltine Creek (HAC−R1, HAC−U), 2018 to 2022

Notes: EPT = Ephemeroptera, Plecoptera, Trichoptera; DW = dry weight; WW = wet weight.

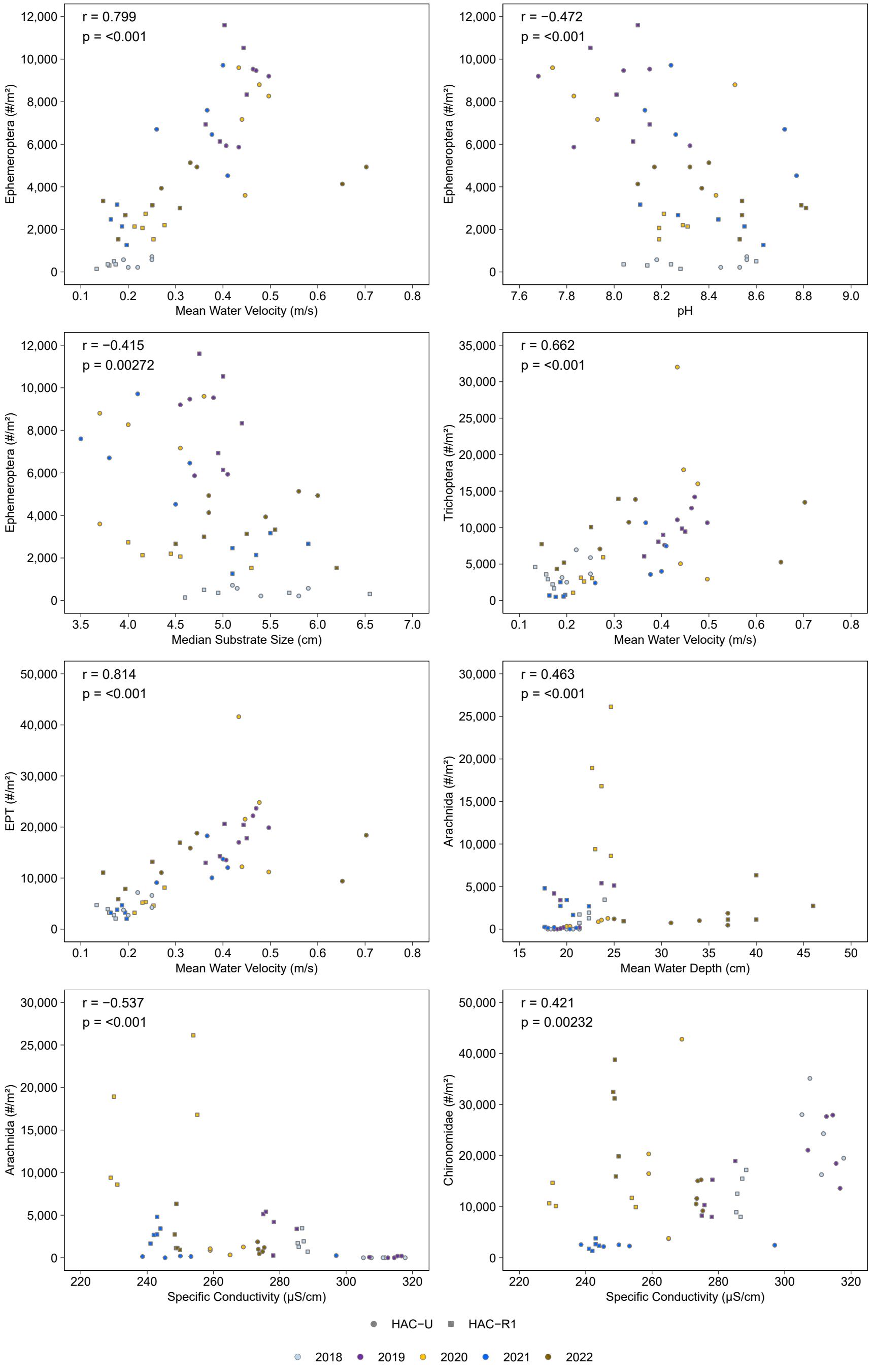


Figure F.3.3: Scatterplots of Spearman's Correlation Relationships (p < 0.05, Bonferroni Corrected) Between Benthic Invertebrate Community Metrics and Supporting In Situ Measures in Upper Hazeltine Creek (HAC−R1, HAC−U), 2018 to 2022

Notes: EPT = Ephemeroptera, Plecoptera, Trichoptera; DW = dry weight; WW = wet weight.

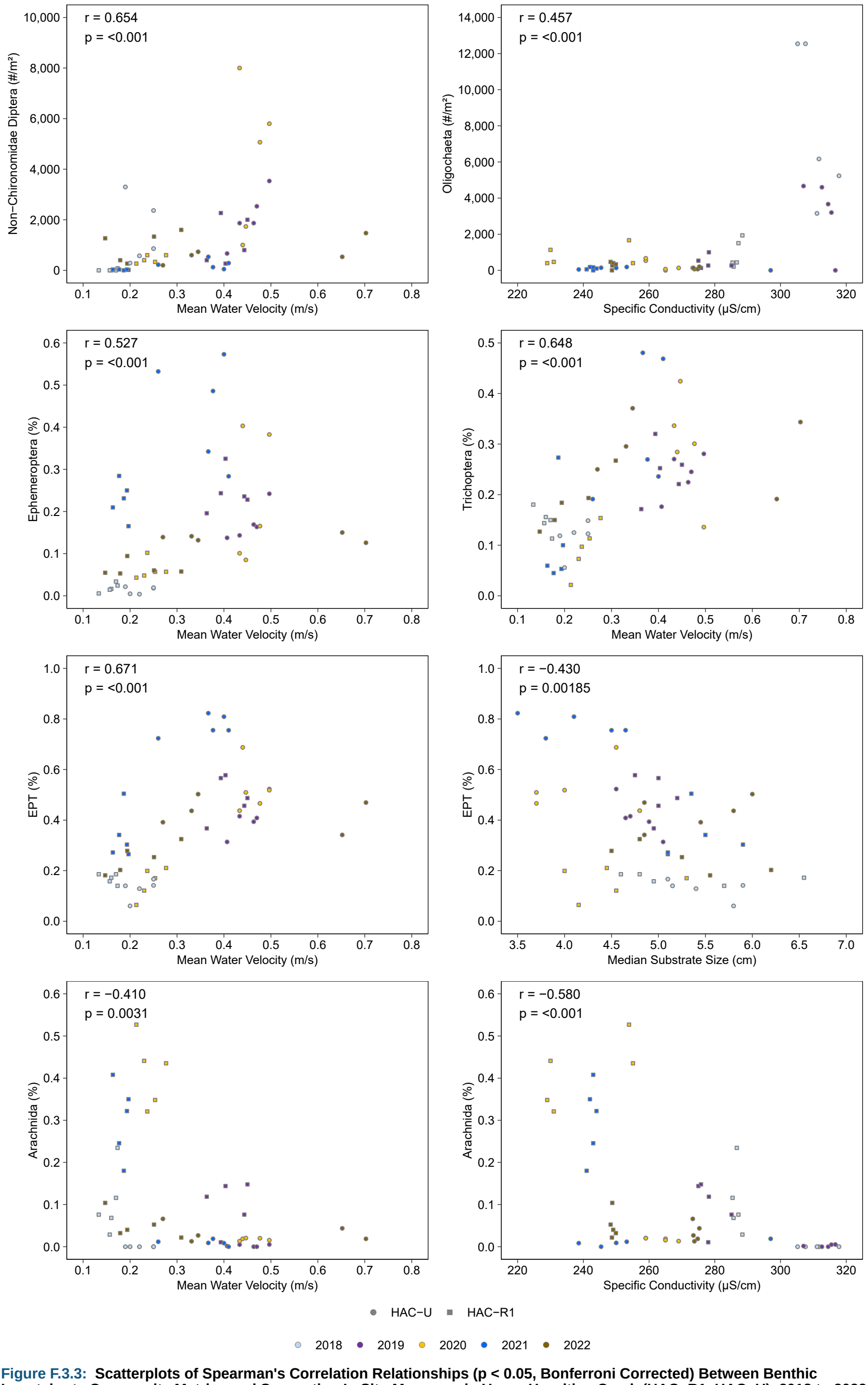


Figure F.3.3: Scatterplots of Spearman's Correlation Relationships (p < 0.05, Bonferroni Corrected) Between Benthic Invertebrate Community Metrics and Supporting In Situ Measures in Upper Hazeltine Creek (HAC−R1, HAC−U), 2018 to 2022

Notes: EPT = Ephemeroptera, Plecoptera, Trichoptera; DW = dry weight; WW = wet weight.

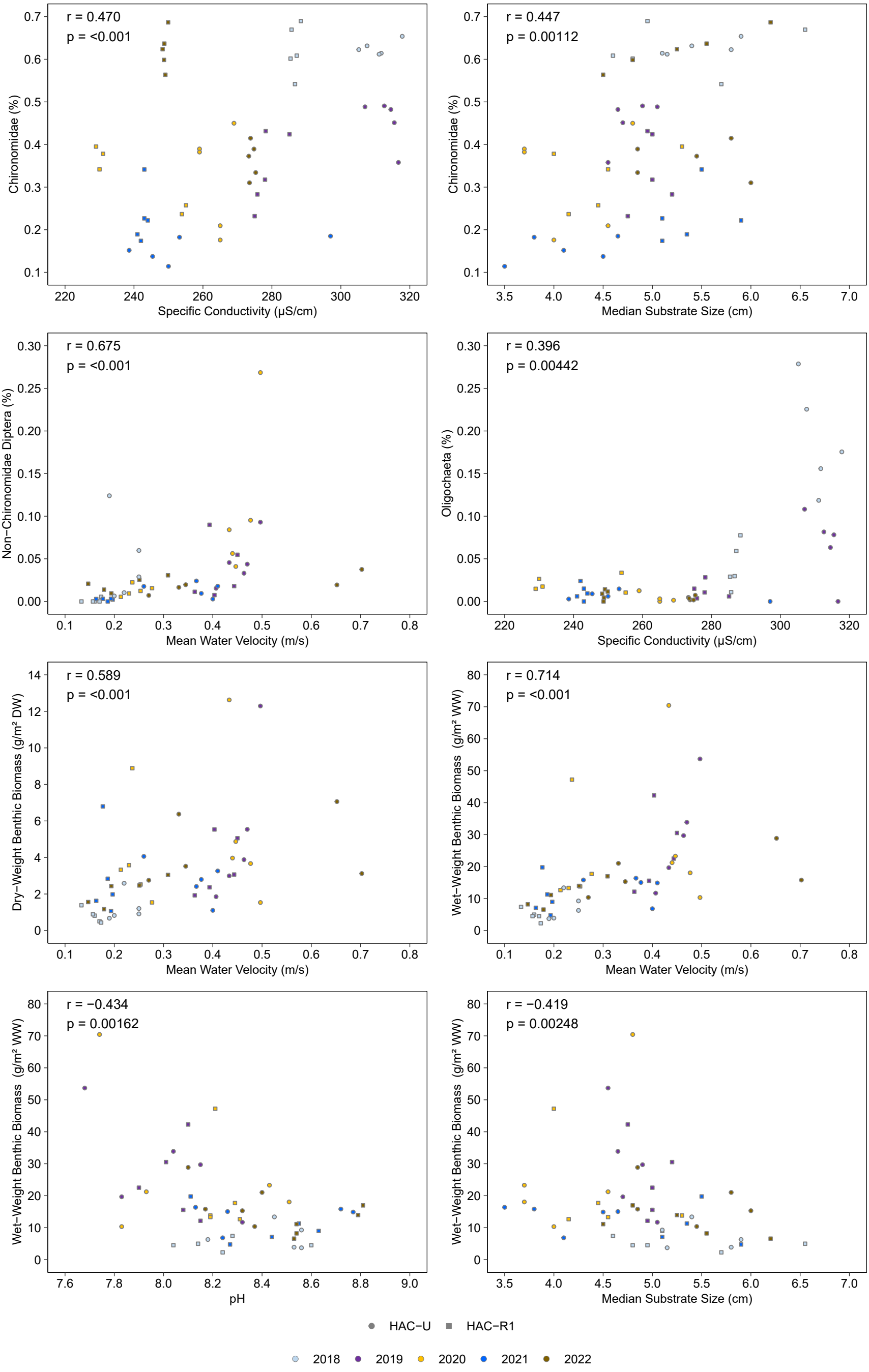


Figure F.3.3: Scatterplots of Spearman's Correlation Relationships (p < 0.05, Bonferroni Corrected) Between Benthic Invertebrate Community Metrics and Supporting In Situ Measures in Upper Hazeltine Creek (HAC−R1, HAC−U), 2018 to 2022

Notes: EPT = Ephemeroptera, Plecoptera, Trichoptera; DW = dry weight; WW = wet weight.

Table F.3.1: Results of Statistical Comparisons of Benthic Invertebrate Community Endpoints for Upper Hazeltine Creek (HAC-R1, HAC-U; Exposed) and Upper Edney Creek (EDC-U; Reference), 2007 to 2022

Endpoint	Transformation	2-Way ANOVA p-values			Area Type	Area	Year[a]	Measures of Central Tendency[b]	Temporal Contrasts Within Sites											Spatial Comparison Within Years[c,e]	
									Pairwise Comparisons Between Years						MOD Relative to Baseline[c]							
		Area	Year	Interaction					2007 (pre-breach)[d]	2018	2019	2020	2021	2022	2007 (pre-breach)	2018	2019	2020	2021	2022	HAC-R1	HAC-U
Ephemeroptera (#/m²)	log10(x+1)	-	-	0.017	Reference	EDC-U	2007	19,658	A	D	AB	nc	C	B	Baseline	-7.0	-1.8	nc	-4.6	-2.1	ns	
							2018	94.0													1.5	1.9
							2019	5,111													ns	ns
							2020	-													nc	nc
							2021	599													1.7	3.2
							2022	4,000													ns	ns
					Exposed	HAC-R1	2007	14,712	A	D	AB	C	BC	BC	Baseline	-5.0	ns	-2.5	-2.5	-2.2		nc
							2018	310														ns
							2019	8,459														ns
							2020	2,098														1.6
							2021	2,240														1.5
							2022	2,640														ns
					Exposed	HAC-U	2007	14,712	A	B	A	A	A	A	Baseline	-4.7	ns	ns	ns	ns		
							2018	405														
							2019	7,802														
							2020	7,098														
							2021	6,793														
							2022	4,587														
Plecoptera (#/m²)	log10(x+1)	-	-	0.083	Reference	EDC-U	2007	3,361	A	B	AB	nc	B	AB	Baseline	-2.0	ns	nc	-2.2	ns	ns	
							2018	185													-2.6	-3.6
							2019	701													-3.9	-3.9
							2020	-													nc	nc
							2021	129													-2.2	-2.8
							2022	1,469													-5.0	-4.5
					Exposed	HAC-R1	2007	3,064	A	B	B	B	B	B	Baseline	-4.5	-5.0	-5.5	-4.4	-5.5		nc
							2018	3.30														ns
							2019	1.30														ns
							2020	0														ns
							2021	4.40														ns
							2022	0														ns
					Exposed	HAC-U	2007	3,064	A	B	B	B	B	B	Baseline	-5.5	-5.0	-5.5	-5.0	-5.0		
							2018	0														
							2019	1.30														
							2020	0														
							2021	1.20														
							2022	1.30														

Magnitude of Difference (MOD) < -2

Magnitude of Difference (MOD) > 2

Notes: "-" = no data available. nc = no comparison. ns = no significance. nm = Contrast MODs could not be calculated because the Median Absolute Deviation (MAD) = 0. EPT = Ephemeroptera, Plecoptera, Trichoptera. DW = dry weight. WW = wet weight. Reference area EDC-U was not sampled in 2020 due to habitat differences (in water depth and flow) relative to the remediated areas HAC-R1 and HAC-U. See Section 4.3 for details

[a] Data from 2007 were used in the analyses to compare post-breach (2018 to 2022) to pre-breach conditions (2007). Post-breach data from HAC-R1 and HAC-U was compared to pre-breach data from UHC, and post-breach data from EDC-U was compared to pre-breach data from UER.

[b] Mean, geometric mean, or median depending on if analysis was conducted on untransformed, log_{10}-transformed, or rank-transformed data.

[c] Magnitude of difference (MOD) calculated for two-way ANOVA as (Exposed Mean - Reference Mean)/SD (or [Mean - Baseline Mean]/SD for temporal comparisons) on the transformed scale, where SD was the pooled standard deviation of the model residuals. MOD calculated for Kruskal-Wallis (i.e., rank-transformed data) as (Exposed Median - Reference Median)/MAD, where MAD was the pooled median absolute deviation.

[d] Pairwise contrasts of post-breach (2018 to 2022) data from HAC-R1 and HAC-U against pre-breach (2007) data from UHC are indicated with in Figure F.3.2.

[e] Spatial pairwise contrasts between HAC-R1 and HAC-U in 2007 were not calculated because UHC in 2007 represents pre-breach data for both HAC-R1 and HAC-U.

Table F.3.1: Results of Statistical Comparisons of Benthic Invertebrate Community Endpoints for Upper Hazeltine Creek (HAC-R1, HAC-U; Exposed) and Upper Edney Creek (EDC-U; Reference), 2007 to 2022

Endpoint	Transformation	2-Way ANOVA p-values			Area Type	Area	Year[a]	Measures of Central Tendency[b]	Temporal Contrasts Within Sites												Spatial Comparison Within Years[c,e]	
									Pairwise Comparisons Between Years						MOD Relative to Baseline[c]							
		Area	Year	Interaction					2007 (pre-breach)[d]	2018	2019	2020	2021	2022	2007 (pre-breach)	2018	2019	2020	2021	2022	HAC-R1	HAC-U
Trichoptera (#/m²)	log10(x+1)	-	-	0.040	Reference	EDC-U	2007	4,005	A	BC	C	nc	BC	B	Baseline	-3.5	-4.1	nc	-2.8	-1.9	ns	
							2018	36.0													3.2	3.5
							2019	15.0													4.6	4.8
							2020	-													nc	nc
							2021	94.0													1.6	2.9
							2022	321													2.3	2.5
					Exposed	HAC-R1	2007	1,744	A	A	A	A	A	A	Baseline	ns	ns	ns	ns	ns		nc
							2018	2,820														ns
							2019	8,372														ns
							2020	2,753														ns
							2021	826														ns
							2022	7,545														ns
					Exposed	HAC-U	2007	1,744	A	A	A	A	A	A	Baseline	ns	ns	ns	ns	ns		
							2018	4,117														
							2019	11,004														
							2020	10,637														
							2021	4,875														
							2022	9,431														
EPT (#/m²)	log10(x+1)	-	-	0.041	Reference	EDC-U	2007	27,942	A	B	A	nc	B	A	Baseline	-5.2	ns	nc	-3.9	ns	ns	
							2018	283													2.7	3.1
							2019	5,968													ns	ns
							2020	-													nc	nc
							2021	877													1.5	3.0
							2022	7,394													ns	ns
					Exposed	HAC-R1	2007	19,692	A	B	A	AB	B	AB	Baseline	-2.1	ns	ns	-2.0	ns		nc
							2018	3,216														ns
							2019	16,921														ns
							2020	5,061														1.5
							2021	3,269														1.5
							2022	10,268														ns
					Exposed	HAC-U	2007	19,692	A	A	A	A	A	A	Baseline	ns	ns	ns	ns	ns		
							2018	4,587														
							2019	18,884														
							2020	19,797														
							2021	12,252														
							2022	14,168														

Magnitude of Difference (MOD) < -2

Magnitude of Difference (MOD) > 2

Notes: "-" = no data available. nc = no comparison. ns = no significance. nm = Contrast MODs could not be calculated because the Median Absolute Deviation (MAD) = 0. EPT = Ephemeroptera, Plecoptera, Trichoptera. DW = dry weight. WW = wet weight. Reference area EDC-U was not sampled in 2020 due to habitat differences (in water depth and flow) relative to the remediated areas HAC-R1 and HAC-U. See Section 4.3 for details

[a] Data from 2007 were used in the analyses to compare post-breach (2018 to 2022) to pre-breach conditions (2007). Post-breach data from HAC-R1 and HAC-U was compared to pre-breach data from UHC, and post-breach data from EDC-U was compared to pre-breach data from UER.

[b] Mean, geometric mean, or median depending on if analysis was conducted on untransformed, log_{10}-transformed, or rank-transformed data.

[c] Magnitude of difference (MOD) calculated for two-way ANOVA as (Exposed Mean - Reference Mean)/SD (or [Mean - Baseline Mean]/SD for temporal comparisons) on the transformed scale, where SD was the pooled standard deviation of the model residuals. MOD calculated for Kruskal-Wallis (i.e., rank-transformed data) as (Exposed Median - Reference Median)/MAD, where MAD was the pooled median absolute deviation.

[d] Pairwise contrasts of post-breach (2018 to 2022) data from HAC-R1 and HAC-U against pre-breach (2007) data from UHC are indicated with in Figure F.3.2.

[e] Spatial pairwise contrasts between HAC-R1 and HAC-U in 2007 were not calculated because UHC in 2007 represents pre-breach data for both HAC-R1 and HAC-U.

Table F.3.1: Results of Statistical Comparisons of Benthic Invertebrate Community Endpoints for Upper Hazeltine Creek (HAC-R1, HAC-U; Exposed) and Upper Edney Creek (EDC-U; Reference), 2007 to 2022

Endpoint	Transformation	2-Way ANOVA p-values			Area Type	Area	Year[a]	Measures of Central Tendency[b]	Temporal Contrasts Within Sites												Spatial Comparison Within Years[c,e]	
									Pairwise Comparisons Between Years						MOD Relative to Baseline[c]							
		Area	Year	Interaction					2007 (pre-breach)[d]	2018	2019	2020	2021	2022	2007 (pre-breach)	2018	2019	2020	2021	2022	HAC-R1	HAC-U
Arachnida (#/m²)	log10(x+1)	-	-	<0.001	Reference	EDC-U	2007	3,126	A	A	A	nc	A	A	Baseline	ns	ns	nc	ns	ns	ns	
							2018	514													ns	-5.0
							2019	1,387													ns	-3.4
							2020	-													nc	nc
							2021	600													ns	-1.8
							2022	3,509													ns	ns
					Exposed	HAC-R1	2007	3,282	A	A	A	A	A	A	Baseline	ns	ns	ns	ns	ns		nc
							2018	1,603														-5.9
							2019	2,541														-3.9
							2020	14,638														-2.5
							2021	2,890														-3.0
							2022	1,834														ns
					Exposed	HAC-U	2007	3,282	A	C	B	A	B	A	Baseline	-6.5	-4.1	ns	-3.1	ns		
							2018	0														
							2019	18.0														
							2020	665														
							2021	63.0														
							2022	948														
Chironomidae (#/m²)	log10	-	-	<0.001	Reference	EDC-U	2007	10,998	A	B	AB	nc	B	B	Baseline	-3.3	ns	nc	-2.7	-1.8	ns	
							2018	1,319													3.4	4.5
							2019	4,090													1.6	2.5
							2020	-													nc	nc
							2021	1,893													ns	ns
							2022	3,458													3.1	1.9
					Exposed	HAC-R1	2007	7,409	B	AB	AB	AB	C	A	Baseline	ns	ns	ns	-1.8	2.0		nc
							2018	11,901														ns
							2019	11,458														ns
							2020	11,306														ns
							2021	2,237														ns
							2022	26,240														ns
					Exposed	HAC-U	2007	7,409	BC	A	AB	AB	C	AB	Baseline	1.8	ns	ns	ns	ns		
							2018	23,772														
							2019	21,005														
							2020	11,518														
							2021	2,406														
							2022	12,092														

Magnitude of Difference (MOD) < -2

Magnitude of Difference (MOD) > 2

Notes: "-" = no data available. nc = no comparison. ns = no significance. nm = Contrast MODs could not be calculated because the Median Absolute Deviation (MAD) = 0. EPT = Ephemeroptera, Plecoptera, Trichoptera. DW = dry weight. WW = wet weight. Reference area EDC-U was not sampled in 2020 due to habitat differences (in water depth and flow) relative to the remediated areas HAC-R1 and HAC-U. See Section 4.3 for details

[a] Data from 2007 were used in the analyses to compare post-breach (2018 to 2022) to pre-breach conditions (2007). Post-breach data from HAC-R1 and HAC-U was compared to pre-breach data from UHC, and post-breach data from EDC-U was compared to pre-breach data from UER.

[b] Mean, geometric mean, or median depending on if analysis was conducted on untransformed, log_{10}-transformed, or rank-transformed data.

[c] Magnitude of difference (MOD) calculated for two-way ANOVA as (Exposed Mean - Reference Mean)/SD (or [Mean - Baseline Mean]/SD for temporal comparisons) on the transformed scale, where SD was the pooled standard deviation of the model residuals. MOD calculated for Kruskal-Wallis (i.e., rank-transformed data) as (Exposed Median - Reference Median)/MAD, where MAD was the pooled median absolute deviation.

[d] Pairwise contrasts of post-breach (2018 to 2022) data from HAC-R1 and HAC-U against pre-breach (2007) data from UHC are indicated with in Figure F.3.2.

[e] Spatial pairwise contrasts between HAC-R1 and HAC-U in 2007 were not calculated because UHC in 2007 represents pre-breach data for both HAC-R1 and HAC-U.

Table F.3.1: Results of Statistical Comparisons of Benthic Invertebrate Community Endpoints for Upper Hazeltine Creek (HAC-R1, HAC-U; Exposed) and Upper Edney Creek (EDC-U; Reference), 2007 to 2022

Endpoint	Transformation	2-Way ANOVA p-values			Area Type	Area	Year[a]	Measures of Central Tendency[b]	Temporal Contrasts Within Sites												Spatial Comparison Within Years[c,e]	
									Pairwise Comparisons Between Years						MOD Relative to Baseline[c]							
		Area	Year	Interaction					2007 (pre-breach)[d]	2018	2019	2020	2021	2022	2007 (pre-breach)	2018	2019	2020	2021	2022	HAC-R1	HAC-U
Non-Chironomidae Diptera (#/m²)	log10(x+1)	-	-	<0.001	Reference	EDC-U	2007	251	A	AB	AB	nc	B	AB	Baseline	ns	ns	nc	-2.0	ns	ns	
							2018	38.0													-2.4	2.8
							2019	161													1.4	2.1
							2020	-													nc	nc
							2021	24.0													ns	1.7
							2022	32.0													2.7	2.4
					Exposed	HAC-R1	2007	338	A	B	A	A	B	A	Baseline	-4.2	ns	ns	-2.6	ns		nc
							2018	1.40														5.1
							2019	827														ns
							2020	418														1.8
							2021	14.0														2.1
							2022	780														ns
					Exposed	HAC-U	2007	338	BC	ABC	AB	A	C	ABC	Baseline	ns	ns	1.9	ns	ns		
							2018	1,020														
							2019	1,835														
							2020	3,327														
							2021	183														
							2022	586														
Oligochaeta (#/m²)	log10(x+1)	-	-	0.012	Reference	EDC-U	2007	27.0	A	A	A	nc	A	A	Baseline	ns	ns	nc	ns	ns	1.5	
							2018	143													ns	2.1
							2019	428													ns	ns
							2020	-													nc	nc
							2021	310													ns	ns
							2022	405													ns	ns
					Exposed	HAC-R1	2007	468	A	A	A	A	A	A	Baseline	ns	ns	ns	ns	ns		nc
							2018	646														ns
							2019	348														ns
							2020	676														ns
							2021	44.0														ns
							2022	110														ns
					Exposed	HAC-U	2007	468	AB	A	AB	B	B	B	Baseline	ns	ns	ns	ns	ns		
							2018	6,933														
							2019	758														
							2020	79.0														
							2021	44.0														
							2022	110														

Magnitude of Difference (MOD) < -2

Magnitude of Difference (MOD) > 2

Notes: "-" = no data available. nc = no comparison. ns = no significance. nm = Contrast MODs could not be calculated because the Median Absolute Deviation (MAD) = 0. EPT = Ephemeroptera, Plecoptera, Trichoptera. DW = dry weight. WW = wet weight. Reference area EDC-U was not sampled in 2020 due to habitat differences (in water depth and flow) relative to the remediated areas HAC-R1 and HAC-U. See Section 4.3 for details

[a] Data from 2007 were used in the analyses to compare post-breach (2018 to 2022) to pre-breach conditions (2007). Post-breach data from HAC-R1 and HAC-U was compared to pre-breach data from UHC, and post-breach data from EDC-U was compared to pre-breach data from UER.

[b] Mean, geometric mean, or median depending on if analysis was conducted on untransformed, log_{10}-transformed, or rank-transformed data.

[c] Magnitude of difference (MOD) calculated for two-way ANOVA as (Exposed Mean - Reference Mean)/SD (or [Mean - Baseline Mean]/SD for temporal comparisons) on the transformed scale, where SD was the pooled standard deviation of the model residuals. MOD calculated for Kruskal-Wallis (i.e., rank-transformed data) as (Exposed Median - Reference Median)/MAD, where MAD was the pooled median absolute deviation.

[d] Pairwise contrasts of post-breach (2018 to 2022) data from HAC-R1 and HAC-U against pre-breach (2007) data from UHC are indicated with in Figure F.3.2.

[e] Spatial pairwise contrasts between HAC-R1 and HAC-U in 2007 were not calculated because UHC in 2007 represents pre-breach data for both HAC-R1 and HAC-U.

Table F.3.1: Results of Statistical Comparisons of Benthic Invertebrate Community Endpoints for Upper Hazeltine Creek (HAC-R1, HAC-U; Exposed) and Upper Edney Creek (EDC-U; Reference), 2007 to 2022

Endpoint	Transformation	2-Way ANOVA p-values			Area Type	Area	Year[a]	Measures of Central Tendency[b]	Temporal Contrasts Within Sites												Spatial Comparison Within Years[c,e]	
									Pairwise Comparisons Between Years						MOD Relative to Baseline[c]							
		Area	Year	Interaction					2007 (pre-breach)[d]	2018	2019	2020	2021	2022	2007 (pre-breach)	2018	2019	2020	2021	2022	HAC-R1	HAC-U
Ephemeroptera (%)	rank	-	-	<0.001	Reference	EDC-U	2007	40.0	A	C	A	nc	B	B	Baseline	-17	ns	nc	-9.7	-9.0	ns	
							2018	5.00													ns	ns
							2019	36.0													-6.0	-9.5
							2020	-													nc	nc
							2021	20.0													1.7	14
							2022	21.0													-7.3	-3.4
					Exposed	HAC-R1	2007	41.0	A	C	B	C	B	C	Baseline	-19	-8.5	-17	-8.8	-17		nc
							2018	1.60														ns
							2019	24.0														ns
							2020	5.70														5.2
							2021	23.0														12
							2022	5.80														ns
					Exposed	HAC-U	2007	41.0	A	C	B	B	A	B	Baseline	-19	-12	-12	ns	-13		
							2018	1.80														
							2019	16.0														
							2020	17.0														
							2021	49.0														
							2022	14.0														
Plecoptera (%)	rank	<0.001	0.689	0.312	Reference	EDC-U	2007	8.00	A	A	A	nc	A	A	Baseline	ns	ns	nc	ns	ns	ns	
							2018	11.0													nm	nm
							2019	5.70													nm	nm
							2020	-													nc	nc
							2021	2.60													nm	nm
							2022	10.0													nm	nm
					Exposed	HAC-R1	2007	7.60	A	B	B	B	B	B	Baseline	nm	nm	nm	nm	nm		nc
							2018	0														ns
							2019	0														ns
							2020	0														ns
							2021	0														ns
							2022	0														ns
					Exposed	HAC-U	2007	7.60	A	B	B	B	B	B	Baseline	nm	nm	nm	nm	nm		
							2018	0														
							2019	0														
							2020	0														
							2021	0														
							2022	0														

Magnitude of Difference (MOD) < -2

Magnitude of Difference (MOD) > 2

Notes: "-" = no data available. nc = no comparison. ns = no significance. nm = Contrast MODs could not be calculated because the Median Absolute Deviation (MAD) = 0. EPT = Ephemeroptera, Plecoptera, Trichoptera. DW = dry weight. WW = wet weight. Reference area EDC-U was not sampled in 2020 due to habitat differences (in water depth and flow) relative to the remediated areas HAC-R1 and HAC-U. See Section 4.3 for details

[a] Data from 2007 were used in the analyses to compare post-breach (2018 to 2022) to pre-breach conditions (2007). Post-breach data from HAC-R1 and HAC-U was compared to pre-breach data from UHC, and post-breach data from EDC-U was compared to pre-breach data from UER.

[b] Mean, geometric mean, or median depending on if analysis was conducted on untransformed, log_{10}-transformed, or rank-transformed data.

[c] Magnitude of difference (MOD) calculated for two-way ANOVA as (Exposed Mean - Reference Mean)/SD (or [Mean - Baseline Mean]/SD for temporal comparisons) on the transformed scale, where SD was the pooled standard deviation of the model residuals. MOD calculated for Kruskal-Wallis (i.e., rank-transformed data) as (Exposed Median - Reference Median)/MAD, where MAD was the pooled median absolute deviation.

[d] Pairwise contrasts of post-breach (2018 to 2022) data from HAC-R1 and HAC-U against pre-breach (2007) data from UHC are indicated with in Figure F.3.2.

[e] Spatial pairwise contrasts between HAC-R1 and HAC-U in 2007 were not calculated because UHC in 2007 represents pre-breach data for both HAC-R1 and HAC-U.

Table F.3.1: Results of Statistical Comparisons of Benthic Invertebrate Community Endpoints for Upper Hazeltine Creek (HAC-R1, HAC-U; Exposed) and Upper Edney Creek (EDC-U; Reference), 2007 to 2022

Endpoint	Transformation	2-Way ANOVA p-values			Area Type	Area	Year[a]	Measures of Central Tendency[b]	Temporal Contrasts Within Sites											Spatial Comparison Within Years[c,e]	
									Pairwise Comparisons Between Years						MOD Relative to Baseline[c]							
		Area	Year	Interaction					2007 (pre-breach)[d]	2018	2019	2020	2021	2022	2007 (pre-breach)	2018	2019	2020	2021	2022	HAC-R1	HAC-U
Trichoptera (%)	rank	-	-	<0.001	Reference	EDC-U	2007	8.10	A	B	B	nc	AB	A	Baseline	-2.1	-2.4	nc	ns	ns	ns	ns
							2018	1.10													4.2	3.4
							2019	0.320													7.5	7.3
							2020	-													nc	nc
							2021	1.70													1.3	7.7
							2022	8.90													2.9	6.2
					Exposed	HAC-R1	2007	4.40	C	AB	A	BC	BC	AB	Baseline	3.2	6.3	ns	ns	4.2		nc
							2018	15.0														ns
							2019	25.0														ns
							2020	9.70														6.2
							2021	5.90														6.4
							2022	18.0														3.4
					Exposed	HAC-U	2007	4.40	B	B	A	A	A	A	Baseline	ns	6.1	7.8	6.8	7.6		
							2018	12.0														
							2019	25.0														
							2020	30.0														
							2021	27.0														
							2022	30.0														
EPT (%)	log10(x+1)	-	-	<0.001	Reference	EDC-U	2007	61.0	A	C	B	nc	C	B	Baseline	-5.1	-1.9	nc	-4.5	-2.0	ns	
							2018	17.0													ns	ns
							2019	43.0													ns	ns
							2020	-													nc	nc
							2021	22.0													1.5	6.0
							2022	42.0													-2.1	ns
					Exposed	HAC-R1	2007	55.0	A	D	AB	D	BC	CD	Baseline	-4.5	ns	-4.7	-2.4	-3.4		nc
							2018	17.0														ns
							2019	49.0														ns
							2020	15.0														4.5
							2021	33.0														4.5
							2022	25.0														2.2
					Exposed	HAC-U	2007	55.0	B	C	B	B	A	B	Baseline	-5.1	ns	ns	2.2	ns		
							2018	13.0														
							2019	41.0														
							2020	52.0														
							2021	77.0														
							2022	43.0														

Magnitude of Difference (MOD) < -2

Magnitude of Difference (MOD) > 2

Notes: "-" = no data available. nc = no comparison. ns = no significance. nm = Contrast MODs could not be calculated because the Median Absolute Deviation (MAD) = 0. EPT = Ephemeroptera, Plecoptera, Trichoptera. DW = dry weight. WW = wet weight. Reference area EDC-U was not sampled in 2020 due to habitat differences (in water depth and flow) relative to the remediated areas HAC-R1 and HAC-U. See Section 4.3 for details

[a] Data from 2007 were used in the analyses to compare post-breach (2018 to 2022) to pre-breach conditions (2007). Post-breach data from HAC-R1 and HAC-U was compared to pre-breach data from UHC, and post-breach data from EDC-U was compared to pre-breach data from UER.

[b] Mean, geometric mean, or median depending on if analysis was conducted on untransformed, log_{10}-transformed, or rank-transformed data.

[c] Magnitude of difference (MOD) calculated for two-way ANOVA as (Exposed Mean - Reference Mean)/SD (or [Mean - Baseline Mean]/SD for temporal comparisons) on the transformed scale, where SD was the pooled standard deviation of the model residuals. MOD calculated for Kruskal-Wallis (i.e., rank-transformed data) as (Exposed Median - Reference Median)/MAD, where MAD was the pooled median absolute deviation.

[d] Pairwise contrasts of post-breach (2018 to 2022) data from HAC-R1 and HAC-U against pre-breach (2007) data from UHC are indicated with in Figure F.3.2.

[e] Spatial pairwise contrasts between HAC-R1 and HAC-U in 2007 were not calculated because UHC in 2007 represents pre-breach data for both HAC-R1 and HAC-U.

Table F.3.1: Results of Statistical Comparisons of Benthic Invertebrate Community Endpoints for Upper Hazeltine Creek (HAC-R1, HAC-U; Exposed) and Upper Edney Creek (EDC-U; Reference), 2007 to 2022

Endpoint	Transformation	2-Way ANOVA p-values			Area Type	Area	Year[a]	Measures of Central Tendency[b]	Temporal Contrasts Within Sites												Spatial Comparison Within Years[c,e]	
									Pairwise Comparisons Between Years						MOD Relative to Baseline[c]							
		Area	Year	Interaction					2007 (pre-breach)[d]	2018	2019	2020	2021	2022	2007 (pre-breach)	2018	2019	2020	2021	2022	HAC-R1	HAC-U
Arachnida (%)	rank	-	-	<0.001	Reference	EDC-U	2007	6.00	B	AB	AB	nc	AB	A	Baseline	ns	ns	nc	ns	4.5	ns	
							2018	18.0													ns	-9.5
							2019	7.50													ns	-3.8
							2020	-													nc	nc
							2021	12.0													ns	-5.7
							2022	15.0													-5.5	-6.2
					Exposed	HAC-R1	2007	15.0	B	B	B	A	A	B	Baseline	ns	ns	15	8.9	ns		nc
							2018	7.60														-3.9
							2019	12.0														-6.0
							2020	44.0														-21
							2021	32.0														-16
							2022	4.00														ns
					Exposed	HAC-U	2007	15.0	A	C	BC	BC	BC	B	Baseline	-7.7	-7.6	-6.7	-7.2	-6.3		
							2018	0														
							2019	0.150														
							2020	1.90														
							2021	0.900														
							2022	2.70														
Chironomidae (%)	none	-	-	<0.001	Reference	EDC-U	2007	25.0	B	A	B	nc	A	B	Baseline	3.1	ns	nc	2.9	ns	ns	
							2018	46.0													2.3	2.3
							2019	30.0													ns	2.2
							2020	-													nc	nc
							2021	45.0													-3.2	-4.3
							2022	19.0													6.1	2.5
					Exposed	HAC-R1	2007	22.0	B	A	B	B	B	A	Baseline	5.8	ns	ns	ns	5.8		nc
							2018	62.0														ns
							2019	34.0														1.7
							2020	32.0														ns
							2021	23.0														ns
							2022	62.0														-3.7
					Exposed	HAC-U	2007	22.0	DE	A	B	CD	E	BC	Baseline	5.9	3.4	ns	ns	2.1		
							2018	63.0														
							2019	45.0														
							2020	32.0														
							2021	15.0														
							2022	36.0														

Magnitude of Difference (MOD) < -2

Magnitude of Difference (MOD) > 2

Notes: "-" = no data available. nc = no comparison. ns = no significance. nm = Contrast MODs could not be calculated because the Median Absolute Deviation (MAD) = 0. EPT = Ephemeroptera, Plecoptera, Trichoptera. DW = dry weight. WW = wet weight. Reference area EDC-U was not sampled in 2020 due to habitat differences (in water depth and flow) relative to the remediated areas HAC-R1 and HAC-U. See Section 4.3 for details

[a] Data from 2007 were used in the analyses to compare post-breach (2018 to 2022) to pre-breach conditions (2007). Post-breach data from HAC-R1 and HAC-U was compared to pre-breach data from UHC, and post-breach data from EDC-U was compared to pre-breach data from UER.

[b] Mean, geometric mean, or median depending on if analysis was conducted on untransformed, $\log_{10}$-transformed, or rank-transformed data.

[c] Magnitude of difference (MOD) calculated for two-way ANOVA as (Exposed Mean - Reference Mean)/SD (or [Mean - Baseline Mean]/SD for temporal comparisons) on the transformed scale, where SD was the pooled standard deviation of the model residuals. MOD calculated for Kruskal-Wallis (i.e., rank-transformed data) as (Exposed Median - Reference Median)/MAD, where MAD was the pooled median absolute deviation.

[d] Pairwise contrasts of post-breach (2018 to 2022) data from HAC-R1 and HAC-U against pre-breach (2007) data from UHC are indicated with in Figure F.3.2.

[e] Spatial pairwise contrasts between HAC-R1 and HAC-U in 2007 were not calculated because UHC in 2007 represents pre-breach data for both HAC-R1 and HAC-U.

Table F.3.1: Results of Statistical Comparisons of Benthic Invertebrate Community Endpoints for Upper Hazeltine Creek (HAC-R1, HAC-U; Exposed) and Upper Edney Creek (EDC-U; Reference), 2007 to 2022

Endpoint	Transformation	2-Way ANOVA p-values			Area Type	Area	Year[a]	Measures of Central Tendency[b]	Temporal Contrasts Within Sites												Spatial Comparison Within Years[c,e]	
									Pairwise Comparisons Between Years						MOD Relative to Baseline[c]							
		Area	Year	Interaction					2007 (pre-breach)[d]	2018	2019	2020	2021	2022	2007 (pre-breach)	2018	2019	2020	2021	2022	HAC-R1	HAC-U
Non-Chironomidae Diptera (%)	rank	-	-	<0.001	Reference	EDC-U	2007	0.520	A	A	A	nc	A	A	Baseline	ns	ns	nc	ns	ns	ns	
							2018	1.30													-2.8	ns
							2019	1.20													ns	6.9
							2020	-													nc	nc
							2021	0.880													-1.3	ns
							2022	0.400													3.6	3.3
					Exposed	HAC-R1	2007	0.930	AB	C	A	A	BC	A	Baseline	-2.0	ns	ns	ns	ns		nc
							2018	0														6.2
							2019	1.80														ns
							2020	1.20														16
							2021	0.280														3.2
							2022	2.10														ns
					Exposed	HAC-U	2007	0.930	C	ABC	AB	A	BC	ABC	Baseline	ns	7.5	16	ns	ns		
							2018	2.90														
							2019	4.40														
							2020	8.40														
							2021	1.80														
							2022	1.90														
Oligochaeta (%)	rank	-	-	<0.001	Reference	EDC-U	2007	0.280	B	A	A	nc	A	A	Baseline	4.8	5.0	nc	7.1	2.2	ns	
							2018	4.60													ns	ns
							2019	4.80													ns	ns
							2020	-													nc	nc
							2021	6.70													-6.4	-6.8
							2022	2.30													-1.5	-2.1
					Exposed	HAC-R1	2007	1.60	AB	A	AB	AB	AB	B	Baseline	ns	ns	ns	ns	ns		nc
							2018	3.00														16
							2019	1.10														7.5
							2020	1.70														-1.6
							2021	0.940														ns
							2022	0.900														ns
					Exposed	HAC-U	2007	1.60	BC	A	AB	C	C	C	Baseline	18	ns	ns	ns	ns		
							2018	18.0														
							2019	7.80														
							2020	0.310														
							2021	0.600														
							2022	0.360														

Magnitude of Difference (MOD) < -2

Magnitude of Difference (MOD) > 2

Notes: "-" = no data available. nc = no comparison. ns = no significance. nm = Contrast MODs could not be calculated because the Median Absolute Deviation (MAD) = 0. EPT = Ephemeroptera, Plecoptera, Trichoptera. DW = dry weight. WW = wet weight. Reference area EDC-U was not sampled in 2020 due to habitat differences (in water depth and flow) relative to the remediated areas HAC-R1 and HAC-U. See Section 4.3 for details

[a] Data from 2007 were used in the analyses to compare post-breach (2018 to 2022) to pre-breach conditions (2007). Post-breach data from HAC-R1 and HAC-U was compared to pre-breach data from UHC, and post-breach data from EDC-U was compared to pre-breach data from UER.

[b] Mean, geometric mean, or median depending on if analysis was conducted on untransformed, log_{10}-transformed, or rank-transformed data.

[c] Magnitude of difference (MOD) calculated for two-way ANOVA as (Exposed Mean - Reference Mean)/SD (or [Mean - Baseline Mean]/SD for temporal comparisons) on the transformed scale, where SD was the pooled standard deviation of the model residuals. MOD calculated for Kruskal-Wallis (i.e., rank-transformed data) as (Exposed Median - Reference Median)/MAD, where MAD was the pooled median absolute deviation.

[d] Pairwise contrasts of post-breach (2018 to 2022) data from HAC-R1 and HAC-U against pre-breach (2007) data from UHC are indicated with in Figure F.3.2.

[e] Spatial pairwise contrasts between HAC-R1 and HAC-U in 2007 were not calculated because UHC in 2007 represents pre-breach data for both HAC-R1 and HAC-U.

Table F.3.1: Results of Statistical Comparisons of Benthic Invertebrate Community Endpoints for Upper Hazeltine Creek (HAC-R1, HAC-U; Exposed) and Upper Edney Creek (EDC-U; Reference), 2007 to 2022

Endpoint	Transformation	2-Way ANOVA p-values			Area Type	Area	Year[a]	Measures of Central Tendency[b]	Temporal Contrasts Within Sites											Spatial Comparison Within Years[c,e]	
									Pairwise Comparisons Between Years						MOD Relative to Baseline[c]							
		Area	Year	Interaction					2007 (pre-breach)[d]	2018	2019	2020	2021	2022	2007 (pre-breach)	2018	2019	2020	2021	2022	HAC-R1	HAC-U
Dry Weight Benthic Biomass (g/m² DW)	rank	<0.001	0.002	0.153	Reference	EDC-U	2007	-	-	B	A	A	AB	A	-	Baseline	0.43	nc	ns	1.4	-	
							2018	0.180													0.96	1.1
							2019	0.460													3.9	5.1
							2020	-													nc	nc
							2021	0.380													2.4	3.6
							2022	1.10													2.0	3.6
					Exposed	HAC-R1	2007	-	-	B	A	A	AB	A	-	Baseline	3.4	3.8	ns	2.4		-
							2018	0.810														ns
							2019	3.10														ns
							2020	3.30														ns
							2021	2.00														ns
							2022	2.40														ns
					Exposed	HAC-U	2007	-	-	B	A	A	AB	A	-	Baseline	4.5	4.6	ns	3.9		
							2018	0.910														
							2019	3.90														
							2020	4.00														
							2021	2.80														
							2022	3.50														
Wet Weight Benthic Biomass (g/m² WW)	rank	<0.001	<0.001	0.213	Reference	EDC-U	2007	-	-	C	A	AB	BC	AB	-	Baseline	0.32	nc	ns	0.96	-	
							2018	1.40													0.88	1.4
							2019	2.50													5.6	7.6
							2020	-													nc	nc
							2021	2.00													2.0	3.7
							2022	4.80													1.8	3.1
					Exposed	HAC-R1	2007	-	-	C	A	AB	BC	AB	-	Baseline	5.1	2.6	ns	1.9		-
							2018	4.50														ns
							2019	22.0														ns
							2020	14.0														ns
							2021	9.00														ns
							2022	11.0														ns
					Exposed	HAC-U	2007	-	-	C	A	AB	BC	AB	-	Baseline	6.6	4.2	ns	2.7		
							2018	6.30														
							2019	30.0														
							2020	21.0														
							2021	15.0														
							2022	16.0														

Magnitude of Difference (MOD) < -2

Magnitude of Difference (MOD) > 2

Notes: "-" = no data available. nc = no comparison. ns = no significance. nm = Contrast MODs could not be calculated because the Median Absolute Deviation (MAD) = 0. EPT = Ephemeroptera, Plecoptera, Trichoptera. DW = dry weight. WW = wet weight. Reference area EDC-U was not sampled in 2020 due to habitat differences (in water depth and flow) relative to the remediated areas HAC-R1 and HAC-U. See Section 4.3 for details

[a] Data from 2007 were used in the analyses to compare post-breach (2018 to 2022) to pre-breach conditions (2007). Post-breach data from HAC-R1 and HAC-U was compared to pre-breach data from UHC, and post-breach data from EDC-U was compared to pre-breach data from UER.

[b] Mean, geometric mean, or median depending on if analysis was conducted on untransformed, log_{10}-transformed, or rank-transformed data.

[c] Magnitude of difference (MOD) calculated for two-way ANOVA as (Exposed Mean - Reference Mean)/SD (or [Mean - Baseline Mean]/SD for temporal comparisons) on the transformed scale, where SD was the pooled standard deviation of the model residuals. MOD calculated for Kruskal-Wallis (i.e., rank-transformed data) as (Exposed Median - Reference Median)/MAD, where MAD was the pooled median absolute deviation.

[d] Pairwise contrasts of post-breach (2018 to 2022) data from HAC-R1 and HAC-U against pre-breach (2007) data from UHC are indicated with in Figure F.3.2.

[e] Spatial pairwise contrasts between HAC-R1 and HAC-U in 2007 were not calculated because UHC in 2007 represents pre-breach data for both HAC-R1 and HAC-U.

Table F.3.2: Spearman's Rank Correlation Relationships Between Benthic Invertebrate Community Metrics and Supporting Measures for Upper Hazeltine Creek (HAC-R1, HAC-U; Exposed), 2018 to 2022

Benthic Invertebrate Community Endpoint	Correlation Parameter	Mean Water Depth (cm)	Mean Water Velocity (m/s)	Temperature (°C)	Dissolved Oxygen (mg/L)
Density (#/m²)	Correlation Coefficient	0.265	0.355	-0.0359	-0.100
	Sig. (2-tailed)	0.063	0.0113	0.805	0.488
Richness (# of taxa)	Correlation Coefficient	0.306	0.203	0.539	-0.242
	Sig. (2-tailed)	0.0304	0.157	<0.001	0.0905
Simpson's Evenness	Correlation Coefficient	-0.182	0.467	-0.208	-0.414
	Sig. (2-tailed)	0.207	<0.001	0.147	0.0028
Simpson's Diversity	Correlation Coefficient	-0.0248	0.512	0.0898	-0.464
	Sig. (2-tailed)	0.864	<0.001	0.535	<0.001
Ephemeroptera (#/m²)	Correlation Coefficient	-0.141	0.799	-0.0650	-0.368
	Sig. (2-tailed)	0.329	<0.001	0.654	0.00864
Plecoptera (#/m²)	Correlation Coefficient	-0.184	-0.151	0.100	-0.151
	Sig. (2-tailed)	0.201	0.296	0.489	0.294
Trichoptera (#/m²)	Correlation Coefficient	0.193	0.662	0.0230	-0.225
	Sig. (2-tailed)	0.180	<0.001	0.874	0.116
EPT (#/m²)	Correlation Coefficient	0.0495	0.814	-0.0302	-0.286
	Sig. (2-tailed)	0.733	<0.001	0.835	0.0438
Arachnida (#/m²)	Correlation Coefficient	0.463	-0.308	0.199	-0.234
	Sig. (2-tailed)	<0.001	0.0297	0.165	0.102
Chironomidae (#/m²)	Correlation Coefficient	0.216	0.0437	-0.0591	-0.0171
	Sig. (2-tailed)	0.132	0.763	0.684	0.906
Non-Chironomidae Diptera (#/m²)	Correlation Coefficient	0.0472	0.654	-0.212	-0.176
	Sig. (2-tailed)	0.745	<0.001	0.139	0.221
Oligochaeta (#/m²)	Correlation Coefficient	-0.0997	-0.177	-0.197	0.0760
	Sig. (2-tailed)	0.491	0.220	0.170	0.600
Ephemeroptera (%)	Correlation Coefficient	-0.341	0.527	0.0898	-0.191
	Sig. (2-tailed)	0.0152	<0.001	0.535	0.185
Plecoptera (%)	Correlation Coefficient	-0.198	-0.181	0.110	-0.111
	Sig. (2-tailed)	0.167	0.208	0.446	0.442
Trichoptera (%)	Correlation Coefficient	0.0714	0.648	0.0586	-0.0945
	Sig. (2-tailed)	0.622	<0.001	0.686	0.514
EPT (%)	Correlation Coefficient	-0.194	0.671	0.0528	-0.137
	Sig. (2-tailed)	0.177	<0.001	0.716	0.343
Arachnida (%)	Correlation Coefficient	0.360	-0.410	0.232	-0.177
	Sig. (2-tailed)	0.0103	0.0031	0.105	0.218
Chironomidae (%)	Correlation Coefficient	0.210	-0.366	-0.0556	0.0313
	Sig. (2-tailed)	0.144	0.00892	0.701	0.829
Non-Chironomidae Diptera (%)	Correlation Coefficient	0.0192	0.675	-0.207	-0.120
	Sig. (2-tailed)	0.895	<0.001	0.149	0.406
Oligochaeta (%)	Correlation Coefficient	-0.216	-0.331	-0.169	0.109
	Sig. (2-tailed)	0.132	0.0188	0.240	0.453
Dry Weight Benthic Biomass (g/m² DW)	Correlation Coefficient	0.198	0.589	0.0298	-0.295
	Sig. (2-tailed)	0.169	<0.001	0.837	0.0375
Wet Weight Benthic Biomass (g/m² WW)	Correlation Coefficient	-0.415	0.483	-0.314	-0.144
	Sig. (2-tailed)	0.00273	<0.001	0.0265	0.317

Significant correlation; p-value <0.00625 (p <0.05, Bonferroni corrected for 8 independent variables).

Notes: EPT = Ephemeroptera, Plecoptera, Trichoptera; DW = dry weight; WW = wet weight; #/m^2 = number per square metre; g/m^2 = grams per square metre

Table F.3.2: Spearman's Rank Correlation Relationships Between Benthic Invertebrate Community Metrics and Supporting Measures for Upper Hazeltine Creek (HAC-R1, HAC-U; Exposed), 2018 to 2022

Benthic Invertebrate Community Endpoint	Correlation Parameter	Dissolved Oxygen (%)	pH	Specific Conductivity (µS/cm)	Median Substrate Size (cm)
Density (#/m²)	Correlation Coefficient	-0.0941	-0.0616	0.302	-0.0469
	Sig. (2-tailed)	0.516	0.671	0.0332	0.746
Richness (# of taxa)	Correlation Coefficient	-0.0499	0.0733	-0.401	0.0312
	Sig. (2-tailed)	0.731	0.613	0.00392	0.829
Simpson's Evenness	Correlation Coefficient	-0.401	-0.342	0.488	0.0188
	Sig. (2-tailed)	0.00393	0.015	<0.001	0.897
Simpson's Diversity	Correlation Coefficient	-0.358	-0.279	0.225	0.0430
	Sig. (2-tailed)	0.0106	0.0494	0.117	0.767
Ephemeroptera (#/m²)	Correlation Coefficient	-0.339	-0.472	0.0174	-0.415
	Sig. (2-tailed)	0.0161	<0.001	0.905	0.00272
Plecoptera (#/m²)	Correlation Coefficient	-0.114	-0.00459	-0.00610	0.119
	Sig. (2-tailed)	0.429	0.975	0.966	0.411
Trichoptera (#/m²)	Correlation Coefficient	-0.193	-0.196	0.281	-0.196
	Sig. (2-tailed)	0.179	0.173	0.0478	0.172
EPT (#/m²)	Correlation Coefficient	-0.262	-0.353	0.169	-0.362
	Sig. (2-tailed)	0.0658	0.0119	0.241	0.0098
Arachnida (#/m²)	Correlation Coefficient	-0.141	-0.0402	-0.537	0.0658
	Sig. (2-tailed)	0.329	0.782	<0.001	0.650
Chironomidae (#/m²)	Correlation Coefficient	-0.0251	0.0438	0.421	0.192
	Sig. (2-tailed)	0.863	0.763	0.00232	0.181
Non-Chironomidae Diptera (#/m²)	Correlation Coefficient	-0.214	-0.259	0.308	-0.191
	Sig. (2-tailed)	0.136	0.0697	0.0296	0.184
Oligochaeta (#/m²)	Correlation Coefficient	0.0326	0.0904	0.457	0.0589
	Sig. (2-tailed)	0.822	0.533	<0.001	0.685
Ephemeroptera (%)	Correlation Coefficient	-0.134	-0.299	-0.261	-0.356
	Sig. (2-tailed)	0.352	0.0349	0.0668	0.0112
Plecoptera (%)	Correlation Coefficient	-0.0750	0.0324	-0.0403	0.117
	Sig. (2-tailed)	0.605	0.823	0.781	0.416
Trichoptera (%)	Correlation Coefficient	-0.0858	-0.164	0.123	-0.311
	Sig. (2-tailed)	0.553	0.255	0.395	0.0278
EPT (%)	Correlation Coefficient	-0.117	-0.277	-0.105	-0.430
	Sig. (2-tailed)	0.420	0.0517	0.470	0.00185
Arachnida (%)	Correlation Coefficient	-0.0806	0.0268	-0.580	0.0832
	Sig. (2-tailed)	0.578	0.853	<0.001	0.566
Chironomidae (%)	Correlation Coefficient	0.00615	0.139	0.470	0.447
	Sig. (2-tailed)	0.966	0.337	<0.001	0.00112
Non-Chironomidae Diptera (%)	Correlation Coefficient	-0.167	-0.249	0.264	-0.262
	Sig. (2-tailed)	0.245	0.0816	0.0641	0.0657
Oligochaeta (%)	Correlation Coefficient	0.0729	0.139	0.396	0.121
	Sig. (2-tailed)	0.615	0.337	0.00442	0.402
Dry Weight Benthic Biomass (g/m² DW)	Correlation Coefficient	-0.263	-0.302	-0.141	-0.347
	Sig. (2-tailed)	0.0645	0.0332	0.329	0.0134
Wet Weight Benthic Biomass (g/m² WW)	Correlation Coefficient	-0.213	-0.524	0.106	-0.505
	Sig. (2-tailed)	0.137	<0.001	0.465	<0.001

Significant correlation; p-value <0.00625 (p <0.05, Bonferroni corrected for 8 independent variables).

Notes: EPT = Ephemeroptera, Plecoptera, Trichoptera; DW = dry weight; WW = wet weight; #/m^2 = number per square metre; g/m^2 = grams per square metre

APPENDIX F.4
PERIPHYTON & BENTHOS
TISSUE QUALITY

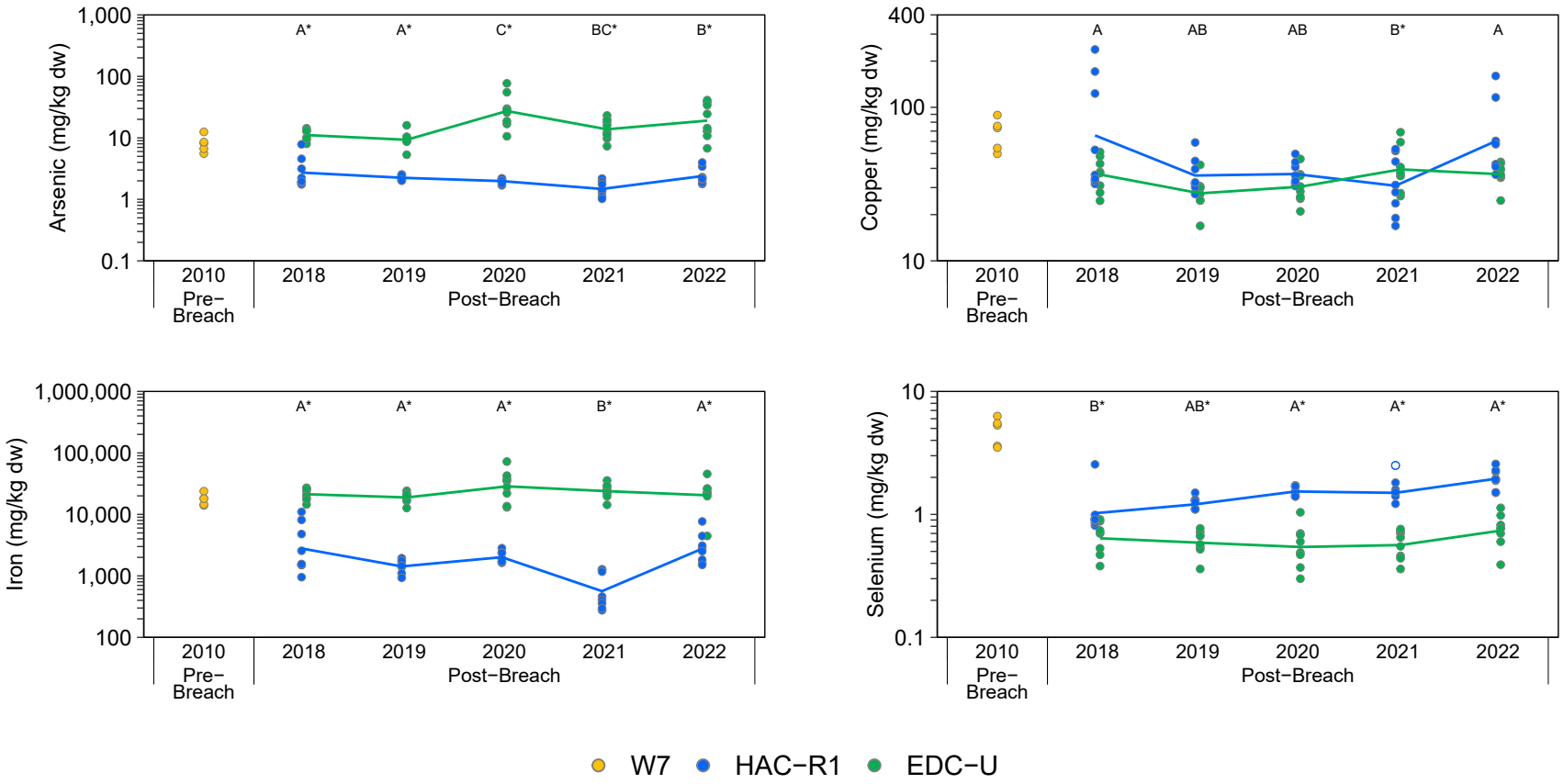
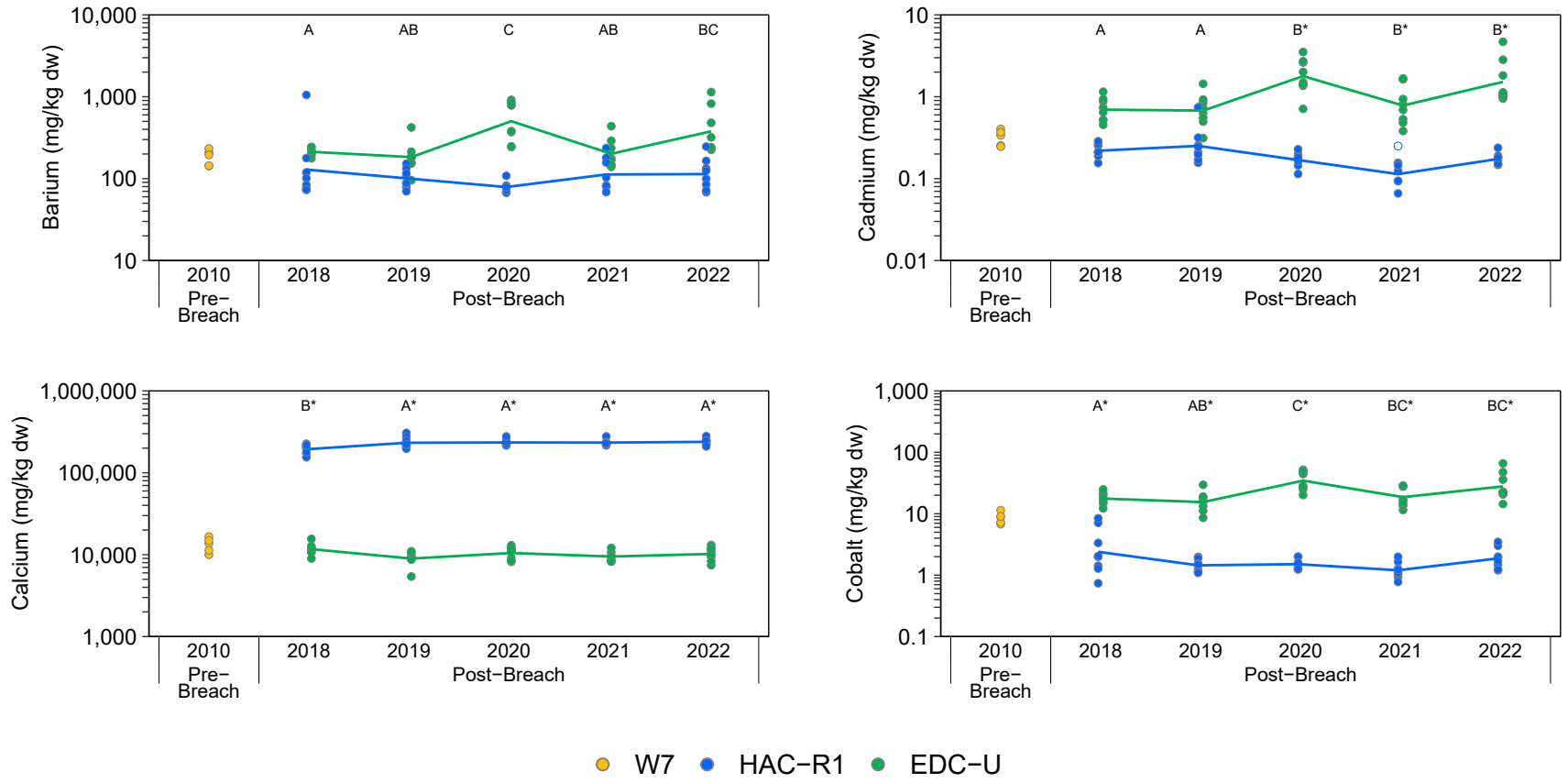


Figure F.4.1: Periphyton Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Upper Hazeltine Creek (HAC-R1; Exposed) and Upper Edney Creek (EDC-U; Reference), 2010 to 2022

Notes: dw = dry weight, <LRL = lower than the laboratory reporting limit (LRL). W7 (2010) is the pre-breach equivalent of HAC-R1. Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted. Letters with a * designate years where the exposed site is different than pre−breach conditions.



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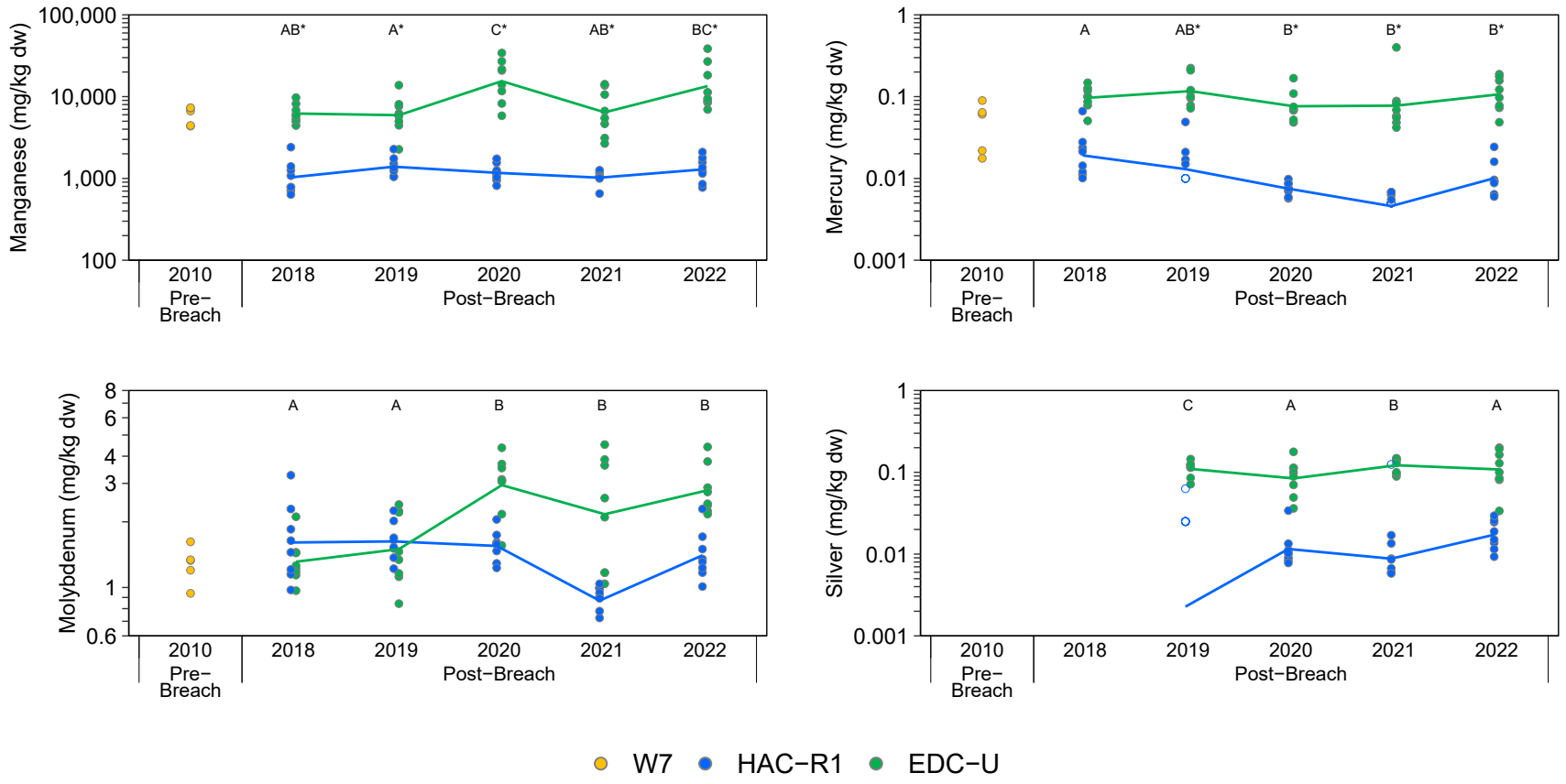

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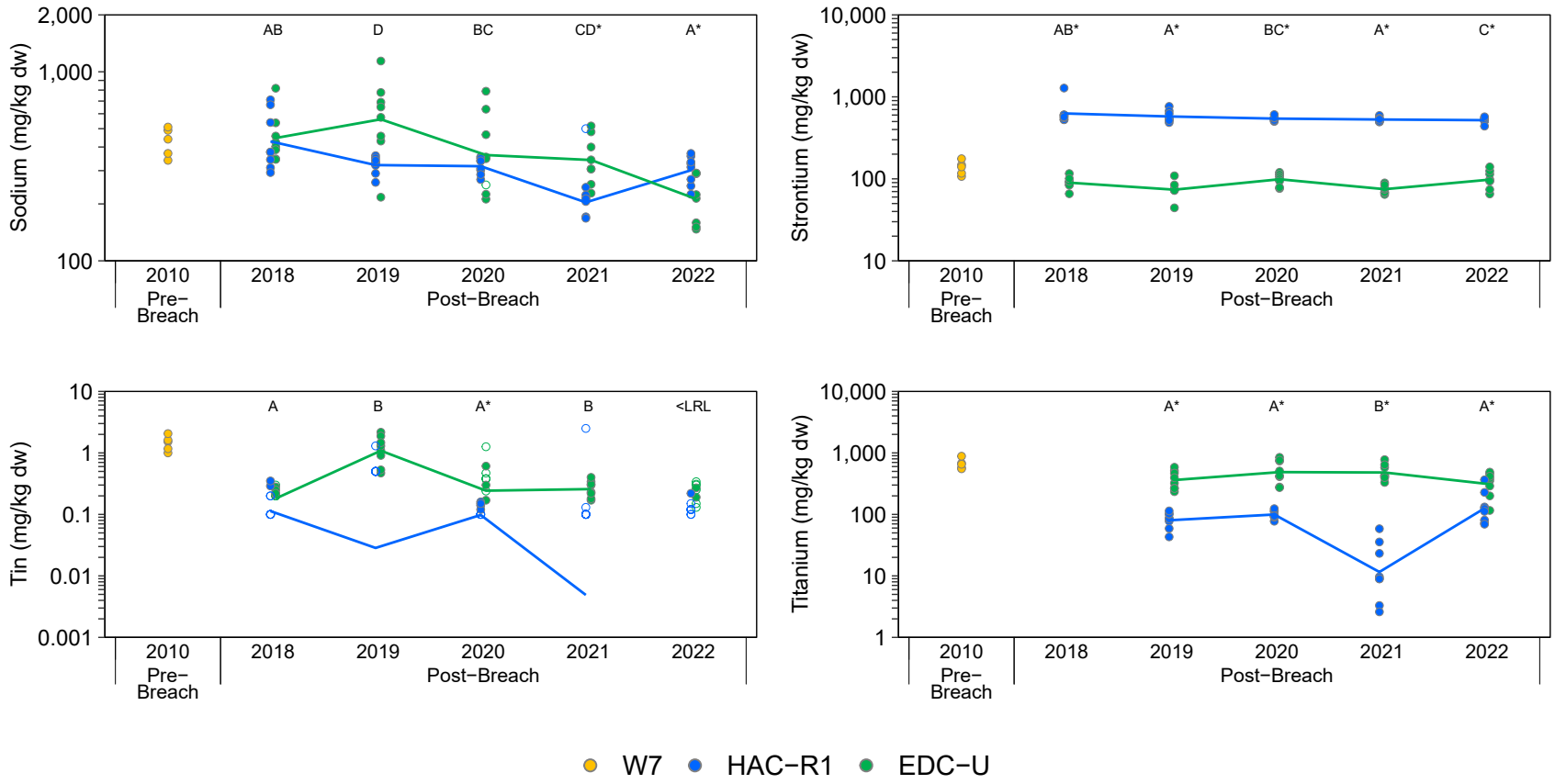

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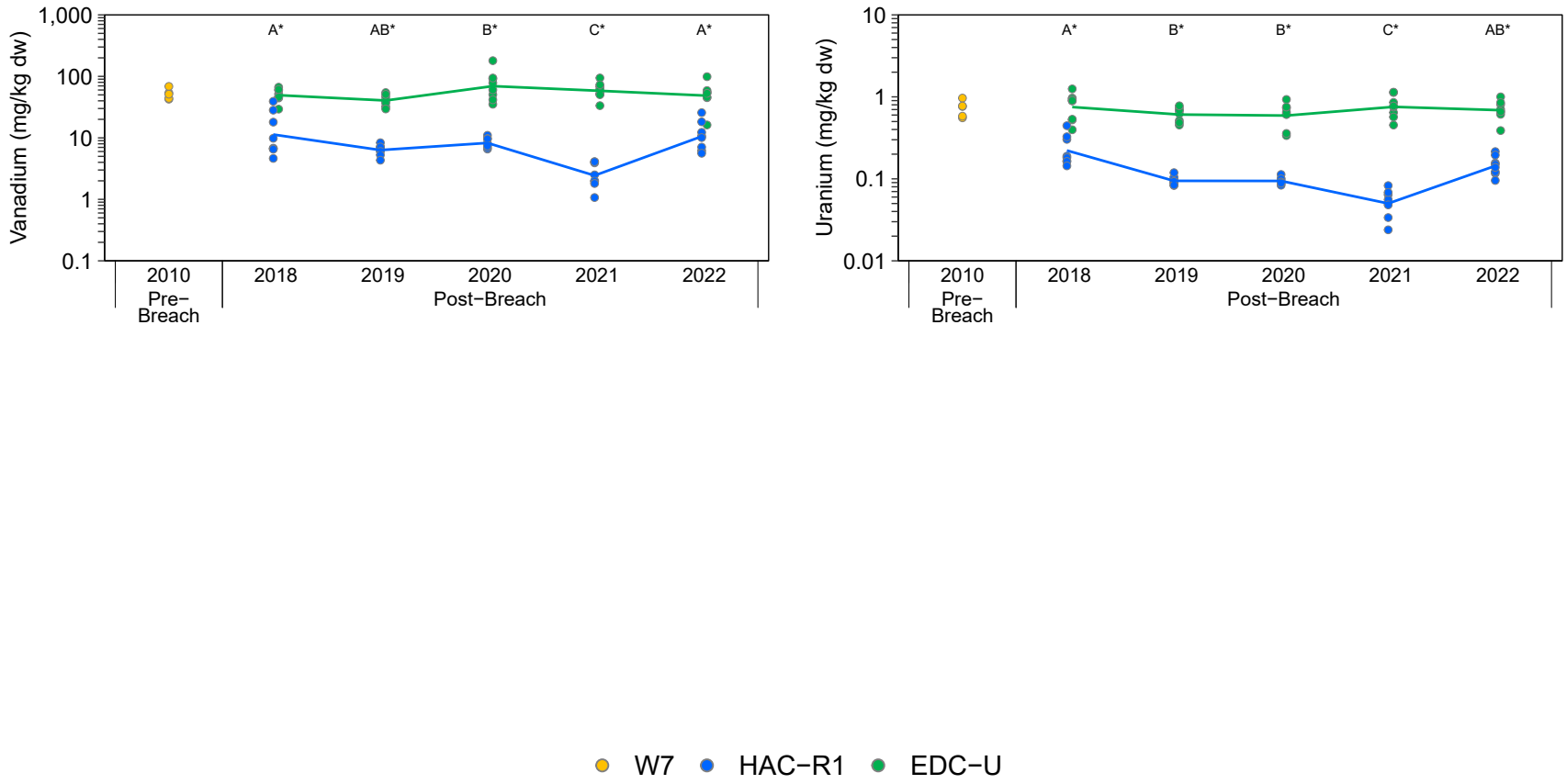

Figure F.4.1: Periphyton Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Upper Hazeltine Creek (HAC-R1; Exposed) and Upper Edney Creek (EDC-U; Reference), 2010 to 2022

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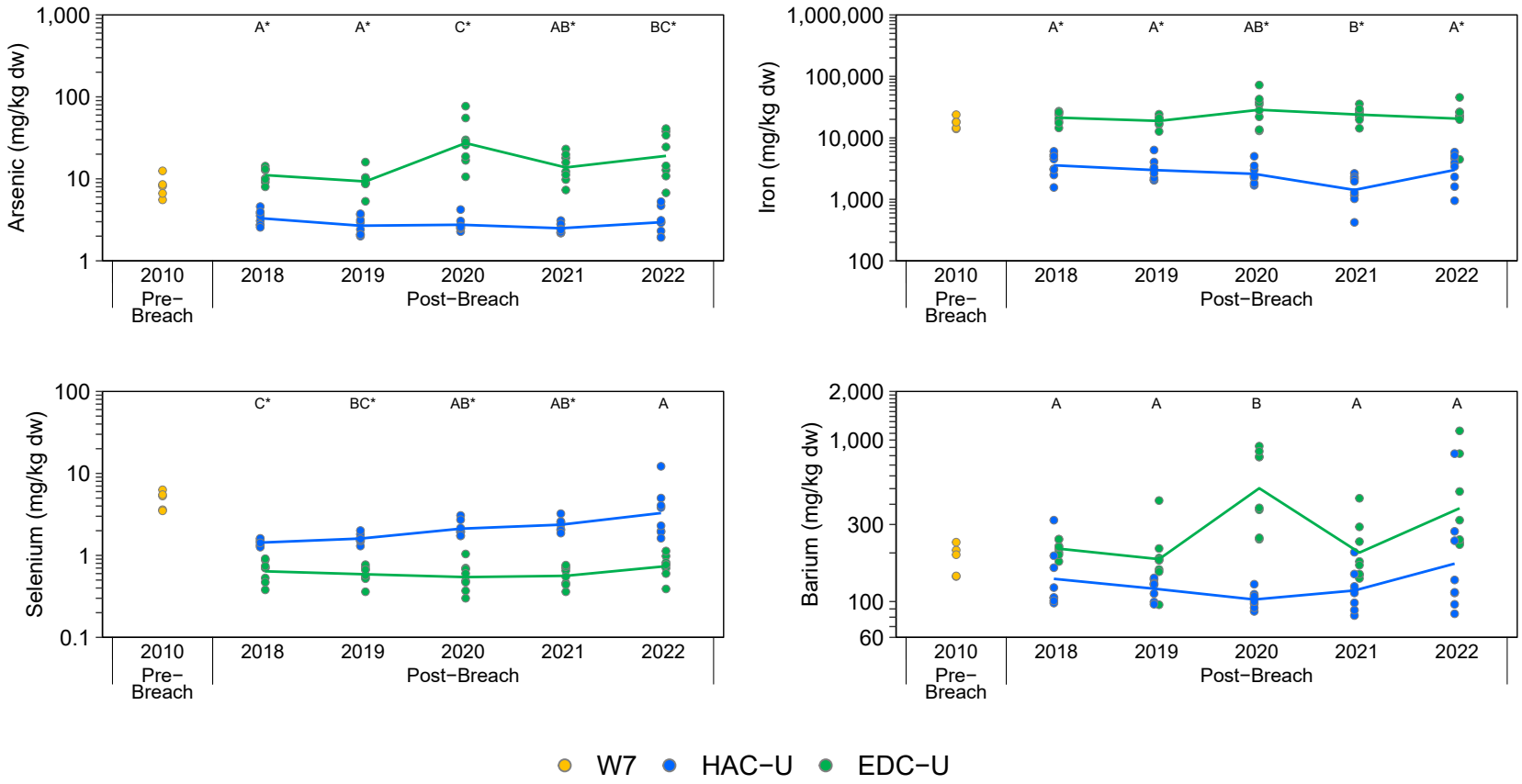
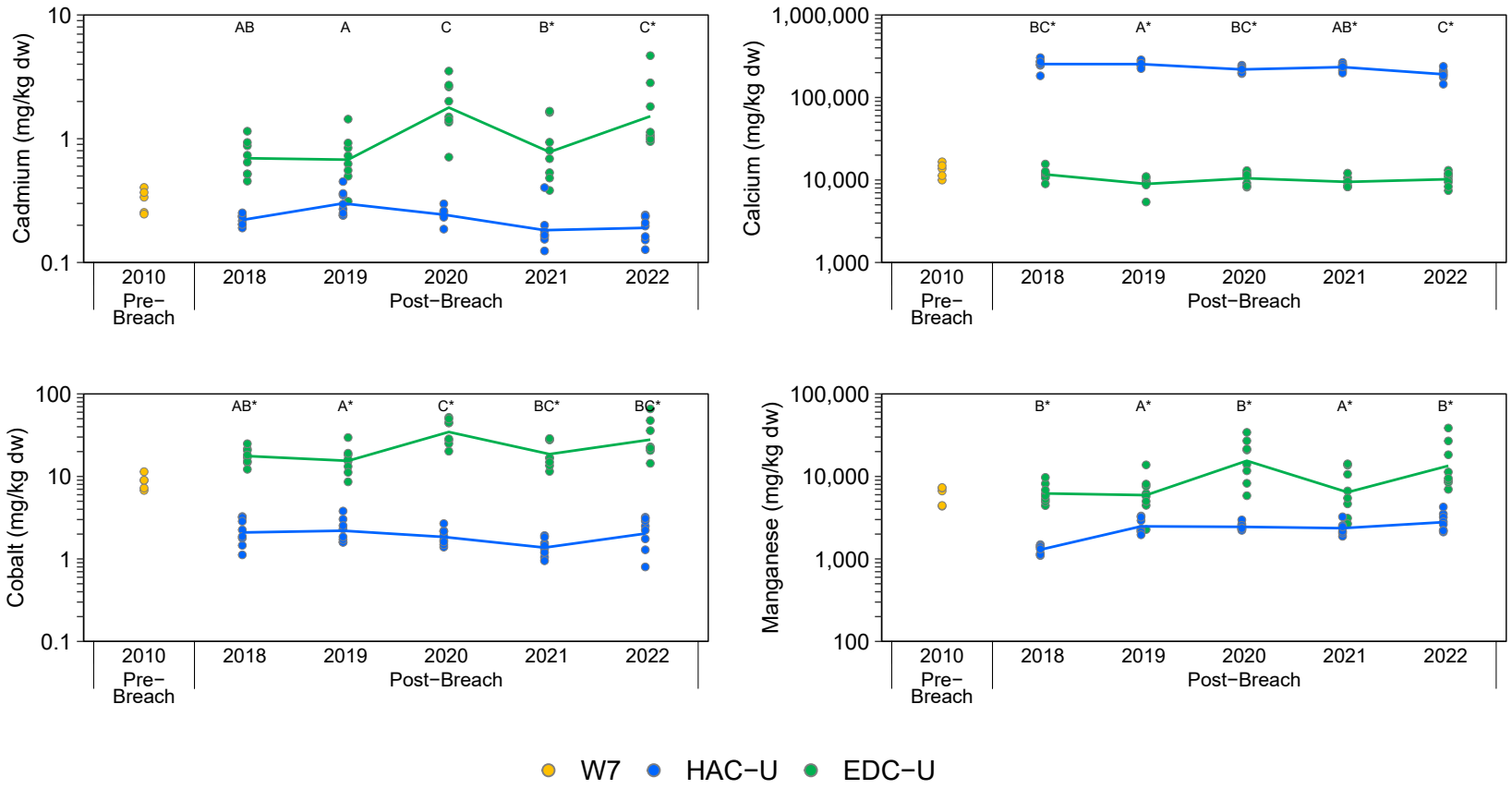


Figure F.4.2: Periphyton Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Upper Hazeltine Creek (HAC-U; Exposed) and Upper Edney Creek (EDC-U; Reference), 2010 to 2022

Notes: dw = dry weight, <LRL = lower than the laboratory reporting limit (LRL). W7 (2010) is the pre-breach equivalent of HAC-U. Concentrations <LRL are plotted as open symbols at the LRL and the open symbol represents one or more values reported <LRL. Individual samples are plotted and lines join the least-squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted. Letters with a * designate years where the exposed site is different than pre−breach conditions.



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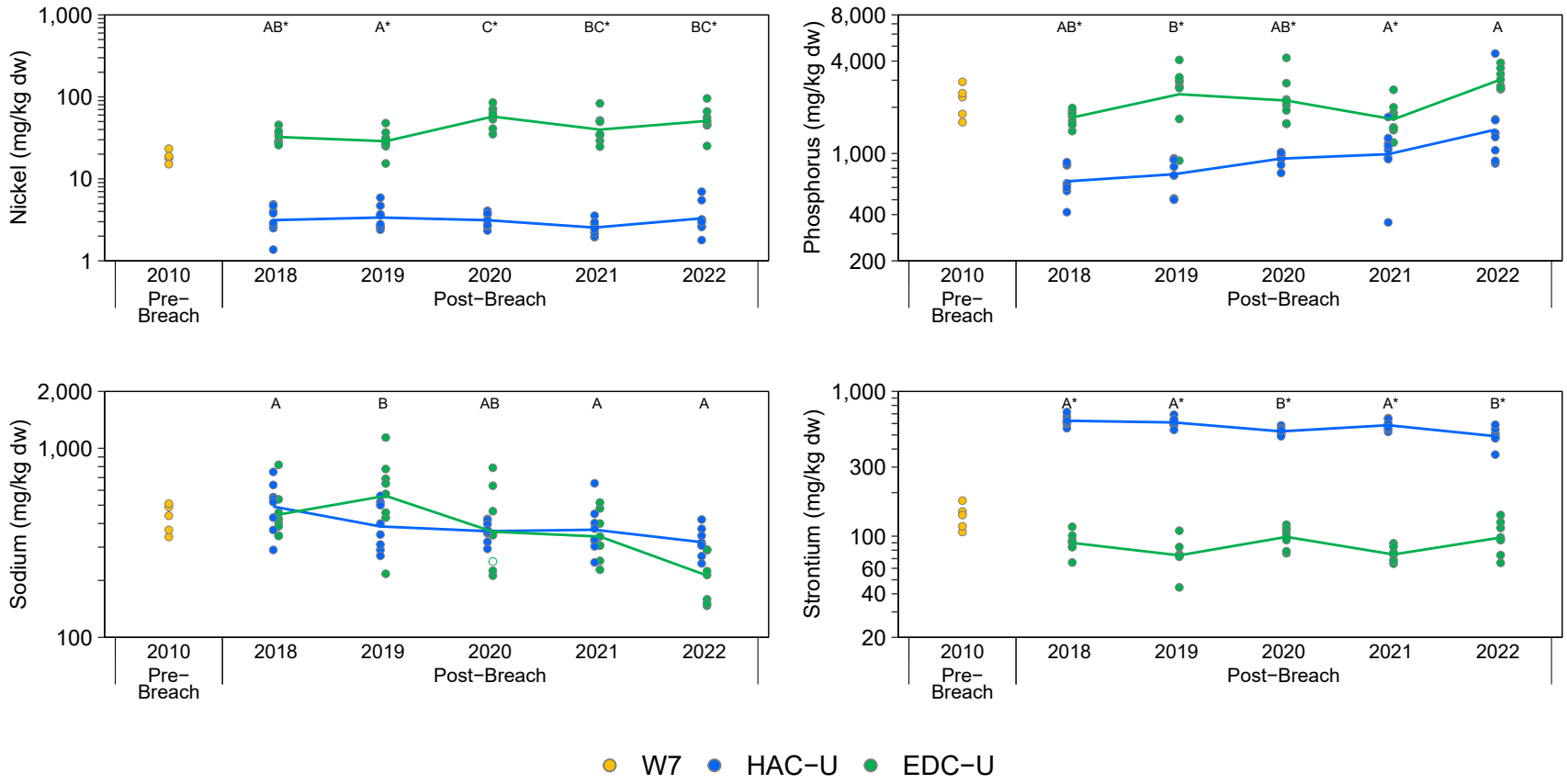

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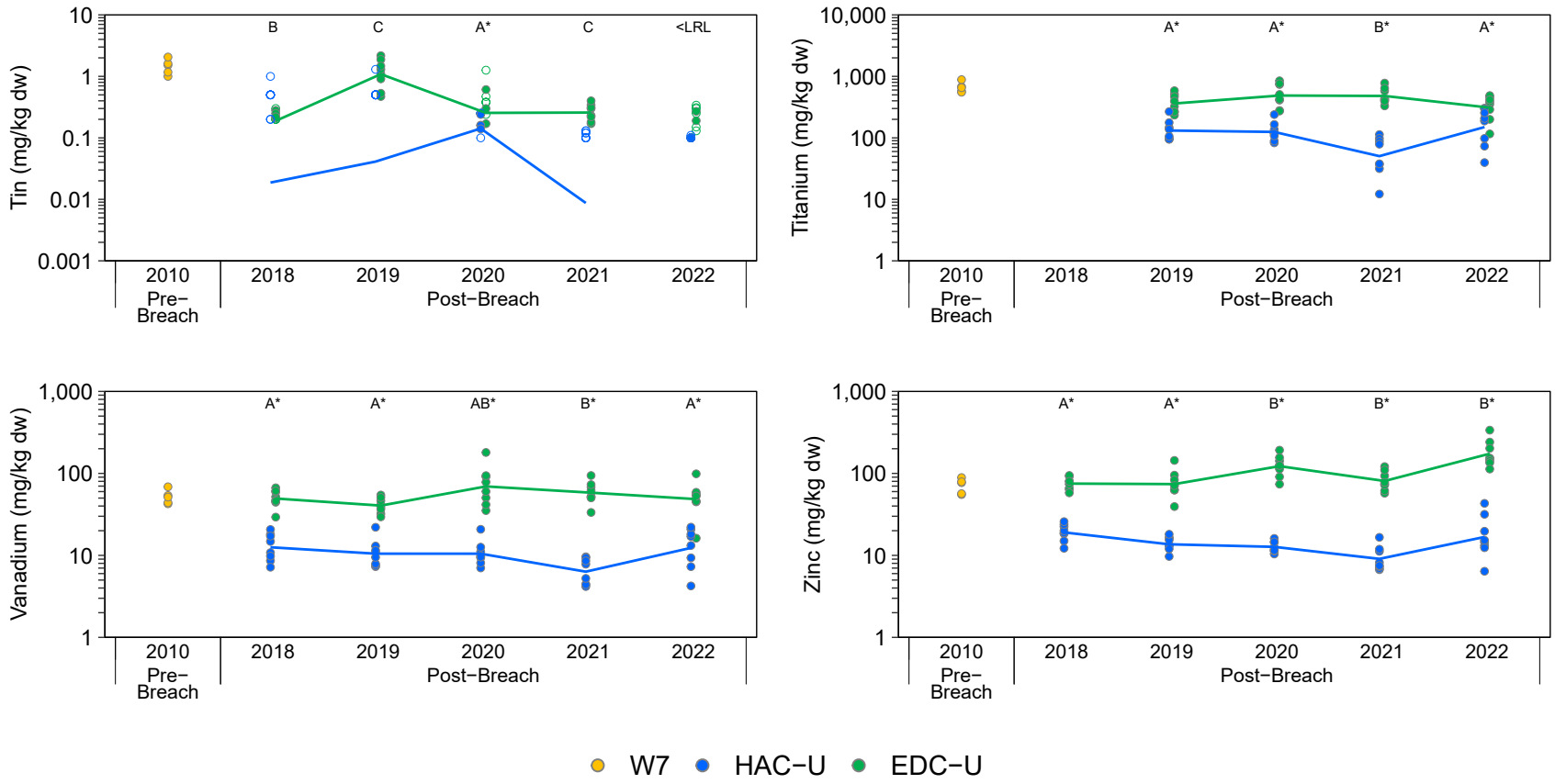

Figure F.4.2: Periphyton Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Upper Hazeltine Creek (HAC-U; Exposed) and Upper Edney Creek (EDC-U; Reference), 2010 to 2022

Notes: dw = dry weight, <LRL = lower than the laboratory reporting limit (LRL). W7 (2010) is the pre-breach equivalent of HAC-U. Concentrations <LRL are plotted as open symbols at the LRL and the open symbol represents one or more values reported <LRL. Individual samples are plotted and lines join the least-squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted. Letters with a * designate years where the exposed site is different than pre−breach conditions.

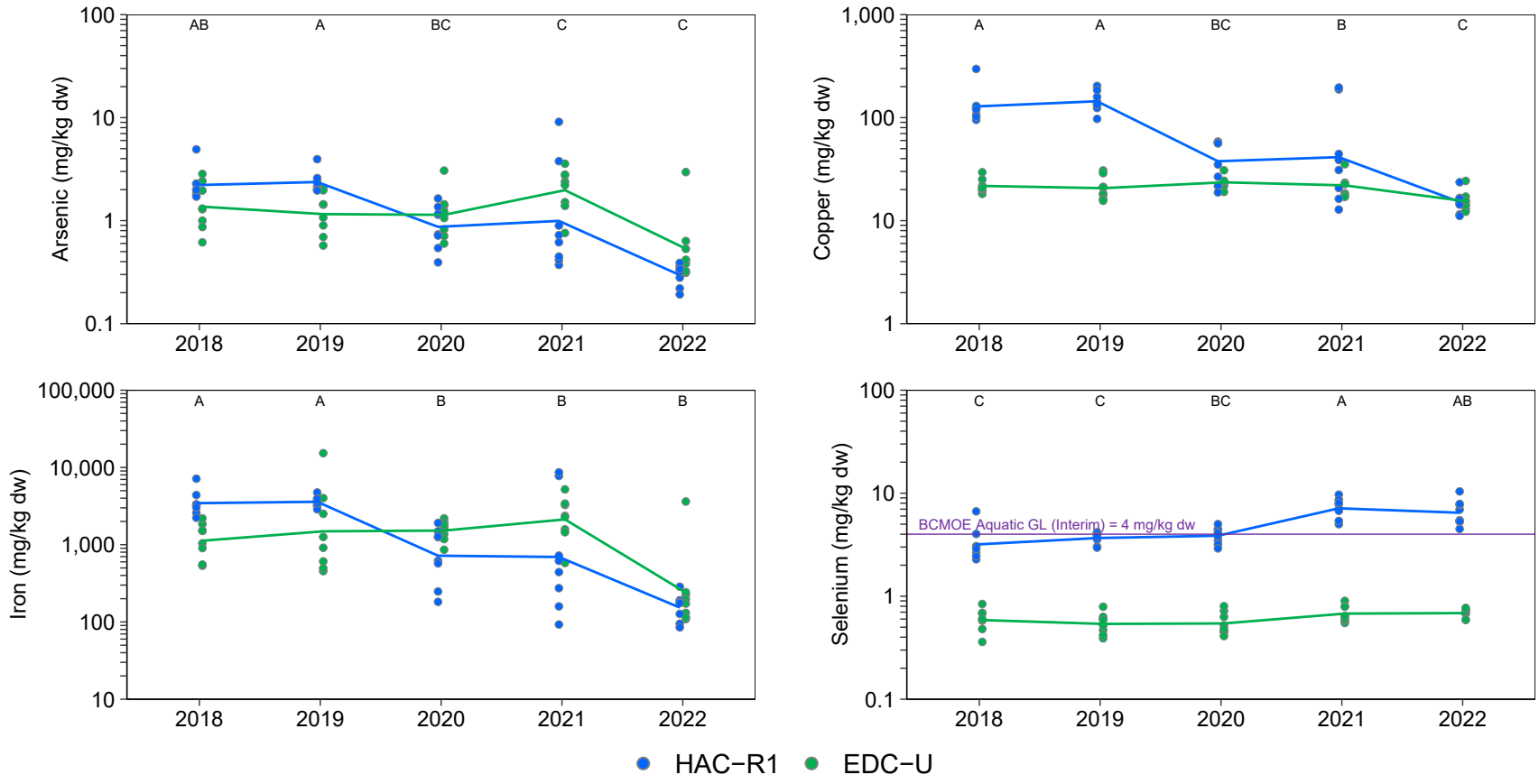

Figure F.4.3: Caddisfly Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Upper Hazeltine Creek (HAC-R1; Exposed) and Upper Edney Creek (EDC-U; Reference), 2018 to 2022

Notes: BCMOE = British Columbia Ministry of the Environment, GL = Guideline, dw = dry weight, <LRL = lower than the laboratory reporting limit (LRL). Concentrations <LRL are plotted as open symbols at the LRL and the open symbol represents one or more values reported <LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two-way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted.

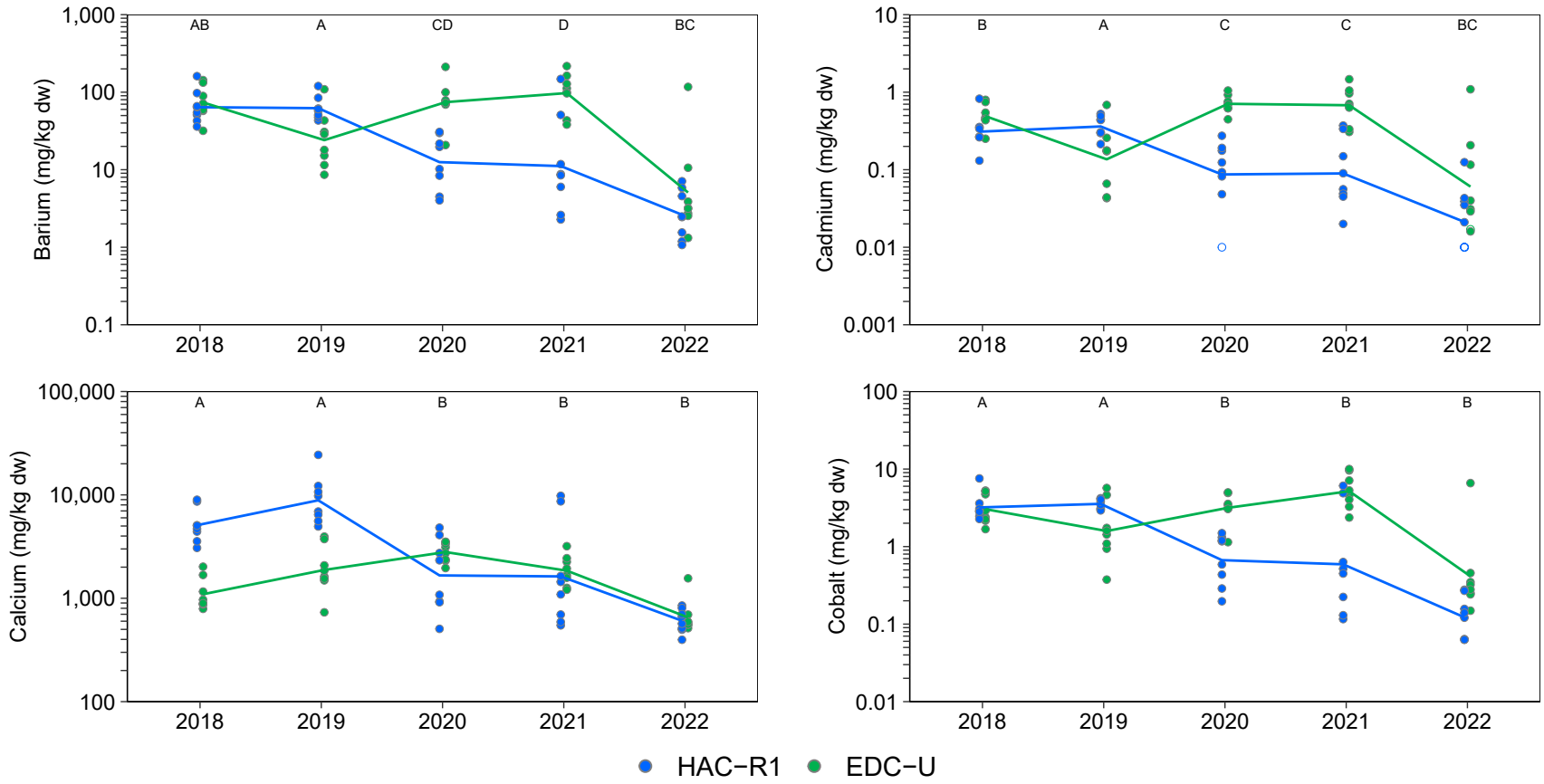

Figure F.4.3: Caddisfly Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Upper Hazeltine Creek (HAC-R1; Exposed) and Upper Edney Creek (EDC-U; Reference), 2018 to 2022

Notes: BCMOE = British Columbia Ministry of the Environment, GL = Guideline, dw = dry weight, <LRL = lower than the laboratory reporting limit (LRL). Concentrations <LRL are plotted as open symbols at the LRL and the open symbol represents one or more values reported <LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two-way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted.

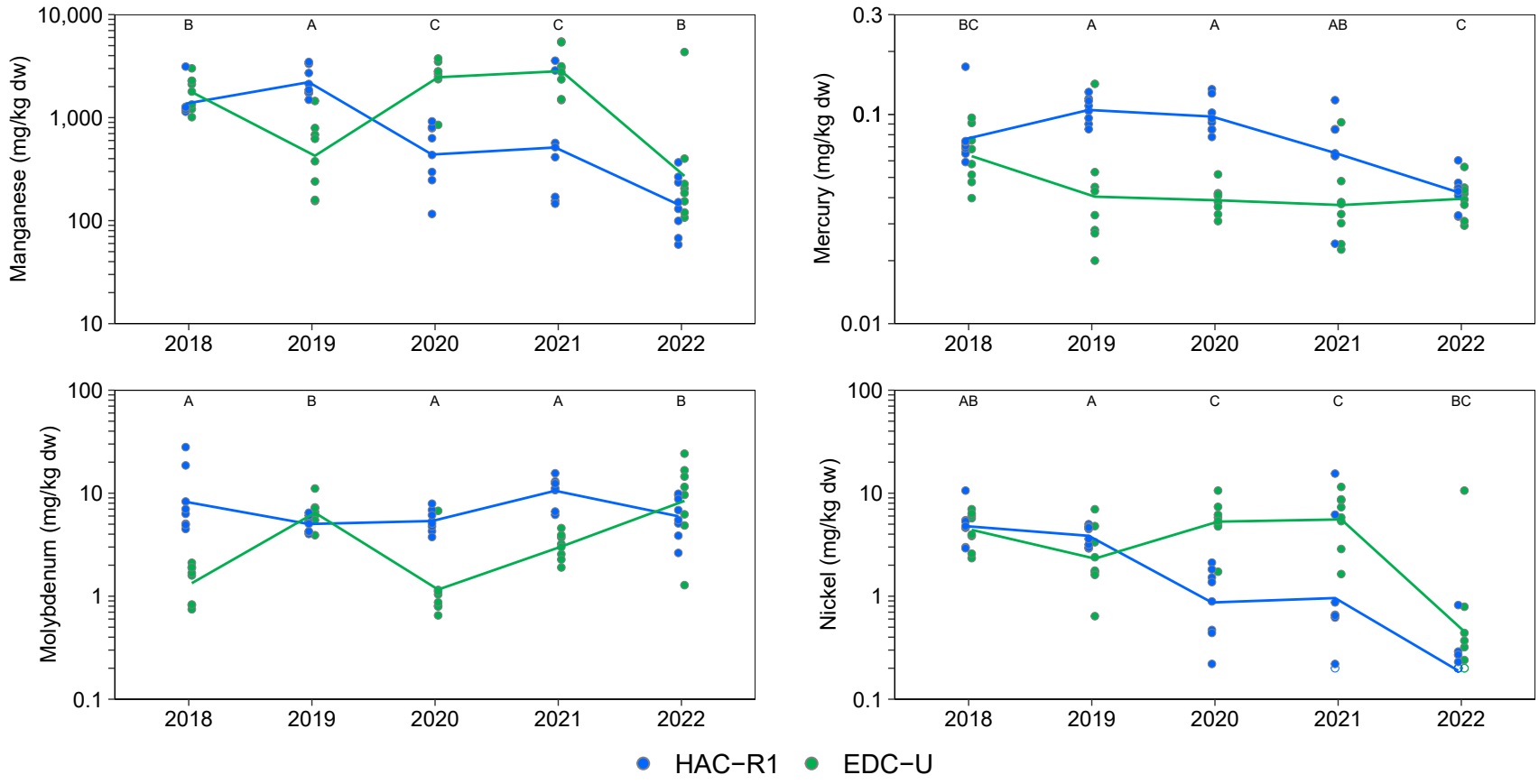

Figure F.4.3: Caddisfly Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Upper Hazeltine Creek (HAC-R1; Exposed) and Upper Edney Creek (EDC-U; Reference), 2018 to 2022

Notes: BCMOE = British Columbia Ministry of the Environment, GL = Guideline, dw = dry weight, <LRL = lower than the laboratory reporting limit (LRL). Concentrations <LRL are plotted as open symbols at the LRL and the open symbol represents one or more values reported <LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two-way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted.

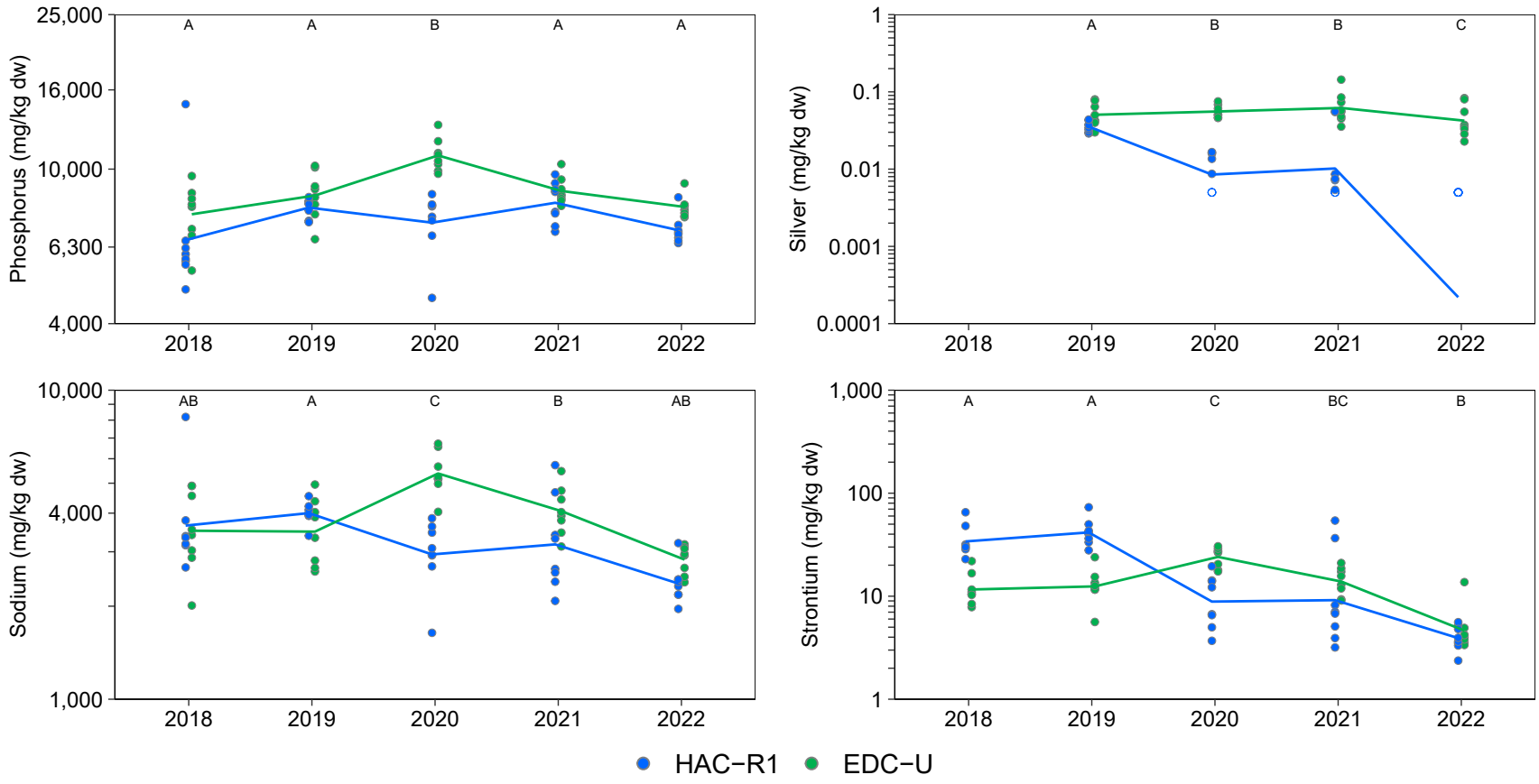

Figure F.4.3: Caddisfly Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Upper Hazeltine Creek (HAC-R1; Exposed) and Upper Edney Creek (EDC-U; Reference), 2018 to 2022

Notes: BCMOE = British Columbia Ministry of the Environment, GL = Guideline, dw = dry weight, <LRL = lower than the laboratory reporting limit (LRL). Concentrations <LRL are plotted as open symbols at the LRL and the open symbol represents one or more values reported <LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two-way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted.

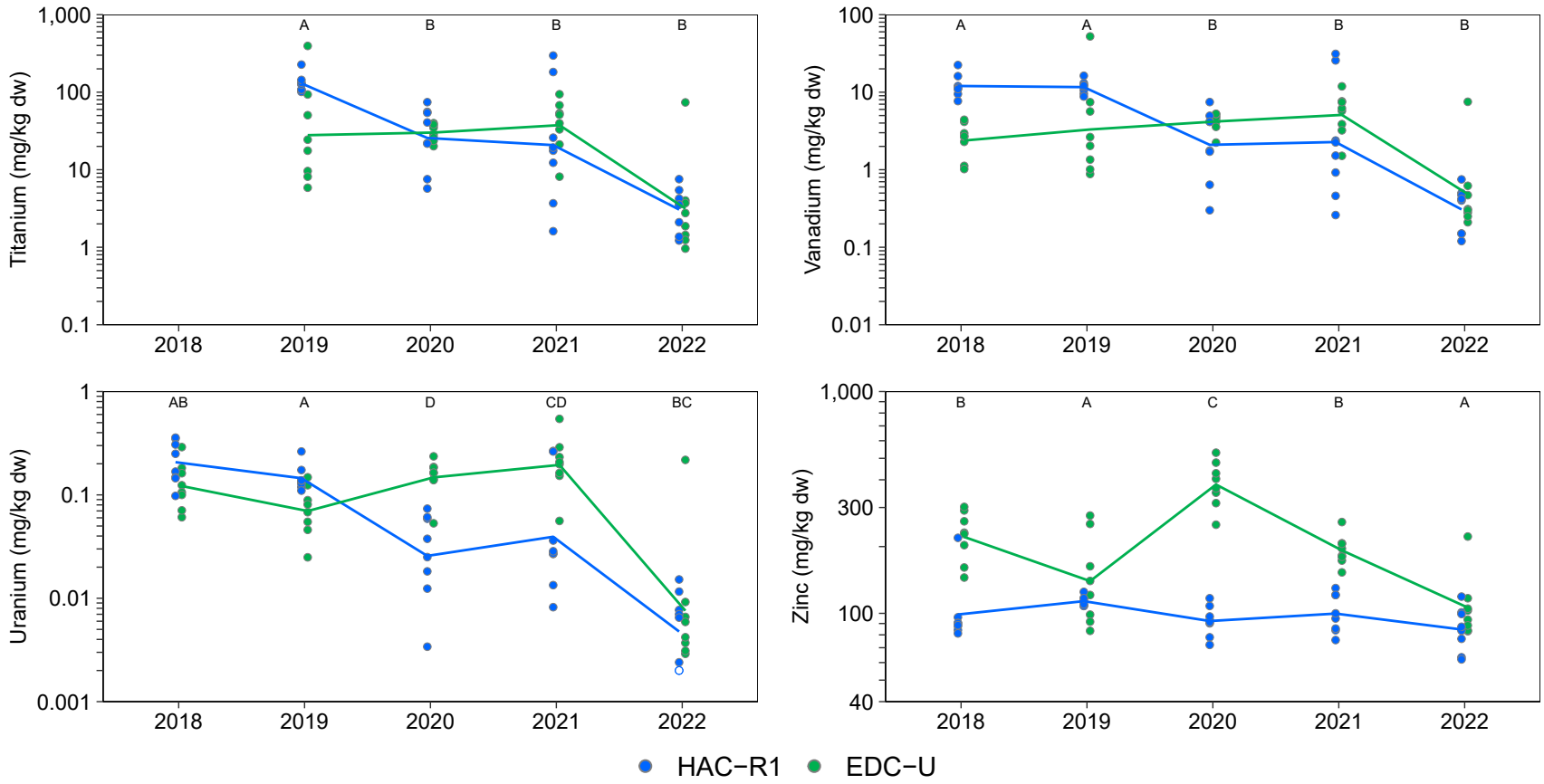

Figure F.4.3: Caddisfly Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Upper Hazeltine Creek (HAC-R1; Exposed) and Upper Edney Creek (EDC-U; Reference), 2018 to 2022

Notes: BCMOE = British Columbia Ministry of the Environment, GL = Guideline, dw = dry weight, <LRL = lower than the laboratory reporting limit (LRL). Concentrations <LRL are plotted as open symbols at the LRL and the open symbol represents one or more values reported <LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two-way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted.

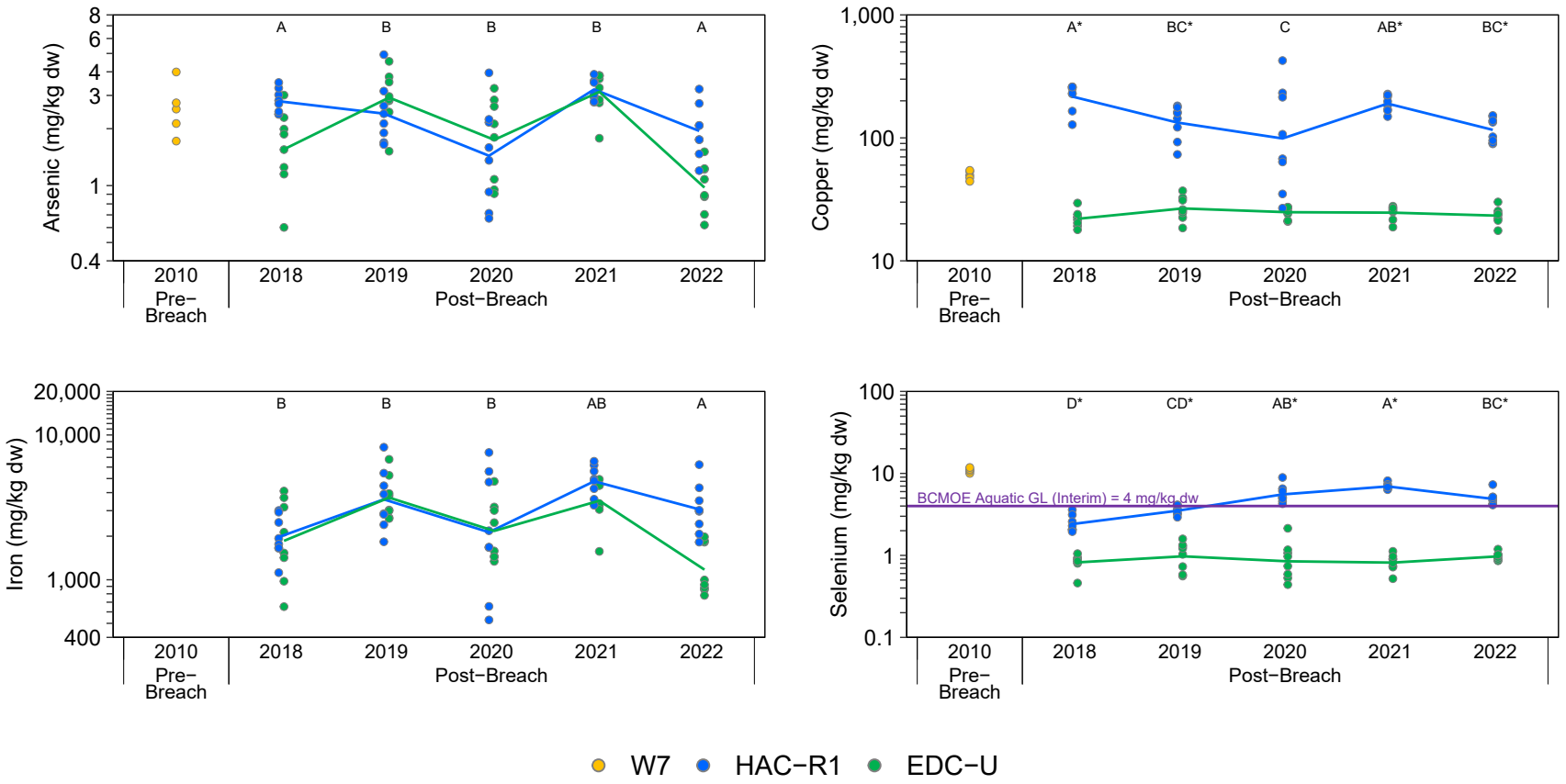

Figure F.4.4: Composite-Taxa Benthic Invertebrate Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Upper Hazeltine Creek (HAC-R1; Exposed) and Upper Edney Creek (EDC-U; Reference), 2010 to 2022

Notes: BCMOE = British Columbia Ministry of the Environment, GL = Guideline, dw = dry weight; <LRL = lower than the laboratory reporting limit (LRL). W7 (2010) is the pre-breach equivalent of HAC-R1. Concentrations <LRL are plotted as open symbols at the LRL and the open symbol represents one or more values reported <LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log-normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted. Letters with a * designate years where the exposed site is different than pre−breach conditions.

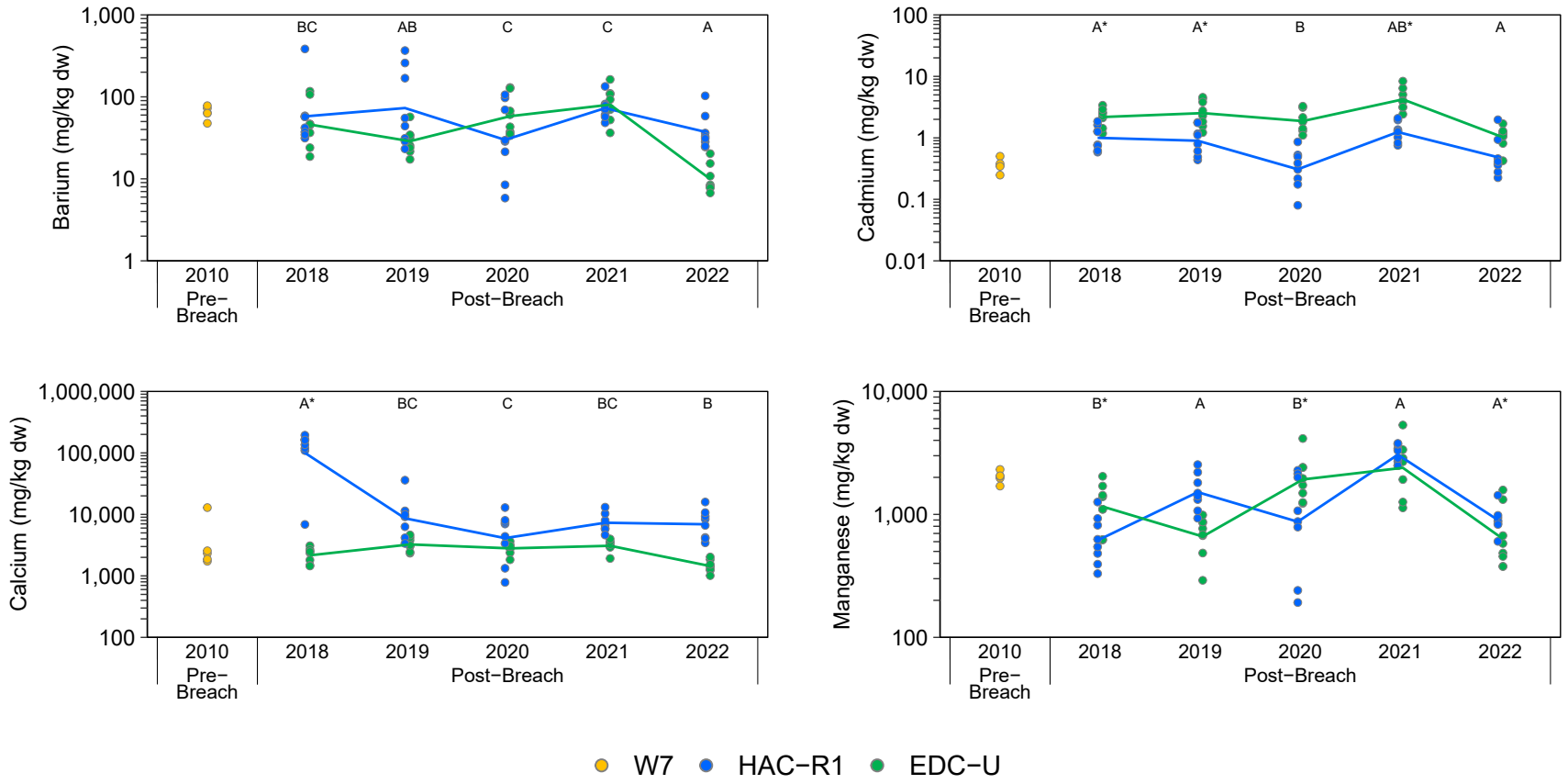

Figure F.4.4: Composite-Taxa Benthic Invertebrate Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Upper Hazeltine Creek (HAC-R1; Exposed) and Upper Edney Creek (EDC-U; Reference), 2010 to 2022

Notes: BCMOE = British Columbia Ministry of the Environment, GL = Guideline, dw = dry weight; <LRL = lower than the laboratory reporting limit (LRL). W7 (2010) is the pre-breach equivalent of HAC-R1. Concentrations <LRL are plotted as open symbols at the LRL and the open symbol represents one or more values reported <LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log-normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted. Letters with a * designate years where the exposed site is different than pre−breach conditions.

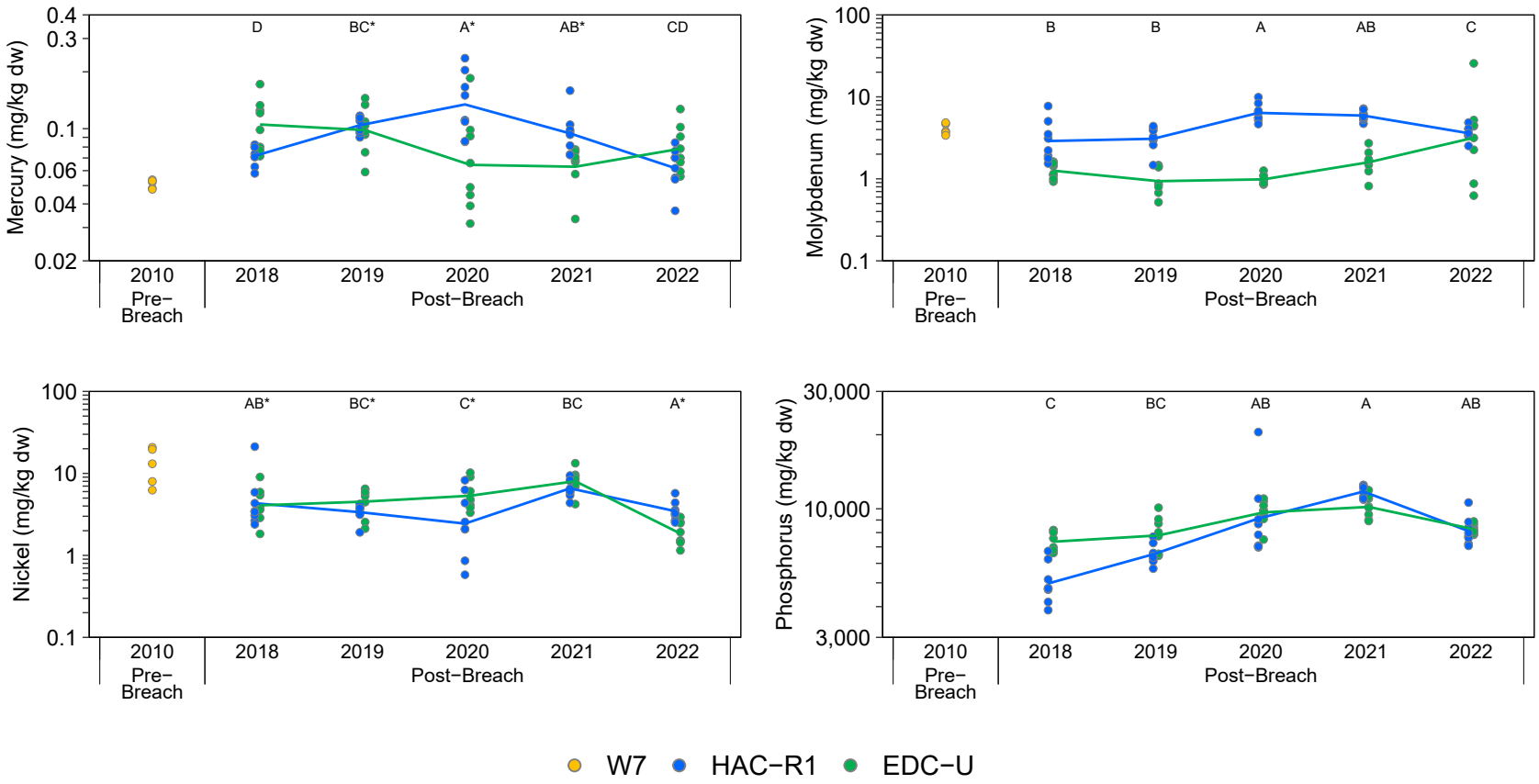

Figure F.4.4: Composite-Taxa Benthic Invertebrate Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Upper Hazeltine Creek (HAC-R1; Exposed) and Upper Edney Creek (EDC-U; Reference), 2010 to 2022

Notes: BCMOE = British Columbia Ministry of the Environment, GL = Guideline, dw = dry weight; <LRL = lower than the laboratory reporting limit (LRL). W7 (2010) is the pre-breach equivalent of HAC-R1. Concentrations <LRL are plotted as open symbols at the LRL and the open symbol represents one or more values reported <LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log-normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted. Letters with a * designate years where the exposed site is different than pre−breach conditions.

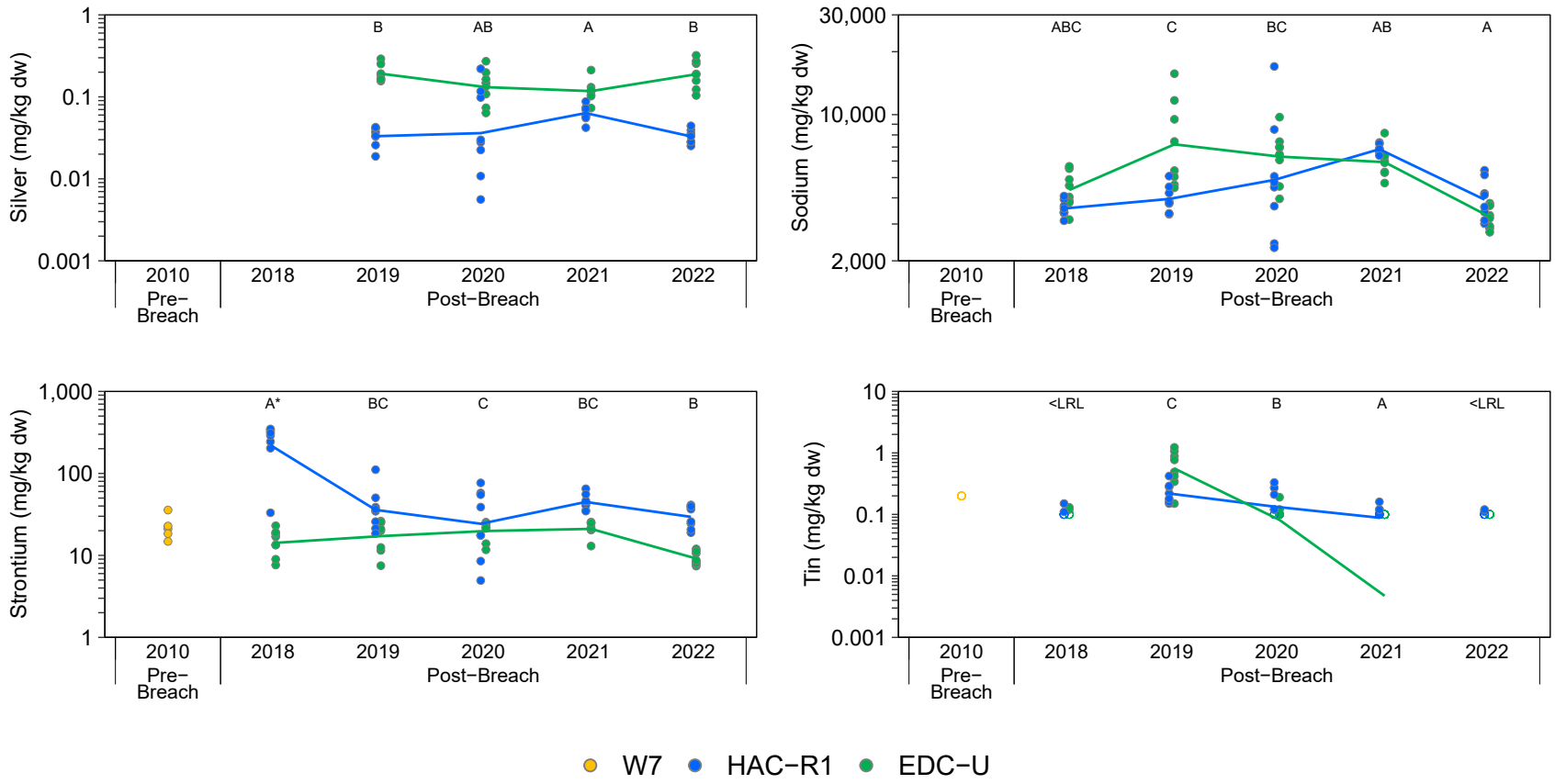

Figure F.4.4: Composite-Taxa Benthic Invertebrate Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Upper Hazeltine Creek (HAC-R1; Exposed) and Upper Edney Creek (EDC-U; Reference), 2010 to 2022

Notes: BCMOE = British Columbia Ministry of the Environment, GL = Guideline, dw = dry weight; <LRL = lower than the laboratory reporting limit (LRL). W7 (2010) is the pre-breach equivalent of HAC-R1. Concentrations <LRL are plotted as open symbols at the LRL and the open symbol represents one or more values reported <LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log-normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted. Letters with a * designate years where the exposed site is different than pre−breach conditions.

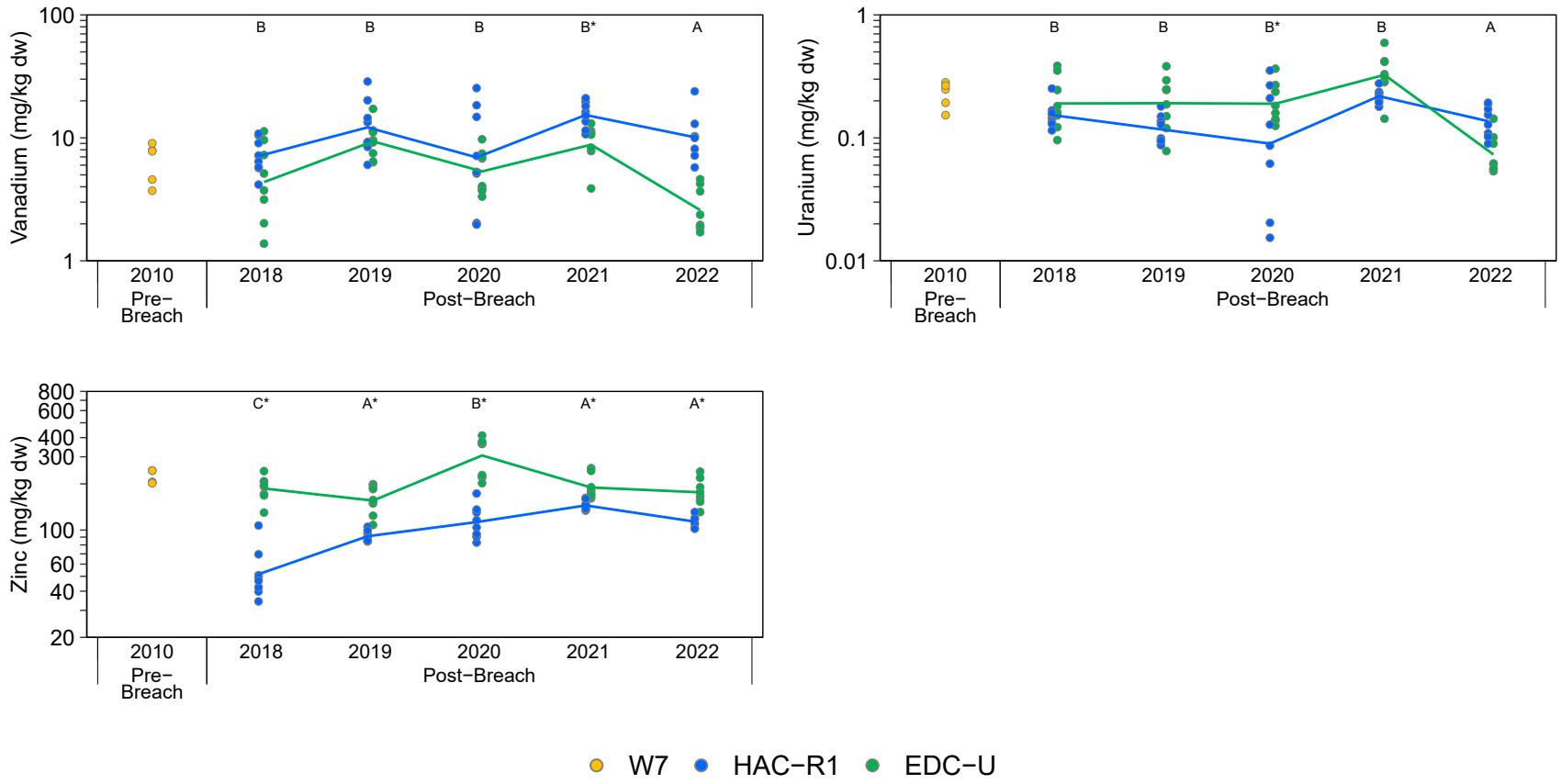

Figure F.4.4: Composite-Taxa Benthic Invertebrate Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Upper Hazeltine Creek (HAC-R1; Exposed) and Upper Edney Creek (EDC-U; Reference), 2010 to 2022

Notes: BCMOE = British Columbia Ministry of the Environment, GL = Guideline, dw = dry weight; <LRL = lower than the laboratory reporting limit (LRL). W7 (2010) is the pre-breach equivalent of HAC-R1. Concentrations <LRL are plotted as open symbols at the LRL and the open symbol represents one or more values reported <LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log-normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted. Letters with a * designate years where the exposed site is different than pre−breach conditions.

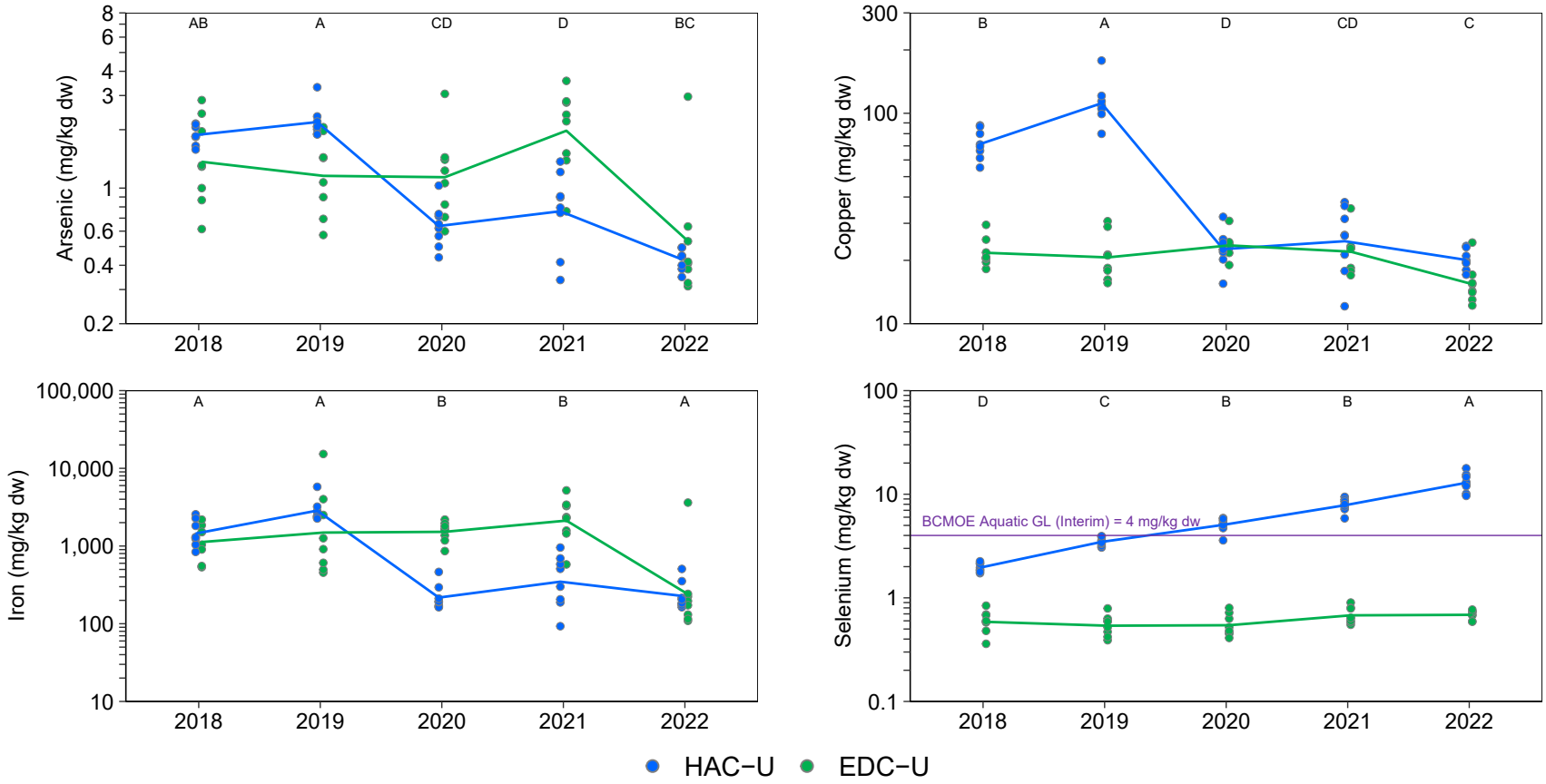

Figure F.4.5: Caddisfly Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Upper Hazeltine Creek (HAC-U; Exposed) and Upper Edney Creek (EDC-U; Reference), 2018 to 2022

Notes: BCMOE = British Columbia Ministry of the Environment, GL = Guideline, dw = dry weight, <LRL = lower than the laboratory reporting limit (LRL). Concentrations <LRL are plotted as open symbols at the LRL and the open symbol represents one or more values reported <LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted.

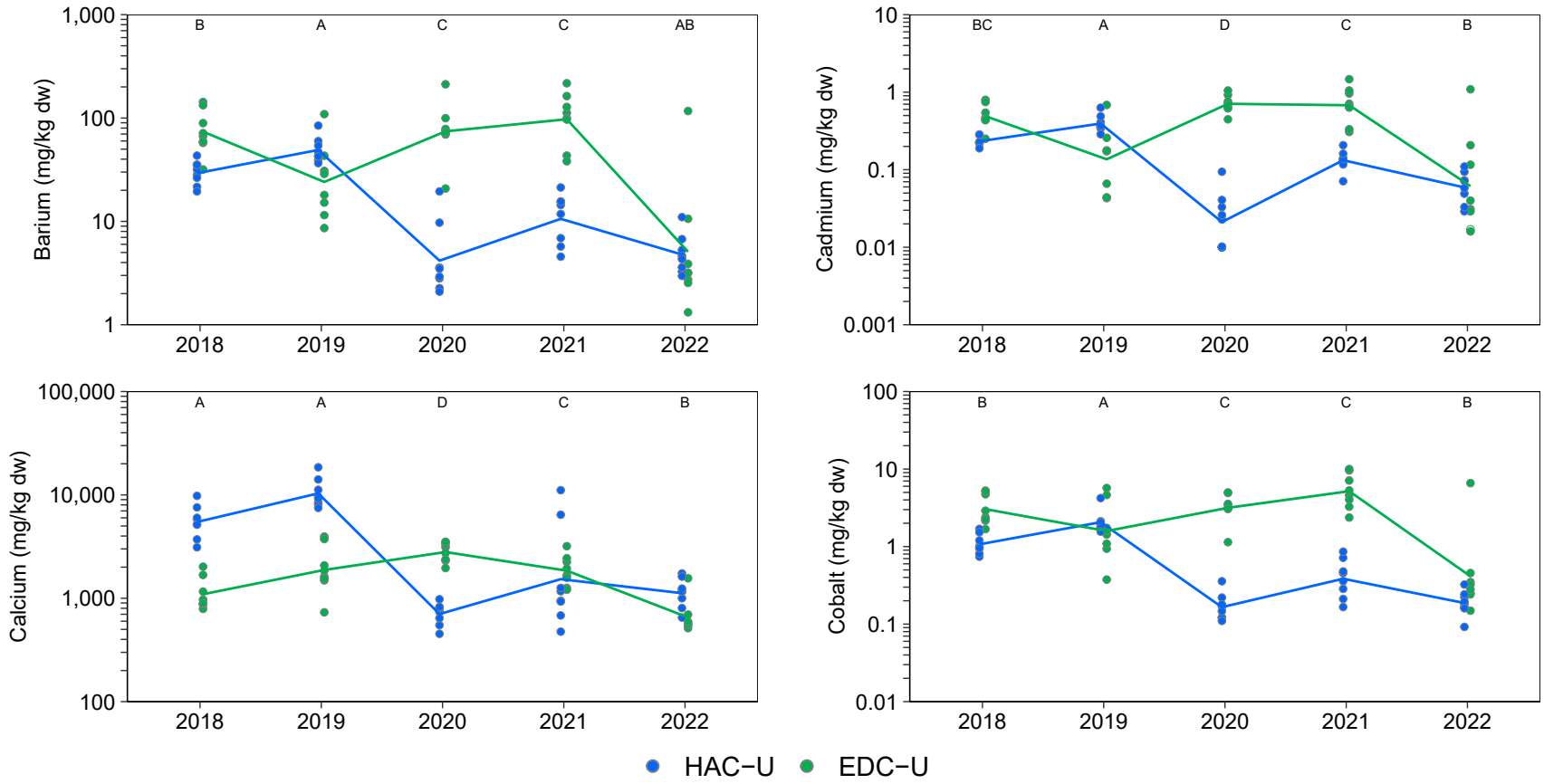

Figure F.4.5: Caddisfly Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Upper Hazeltine Creek (HAC-U; Exposed) and Upper Edney Creek (EDC-U; Reference), 2018 to 2022

Notes: BCMOE = British Columbia Ministry of the Environment, GL = Guideline, dw = dry weight, <LRL = lower than the laboratory reporting limit (LRL). Concentrations <LRL are plotted as open symbols at the LRL and the open symbol represents one or more values reported <LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted.

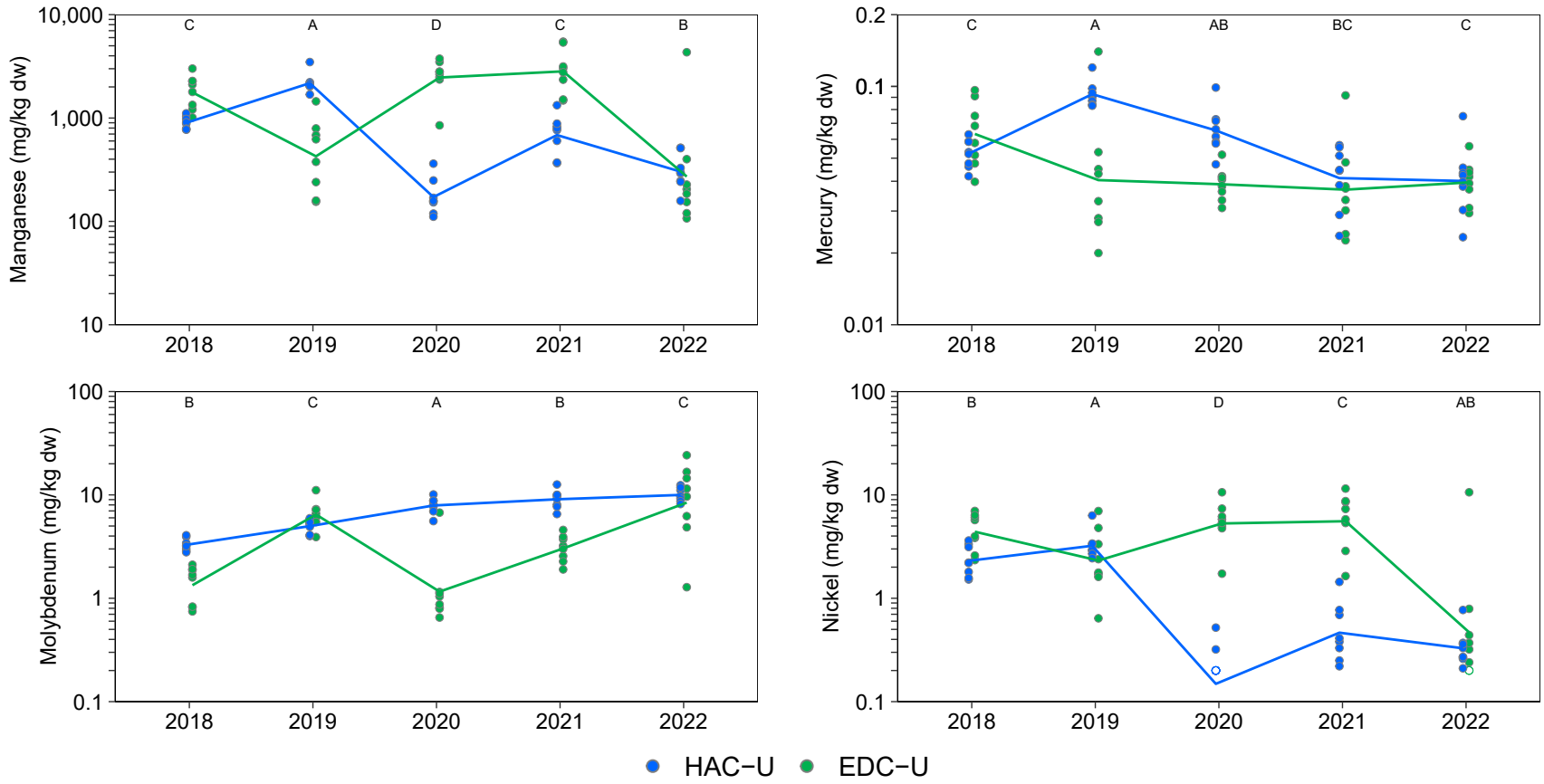

Figure F.4.5: Caddisfly Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Upper Hazeltine Creek (HAC-U; Exposed) and Upper Edney Creek (EDC-U; Reference), 2018 to 2022

Notes: BCMOE = British Columbia Ministry of the Environment, GL = Guideline, dw = dry weight, <LRL = lower than the laboratory reporting limit (LRL). Concentrations <LRL are plotted as open symbols at the LRL and the open symbol represents one or more values reported <LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted.

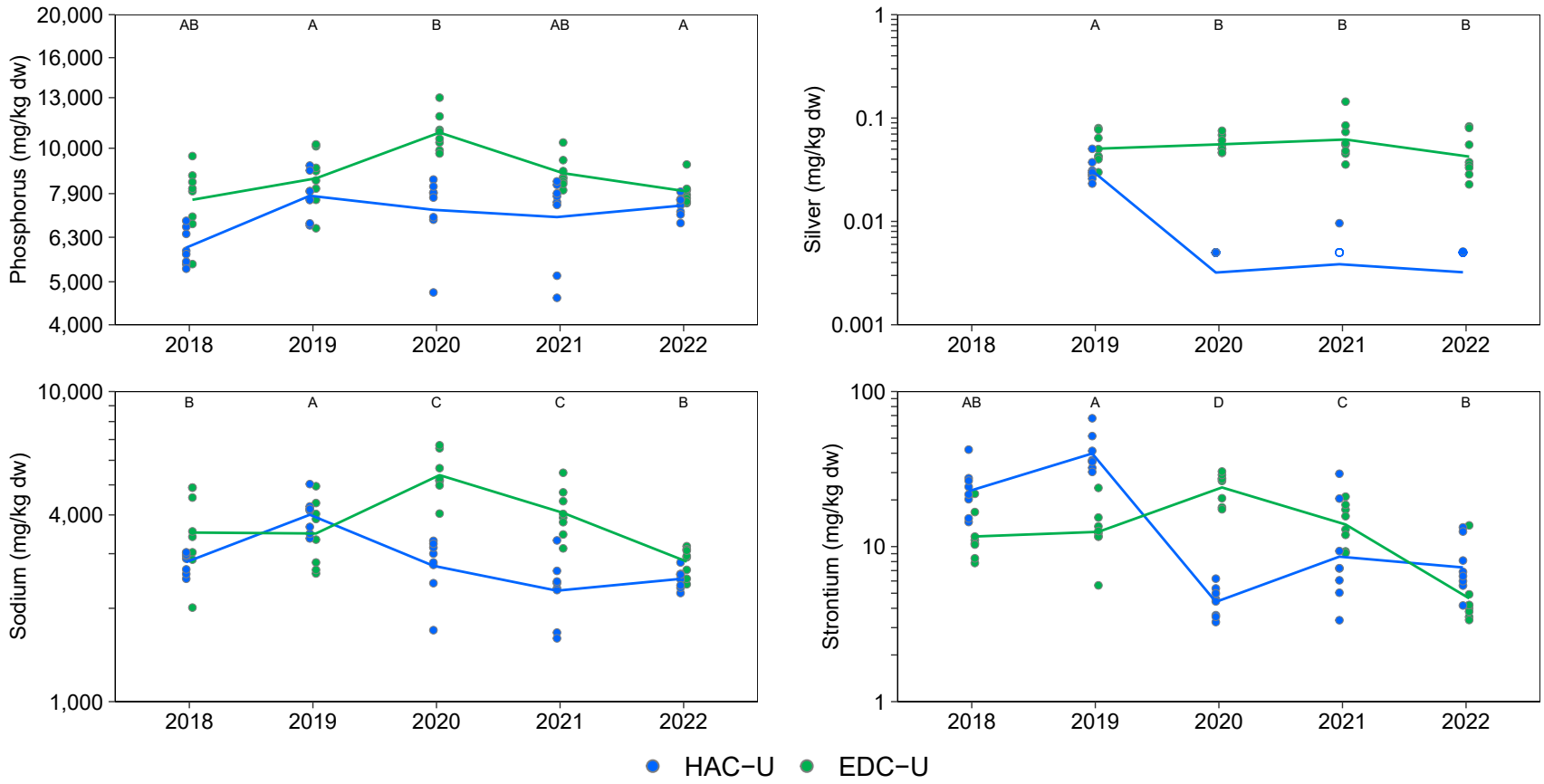

Figure F.4.5: Caddisfly Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Upper Hazeltine Creek (HAC-U; Exposed) and Upper Edney Creek (EDC-U; Reference), 2018 to 2022

Notes: BCMOE = British Columbia Ministry of the Environment, GL = Guideline, dw = dry weight, <LRL = lower than the laboratory reporting limit (LRL). Concentrations <LRL are plotted as open symbols at the LRL and the open symbol represents one or more values reported <LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted.

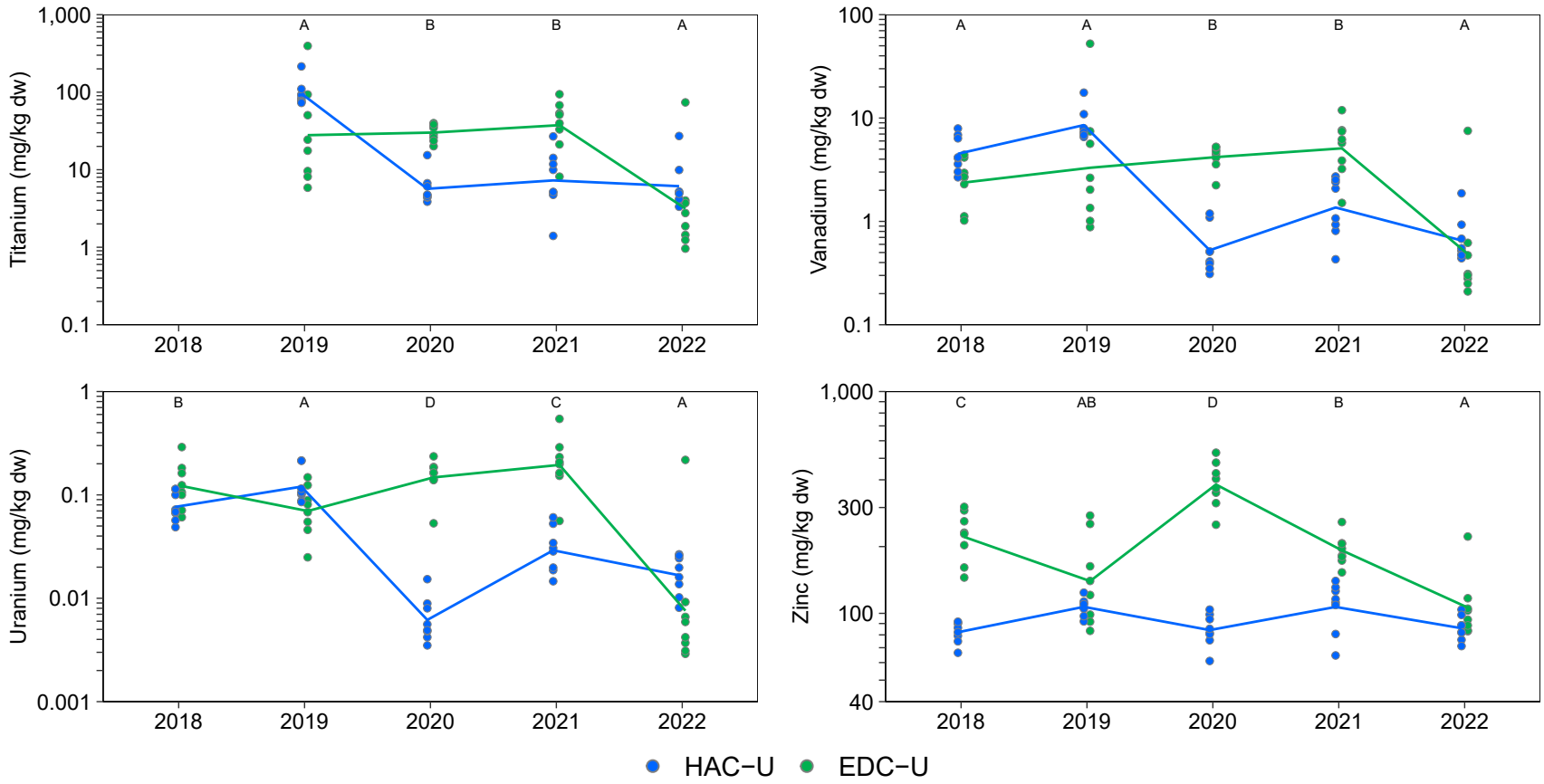

Figure F.4.5: Caddisfly Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Upper Hazeltine Creek (HAC-U; Exposed) and Upper Edney Creek (EDC-U; Reference), 2018 to 2022

Notes: BCMOE = British Columbia Ministry of the Environment, GL = Guideline, dw = dry weight, <LRL = lower than the laboratory reporting limit (LRL). Concentrations <LRL are plotted as open symbols at the LRL and the open symbol represents one or more values reported <LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted.

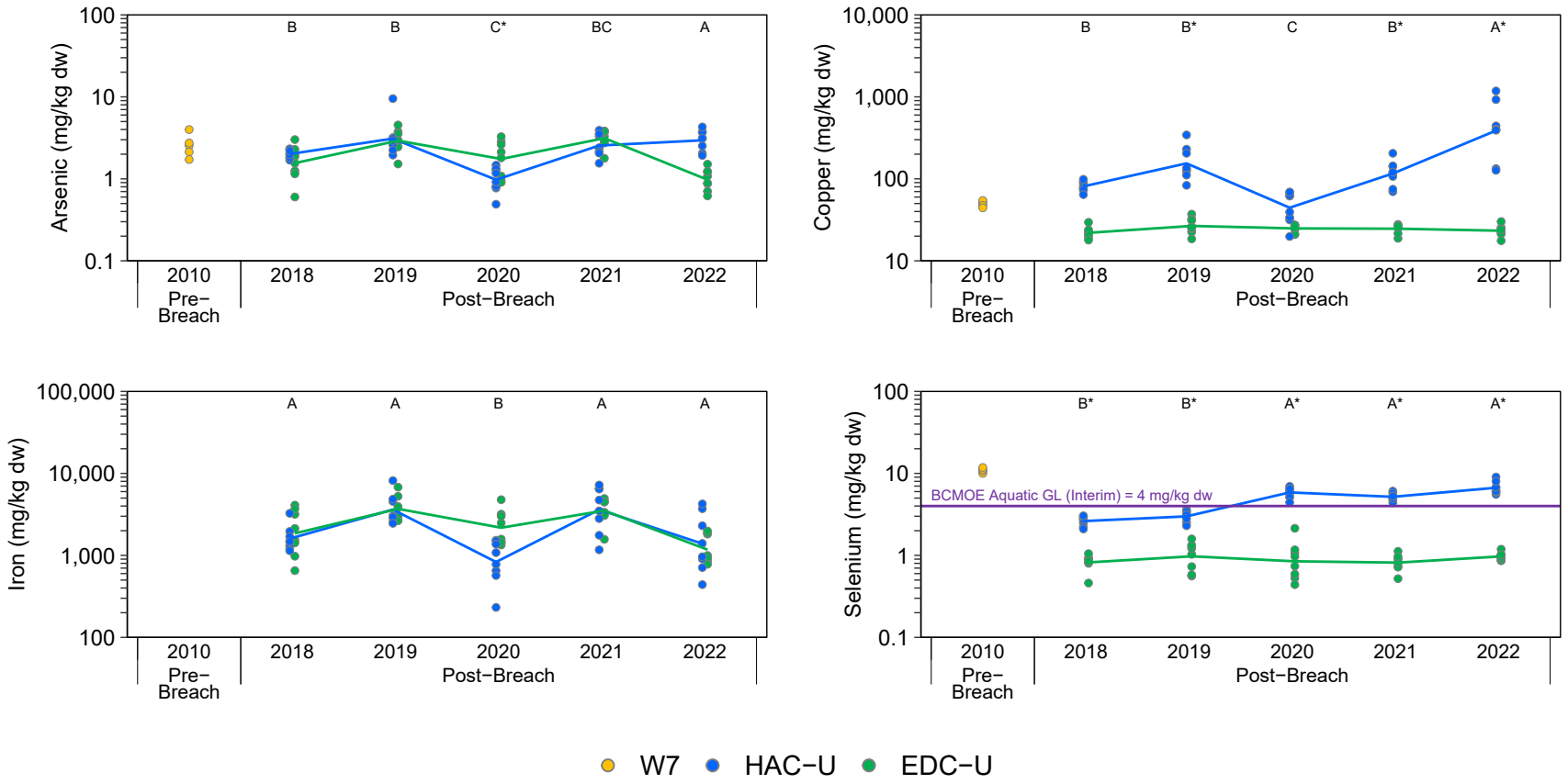

Figure F.4.6: Composite-Taxa Benthic Invertebrate Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Upper Hazeltine Creek (HAC-U; Exposed) and Upper Edney Creek (EDC-U; Reference), 2010 to 2022

Notes: BCMOE = British Columbia Ministry of the Environment; GL = Guideline; dw = dry weight; <LRL = lower than the laboratory reporting limit (LRL). W7 (2010) is the pre-breach equivalent of HAC-U. Concentrations <LRL are plotted as open symbols at the LRL and the open symbol represents one or more values reported <LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log −normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted. Letters with a * designate years where the exposed site is different than pre−breach conditions.

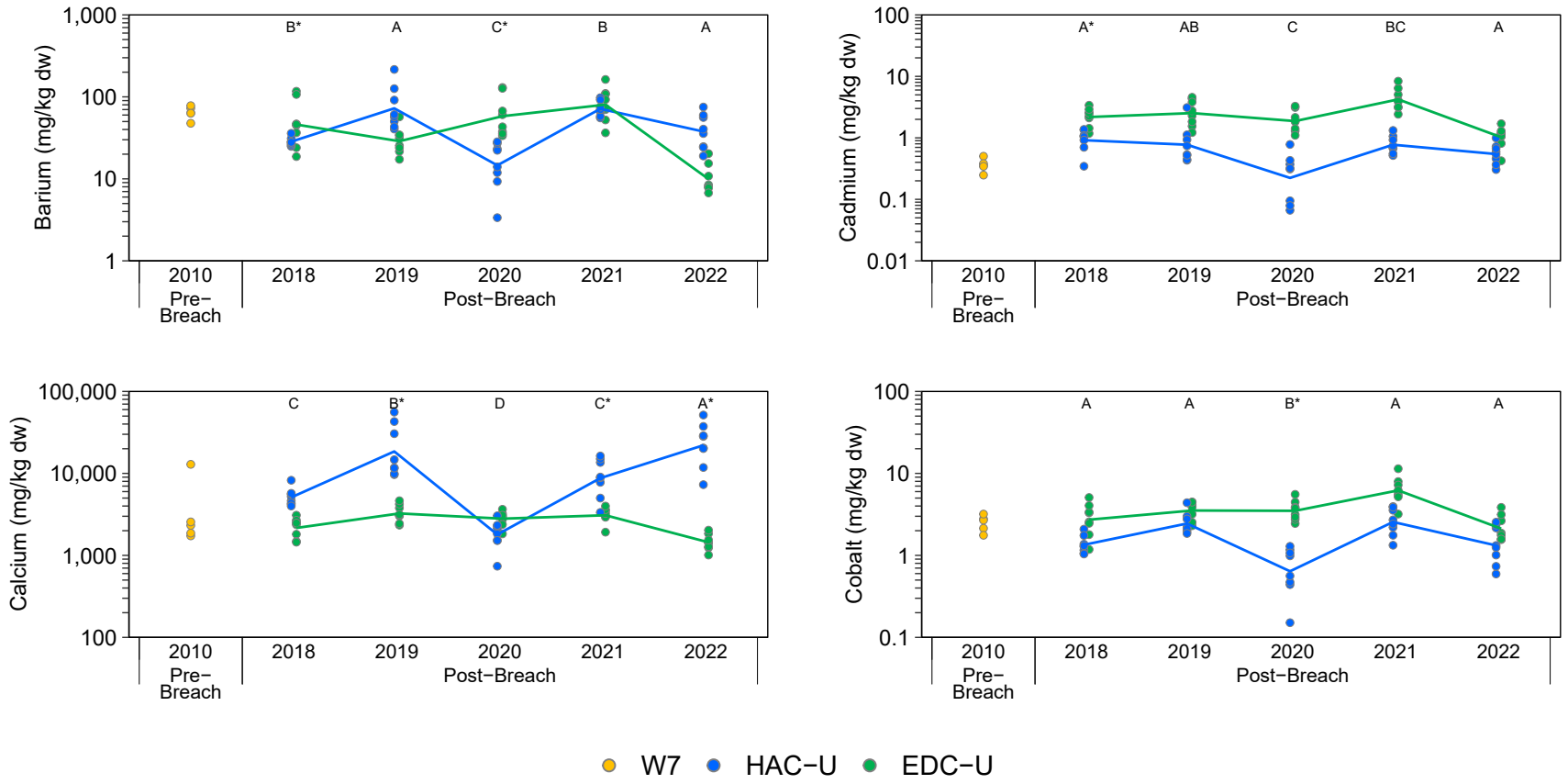

Figure F.4.6: Composite-Taxa Benthic Invertebrate Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Upper Hazeltine Creek (HAC-U; Exposed) and Upper Edney Creek (EDC-U; Reference), 2010 to 2022

Notes: BCMOE = British Columbia Ministry of the Environment; GL = Guideline; dw = dry weight; <LRL = lower than the laboratory reporting limit (LRL). W7 (2010) is the pre-breach equivalent of HAC-U. Concentrations <LRL are plotted as open symbols at the LRL and the open symbol represents one or more values reported <LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log −normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted. Letters with a * designate years where the exposed site is different than pre−breach conditions.

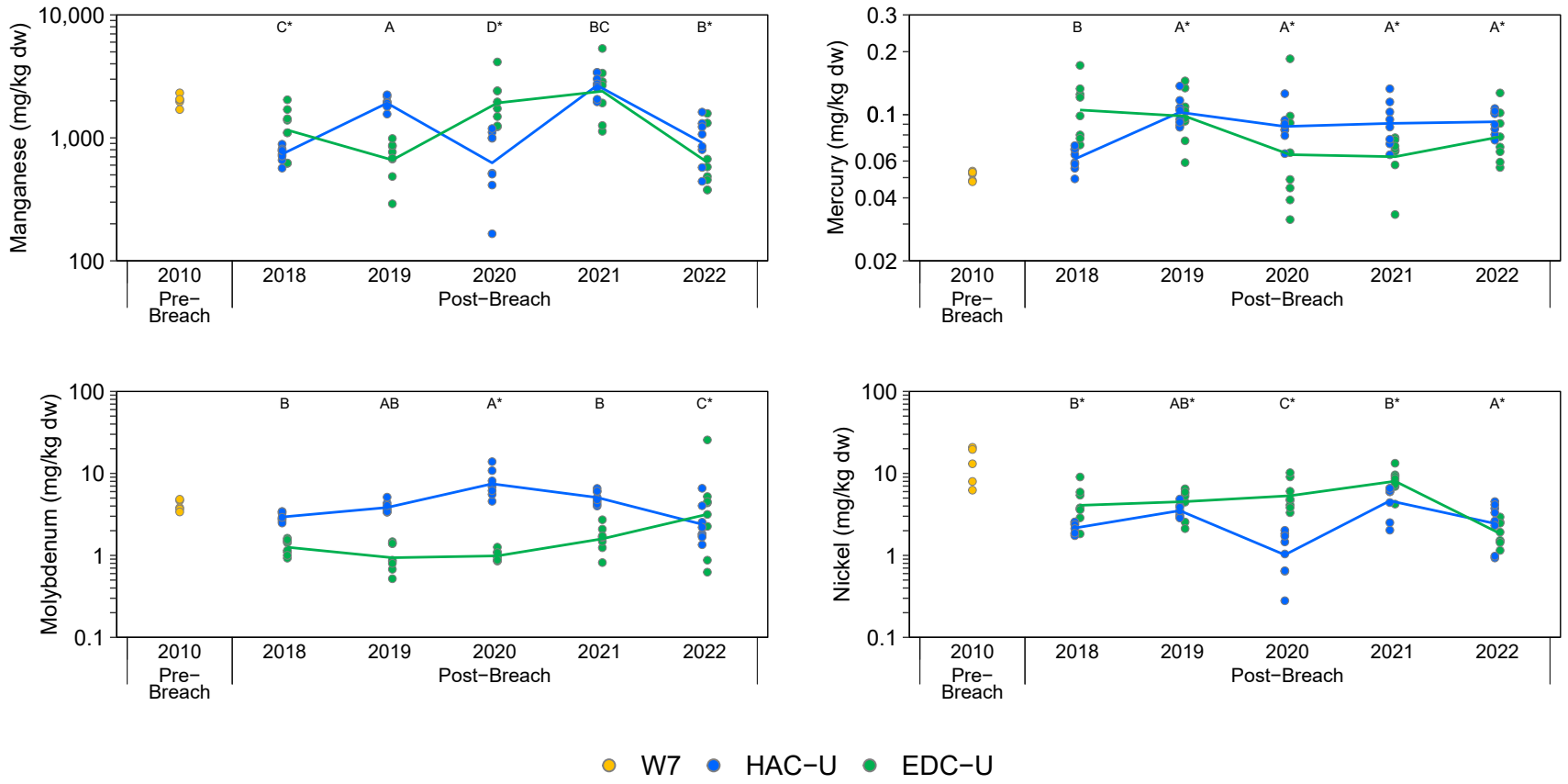

Figure F.4.6: Composite-Taxa Benthic Invertebrate Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Upper Hazeltine Creek (HAC-U; Exposed) and Upper Edney Creek (EDC-U; Reference), 2010 to 2022

Notes: BCMOE = British Columbia Ministry of the Environment; GL = Guideline; dw = dry weight; <LRL = lower than the laboratory reporting limit (LRL). W7 (2010) is the pre-breach equivalent of HAC-U. Concentrations <LRL are plotted as open symbols at the LRL and the open symbol represents one or more values reported <LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log −normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted. Letters with a * designate years where the exposed site is different than pre−breach conditions.

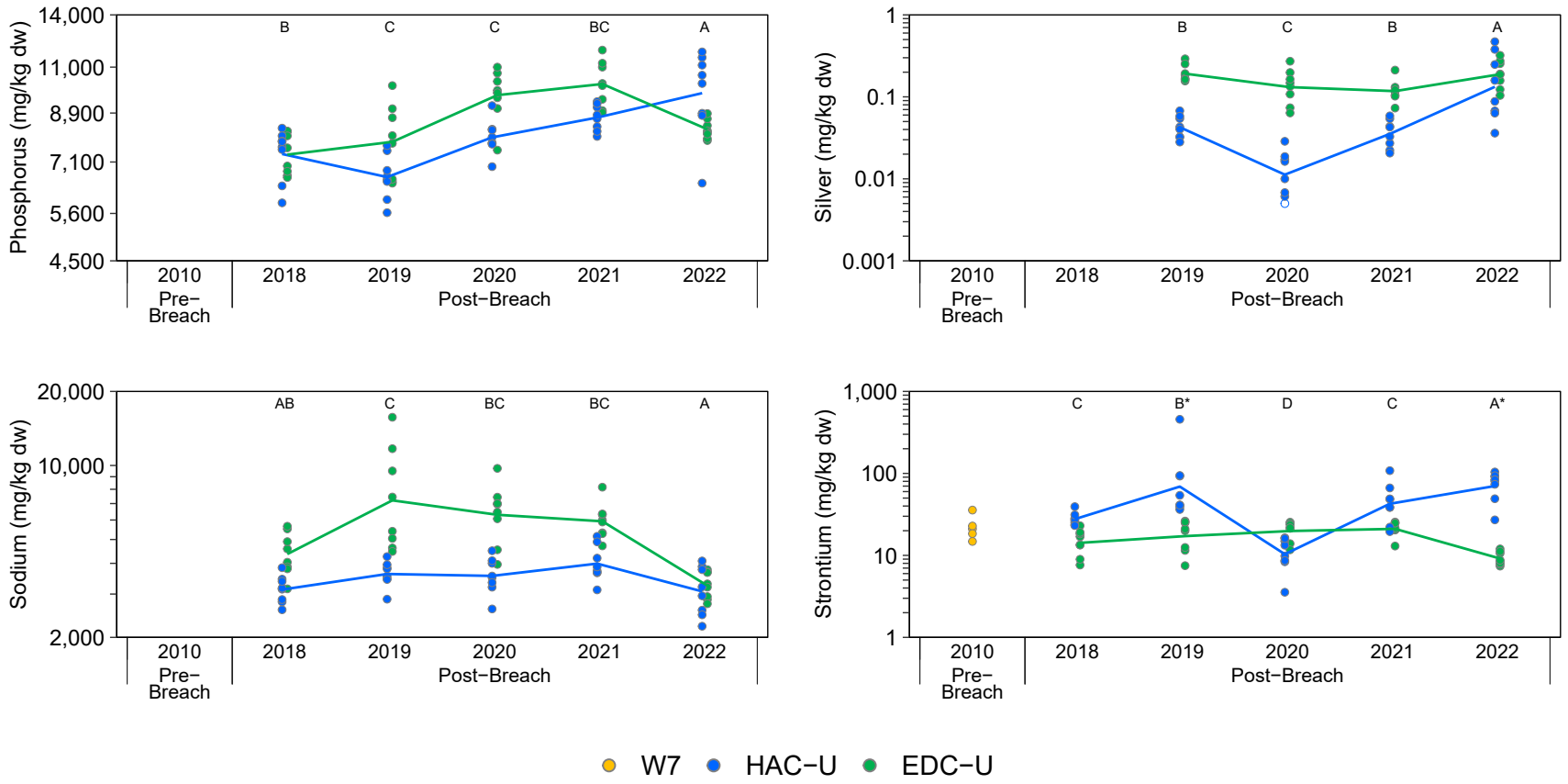

Figure F.4.6: Composite-Taxa Benthic Invertebrate Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Upper Hazeltine Creek (HAC-U; Exposed) and Upper Edney Creek (EDC-U; Reference), 2010 to 2022

Notes: BCMOE = British Columbia Ministry of the Environment; GL = Guideline; dw = dry weight; <LRL = lower than the laboratory reporting limit (LRL). W7 (2010) is the pre-breach equivalent of HAC-U. Concentrations <LRL are plotted as open symbols at the LRL and the open symbol represents one or more values reported <LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log −normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted. Letters with a * designate years where the exposed site is different than pre−breach conditions.

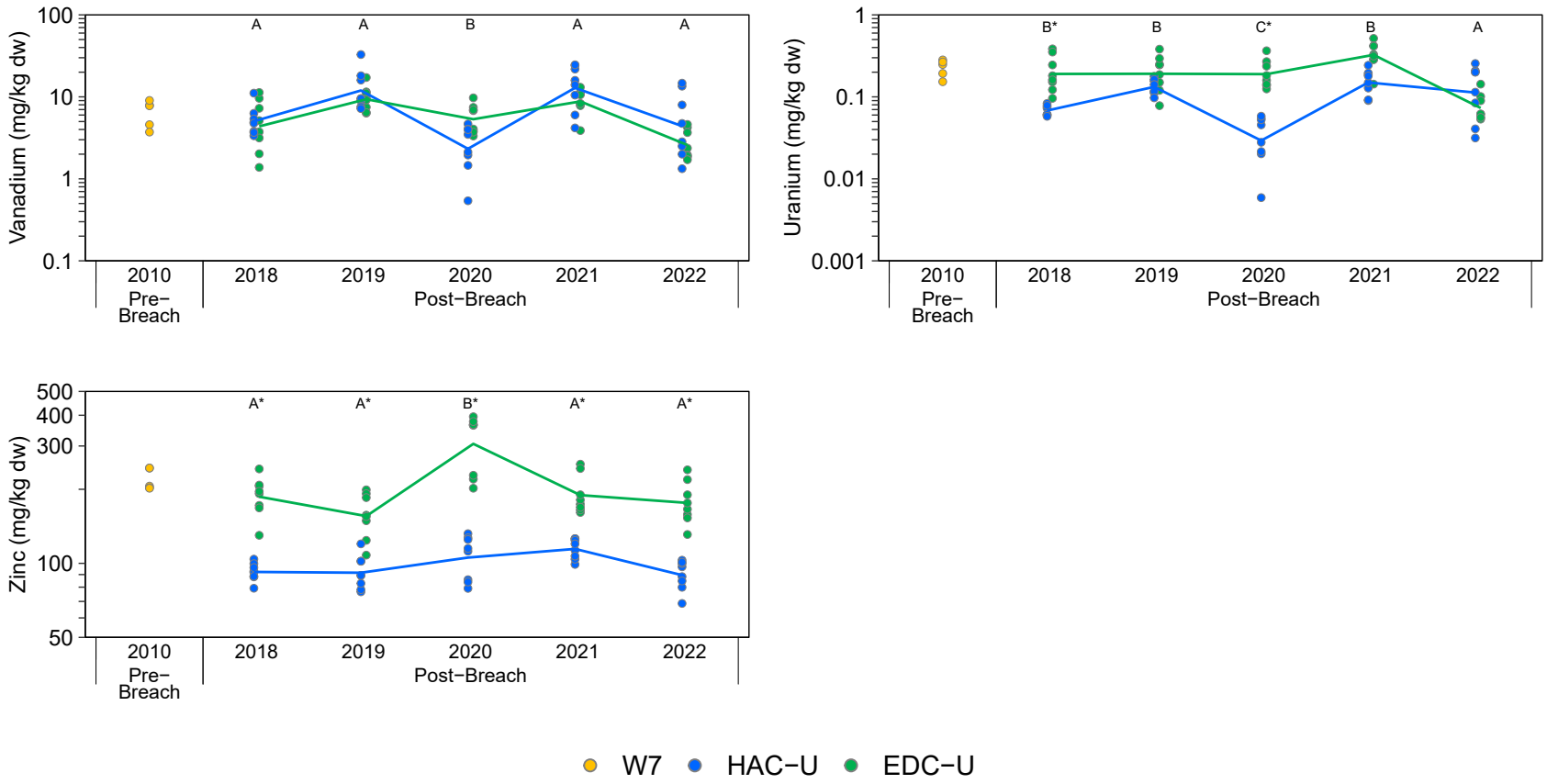

Figure F.4.6: Composite-Taxa Benthic Invertebrate Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Upper Hazeltine Creek (HAC-U; Exposed) and Upper Edney Creek (EDC-U; Reference), 2010 to 2022

Notes: BCMOE = British Columbia Ministry of the Environment; GL = Guideline; dw = dry weight; <LRL = lower than the laboratory reporting limit (LRL). W7 (2010) is the pre-breach equivalent of HAC-U. Concentrations <LRL are plotted as open symbols at the LRL and the open symbol represents one or more values reported <LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log −normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted. Letters with a * designate years where the exposed site is different than pre−breach conditions.

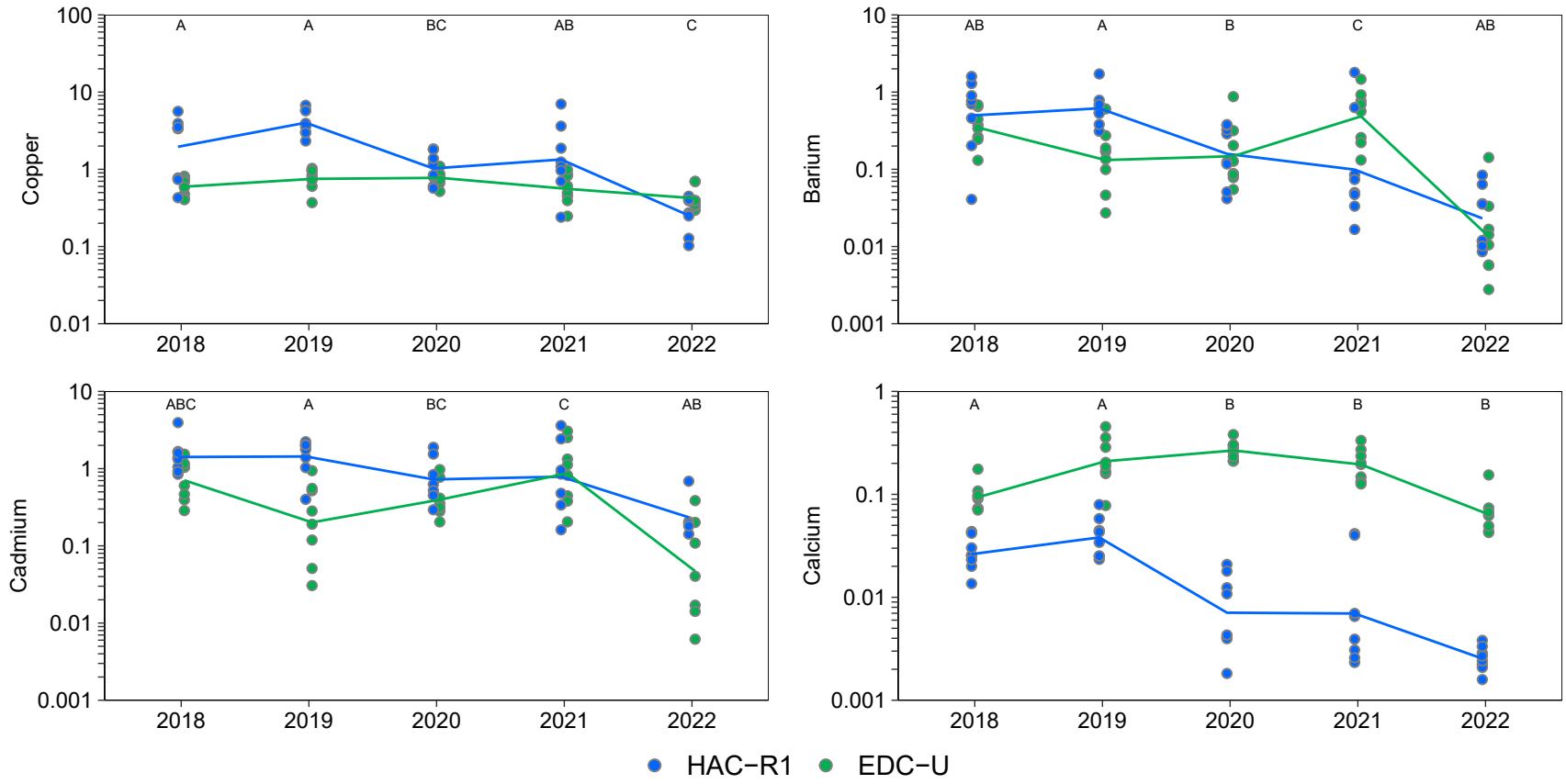

Figure F.4.7: Trophic Transfer Factors for Caddisfly Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Upper Hazeltine Creek (HAC-R1; Exposed) and Upper Edney Creek (EDC-U; Reference), 2018 to 2022

Notes: Trophic Transfer Factors (TTFs) were not calculated for analytes with results reported below the laboratory reporting limit (<LRL). Concentrations <LRL are plotted as open symbols at the LRL and the open symbol represents one or more values reported <LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log-normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted.

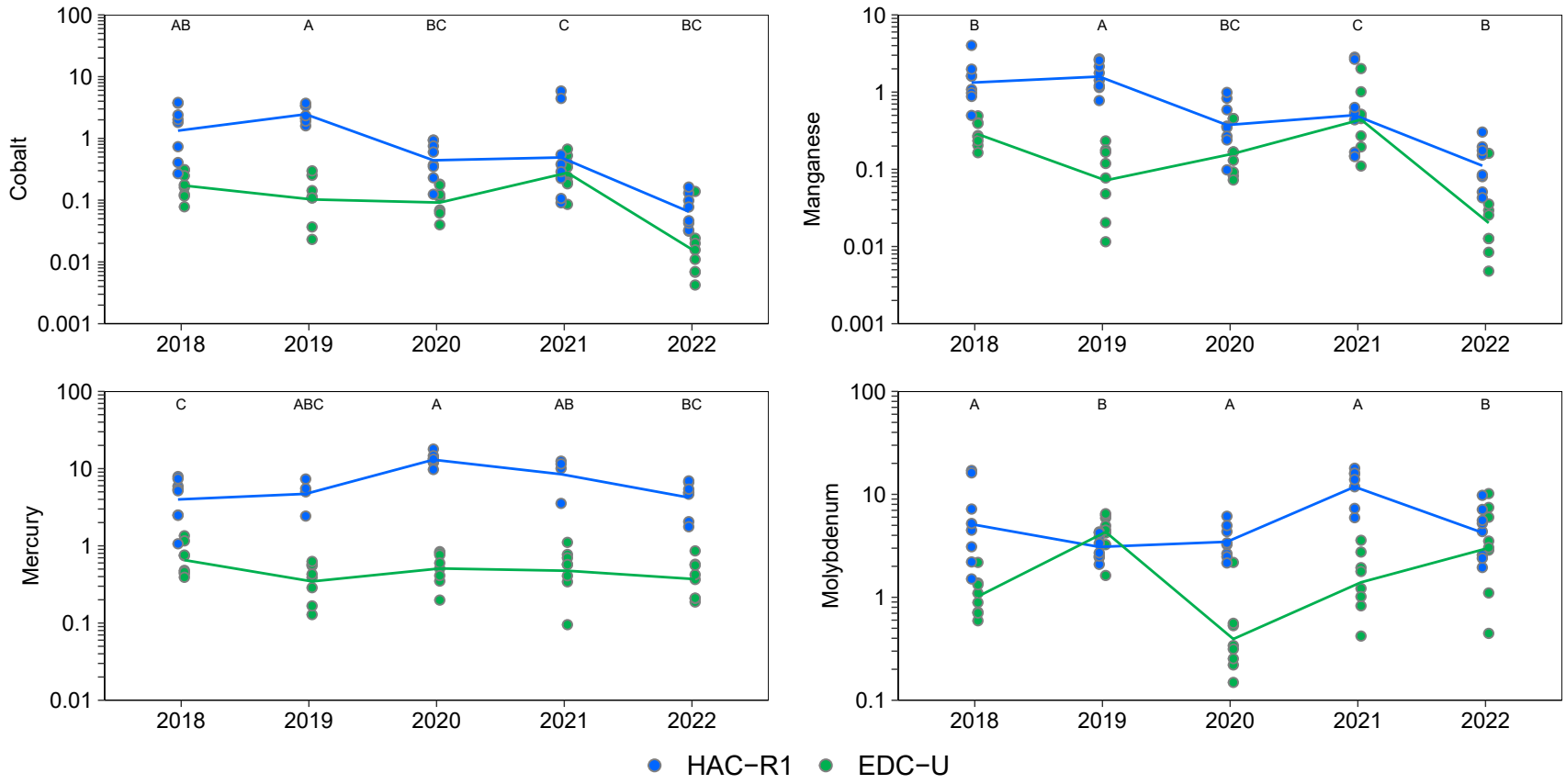

Figure F.4.7: Trophic Transfer Factors for Caddisfly Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Upper Hazeltine Creek (HAC-R1; Exposed) and Upper Edney Creek (EDC-U; Reference), 2018 to 2022

Notes: Trophic Transfer Factors (TTFs) were not calculated for analytes with results reported below the laboratory reporting limit (<LRL). Concentrations <LRL are plotted as open symbols at the LRL and the open symbol represents one or more values reported <LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log-normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted.

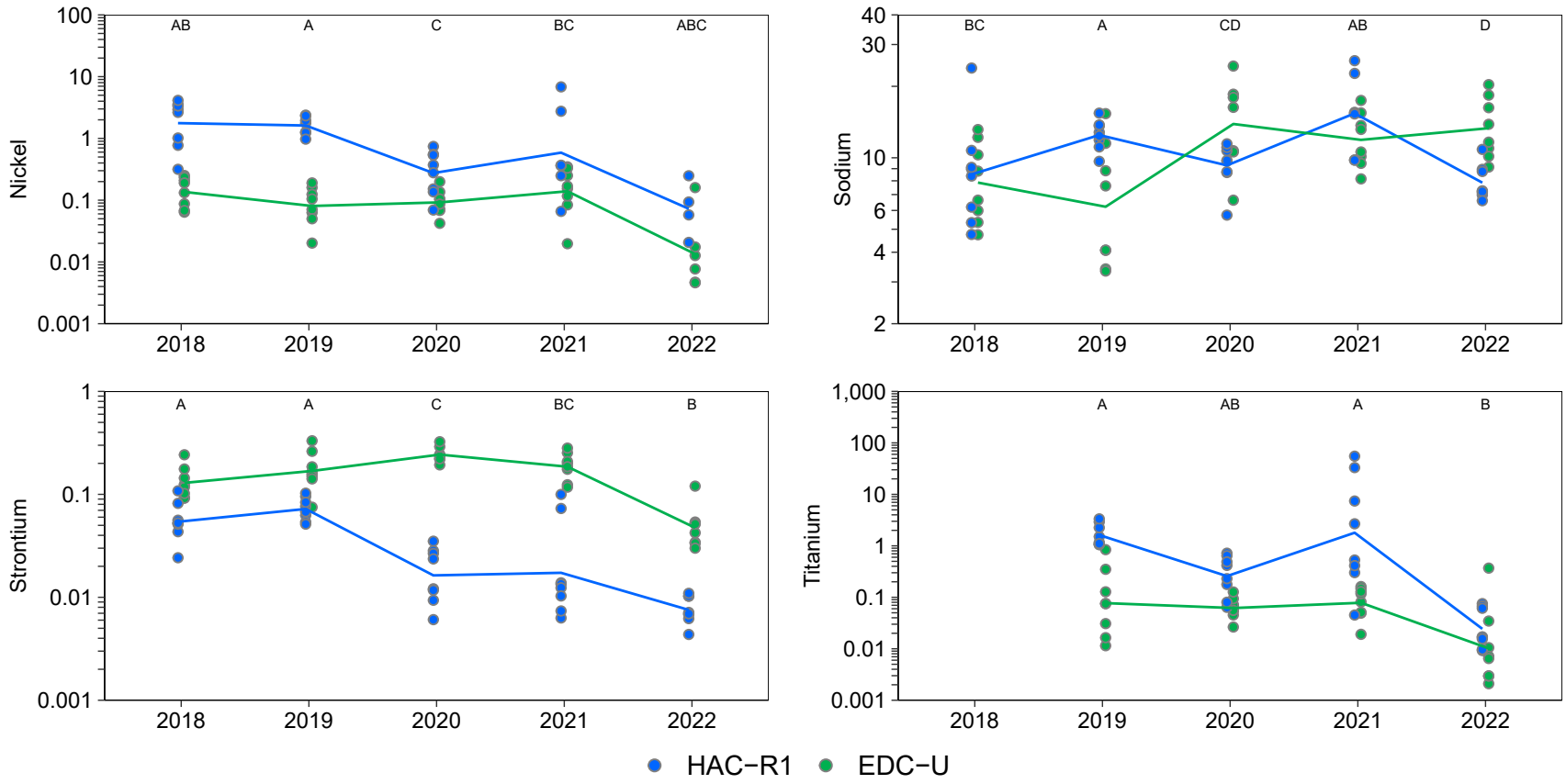

Figure F.4.7: Trophic Transfer Factors for Caddisfly Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Upper Hazeltine Creek (HAC-R1; Exposed) and Upper Edney Creek (EDC-U; Reference), 2018 to 2022

Notes: Trophic Transfer Factors (TTFs) were not calculated for analytes with results reported below the laboratory reporting limit (<LRL). Concentrations <LRL are plotted as open symbols at the LRL and the open symbol represents one or more values reported <LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log-normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted.

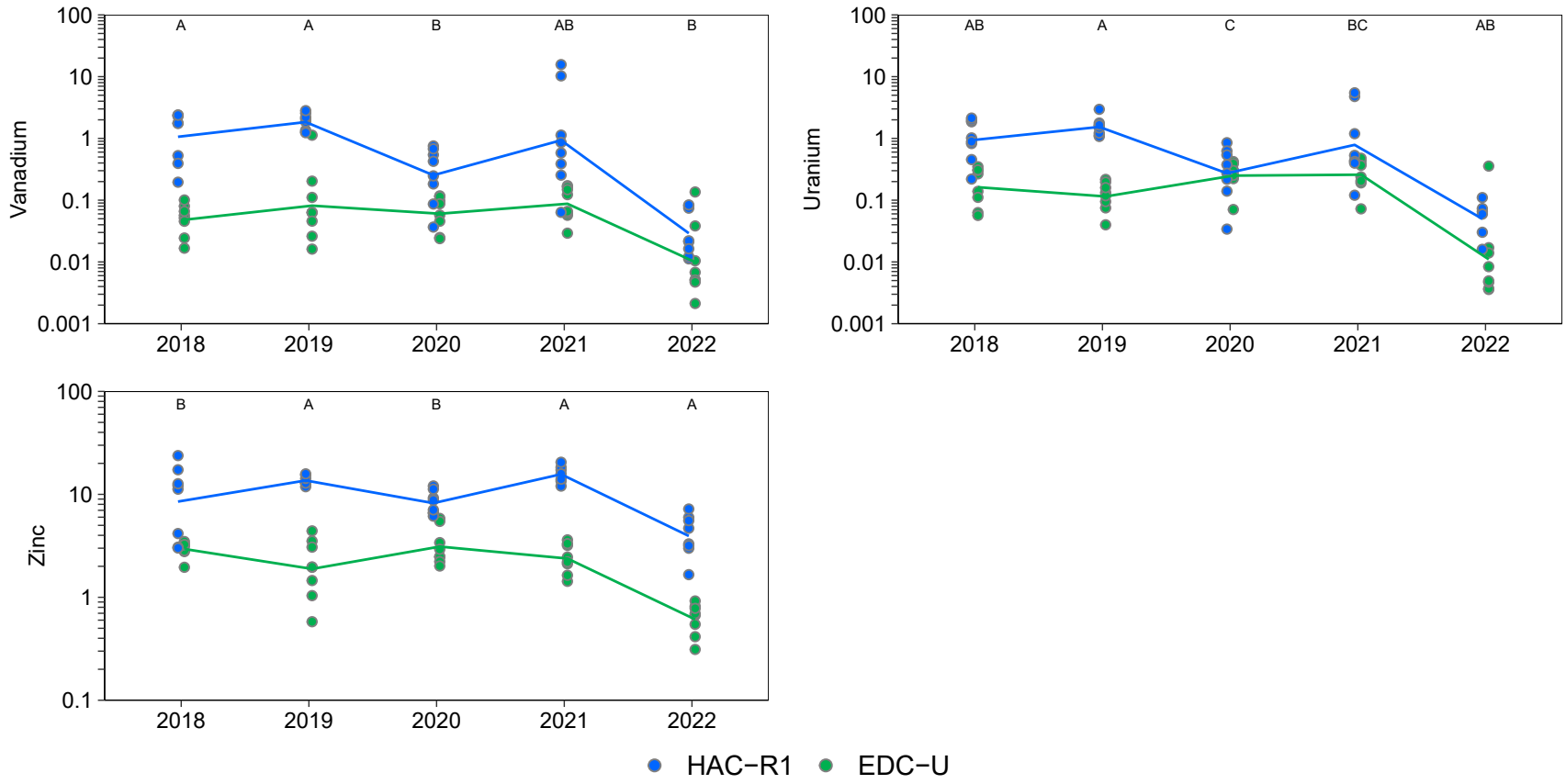

Figure F.4.7: Trophic Transfer Factors for Caddisfly Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Upper Hazeltine Creek (HAC-R1; Exposed) and Upper Edney Creek (EDC-U; Reference), 2018 to 2022

Notes: Trophic Transfer Factors (TTFs) were not calculated for analytes with results reported below the laboratory reporting limit (<LRL). Concentrations <LRL are plotted as open symbols at the LRL and the open symbol represents one or more values reported <LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log-normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted.

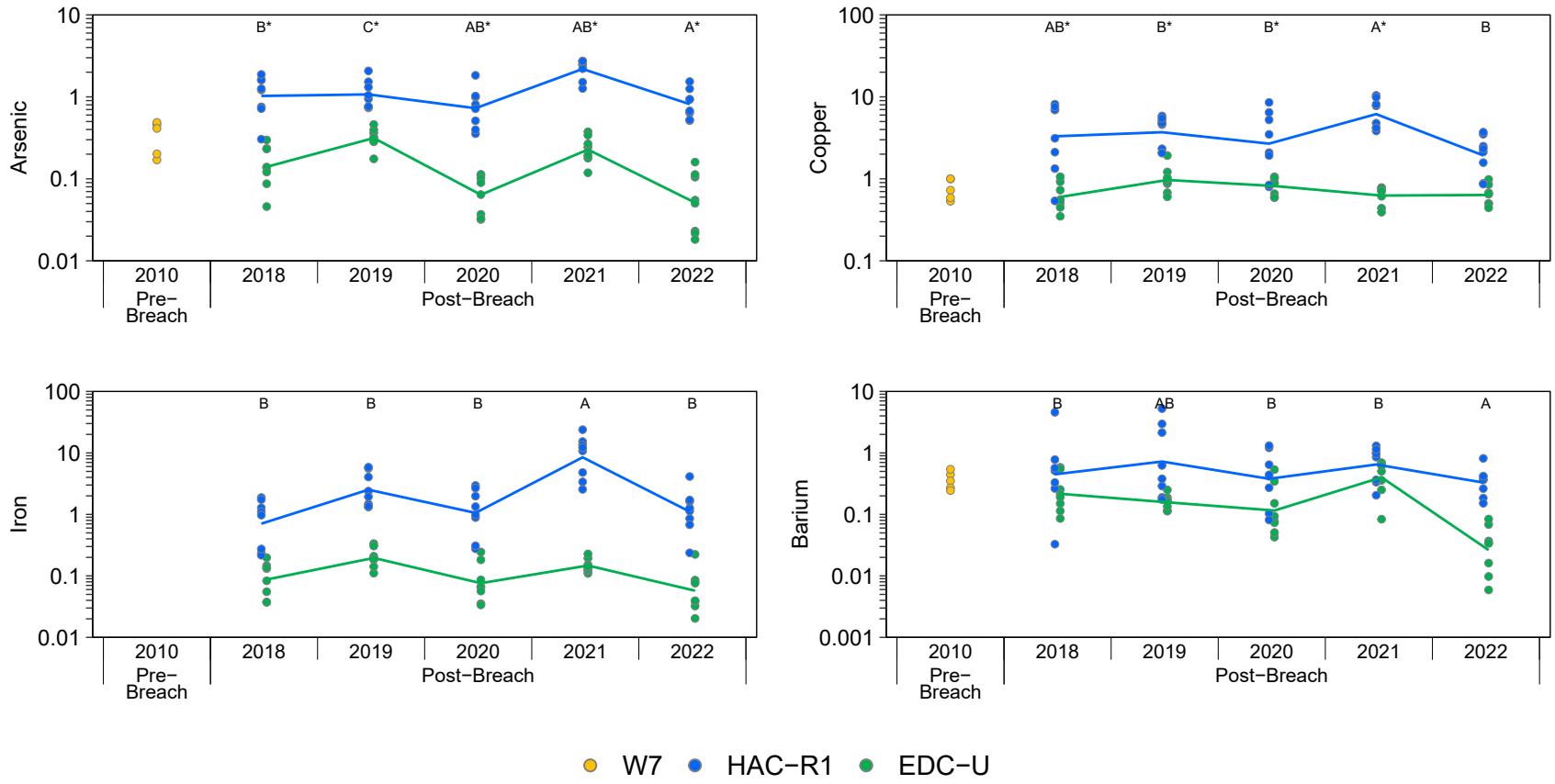

Figure F.4.8: Trophic Transfer Factors for Composite-Taxa Benthic Invertebrate Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Upper Hazeltine Creek (HAC-R1; Exposed) and Upper Edney Creek (EDC-U; Reference), 2010 to 2022

Notes: Trophic Transfer Factors (TTFs) were not calculated for analytes with results reported below the laboratory reporting limit (<LRL). W7 (2010) is the pre-breach equivalent of HAC-R1. Concentrations <LRL are plotted as open symbols at the LRL and the open symbol represents one or more values reported <LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p −value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted. Letters with a * designate years where the exposed site is different than pre−breach conditions.

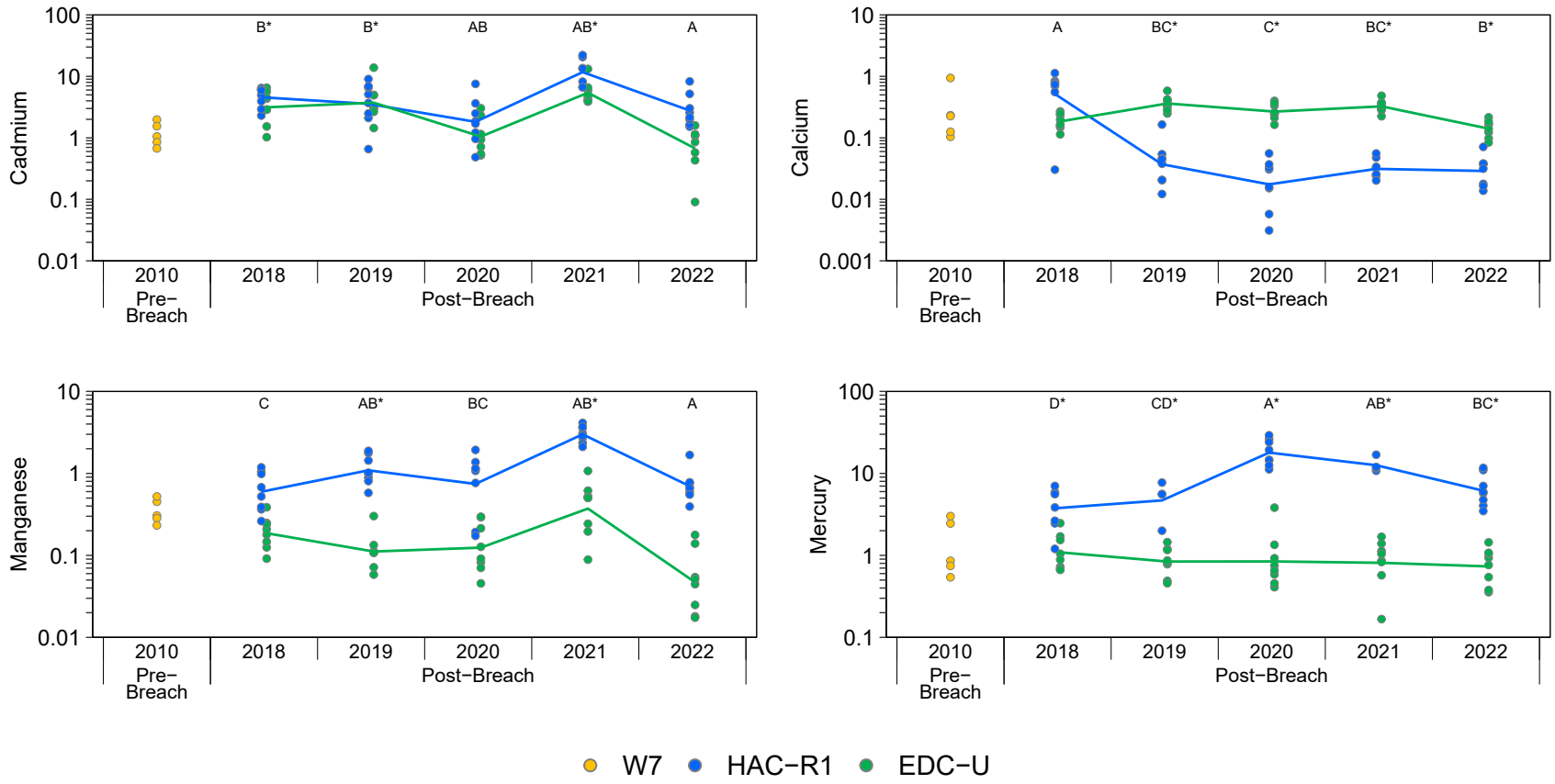

Figure F.4.8: Trophic Transfer Factors for Composite-Taxa Benthic Invertebrate Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Upper Hazeltine Creek (HAC-R1; Exposed) and Upper Edney Creek (EDC-U; Reference), 2010 to 2022

Notes: Trophic Transfer Factors (TTFs) were not calculated for analytes with results reported below the laboratory reporting limit (<LRL). W7 (2010) is the pre-breach equivalent of HAC-R1. Concentrations <LRL are plotted as open symbols at the LRL and the open symbol represents one or more values reported <LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p −value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted. Letters with a * designate years where the exposed site is different than pre−breach conditions.

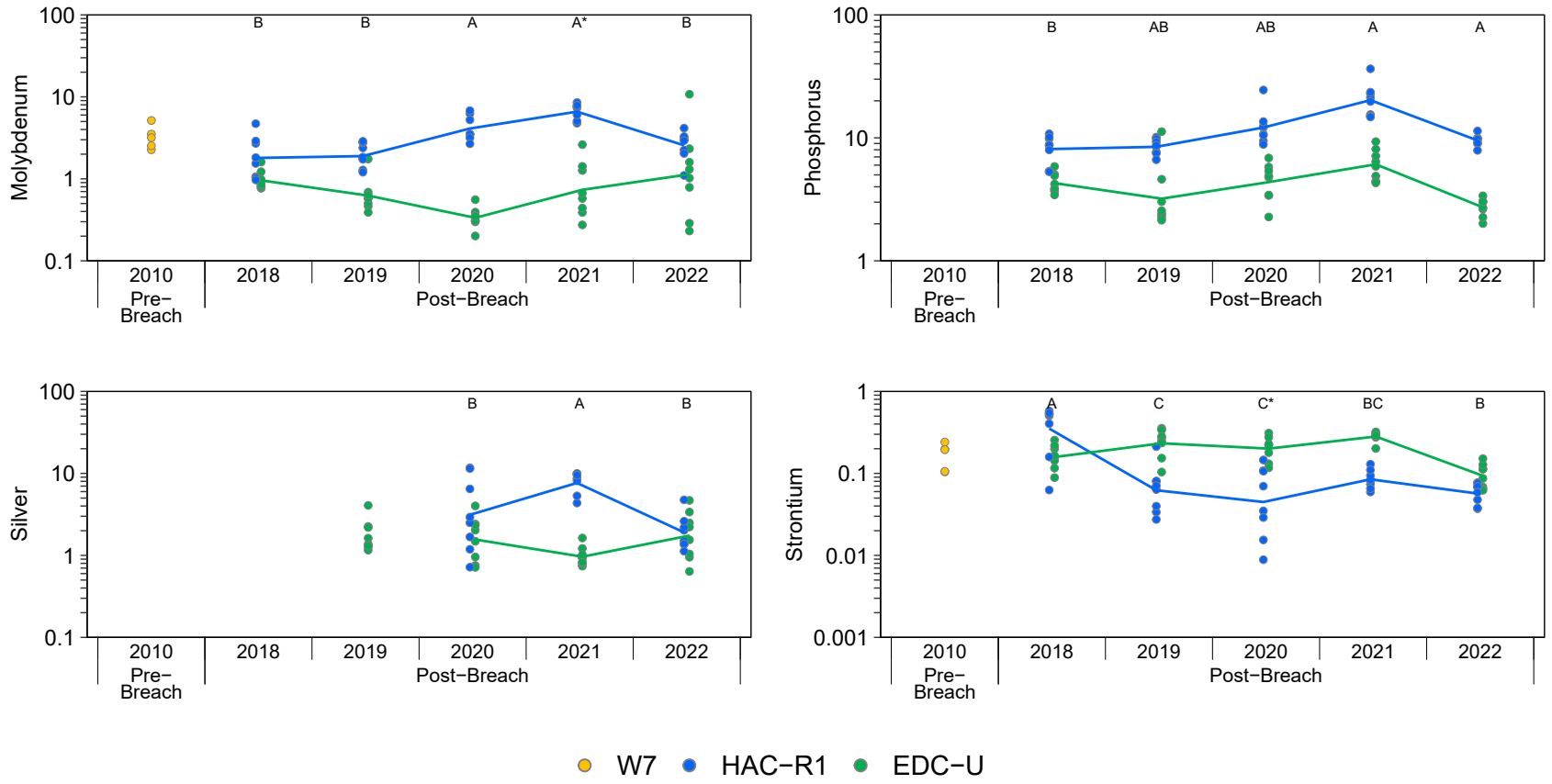

Figure F.4.8: Trophic Transfer Factors for Composite-Taxa Benthic Invertebrate Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Upper Hazeltine Creek (HAC-R1; Exposed) and Upper Edney Creek (EDC-U; Reference), 2010 to 2022

Notes: Trophic Transfer Factors (TTFs) were not calculated for analytes with results reported below the laboratory reporting limit (<LRL). W7 (2010) is the pre-breach equivalent of HAC-R1. Concentrations <LRL are plotted as open symbols at the LRL and the open symbol represents one or more values reported <LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p −value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted. Letters with a * designate years where the exposed site is different than pre−breach conditions.

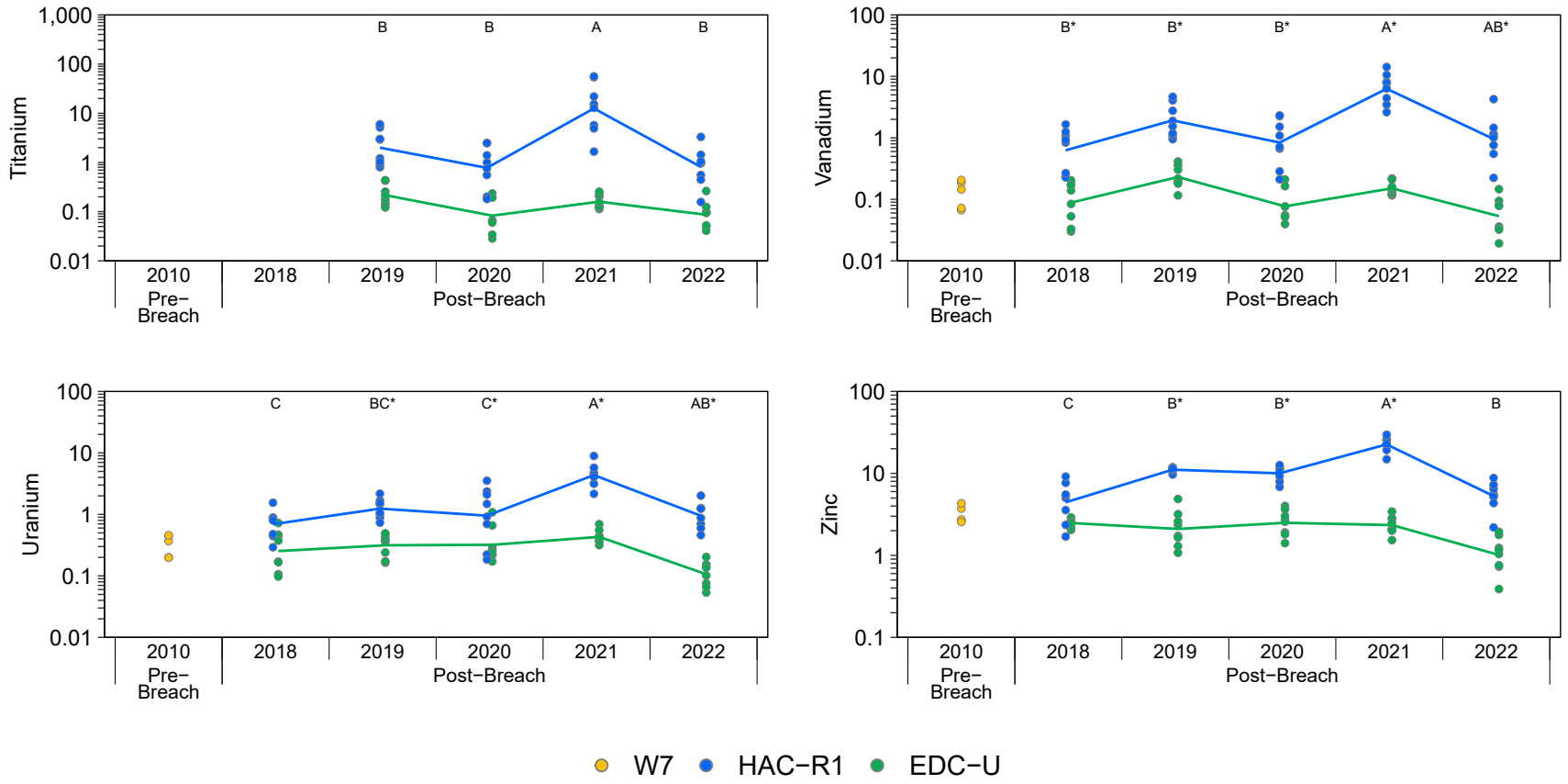

Figure F.4.8: Trophic Transfer Factors for Composite-Taxa Benthic Invertebrate Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Upper Hazeltine Creek (HAC-R1; Exposed) and Upper Edney Creek (EDC-U; Reference), 2010 to 2022

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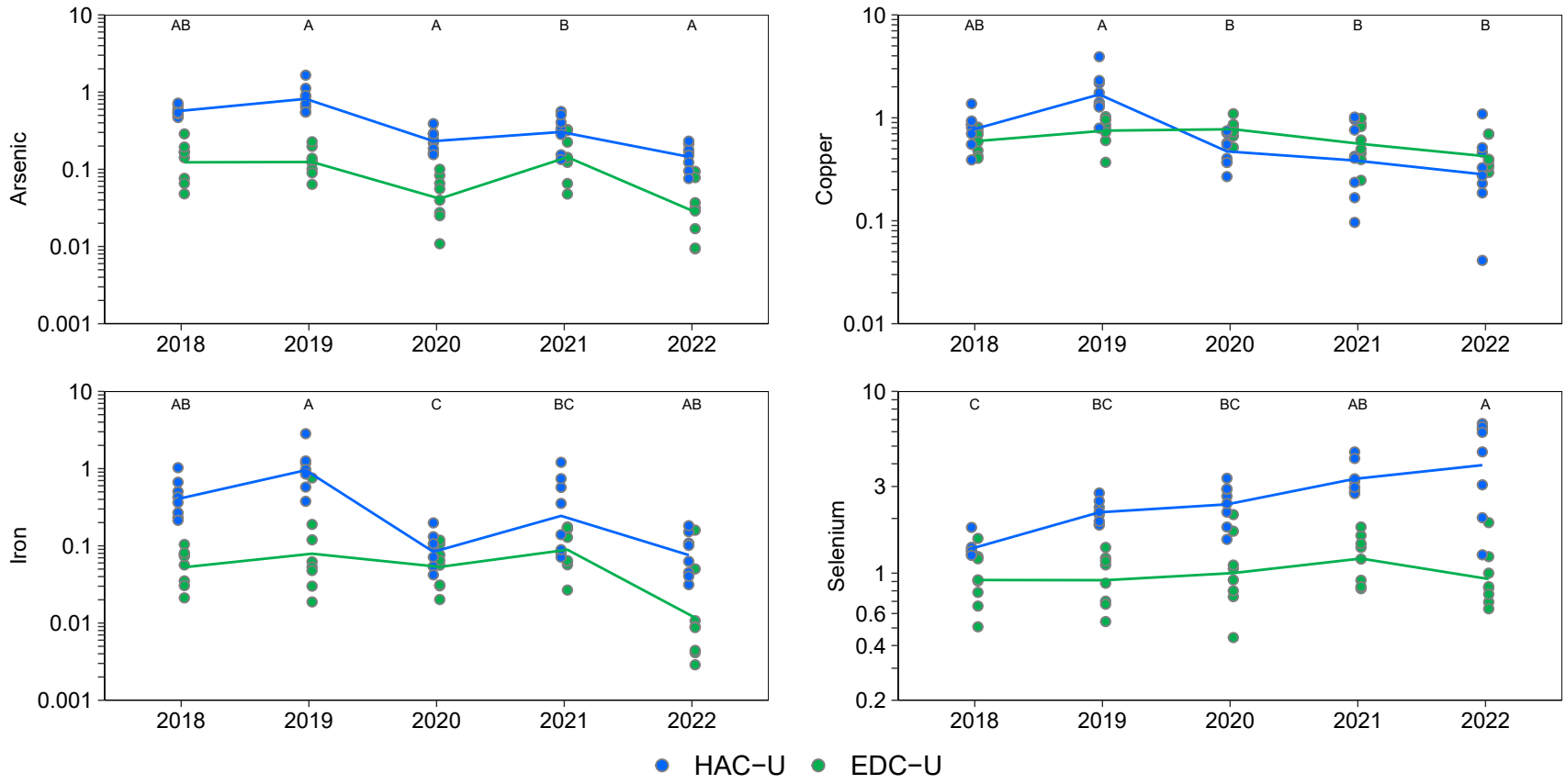

Figure F.4.9: Trophic Transfer Factors for Caddisfly Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Upper Hazeltine Creek (HAC-U; Exposed) and Upper Edney Creek (EDC-U; Reference), 2018 to 2022

Notes: Trophic Transfer Factors (TTFs) were not calculated for analytes with results reported below the laboratory reporting limit (<LRL). Concentrations <LRL are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted.

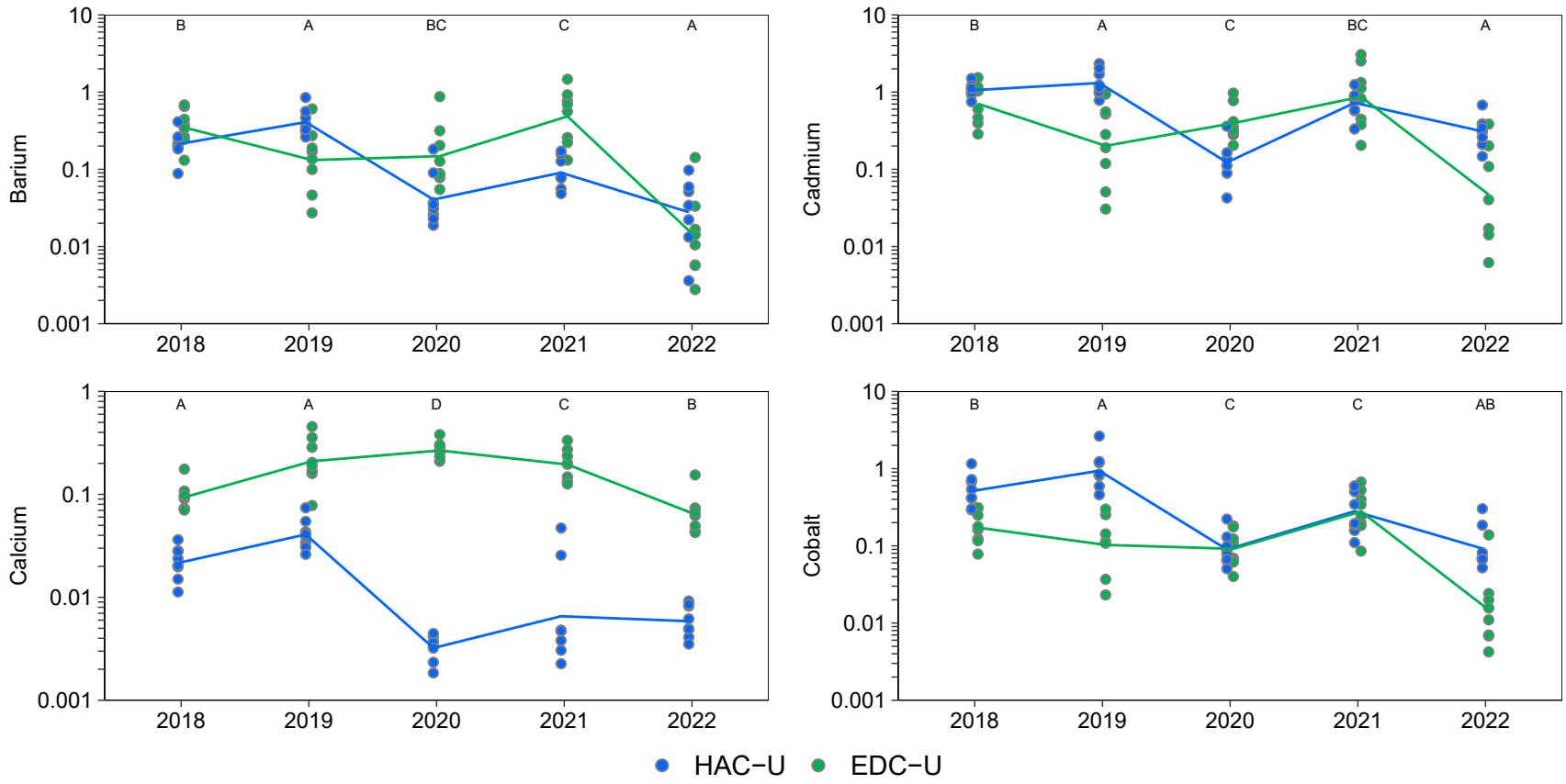

Figure F.4.9: Trophic Transfer Factors for Caddisfly Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Upper Hazeltine Creek (HAC-U; Exposed) and Upper Edney Creek (EDC-U; Reference), 2018 to 2022

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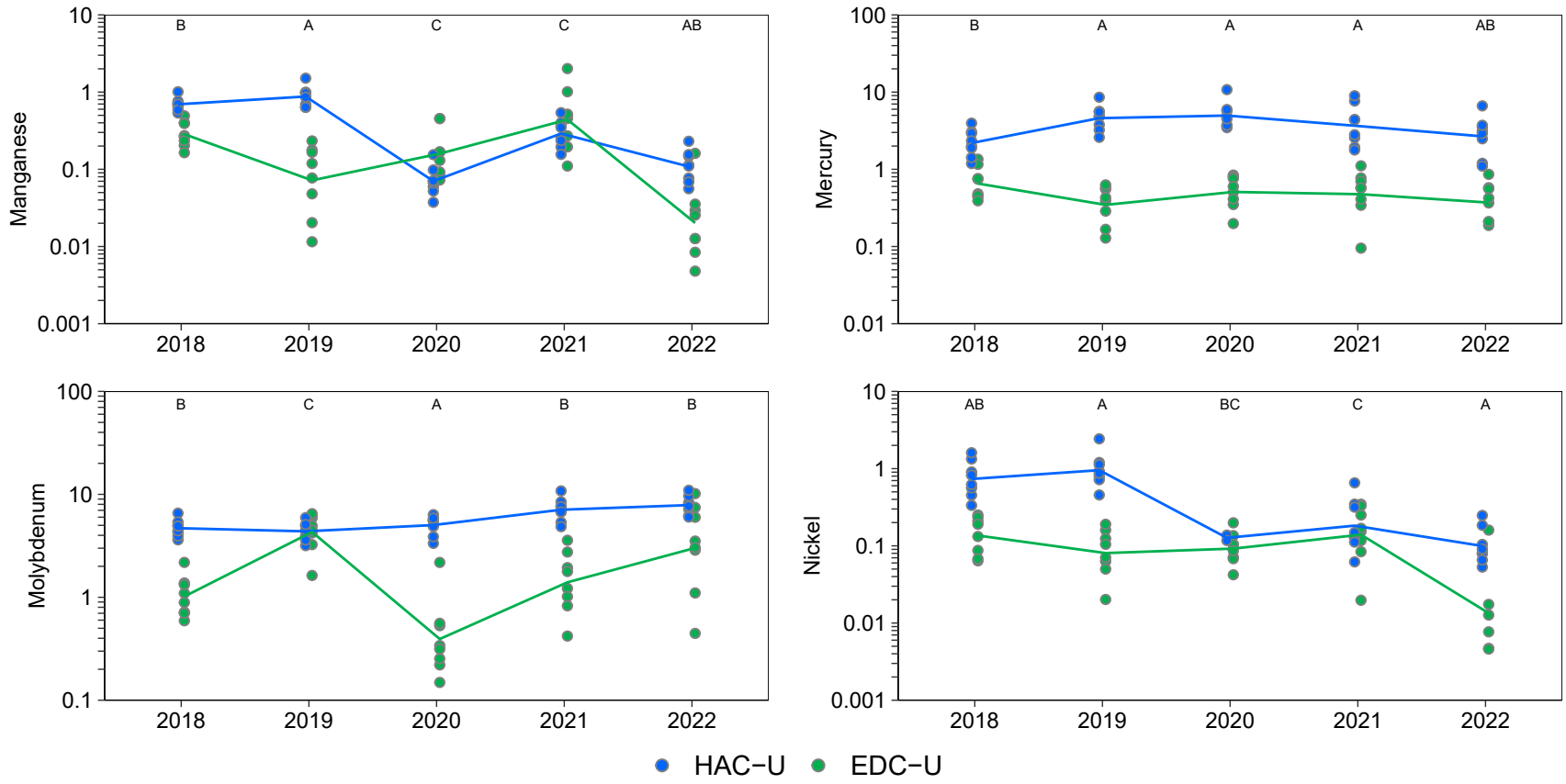
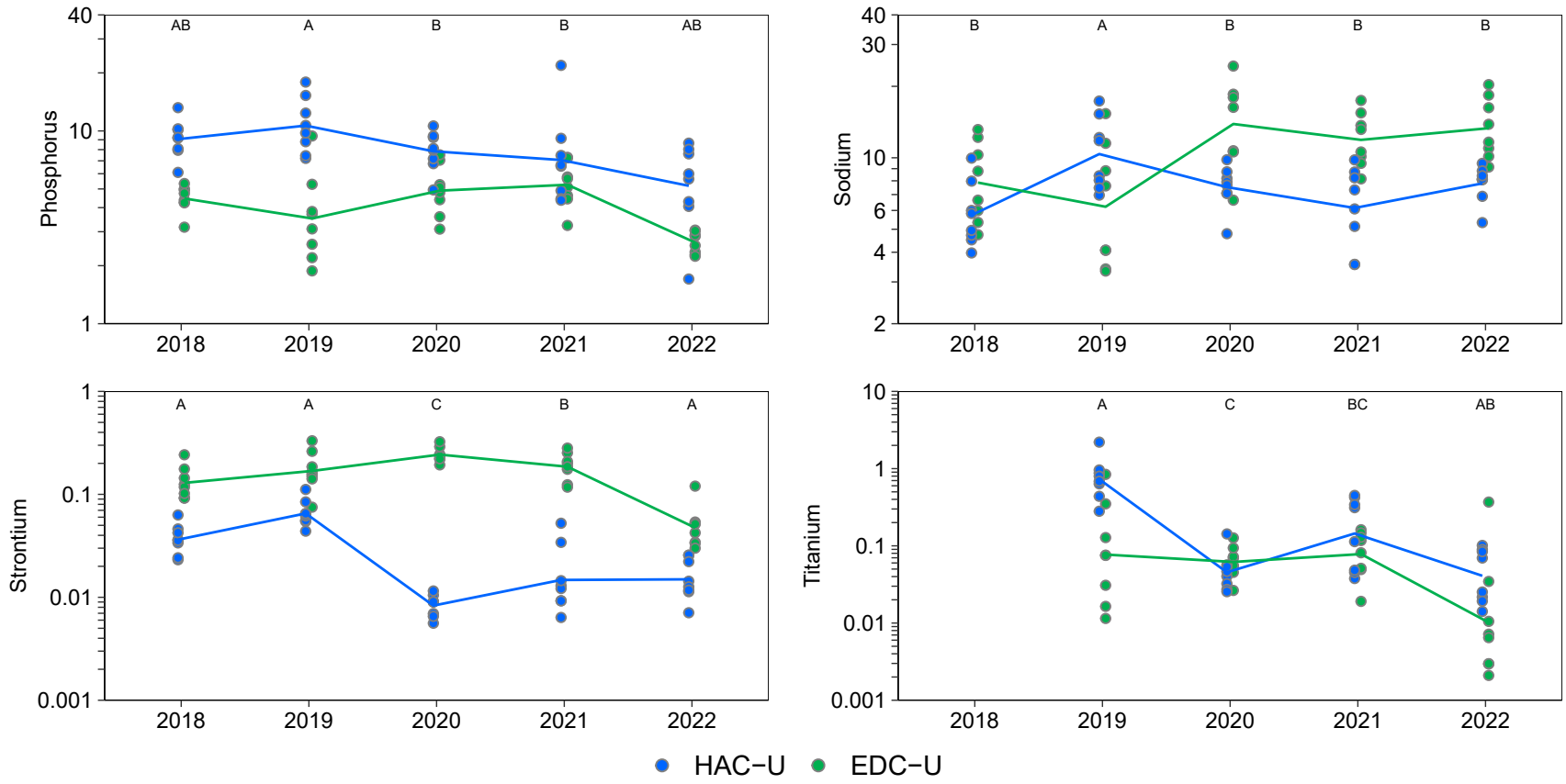


Figure F.4.9: Trophic Transfer Factors for Caddisfly Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Upper Hazeltine Creek (HAC-U; Exposed) and Upper Edney Creek (EDC-U; Reference), 2018 to 2022

Notes: Trophic Transfer Factors (TTFs) were not calculated for analytes with results reported below the laboratory reporting limit (<LRL). Concentrations <LRL are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted.



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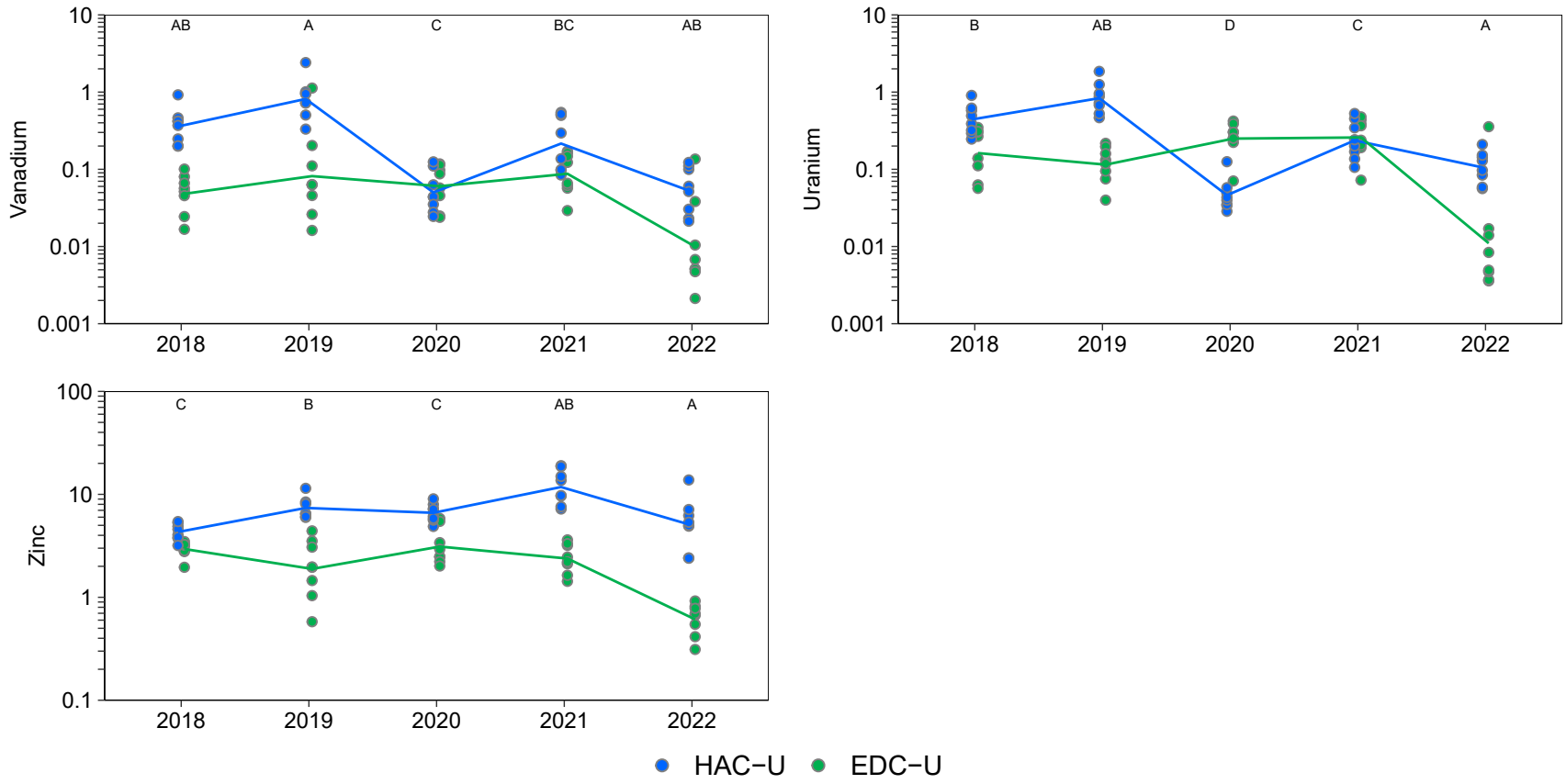

Figure F.4.9: Trophic Transfer Factors for Caddisfly Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Upper Hazeltine Creek (HAC-U; Exposed) and Upper Edney Creek (EDC-U; Reference), 2018 to 2022

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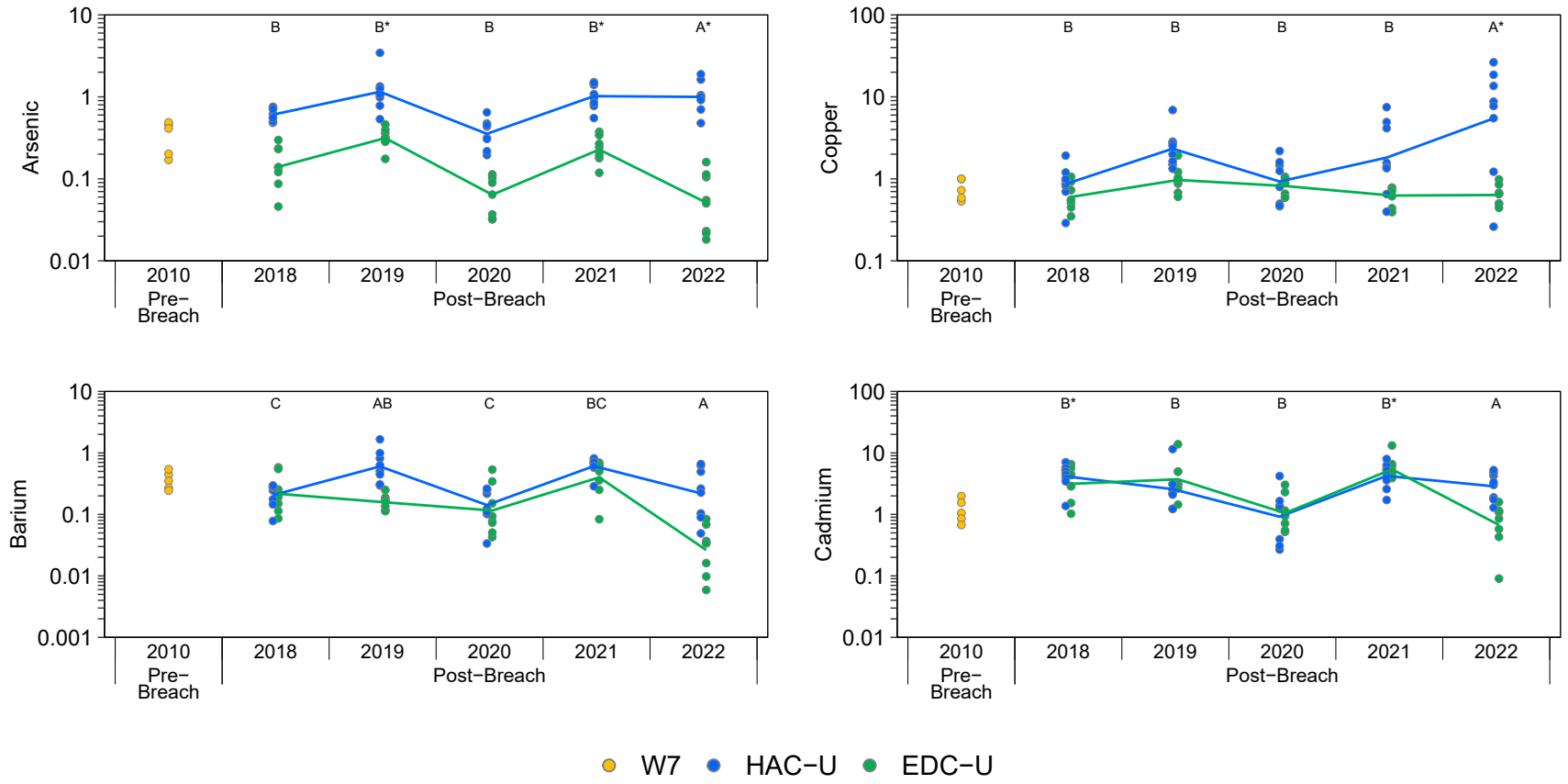

Figure F.4.10: Trophic Transfer Factors for Composite-Taxa Benthic Invertebrate Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Upper Hazeltine Creek (HAC-U; Exposed) and Upper Edney Creek (EDC-U; Reference), 2010 to 2022

Notes: Trophic Transfer Factors (TTFs) were not calculated for analytes with results reported below the laboratory reporting limit (<LRL). W7 (2010) is the pre-breach equivalent of HAC-U. Concentrations <LRL are plotted as open symbols at the LRL and the open symbol represents one or more values reported <LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p −value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted. Letters with a * designate years where the exposed site is different than pre−breach conditions.

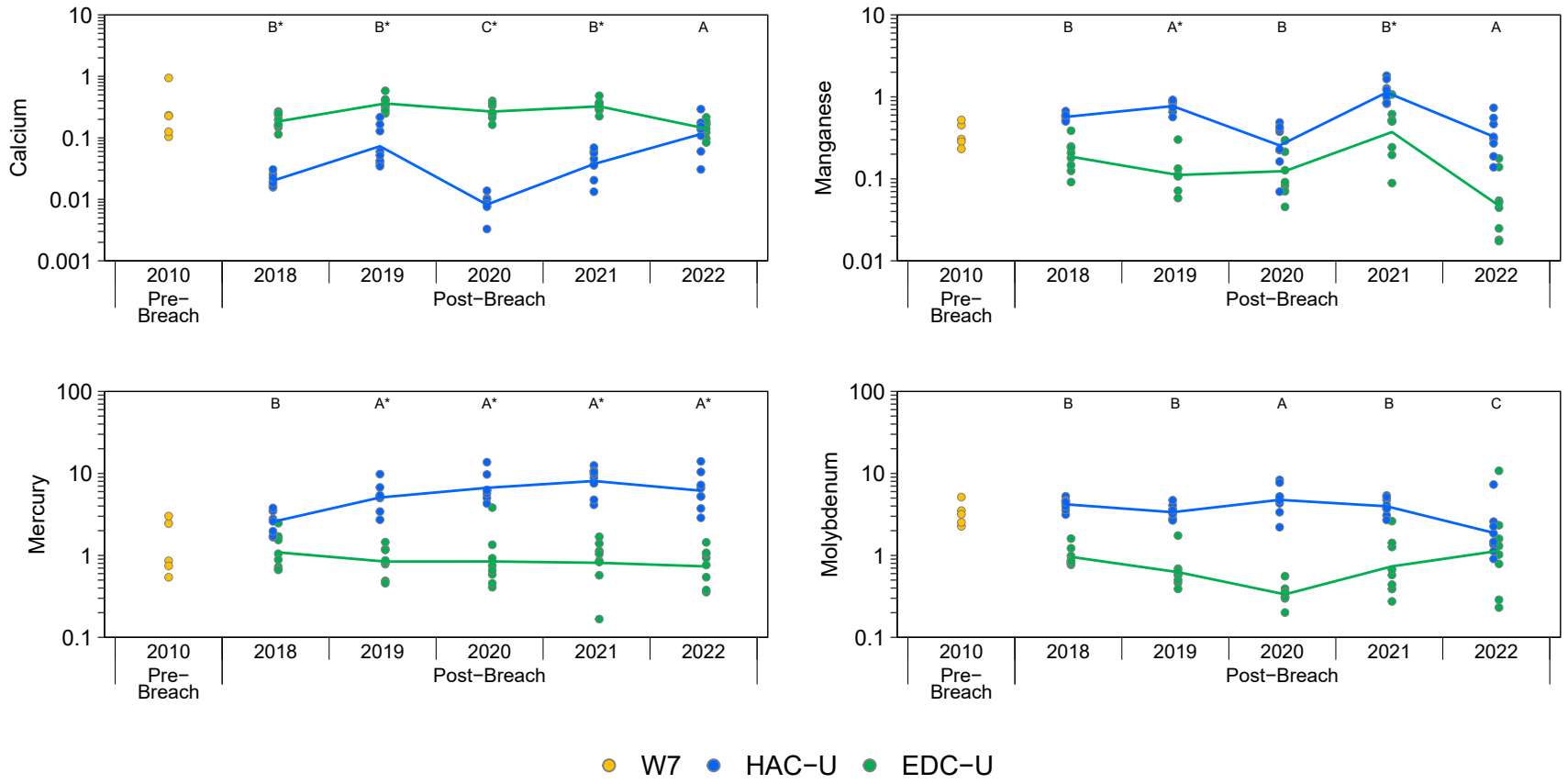

Figure F.4.10: Trophic Transfer Factors for Composite-Taxa Benthic Invertebrate Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Upper Hazeltine Creek (HAC-U; Exposed) and Upper Edney Creek (EDC-U; Reference), 2010 to 2022

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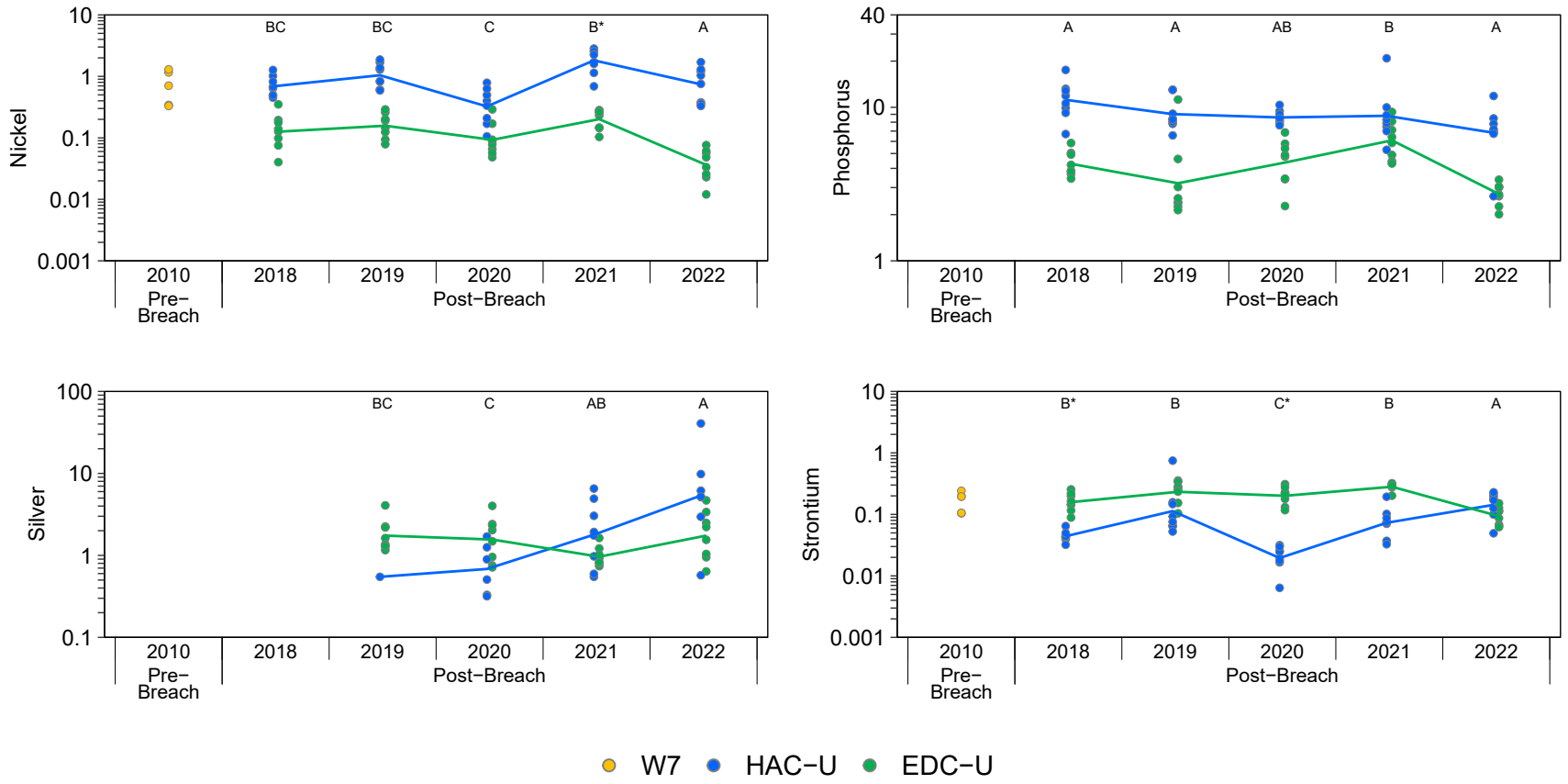

Figure F.4.10: Trophic Transfer Factors for Composite-Taxa Benthic Invertebrate Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Upper Hazeltine Creek (HAC-U; Exposed) and Upper Edney Creek (EDC-U; Reference), 2010 to 2022

Notes: Trophic Transfer Factors (TTFs) were not calculated for analytes with results reported below the laboratory reporting limit (<LRL). W7 (2010) is the pre-breach equivalent of HAC-U. Concentrations <LRL are plotted as open symbols at the LRL and the open symbol represents one or more values reported <LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p −value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted. Letters with a * designate years where the exposed site is different than pre−breach conditions.

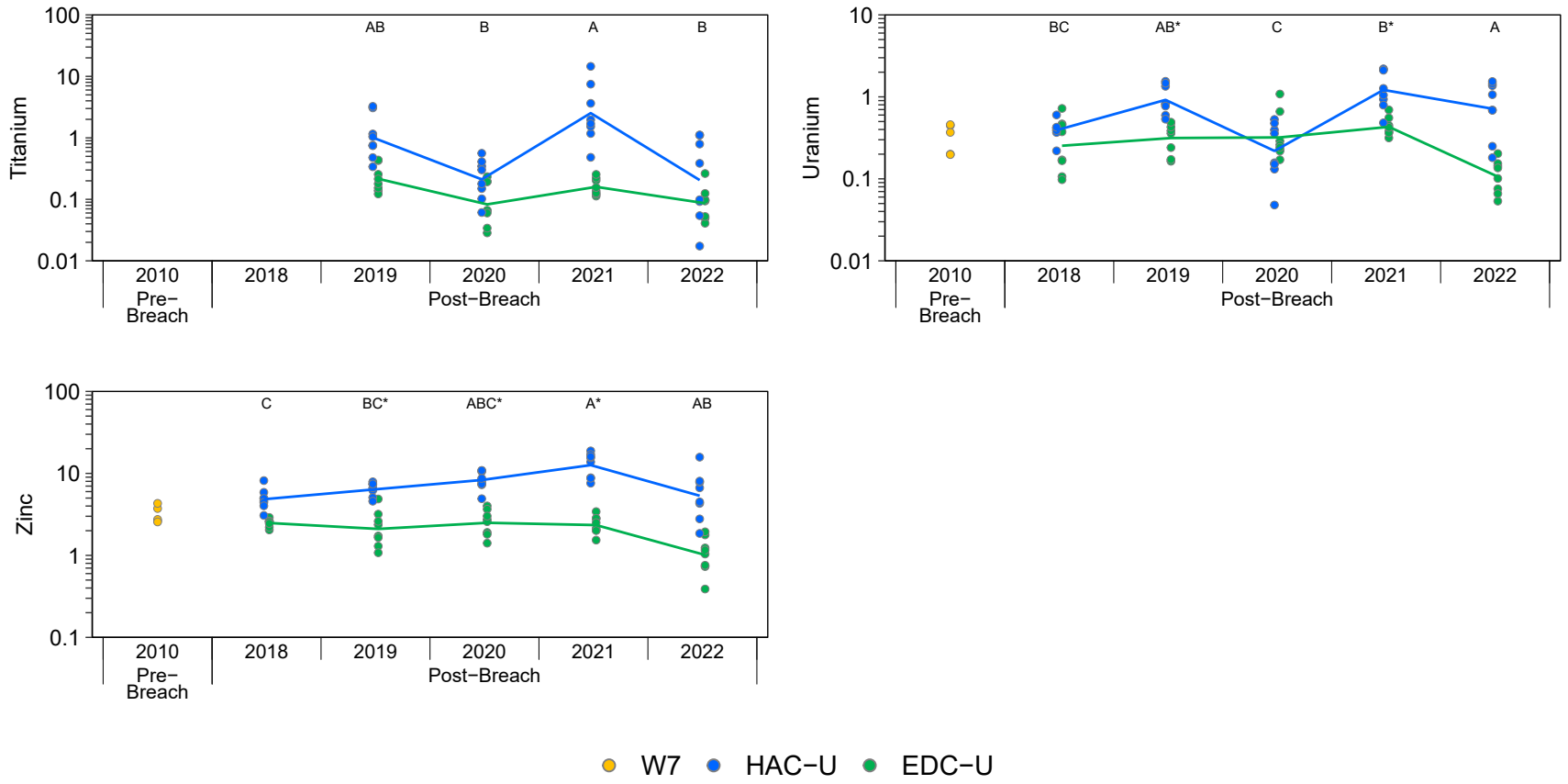

Figure F.4.10: Trophic Transfer Factors for Composite-Taxa Benthic Invertebrate Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Upper Hazeltine Creek (HAC-U; Exposed) and Upper Edney Creek (EDC-U; Reference), 2010 to 2022

Notes: Trophic Transfer Factors (TTFs) were not calculated for analytes with results reported below the laboratory reporting limit (<LRL). W7 (2010) is the pre-breach equivalent of HAC-U. Concentrations <LRL are plotted as open symbols at the LRL and the open symbol represents one or more values reported <LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p −value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted. Letters with a * designate years where the exposed site is different than pre−breach conditions.

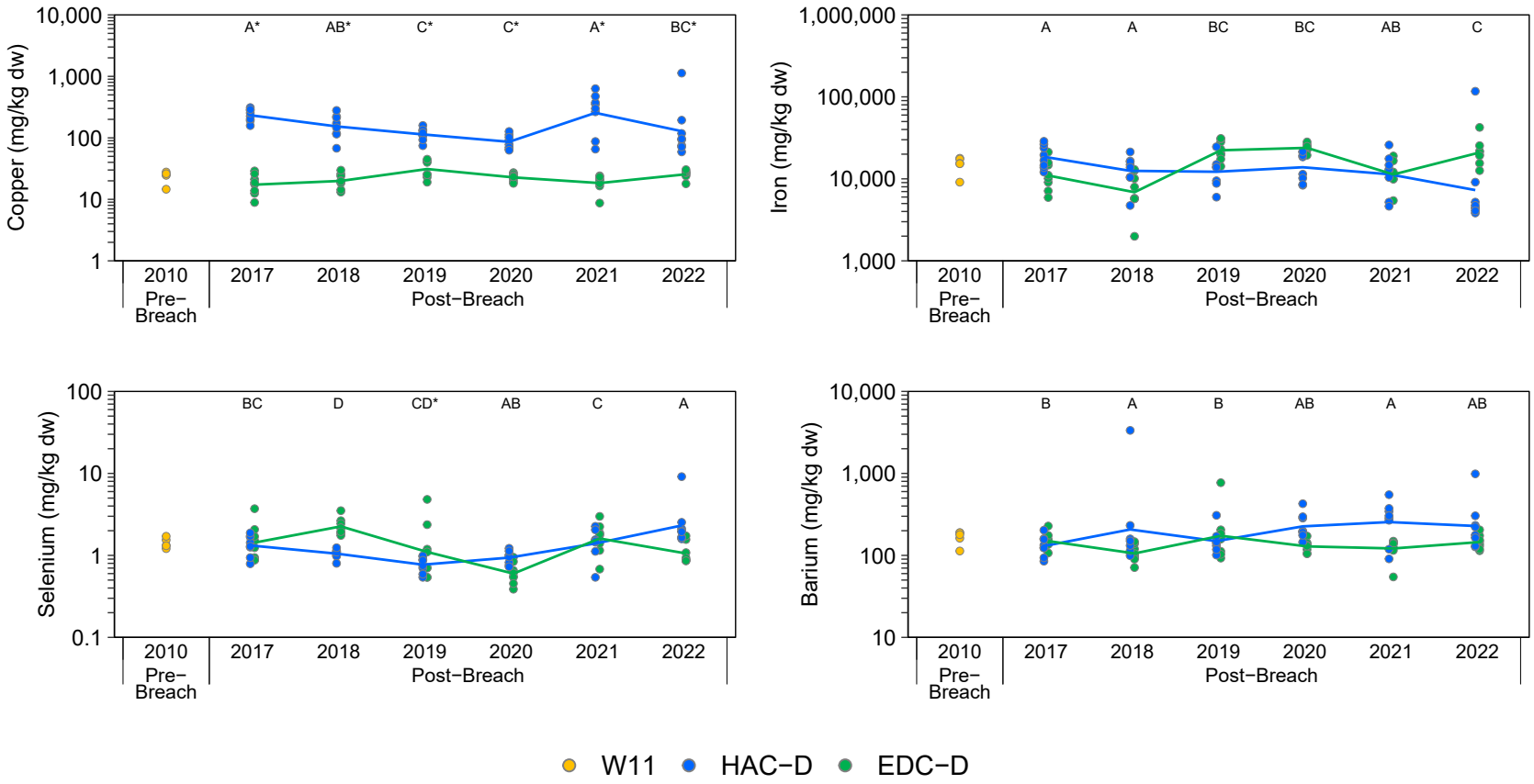

Figure F.4.11: Periphyton Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Lower Hazeltine Creek (HAC-D; Exposed) and Lower Edney Creek (EDC-D; Reference), 2010 to 2022

Notes: dw = dry weight, <LRL = lower than the laboratory reporting limit (LRL). W11 (2010) is the pre-breach equivalent of HAC-D. Concentrations <LRL are plotted as open symbols at the LRL and the open symbol represents one or more values reported <LRL. Individual samples are plotted and lines join the least-squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted. Letters with a * designate years where the exposed site is different than pre−breach conditions.

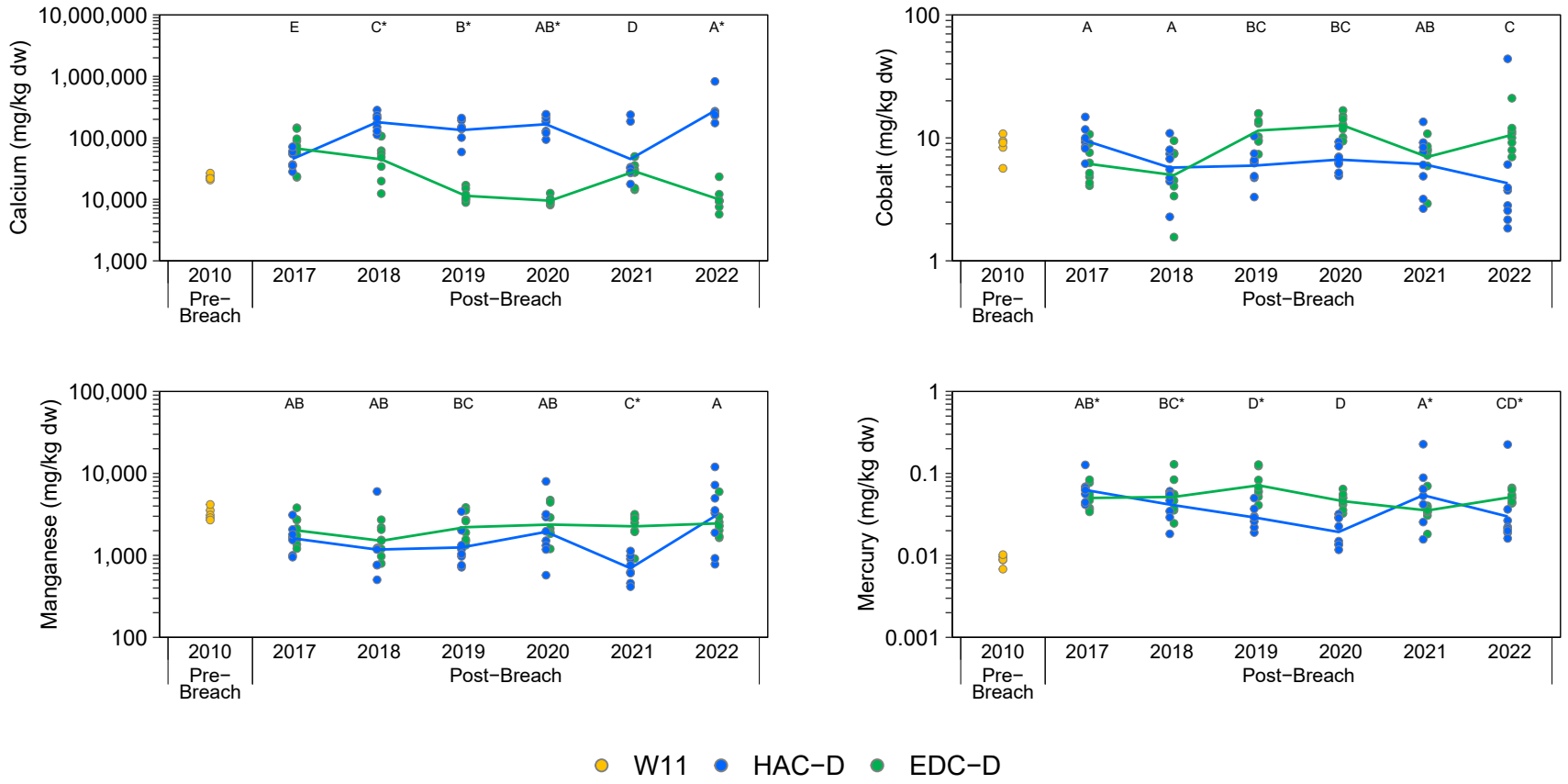

Figure F.4.11: Periphyton Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Lower Hazeltine Creek (HAC-D; Exposed) and Lower Edney Creek (EDC-D; Reference), 2010 to 2022

Notes: dw = dry weight, <LRL = lower than the laboratory reporting limit (LRL). W11 (2010) is the pre-breach equivalent of HAC-D. Concentrations <LRL are plotted as open symbols at the LRL and the open symbol represents one or more values reported <LRL. Individual samples are plotted and lines join the least-squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted. Letters with a * designate years where the exposed site is different than pre−breach conditions.

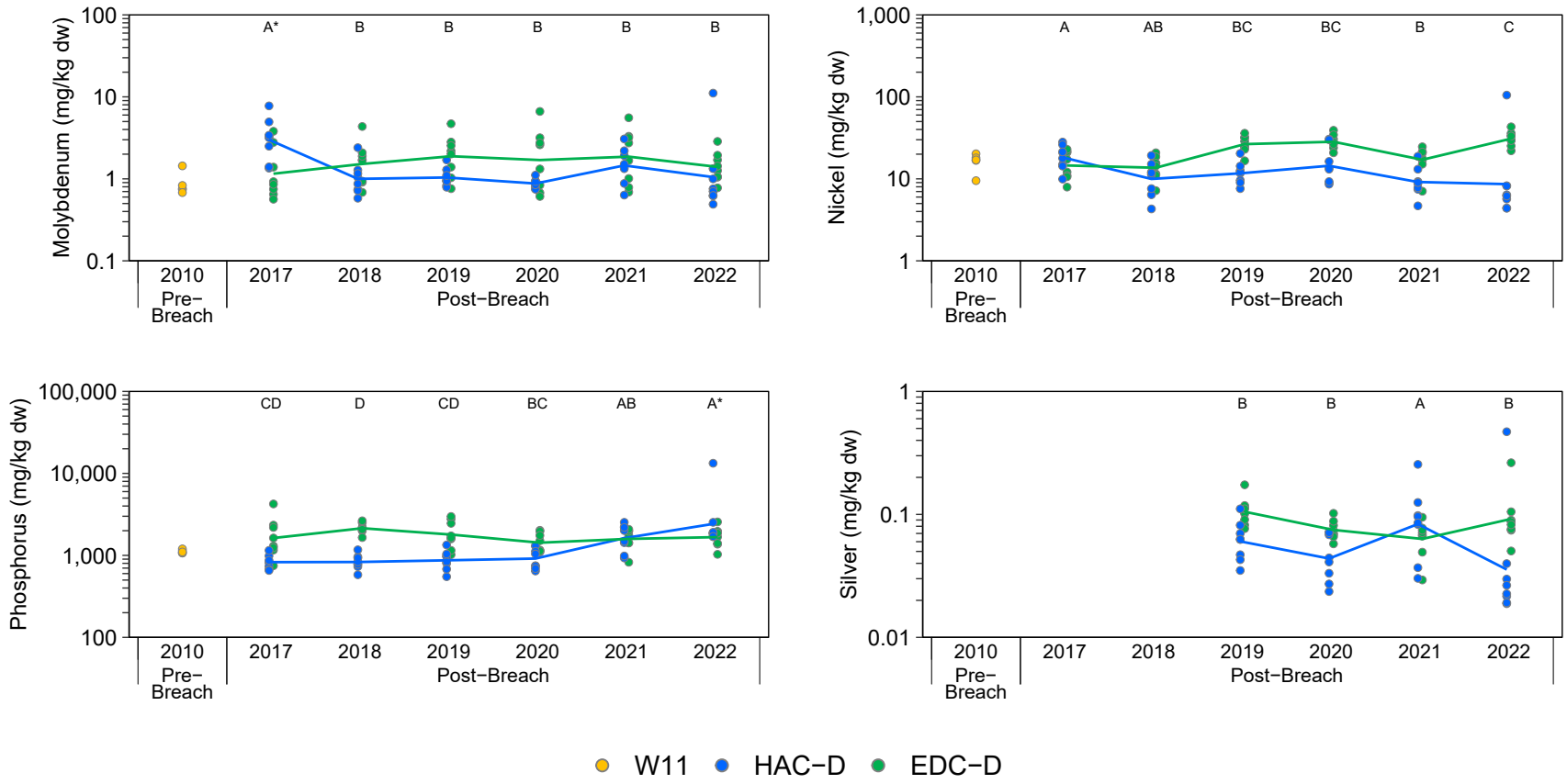

Figure F.4.11: Periphyton Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Lower Hazeltine Creek (HAC-D; Exposed) and Lower Edney Creek (EDC-D; Reference), 2010 to 2022

Notes: dw = dry weight, <LRL = lower than the laboratory reporting limit (LRL). W11 (2010) is the pre-breach equivalent of HAC-D. Concentrations <LRL are plotted as open symbols at the LRL and the open symbol represents one or more values reported <LRL. Individual samples are plotted and lines join the least-squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted. Letters with a * designate years where the exposed site is different than pre−breach conditions.

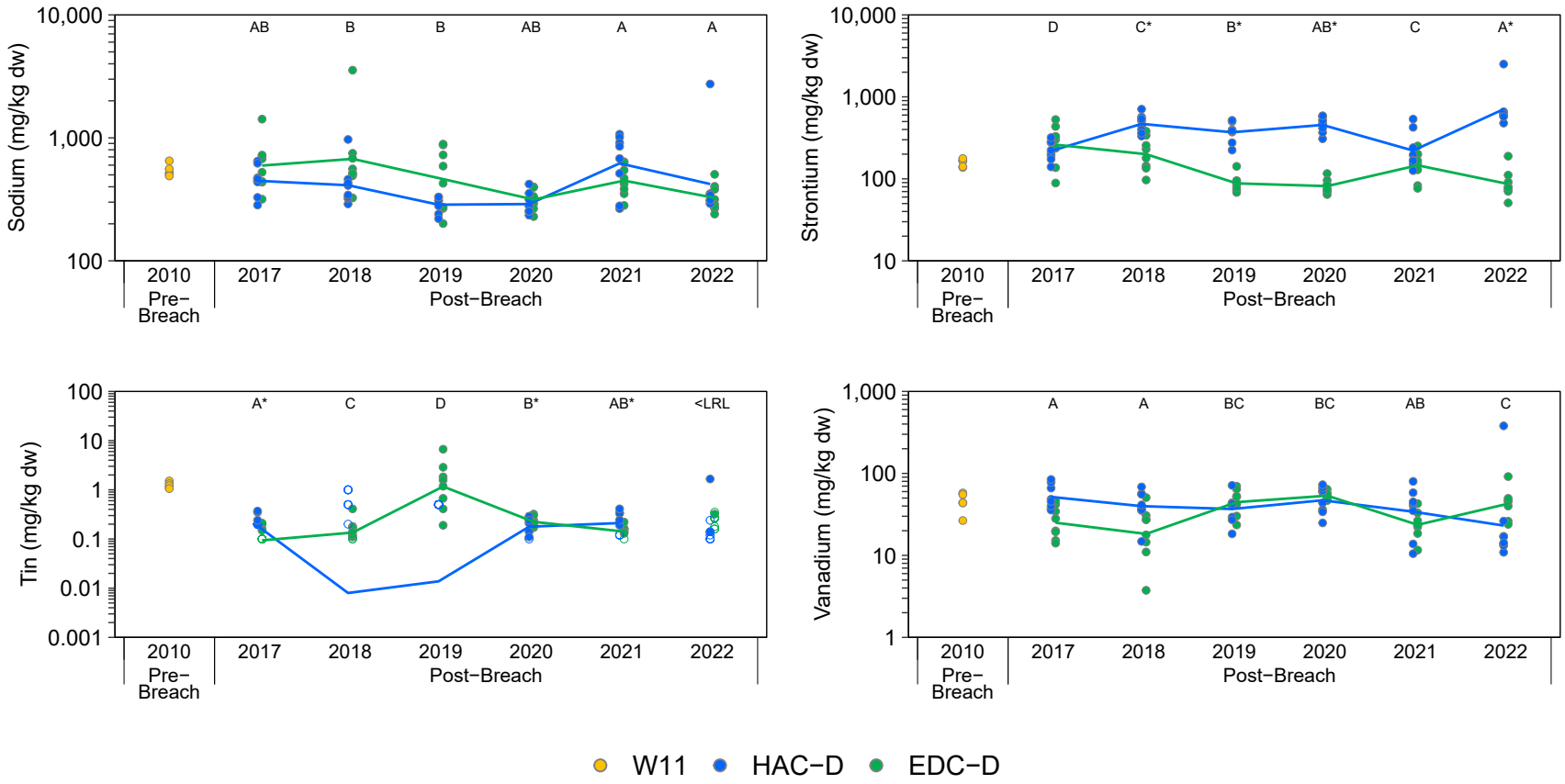

Figure F.4.11: Periphyton Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Lower Hazeltine Creek (HAC-D; Exposed) and Lower Edney Creek (EDC-D; Reference), 2010 to 2022

Notes: dw = dry weight, <LRL = lower than the laboratory reporting limit (LRL). W11 (2010) is the pre-breach equivalent of HAC-D. Concentrations <LRL are plotted as open symbols at the LRL and the open symbol represents one or more values reported <LRL. Individual samples are plotted and lines join the least-squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted. Letters with a * designate years where the exposed site is different than pre−breach conditions.

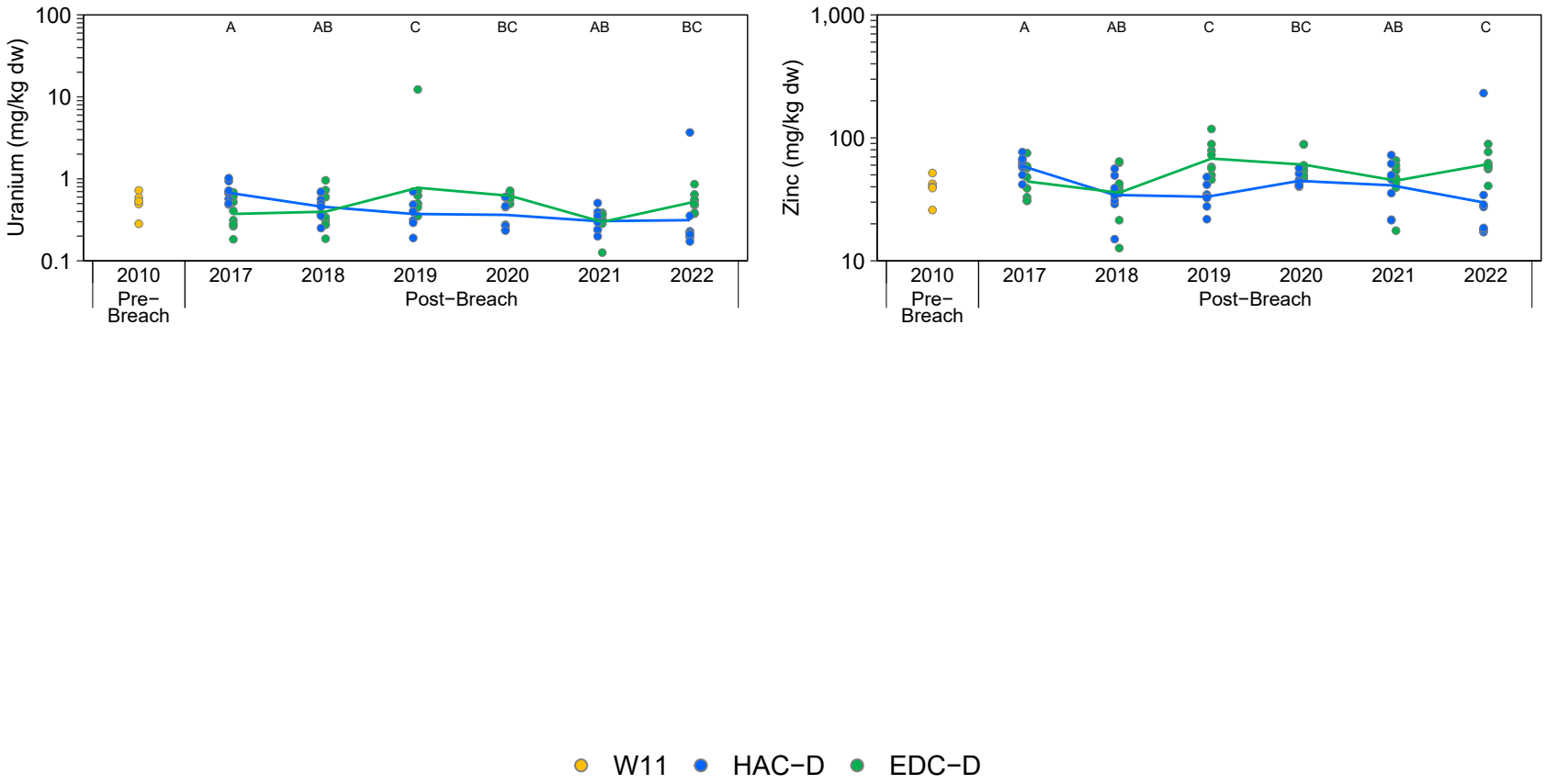

Figure F.4.11: Periphyton Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Lower Hazeltine Creek (HAC-D; Exposed) and Lower Edney Creek (EDC-D; Reference), 2010 to 2022

Notes: dw = dry weight, <LRL = lower than the laboratory reporting limit (LRL). W11 (2010) is the pre-breach equivalent of HAC-D. Concentrations <LRL are plotted as open symbols at the LRL and the open symbol represents one or more values reported <LRL. Individual samples are plotted and lines join the least-squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted. Letters with a * designate years where the exposed site is different than pre−breach conditions.

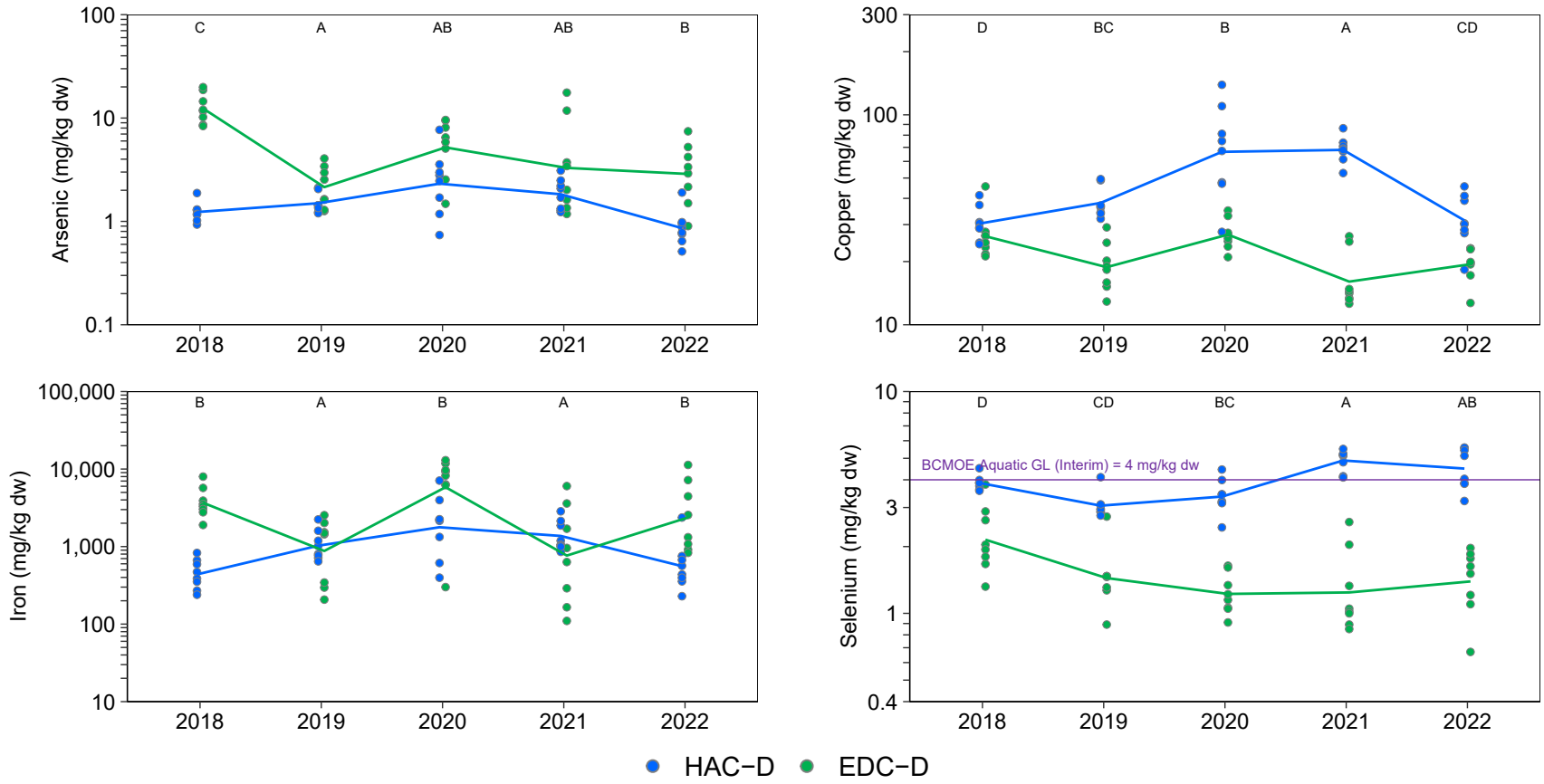

Figure F.4.12: Caddisfly Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Lower Hazeltine Creek (HAC-D; Exposed) and Lower Edney Creek (EDC-D; Reference), 2018 to 2022

Notes: BCMOE = British Columbia Ministry of the Environment, GL = Guideline, dw = dry weight, <LRL = lower than the laboratory reporting limit (<LRL). Concentrations <LRL are plotted as open symbols at the LRL and the open symbol represents one or more values reported <LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted.

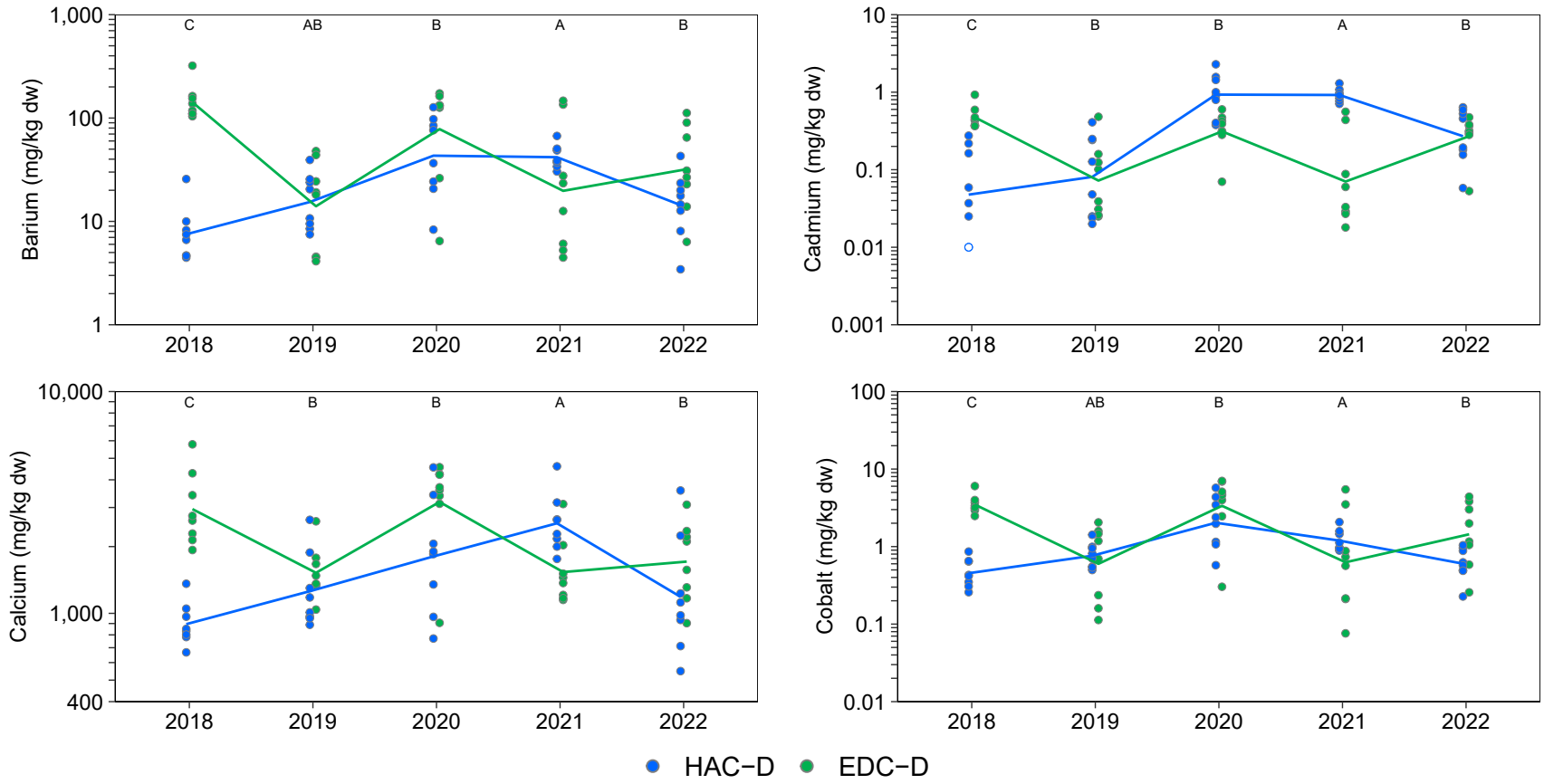

Figure F.4.12: Caddisfly Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Lower Hazeltine Creek (HAC-D; Exposed) and Lower Edney Creek (EDC-D; Reference), 2018 to 2022

Notes: BCMOE = British Columbia Ministry of the Environment, GL = Guideline, dw = dry weight, <LRL = lower than the laboratory reporting limit (<LRL). Concentrations <LRL are plotted as open symbols at the LRL and the open symbol represents one or more values reported <LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted.

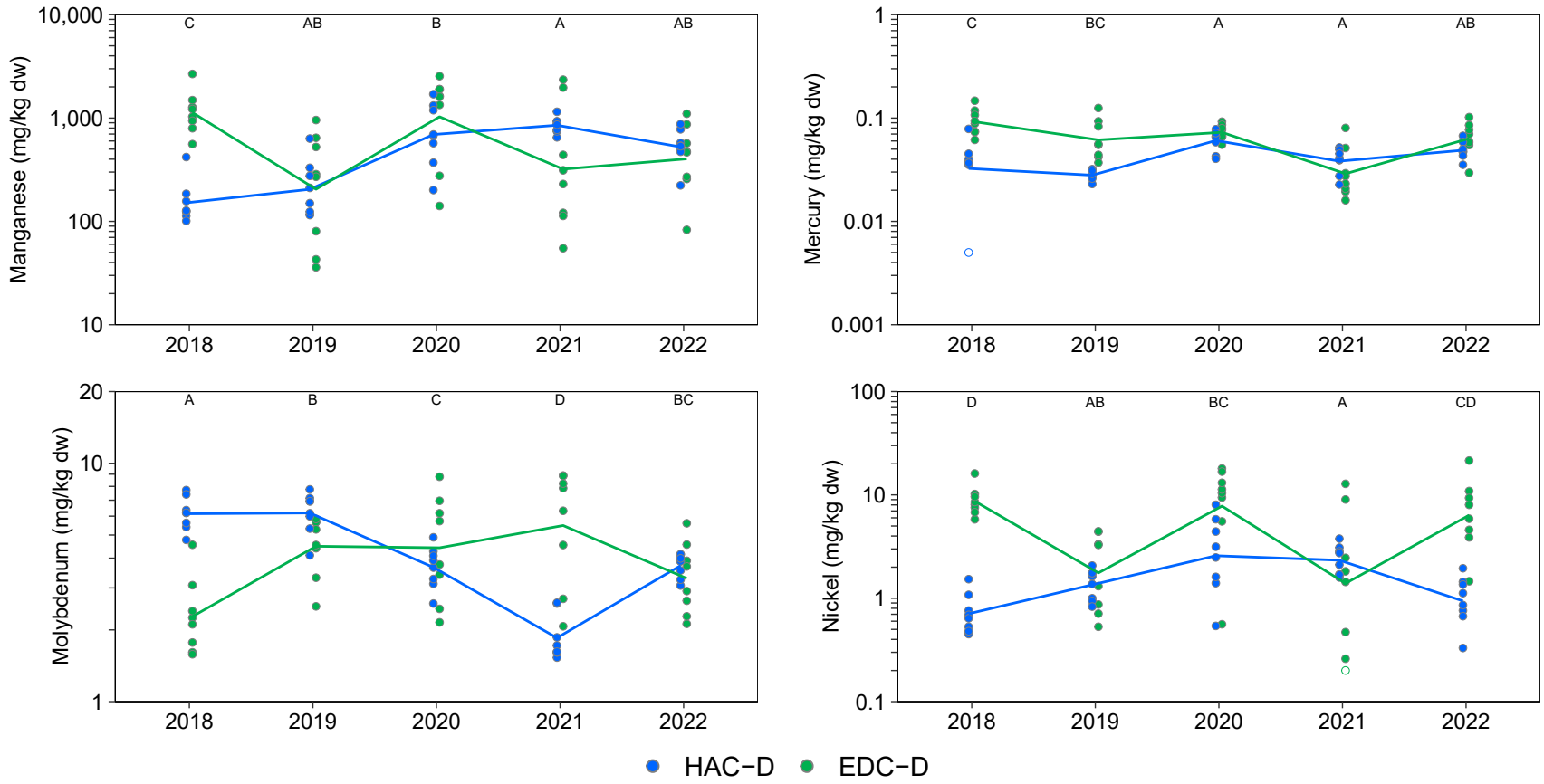

Figure F.4.12: Caddisfly Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Lower Hazeltine Creek (HAC-D; Exposed) and Lower Edney Creek (EDC-D; Reference), 2018 to 2022

Notes: BCMOE = British Columbia Ministry of the Environment, GL = Guideline, dw = dry weight, <LRL = lower than the laboratory reporting limit (<LRL). Concentrations <LRL are plotted as open symbols at the LRL and the open symbol represents one or more values reported <LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted.

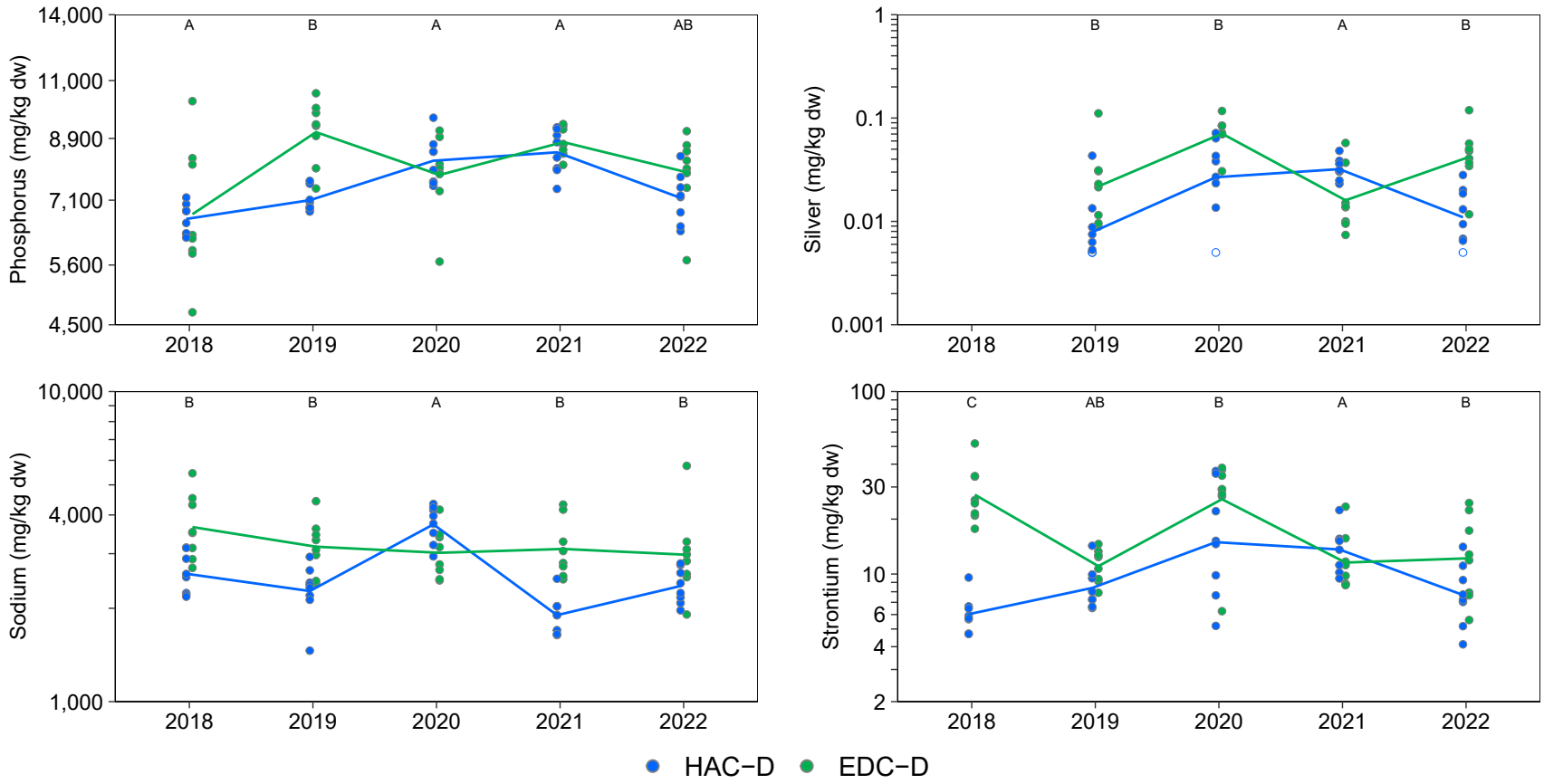

Figure F.4.12: Caddisfly Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Lower Hazeltine Creek (HAC-D; Exposed) and Lower Edney Creek (EDC-D; Reference), 2018 to 2022

Notes: BCMOE = British Columbia Ministry of the Environment, GL = Guideline, dw = dry weight, <LRL = lower than the laboratory reporting limit (<LRL). Concentrations <LRL are plotted as open symbols at the LRL and the open symbol represents one or more values reported <LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted.

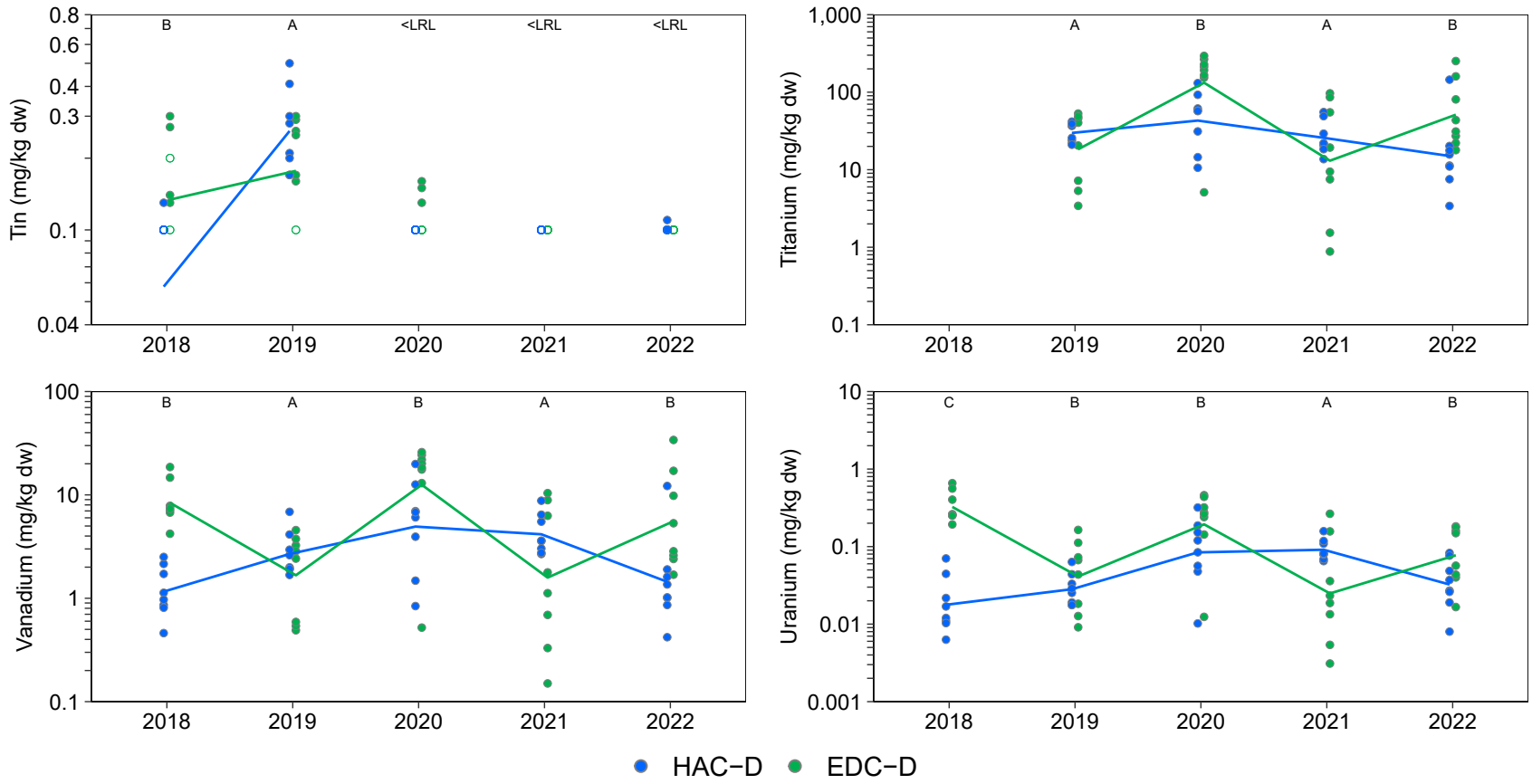

Figure F.4.12: Caddisfly Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Lower Hazeltine Creek (HAC-D; Exposed) and Lower Edney Creek (EDC-D; Reference), 2018 to 2022

Notes: BCMOE = British Columbia Ministry of the Environment, GL = Guideline, dw = dry weight, <LRL = lower than the laboratory reporting limit (<LRL). Concentrations <LRL are plotted as open symbols at the LRL and the open symbol represents one or more values reported <LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted.

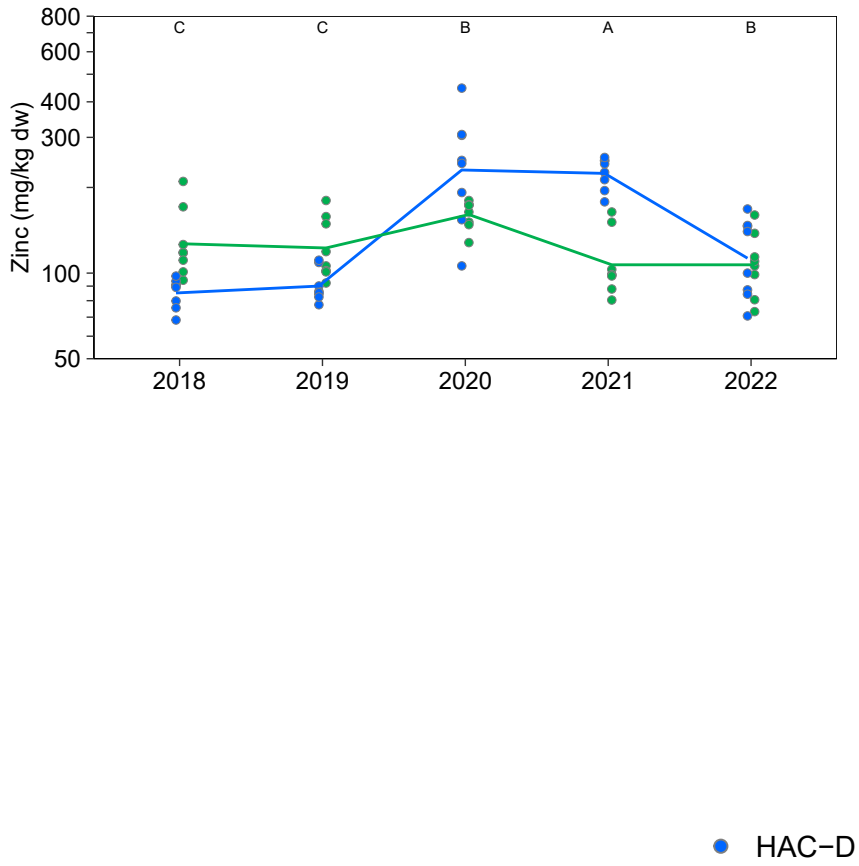

Figure F.4.12: Caddisfly Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Lower Hazeltine Creek (HAC-D; Exposed) and Lower Edney Creek (EDC-D; Reference), 2018 to 2022

Notes: BCMOE = British Columbia Ministry of the Environment, GL = Guideline, dw = dry weight, <LRL = lower than the laboratory reporting limit (<LRL). Concentrations <LRL are plotted as open symbols at the LRL and the open symbol represents one or more values reported <LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted.

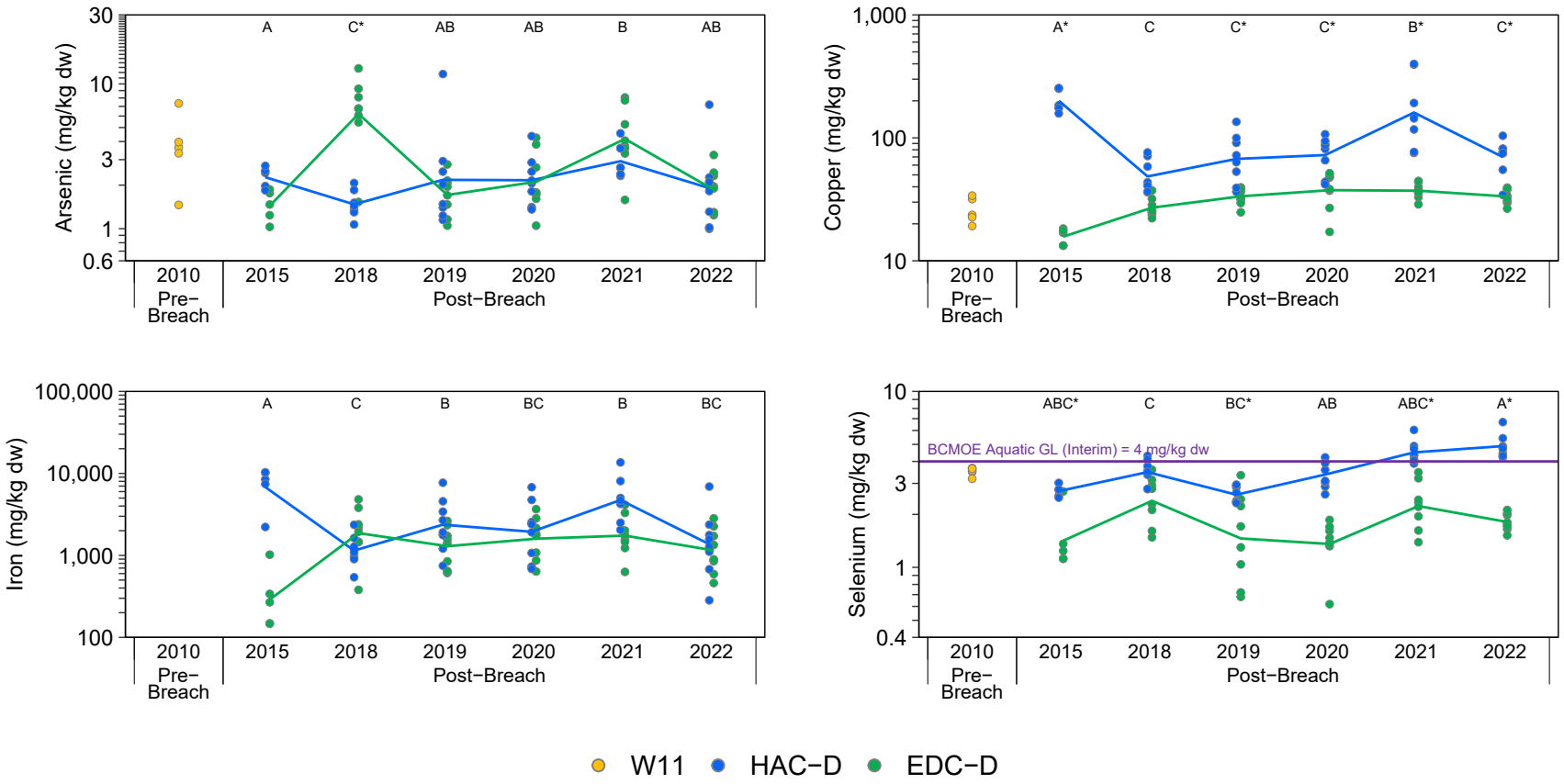

Figure F.4.13: Composite-Taxa Benthic Invertebrate Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Lower Hazeltine Creek (HAC-D; Exposed) and Lower Edney Creek (EDC-D; Reference), 2010 to 2022

Notes: BCMOE = British Columbia Ministry of the Environment, GL = Guideline, dw = dry weight, <LRL = lower than the laboratory reporting limit (LRL). W11 (2010) is the pre-breach equivalent of HAC-D. Concentrations <LRL are plotted as open symbols at the LRL and the open symbol represents one or more values reported <LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted. Letters with a * designate years where the exposed site is different than pre−breach conditions.

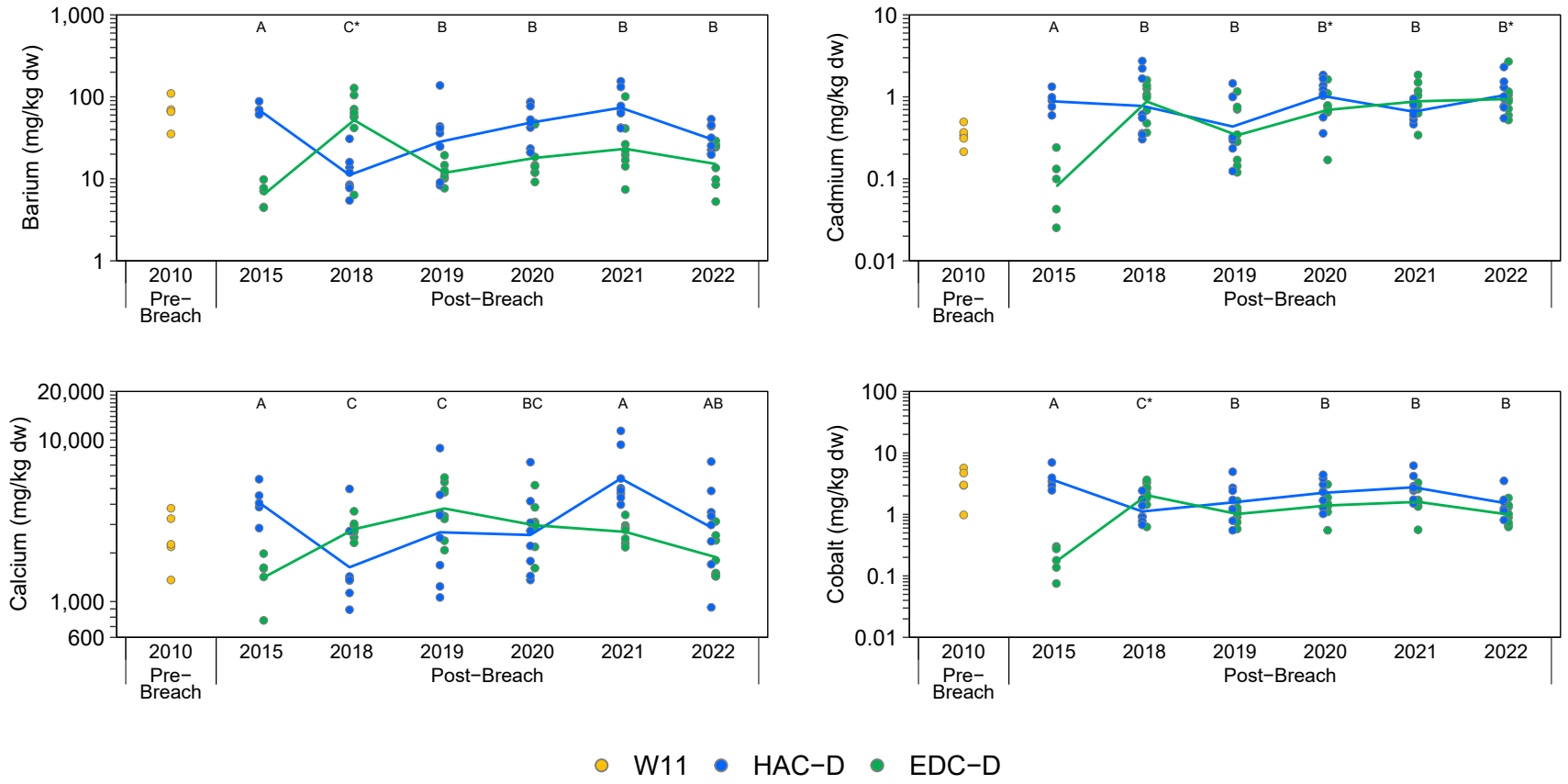

Figure F.4.13: Composite-Taxa Benthic Invertebrate Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Lower Hazeltine Creek (HAC-D; Exposed) and Lower Edney Creek (EDC-D; Reference), 2010 to 2022

Notes: BCMOE = British Columbia Ministry of the Environment, GL = Guideline, dw = dry weight, <LRL = lower than the laboratory reporting limit (LRL). W11 (2010) is the pre-breach equivalent of HAC-D. Concentrations <LRL are plotted as open symbols at the LRL and the open symbol represents one or more values reported <LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted. Letters with a * designate years where the exposed site is different than pre−breach conditions.

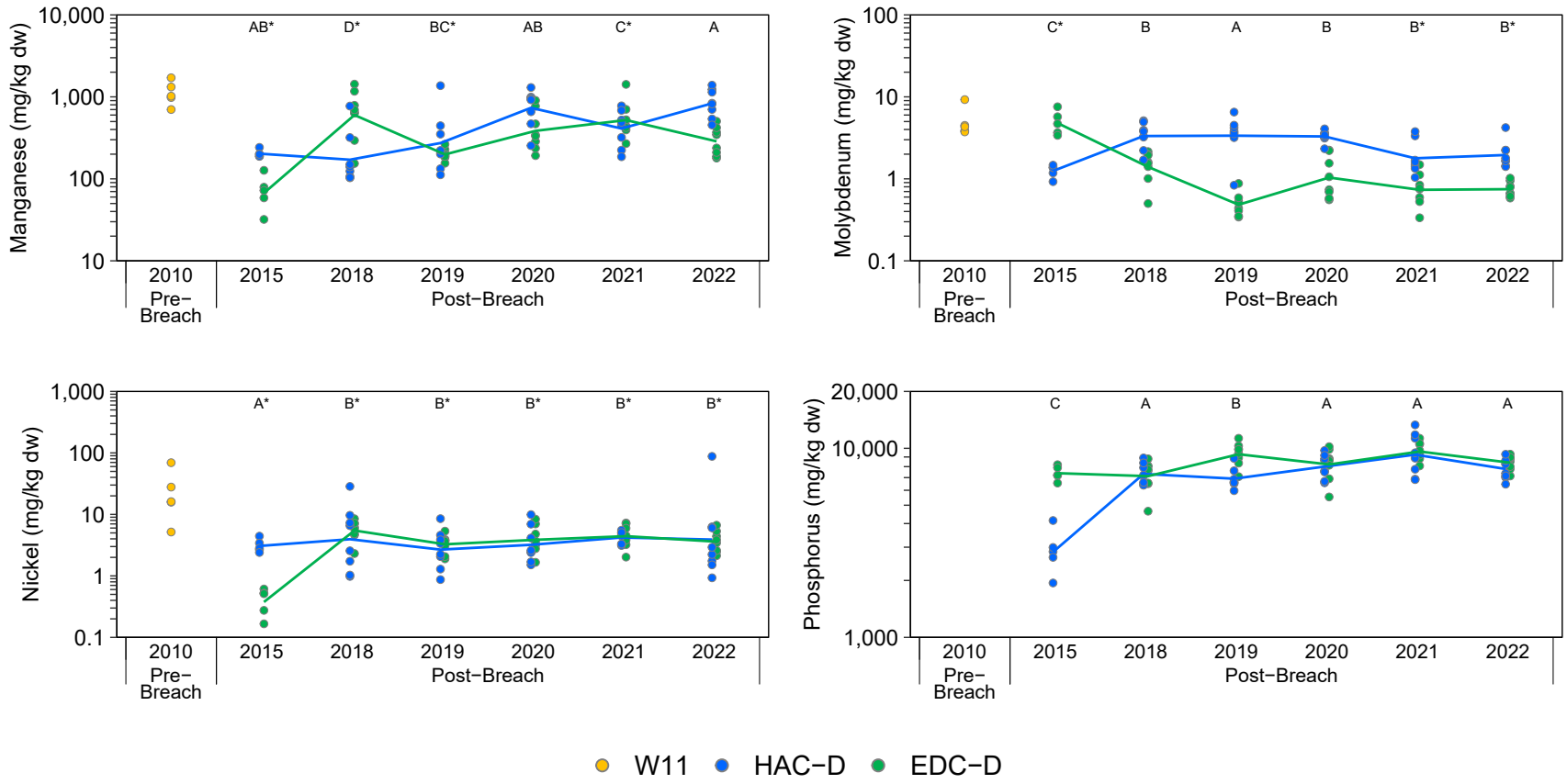

Figure F.4.13: Composite-Taxa Benthic Invertebrate Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Lower Hazeltine Creek (HAC-D; Exposed) and Lower Edney Creek (EDC-D; Reference), 2010 to 2022

Notes: BCMOE = British Columbia Ministry of the Environment, GL = Guideline, dw = dry weight, <LRL = lower than the laboratory reporting limit (LRL). W11 (2010) is the pre-breach equivalent of HAC-D. Concentrations <LRL are plotted as open symbols at the LRL and the open symbol represents one or more values reported <LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted. Letters with a * designate years where the exposed site is different than pre−breach conditions.

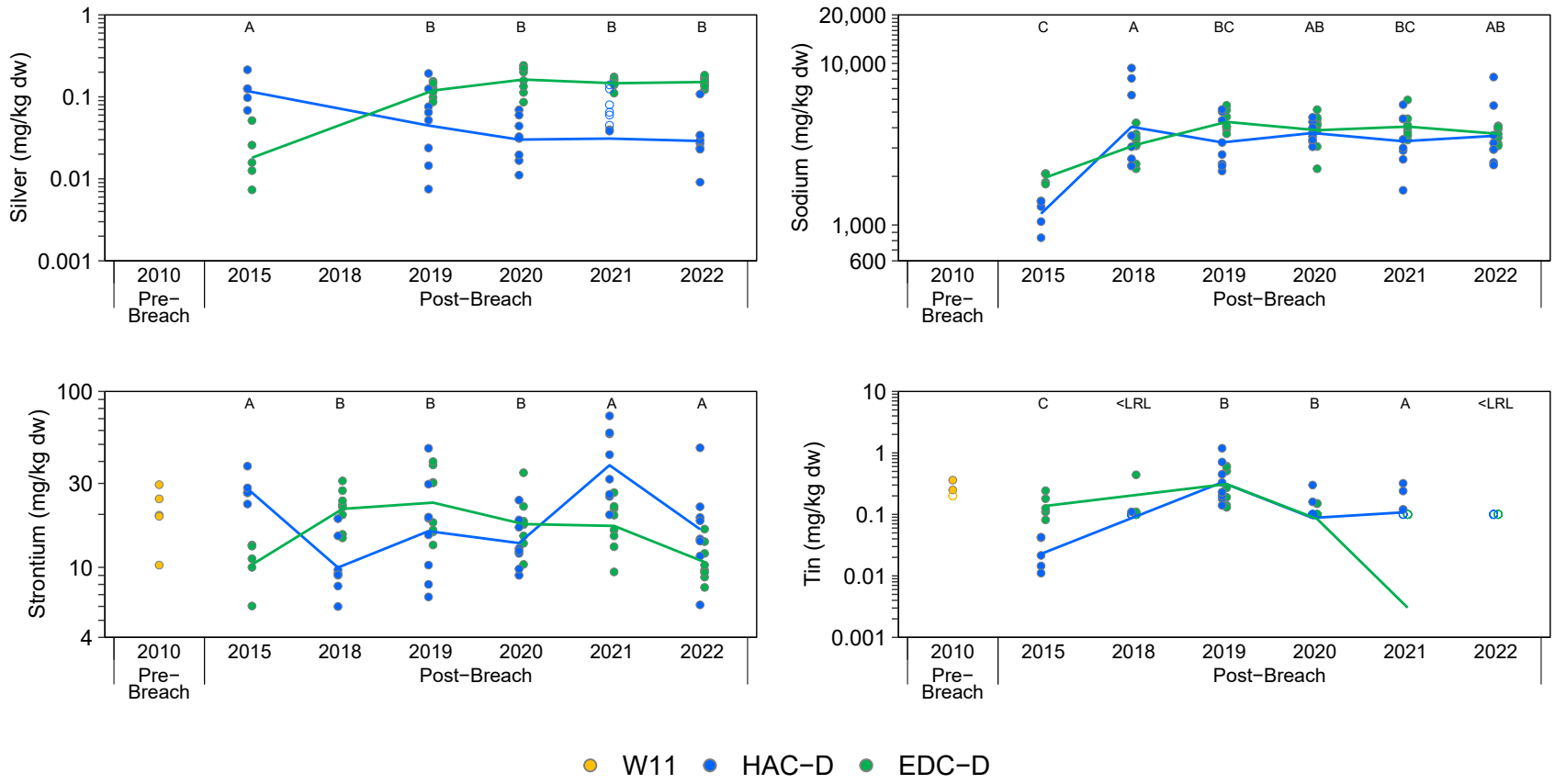

Figure F.4.13: Composite-Taxa Benthic Invertebrate Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Lower Hazeltine Creek (HAC-D; Exposed) and Lower Edney Creek (EDC-D; Reference), 2010 to 2022

Notes: BCMOE = British Columbia Ministry of the Environment, GL = Guideline, dw = dry weight, <LRL = lower than the laboratory reporting limit (LRL). W11 (2010) is the pre-breach equivalent of HAC-D. Concentrations <LRL are plotted as open symbols at the LRL and the open symbol represents one or more values reported <LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted. Letters with a * designate years where the exposed site is different than pre−breach conditions.

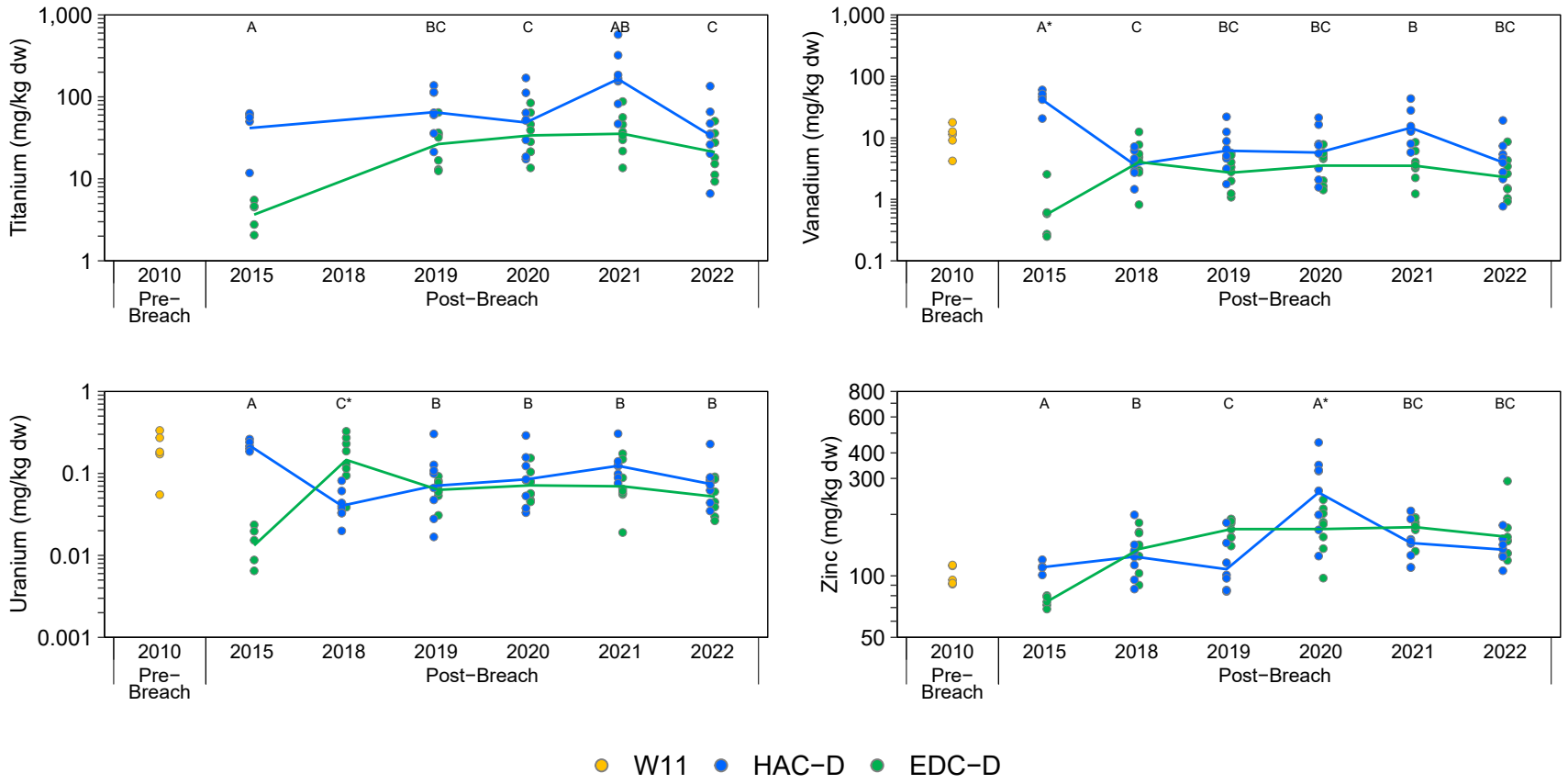

Figure F.4.13: Composite-Taxa Benthic Invertebrate Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Lower Hazeltine Creek (HAC-D; Exposed) and Lower Edney Creek (EDC-D; Reference), 2010 to 2022

Notes: BCMOE = British Columbia Ministry of the Environment, GL = Guideline, dw = dry weight, <LRL = lower than the laboratory reporting limit (LRL). W11 (2010) is the pre-breach equivalent of HAC-D. Concentrations <LRL are plotted as open symbols at the LRL and the open symbol represents one or more values reported <LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted. Letters with a * designate years where the exposed site is different than pre−breach conditions.

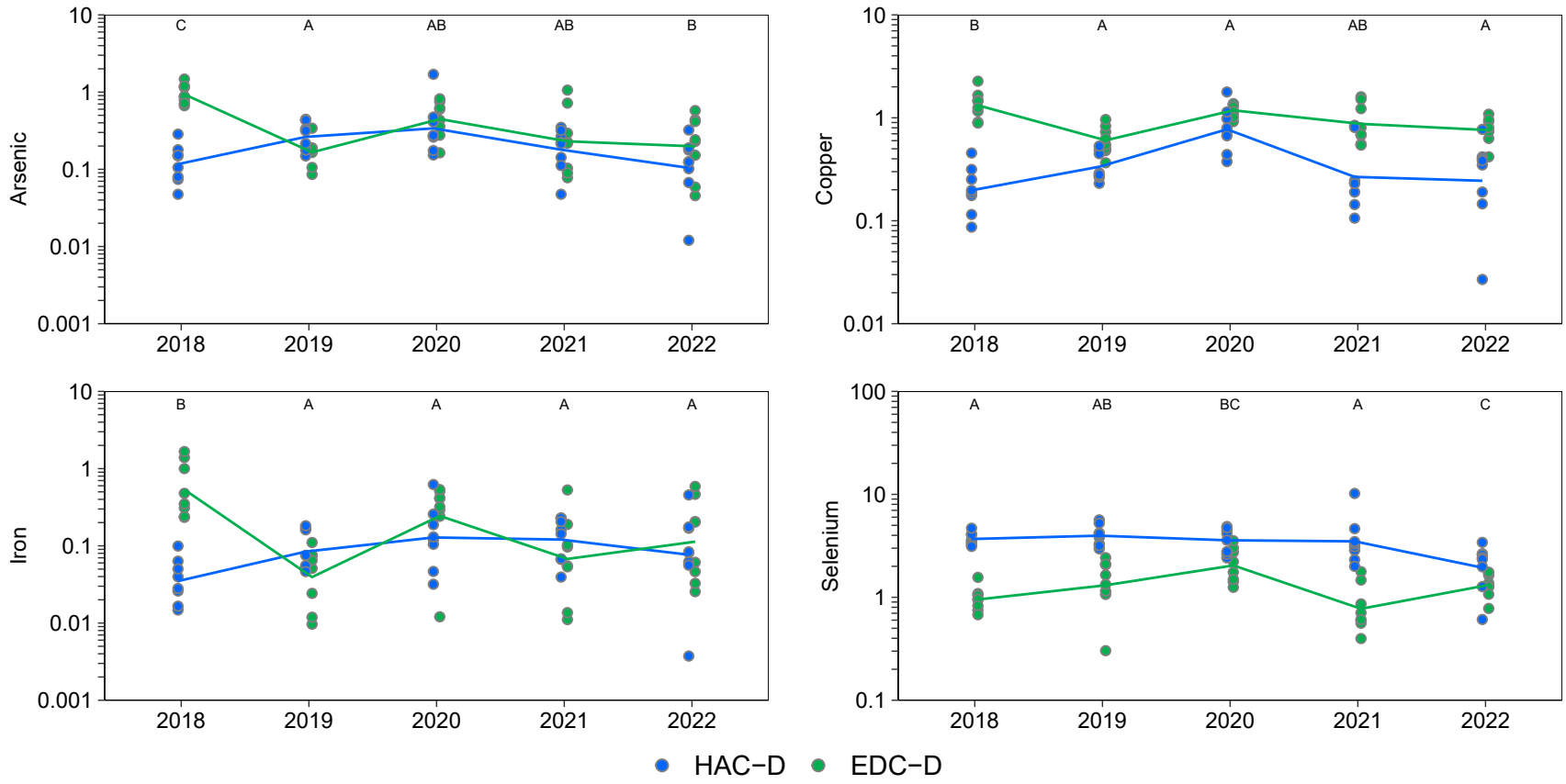

Figure F.4.14: Trophic Transfer Factors for Caddisfly Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Lower Hazeltine Creek (HAC-D; Exposed) and Lower Edney Creek (EDC-D; Reference), 2018 to 2022

Notes: Trophic Transfer Factors (TTFs) were not calculated for analytes with results reported below the laboratory reporting limit (<LRL). Concentrations <LRL are plotted as open symbols at the LRL and the open symbol represents one or more values reported <LRL. Individual samples are plotted and lines join the least −squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted.

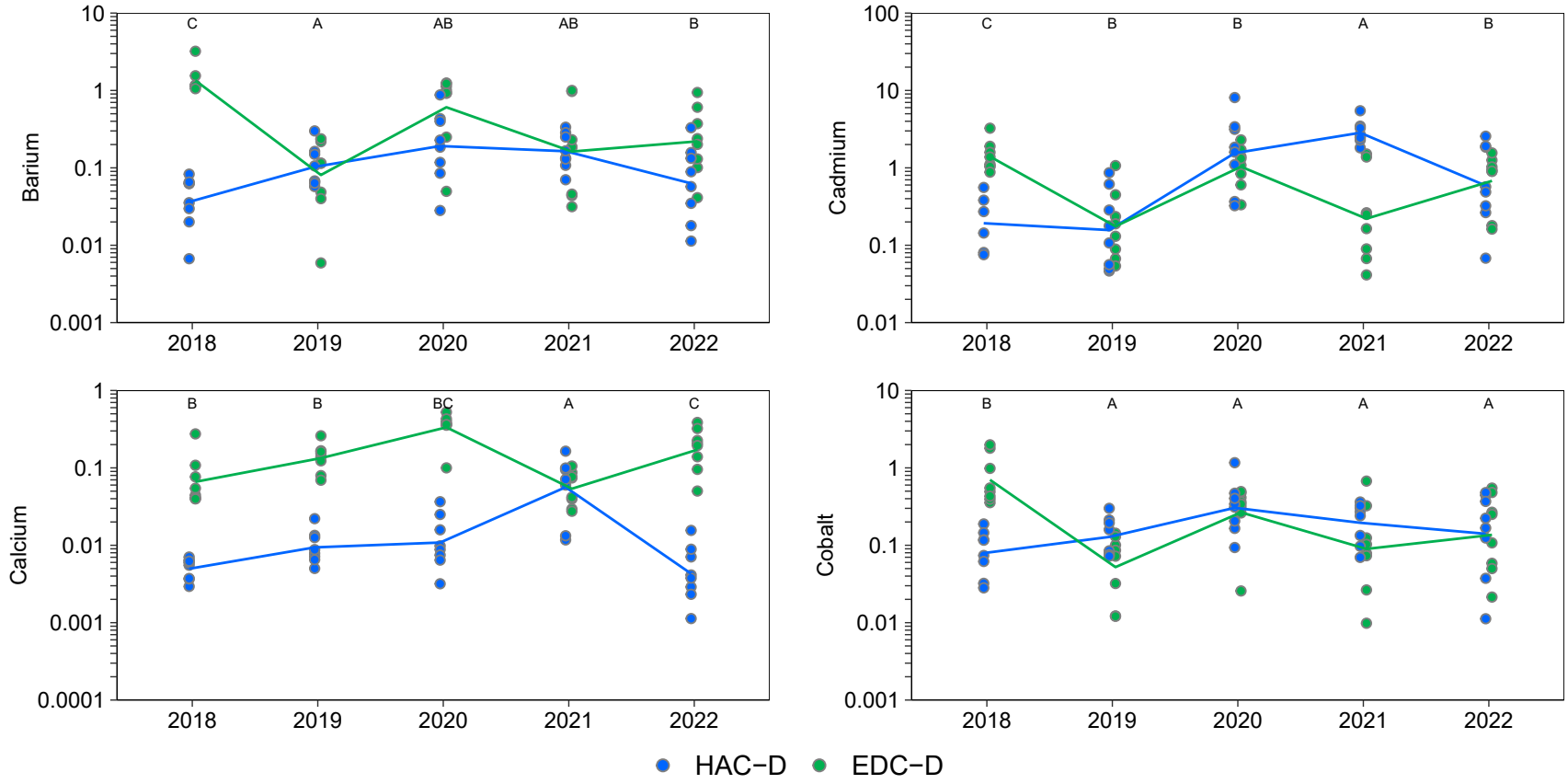

Figure F.4.14: Trophic Transfer Factors for Caddisfly Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Lower Hazeltine Creek (HAC-D; Exposed) and Lower Edney Creek (EDC-D; Reference), 2018 to 2022

Notes: Trophic Transfer Factors (TTFs) were not calculated for analytes with results reported below the laboratory reporting limit (<LRL). Concentrations <LRL are plotted as open symbols at the LRL and the open symbol represents one or more values reported <LRL. Individual samples are plotted and lines join the least −squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted.

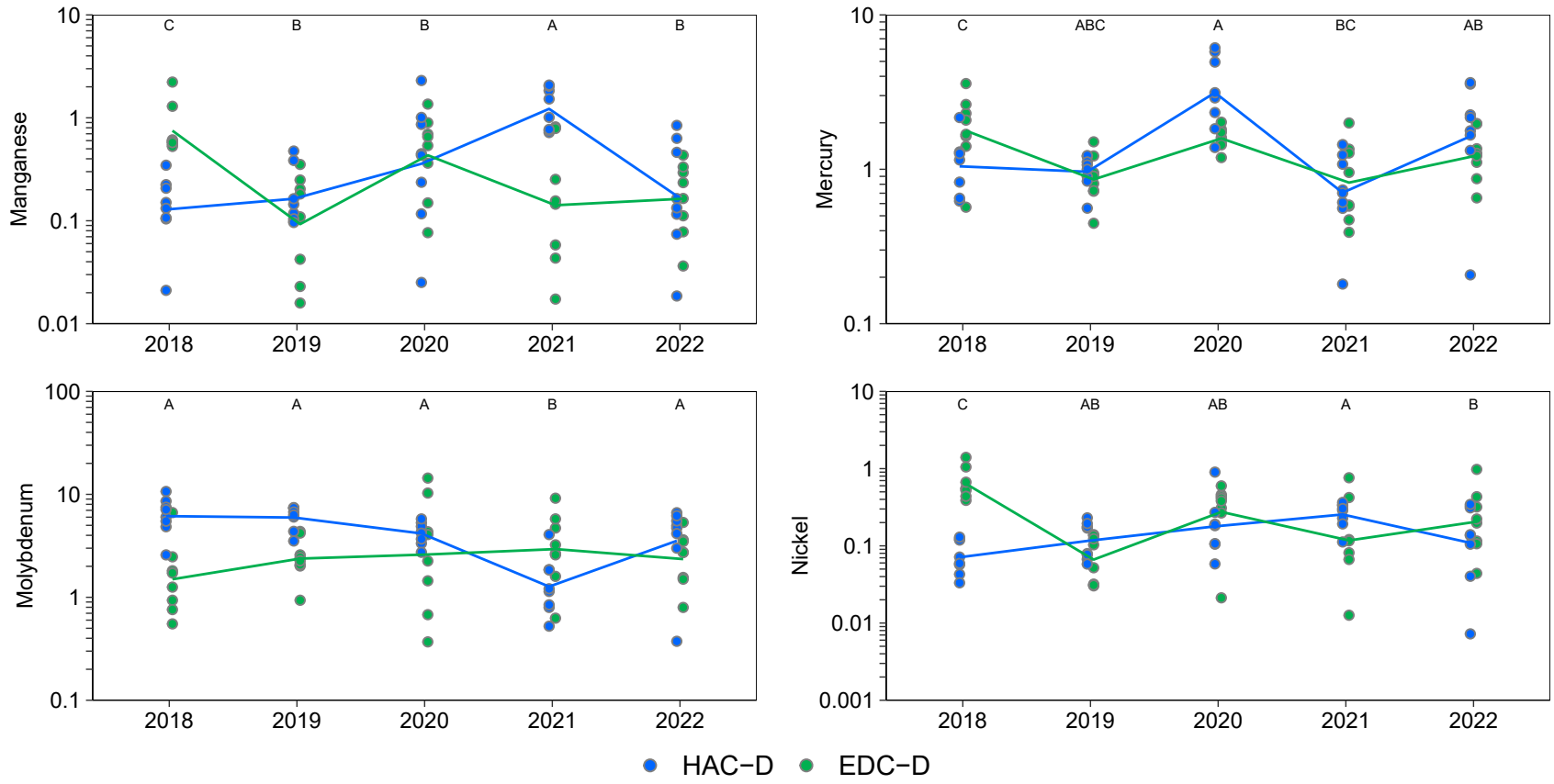

Figure F.4.14: Trophic Transfer Factors for Caddisfly Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Lower Hazeltine Creek (HAC-D; Exposed) and Lower Edney Creek (EDC-D; Reference), 2018 to 2022

Notes: Trophic Transfer Factors (TTFs) were not calculated for analytes with results reported below the laboratory reporting limit (<LRL). Concentrations <LRL are plotted as open symbols at the LRL and the open symbol represents one or more values reported <LRL. Individual samples are plotted and lines join the least −squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted.

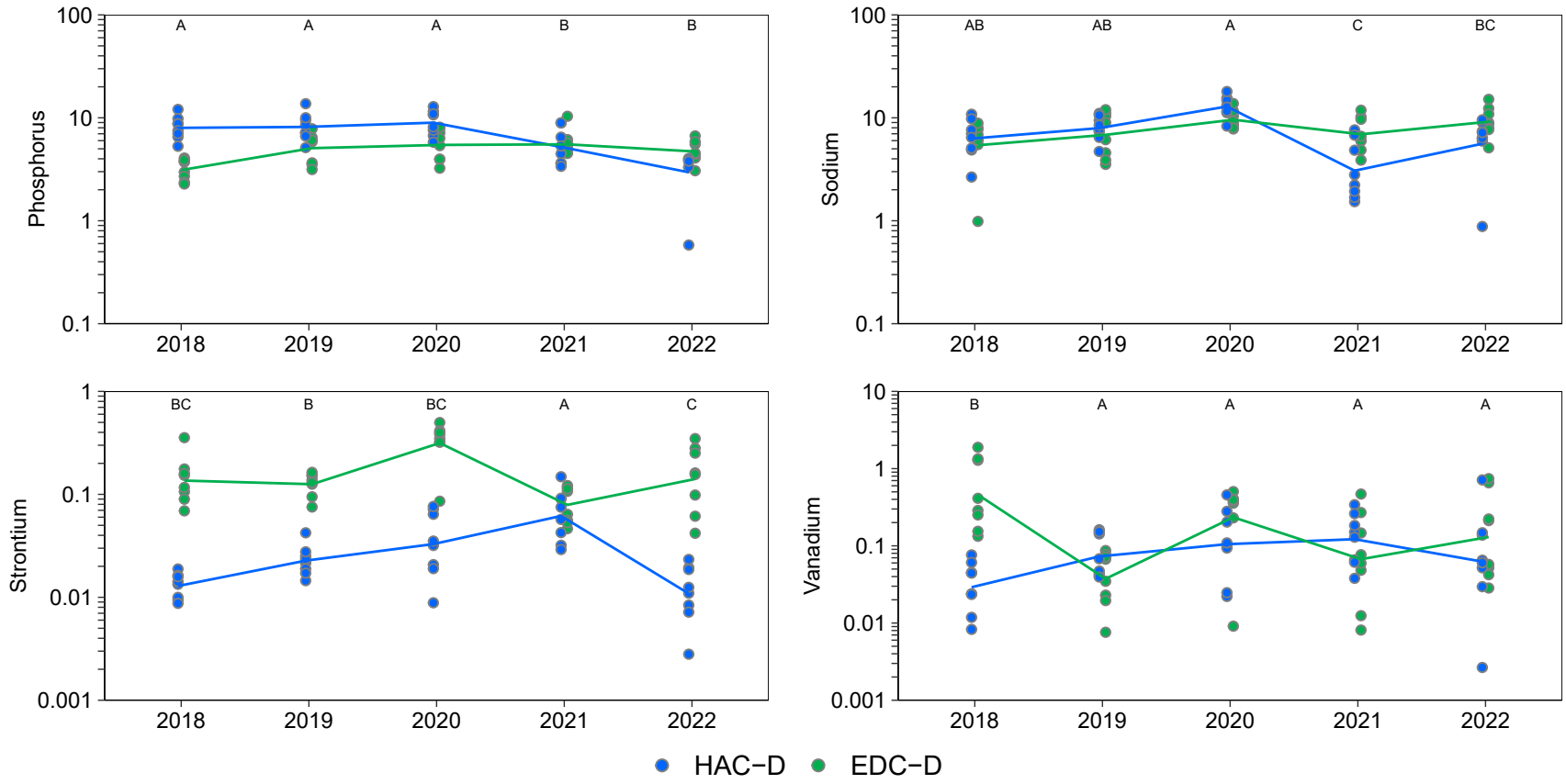

Figure F.4.14: Trophic Transfer Factors for Caddisfly Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Lower Hazeltine Creek (HAC-D; Exposed) and Lower Edney Creek (EDC-D; Reference), 2018 to 2022

Notes: Trophic Transfer Factors (TTFs) were not calculated for analytes with results reported below the laboratory reporting limit (<LRL). Concentrations <LRL are plotted as open symbols at the LRL and the open symbol represents one or more values reported <LRL. Individual samples are plotted and lines join the least −squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted.

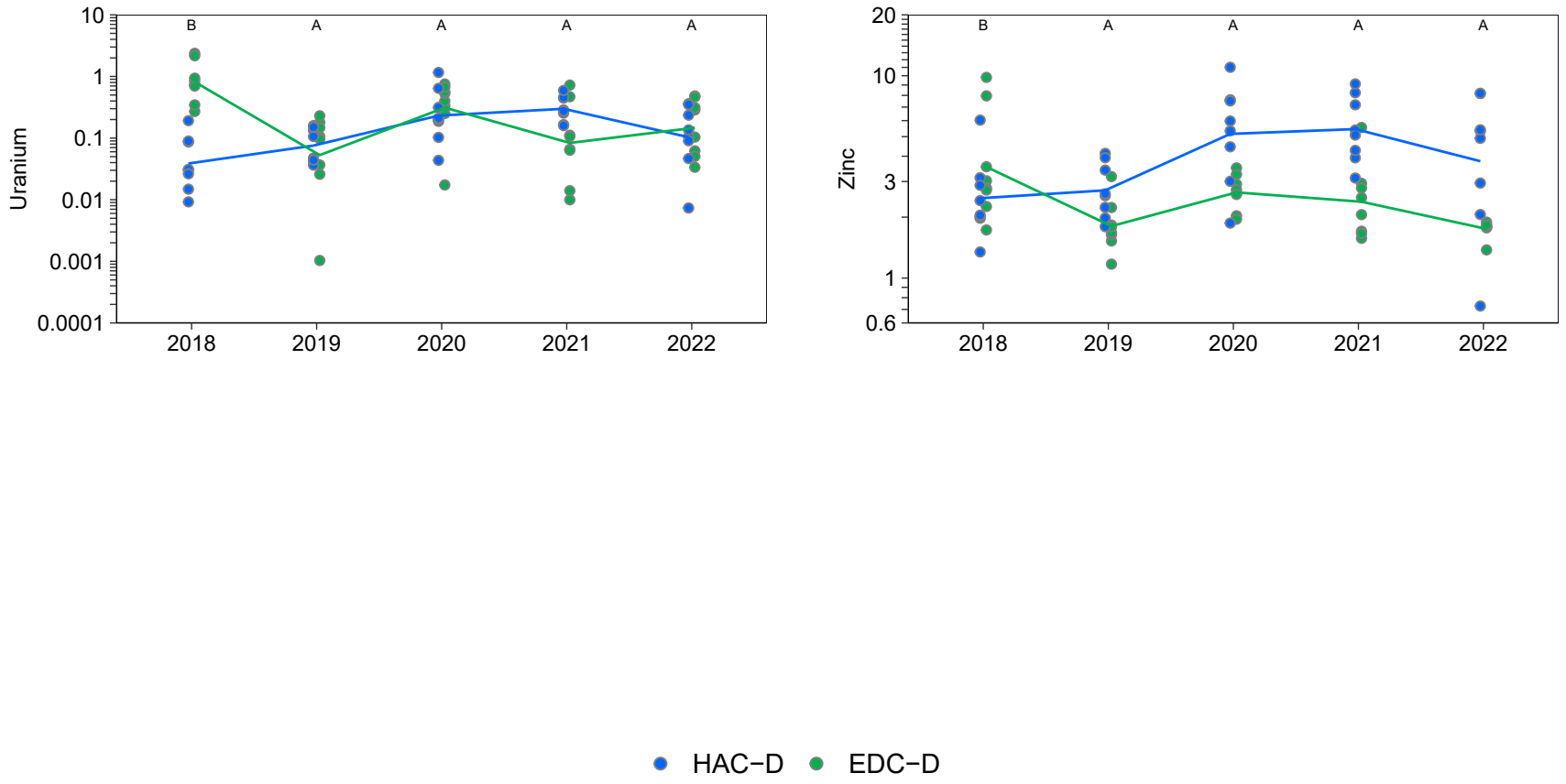

Figure F.4.14: Trophic Transfer Factors for Caddisfly Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Lower Hazeltine Creek (HAC-D; Exposed) and Lower Edney Creek (EDC-D; Reference), 2018 to 2022

Notes: Trophic Transfer Factors (TTFs) were not calculated for analytes with results reported below the laboratory reporting limit (<LRL). Concentrations <LRL are plotted as open symbols at the LRL and the open symbol represents one or more values reported <LRL. Individual samples are plotted and lines join the least −squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted.

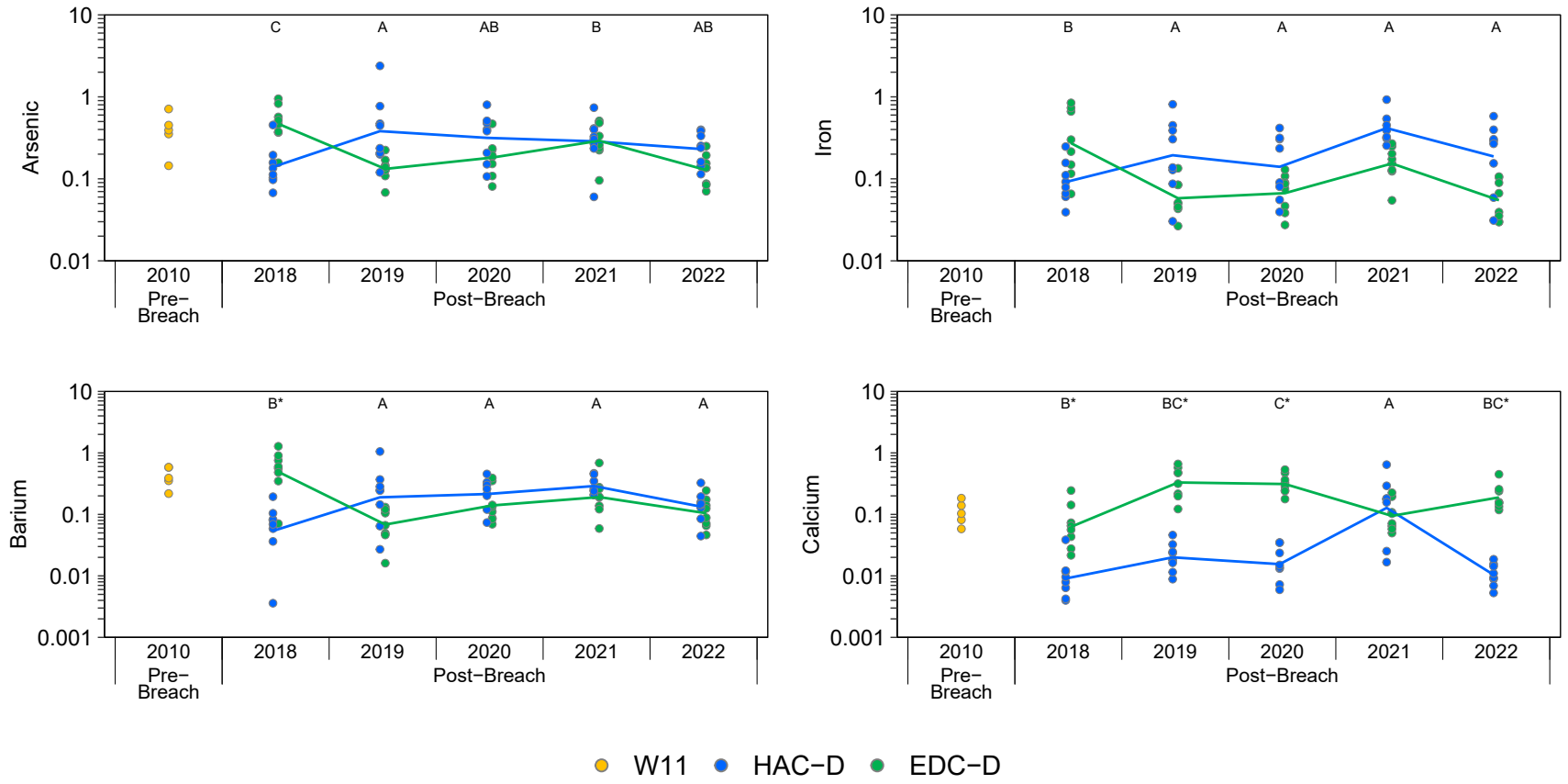

Figure F.4.15: Trophic Transfer Factors for Composite-Taxa Benthic Invertebrate Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Lower Hazeltine Creek (HAC-D; Exposed) and Lower Edney Creek (EDC-D; Reference), 2010 to 2022

Notes: Trophic Transfer Factors (TTFs) were not calculated for analytes with results reported below the laboratory reporting limit (<LRL). W11 (2010) is the pre-breach equivalent of HAC-D.. Concentrations <LRL are plotted as open symbols at the LRL and the open symbol represents one or more values reported <LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p −value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted. Letters with a * designate years where the exposed site is different than pre−breach conditions.

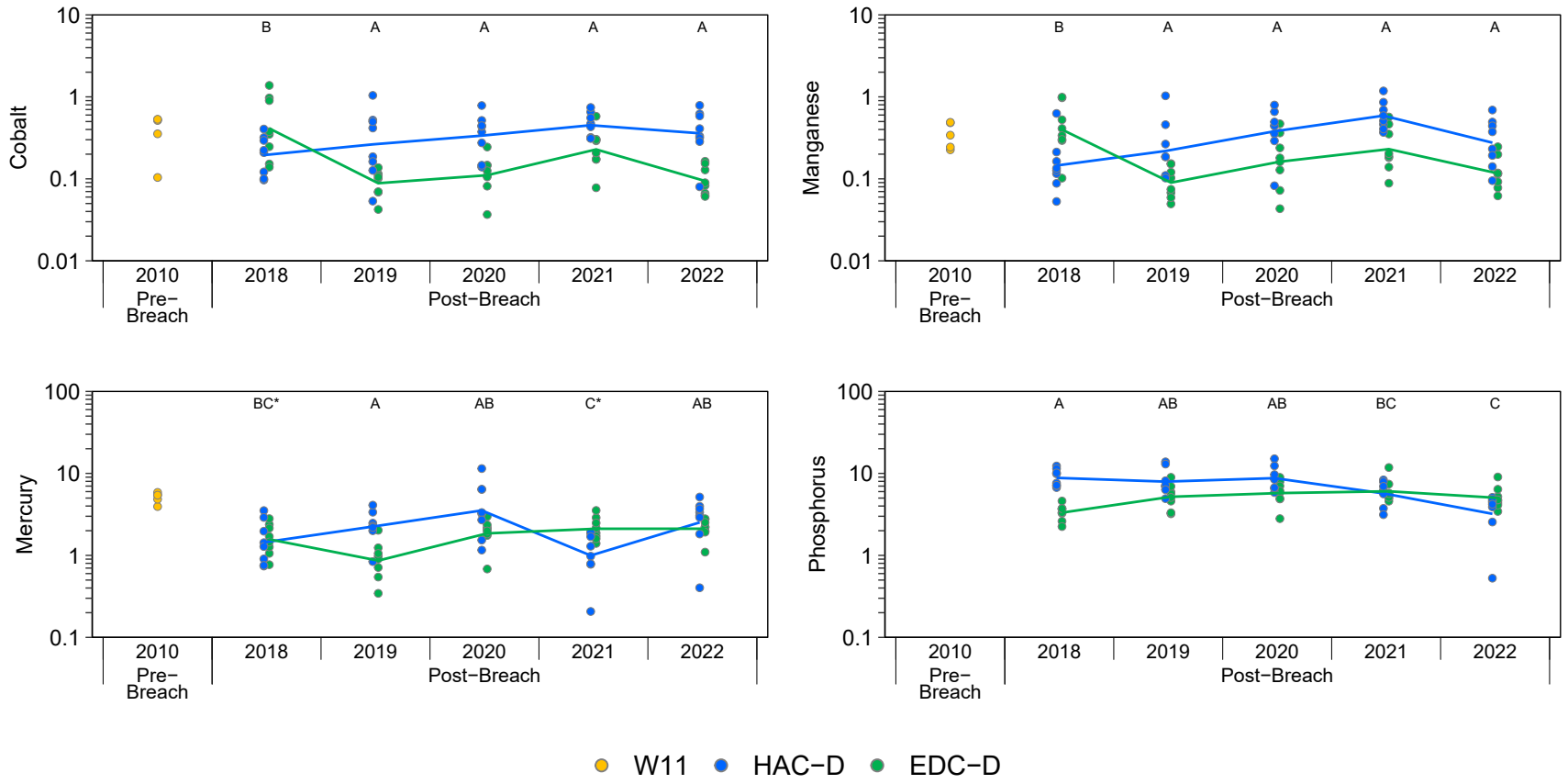

Figure F.4.15: Trophic Transfer Factors for Composite-Taxa Benthic Invertebrate Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Lower Hazeltine Creek (HAC-D; Exposed) and Lower Edney Creek (EDC-D; Reference), 2010 to 2022

Notes: Trophic Transfer Factors (TTFs) were not calculated for analytes with results reported below the laboratory reporting limit (<LRL). W11 (2010) is the pre-breach equivalent of HAC-D.. Concentrations <LRL are plotted as open symbols at the LRL and the open symbol represents one or more values reported <LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p −value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted. Letters with a * designate years where the exposed site is different than pre−breach conditions.

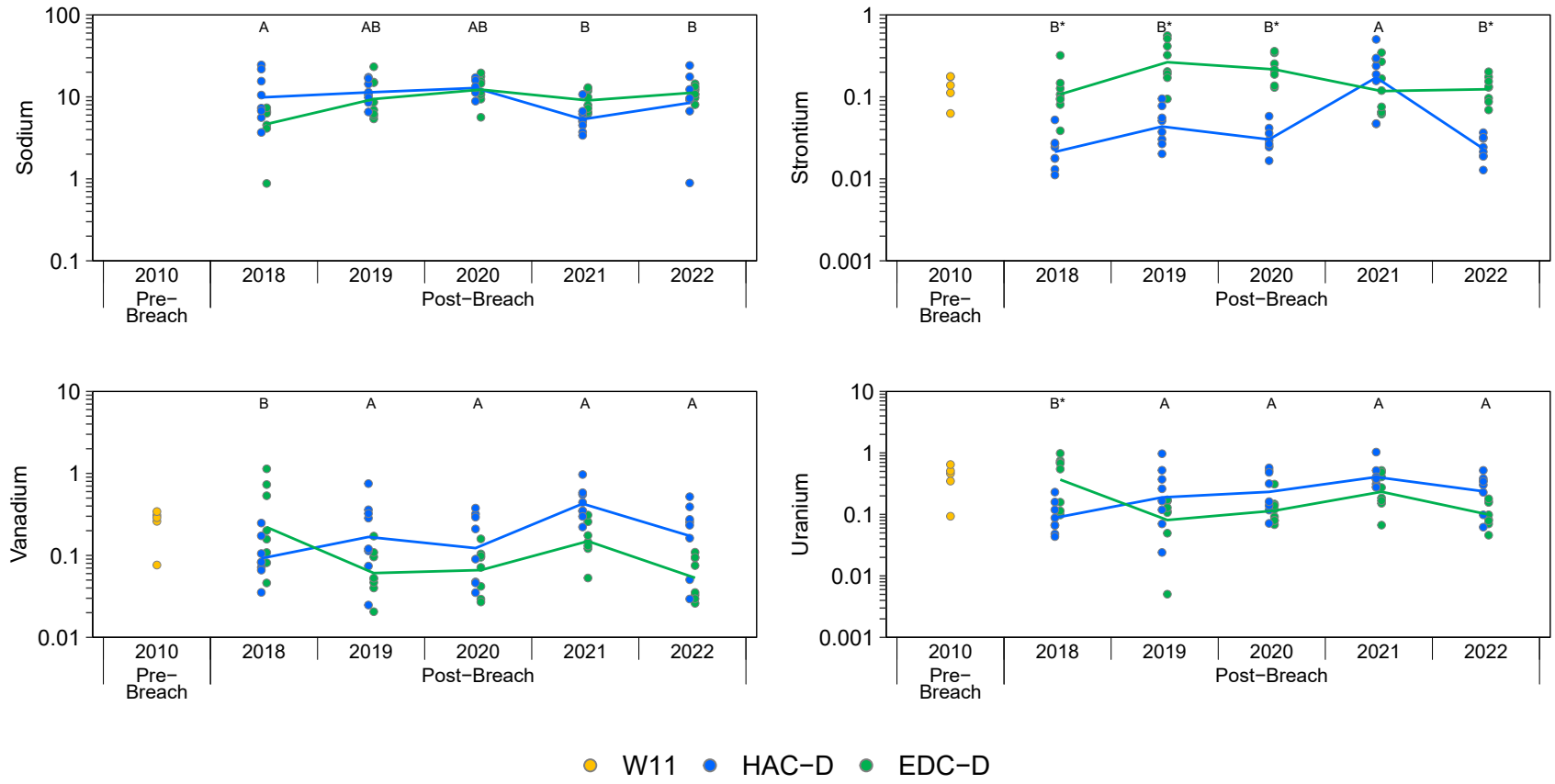

Figure F.4.15: Trophic Transfer Factors for Composite-Taxa Benthic Invertebrate Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Lower Hazeltine Creek (HAC-D; Exposed) and Lower Edney Creek (EDC-D; Reference), 2010 to 2022

Notes: Trophic Transfer Factors (TTFs) were not calculated for analytes with results reported below the laboratory reporting limit (<LRL). W11 (2010) is the pre-breach equivalent of HAC-D.. Concentrations <LRL are plotted as open symbols at the LRL and the open symbol represents one or more values reported <LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p −value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted. Letters with a * designate years where the exposed site is different than pre−breach conditions.

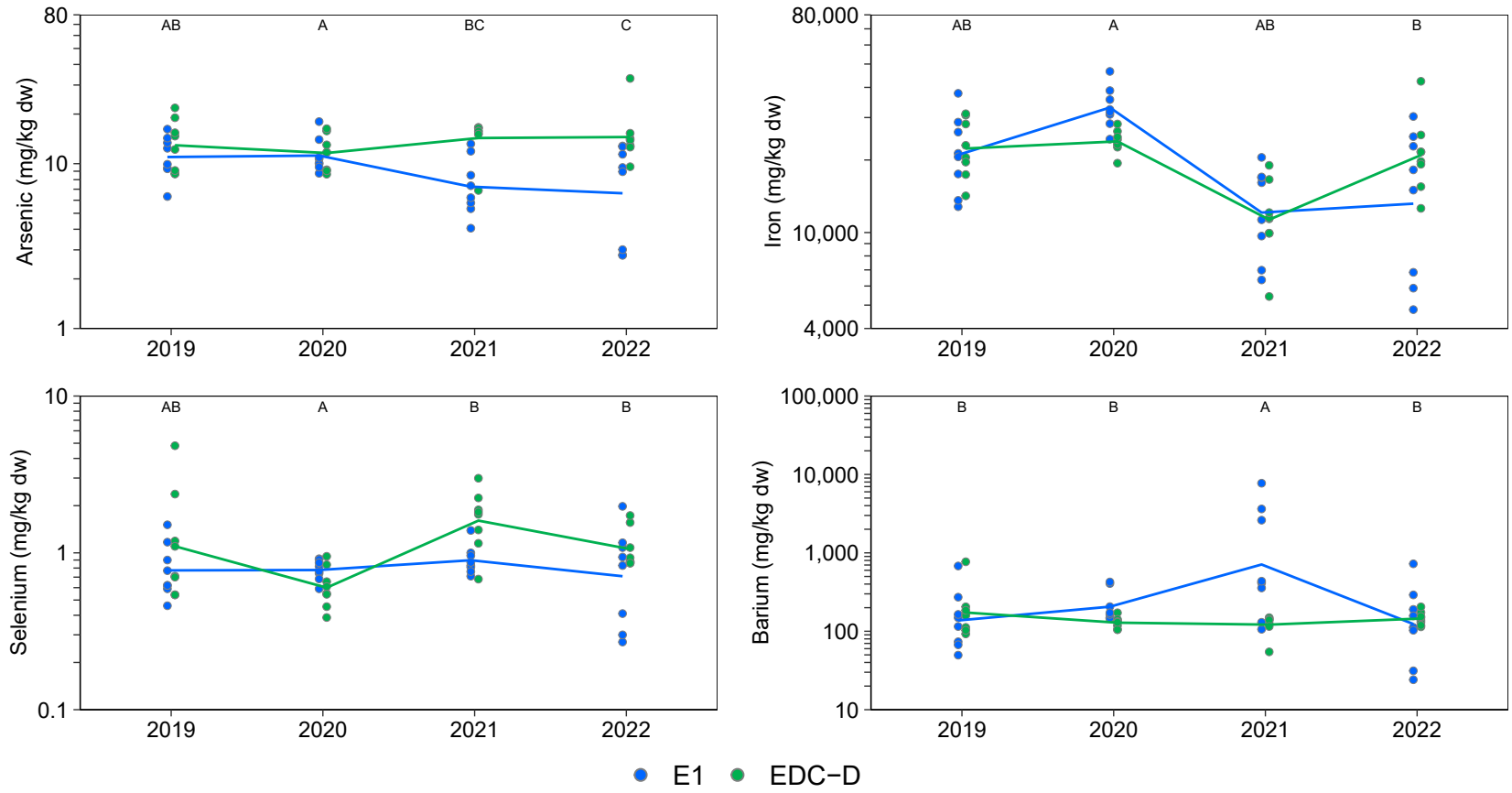

Figure F.4.16: Periphyton Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Lower Edney Creek (E1 [Exposed]; EDC-D [Reference]), 2019 to 2022

Notes: dw = dry weight, <LRL = lower than the laboratory reporting limit (LRL). Concentrations <LRL are plotted as open symbols at the LRL and the open symbol represents one or more values reported <LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted.

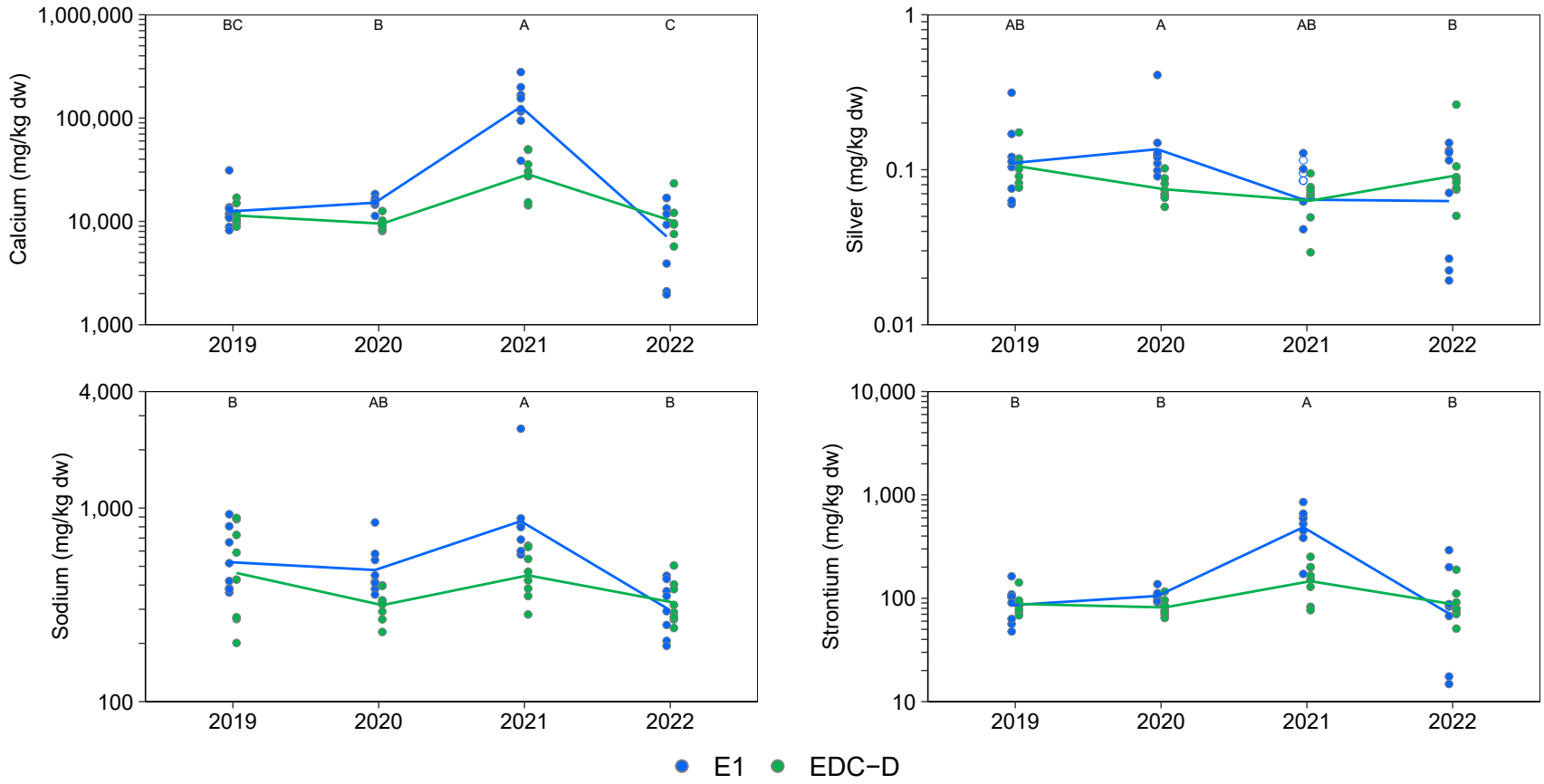

Figure F.4.16: Periphyton Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Lower Edney Creek (E1 [Exposed]; EDC-D [Reference]), 2019 to 2022

Notes: dw = dry weight, <LRL = lower than the laboratory reporting limit (LRL). Concentrations <LRL are plotted as open symbols at the LRL and the open symbol represents one or more values reported <LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted.

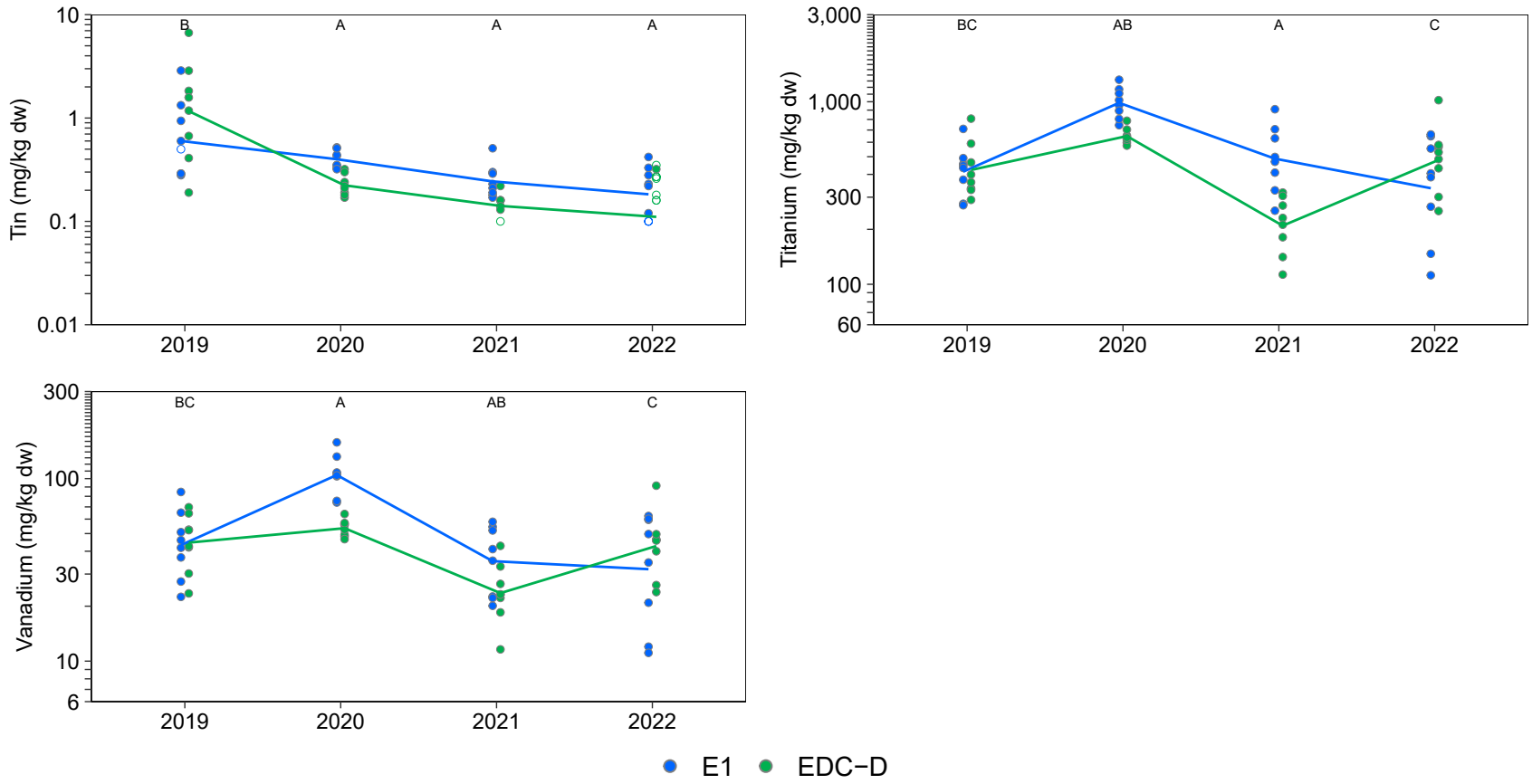

Figure F.4.16: Periphyton Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Lower Edney Creek (E1 [Exposed]; EDC-D [Reference]), 2019 to 2022

Notes: dw = dry weight, <LRL = lower than the laboratory reporting limit (LRL). Concentrations <LRL are plotted as open symbols at the LRL and the open symbol represents one or more values reported <LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted.

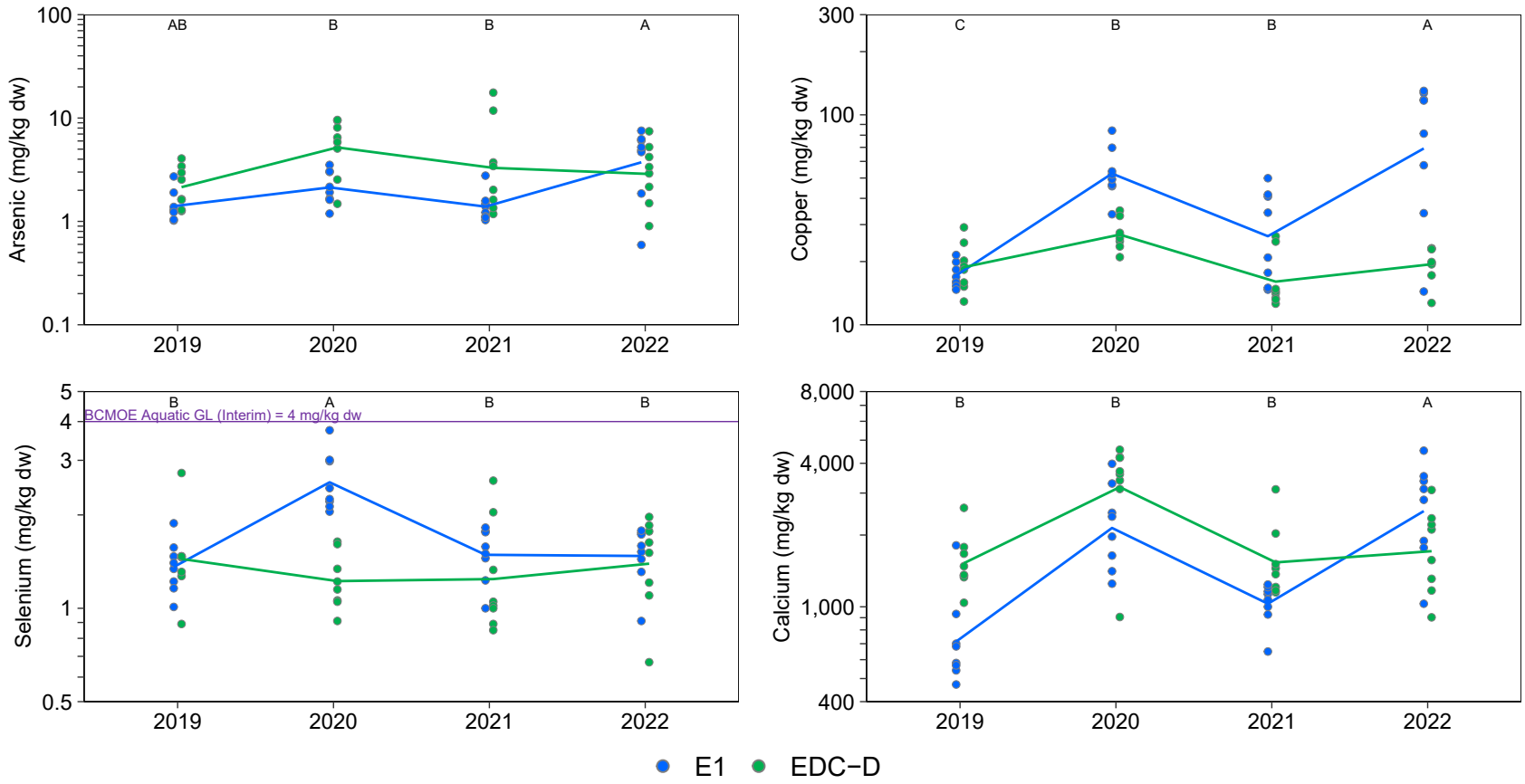

Figure F.4.17: Caddisfly Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Lower Edney Creek (E1 [Exposed]; EDC-D [Reference]), 2019 to 2022

Notes: BCMOE = British Columbia Ministry of the Environment, GL = Guideline, dw = dry weight, <LRL = lower than the laboratory reporting limit (LRL). Concentrations <LRL are plotted as open symbols at the LRL and the open symbol represents one or more values reported <LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted.

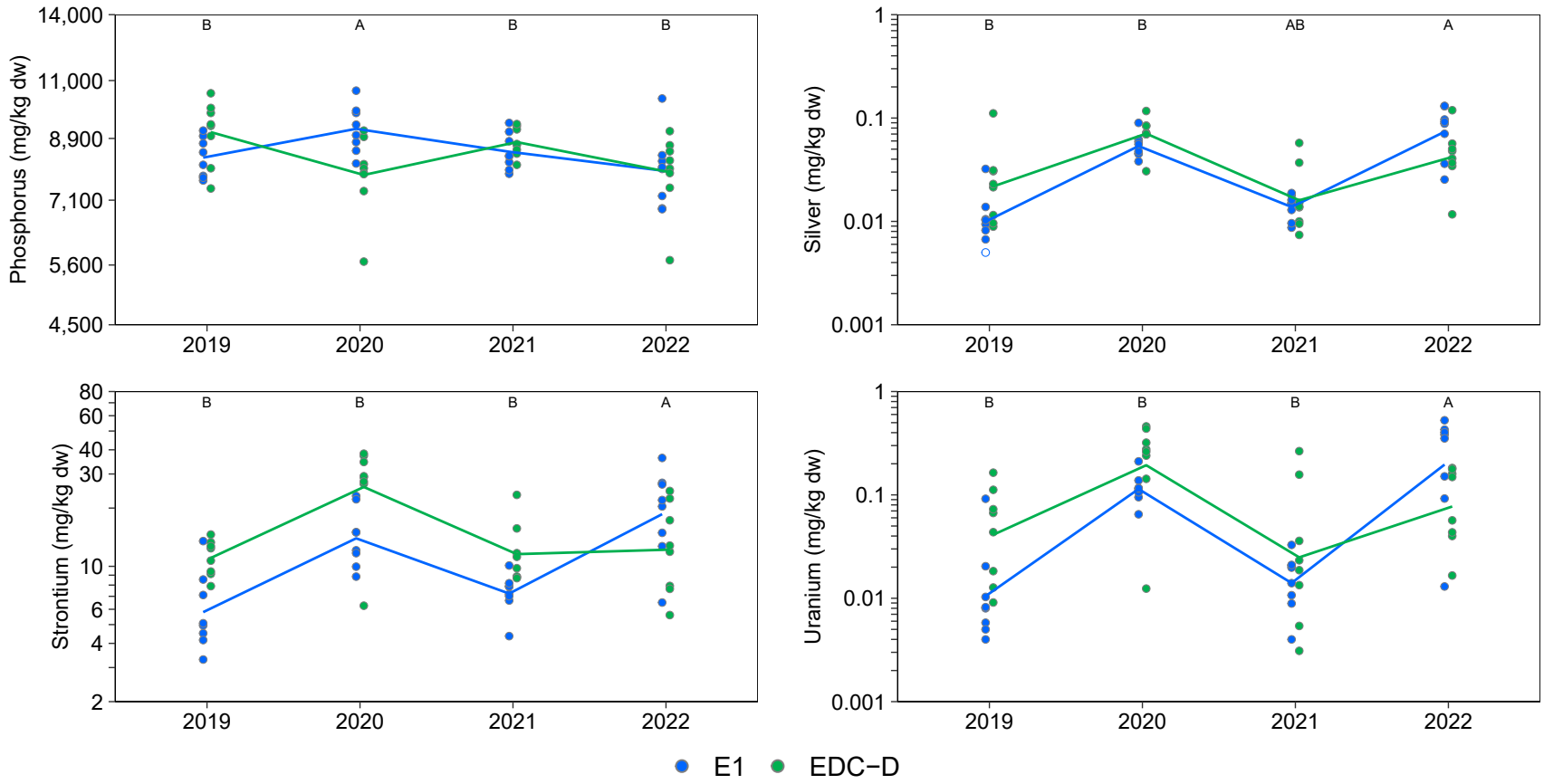

Figure F.4.17: Caddisfly Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Lower Edney Creek (E1 [Exposed]; EDC-D [Reference]), 2019 to 2022

Notes: BCMOE = British Columbia Ministry of the Environment, GL = Guideline, dw = dry weight, <LRL = lower than the laboratory reporting limit (LRL). Concentrations <LRL are plotted as open symbols at the LRL and the open symbol represents one or more values reported <LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted.

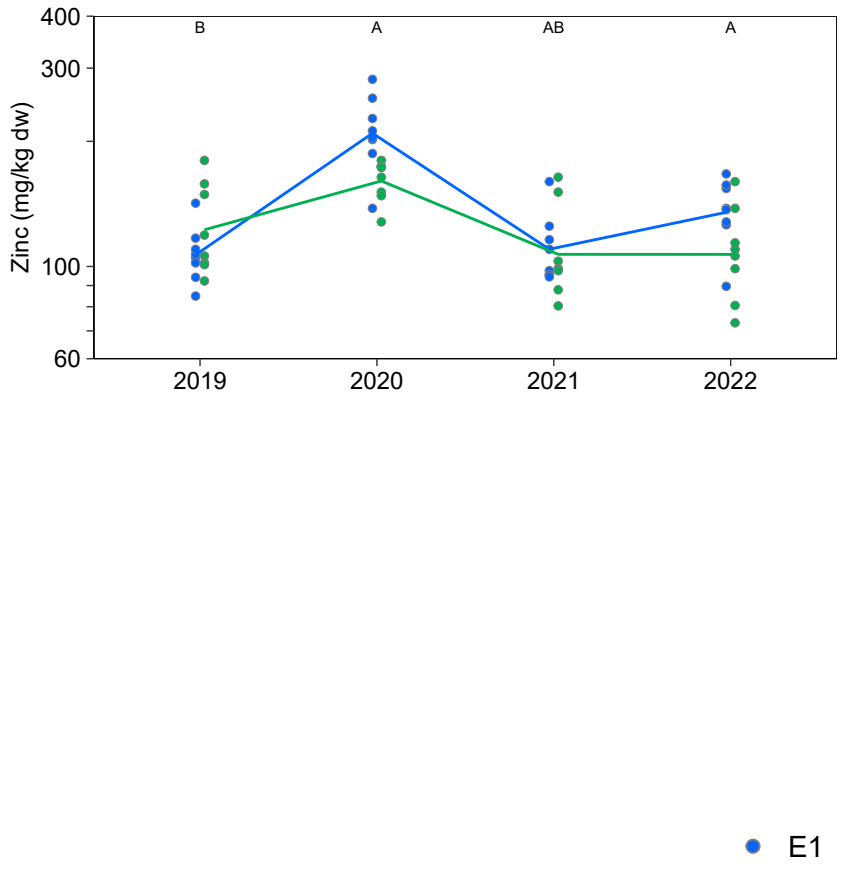

Figure F.4.17: Caddisfly Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Lower Edney Creek (E1 [Exposed]; EDC-D [Reference]), 2019 to 2022

Notes: BCMOE = British Columbia Ministry of the Environment, GL = Guideline, dw = dry weight, <LRL = lower than the laboratory reporting limit (LRL). Concentrations <LRL are plotted as open symbols at the LRL and the open symbol represents one or more values reported <LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted.

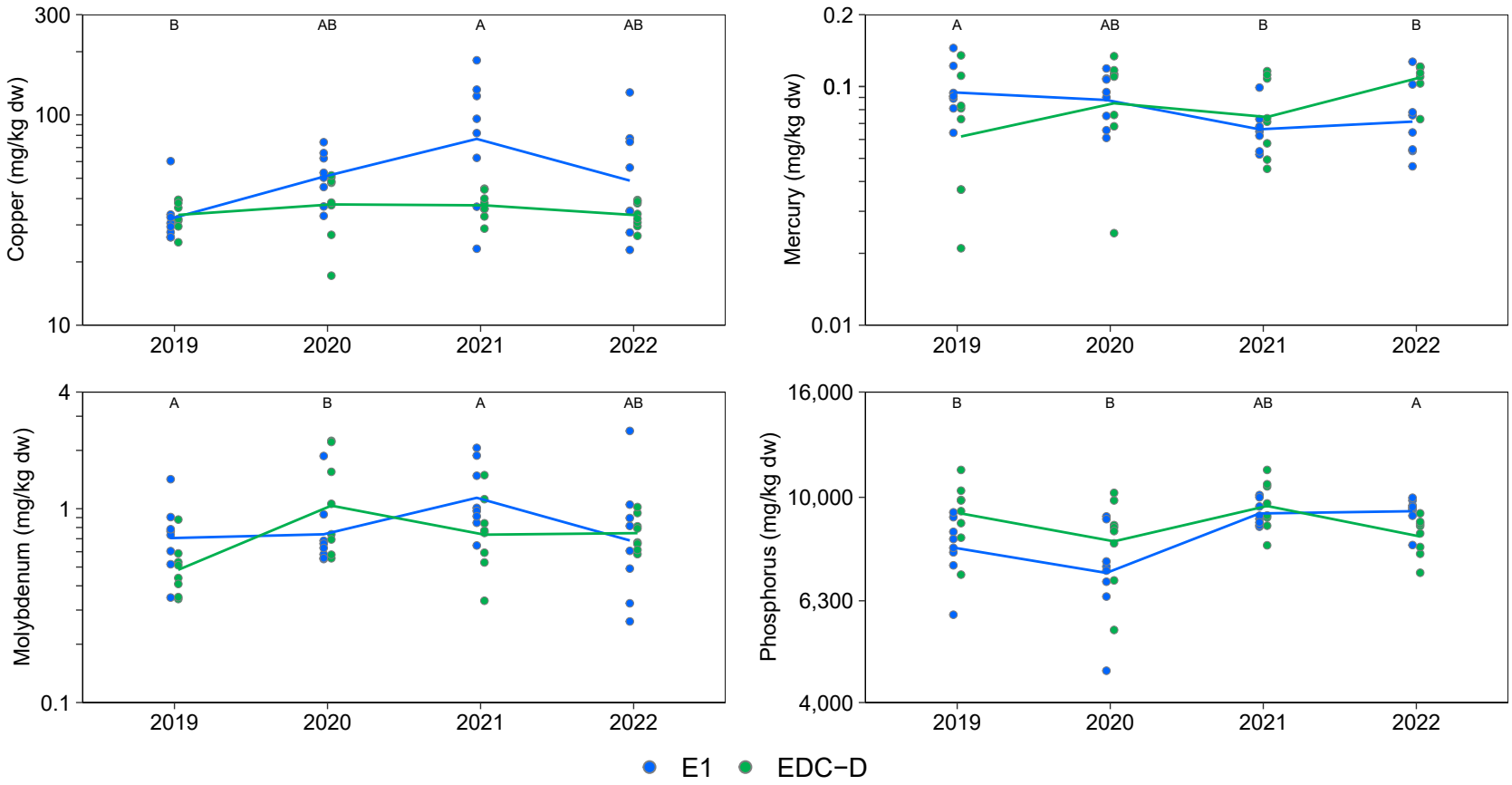

Figure F.4.18: Composite-Taxa Benthic Invertebrate Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Lower Edney Creek (E1 [Exposed]; EDC-D [Reference]), 2019 to 2022

Notes: BCMOE = British Columbia Ministry of the Environment, GL = Guideline, dw = dry weight, <LRL = lower than the laboratory reporting limit (LRL). Concentrations <LRL are plotted as open symbols at the LRL and the open symbol represents one or more values reported <LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted.

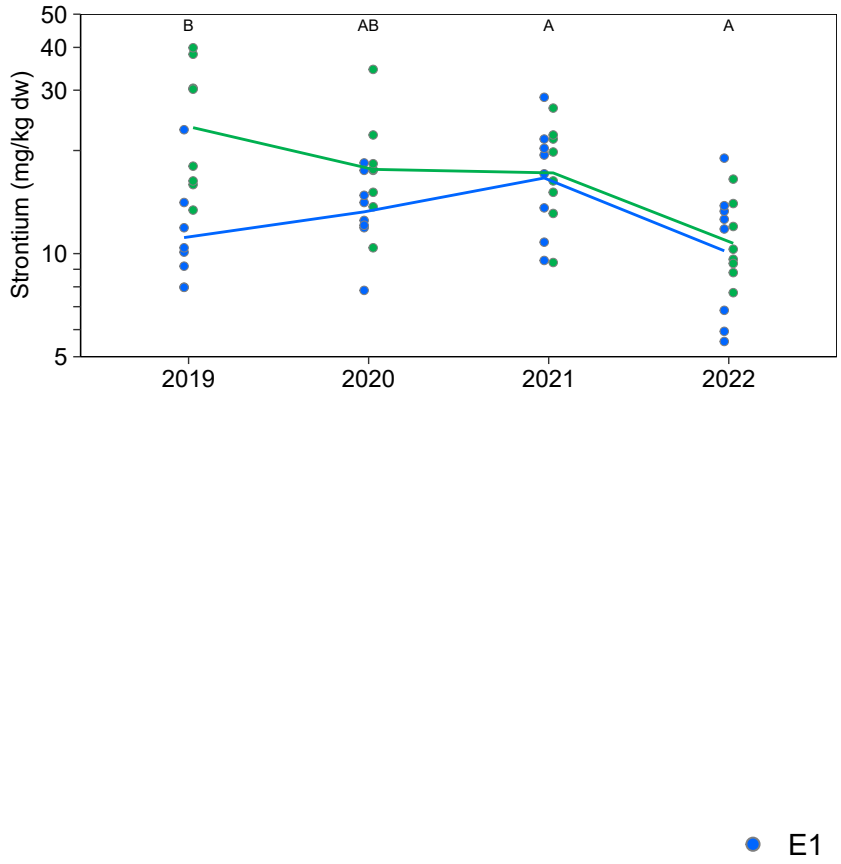

Figure F.4.18: Composite-Taxa Benthic Invertebrate Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Lower Edney Creek (E1 [Exposed]; EDC-D [Reference]), 2019 to 2022

Notes: BCMOE = British Columbia Ministry of the Environment, GL = Guideline, dw = dry weight, <LRL = lower than the laboratory reporting limit (LRL). Concentrations <LRL are plotted as open symbols at the LRL and the open symbol represents one or more values reported <LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted.

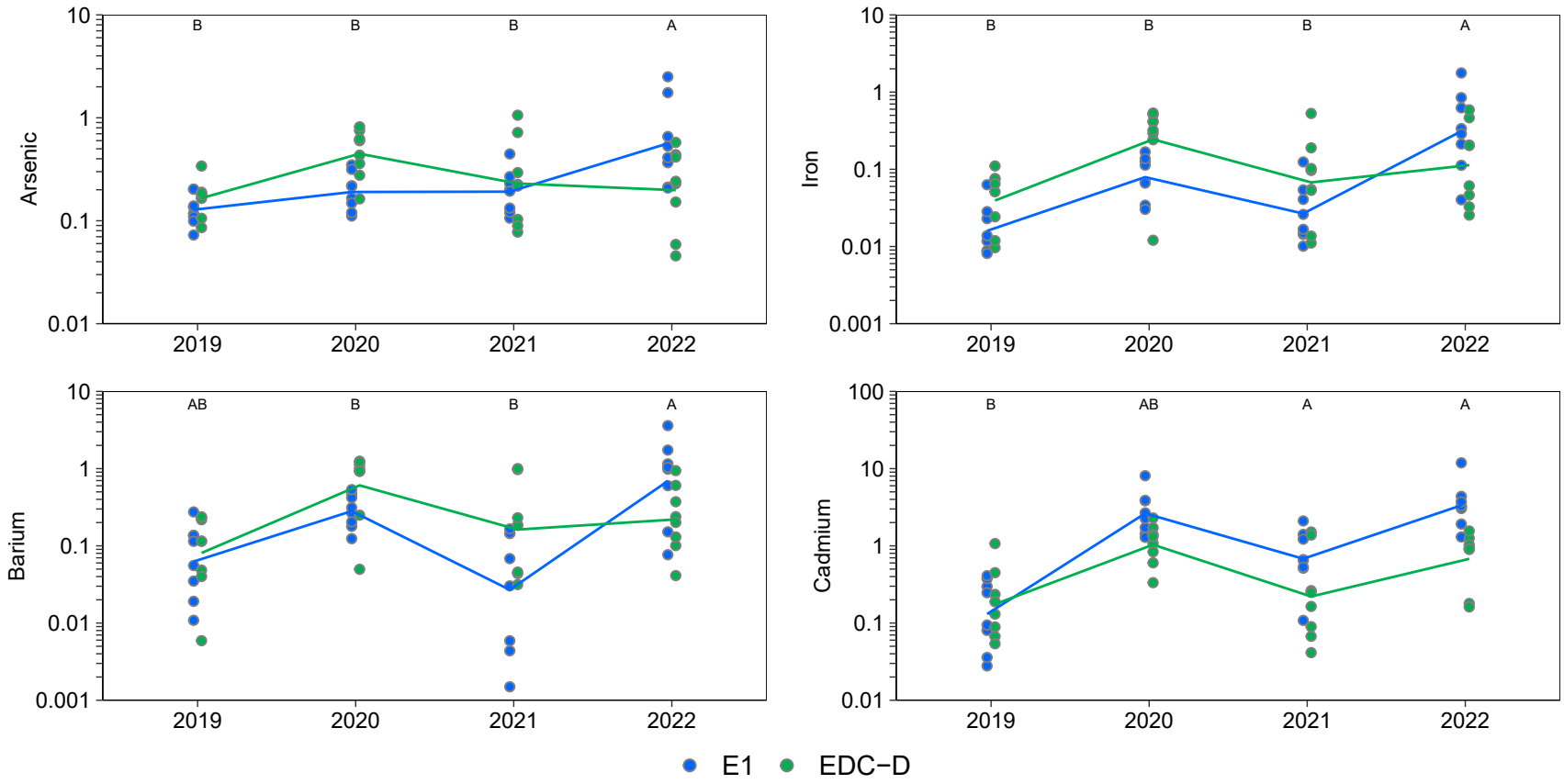

Figure F.4.19: Trophic Transfer Factors for Caddisfly Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Lower Edney Creek (E1 [Exposed]; EDC-D [Reference]), 2019 to 2022

Notes: Trophic Transfer Factors (TTFs) were not calculated for analytes with results reported below the laboratory reporting limit (<LRL). Concentrations <LRL are plotted as open symbols at the LRL and the open symbol represents one or more values reported <LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted.

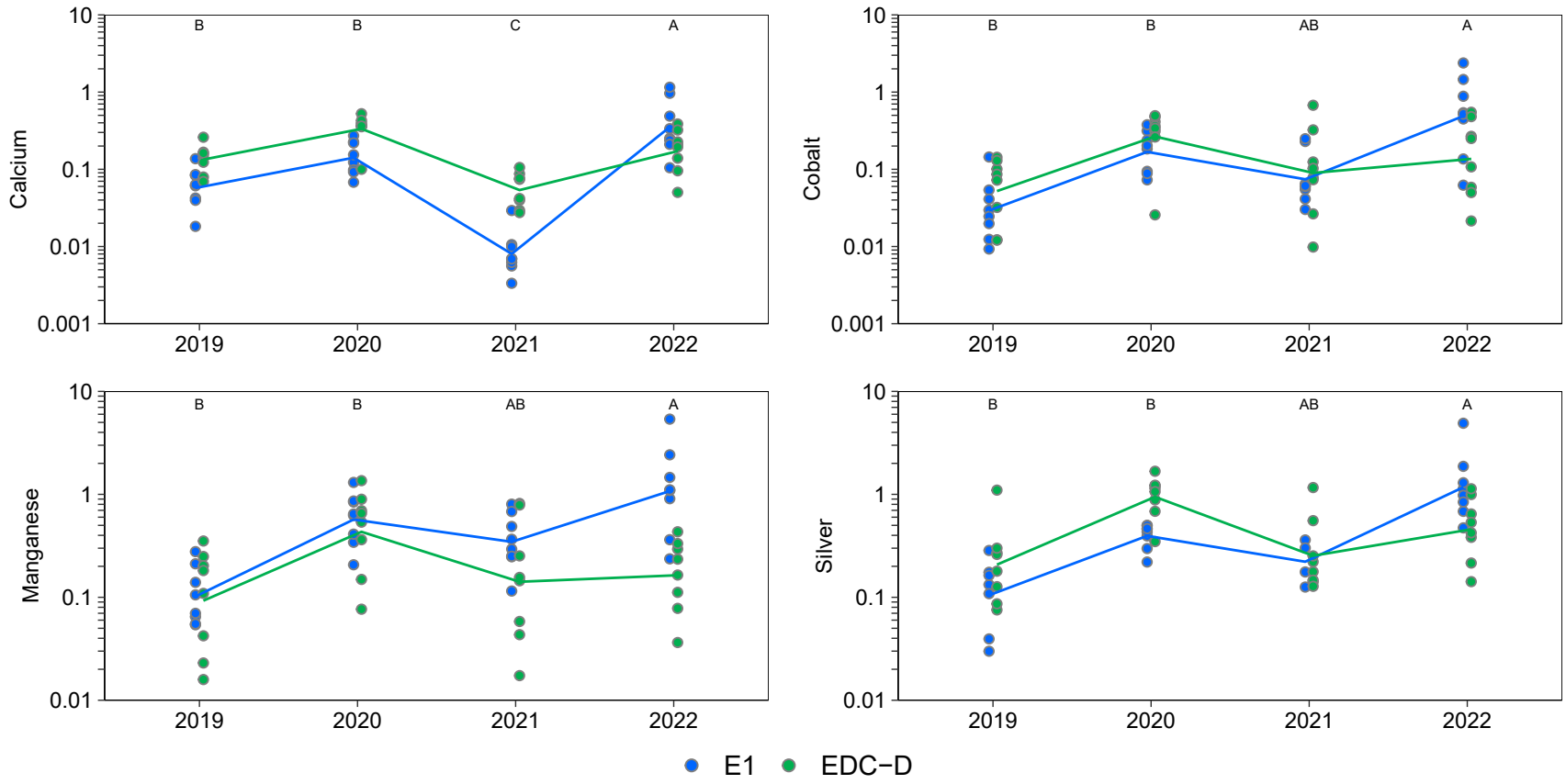

Figure F.4.19: Trophic Transfer Factors for Caddisfly Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Lower Edney Creek (E1 [Exposed]; EDC-D [Reference]), 2019 to 2022

Notes: Trophic Transfer Factors (TTFs) were not calculated for analytes with results reported below the laboratory reporting limit (<LRL). Concentrations <LRL are plotted as open symbols at the LRL and the open symbol represents one or more values reported <LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted.

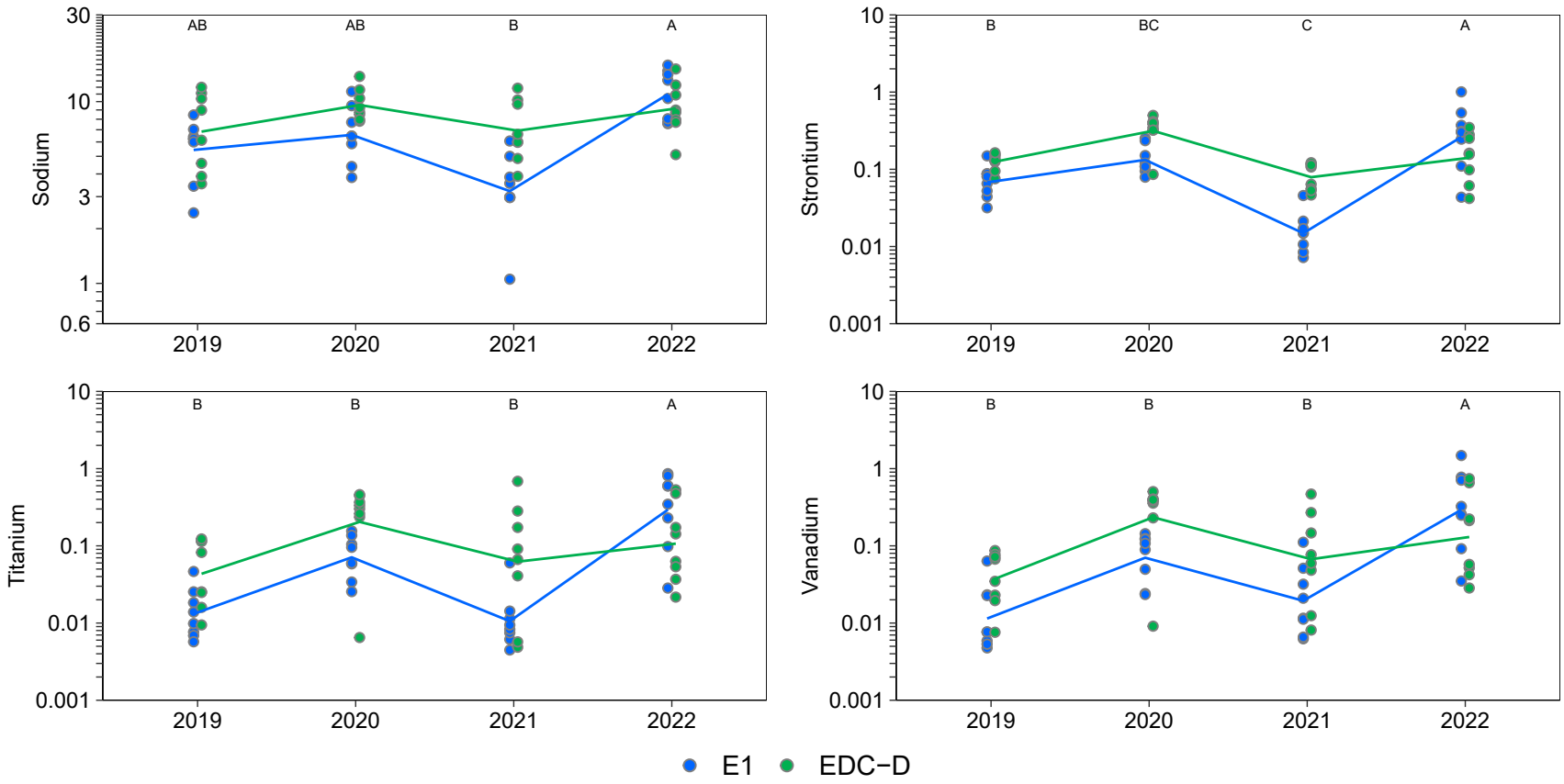

Figure F.4.19: Trophic Transfer Factors for Caddisfly Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Lower Edney Creek (E1 [Exposed]; EDC-D [Reference]), 2019 to 2022

Notes: Trophic Transfer Factors (TTFs) were not calculated for analytes with results reported below the laboratory reporting limit (<LRL). Concentrations <LRL are plotted as open symbols at the LRL and the open symbol represents one or more values reported <LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted.

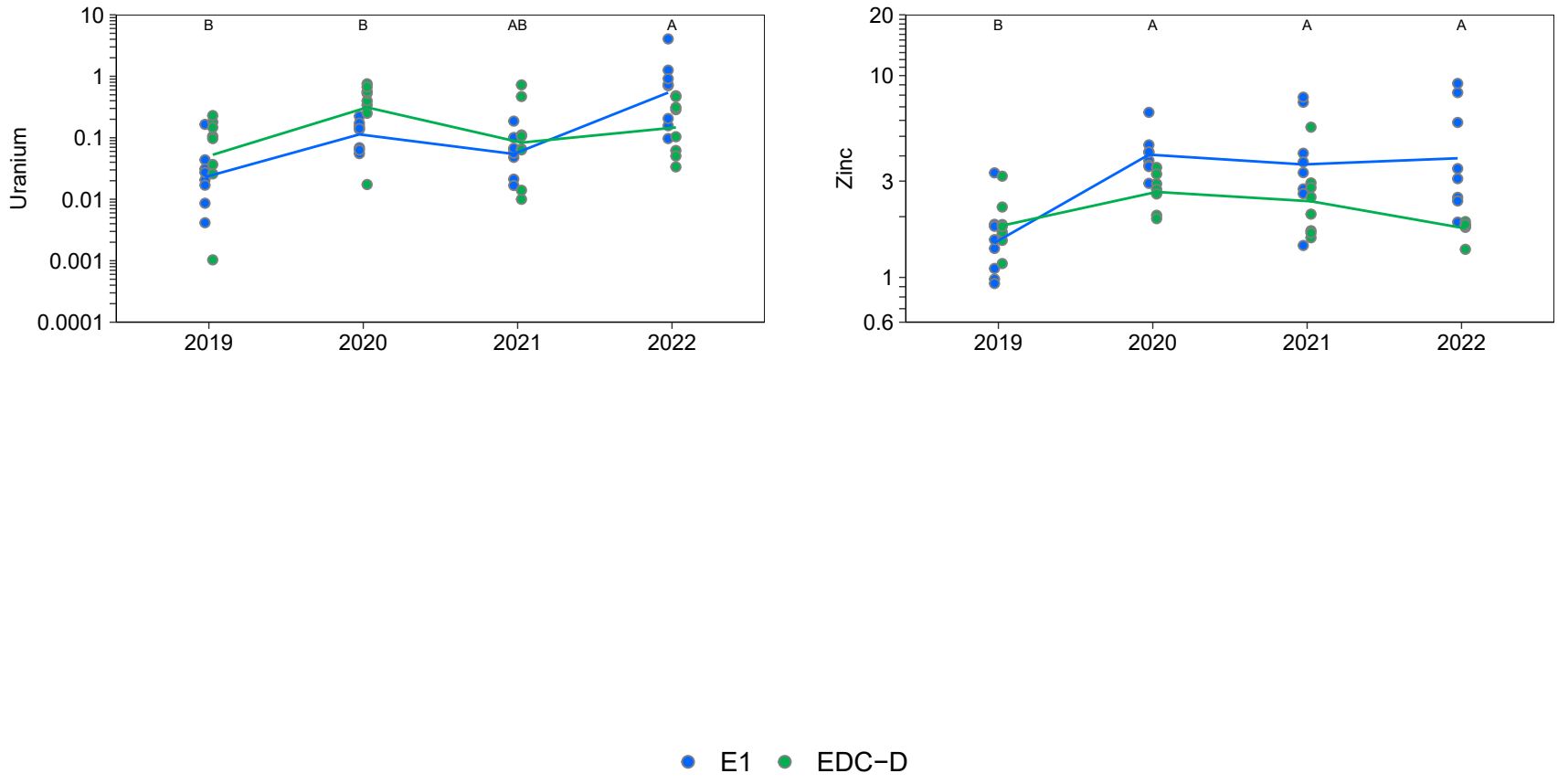

Figure F.4.19: Trophic Transfer Factors for Caddisfly Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Lower Edney Creek (E1 [Exposed]; EDC-D [Reference]), 2019 to 2022

Notes: Trophic Transfer Factors (TTFs) were not calculated for analytes with results reported below the laboratory reporting limit (<LRL). Concentrations <LRL are plotted as open symbols at the LRL and the open symbol represents one or more values reported <LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted.

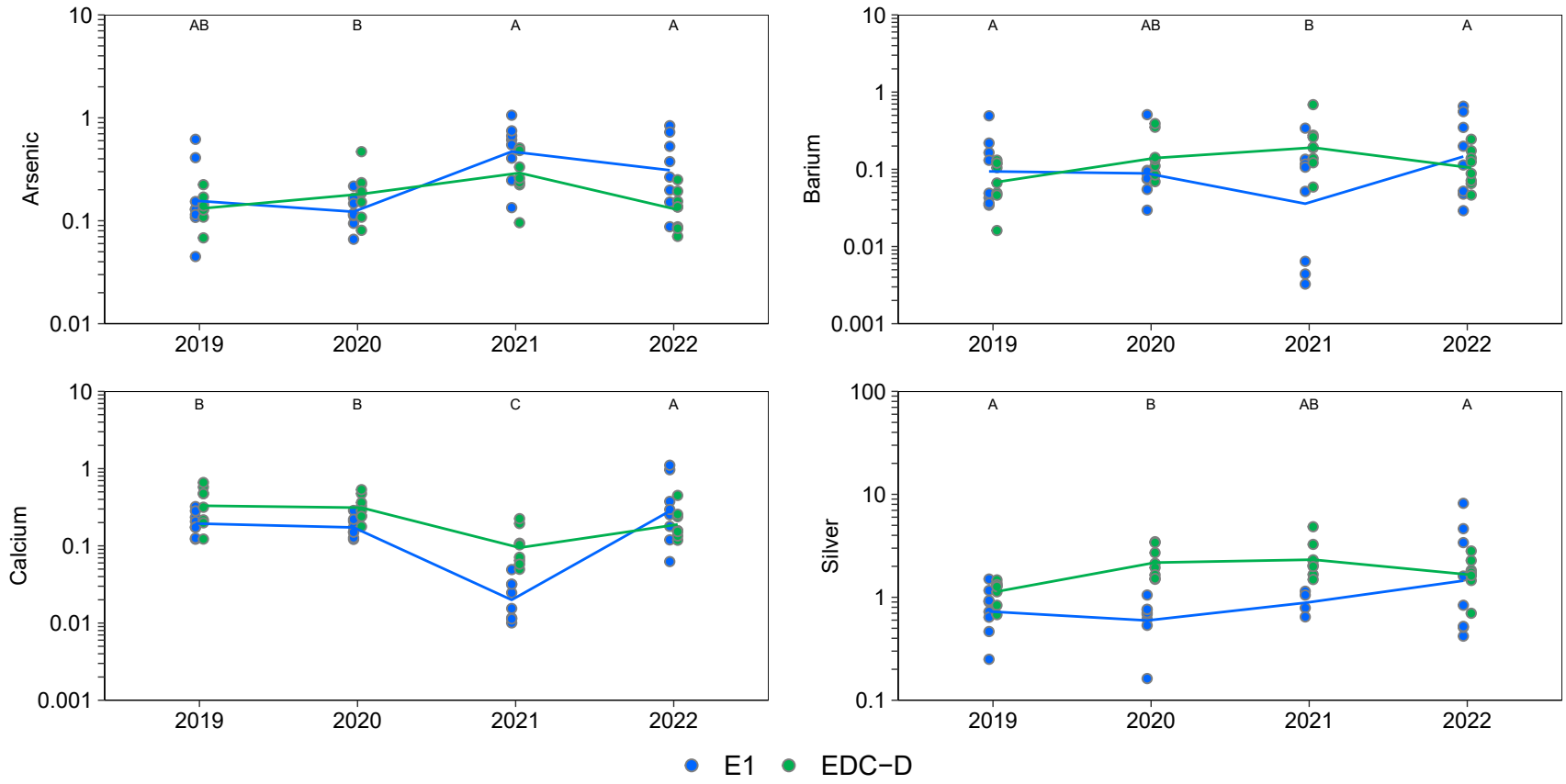

Figure F.4.20: Trophic Transfer Factors for Composite-Taxa Benthic Invertebrate Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Lower Edney Creek (E1 [Exposed]; EDC-D [Reference]), 2019 to 2022

Notes: Trophic Transfer Factors (TTFs) were not calculated for analytes with results reported below the laboratory reporting limit (<LRL). Concentrations <LRL are plotted as open symbols at the LRL and the open symbol represents one or more values reported <LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted.

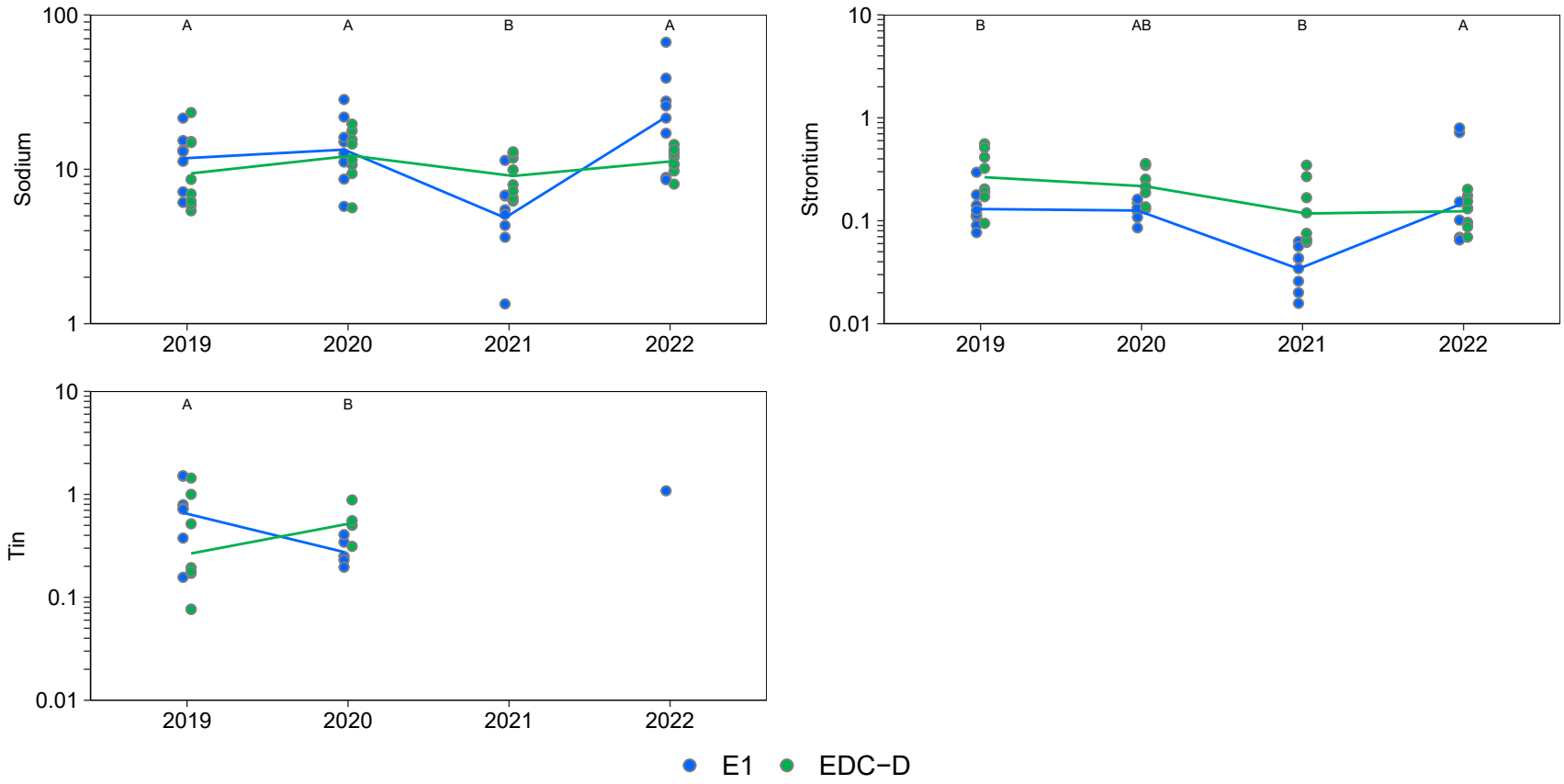

Figure F.4.20: Trophic Transfer Factors for Composite-Taxa Benthic Invertebrate Tissue Primary and Secondary Analyte Concentrations with a Significant Area x Year Effect for Lower Edney Creek (E1 [Exposed]; EDC-D [Reference]), 2019 to 2022

Notes: Trophic Transfer Factors (TTFs) were not calculated for analytes with results reported below the laboratory reporting limit (<LRL). Concentrations <LRL are plotted as open symbols at the LRL and the open symbol represents one or more values reported <LRL. Individual samples are plotted and lines join the least−squares estimated mean values for years included in the statistical analysis (i.e., not <LRL). Statistical analyses were conducted using a two−way ANOVA with factors Area and Year. The models were fit using Maximum Likelihood Estimation with an assumed log−normal distribution. Years that share a letter (e.g., A,B,C) have ratios of concentrations (Exposed:Reference) that do not differ significantly (p−value < 0.05) among years. Letter A was assigned to the year with the highest ratio of concentrations (Exposed:Reference). Only years with samples from both reference and exposed areas are plotted.

Table F.4.1: Statistical Comparisons of Exposed - Reference Relative Differences of Periphyton Tissue Metal Concentrations for Upper Hazeltine Creek (HAC-R1; Exposed) and Upper Edney Creek (EDC-U; Reference), 2018 to 2022

Parameter	Data Transformation	Two-way ANOVA P-values			(Exposed – Reference) Contrasts Among Periods[a]					Magnitude of Difference in (Exposed – Reference) Relative to Baseline Period (%)[b]					Magnitude of Difference for HAC-R1 Mean Relative to EDC-U (%)[c]				
		Area	Year	Area × Year	Post-Breach Period					Post-Breach Period					Post-Breach Period				
					2018	2019	2020	2021	2022	2018	2019	2020	2021	2022	2018	2019	2020	2021	2022
Aluminum	MLE	<0.001	0.023	0.008	A	AB	AB	B	A	baseline	ns	ns	-72	ns	-80	-89	-88	-94	-79
Antimony	MLE	0.161	0.010	0.358	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns
Arsenic	MLE	<0.001	0.005	<0.001	A	A	C	BC	B	baseline	ns	-70	-56	-49	-75	-76	-93	-89	-87
Barium	MLE	<0.001	0.124	<0.001	A	AB	C	AB	BC	baseline	ns	-74	ns	-50	-39	-45	-84	-44	-70
Beryllium	MLE	<0.001	0.002	<0.001	A	BC	CD	D	AB	baseline	-51	-65	-74	ns	-75	-88	-91	-94	-84
Bismuth	MLE	<0.001	0.073	0.071	A	A	A	A	A	baseline	ns	ns	ns	ns			-91		
Boron	MLE	<0.001	0.073	<0.001	C	B	A	AB	AB	baseline	259	610	471	591	236	1,105	2,281	1,815	2,219
Cadmium	MLE	<0.001	0.005	<0.001	A	A	B	B	B	baseline	ns	-70	-54	-64	-68	-63	-91	-85	-89
Calcium	MLE	<0.001	0.563	<0.001	B	A	A	A	A	baseline	56	35	48	41	1,561	2,495	2,138	2,364	2,236
Cesium	MLE	<0.001	<0.001	<0.001	A	A	A	B	A	baseline	ns	ns	-80	ns	-51	-61	-54	-90	-66
Chromium	MLE	<0.001	<0.001	0.002	A	AB	A	B	A	baseline	ns	ns	-83	ns	-93	-97	-96	-99	-93
Cobalt	MLE	<0.001	0.006	0.002	A	AB	C	BC	BC	baseline	ns	-68	-53	-51	-86	-91	-96	-94	-93
Copper	MLE	0.010	0.005	0.024	A	AB	AB	B	A	baseline	ns	ns	-57	ns	80	ns	ns	ns	64
Iron	MLE	<0.001	<0.001	<0.001	A	A	A	B	A	baseline	ns	ns	-82	ns	-87	-92	-93	-98	-86
Lead	MLE	<0.001	0.004	<0.001	A	B	B	C	AB	baseline	-54	-66	-87	ns	-76	-89	-92	-97	-85
Lithium	MLE	<0.001	0.002	0.013	A	D	BC	C	AB	baseline	-93	-54	-67	ns	-72	ns	-87	-91	-77
Magnesium	MLE	<0.001	0.892	0.279	A	A	A	A	A	baseline	ns	ns	ns	ns			-43		
Manganese	MLE	<0.001	0.001	0.002	AB	A	C	AB	BC	baseline	ns	-54	ns	ns	-83	-77	-92	-84	-90
Mercury	MLE	<0.001	<0.001	0.015	A	AB	B	B	B	baseline	ns	-50	-70	-52	-80	-89	-90	-94	-91
Molybdenum	MLE	<0.001	0.004	<0.001	A	A	B	B	B	baseline	ns	-57	-67	-59	ns	ns	-47	-60	-50
Nickel	MLE	<0.001	<0.001	0.276	A	A	A	A	A	baseline	ns	ns	ns	ns			-93		
Phosphorus	MLE	<0.001	<0.001	0.665	A	A	A	A	A	baseline	ns	ns	ns	ns			-67		
Potassium	MLE	0.199	<0.001	<0.001	B	A	A	B	B	baseline	71	89	ns	ns	ns	60	77	ns	ns
Rubidium	MLE	<0.001	<0.001	<0.001	B	A	A	C	B	baseline	46	74	-48	ns	-61	-43	-32	-80	-66
Selenium	MLE	<0.001	0.001	0.011	B	AB	A	A	A	baseline	ns	77	66	65	60	105	183	166	164
Silver	MLE	<0.001	0.164	0.033	-	C	A	B	A	-	baseline	563	248	670	-	ns	-86	-93	-84
Sodium	MLE	0.064	<0.001	<0.001	AB	D	BC	CD	A	baseline	-40	ns	-38	ns	ns	-43	ns	-40	42
Strontium	MLE	<0.001	0.034	0.004	AB	A	BC	A	C	baseline	ns	ns	ns	-24	599	682	449	608	431
Tellurium	MLE	<0.001	0.208	0.061	<LRL	<LRL	A	A	A	<LRL	<LRL	baseline	ns	ns	<LRL	<LRL		40	
Thallium	MLE	<0.001	0.003	0.070	A	A	A	A	A	baseline	ns	ns	ns	ns			-95		
Tin	MLE	<0.001	<0.001	0.005	A	B	A	B	<LRL	baseline	-96	ns	-97	<LRL	ns	ns	-60	ns	<LRL
Titanium	MLE	<0.001	<0.001	<0.001	-	A	A	B	A	-	baseline	ns	-89	ns	-	-78	-80	-98	-59
Uranium	MLE	<0.001	<0.001	<0.001	A	B	B	C	AB	baseline	-47	-46	-78	ns	-70	-84	-84	-93	-79
Vanadium	MLE	<0.001	<0.001	<0.001	A	AB	B	C	A	baseline	ns	-48	-82	ns	-77	-84	-88	-96	-78
Zinc	MLE	<0.001	<0.001	0.067	A	A	A	A	A	baseline	ns	ns	ns	ns			-89		
Zirconium	MLE	<0.001	<0.001	<0.001	A	B	AB	C	A	baseline	-49	ns	-99	ns	-74	-87	-84	ns	-76

Area x Year or Area P-value < 0.05.

Contrast is significant (α = 0.05) and magnitude of difference is positive.

Contrast is significant (α = 0.05) and magnitude of difference is negative.

Notes: "-" = no data available, ww = wet weight, ANOVA = two way analysis of variance, MLE = censored regression using maximum likelihood estimation, MOD = Magnitude of Difference, nt = not tested because all data were reported below the laboratory reporting limit (<LRL) or because there were only data for a single time period, ns = not significant, baseline= first year of data included in analysis, <LRL = greater than 50% LRL data for both stations so the time period was omitted from the analysis,Merged cells across years indicate that the Area × Time term was not significant, therefore MOD is for all years combined. Only years with samples from both reference and exposed were included in the analysis. Data were analysed in units of mg/kg dry weight.

[a] Years that share a letter (e.g., A,B,C) had ratios of concentrations (HAC-R1:EDC-U) that do not differ significantly among years. Letters are assigned such that A is assigned to the year with the highest ratio of concentrations (HAC-R1:EDC-U).

[b] Magnitude of difference (MOD) calculated on backtransformed least-squares means for the observed time period as $(Exp_{observed} - Exp_{predicted})/(Exp_{predicted}) \times 100\%$ where $Exp_{predicted} = Ref_{observed} + (Exp_{baseline} - Ref_{baseline})$.

[c] Magnitude of difference (MOD) calculated on backtransformed least-squares means as (Exp-Ref)/Ref x 100%.

Table F.4.2: Statistical Comparisons of Periphyton Tissue Metal Concentrations for Upper Hazeltine Creek (HAC-R1; Exposed) in Post-Breach Years (2017 to 2022) Relative to Pre-Breach Conditions (2010; W7)

Parameter	Data Transformation	Year	Magnitude of Difference in Relative to Pre-Breach Period (%)[a]					
			Post-Breach Period					
			2017	2018	2019	2020	2021	2022
Aluminum	MLE	<0.001	-69	-87	-93	-93	-97	-89
Antimony	MLE	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Arsenic	MLE	<0.001	ns	-66	-72	-75	-81	-70
Barium	MLE	<0.001	ns	ns	ns	ns	ns	ns
Beryllium	MLE	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Bismuth	MLE	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Boron	MLE	-	-	-	-	-	-	-
Cadmium	MLE	<0.001	ns	ns	ns	-46	-64	-45
Calcium	MLE	<0.001	1,207	1,383	1,678	1,694	1,687	1,725
Cesium	MLE	-	-	-	-	-	-	-
Chromium	MLE	<0.001	-70	-93	-96	-95	-95	-83
Cobalt	MLE	<0.001	ns	-72	-83	-82	-86	-78
Copper	MLE	<0.001	ns	ns	ns	ns	-54	ns
Iron	MLE	<0.001	ns	-84	-92	-88	-97	-84
Lead	MLE	<0.001	-63	-79	-93	-94	-96	-90
Lithium	MLE	<0.001	ns	-75	<LRL	-91	-93	-87
Magnesium	MLE	<0.001	ns	-50	-49	-50	-54	-46
Manganese	MLE	<0.001	-84	-82	-76	-80	-83	-78
Mercury	MLE	<0.001	ns	ns	-69	-82	-89	-76
Molybdenum	MLE	0.007	ns	ns	ns	ns	ns	ns
Nickel	MLE	<0.001	ns	-85	-88	-83	-88	-78
Phosphorus	MLE	<0.001	-55	-72	-64	-65	-73	-61
Potassium	MLE	<0.001	-52	-46	ns	ns	-50	ns
Rubidium	MLE	-	-	-	-	-	-	-
Selenium	MLE	<0.001	-72	-78	-74	-67	-68	-59
Silver	MLE	-	-	-	-	-	-	-
Sodium	MLE	<0.001	ns	ns	ns	ns	-52	-29
Strontium	MLE	<0.001	261	363	326	301	291	283
Tellurium	MLE	-	-	-	-	-	-	-
Thallium	MLE	<0.001	-85	-92	<LRL	-94	-96	-94
Tin	MLE	<0.001	-91	<LRL	<LRL	-92	<LRL	<LRL
Titanium	MLE	<0.001	-	-	-88	-85	-98	-81
Uranium	MLE	<0.001	-65	-69	-87	-87	-93	-80
Vanadium	MLE	<0.001	ns	-78	-88	-84	-95	-79
Zinc	MLE	<0.001	-66	-83	-88	-84	-91	-69
Zirconium	MLE	-	-	-	-	-	-	-

Year P-value < 0.05.

Contrast is significant (α = 0.05) and magnitude of difference is positive.

Contrast is significant (α = 0.05) and magnitude of difference is negative.

Notes: "-" = no data available, nt = not tested because all data were reported below the laboratory reporting limit (<LRL) or because there were only data for a single time period, ns = not significant, LRL = greater than 50% LRL data for both stations so the time period was omitted from the analysis, dw = dry weight, ANOVA = two way analysis of variance, MLE = censored regression using maximum likelihood estimation, MOD = Magnitude of Difference. Data were analysed in units of mg/kg dry weight.

[a] Magnitude of difference (MOD) calculated on backtransformed least-squares means as (Post-breach-Pre-breach)/Pre-breach x 100%.

Table F.4.3: **Statistical Comparisons of Exposed - Reference Relative Differences of Periphyton Tissue Metal Concentrations for Upper Hazeltine Creek (HAC-U; Exposed) and Upper Edney Creek (EDC-U; Reference), 2018 to 2022**

Parameter	Data Transformation	Two-way ANOVA P-values			(Exposed – Reference) Contrasts Among Periodsa					Magnitude of Difference in (Exposed – Reference) Relative to Baseline Period (%)b					Magnitude of Difference for HAC-U Mean Relative to EDC-U (%)c				
		Area	Year	Area × Year	Post-Breach Period					Post-Breach Period					Post-Breach Period				
					2018	2019	2020	2021	2022	2018	2019	2020	2021	2022	2018	2019	2020	2021	2022
Aluminum	MLE	<0.001	0.090	0.041	A	A	AB	B	A	baseline	ns	ns	-55	ns	-75	-77	-82	-89	-70
Antimony	MLE	0.307	0.017	0.044	B	C	A	A	AB	baseline	-64	68	76	ns	-32	ns	ns	ns	ns
Arsenic	MLE	<0.001	0.003	<0.001	A	A	C	AB	BC	baseline	ns	-66	ns	-48	-70	-71	-90	-82	-84
Barium	MLE	<0.001	0.004	<0.001	A	A	B	A	A	baseline	ns	-69	ns	ns	-35	-34	-80	-42	-55
Beryllium	MLE	<0.001	0.206	0.042	A	AB	BC	C	ABC	baseline	ns	-48	-51	ns	-75	-77	-87	-88	-80
Bismuth	MLE	<0.001	0.289	0.116	A	A	A	A	A	baseline	ns	ns	ns	ns	-89				
Boron	MLE	<0.001	0.431	<0.001	C	B	A	A	A	baseline	589	1,863	1,968	1,449	ns	640	2,007	2,120	1,563
Cadmium	MLE	<0.001	0.002	<0.001	AB	A	C	B	C	baseline	ns	-57	ns	-60	-68	-56	-86	-77	-87
Calcium	MLE	<0.001	0.008	<0.001	BC	A	BC	AB	C	baseline	30	ns	ns	ns	2,075	2,732	1,986	2,363	1,771
Cesium	MLE	<0.001	0.092	0.034	B	AB	A	B	B	baseline	ns	107	ns	ns	-61	-48	ns	-66	-56
Chromium	MLE	<0.001	<0.001	0.209	A	A	A	A	A	baseline	ns	ns	ns	ns	-94				
Cobalt	MLE	<0.001	0.007	<0.001	AB	A	C	BC	BC	baseline	ns	-55	ns	ns	-88	-86	-95	-93	-93
Copper	MLE	<0.001	0.102	0.449	A	A	A	A	A	baseline	ns	ns	ns	ns	98				
Iron	MLE	<0.001	0.134	0.005	A	A	AB	B	A	baseline	ns	ns	-65	ns	-83	-84	-91	-94	-85
Lead	MLE	<0.001	0.052	<0.001	AB	A	BC	C	AB	baseline	ns	ns	-64	ns	-77	-73	-86	-92	-77
Lithium	MLE	<0.001	0.055	0.125	A	A	A	A	A	baseline	ns	ns	ns	ns	-80				
Magnesium	MLE	<0.001	0.678	0.333	A	A	A	A	A	baseline	ns	ns	ns	ns	-29				
Manganese	MLE	<0.001	<0.001	0.002	B	A	B	A	B	baseline	101	ns	76	ns	-79	-58	-84	-63	-79
Mercury	MLE	<0.001	0.002	0.325	A	A	A	A	A	baseline	ns	ns	ns	ns	-83				
Molybdenum	MLE	<0.001	<0.001	0.148	A	A	A	A	A	baseline	ns	ns	ns	ns	-43				
Nickel	MLE	<0.001	0.018	0.003	AB	A	C	BC	BC	baseline	ns	-44	ns	ns	-90	-88	-95	-94	-94
Phosphorus	MLE	<0.001	<0.001	0.037	AB	B	AB	A	A	baseline	ns	ns	ns	ns	-62	-70	-58	-41	-53
Potassium	MLE	0.020	<0.001	<0.001	D	C	A	A	B	baseline	61	337	403	144	-46	ns	138	174	33
Rubidium	MLE	<0.001	<0.001	<0.001	D	C	A	AB	B	baseline	45	265	189	143	-73	-61	ns	-23	-35
Selenium	MLE	<0.001	<0.001	0.006	C	BC	AB	AB	A	baseline	ns	74	88	98	124	173	290	320	345
Silver	MLE	<0.001	0.281	0.907	-	A	A	A	A	-	baseline	ns	ns	ns	-	-83			
Sodium	MLE	0.605	<0.001	0.014	A	B	AB	A	A	baseline	-37	ns	ns	ns	ns	-31	ns	ns	50
Strontium	MLE	<0.001	0.227	<0.001	A	A	B	A	B	baseline	ns	-23	ns	-28	598	728	436	681	402
Tellurium	MLE	<0.001	0.194	0.448	<LRL	<LRL	A	A	<LRL	<LRL	<LRL	baseline	ns	<LRL	<LRL	<LRL	92		<LRL
Thallium	MLE	<0.001	0.073	0.393	A	A	A	A	A	baseline	ns	ns	ns	ns	-92				
Tin	MLE	<0.001	<0.001	0.014	B	C	A	C	<LRL	baseline	-62	461	-66	<LRL	ns	ns	-44	ns	<LRL
Titanium	MLE	<0.001	0.117	<0.001	-	A	A	B	A	-	baseline	ns	-71	ns	-	-64	-74	-90	-52
Uranium	MLE	<0.001	0.086	0.223	A	A	A	A	A	baseline	ns	ns	ns	ns	-78				
Vanadium	MLE	<0.001	0.127	0.003	A	A	AB	B	A	baseline	ns	ns	-57	ns	-75	-74	-85	-89	-75
Zinc	MLE	<0.001	<0.001	<0.001	A	A	B	B	B	baseline	ns	-59	-56	-62	-75	-82	-90	-89	-90
Zirconium	MLE	<0.001	0.004	0.003	A	A	A	B	A	baseline	ns	ns	-66	ns	-75	-77	-81	-92	-79

Area x Year or Area P-value < 0.05.

Contrast is significant (α = 0.05) and magnitude of difference is positive.

Contrast is significant (α = 0.05) and magnitude of difference is negative.

Notes: "-" = no data available, ANOVA = two way analysis of variance, MLE = censored regression using maximum likelihood estimation, MOD = Magnitude of Difference, nt = not tested because all data were reported below the laboratory reporting limit (<LRL) or because there were only data for a single time period, ns = not significant, baseline= first year of data included in analysis, <LRL = greater than 50% LRL data for both stations so the time period was omitted from the analysis. Merged cells across years indicate that the Area × Time term was not significant, therefore MOD is for all years combined. Only years with samples from both reference and exposed were included in the analysis. Data were analysed in units of mg/kg dry weight.

[a] Years that share a letter (e.g., A,B,C) had ratios of concentrations (HAC-U:EDC-U) that do not differ significantly among years. Letters are assigned such that A is assigned to the year with the highest ratio of concentrations (HAC-U:EDC-U).

[b] Magnitude of difference (MOD) calculated on backtransformed least-squares means for the observed time period as $(Exp_{observed} - Exp_{predicted})/(Exp_{predicted})\times 100\%$ where $Exp_{predicted} = Ref_{observed} + (Exp_{baseline} - Ref_{baseline})$.

[c] Magnitude of difference (MOD) calculated on backtransformed least-squares means as (Exp-Ref)/Ref x 100%.

Table F.4.4: Statistical Comparisons of Periphyton Tissue Metal Concentrations for Upper Hazeltine Creek (HAC-U; Exposed) in Post-Breach Years (2018 to 2022) Relative to Pre-Breach Conditions (2010; W7)

Parameter	Data Transformation	Year	Magnitude of Difference in Relative to Pre-Breach Period (%)[a]				
			Post-Breach Period				
			2018	2019	2020	2021	2022
Aluminum	MLE	<0.001	-83	-87	-90	-93	-85
Antimony	MLE	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Arsenic	MLE	<0.001	-58	-66	-65	-69	-63
Barium	MLE	0.050	ns	ns	ns	ns	ns
Beryllium	MLE	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Bismuth	MLE	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Boron	MLE	-	-	-	-	-	-
Cadmium	MLE	<0.001	ns	ns	ns	-42	-40
Calcium	MLE	<0.001	1,842	1,840	1,572	1,686	1,362
Cesium	MLE	-	-	-	-	-	-
Chromium	MLE	<0.001	-91	-90	-92	-86	-88
Cobalt	MLE	<0.001	-75	-74	-78	-84	-76
Copper	MLE	0.372	ns	ns	ns	ns	ns
Iron	MLE	<0.001	-79	-83	-85	-92	-83
Lead	MLE	<0.001	-80	-82	-90	-89	-85
Lithium	MLE	<0.001	-78	<LRL	-88	-91	-86
Magnesium	MLE	<0.001	-38	-33	-39	-43	-38
Manganese	MLE	<0.001	-78	-58	-58	-60	-52
Mercury	MLE	<0.001	ns	-52	-69	-73	-64
Molybdenum	MLE	<0.001	-45	ns	ns	ns	ns
Nickel	MLE	<0.001	-83	-82	-83	-86	-82
Phosphorus	MLE	<0.001	-70	-66	-57	-55	ns
Potassium	MLE	<0.001	-68	ns	51	51	40
Rubidium	MLE	-	-	-	-	-	-
Selenium	MLE	<0.001	-70	-66	-55	-50	ns
Silver	MLE	-	-	-	-	-	-
Sodium	MLE	0.013	ns	ns	ns	ns	ns
Strontium	MLE	<0.001	363	351	291	331	262
Tellurium	MLE	-	-	-	-	-	-
Thallium	MLE	<0.001	-89	<LRL	-90	-91	-90
Tin	MLE	<0.001	<LRL	<LRL	-90	<LRL	<LRL
Titanium	MLE	<0.001	-	-80	-81	-92	-77
Uranium	MLE	<0.001	-76	-80	-81	-83	-78
Vanadium	MLE	<0.001	-75	-80	-80	-88	-76
Zinc	MLE	<0.001	-73	-81	-82	-87	-76
Zirconium	MLE	-	-	-	-	-	-

Year P-value < 0.05.

Contrast is significant (α = 0.05) and magnitude of difference is positive.

Contrast is significant (α = 0.05) and magnitude of difference is negative.

Notes: "-" = no data available, ANOVA = two way analysis of variance, MLE = censored regression using maximum likelihood estimation, MOD = Magnitude of Difference, nt = not tested because all data were reported below the laboratory reporting limit (<LRL) or because there were only data for a single time period, ns = not significant, LRL = greater than 50% LRL data for both stations so the time period was omitted from the analysis. Data were analysed in units of mg/kg dry weight.

[a] Magnitude of difference (MOD) calculated on backtransformed least-squares means as (Post-breach-Pre-breach)/Pre-breach x 100%.

Table F.4.5: **Statistical Comparisons of Exposed - Reference Relative Differences of Caddisfly Tissue Metal Concentrations for Upper Hazeltine Creek (HAC-R1; Exposed) and Upper Edney Creek (EDC-U; Reference), 2018 to 2022**

Parameter	Data Transformation	Two-way ANOVA P-values			(Exposed – Reference) Contrasts Among Periods[a]					Magnitude of Difference in (Exposed – Reference) Relative to Baseline Period (%)[b]					Magnitude of Difference for HAC-R1 Mean Relative to EDC-U (%)[c]				
		Area	Year	Area × Year	Post-Breach Period					Post-Breach Period					Post-Breach Period				
					2018	2019	2020	2021	2022	2018	2019	2020	2021	2022	2018	2019	2020	2021	2022
Aluminum	MLE	0.615	<0.001	<0.001	A	A	B	B	B	baseline	ns	-87	-93	-87	389	231	ns	-65	ns
Antimony	MLE	0.003	<0.001	<0.001	A	AB	C	C	B	baseline	ns	-81	-84	-61	312	209	ns	ns	63
Arsenic	MLE	0.708	<0.001	<0.001	AB	A	BC	C	C	baseline	ns	ns	-69	-66	ns	105	ns	-50	-44
Barium	MLE	0.017	<0.001	<0.001	AB	A	CD	D	BC	baseline	ns	-81	-87	ns	ns	158	-83	-89	ns
Beryllium	MLE	0.074	0.162	<0.001	A	A	B	B	<LRL	baseline	ns	-85	-87	<LRL	300	306	ns	ns	<LRL
Bismuth	MLE	0.001	0.184	0.436	A	A	<LRL	<LRL	<LRL	baseline	ns	<LRL	<LRL	<LRL	65		<LRL	<LRL	<LRL
Boron	MLE	0.615	<0.001	<0.001	B	A	C	C	<LRL	baseline	343	-90	-80	<LRL	108	822	-78	-58	<LRL
Cadmium	MLE	0.002	<0.001	<0.001	B	A	C	C	BC	baseline	320	-81	-79	ns	ns	165	-88	-87	-65
Calcium	MLE	0.024	<0.001	<0.001	A	A	B	B	B	baseline	ns	-87	-81	-80	365	372	ns	ns	ns
Cesium	MLE	0.025	<0.001	<0.001	A	A	B	B	B	baseline	ns	-91	-93	-87	784	552	ns	ns	ns
Chromium	MLE	0.017	<0.001	0.001	A	A	B	B	B	baseline	ns	-80	-81	-80	ns	ns	-73	-74	-72
Cobalt	MLE	0.006	<0.001	<0.001	A	A	B	B	B	baseline	ns	-80	-89	-72	ns	124	-79	-89	-70
Copper	MLE	<0.001	<0.001	<0.001	A	A	BC	B	C	baseline	ns	-73	-68	-83	491	598	60	88	ns
Iron	MLE	0.825	<0.001	<0.001	A	A	B	B	B	baseline	ns	-85	-89	-79	206	141	ns	-67	ns
Lead	MLE	0.628	<0.001	<0.001	A	A	B	B	B	baseline	ns	-88	-93	-82	329	266	ns	-69	ns
Lithium	MLE	<0.001	<0.001	0.022	A	AB	B	<LRL	<LRL	baseline	ns	-74	<LRL	<LRL	395	191	ns	<LRL	<LRL
Magnesium	MLE	0.085	<0.001	<0.001	A	AB	C	BC	BC	baseline	ns	-63	-47	-44	38	ns	-48	-27	ns
Manganese	MLE	0.044	<0.001	<0.001	B	A	C	C	B	baseline	571	-77	-76	ns	ns	418	-82	-82	ns
Mercury	MLE	<0.001	<0.001	<0.001	BC	A	A	AB	C	baseline	115	108	ns	ns	ns	160	151	77	ns
Molybdenum	MLE	<0.001	<0.001	<0.001	A	B	A	A	B	baseline	-87	ns	ns	-88	516	ns	363	248	ns
Nickel	MLE	0.013	<0.001	<0.001	AB	A	C	C	BC	baseline	ns	-85	-84	ns	ns	ns	-84	-83	-58
Phosphorus	MLE	<0.001	<0.001	0.014	A	A	B	A	A	baseline	ns	-22	ns	ns	-14	ns	-33	ns	ns
Potassium	MLE	<0.001	<0.001	<0.001	B	A	C	BC	B	baseline	55	-43	ns	ns	-21	ns	-55	-41	-20
Rubidium	MLE	<0.001	<0.001	<0.001	A	A	C	B	B	baseline	ns	-79	-61	-56	ns	ns	-81	-65	-60
Selenium	MLE	<0.001	<0.001	<0.001	C	C	BC	A	AB	baseline	ns	ns	94	74	442	581	610	952	842
Silver	MLE	<0.001	<0.001	<0.001	-	A	B	B	C	-	baseline	-78	-77	-99	-	ns	-85	-84	ns
Sodium	MLE	0.012	<0.001	<0.001	AB	A	C	B	AB	baseline	ns	-47	ns	ns	ns	ns	-45	-22	ns
Strontium	MLE	0.470	<0.001	<0.001	A	A	C	BC	B	baseline	ns	-87	-77	-71	193	234	-63	ns	ns
Tellurium	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Thallium	MLE	<0.001	0.184	<0.001	A	A	B	B	<LRL	baseline	ns	-84	-84	<LRL	ns	ns	-86	-86	<LRL
Tin	MLE	0.006	0.003	0.480	A	A	<LRL	<LRL	<LRL	baseline	ns	<LRL	<LRL	<LRL	90		<LRL	<LRL	<LRL
Titanium	MLE	0.623	<0.001	0.021	-	A	B	B	B	-	baseline	-82	-88	-79	-	366	ns	ns	ns
Uranium	MLE	0.125	<0.001	<0.001	AB	A	D	CD	BC	baseline	ns	-90	-88	ns	ns	ns	-83	-80	ns
Vanadium	MLE	0.561	<0.001	<0.001	A	A	B	B	B	baseline	ns	-90	-91	-87	406	252	ns	ns	ns
Zinc	MLE	<0.001	<0.001	<0.001	B	A	C	B	A	baseline	82	-46	ns	78	-55	ns	-76	-48	ns
Zirconium	MLE	0.432	0.048	<0.001	A	A	B	B	<LRL	baseline	ns	-87	-86	<LRL	104	185	-73	-71	<LRL

Area x Year or Area P-value < 0.05.

Contrast is significant (α = 0.05) and magnitude of difference is positive.

Contrast is significant (α = 0.05) and magnitude of difference is negative.

Notes: "-" = no data available, ANOVA = two way analysis of variance, MLE = censored regression using maximum likelihood estimation, MOD = Magnitude of Difference, nt = not tested because all data were reported below the laboratory reporting limit (<LRL) or because there were only data for a single time period, ns = not significant, baseline= first year of data included in analysis, <LRL = greater than 50% LRL data for both stations so the time period was omitted from the analysis. Merged cells across years indicate that the Area × Time term was not significant, therefore MOD is for all years combined. Only years with samples from both reference and exposed were included in the analysis. Data were analysed in units of mg/kg dry weight.

[a] Years that share a letter (e.g., A,B,C) had ratios of concentrations (HAC-R1:EDC-U) that do not differ significantly among years. Letters are assigned such that A is assigned to the year with the highest ratio of concentrations (HAC-R1:EDC-U).

[b] Magnitude of difference (MOD) calculated on backtransformed least-squares means for the observed time period as $(Exp_{observed} - Exp_{predicted})/(Exp_{predicted}) \times 100\%$ where $Exp_{predicted} = Ref_{observed} + (Exp_{baseline} - Ref_{baseline})$.

[c] Magnitude of difference (MOD) calculated on backtransformed least-squares means as (Exp-Ref)/Ref x 100%.

Table F.4.6: **Statistical Comparisons of Exposed - Reference Relative Differences of Composite-Taxa Benthic Invertebrate Tissue Metal Concentrations for Upper Hazeltine Creek (HAC-R1; Exposed) and Upper Edney Creek (EDC-U; Reference), 2018 to 2022**

Parameter	Data Transformation	Two-way ANOVA P-values			(Exposed – Reference) Contrasts Among Periods[a]					Magnitude of Difference in (Exposed – Reference) Relative to Baseline Period (%)[b]					Magnitude of Difference for HAC-R1 Mean Relative to EDC-U (%)[c]				
		Area	Year	Area × Year	Post-Breach Period					Post-Breach Period					Post-Breach Period				
					2018	2019	2020	2021	2022	2018	2019	2020	2021	2022	2018	2019	2020	2021	2022
Aluminum	MLE	0.002	<0.001	0.025	B	B	B	B	A	baseline	ns	ns	ns	154	ns	ns	ns	ns	265
Antimony	MLE	<0.001	<0.001	0.021	B	B	AB	B	A	baseline	ns	ns	ns	110	ns	41	101	73	188
Arsenic	MLE	0.110	<0.001	<0.001	A	B	B	B	A	baseline	-54	-54	-43	ns	80	ns	ns	ns	99
Barium	MLE	0.073	<0.001	<0.001	BC	AB	C	C	A	baseline	ns	ns	ns	199	ns	154	-49	ns	276
Beryllium	MLE	<0.001	<0.001	0.019	B	B	B	B	A	baseline	ns	ns	ns	126	ns	ns	ns	ns	279
Bismuth	MLE	0.128	0.026	0.425	<LRL	A	<LRL	A	<LRL	<LRL	baseline	<LRL	ns	<LRL	<LRL	ns	<LRL	ns	<LRL
Boron	MLE	0.037	<0.001	<0.001	C	B	C	B	A	baseline	132	ns	155	760	ns	ns	ns	73	484
Cadmium	MLE	<0.001	<0.001	0.015	A	A	B	AB	A	baseline	ns	-64	ns	ns	-54	-64	-84	-71	-53
Calcium	MLE	<0.001	<0.001	<0.001	A	BC	C	BC	B	baseline	-94	-97	-95	-90	4,536	166	ns	137	379
Cesium	MLE	<0.001	<0.001	0.291	A	A	A	A	A	baseline	ns	ns	ns	ns	137				
Chromium	MLE	0.230	<0.001	0.390	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns
Cobalt	MLE	0.011	<0.001	0.105	A	A	A	A	A	baseline	ns	ns	ns	ns	-27				
Copper	MLE	<0.001	0.045	0.002	A	BC	C	AB	BC	baseline	-49	-60	ns	-49	887	399	298	671	398
Iron	MLE	0.063	<0.001	0.022	B	B	B	AB	A	baseline	ns	ns	ns	146	ns	ns	ns	ns	161
Lead	MLE	0.012	<0.001	0.063	A	A	A	A	A	baseline	ns	ns	ns	ns	38				
Lithium	MLE	<0.001	<0.001	0.089	A	A	A	A	A	baseline	ns	ns	ns	ns	95				
Magnesium	MLE	0.061	<0.001	0.003	AB	BC	C	AB	A	baseline	ns	-35	ns	ns	ns	ns	-21	ns	48
Manganese	MLE	0.996	<0.001	<0.001	B	A	B	A	A	baseline	332	ns	141	168	-47	129	-55	ns	ns
Mercury	MLE	0.175	0.035	<0.001	D	BC	A	AB	CD	baseline	55	206	120	ns	-32	ns	109	50	ns
Molybdenum	MLE	<0.001	0.001	<0.001	B	B	A	AB	C	baseline	ns	181	ns	-51	130	229	546	271	ns
Nickel	MLE	0.387	<0.001	<0.001	AB	BC	C	BC	A	baseline	ns	-57	ns	ns	ns	ns	-54	ns	88
Phosphorus	MLE	0.103	<0.001	<0.001	C	BC	AB	A	AB	baseline	ns	40	71	45	-32	-16	ns	ns	ns
Potassium	MLE	0.049	<0.001	<0.001	C	AB	B	AB	A	baseline	92	52	104	136	-51	ns	-25	ns	ns
Rubidium	MLE	<0.001	<0.001	<0.001	A	A	C	BC	AB	baseline	ns	-52	-39	ns	-35	-32	-69	-61	-42
Selenium	MLE	<0.001	<0.001	<0.001	D	CD	AB	A	BC	baseline	ns	123	190	71	193	260	555	749	403
Silver	MLE	<0.001	0.709	0.005	-	B	AB	A	B	-	baseline	ns	213	ns	-	-83	-73	-46	-83
Sodium	MLE	0.091	<0.001	<0.001	ABC	C	BC	AB	A	baseline	ns	ns	ns	ns	ns	-45	ns	ns	ns
Strontium	MLE	<0.001	<0.001	<0.001	A	BC	C	BC	B	baseline	-87	-92	-86	-79	1,454	109	ns	113	222
Tellurium	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Thallium	MLE	<0.001	<0.001	<0.001	A	B	B	B	A	baseline	-66	-67	-52	ns	ns	-76	-77	-67	ns
Tin	MLE	0.940	<0.001	<0.001	<LRL	C	B	A	<LRL	<LRL	baseline	320	4,648	<LRL	<LRL	-61	ns	ns	<LRL
Titanium	MLE	<0.001	<0.001	0.165	-	A	A	A	A	-	baseline	ns	ns	ns	-	130			
Uranium	MLE	0.078	<0.001	0.001	B	B	B	B	A	baseline	ns	ns	ns	132	ns	-39	-53	ns	87
Vanadium	MLE	<0.001	<0.001	0.011	B	B	B	B	A	baseline	ns	ns	ns	140	63	ns	ns	74	291
Zinc	MLE	<0.001	<0.001	<0.001	C	A	B	A	A	baseline	112	33	176	133	-72	-41	-63	-24	-36
Zirconium	MLE	0.128	<0.001	<0.001	C	BC	B	B	A	baseline	ns	136	272	792	-72	-44	ns	ns	150

Area x Year or Area P-value < 0.05.

Contrast is significant (α = 0.05) and magnitude of difference is positive.

Contrast is significant (α = 0.05) and magnitude of difference is negative.

Notes: "-" = no data available, ANOVA = two way analysis of variance, MLE = censored regression using maximum likelihood estimation, MOD = Magnitude of Difference, nt = not tested because all data were reported below the laboratory reporting limit (<LRL) or because there were only data for a single time period, ns = not significant, baseline= first year of data included in analysis, <LRL = greater than 50% LRL data for both stations so the time period was omitted from the analysis. Merged cells across years indicate that the Area × Time term was not significant, therefore MOD is for all years combined. Only years with samples from both reference and exposed were included in the analysis. Data were analysed in units of mg/kg dry weight.

[a] Years that share a letter (e.g., A,B,C) had ratios of concentrations (HAC-R1:EDC-U) that do not differ significantly among years. Letters are assigned such that A is assigned to the year with the highest ratio of concentrations (HAC-R1:EDC-U). <LRL = all of the concentrations were reported as <LRL for at least one area so the time period was omitted from the analysis.

[b] Magnitude of difference (MOD) calculated on backtransformed least-squares means for the observed time period as $(Exp_{observed} - Exp_{predicted})/(Exp_{predicted}) \times 100\%$ where $Exp_{predicted} = Ref_{observed} + (Exp_{baseline} - Ref_{baseline})$.

[c] Magnitude of difference (MOD) calculated on backtransformed least-squares means as (Exp-Ref)/Ref x 100%.

Table F.4.7: Statistical Comparisons of Composite-Taxa Benthic Invertebrate Tissue Metal Concentrations for Upper Hazeltine Creek (HAC-R1; Exposed) in Post-Breach Years (2018 to 2022) Relative to Pre-Breach Conditions (2010; W7)

Parameter	Data Transformation	Year	Magnitude of Difference in Relative to Pre-Breach Period (%)[a]				
			Post-Breach Period				
			2018	2019	2020	2021	2022
Aluminum	MLE	0.101	ns	ns	ns	ns	ns
Antimony	MLE	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Arsenic	MLE	<0.001	ns	ns	ns	ns	ns
Barium	MLE	0.091	ns	ns	ns	ns	ns
Beryllium	MLE	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Bismuth	MLE	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Boron	MLE	-	-	-	-	-	-
Cadmium	MLE	<0.001	180	152	ns	248	ns
Calcium	MLE	<0.001	3,227	ns	ns	ns	ns
Cesium	MLE	-	-	-	-	-	-
Chromium	MLE	<0.001	-76	-85	-87	-71	-86
Cobalt	MLE	0.005	ns	ns	ns	ns	ns
Copper	MLE	<0.001	336	168	ns	282	134
Iron	MLE	-	-	-	-	-	-
Lead	MLE	0.109	ns	ns	ns	ns	ns
Lithium	MLE	0.016	ns	ns	ns	146	ns
Magnesium	MLE	0.125	ns	ns	ns	ns	ns
Manganese	MLE	<0.001	-69	ns	-57	ns	-55
Mercury	MLE	<0.001	ns	105	164	85	ns
Molybdenum	MLE	<0.001	ns	ns	ns	ns	ns
Nickel	MLE	<0.001	-64	-72	-80	ns	-72
Phosphorus	MLE	-	-	-	-	-	-
Potassium	MLE	-	-	-	-	-	-
Rubidium	MLE	-	-	-	-	-	-
Selenium	MLE	<0.001	-78	-68	-49	-36	-55
Silver	MLE	-	-	-	-	-	-
Sodium	MLE	-	-	-	-	-	-
Strontium	MLE	<0.001	925	ns	ns	ns	ns
Tellurium	MLE	-	-	-	-	-	-
Thallium	MLE	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Tin	MLE	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Titanium	MLE	-	-	-	-	-	-
Uranium	MLE	0.010	ns	ns	-60	ns	ns
Vanadium	MLE	0.008	ns	ns	ns	146	ns
Zinc	MLE	<0.001	-76	-58	-49	-34	-48
Zirconium	MLE	-	-	-	-	-	-

Year P-value < 0.05.

Contrast is significant (α = 0.05) and magnitude of difference is positive.

Contrast is significant (α = 0.05) and magnitude of difference is negative.

Notes: "-" = no data available, nt = not tested because all data were reported below the laboratory reporting limit (<LRL) or because there were only data for a single time period, ns = not significant, LRL = greater than 50% LRL data for both stations so the time period was omitted from the analysis, dw = dry weight, ANOVA = two way analysis of variance, MLE = censored regression using maximum likelihood estimation, MOD = Magnitude of Difference. Data were analysed in units of mg/kg dry weight.

[a] Magnitude of difference (MOD) calculated on backtransformed least-squares means as (Post-breach-Pre-breach)/Pre-breach x 100%.

Table F.4.8: Statistical Comparisons of Exposed - Reference Relative Differences of Caddisfly Tissue Metal Concentrations for Upper Hazeltine Creek (HAC-U; Exposed) and Upper Edney Creek (EDC-U; Reference), 2018 to 2022

Parameter	Data Transformation	Two-way ANOVA P-values			(Exposed – Reference) Contrasts Among Periodsa					Magnitude of Difference in (Exposed – Reference) Relative to Baseline Period (%)[b]					Magnitude of Difference for HAC-U Mean Relative to EDC-U (%)[c]				
		Area	Year	Area × Year	Post-Breach Period					Post-Breach Period					Post-Breach Period				
					2018	2019	2020	2021	2022	2018	2019	2020	2021	2022	2018	2019	2020	2021	2022
Aluminum	MLE	0.288	<0.001	<0.001	A	A	B	B	A	baseline	ns	-93	-89	ns	ns	153	-86	-77	ns
Antimony	MLE	0.475	<0.001	<0.001	AB	A	C	D	B	baseline	ns	-67	-82	ns	83	165	-40	-67	52
Arsenic	MLE	0.294	<0.001	<0.001	AB	A	CD	D	BC	baseline	ns	-59	-72	ns	ns	89	-44	-62	ns
Barium	MLE	<0.001	<0.001	<0.001	B	A	C	C	AB	baseline	414	-86	-73	ns	-60	104	-94	-89	ns
Beryllium	MLE	0.232	0.015	<0.001	A	A	C	B	<LRL	baseline	ns	-99	-82	<LRL	ns	200	ns	-72	<LRL
Bismuth	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Boron	MLE	0.221	0.010	<0.001	B	A	D	C	<LRL	baseline	409	-93	-59	<LRL	ns	472	-92	-54	<LRL
Cadmium	MLE	<0.001	<0.001	<0.001	BC	A	D	C	B	baseline	510	-94	ns	ns	-53	189	-97	-80	ns
Calcium	MLE	0.028	<0.001	<0.001	A	A	D	C	B	baseline	ns	-95	-83	-66	400	450	-75	ns	72
Cesium	MLE	0.267	<0.001	<0.001	AB	A	C	C	B	baseline	ns	-93	-88	ns	237	488	-75	-61	95
Chromium	MLE	<0.001	<0.001	<0.001	AB	A	C	C	B	baseline	ns	-90	-88	ns	ns	ns	-92	-90	-55
Cobalt	MLE	<0.001	<0.001	<0.001	B	A	C	C	B	baseline	269	-85	-79	ns	-65	ns	-95	-93	-55
Copper	MLE	<0.001	<0.001	<0.001	B	A	D	CD	C	baseline	64	-71	-66	-60	229	440	ns	ns	30
Iron	MLE	0.023	<0.001	<0.001	A	A	B	B	A	baseline	ns	-89	-87	ns	ns	92	-86	-84	ns
Lead	MLE	0.216	<0.001	<0.001	AB	A	C	C	B	baseline	ns	-91	-90	ns	92	223	-83	-80	ns
Lithium	MLE	0.018	0.038	0.347	A	A	<LRL	<LRL	<LRL	baseline	ns	<LRL	<LRL	<LRL	94		<LRL	<LRL	<LRL
Magnesium	MLE	<0.001	<0.001	<0.001	AB	A	C	BC	A	baseline	ns	-39	ns	ns	-23	ns	-53	-44	ns
Manganese	MLE	0.013	<0.001	<0.001	C	A	D	C	B	baseline	904	-86	ns	120	-49	410	-93	-76	ns
Mercury	MLE	0.005	<0.001	<0.001	C	A	AB	BC	C	baseline	178	104	ns	ns	ns	129	68	ns	ns
Molybdenum	MLE	<0.001	<0.001	<0.001	B	C	A	B	C	baseline	-69	177	ns	-52	146	ns	581	199	ns
Nickel	MLE	<0.001	<0.001	<0.001	B	A	D	C	AB	baseline	166	-95	-84	ns	-48	ns	-97	-92	ns
Phosphorus	MLE	<0.001	<0.001	0.003	AB	A	B	AB	A	baseline	ns	ns	ns	ns	-22	ns	-33	-20	ns
Potassium	MLE	<0.001	<0.001	<0.001	B	A	C	C	B	baseline	84	-37	-25	ns	-32	26	-57	-49	-18
Rubidium	MLE	<0.001	0.001	<0.001	A	A	C	B	B	baseline	ns	-85	-61	-45	ns	ns	-87	-65	-52
Selenium	MLE	<0.001	<0.001	<0.001	D	C	B	B	A	baseline	93	179	246	464	234	544	830	1,053	1,781
Silver	MLE	<0.001	<0.001	<0.001	-	A	B	B	B	-	baseline	-91	-90	-88	-	-39	-94	-94	-92
Sodium	MLE	<0.001	<0.001	<0.001	B	A	C	C	B	baseline	43	-37	-30	ns	-20	ns	-49	-44	ns
Strontium	MLE	0.891	<0.001	<0.001	AB	A	D	C	B	baseline	ns	-91	-68	ns	96	220	-82	-38	58
Tellurium	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Thallium	MLE	<0.001	0.058	<0.001	B	A	C	C	<LRL	baseline	78	-82	-86	<LRL	-40	ns	-89	-92	<LRL
Tin	MLE	0.636	0.001	0.154	A	A	<LRL	<LRL	<LRL	baseline	ns	<LRL	<LRL	<LRL	ns	ns	<LRL	<LRL	<LRL
Titanium	MLE	0.304	<0.001	<0.001	-	A	B	B	A	-	baseline	-95	-94	ns	-	244	-81	-81	ns
Uranium	MLE	0.004	<0.001	<0.001	B	A	D	C	A	baseline	174	-93	-76	250	ns	ns	-96	-85	120
Vanadium	MLE	0.258	<0.001	<0.001	A	A	B	B	A	baseline	ns	-93	-86	ns	ns	159	-87	-73	ns
Zinc	MLE	<0.001	<0.001	<0.001	C	AB	D	B	A	baseline	106	-41	49	117	-63	-23	-78	-44	ns
Zirconium	MLE	<0.001	0.006	<0.001	B	A	C	D	<LRL	baseline	136	-88	-98	<LRL	ns	111	-89	ns	<LRL

Area x Year or Area P-value < 0.05.

Contrast is significant (α = 0.05) and magnitude of difference is positive.

Contrast is significant (α = 0.05) and magnitude of difference is negative.

Notes: "-" = no data available, ANOVA = two way analysis of variance, MLE = censored regression using maximum likelihood estimation, MOD = Magnitude of Difference, nt = not tested because all data were reported below the laboratory reporting limit (<LRL) or because there were only data for a single time period, ns = not significant, baseline= first year of data included in analysis, <LRL = greater than 50% LRL data for both stations so the time period was omitted from the analysis. Merged cells across years indicate that the Area × Time term was not significant, therefore MOD is for all years combined. Only years with samples from both reference and exposed were included in the analysis. Data were analysed in units of mg/kg dry weight.

[a] Years that share a letter (e.g., A,B,C) had ratios of concentrations (HAC-U:EDC-U) that do not differ significantly among years. Letters are assigned such that A is assigned to the year with the highest ratio of concentrations (HAC-U:EDC-U).

[b] Magnitude of difference (MOD) calculated on backtransformed least-squares means for the observed time period as $(Exp_{observed} - Exp_{predicted})/(Exp_{predicted}) \times 100\%$ where $Exp_{predicted} = Ref_{observed} + (Exp_{baseline} - Ref_{baseline})$.

[c] Magnitude of difference (MOD) calculated on backtransformed least-squares means as (Exp-Ref)/Ref x 100%.

Table F.4.9: Statistical Comparisons of Exposed - Reference Relative Differences of Composite-Taxa Benthic Invertebrate Tissue Metal Concentrations for Upper Hazeltine Creek (HAC-U; Exposed) and Upper Edney Creek (EDC-U; Reference), 2018 to 2022

Parameter	Data Transformation	Two-way ANOVA P-values			(Exposed – Reference) Contrasts Among Periods[a]					Magnitude of Difference in (Exposed – Reference) Relative to Baseline Period (%)[b]					Magnitude of Difference for HAC-U Mean Relative to EDC-U (%)[c]				
		Area	Year	Area × Year	Post-Breach Period					Post-Breach Period					Post-Breach Period				
					2018	2019	2020	2021	2022	2018	2019	2020	2021	2022	2018	2019	2020	2021	2022
Aluminum	MLE	0.892	<0.001	0.050	AB	A	B	A	A	baseline	ns	ns	ns	ns	ns	ns	-54	ns	ns
Antimony	MLE	0.100	<0.001	0.007	BC	AB	C	BC	A	baseline	ns	ns	ns	76	ns	34	ns	ns	76
Arsenic	MLE	0.305	<0.001	<0.001	B	B	C	BC	A	baseline	ns	-57	ns	134	ns	ns	-44	ns	202
Barium	MLE	0.758	<0.001	<0.001	B	A	C	B	A	baseline	307	-59	ns	514	-38	152	-75	ns	280
Beryllium	MLE	0.515	<0.001	0.007	A	A	B	A	A	baseline	ns	-64	ns	ns	ns	ns	-57	ns	ns
Bismuth	MLE	0.072	0.721	0.392	<LRL	A	<LRL	A	<LRL	<LRL	baseline	<LRL	ns	<LRL	<LRL	ns	<LRL	ns	<LRL
Boron	MLE	0.746	<0.001	<0.001	C	BC	D	B	A	baseline	ns	-62	117	333	ns	ns	-71	65	231
Cadmium	MLE	<0.001	<0.001	<0.001	A	AB	C	BC	A	baseline	ns	-72	-56	ns	-58	-69	-88	-82	-47
Calcium	MLE	<0.001	<0.001	<0.001	C	B	D	C	A	baseline	142	-73	ns	546	136	471	-36	184	1,426
Cesium	MLE	0.003	<0.001	0.008	A	A	B	AB	A	baseline	ns	-60	ns	ns	81	202	ns	ns	134
Chromium	MLE	<0.001	<0.001	0.033	A	A	B	A	A	baseline	ns	-54	ns	ns	-39	ns	-72	-38	-41
Cobalt	MLE	<0.001	<0.001	<0.001	A	A	B	A	A	baseline	ns	-63	ns	ns	-51	ns	-82	-59	-38
Copper	MLE	<0.001	<0.001	<0.001	B	B	C	B	A	baseline	ns	-51	ns	351	269	479	79	371	1,564
Iron	MLE	0.240	<0.001	0.018	A	A	B	A	A	baseline	ns	-56	ns	ns	ns	ns	-62	ns	ns
Lead	MLE	0.602	<0.001	0.046	A	A	B	A	A	baseline	ns	-49	ns	ns	ns	ns	-50	ns	ns
Lithium	MLE	0.202	<0.001	0.097	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns
Magnesium	MLE	0.796	0.006	<0.001	C	B	C	B	A	baseline	55	ns	37	195	-28	ns	-45	ns	111
Manganese	MLE	0.966	<0.001	<0.001	C	A	D	BC	B	baseline	355	-49	ns	127	-36	190	-67	ns	ns
Mercury	MLE	0.353	0.070	<0.001	B	A	A	A	A	baseline	79	134	148	102	-42	ns	36	44	ns
Molybdenum	MLE	<0.001	0.103	<0.001	B	AB	A	B	C	baseline	ns	224	ns	-68	134	310	657	219	ns
Nickel	MLE	<0.001	<0.001	<0.001	B	AB	C	B	A	baseline	ns	-64	ns	151	-47	ns	-81	-42	ns
Phosphorus	MLE	0.075	<0.001	<0.001	B	C	C	BC	A	baseline	-15	-18	ns	18	ns	-15	-18	-14	18
Potassium	MLE	<0.001	<0.001	<0.001	A	A	B	B	A	baseline	ns	-40	-33	ns	ns	ns	-43	-36	-19
Rubidium	MLE	<0.001	0.041	<0.001	AB	B	C	C	A	baseline	ns	-71	-64	ns	ns	-38	-76	-71	ns
Selenium	MLE	<0.001	<0.001	<0.001	B	B	A	A	A	baseline	ns	117	99	116	219	207	592	534	587
Silver	MLE	<0.001	<0.001	<0.001	-	B	C	B	A	-	baseline	-61	ns	216	-	-78	-91	-70	ns
Sodium	MLE	<0.001	<0.001	0.001	AB	C	BC	BC	A	baseline	-30	ns	ns	ns	-28	-50	-44	-33	ns
Strontium	MLE	<0.001	0.001	<0.001	C	B	D	C	A	baseline	106	-73	ns	293	95	302	-48	102	666
Tellurium	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Thallium	MLE	<0.001	<0.001	<0.001	B	B	C	BC	A	baseline	ns	-60	ns	239	-66	-67	-86	-78	ns
Tin	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Titanium	MLE	0.380	<0.001	0.086	-	A	A	A	A	-	baseline	ns	ns	ns	-	ns	ns	ns	ns
Uranium	MLE	<0.001	<0.001	<0.001	B	B	C	B	A	baseline	ns	-57	ns	331	-64	ns	-85	-54	ns
Vanadium	MLE	0.591	<0.001	0.006	A	A	B	A	A	baseline	ns	-62	ns	ns	ns	ns	-56	ns	ns
Zinc	MLE	<0.001	<0.001	<0.001	A	A	B	A	A	baseline	ns	-30	ns	ns	-51	-41	-66	-40	-49
Zirconium	MLE	<0.001	<0.001	0.053	A	A	A	A	A	baseline	ns	ns	ns	ns	-47				

Area x Year or Area P-value < 0.05.

Contrast is significant (α = 0.05) and magnitude of difference is positive.

Contrast is significant (α = 0.05) and magnitude of difference is negative.

Notes: "-" = no data available, ANOVA = two way analysis of variance, MLE = censored regression using maximum likelihood estimation, MOD = Magnitude of Difference, nt = not tested because all data were reported below the laboratory reporting limit (<LRL) or because there were only data for a single time period, ns = not significant, baseline= first year of data included in analysis, <LRL = greater than 50% LRL data for both stations so the time period was omitted from the analysis. Merged cells across years indicate that the Area × Time term was not significant, therefore MOD is for all years combined. Only years with samples from both reference and exposed were included in the analysis. Data were analysed in units of mg/kg dry weight.

[a] Years that share a letter (e.g., A,B,C) had ratios of concentrations (HAC-U:EDC-U) that do not differ significantly among years. Letters are assigned such that A is assigned to the year with the highest ratio of concentrations (HAC-U:EDC-U).

[b] Magnitude of difference (MOD) calculated on backtransformed least-squares means for the observed time period as $(Exp_{observed} - Exp_{predicted})/(Exp_{predicted}) \times 100\%$ where $Exp_{predicted} = Ref_{observed} + (Exp_{baseline} - Ref_{baseline})$.

[c] Magnitude of difference (MOD) calculated on backtransformed least-squares means as (Exp-Ref)/Ref x 100%.

Table F.4.10: Statistical Comparisons of Composite-Taxa Benthic Invertebrate Tissue Metal Concentrations for Upper Hazeltine Creek (HAC-U; Exposed) in Post-Breach Years (2015 to 2022) Relative to Pre-Breach Conditions (2010; W7)

Parameter	Data Transformation	Year	Magnitude of Difference in Relative to Pre-Breach Period (%)[a]					
			Post-Breach Period					
			2015	2018	2019	2020	2021	2022
Aluminum	MLE	<0.001	315	ns	ns	ns	ns	ns
Antimony	MLE	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Arsenic	MLE	<0.001	ns	ns	ns	-61	ns	ns
Barium	MLE	<0.001	ns	-56	ns	-77	ns	ns
Beryllium	MLE	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Bismuth	MLE	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Boron	MLE	-	-	-	-	-	-	-
Cadmium	MLE	<0.001	ns	157	ns	ns	ns	ns
Calcium	MLE	<0.001	ns	ns	515	ns	191	631
Cesium	MLE	-	-	-	-	-	-	-
Chromium	MLE	<0.001	-65	-86	-82	-95	-74	-93
Cobalt	MLE	<0.001	ns	ns	ns	-74	ns	ns
Copper	MLE	<0.001	253	ns	211	ns	134	680
Iron	MLE	-	-	-	-	-	-	-
Lead	MLE	<0.001	225	ns	ns	-63	ns	-54
Lithium	MLE	<0.001	276	ns	148	<LRL	ns	ns
Magnesium	MLE	<0.001	78	-35	ns	ns	ns	ns
Manganese	MLE	<0.001	-71	-63	ns	-69	ns	-55
Mercury	MLE	<0.001	-	ns	101	72	78	81
Molybdenum	MLE	<0.001	-64	ns	ns	85	ns	-41
Nickel	MLE	<0.001	ns	-82	-71	-92	-62	-80
Phosphorus	MLE	-	-	-	-	-	-	-
Potassium	MLE	-	-	-	-	-	-	-
Rubidium	MLE	-	-	-	-	-	-	-
Selenium	MLE	<0.001	-55	-76	-73	-46	-52	-39
Silver	MLE	-	-	-	-	-	-	-
Sodium	MLE	-	-	-	-	-	-	-
Strontium	MLE	<0.001	179	ns	220	ns	ns	225
Tellurium	MLE	-	-	-	-	-	-	-
Thallium	MLE	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Tin	MLE	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Titanium	MLE	-	-	-	-	-	-	-
Uranium	MLE	<0.001	ns	-69	ns	-87	ns	ns
Vanadium	MLE	<0.001	351	ns	ns	ns	ns	ns
Zinc	MLE	<0.001	-58	-58	-58	-52	-48	-59
Zirconium	MLE	-	-	-	-	-	-	-

Year P-value < 0.05.

Contrast is significant (α = 0.05) and magnitude of difference is positive.

Contrast is significant (α = 0.05) and magnitude of difference is negative.

Notes: "-" = no data available, ANOVA = two way analysis of variance, MLE = censored regression using maximum likelihood estimation, MOD = Magnitude of Difference, nt = not tested because all data were reported below the laboratory reporting limit (<LRL) or because there were only data for a single time period, ns = not significant, LRL = greater than 50% LRL data for both stations so the time period was omitted from the analysis. Data were analysed in units of mg/kg dry weight.

[a] Magnitude of difference (MOD) calculated on backtransformed least-squares means as (Post-breach-Pre-breach)/Pre-breach x 100%.

Table F.4.11: **Statistical Comparisons of Exposed - Reference Relative Differences of Trophic Transfer Factors for Caddisfly Tissue Metal Concentrations for Upper Hazeltine Creek (HAC-R1; Exposed) and Upper Edney Creek (EDC-U; Reference), 2018 to 2022**

Parameter	Data Transformation	Two-way ANOVA P-values			(Exposed – Reference) Contrasts Among Periods[a]					Magnitude of Difference in (Exposed – Reference) Relative to Baseline Period (%)[b]					Magnitude of Difference for HAC-R1 Mean Relative to EDC-U (%)[c]				
					Post-Breach Period					Post-Breach Period					Post-Breach Period				
		Area	Year	Area × Year	2018	2019	2020	2021	2022	2018	2019	2020	2021	2022	2018	2019	2020	2021	2022
Aluminum	log_{10}	<0.001	<0.001	0.030	A	A	AB	AB	B	baseline	ns	ns	ns	-88	2,375	2,808	430	532	ns
Antimony	log_{10}	0.037	<0.001	<0.001	A	-	B	B	B	baseline	-	-87	-88	-71	468	-	ns	ns	ns
Arsenic	log_{10}	<0.001	<0.001	0.311	A	A	A	A	A	baseline	ns	ns	ns	ns	557				
Barium	log_{10}	0.409	<0.001	0.001	AB	A	B	C	AB	baseline	ns	ns	-86	ns	ns	368	ns	-80	ns
Beryllium	log_{10}	<0.001	0.246	0.994	A	A	A	A	-	baseline	ns	ns	ns	-	1,151				-
Bismuth	log_{10}	nt	nt	nt	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron	log_{10}	<0.001	0.427	<0.001	A	A	B	B	-	baseline	ns	-98	-93	-	ns	ns	-99	-96	-
Cadmium	log_{10}	<0.001	<0.001	0.017	ABC	A	BC	C	AB	baseline	ns	ns	ns	ns	ns	614	ns	ns	398
Calcium	log_{10}	<0.001	<0.001	<0.001	A	A	B	B	B	baseline	ns	-91	-87	-86	-72	-82	-97	-96	-96
Cesium	log_{10}	<0.001	<0.001	<0.001	A	A	B	AB	B	baseline	ns	-91	ns	-91	1,688	1,569	ns	446	ns
Chromium	log_{10}	<0.001	<0.001	0.023	AB	A	BC	AB	C	baseline	ns	ns	ns	-83	1,801	3,867	505	1,952	ns
Cobalt	log_{10}	<0.001	<0.001	0.002	AB	A	BC	C	BC	baseline	ns	ns	-77	ns	675	2,296	384	ns	341
Copper	log_{10}	<0.001	<0.001	<0.001	A	A	BC	AB	C	baseline	ns	-60	ns	-82	229	434	ns	140	ns
Iron	log_{10}	<0.001	<0.001	0.058	A	A	A	A	A	baseline	ns	ns	ns	ns	1,167				
Lead	log_{10}	<0.001	0.035	0.043	AB	A	B	AB	B	baseline	ns	ns	ns	ns	1,718	2,879	550	1,869	347
Lithium	log_{10}	<0.001	0.022	0.307	A	-	A	A	-	baseline	-	ns	ns	-	1,617	-	1,617		-
Magnesium	log_{10}	<0.001	0.004	0.002	A	AB	C	BC	BC	baseline	ns	-69	-46	-60	176	86	ns	ns	ns
Manganese	log_{10}	<0.001	<0.001	<0.001	B	A	BC	C	B	baseline	374	ns	-75	ns	366	2,107	135	ns	451
Mercury	log_{10}	<0.001	0.003	0.010	C	ABC	A	AB	BC	baseline	ns	320	192	ns	510	1,261	2,461	1,679	1,040
Molybdenum	log_{10}	<0.001	<0.001	<0.001	A	B	A	A	B	baseline	-86	ns	ns	-72	403	ns	780	746	ns
Nickel	log_{10}	<0.001	<0.001	0.031	AB	A	C	BC	ABC	baseline	ns	-77	ns	ns	1,200	1,907	199	321	440
Phosphorus	log_{10}	<0.001	<0.001	0.249	A	A	A	A	A	baseline	ns	ns	ns	ns	159				
Potassium	log_{10}	<0.001	<0.001	<0.001	A	A	B	A	A	baseline	ns	-70	ns	ns	ns	ns	-74	-35	ns
Rubidium	log_{10}	0.044	<0.001	<0.001	A	AB	C	AB	B	baseline	ns	-88	ns	-49	128	110	-72	73	ns
Selenium	log_{10}	<0.001	0.065	0.609	A	A	A	A	A	baseline	ns	ns	ns	ns	223				
Silver	log_{10}	0.002	0.825	0.090	-	-	A	A	-	-	-	baseline	ns	-	-	-	131		-
Sodium	log_{10}	0.825	0.003	<0.001	BC	A	CD	AB	D	baseline	85	ns	ns	-46	ns	100	-33	ns	-41
Strontium	log_{10}	<0.001	<0.001	<0.001	A	A	C	BC	B	baseline	ns	-84	-78	-62	-58	-57	-93	-91	-84
Tellurium	log_{10}	nt	nt	nt	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	log_{10}	<0.001	0.001	0.191	A	-	A	A	-	baseline	-	ns	ns	-	736	-	736		-
Tin	log_{10}	0.282	0.213	0.579	A	-	A	-	-	baseline	-	ns	-	-	ns	-	ns	-	-
Titanium	log_{10}	<0.001	<0.001	0.037	-	A	AB	A	B	-	baseline	ns	ns	-89	-	2,004	317	2,196	ns
Uranium	log_{10}	<0.001	<0.001	0.004	AB	A	C	BC	AB	baseline	ns	-81	ns	ns	477	1,237	ns	204	352
Vanadium	log_{10}	<0.001	<0.001	0.019	A	A	B	AB	B	baseline	ns	-81	ns	-87	2,107	2,154	320	966	193
Zinc	log_{10}	<0.001	<0.001	0.002	B	A	B	A	A	baseline	150	ns	128	124	189	623	164	559	546
Zirconium	log_{10}	<0.001	0.652	0.013	A	A	B	-	-	baseline	ns	-70	-	-	687	1,133	132	-	-

Area x Year or Area P-value < 0.05.

Contrast is significant (α = 0.05) and magnitude of difference is positive.

Contrast is significant (α = 0.05) and magnitude of difference is negative.

Notes: ANOVA = two way analysis of variance, MLE = censored regression using maximum likelihood estimation, MOD = Magnitude of Difference, "-" = no data available or sample reported below the laboratory reporting limit (<LRL) so TTF ratio was not calculated, nt = not tested because all data were <LRL or because there were only data for a single time period, ns = not significant, baseline= first year of data included in analysis, <LRL = greater than 50% LRL data for both stations so the time period was omitted from the analysis. Merged cells across years indicate that the Area × Time term was not significant, therefore MOD is for all years combined. Only years with samples from both reference and exposed were included in the analysis.

[a] Years that share a letter (e.g., A,B,C) had ratios of concentrations (HAC-R1:EDC-U) that do not differ significantly among years. Letters are assigned such that A is assigned to the year with the highest ratio of concentrations (HAC-R1:EDC-U).

[b] Magnitude of difference (MOD) calculated on backtransformed least-squares means for the observed time period as $(Exp_{observed} - Exp_{predicted})/(Exp_{predicted}) \times 100\%$ where $Exp_{predicted} = Ref_{observed} + (Exp_{baseline} - Ref_{baseline})$.

[c] Magnitude of difference (MOD) calculated on backtransformed least-squares means as (Exp-Ref)/Ref x 100%.

Table F.4.12: **Statistical Comparisons of Exposed - Reference Relative Differences of Trophic Transfer Factors for Composite-Taxa Benthic Invertebrate Tissue Metal Concentrations for Upper Hazeltine Creek (HAC-R1; Exposed) and Upper Edney Creek (EDC-U; Reference), 2018 to 2022**

Parameter	Data Transformation	Two-way ANOVA P-values			(Exposed – Reference) Contrasts Among Periods[a]					Magnitude of Difference in (Exposed – Reference) Relative to Baseline Period (%)[b]					Magnitude of Difference for HAC-R1 Mean Relative to EDC-U (%)[c]				
		Area	Year	Area × Year	Post-Breach Period					Post-Breach Period					Post-Breach Period				
					2018	2019	2020	2021	2022	2018	2019	2020	2021	2022	2018	2019	2020	2021	2022
Aluminum	log_{10}	<0.001	<0.001	0.345	A	A	A	A	A	baseline	ns	ns	ns	ns			1,176		
Antimony	log_{10}	<0.001	<0.001	0.176	A	-	A	A	A	baseline	-	ns	ns	ns	122	-		122	
Arsenic	log_{10}	<0.001	<0.001	0.001	B	C	AB	AB	A	baseline	-53	ns	ns	117	632	241	1,036	861	1,490
Barium	log_{10}	<0.001	<0.001	0.019	B	AB	B	B	A	baseline	ns	ns	ns	504	ns	360	228	ns	1,152
Beryllium	log_{10}	<0.001	<0.001	0.022	C	BC	ABC	A	AB	baseline	ns	ns	317	261	476	512	1,468	2,303	1,980
Bismuth	log_{10}	nt	nt	nt	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron	log_{10}	<0.001	0.161	0.007	A	AB	C	BC	ABC	baseline	ns	-76	-55	ns	-80	-87	-95	-91	-94
Cadmium	log_{10}	<0.001	<0.001	0.043	B	B	AB	AB	A	baseline	ns	ns	ns	184	ns	ns	ns	117	313
Calcium	log_{10}	<0.001	<0.001	<0.001	A	BC	C	BC	B	baseline	-96	-98	-97	-93	179	-90	-93	-90	-80
Cesium	log_{10}	<0.001	<0.001	0.011	BC	BC	C	A	AB	baseline	ns	ns	321	ns	408	511	265	2,041	989
Chromium	log_{10}	<0.001	<0.001	0.198	A	A	A	A	A	baseline	ns	ns	ns	ns			2,069		
Cobalt	log_{10}	<0.001	<0.001	0.155	A	A	A	A	A	baseline	ns	ns	ns	ns			876		
Copper	log_{10}	<0.001	0.025	0.019	AB	B	B	A	B	baseline	ns	ns	ns	ns	448	282	229	885	203
Iron	log_{10}	<0.001	<0.001	0.004	B	B	B	A	B	baseline	ns	ns	610	ns	710	1,186	1,290	5,652	1,832
Lead	log_{10}	<0.001	<0.001	0.002	C	BC	BC	A	AB	baseline	ns	ns	724	214	436	796	1,376	4,322	1,584
Lithium	log_{10}	<0.001	0.001	0.094	A	-	A	A	A	baseline	-	ns	ns	ns	1,000	-		1,000	
Magnesium	log_{10}	<0.001	0.011	0.104	A	A	A	A	A	baseline	ns	ns	ns	ns			98		
Manganese	log_{10}	<0.001	<0.001	0.012	C	AB	BC	AB	A	baseline	205	ns	151	364	220	878	499	705	1,386
Mercury	log_{10}	<0.001	0.005	<0.001	D	CD	A	AB	BC	baseline	ns	516	350	143	245	457	2,026	1,451	738
Molybdenum	log_{10}	<0.001	0.007	<0.001	B	B	A	A	B	baseline	ns	555	379	ns	88	203	1,128	798	126
Nickel	log_{10}	<0.001	<0.001	0.099	A	A	A	A	A	baseline	ns	ns	ns	ns			1,172		
Phosphorus	log_{10}	<0.001	<0.001	0.040	B	AB	AB	A	A	baseline	ns	ns	76	85	89	164	178	233	250
Potassium	log_{10}	0.001	<0.001	<0.001	B	B	B	A	A	baseline	ns	ns	109	185	-47	-41	-58	ns	51
Rhenium	log_{10}	nt	nt	nt	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rubidium	log_{10}	0.016	<0.001	<0.001	A	A	B	A	A	baseline	ns	-72	ns	ns	66	ns	-54	95	70
Selenium	log_{10}	<0.001	0.019	0.120	A	A	A	A	A	baseline	ns	ns	ns	ns			111		
Silver	log_{10}	<0.001	0.290	<0.001	-	-	B	A	B	-	-	baseline	296	ns	-	-	100	694	ns
Sodium	log_{10}	0.821	<0.001	0.056	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns
Strontium	log_{10}	<0.001	<0.001	<0.001	A	C	C	BC	B	baseline	-88	-90	-86	-73	122	-73	-78	-70	ns
Tellurium	log_{10}	nt	nt	nt	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	log_{10}	<0.001	<0.001	0.221	A	-	A	A	A	baseline	-	ns	ns	ns	857	-		857	
Tin	log_{10}	nt	nt	nt	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Titanium	log_{10}	<0.001	<0.001	<0.001	-	B	B	A	B	-	baseline	ns	749	ns	-	825	836	7,760	838
Uranium	log_{10}	<0.001	<0.001	0.003	C	BC	C	A	AB	baseline	ns	ns	270	227	173	294	198	911	792
Vanadium	log_{10}	<0.001	<0.001	0.003	B	B	B	A	AB	baseline	ns	ns	486	ns	610	733	991	4,060	1,702
Zinc	log_{10}	<0.001	<0.001	<0.001	C	B	B	A	B	baseline	195	124	438	192	79	428	301	863	423
Zirconium	log_{10}	<0.001	<0.001	0.002	C	BC	AB	-	A	baseline	ns	247	-	640	ns	ns	391	-	949

Area x Year or Area P-value < 0.05.

Contrast is significant (α = 0.05) and magnitude of difference is positive.

Contrast is significant (α = 0.05) and magnitude of difference is negative.

Notes: ANOVA = two way analysis of variance, MLE = censored regression using maximum likelihood estimation, MOD = Magnitude of Difference, "-" = no data available or sample reported below the laboratory reporting limit (<LRL) so TTF ratio was not calculated, nt = not tested because all data were <LRL or because there were only data for a single time period, ns = not significant, baseline= first year of data included in analysis, <LRL = greater than 50% LRL data for both stations so the time period was omitted from the analysis. Merged cells across years indicate that the Area × Time term was not significant, therefore MOD is for all years combined. Only years with samples from both reference and exposed were included in the analysis.

[a] Years that share a letter (e.g., A,B,C) had ratios of concentrations (HAC-R1:EDC-U) that do not differ significantly among years. Letters are assigned such that A is assigned to the year with the highest ratio of concentrations (HAC-R1:EDC-U).

[b] Magnitude of difference (MOD) calculated on backtransformed least-squares means for the observed time period as $(Exp_{observed} - Exp_{predicted})/(Exp_{predicted}) \times 100\%$ where $Exp_{predicted} = Ref_{observed} + (Exp_{baseline} - Ref_{baseline})$.

[c] Magnitude of difference (MOD) calculated on backtransformed least-squares means as (Exp-Ref)/Ref x 100%.

Table F.4.13: Statistical Comparisons of Trophic Transfer Factors for Composite-Taxa Benthic Invertebrate Tissue Metal Concentrations for Upper Hazeltine Creek (HAC-R1; Exposed) in Post-Breach Years (2018 to 2022) Relative to Pre-Breach Conditions (2010; W7)

Parameter	Data Transformation	One-way ANOVA Year P-values	Magnitude of Difference in Relative to Pre-Breach Period (%)[a]				
			Post-Breach Period				
			2018	2019	2020	2021	2022
Aluminum	log_{10}	<0.001	657	2,444	1,244	5,324	1,270
Antimony	log_{10}	-	-	-	-	-	-
Arsenic	log_{10}	<0.001	224	239	130	592	158
Barium	log_{10}	0.532	ns	ns	ns	ns	ns
Beryllium	log_{10}	-	-	-	-	-	-
Bismuth	log_{10}	-	-	-	-	-	-
Boron	log_{10}	-	-	-	-	-	-
Cadmium	log_{10}	<0.001	304	216	ns	936	ns
Calcium	log_{10}	<0.001	ns	-84	-92	-86	-87
Cesium	log_{10}	-	-	-	-	-	-
Chromium	log_{10}	0.002	ns	ns	ns	550	ns
Cobalt	log_{10}	<0.001	ns	649	286	1,092	307
Copper	log_{10}	<0.001	344	398	262	729	ns
Iron	log_{10}	-	-	-	-	-	-
Lead	log_{10}	<0.001	452	1,507	1,474	4,189	967
Lithium	log_{10}	<0.001	556	-	1,889	3,231	1,084
Magnesium	log_{10}	<0.001	123	120	100	200	ns
Manganese	log_{10}	<0.001	ns	218	ns	773	ns
Mercury	log_{10}	<0.001	211	288	1,386	943	410
Molybdenum	log_{10}	<0.001	ns	ns	ns	107	ns
Nickel	log_{10}	<0.001	ns	ns	ns	355	ns
Phosphorus	log_{10}	-	-	-	-	-	-
Potassium	log_{10}	-	-	-	-	-	-
Rubidium	log_{10}	-	-	-	-	-	-
Selenium	log_{10}	<0.001	ns	ns	56	103	ns
Silver	log_{10}	-	-	-	-	-	-
Sodium	log_{10}	-	-	-	-	-	-
Strontium	log_{10}	<0.001	ns	ns	-72	ns	ns
Tellurium	log_{10}	-	-	-	-	-	-
Thallium	log_{10}	-	-	-	-	-	-
Tin	log_{10}	-	-	-	-	-	-
Titanium	log_{10}	-	-	-	-	-	-
Uranium	log_{10}	<0.001	ns	297	205	1,293	204
Vanadium	log_{10}	<0.001	416	1,480	590	5,066	688
Zinc	log_{10}	<0.001	ns	255	221	622	ns
Zirconium	log_{10}	-	-	-	-	-	-

Area x Year or Area P-value < 0.05.

Contrast is significant (α = 0.05) and magnitude of difference is positive.

Contrast is significant (α = 0.05) and magnitude of difference is negative.

Notes: "-" = no data available or sample reported below the laboratory reporting limit (<LRL) so TTF ratio was not calculated, ANOVA = one way analysis of variance, MOD = Magnitude of Difference, nt = not tested because all data were <LRL or because there were only data for a single time period, ns = not significant.

[a] Magnitude of difference (MOD) calculated on backtransformed least-squares means as (Post-breach-Pre-breach)/Pre-breach x 100%.

Table F.4.14: Statistical Comparisons of Exposed - Reference Relative Differences of Trophic Transfer Factors for Caddisfly Tissue Metal Concentrations for Upper Hazeltine Creek (HAC-U; Exposed) and Upper Edney Creek (EDC-U; Reference), 2018 to 2022

Parameter	Data Transformation	Two-way ANOVA P-values			(Exposed – Reference) Contrasts Among Periods[a]					Magnitude of Difference in (Exposed – Reference) Relative to Baseline Period (%)[b]					Magnitude of Difference for HAC-U Mean Relative to EDC-U (%)[c]				
		Area	Year	Area × Year	Post-Breach Period					Post-Breach Period					Post-Breach Period				
					2018	2019	2020	2021	2022	2018	2019	2020	2021	2022	2018	2019	2020	2021	2022
Aluminum	log_{10}	<0.001	<0.001	<0.001	A	A	C	BC	AB	baseline	ns	-91	-76	ns	709	1,011	ns	ns	351
Antimony	log_{10}	0.395	<0.001	<0.001	A	-	B	C	A	baseline	-	-74	-89	ns	158	-	ns	-73	70
Arsenic	log_{10}	<0.001	<0.001	0.045	AB	A	A	B	A	baseline	ns	ns	ns	ns	361	556	456	112	419
Barium	log_{10}	0.077	<0.001	<0.001	B	A	BC	C	A	baseline	409	ns	-69	240	ns	210	-73	-81	ns
Beryllium	log_{10}	<0.001	0.015	0.188	A	A	-	A	-	baseline	ns	-	ns	-	377		-	377	-
Bismuth	log_{10}	nt	nt	nt	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron	log_{10}	<0.001	0.005	<0.001	A	A	C	B	BC	baseline	ns	-99	-89	-97	ns	ns	-99	-88	-97
Cadmium	log_{10}	0.001	<0.001	<0.001	B	A	C	BC	A	baseline	337	-79	ns	342	ns	552	-69	ns	560
Calcium	log_{10}	<0.001	<0.001	<0.001	A	A	D	C	B	baseline	ns	-95	-85	-60	-77	-81	-99	-97	-91
Cesium	log_{10}	<0.001	<0.001	<0.001	A	A	C	B	B	baseline	ns	-96	-88	-80	772	1,027	-69	ns	ns
Chromium	log_{10}	<0.001	<0.001	0.001	A	A	C	BC	AB	baseline	ns	-85	-76	ns	743	1,476	ns	ns	691
Cobalt	log_{10}	<0.001	<0.001	<0.001	B	A	C	C	AB	baseline	208	-67	-66	ns	197	814	ns	ns	522
Copper	log_{10}	0.724	<0.001	0.002	AB	A	B	B	B	baseline	ns	ns	ns	ns	ns	124	ns	ns	ns
Iron	log_{10}	<0.001	<0.001	0.007	AB	A	C	BC	AB	baseline	ns	-80	ns	ns	666	1,107	ns	174	548
Lead	log_{10}	<0.001	<0.001	<0.001	AB	A	C	BC	C	baseline	ns	-83	ns	-77	731	1,085	ns	186	ns
Lithium	log_{10}	<0.001	<0.001	0.024	AB	B	-	A	-	baseline	ns	-	ns	-	203	ns	-	723	-
Magnesium	log_{10}	0.951	0.003	0.061	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns
Manganese	log_{10}	<0.001	<0.001	<0.001	B	A	C	C	AB	baseline	399	-82	-73	ns	144	1,119	-56	ns	438
Mercury	log_{10}	<0.001	0.180	0.009	B	A	A	A	AB	baseline	297	191	130	ns	235	1,228	876	671	621
Molybdenum	log_{10}	<0.001	<0.001	<0.001	B	C	A	B	B	baseline	-78	178	ns	ns	360	ns	1,179	407	161
Nickel	log_{10}	<0.001	<0.001	<0.001	AB	A	BC	C	A	baseline	ns	ns	-76	ns	440	1,085	ns	ns	641
Phosphorus	log_{10}	<0.001	<0.001	0.024	AB	A	B	B	AB	baseline	ns	ns	ns	ns	103	203	60	ns	97
Potassium	log_{10}	<0.001	<0.001	<0.001	A	A	C	C	B	baseline	ns	-86	-85	-51	ns	ns	-82	-81	-38
Rubidium	log_{10}	0.065	<0.001	<0.001	A	A	C	B	B	baseline	ns	-96	-86	-77	229	212	-87	-55	ns
Selenium	log_{10}	<0.001	<0.001	0.003	C	BC	BC	AB	A	baseline	ns	ns	84	184	49	136	139	174	323
Silver	log_{10}	0.174	0.118	0.175	-	A	A	A	A	-	baseline	ns	ns	ns	-	ns	ns	ns	ns
Sodium	log_{10}	<0.001	0.008	<0.001	B	A	B	B	B	baseline	129	ns	ns	ns	ns	67	-46	-48	-41
Strontium	log_{10}	<0.001	<0.001	<0.001	A	A	C	B	A	baseline	ns	-88	-72	ns	-72	-61	-97	-92	-68
Tellurium	log_{10}	nt	nt	nt	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	log_{10}	<0.001	0.007	0.062	A	A	A	A	A	baseline	ns	ns	ns	ns			321		
Tin	log_{10}	nt	nt	nt	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Titanium	log_{10}	<0.001	<0.001	0.006	-	A	C	BC	AB	-	baseline	-92	-80	ns	-	845	ns	ns	302
Uranium	log_{10}	<0.001	<0.001	<0.001	B	AB	D	C	A	baseline	ns	-93	-66	253	172	627	-82	ns	861
Vanadium	log_{10}	<0.001	<0.001	<0.001	AB	A	C	BC	AB	baseline	ns	-89	ns	ns	645	899	ns	146	432
Zinc	log_{10}	<0.001	<0.001	<0.001	C	B	C	AB	A	baseline	167	ns	238	472	ns	291	113	395	737
Zirconium	log_{10}	<0.001	0.193	0.002	A	A	B	-	-	baseline	ns	-71	-	-	214	527	ns	-	-

Area x Year or Area P-value < 0.05.

Contrast is significant (α = 0.05) and magnitude of difference is positive.

Contrast is significant (α = 0.05) and magnitude of difference is negative.

Notes: "-" = no data available or sample reported below the laboratory reporting limit (<LRL) so TTF ratio was not calculated, ANOVA = two way analysis of variance, MLE = censored regression using maximum likelihood estimation, MOD = Magnitude of Difference, nt = not tested because all data were <LRL or because there were only data for a single time period, ns = not significant, baseline= first year of data included in analysis, <LRL = greater than 50% LRL data for both stations so the time period was omitted from the analysis. Merged cells across years indicate that the Area × Time term was not significant, therefore MOD is for all years combined. Only years with samples from both reference and exposed were included in the analysis.

[a] Years that share a letter (e.g., A,B,C) had ratios of concentrations (HAC-U:EDC-U) that do not differ significantly among years. Letters are assigned such that A is assigned to the year with the highest ratio of concentrations (HAC-U:EDC-U).

[b] Magnitude of difference (MOD) calculated on backtransformed least-squares means for the observed time period as $(Exp_{observed} - Exp_{predicted})/(Exp_{predicted})\times 100\%$ where $Exp_{predicted} = Ref_{observed} + (Exp_{baseline} - Ref_{baseline})$.

[c] Magnitude of difference (MOD) calculated on backtransformed least-squares means as (Exp-Ref)/Ref x 100%.

Table F.4.15: **Statistical Comparisons of Exposed - Reference Relative Differences of Trophic Transfer Factors for Composite-Taxa Benthic Invertebrate Tissue Metal Concentrations for Upper Hazeltine Creek (HAC-U; Exposed) and Upper Edney Creek (EDC-U; Reference), 2018 to 2022**

Parameter	Data Transformation	Two-way ANOVA P-values			(Exposed – Reference) Contrasts Among Periods[a]					Magnitude of Difference in (Exposed – Reference) Relative to Baseline Period (%)[b]					Magnitude of Difference for HAC-U Mean Relative to EDC-U (%)[c]				
		Area	Year	Area × Year	Post-Breach Period					Post-Breach Period					Post-Breach Period				
					2018	2019	2020	2021	2022	2018	2019	2020	2021	2022	2018	2019	2020	2021	2022
Aluminum	log_{10}	<0.001	<0.001	0.186	A	A	A	A	A	baseline	ns	ns	ns	ns			376		
Antimony	log_{10}	0.020	<0.001	0.001	AB	-	C	BC	A	baseline	-	-46	ns	ns	ns	-	ns	ns	128
Arsenic	log_{10}	<0.001	<0.001	<0.001	B	B	B	B	A	baseline	ns	ns	ns	350	333	267	454	348	1,849
Barium	log_{10}	<0.001	<0.001	<0.001	C	AB	C	BC	A	baseline	303	ns	ns	780	ns	283	ns	ns	736
Beryllium	log_{10}	<0.001	<0.001	0.129	A	A	A	A	A	baseline	ns	ns	ns	ns			542		
Bismuth	log_{10}	nt	nt	nt	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron	log_{10}	<0.001	<0.001	<0.001	A	B	D	C	BCD	baseline	-75	-98	-90	-93	ns	-82	-98	-93	-95
Cadmium	log_{10}	0.193	<0.001	0.001	B	B	B	B	A	baseline	ns	ns	ns	222	ns	ns	ns	ns	325
Calcium	log_{10}	<0.001	<0.001	<0.001	B	B	C	B	A	baseline	ns	-72	ns	651	-89	-80	-97	-88	ns
Cesium	log_{10}	<0.001	<0.001	0.003	A	A	B	A	A	baseline	ns	-81	ns	ns	367	479	ns	339	431
Chromium	log_{10}	<0.001	<0.001	0.127	A	A	A	A	A	baseline	ns	ns	ns	ns			760		
Cobalt	log_{10}	<0.001	<0.001	0.215	A	A	A	A	A	baseline	ns	ns	ns	ns			407		
Copper	log_{10}	<0.001	0.001	0.001	B	B	B	B	A	baseline	ns	ns	ns	497	ns	141	ns	190	759
Iron	log_{10}	<0.001	<0.001	0.070	A	A	A	A	A	baseline	ns	ns	ns	ns			613		
Lead	log_{10}	<0.001	<0.001	0.053	A	A	A	A	A	baseline	ns	ns	ns	ns			424		
Lithium	log_{10}	<0.001	<0.001	0.019	B	B	AB	A	A	baseline	ns	ns	225	253	193	170	334	854	935
Magnesium	log_{10}	<0.001	0.002	<0.001	BC	B	C	B	A	baseline	ns	ns	ns	133	ns	39	ns	60	167
Manganese	log_{10}	<0.001	<0.001	0.007	B	A	B	B	A	baseline	126	ns	ns	128	206	592	106	204	597
Mercury	log_{10}	<0.001	0.171	0.001	B	A	A	A	A	baseline	156	235	321	255	136	504	691	895	739
Molybdenum	log_{10}	<0.001	0.182	<0.001	B	B	A	B	C	baseline	ns	225	ns	-62	338	438	1,321	441	ns
Nickel	log_{10}	<0.001	<0.001	<0.001	BC	BC	C	B	A	baseline	ns	ns	ns	275	446	561	249	803	1,948
Phosphorus	log_{10}	<0.001	<0.001	0.039	A	A	AB	B	A	baseline	ns	ns	-45	ns	161	182	97	45	151
Potassium	log_{10}	<0.001	<0.001	<0.001	A	B	D	D	C	baseline	-39	-86	-87	-65	76	ns	-76	-76	-39
Rubidium	log_{10}	0.259	<0.001	<0.001	A	B	C	C	B	baseline	-48	-92	-88	-54	205	60	-76	-62	ns
Selenium	log_{10}	<0.001	0.362	0.669	A	A	A	A	A	baseline	ns	ns	ns	ns			46		
Silver	log_{10}	0.271	0.006	0.003	-	BC	C	AB	A	-	baseline	ns	ns	879	-	ns	ns	ns	208
Sodium	log_{10}	<0.001	0.002	0.946	A	A	A	A	A	baseline	ns	ns	ns	ns			-36		
Strontium	log_{10}	<0.001	<0.001	<0.001	B	B	C	B	A	baseline	ns	-65	ns	448	-72	-51	-90	-74	ns
Tellurium	log_{10}	nt	nt	nt	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	log_{10}	<0.001	<0.001	<0.001	B	B	B	B	A	baseline	ns	ns	ns	327	241	146	168	167	1,355
Tin	log_{10}	nt	nt	nt	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Titanium	log_{10}	<0.001	<0.001	0.014	-	AB	B	A	B	-	baseline	ns	ns	ns	-	369	155	1,482	ns
Uranium	log_{10}	<0.001	<0.001	<0.001	BC	AB	C	B	A	baseline	ns	ns	ns	335	ns	192	ns	182	573
Vanadium	log_{10}	<0.001	<0.001	0.056	A	A	A	A	A	baseline	ns	ns	ns	ns			466		
Zinc	log_{10}	<0.001	<0.001	0.002	C	BC	ABC	A	AB	baseline	ns	ns	176	171	95	202	233	438	427
Zirconium	log_{10}	<0.001	<0.001	0.008	B	B	B	A	AB	baseline	ns	ns	191	ns	151	ns	92	630	243

Area x Year or Area P-value < 0.05.

Contrast is significant (α = 0.05) and magnitude of difference is positive.

Contrast is significant (α = 0.05) and magnitude of difference is negative.

Notes: "-" = no data available or sample reported below the laboratory reporting limit (<LRL) so TTF ratio was not calculated, ANOVA = two way analysis of variance, MLE = censored regression using maximum likelihood estimation, MOD = Magnitude of Difference, nt = not tested because all data were <LRL or because there were only data for a single time period, ns = not significant, baseline= first year of data included in analysis, <LRL = greater than 50% LRL data for both stations so the time period was omitted from the analysis. Merged cells across years indicate that the Area × Time term was not significant, therefore MOD is for all years combined. Only years with samples from both reference and exposed were included in the analysis.

[a] Years that share a letter (e.g., A,B,C) had ratios of concentrations (HAC-U:EDC-U) that do not differ significantly among years. Letters are assigned such that A is assigned to the year with the highest ratio of concentrations (HAC-U:EDC-U).

[b] Magnitude of difference (MOD) calculated on backtransformed least-squares means for the observed time period as $(Exp_{observed} - Exp_{predicted})/(Exp_{predicted}) \times 100\%$ where $Exp_{predicted} = Ref_{observed} + (Exp_{baseline} - Ref_{baseline})$.

[c] Magnitude of difference (MOD) calculated on backtransformed least-squares means as (Exp-Ref)/Ref x 100%.

Table F.4.16: Statistical Comparisons of Trophic Transfer Factors for Composite-Taxa Benthic Invertebrate Tissue Metal Concentrations for Upper Hazeltine Creek (HAC-U; Exposed) in Post-Breach Years (2018 to 2022) Relative to Pre-Breach Conditions (2010; W7)

Parameter	Data Transformation	One-way ANOVA Year P-values	Magnitude of Difference in Relative to Pre-Breach Period (%)[a]				
			Post-Breach Period				
			2018	2019	2020	2021	2022
Aluminum	log_{10}	<0.001	ns	1,410	ns	2,247	ns
Antimony	log_{10}	-	-	-	-	-	-
Arsenic	log_{10}	<0.001	ns	265	ns	223	216
Barium	log_{10}	<0.001	ns	ns	ns	ns	ns
Beryllium	log_{10}	-	-	-	-	-	-
Bismuth	log_{10}	-	-	-	-	-	-
Boron	log_{10}	-	-	-	-	-	-
Cadmium	log_{10}	<0.001	267	ns	ns	274	ns
Calcium	log_{10}	<0.001	-91	-68	-96	-84	ns
Cesium	log_{10}	-	-	-	-	-	-
Chromium	log_{10}	0.027	ns	ns	ns	ns	ns
Cobalt	log_{10}	<0.001	ns	286	ns	546	ns
Copper	log_{10}	<0.001	ns	ns	ns	ns	635
Iron	log_{10}	-	-	-	-	-	-
Lead	log_{10}	<0.001	338	663	275	1,134	ns
Lithium	log_{10}	<0.001	310	557	515	1,793	770
Magnesium	log_{10}	<0.001	ns	76	ns	91	119
Manganese	log_{10}	<0.001	ns	125	ns	230	ns
Mercury	log_{10}	<0.001	ns	321	453	569	410
Molybdenum	log_{10}	<0.001	ns	ns	ns	ns	ns
Nickel	log_{10}	<0.001	ns	ns	ns	178	ns
Phosphorus	log_{10}	-	-	-	-	-	-
Potassium	log_{10}	-	-	-	-	-	-
Rubidium	log_{10}	-	-	-	-	-	-
Selenium	log_{10}	0.350	ns	ns	ns	ns	ns
Silver	log_{10}	-	-	-	-	-	-
Sodium	log_{10}	-	-	-	-	-	-
Strontium	log_{10}	<0.001	-72	ns	-88	ns	ns
Tellurium	log_{10}	-	-	-	-	-	-
Thallium	log_{10}	-	-	-	-	-	-
Tin	log_{10}	-	-	-	-	-	-
Titanium	log_{10}	-	-	-	-	-	-
Uranium	log_{10}	<0.001	ns	194	ns	289	ns
Vanadium	log_{10}	<0.001	ns	837	ns	1,572	ns
Zinc	log_{10}	<0.001	ns	103	166	304	ns
Zirconium	log_{10}	-	-	-	-	-	-

Area x Year or Area P-value < 0.05.

Contrast is significant (α = 0.05) and magnitude of difference is positive.

Contrast is significant (α = 0.05) and magnitude of difference is negative.

Notes: " -" = no data available or sample reported below the laboratory reporting limit (<LRL) so TTF ratio was not calculated, ns = not significant, ANOVA = one way analysis of variance, MOD = Magnitude of Difference, nt = not tested because all data were reported below the laboratory reporting limit (LRL) or because there were only data for a single time period.

[a] Magnitude of difference (MOD) calculated on backtransformed least-squares means as (Post-breach-Pre-breach)/Pre-breach x 100%.

Table F.4.17:Statistical Comparisons of Exposed - Reference Relative Differences of Periphyton Tissue Metal Concentrations for Lower Hazeltine Creek (HAC-D; Exposed) and Lower Edney Creek (EDC-D; Reference), 2017 to 2022

Parameter	Data Transformation	Two-way ANOVA P-values			(Exposed – Reference) Contrasts Among Periods[a]						Magnitude of Difference in (Exposed – Reference) Relative to Baseline Period (%)[b]						Magnitude of Difference for HAC-D Mean Relative to EDC-D (%)[c]					
		Area	Year	Area × Year	Post-Breach Period						Post-Breach Period						Post-Breach Period					
					2017	2018	2019	2020	2021	2022	2017	2018	2019	2020	2021	2022	2017	2018	2019	2020	2021	2022
Aluminum	MLE	0.187	0.039	<0.001	A	A	B	B	A	B	baseline	ns	-55	-65	ns	-72	ns	93	-42	-55	ns	-64
Antimony	MLE	0.047	0.003	0.029	BC	C	D	A	BC	AB	baseline	ns	-80	158	ns	ns	-45	-56	ns	ns	ns	ns
Arsenic	MLE	<0.001	0.002	0.370	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	-37					
Barium	MLE	0.001	0.685	0.029	B	A	B	AB	A	AB	baseline	125	ns	ns	141	ns	ns	96	ns	76	110	ns
Beryllium	MLE	0.807	0.253	<0.001	A	A	B	B	A	B	baseline	ns	-69	-68	ns	-77	91	69	-40	-38	64	-56
Bismuth	MLE	0.117	0.238	<0.001	A	A	BC	BC	B	C	baseline	ns	-77	-77	-60	-85	120	118	-49	-50	ns	-67
Boron	MLE	<0.001	0.201	<0.001	E	D	AB	A	C	BC	baseline	430	5,735	11,307	1,448	3,260	-85	ns	777	1,614	132	405
Cadmium	MLE	<0.001	0.295	0.235	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	38					
Calcium	MLE	<0.001	0.026	<0.001	E	C	B	AB	D	A	baseline	494	1,635	2,483	134	3,997	ns	303	1,076	1,650	ns	2,676
Cesium	MLE	0.007	0.608	<0.001	A	AB	BCD	CD	ABC	D	baseline	ns	-70	-75	ns	-80	83	ns	-45	-54	ns	-64
Chromium	MLE	<0.001	<0.001	0.002	A	AB	BC	C	BC	BC	baseline	ns	-68	-81	-73	-78	ns	ns	-57	-75	-63	-70
Cobalt	MLE	0.008	0.049	<0.001	A	A	BC	BC	AB	C	baseline	ns	-67	-66	ns	-74	55	ns	-48	-47	ns	-60
Copper	MLE	<0.001	0.233	<0.001	A	AB	C	C	A	BC	baseline	ns	-73	-72	ns	-63	1,247	669	265	279	1,287	402
Iron	MLE	0.159	0.016	<0.001	A	A	BC	BC	AB	C	baseline	ns	-68	-66	ns	-79	70	82	-45	-42	ns	-65
Lead	MLE	0.274	0.072	<0.001	A	A	B	B	B	B	baseline	ns	-73	-78	-68	-84	138	82	ns	-48	ns	-62
Lithium	MLE	0.155	0.019	<0.001	A	A	BC	C	AB	C	baseline	ns	-68	-79	ns	-82	92	67	ns	-60	ns	-65
Magnesium	MLE	0.962	0.049	0.134	A	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
Manganese	MLE	0.004	0.002	0.011	AB	AB	BC	AB	C	A	baseline	ns	ns	ns	-62	ns	ns	ns	-43	ns	-69	ns
Mercury	MLE	0.006	0.025	<0.001	AB	BC	D	D	A	CD	baseline	ns	-68	-66	ns	-54	ns	ns	-59	-58	ns	-42
Molybdenum	MLE	0.121	0.281	0.002	A	B	B	B	B	B	baseline	-75	-79	-80	-70	-71	159	ns	-45	-48	ns	ns
Nickel	MLE	<0.001	0.017	<0.001	A	AB	BC	BC	B	C	baseline	ns	-65	-59	-57	-78	ns	ns	-56	-49	-46	-72
Phosphorus	MLE	<0.001	<0.001	<0.001	CD	D	CD	BC	AB	A	baseline	ns	ns	ns	101	185	-49	-61	-52	-36	ns	45
Potassium	MLE	<0.001	0.005	<0.001	C	C	BC	AB	BC	A	baseline	ns	ns	173	ns	301	-67	-57	-51	ns	ns	ns
Rubidium	MLE	<0.001	0.007	0.005	A	AB	C	BC	AB	A	baseline	ns	-52	-42	ns	ns	ns	-29	-63	-54	-32	ns
Selenium	MLE	0.869	<0.001	<0.001	BC	D	CD	AB	C	A	baseline	-50	ns	ns	ns	137	ns	-53	ns	57	ns	119
Silver	MLE	0.003	0.237	0.011	-	-	B	B	A	B	-	-	baseline	ns	130	ns	-	-	-43	-41	ns	-61
Sodium	MLE	0.217	<0.001	0.019	AB	B	B	AB	A	A	baseline	ns	ns	ns	ns	ns	ns	-39	-38	ns	ns	ns
Strontium	MLE	<0.001	0.034	<0.001	D	C	B	AB	C	A	baseline	179	400	564	80	873	ns	134	320	457	51	717
Tellurium	MLE	<0.001	0.089	0.485	A	<LRL	<LRL	A	A	A	baseline	<LRL	<LRL	ns	ns	ns	116	<LRL	<LRL	116		
Thallium	MLE	0.187	0.109	<0.001	A	A	C	BC	AB	BC	baseline	ns	-80	-62	ns	-71	77	ns	-65	ns	ns	-48
Tin	MLE	0.164	<0.001	<0.001	A	C	D	B	AB	<LRL	baseline	-97	-99	-60	ns	<LRL	97	ns	ns	ns	ns	<LRL
Titanium	MLE	0.272	0.008	0.110	-	-	A	A	A	A	-	-	baseline	ns	ns	ns	-	-	ns	ns	ns	ns
Uranium	MLE	0.163	0.073	0.004	A	AB	C	BC	AB	BC	baseline	ns	-74	-68	ns	-67	81	ns	-52	-41	ns	-40
Vanadium	MLE	0.220	0.034	0.001	A	A	BC	BC	AB	C	baseline	ns	-60	-57	ns	-74	106	118	ns	ns	ns	-46
Zinc	MLE	0.005	0.108	0.002	A	AB	C	BC	AB	C	baseline	ns	-63	-45	ns	-63	ns	ns	-51	ns	ns	-51
Zirconium	MLE	0.131	0.075	<0.001	A	AB	BC	BC	AB	C	baseline	ns	-56	-59	ns	-78	ns	ns	ns	ns	ns	-65

Area x Year or Area P-value < 0.05.

Contrast is significant (α = 0.05) and magnitude of difference is positive.

Contrast is significant (α = 0.05) and magnitude of difference is negative.

Notes: "-" = no data available, ANOVA = two way analysis of variance, MLE = censored regression using maximum likelihood estimation, MOD = Magnitude of Difference, nt = not tested because all data were reported below the laboratory reporting limit (<LRL) or because there were only data for a single time period, ns = not significant, baseline= first year of data included in analysis, <LRL = greater than 50% LRL data for both stations so the time period was omitted from the analysis. Merged cells across years indicate that the Area × Time term was not significant, therefore MOD is for all years combined. Only years with samples from both reference and exposed were included in the analysis. Data were analysed in units of mg/kg dry weight.

[a] Years that share a letter (e.g., A,B,C) had ratios of concentrations (HAC-D:EDC-D) that do not differ significantly among years. Letters are assigned such that A is assigned to the year with the highest ratio of concentrations (HAC-D:EDC-D).

[b] Magnitude of difference (MOD) calculated on backtransformed least-squares means for the observed time period as $(Exp_{observed} - Exp_{predicted})/(Exp_{predicted})\times 100\%$ where $Exp_{predicted} = Ref_{observed} + (Exp_{baseline} - Ref_{baseline})$.

[c] Magnitude of difference (MOD) calculated on backtransformed least-squares means as (Exp-Ref)/Ref x 100%.

Table F.4.18: Statistical Comparisons of Periphyton Tissue Metal Concentrations for Lower Hazeltine Creek (HAC-D; Exposed) in Post-Breach Years (2017 to 2022) Relative to Pre-Breach Conditions (2010; W11)

Parameter	Data Transformation	Year	Magnitude of Difference in Relative to Pre-Breach Period (%)[a]					
			Post-Breach Period					
			2017	2018	2019	2020	2021	2022
Aluminum	MLE	0.068	ns	ns	ns	ns	ns	ns
Antimony	MLE	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Arsenic	MLE	0.029	ns	ns	ns	ns	ns	ns
Barium	MLE	0.237	ns	ns	ns	ns	ns	ns
Beryllium	MLE	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Bismuth	MLE	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Boron	MLE	-	-	-	-	-	-	-
Cadmium	MLE	0.009	ns	ns	ns	133	ns	ns
Calcium	MLE	<0.001	ns	678	480	620	ns	1,096
Cesium	MLE	-	-	-	-	-	-	-
Chromium	MLE	0.060	ns	ns	ns	ns	ns	ns
Cobalt	MLE	0.072	ns	ns	ns	ns	ns	ns
Copper	MLE	<0.001	912	566	393	274	1,006	457
Iron	MLE	0.087	ns	ns	ns	ns	ns	ns
Lead	MLE	0.012	ns	ns	ns	ns	ns	ns
Lithium	MLE	0.039	ns	ns	ns	ns	ns	ns
Magnesium	MLE	0.737	ns	ns	ns	ns	ns	ns
Manganese	MLE	<0.001	ns	ns	ns	ns	-78	ns
Mercury	MLE	<0.001	615	375	231	ns	517	240
Molybdenum	MLE	<0.001	251	ns	ns	ns	ns	ns
Nickel	MLE	0.047	ns	ns	ns	ns	ns	ns
Phosphorus	MLE	<0.001	ns	ns	ns	ns	ns	117
Potassium	MLE	<0.001	-60	ns	ns	ns	ns	ns
Rubidium	MLE	-	-	-	-	-	-	-
Selenium	MLE	<0.001	ns	ns	-45	ns	ns	ns
Silver	MLE	-	-	-	-	-	-	-
Sodium	MLE	0.003	ns	ns	ns	ns	ns	ns
Strontium	MLE	<0.001	ns	198	136	190	ns	351
Tellurium	MLE	-	-	-	-	-	-	-
Thallium	MLE	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Tin	MLE	<0.001	-84	<LRL	<LRL	-85	-82	<LRL
Titanium	MLE	0.235	-	-	ns	ns	ns	ns
Uranium	MLE	0.024	ns	ns	ns	ns	ns	ns
Vanadium	MLE	0.168	ns	ns	ns	ns	ns	ns
Zinc	MLE	0.044	ns	ns	ns	ns	ns	ns
Zirconium	MLE	-	-	-	-	-	-	-

Year P-value < 0.05.

Contrast is significant (α = 0.05) and magnitude of difference is positive.

Contrast is significant (α = 0.05) and magnitude of difference is negative.

Notes: "-" = no data available, ANOVA = two way analysis of variance, MLE = censored regression using maximum likelihood estimation, MOD = Magnitude of Difference, nt = not tested because all data were reported below the laboratory reporting limit (<LRL) or because there were only data for a single time period, ns = not significant, LRL = greater than 50% LRL data for both stations so the time period was omitted from the analysis. Data were analysed in units of mg/kg dry weight.

[a] Magnitude of difference (MOD) calculated on backtransformed least-squares means as (Post-breach-Pre-breach)/Pre-breach x 100%.

Table F.4.19: **Statistical Comparisons of Exposed - Reference Relative Differences of Caddisfly Tissue Metal Concentrations for Lower Hazeltine Creek (HAC-D; Exposed) and Lower Edney Creek (EDC-D; Reference), 2018 to 2022**

Parameter	Data Transformation	Two-way ANOVA P-values			(Exposed – Reference) Contrasts Among Periods[a]					Magnitude of Difference in (Exposed – Reference) Relative to Baseline Period (%)[b]					Magnitude of Difference for HAC-D Mean Relative to EDC-D (%)[c]				
		Area	Year	Area × Year	Post-Breach Period					Post-Breach Period					Post-Breach Period				
					2018	2019	2020	2021	2022	2018	2019	2020	2021	2022	2018	2019	2020	2021	2022
Aluminum	MLE	0.007	0.007	<0.001	B	A	B	A	B	baseline	1,109	ns	1,774	ns	-87	ns	-73	ns	-77
Antimony	MLE	0.075	<0.001	<0.001	D	AB	BC	A	CD	baseline	247	114	382	ns	-44	93	ns	169	ns
Arsenic	MLE	<0.001	<0.001	<0.001	C	A	AB	AB	B	baseline	602	348	459	201	-90	ns	-55	-44	-70
Barium	MLE	0.007	0.006	<0.001	C	AB	B	A	B	baseline	1,978	947	3,903	751	-95	ns	ns	ns	ns
Beryllium	MLE	<0.001	0.005	<0.001	C	A	B	A	B	baseline	2,216	606	4,091	379	-95	ns	-67	ns	-78
Bismuth	MLE	<0.001	0.087	0.023	B	<LRL	A	<LRL	B	baseline	<LRL	6,408	<LRL	ns	ns	<LRL	-55	<LRL	ns
Boron	MLE	0.071	0.002	<0.001	C	<LRL	B	A	B	baseline	<LRL	2,223	11,486	1,885	-97	<LRL	ns	286	ns
Cadmium	MLE	0.340	<0.001	<0.001	C	B	B	A	B	baseline	1,007	2,860	12,883	894	-90	ns	198	1,207	ns
Calcium	MLE	0.003	0.009	<0.001	C	B	B	A	B	baseline	173	87	448	129	-70	ns	-43	66	ns
Cesium	MLE	0.020	<0.001	<0.001	B	A	B	A	B	baseline	1,480	ns	1,971	ns	-88	ns	-65	144	-69
Chromium	MLE	<0.001	0.018	<0.001	C	AB	BC	A	C	baseline	759	ns	1,320	ns	-89	ns	-70	ns	-89
Cobalt	MLE	0.028	<0.001	<0.001	C	AB	B	A	B	baseline	876	364	1,361	221	-87	ns	ns	ns	-58
Copper	MLE	<0.001	<0.001	<0.001	D	BC	B	A	CD	baseline	76	116	269	ns	ns	102	148	324	62
Iron	MLE	0.001	0.004	<0.001	B	A	B	A	B	baseline	881	ns	1,405	ns	-88	ns	-70	ns	-76
Lead	MLE	0.171	<0.001	<0.001	B	A	B	A	B	baseline	788	ns	1,505	ns	-81	ns	ns	207	-59
Lithium	MLE	<0.001	<0.001	<0.001	C	A	B	A	B	baseline	58,130	9,262	77,099	10,011	ns	ns	-79	ns	-77
Magnesium	MLE	<0.001	<0.001	0.005	B	A	B	A	B	baseline	69	ns	75	ns	-43	ns	-34	ns	-34
Manganese	MLE	0.309	0.001	<0.001	C	AB	B	A	AB	baseline	645	403	1,887	874	-87	ns	ns	166	ns
Mercury	MLE	nt	nt	nt	-	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL
Molybdenum	MLE	0.767	0.034	<0.001	A	B	C	D	BC	baseline	-49	-69	-87	-58	170	38	ns	-66	ns
Nickel	MLE	<0.001	0.024	<0.001	D	AB	BC	A	CD	baseline	841	306	1,950	ns	-92	ns	-67	ns	-85
Phosphorus	MLE	0.043	<0.001	0.006	A	B	A	A	AB	baseline	-21	ns	ns	ns	ns	-22	ns	ns	ns
Potassium	MLE	<0.001	<0.001	<0.001	B	A	A	A	A	baseline	95	91	130	142	-61	-24	-25	ns	ns
Rubidium	MLE	<0.001	<0.001	<0.001	C	A	B	A	AB	baseline	221	81	223	159	-80	-37	-64	-36	-49
Selenium	MLE	<0.001	0.004	<0.001	D	CD	BC	A	AB	baseline	ns	52	118	79	80	112	175	293	223
Silver	MLE	0.003	<0.001	<0.001	-	B	B	A	B	-	baseline	ns	455	ns	-	-64	-62	100	-74
Sodium	MLE	<0.001	<0.001	<0.001	B	B	A	B	B	baseline	ns	75	ns	ns	-29	-28	23	-39	-21
Strontium	MLE	<0.001	<0.001	<0.001	C	AB	B	A	B	baseline	243	163	432	184	-78	ns	-42	ns	-37
Tellurium	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Thallium	MLE	<0.001	<0.001	<0.001	C	B	B	A	B	baseline	611	377	1,770	206	-89	ns	-49	100	-67
Tin	MLE	0.762	<0.001	0.003	B	A	<LRL	<LRL	<LRL	baseline	241	<LRL	<LRL	<LRL	-57	ns	<LRL	<LRL	<LRL
Titanium	MLE	0.336	0.003	0.011	-	A	B	A	B	-	baseline	-80	ns	-82	-	ns	-67	ns	-71
Uranium	MLE	0.006	0.012	<0.001	C	B	B	A	B	baseline	1,153	695	6,599	668	-95	ns	ns	266	-58
Vanadium	MLE	0.031	0.008	<0.001	B	A	B	A	B	baseline	1,063	ns	1,799	ns	-86	ns	-61	163	-74
Zinc	MLE	0.320	<0.001	<0.001	C	C	B	A	B	baseline	ns	114	212	57	-33	-27	43	110	ns
Zirconium	MLE	<0.001	<0.001	<0.001	B	A	A	A	A	baseline	2,296	671	1,145	621	-96	ns	-66	ns	-68

Area x Year or Area P-value < 0.05.

Contrast is significant (α = 0.05) and magnitude of difference is positive.

Contrast is significant (α = 0.05) and magnitude of difference is negative.

Notes: "-" = no data available, ANOVA = two way analysis of variance, MLE = censored regression using maximum likelihood estimation, MOD = Magnitude of Difference, nt = not tested because all data were reported below the laboratory reporting limit (<LRL) or because there were only data for a single time period, ns = not significant, baseline= first year of data included in analysis, <LRL = greater than 50% LRL data for both stations so the time period was omitted from the analysis. Merged cells across years indicate that the Area × Time term was not significant, therefore MOD is for all years combined. Only years with samples from both reference and exposed were included in the analysis. Data were analysed in units of mg/kg dry weight.

[a] Years that share a letter (e.g., A,B,C) had ratios of concentrations (HAC-D:EDC-D) that do not differ significantly among years. Letters are assigned such that A is assigned to the year with the highest ratio of concentrations (HAC-D:EDC-D).

[b] Magnitude of difference (MOD) calculated on backtransformed least-squares means for the observed time period as $(Exp_{observed} - Exp_{predicted})/(Exp_{predicted}) \times 100\%$ where $Exp_{predicted} = Ref_{observed} + (Exp_{baseline} - Ref_{baseline})$.

[c] Magnitude of difference (MOD) calculated on backtransformed least-squares means as (Exp-Ref)/Ref x 100%.

Table F.4.20: **Statistical Comparisons of Exposed - Reference Relative Differences of Composite-Taxa Benthic Invertebrate Tissue Metal Concentrations for Lower Hazeltine Creek (HAC-D; Exposed) and Lower Edney Creek (EDC-D; Reference), 2015 to 2022**

Parameter	Data Transformation	Two-way ANOVA P-values			(Exposed – Reference) Contrasts Among Periods[a]						Magnitude of Difference in (Exposed – Reference) Relative to Baseline Period (%)[b]						Magnitude of Difference for HAC-D Mean Relative to EDC-D (%)[c]					
		Area	Year	Area × Year	Post-Breach Period						Post-Breach Period						Post-Breach Period					
					2015	2018	2019	2020	2021	2022	2015	2018	2019	2020	2021	2022	2015	2018	2019	2020	2021	2022
Aluminum	MLE	<0.001	0.041	<0.001	A	D	BC	CD	B	CD	baseline	-97	-90	-94	-82	-94	1,901	ns	100	ns	261	ns
Antimony	MLE	<0.001	<0.001	0.049	A	C	ABC	AB	ABC	BC	baseline	-60	ns	ns	ns	-50	186	ns	79	135	83	ns
Arsenic	MLE	0.083	0.002	<0.001	A	C	AB	AB	B	AB	baseline	-85	ns	ns	-56	ns	ns	-76	ns	ns	ns	ns
Barium	MLE	<0.001	0.078	<0.001	A	C	B	B	B	B	baseline	-98	-78	-75	-71	-81	978	-79	139	169	217	101
Beryllium	MLE	<0.001	0.056	<0.001	A	D	BC	C	B	BC	baseline	-98	-90	-94	-83	-93	2,041	-50	114	ns	258	ns
Bismuth	MLE	0.010	0.987	<0.001	A	C	B	<LRL	B	<LRL	baseline	-100	-74	<LRL	-80	<LRL	980	ns	182	<LRL	111	<LRL
Boron	MLE	0.038	<0.001	<0.001	A	C	B	B	A	B	baseline	-96	-81	-73	ns	-62	427	-79	ns	ns	428	100
Cadmium	MLE	0.069	<0.001	<0.001	A	B	B	B	B	B	baseline	-92	-88	-87	-93	-90	994	ns	ns	ns	ns	ns
Calcium	MLE	0.199	0.011	<0.001	A	C	C	BC	A	AB	baseline	-80	-75	-70	ns	ns	191	-42	ns	ns	114	53
Cesium	MLE	0.007	0.034	<0.001	A	C	B	B	B	B	baseline	-97	-89	-93	-88	-92	1,511	-54	79	ns	89	ns
Chromium	MLE	0.013	<0.001	<0.001	A	B	B	B	B	B	baseline	-90	-88	-92	-88	-92	1,139	ns	ns	ns	ns	ns
Cobalt	MLE	<0.001	0.012	<0.001	A	C	B	B	B	B	baseline	-97	-93	-93	-92	-93	2,039	-46	ns	60	73	ns
Copper	MLE	<0.001	<0.001	<0.001	A	C	C	C	B	C	baseline	-86	-84	-85	-66	-84	1,173	80	101	93	332	110
Iron	MLE	0.001	0.094	<0.001	A	C	B	BC	B	BC	baseline	-97	-92	-95	-88	-95	2,256	ns	ns	ns	172	ns
Lead	MLE	<0.001	0.411	<0.001	A	C	B	B	B	B	baseline	-97	-90	-93	-87	-93	2,076	ns	114	ns	185	ns
Lithium	MLE	0.005	0.091	<0.001	A	D	BC	C	B	BC	baseline	-98	-82	-90	-74	-89	1,164	-73	128	ns	232	ns
Magnesium	MLE	0.828	<0.001	0.003	AB	C	C	BC	A	BC	baseline	-47	-45	ns	ns	ns	41	-25	ns	ns	43	ns
Manganese	MLE	0.199	<0.001	<0.001	AB	D	BC	AB	C	A	baseline	-91	ns	ns	-74	ns	202	-72	ns	91	ns	190
Mercury	MLE	nt	nt	nt	-	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL
Molybdenum	MLE	<0.001	0.001	<0.001	C	B	A	B	B	B	baseline	813	2,565	1,117	830	901	-74	138	594	217	143	161
Nickel	MLE	0.538	<0.001	<0.001	A	B	B	B	B	B	baseline	-91	-90	-90	-88	-87	715	ns	ns	ns	ns	ns
Phosphorus	MLE	0.004	<0.001	<0.001	C	A	B	A	A	A	baseline	168	94	155	151	142	-62	ns	-26	ns	ns	ns
Potassium	MLE	0.006	<0.001	0.032	B	B	AB	A	A	AB	baseline	ns	ns	51	40	ns	-31	-29	ns	ns	ns	-19
Rubidium	MLE	<0.001	0.001	<0.001	A	C	B	B	B	B	baseline	-86	-77	-76	-70	-67	150	-65	-43	-40	-25	ns
Selenium	MLE	<0.001	<0.001	0.015	ABC	C	BC	AB	ABC	A	baseline	ns	ns	ns	ns	ns	91	46	77	148	102	170
Silver	MLE	<0.001	0.669	<0.001	A	-	B	B	B	B	baseline	-	-94	-97	-97	-97	550	-	-63	-81	-79	-81
Sodium	MLE	0.196	<0.001	0.020	C	A	BC	AB	BC	AB	baseline	116	ns	61	ns	62	-40	ns	-25	ns	ns	ns
Strontium	MLE	0.478	0.006	<0.001	A	B	B	B	A	A	baseline	-83	-75	-71	ns	ns	170	-54	ns	ns	121	54
Tellurium	MLE	nt	nt	nt	-	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL	-	<LRL	<LRL	<LRL	<LRL	<LRL
Thallium	MLE	0.545	0.363	<0.001	A	C	B	BC	BC	BC	baseline	-94	-85	-91	-88	-90	732	-47	ns	ns	ns	ns
Tin	MLE	0.743	<0.001	<0.001	C	<LRL	B	B	A	<LRL	baseline	<LRL	543	525	21,287	<LRL	-83	<LRL	ns	ns	ns	<LRL
Titanium	MLE	<0.001	<0.001	<0.001	A	-	BC	C	AB	C	baseline	-	-78	-87	ns	-86	1,037	-	145	ns	364	ns
Uranium	MLE	0.072	0.528	<0.001	A	C	B	B	B	B	baseline	-98	-93	-93	-89	-91	1,553	-72	ns	ns	78	ns
Vanadium	MLE	<0.001	0.193	<0.001	A	C	BC	BC	B	BC	baseline	-99	-97	-98	-94	-98	7,174	ns	127	ns	314	ns
Zinc	MLE	0.625	<0.001	<0.001	A	B	C	A	BC	BC	baseline	-38	-57	ns	-43	-41	47	ns	-36	51	ns	ns
Zirconium	MLE	0.265	<0.001	<0.001	A	C	B	B	A	B	baseline	-94	-85	-86	ns	-83	557	-63	ns	ns	181	ns

Area x Year or Area P-value < 0.05.

Contrast is significant (α = 0.05) and magnitude of difference is positive.

Contrast is significant (α = 0.05) and magnitude of difference is negative.

Notes: "-" = no data available, ANOVA = two way analysis of variance, MLE = censored regression using maximum likelihood estimation, MOD = Magnitude of Difference, nt = not tested because all data were reported below the laboratory reporting limit (<LRL) or because there were only data for a single time period, ns = not significant, baseline= first year of data included in analysis, <LRL = greater than 50% LRL data for both stations so the time period was omitted from the analysis. Merged cells across years indicate that the Area × Time term was not significant, therefore MOD is for all years combined. Only years with samples from both reference and exposed were included in the analysis. Data were analysed in units of mg/kg dry weight.

[a] Years that share a letter (e.g., A,B,C) had ratios of concentrations (HAC-D:EDC-D) that do not differ significantly among years. Letters are assigned such that A is assigned to the year with the highest ratio of concentrations (HAC-D:EDC-D).

[b] Magnitude of difference (MOD) calculated on backtransformed least-squares means for the observed time period as $(Exp_{observed} - Exp_{predicted})/(Exp_{predicted})\times 100\%$ where $Exp_{predicted} = Ref_{observed} + (Exp_{baseline} - Ref_{baseline})$.

[c] Magnitude of difference (MOD) calculated on backtransformed least-squares means as (Exp-Ref)/Ref x 100%.

Table F.4.21: Statistical Comparisons of Composite-Taxa Benthic Invertebrate Tissue Metal Concentrations for Lower Hazeltine Creek (HAC-D; Exposed) in Post-Breach Years (2015 to 2022) Relative to Pre-Breach Conditions (2010; W11)

Parameter	Data Transformation	Year	Magnitude of Difference in Relative to Pre-Breach Period (%)[a]					
			Post-Breach Period					
			2015	2018	2019	2020	2021	2022
Aluminum	MLE	<0.001	ns	-71	ns	ns	ns	ns
Antimony	MLE	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Arsenic	MLE	0.032	ns	-58	ns	ns	ns	ns
Barium	MLE	<0.001	ns	-83	ns	ns	ns	ns
Beryllium	MLE	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Bismuth	MLE	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Boron	MLE	-	-	-	-	-	-	-
Cadmium	MLE	0.004	ns	ns	ns	206	ns	213
Calcium	MLE	<0.001	ns	ns	ns	ns	ns	ns
Cesium	MLE	-	-	-	-	-	-	-
Chromium	MLE	<0.001	-83	-80	-90	-92	-84	-93
Cobalt	MLE	<0.001	ns	-63	ns	ns	ns	ns
Copper	MLE	<0.001	682	ns	163	183	527	173
Iron	MLE	-	-	-	-	-	-	-
Lead	MLE	<0.001	ns	-63	ns	ns	ns	ns
Lithium	MLE	0.013	ns	<LRL	ns	ns	ns	ns
Magnesium	MLE	<0.001	ns	ns	ns	ns	ns	ns
Manganese	MLE	<0.001	-81	-84	-75	ns	-63	ns
Mercury	MLE	0.031	-	ns	ns	ns	ns	69
Molybdenum	MLE	<0.001	-74	ns	ns	ns	-63	-60
Nickel	MLE	0.009	-84	-79	-86	-83	-78	-80
Phosphorus	MLE	-	-	-	-	-	-	-
Potassium	MLE	-	-	-	-	-	-	-
Rubidium	MLE	-	-	-	-	-	-	-
Selenium	MLE	<0.001	-23	ns	-26	ns	28	40
Silver	MLE	-	-	-	-	-	-	-
Sodium	MLE	-	-	-	-	-	-	-
Strontium	MLE	<0.001	ns	ns	ns	ns	ns	ns
Tellurium	MLE	-	-	-	-	-	-	-
Thallium	MLE	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Tin	MLE	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Titanium	MLE	-	-	-	-	-	-	-
Uranium	MLE	<0.001	ns	-77	ns	ns	ns	ns
Vanadium	MLE	<0.001	318	ns	ns	ns	ns	ns
Zinc	MLE	<0.001	ns	ns	ns	155	ns	ns
Zirconium	MLE	-	-	-	-	-	-	-

Year P-value < 0.05.

Contrast is significant (α = 0.05) and magnitude of difference is positive.

Contrast is significant (α = 0.05) and magnitude of difference is negative.

Notes: "-" = no data available, ANOVA = two way analysis of variance, MLE = censored regression using maximum likelihood estimation, MOD = Magnitude of Difference, nt = not tested because all data were reported below the laboratory reporting limit (<LRL) or because there were only data for a single time period, ns = not significant, LRL = greater than 50% LRL data for both stations so the time period was omitted from the analysis. Data were analysed in units of mg/kg dry weight.

[a] Magnitude of difference (MOD) calculated on backtransformed least-squares means as (Post-breach-Pre-breach)/Pre-breach x 100%.

Table F.4.22: Statistical Comparisons of Exposed - Reference Relative Differences of Trophic Transfer Factors for Caddisfly Tissue Metal Concentrations for Lower Hazeltine Creek (HAC-D; Exposed) and Lower Edney Creek (EDC-D; Reference), 2018 to 2022

Parameter	Data Transformation	Two-way ANOVA P-values			(Exposed – Reference) Contrasts Among Periods[a]					Magnitude of Difference in (Exposed – Reference) Relative to Baseline Period (%)[b]					Magnitude of Difference for HAC-D Mean Relative to EDC-D (%)[c]				
		Area	Year	Area × Year	Post-Breach Period					Post-Breach Period					Post-Breach Period				
					2018	2019	2020	2021	2022	2018	2019	2020	2021	2022	2018	2019	2020	2021	2022
Aluminum	log_{10}	0.067	0.018	<0.001	B	A	A	A	A	baseline	3,901	813	2,335	900	-94	ns	ns	ns	ns
Antimony	log_{10}	0.855	<0.001	0.095	A	-	A	A	A	baseline	-	ns	ns	ns	ns	-	ns	ns	ns
Arsenic	log_{10}	<0.001	<0.001	<0.001	C	A	AB	AB	B	baseline	1,170	507	525	322	-88	ns	ns	ns	ns
Barium	log_{10}	<0.001	0.003	<0.001	C	A	AB	AB	B	baseline	4,622	1,068	3,638	960	-97	ns	-68	ns	-71
Beryllium	log_{10}	0.002	<0.001	0.011	C	AB	BC	AB	A	baseline	1,573	ns	780	2,520	-93	ns	-59	ns	ns
Bismuth	log_{10}	nt	nt	nt	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron	log_{10}	<0.001	0.001	0.078	A	A	A	A	A	baseline	ns	ns	ns	ns	-91				
Cadmium	log_{10}	0.343	<0.001	<0.001	C	B	B	A	B	baseline	550	988	9,251	531	-86	ns	ns	1,188	ns
Calcium	log_{10}	<0.001	<0.001	<0.001	B	B	BC	A	C	baseline	ns	ns	1,290	-67	-92	-93	-97	ns	-98
Cesium	log_{10}	0.763	0.002	<0.001	C	A	B	AB	AB	baseline	2,646	514	2,041	590	-88	240	ns	165	ns
Chromium	log_{10}	0.479	<0.001	<0.001	C	A	AB	A	BC	baseline	1,295	659	1,649	ns	-84	ns	ns	ns	ns
Cobalt	log_{10}	0.754	0.003	<0.001	B	A	A	A	A	baseline	2,068	913	1,823	812	-89	ns	ns	ns	ns
Copper	log_{10}	<0.001	<0.001	0.002	B	A	A	AB	A	baseline	271	338	ns	116	-85	-45	ns	-69	-68
Iron	log_{10}	0.036	0.028	<0.001	B	A	A	A	A	baseline	3,171	704	2,626	936	-93	ns	ns	ns	ns
Lead	log_{10}	0.476	<0.001	<0.001	B	A	A	A	A	baseline	2,400	800	1,954	922	-90	162	ns	ns	ns
Lithium	log_{10}	0.223	0.011	0.184	-	A	A	A	A	-	baseline	ns	ns	ns	-	ns	ns	ns	ns
Magnesium	log_{10}	0.009	0.005	0.070	A	A	A	A	A	baseline	ns	ns	ns	ns	-23				
Manganese	log_{10}	0.458	0.002	<0.001	C	B	B	A	B	baseline	928	382	4,937	521	-83	ns	ns	764	ns
Mercury	log_{10}	0.469	<0.001	0.026	C	ABC	A	BC	AB	baseline	ns	237	ns	127	ns	ns	98	ns	ns
Molybdenum	log_{10}	0.004	0.109	<0.001	A	A	A	B	A	baseline	ns	ns	-89	ns	310	151	ns	-57	ns
Nickel	log_{10}	0.044	0.023	<0.001	C	AB	AB	A	B	baseline	1,460	481	1,841	375	-89	ns	ns	ns	ns
Phosphorus	log_{10}	<0.001	<0.001	<0.001	A	A	A	B	B	baseline	ns	ns	-63	-75	154	61	64	ns	-37
Potassium	log_{10}	0.786	<0.001	0.179	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns
Rubidium	log_{10}	0.012	<0.001	<0.001	C	A	B	AB	B	baseline	506	181	238	142	-72	69	ns	ns	ns
Selenium	log_{10}	<0.001	0.002	<0.001	A	AB	BC	A	C	baseline	ns	-55	ns	-62	287	203	75	352	ns
Silver	log_{10}	0.826	<0.001	0.606	-	A	A	A	A	-	baseline	ns	ns	ns	-	ns	ns	ns	ns
Sodium	log_{10}	0.195	<0.001	0.006	AB	AB	A	C	BC	baseline	ns	ns	-62	ns	ns	ns	ns	-56	-39
Strontium	log_{10}	<0.001	<0.001	<0.001	BC	B	BC	A	C	baseline	ns	ns	724	ns	-91	-82	-90	ns	-92
Tellurium	log_{10}	nt	nt	nt	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	log_{10}	0.039	<0.001	<0.001	B	A	A	A	A	baseline	2,848	917	1,731	874	-93	ns	ns	ns	ns
Tin	log_{10}	nt	nt	nt	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Titanium	log_{10}	0.775	0.255	0.370	-	A	A	A	A	-	baseline	ns	ns	ns	-	ns	ns	ns	ns
Uranium	log_{10}	0.108	0.011	<0.001	B	A	A	A	A	baseline	2,918	1,467	7,465	1,384	-95	ns	ns	258	ns
Vanadium	log_{10}	0.018	0.091	<0.001	B	A	A	A	A	baseline	2,975	608	2,766	658	-94	ns	ns	ns	ns
Zinc	log_{10}	<0.001	0.009	0.003	B	A	A	A	A	baseline	115	178	226	209	ns	ns	95	129	116
Zirconium	log_{10}	<0.001	0.007	0.001	C	AB	B	BC	A	baseline	1,012	640	ns	2,794	-93	ns	ns	-72	ns

Area x Year or Area P-value < 0.05.

Contrast is significant (α = 0.05) and magnitude of difference is positive.

Contrast is significant (α = 0.05) and magnitude of difference is negative.

Notes: "-" = no data available or samples reported bellow the laboratory reporting limit (<LRL) so TTF ratio was not calculated, ANOVA = two way analysis of variance, MLE = censored regression using maximum likelihood estimation, MOD = Magnitude of Difference, nt = not tested because all data were reported <LRL or because there were only data for a single time period, ns = not significant, baseline= first year of data included in analysis, <LRL = greater than 50% LRL data for both stations so the time period was omitted from the analysis. Merged cells across years indicate that the Area × Time term was not significant, therefore MOD is for all years combined. Only years with samples from both reference and exposed were included in the analysis.

[a] Years that share a letter (e.g., A,B,C) had ratios of concentrations (HAC-D:EDC-D) that do not differ significantly among years. Letters are assigned such that A is assigned to the year with the highest ratio of concentrations (HAC-D:EDC-D).

[b] Magnitude of difference (MOD) calculated on backtransformed least-squares means for the observed time period as $(Exp_{observed} - Exp_{predicted})/(Exp_{predicted}) \times 100\%$ where $Exp_{predicted} = Ref_{observed} + (Exp_{baseline} - Ref_{baseline})$.

[c] Magnitude of difference (MOD) calculated on backtransformed least-squares means as (Exp-Ref)/Ref x 100%.

Table F.4.23: **Statistical Comparisons of Exposed - Reference Relative Differences of Trophic Transfer Factors for Composite-Taxa Benthic Invertebrate Tissue Metal Concentrations for Lower Hazeltine Creek (HAC-D; Exposed) and Lower Edney Creek (EDC-D; Reference), 2018 to 2022**

Parameter	Data Transformation	Two-way ANOVA P-values			(Exposed – Reference) Contrasts Among Periods[a]					Magnitude of Difference in (Exposed – Reference) Relative to Baseline Period (%)[b]					Magnitude of Difference for HAC-D Mean Relative to EDC-D (%)[c]				
		Area	Year	Area × Year	Post-Breach Period					Post-Breach Period					Post-Breach Period				
					2018	2019	2020	2021	2022	2018	2019	2020	2021	2022	2018	2019	2020	2021	2022
Aluminum	log_{10}	<0.001	0.016	<0.001	B	A	A	A	A	baseline	1,005	746	684	908	-69	242	161	142	211
Antimony	log_{10}	0.006	0.001	0.655	A	-	A	A	A	baseline	-	ns	ns	ns	72	-	72		
Arsenic	log_{10}	0.153	0.174	<0.001	C	A	AB	B	AB	baseline	870	484	230	506	-70	189	ns	ns	ns
Barium	log_{10}	0.903	0.059	<0.001	B	A	A	A	A	baseline	2,438	1,301	1,282	1,072	-89	177	ns	ns	ns
Beryllium	log_{10}	0.008	0.033	<0.001	B	A	A	A	A	baseline	1,218	726	717	1,337	-77	203	ns	ns	230
Bismuth	log_{10}	0.017	0.803	0.264	-	A	A	A	A	-	baseline	ns	ns	ns	-	105			
Boron	log_{10}	<0.001	0.053	<0.001	B	BC	C	A	B	baseline	ns	-77	677	ns	-74	-88	-94	ns	-68
Cadmium	log_{10}	0.179	<0.001	0.859	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns
Calcium	log_{10}	<0.001	<0.001	<0.001	B	BC	C	A	BC	baseline	ns	-66	835	ns	-86	-94	-95	ns	-94
Cesium	log_{10}	<0.001	0.009	0.005	B	A	A	A	A	baseline	579	379	325	641	ns	227	131	ns	257
Chromium	log_{10}	<0.001	<0.001	0.729	A	A	A	A	A	baseline	ns	ns	ns	ns	218				
Cobalt	log_{10}	<0.001	0.006	<0.001	B	A	A	A	A	baseline	529	542	317	707	-53	198	204	97	282
Copper	log_{10}	<0.001	0.009	0.114	A	A	A	A	A	baseline	ns	ns	ns	ns	-61				
Iron	log_{10}	<0.001	0.001	<0.001	B	A	A	A	A	baseline	896	524	704	919	-66	235	110	170	242
Lead	log_{10}	<0.001	0.310	<0.001	B	A	A	A	A	baseline	860	775	1,001	1,093	-66	231	202	279	311
Lithium	log_{10}	0.003	0.004	0.043	B	A	A	A	A	baseline	1,155	1,511	910	1,178	ns	175	252	121	180
Magnesium	log_{10}	0.679	0.007	0.287	A	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns	ns	ns
Manganese	log_{10}	<0.001	0.001	<0.001	B	A	A	A	A	baseline	567	543	601	549	-64	143	134	156	137
Mercury	log_{10}	0.140	0.005	<0.001	BC	A	AB	C	AB	baseline	183	ns	ns	ns	ns	160	90	-53	ns
Molybdenum	log_{10}	<0.001	0.010	0.084	A	A	A	A	A	baseline	ns	ns	ns	ns	397				
Nickel	log_{10}	0.002	0.014	0.275	A	A	A	A	A	baseline	ns	ns	ns	ns	83				
Phosphorus	log_{10}	0.003	0.001	<0.001	A	AB	AB	BC	C	baseline	ns	ns	-64	-76	165	53	52	ns	-36
Potassium	log_{10}	0.047	0.009	0.028	A	A	AB	A	B	baseline	ns	ns	ns	-63	ns	82	ns	ns	ns
Rubidium	log_{10}	0.723	<0.001	0.008	B	A	A	A	A	baseline	206	166	123	118	-50	ns	ns	ns	ns
Selenium	log_{10}	<0.001	0.111	0.057	A	A	A	A	A	baseline	ns	ns	ns	ns	105				
Silver	log_{10}	<0.001	0.317	0.578	-	A	A	A	A	-	baseline	ns	ns	ns	-	-53			
Sodium	log_{10}	0.788	0.005	0.013	A	AB	AB	B	B	baseline	ns	ns	-72	-65	111	ns	ns	-41	ns
Strontium	log_{10}	<0.001	<0.001	<0.001	B	B	B	A	B	baseline	ns	ns	637	ns	-80	-84	-86	ns	-81
Tellurium	log_{10}	nt	nt	nt	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	log_{10}	0.348	0.052	<0.001	C	A	B	B	AB	baseline	1,007	256	211	424	-68	252	ns	ns	ns
Tin	log_{10}	nt	nt	nt	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Titanium	log_{10}	<0.001	<0.001	0.618	-	A	A	A	A	-	baseline	ns	ns	ns	-	178			
Uranium	log_{10}	0.087	0.028	<0.001	B	A	A	A	A	baseline	877	746	627	902	-76	133	ns	ns	140
Vanadium	log_{10}	0.001	0.003	0.003	B	A	A	A	A	baseline	562	346	589	680	-58	176	ns	186	225
Zinc	log_{10}	0.012	0.358	0.086	A	A	A	A	A	baseline	ns	ns	ns	ns	33				
Zirconium	log_{10}	0.105	0.069	<0.001	B	A	A	A	A	baseline	590	599	993	1,619	-80	ns	ns	121	248

Area x Year or Area P-value < 0.05.

Contrast is significant (α = 0.05) and magnitude of difference is positive.

Contrast is significant (α = 0.05) and magnitude of difference is negative.

Notes: "-" = no data available or samples reported below the laboratory reporting limit (<LRL) so TTF ratio was not calculated, ANOVA = two way analysis of variance, MLE = censored regression using maximum likelihood estimation, MOD = Magnitude of Difference, nt = not tested because all data were reported <LRL or because there were only data for a single time period, ns = not significant, baseline = first year of data included in analysis, <LRL = greater than 50% LRL data for both stations so the time period was omitted from the analysis. Merged cells across years indicate that the Area × Time term was not significant, therefore MOD is for all years combined. Only years with samples from both reference and exposed were included in the analysis.

[a] Years that share a letter (e.g., A,B,C) had ratios of concentrations (HAC-D:EDC-D) that do not differ significantly among years. Letters are assigned such that A is assigned to the year with the highest ratio of concentrations (HAC-D:EDC-D).

[b] Magnitude of difference (MOD) calculated on backtransformed least-squares means for the observed time period as $(Exp_{observed} - Exp_{predicted})/(Exp_{predicted})\times100\%$ where $Exp_{predicted} = Ref_{observed} + (Exp_{baseline} - Ref_{baseline})$.

[c] Magnitude of difference (MOD) calculated on backtransformed least-squares means as (Exp-Ref)/Ref x 100%.

Table F.4.24: Statistical Comparisons of Trophic Transfer Factors for Composite-Taxa Benthic Invertebrate Tissue Metal Concentrations for Lower Hazeltine Creek (HAC-D; Exposed) in Post-Breach Years (2018 to 2022) Relative to Pre-Breach Conditions (2010; W11)

Parameter	Data Transformation	One-way ANOVA Year P-values	Magnitude of Difference in Relative to Pre-Breach Period (%)[a]				
			Post-Breach Period				
			2018	2019	2020	2021	2022
Aluminum	log_{10}	0.029	ns	ns	ns	ns	ns
Antimony	log_{10}	-	-	-	-	-	-
Arsenic	log_{10}	0.068	ns	ns	ns	ns	ns
Barium	log_{10}	<0.001	-87	ns	ns	ns	ns
Beryllium	log_{10}	-	-	-	-	-	-
Bismuth	log_{10}	-	-	-	-	-	-
Boron	log_{10}	-	-	-	-	-	-
Cadmium	log_{10}	0.019	ns	ns	ns	ns	ns
Calcium	log_{10}	<0.001	-91	-81	-85	ns	-90
Cesium	log_{10}	-	-	-	-	-	-
Chromium	log_{10}	<0.001	ns	-89	-90	ns	-85
Cobalt	log_{10}	0.209	ns	ns	ns	ns	ns
Copper	log_{10}	0.010	-72	ns	ns	ns	ns
Iron	log_{10}	-	-	-	-	-	-
Lead	log_{10}	0.303	ns	ns	ns	ns	ns
Lithium	log_{10}	0.381	ns	ns	ns	ns	ns
Magnesium	log_{10}	0.036	ns	ns	ns	ns	ns
Manganese	log_{10}	0.003	ns	ns	ns	ns	ns
Mercury	log_{10}	-	-	-	-	-	-
Molybdenum	log_{10}	0.008	ns	ns	ns	-78	ns
Nickel	log_{10}	0.097	ns	ns	ns	ns	ns
Phosphorus	log_{10}	-	-	-	-	-	-
Potassium	log_{10}	-	-	-	-	-	-
Rubidium	log_{10}	-	-	-	-	-	-
Selenium	log_{10}	0.018	ns	ns	ns	ns	ns
Silver	log_{10}	-	-	-	-	-	-
Sodium	log_{10}	-	-	-	-	-	-
Strontium	log_{10}	<0.001	-83	-65	-76	ns	-81
Tellurium	log_{10}	-	-	-	-	-	-
Thallium	log_{10}	0.271	ns	ns	ns	ns	ns
Tin	log_{10}	0.036	-	-	ns	217	-
Titanium	log_{10}	-	-	-	-	-	-
Uranium	log_{10}	0.009	-75	ns	ns	ns	ns
Vanadium	log_{10}	0.018	ns	ns	ns	ns	ns
Zinc	log_{10}	0.139	ns	ns	ns	ns	ns
Zirconium	log_{10}	-	-	-	-	-	-

Area x Year or Area P-value < 0.05.

Contrast is significant (α = 0.05) and magnitude of difference is positive.

Contrast is significant (α = 0.05) and magnitude of difference is negative.

Notes: "-" = no data available or samples reported below the laboratory reporting limit (<LRL) so TTF ratio was not calculated, ANOVA = one way analysis of variance, MOD = Magnitude of Difference, nt = not tested because all data were reported <LRL or because there were only data for a single time period, ns = not significant.

[a] Magnitude of difference (MOD) calculated on backtransformed least-squares means as (Post-breach-Pre-breach)/Pre-breach x 100%.

Table F.4.25: Statistical Comparisons of Exposed - Reference Relative Differences of Periphyton Tissue Metal Concentrations for Lower Edney Creek (E1 [Exposed]; EDC-D [Reference]), 2019 to 2022

Parameter	Data Transformation	Two-way ANOVA P-values			(Exposed – Reference) Contrasts Among Periods[a]				Magnitude of Difference in (Exposed – Reference) Relative to Baseline Period (%)[b]				Magnitude of Difference for E1 Mean Relative to EDC-D (%)[c]			
		Area	Year	Area × Year	Post-Breach Period				Post-Breach Period				Post-Breach Period			
					2019	2020	2021	2022	2019	2020	2021	2022	2019	2020	2021	2022
Aluminum	MLE	0.230	0.003	<0.001	B	B	A	B	baseline	ns	100	ns	ns	ns	123	ns
Antimony	MLE	0.627	0.033	0.177	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns
Arsenic	MLE	<0.001	0.473	0.010	AB	A	BC	C	baseline	ns	ns	-46	ns	ns	-49	-54
Barium	MLE	0.047	0.062	0.001	B	B	A	B	baseline	ns	637	ns	ns	ns	484	ns
Beryllium	MLE	0.500	<0.001	0.156	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns
Bismuth	MLE	0.036	<0.001	0.150	A	A	A	A	baseline	ns	ns	ns	-23			
Boron	MLE	0.936	<0.001	0.160	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns
Cadmium	MLE	0.006	0.074	0.272	A	A	A	A	baseline	ns	ns	ns	-30			
Calcium	MLE	0.072	<0.001	<0.001	BC	B	A	C	baseline	ns	311	ns	ns	59	350	ns
Cesium	MLE	0.057	<0.001	0.036	AB	A	AB	B	baseline	ns	ns	ns	ns	ns	-32	-46
Chromium	MLE	0.685	0.131	0.018	B	B	A	B	baseline	ns	313	ns	ns	ns	137	ns
Cobalt	MLE	0.056	<0.001	0.362	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns
Copper	MLE	<0.001	0.871	0.145	A	A	A	A	baseline	ns	ns	ns	356			
Iron	MLE	0.794	<0.001	0.032	AB	A	AB	B	baseline	ns	ns	ns	ns	ns	ns	-37
Lead	MLE	0.237	0.321	0.380	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns
Lithium	MLE	0.813	<0.001	0.024	A	A	A	B	baseline	ns	ns	-53	ns	ns	ns	-44
Magnesium	MLE	0.243	<0.001	0.002	A	A	A	B	baseline	ns	ns	-61	65	ns	49	-35
Manganese	MLE	<0.001	0.134	0.059	A	A	A	A	baseline	ns	ns	ns	-54			
Mercury	MLE	0.242	<0.001	0.703	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns
Molybdenum	MLE	0.039	0.237	0.406	A	A	A	A	baseline	ns	ns	ns	-27			
Nickel	MLE	<0.001	<0.001	0.474	A	A	A	A	baseline	ns	ns	ns	-34			
Phosphorus	MLE	0.499	0.055	0.486	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns
Potassium	MLE	0.071	0.002	0.719	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns
Rubidium	MLE	0.006	<0.001	0.162	A	A	A	A	baseline	ns	ns	ns	-27			
Selenium	MLE	0.035	0.011	0.044	AB	A	B	B	baseline	ns	ns	ns	ns	ns	-44	ns
Silver	MLE	0.542	0.015	0.038	AB	A	AB	B	baseline	ns	ns	ns	ns	81	ns	ns
Sodium	MLE	0.014	<0.001	0.024	B	AB	A	B	baseline	ns	68	ns	ns	52	91	ns
Strontium	MLE	0.093	<0.001	<0.001	B	B	A	B	baseline	ns	242	ns	ns	ns	233	ns
Tellurium	MLE	<0.001	0.054	0.074	<LRL	A	A	A	<LRL	baseline	ns	ns	<LRL	94		
Thallium	MLE	0.007	<0.001	0.171	A	A	A	A	baseline	ns	ns	ns	-34			
Tin	MLE	0.444	<0.001	0.012	B	A	A	A	baseline	248	236	222	-49	ns	ns	ns
Titanium	MLE	0.109	<0.001	<0.001	BC	AB	A	C	baseline	ns	138	ns	ns	52	133	ns
Uranium	MLE	0.448	<0.001	0.106	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns
Vanadium	MLE	0.183	<0.001	0.005	BC	A	AB	C	baseline	102	ns	ns	ns	96	50	ns
Zinc	MLE	0.022	<0.001	0.104	A	A	A	A	baseline	ns	ns	ns	-23			
Zirconium	MLE	0.774	0.001	0.010	BC	AB	A	C	baseline	ns	90	ns	ns	ns	55	ns

Area x Year or Area P-value < 0.05.

Contrast is significant (α = 0.05) and magnitude of difference is positive.

Contrast is significant (α = 0.05) and magnitude of difference is negative.

Notes: "-" = no data available, ANOVA = two way analysis of variance, MLE = censored regression using maximum likelihood estimation, MOD = Magnitude of Difference, nt = not tested because all data were reported below the laboratory reporting limit (<LRL) or because there were only data for a single time period, ns = not significant, baseline= first year of data included in analysis, <LRL = greater than 50% LRL data for both stations so the time period was omitted from the analysis. Merged cells across years indicate that the Area × Time term was not significant, therefore MOD is for all years combined. Only years with samples from both reference and exposed were included in the analysis. Data were analysed in units of mg/kg dry weight.

[a] Years that share a letter (e.g., A,B,C) had ratios of concentrations (E1:EDC-D) that do not differ significantly among years. Letters are assigned such that A is assigned to the year with the highest ratio of concentrations (E1:EDC-D).

[b] Magnitude of difference (MOD) calculated on backtransformed least-squares means for the observed time period as $(Exp_{observed} - Exp_{predicted})/(Exp_{predicted})\times 100\%$ where $Exp_{predicted} = Ref_{observed} + (Exp_{baseline} - Ref_{baseline})$.

[c] Magnitude of difference (MOD) calculated on backtransformed least-squares means as (Exp-Ref)/Ref x 100%.

Table F.4.26: Statistical Comparisons of Exposed - Reference Relative Differences of Caddisfly Tissue Metal Concentrations for Lower Edney Creek (E1 [Exposed]; EDC-D [Reference]), 2019 to 2022

Parameter	Data Transformation	Two-way ANOVA P-values			(Exposed – Reference) Contrasts Among Periods[a]				Magnitude of Difference in (Exposed – Reference) Relative to Baseline Period (%)[b]				Magnitude of Difference for E1 Mean Relative to EDC-D (%)[c]			
		Area	Year	Area × Year	Post-Breach Period				Post-Breach Period				Post-Breach Period			
					2019	2020	2021	2022	2019	2020	2021	2022	2019	2020	2021	2022
Aluminum	MLE	0.143	<0.001	0.125	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns
Antimony	MLE	0.999	<0.001	0.057	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns
Arsenic	MLE	0.007	0.010	0.027	AB	B	B	A	baseline	ns	ns	ns	ns	-59	-58	ns
Barium	MLE	0.895	<0.001	0.140	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns
Beryllium	MLE	0.246	<0.001	0.023	B	B	B	A	baseline	ns	ns	564	ns	ns	-73	ns
Bismuth	MLE	0.117	0.294	0.104	<LRL	A	<LRL	A	<LRL	baseline	<LRL	ns	<LRL	ns	<LRL	ns
Boron	MLE	0.549	0.369	<0.001	<LRL	B	<LRL	A	<LRL	baseline	<LRL	546	<LRL	-53	<LRL	204
Cadmium	MLE	0.118	<0.001	0.097	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns
Calcium	MLE	0.042	<0.001	<0.001	B	B	B	A	baseline	ns	ns	214	-53	-33	-33	47
Cesium	MLE	0.189	<0.001	0.060	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns
Chromium	MLE	0.108	<0.001	0.227	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns
Cobalt	MLE	0.496	<0.001	0.135	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns
Copper	MLE	<0.001	<0.001	<0.001	C	B	B	A	baseline	114	80	290	ns	95	65	256
Iron	MLE	0.134	<0.001	0.089	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns
Lead	MLE	0.544	<0.001	0.164	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns
Lithium	MLE	0.866	0.388	0.007	<LRL	B	<LRL	A	<LRL	baseline	<LRL	529	<LRL	-62	<LRL	ns
Magnesium	MLE	0.247	<0.001	0.010	AB	B	B	A	baseline	ns	ns	ns	ns	-34	ns	ns
Manganese	MLE	0.984	<0.001	0.324	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns
Mercury	MLE	0.887	<0.001	0.256	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns
Molybdenum	MLE	<0.001	0.026	0.326	A	A	A	A	baseline	ns	ns	ns	-44			
Nickel	MLE	0.085	<0.001	0.183	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns
Phosphorus	MLE	0.696	0.070	0.004	B	A	B	B	baseline	30	ns	ns	ns	18	ns	ns
Potassium	MLE	0.987	0.054	<0.001	B	B	B	A	baseline	ns	ns	73	ns	ns	-23	67
Rubidium	MLE	0.742	<0.001	0.002	B	B	B	A	baseline	ns	ns	98	ns	ns	ns	107
Selenium	MLE	0.005	0.066	<0.001	B	A	B	B	baseline	121	ns	ns	ns	108	ns	ns
Silver	MLE	0.467	<0.001	0.008	B	B	AB	A	baseline	ns	ns	284	-54	ns	ns	75
Sodium	MLE	0.716	0.728	0.238	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns
Strontium	MLE	0.027	<0.001	<0.001	B	B	B	A	baseline	ns	ns	191	-48	-46	-37	52
Tellurium	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Thallium	MLE	0.340	<0.001	0.023	B	B	AB	A	baseline	ns	ns	442	-63	ns	ns	ns
Tin	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Titanium	MLE	0.179	<0.001	0.072	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns
Uranium	MLE	0.287	<0.001	0.014	B	B	B	A	baseline	ns	ns	898	-75	ns	ns	ns
Vanadium	MLE	0.178	<0.001	0.110	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns
Zinc	MLE	0.194	<0.001	0.015	B	A	AB	A	baseline	50	ns	45	ns	30	ns	26
Zirconium	MLE	0.134	<0.001	0.003	B	B	C	A	baseline	ns	-99	627	ns	ns	ns	ns

Area x Year or Area P-value < 0.05.

Contrast is significant (α = 0.05) and magnitude of difference is positive.

Contrast is significant (α = 0.05) and magnitude of difference is negative.

Notes: "-" = no data available, ANOVA = two way analysis of variance, MLE = censored regression using maximum likelihood estimation, MOD = Magnitude of Difference, nt = not tested because all data were reported below the laboratory reporting limit (<LRL) or because there were only data for a single time period, ns = not significant, baseline= first year of data included in analysis, <LRL = greater than 50% LRL data for both stations so the time period was omitted from the analysis. Merged cells across years indicate that the Area × Time term was not significant, therefore MOD is for all years combined. Only years with samples from both reference and exposed were included in the analysis. Data were analysed in units of mg/kg dry weight.

[a] Years that share a letter (e.g., A,B,C) had ratios of concentrations (E1:EDC-D) that do not differ significantly among years. Letters are assigned such that A is assigned to the year with the highest ratio of concentrations (E1:EDC-D).

[b] Magnitude of difference (MOD) calculated on backtransformed least-squares means for the observed time period as $(Exp_{observed} - Exp_{predicted})/(Exp_{predicted}) \times 100\%$ where $Exp_{predicted} = Ref_{observed} + (Exp_{baseline} - Ref_{baseline})$.

[c] Magnitude of difference (MOD) calculated on backtransformed least-squares means as (Exp-Ref)/Ref x 100%.

Table F.4.27: **Statistical Comparisons of Exposed - Reference Relative Differences of Composite-Taxa Benthic Invertebrate Tissue Metal Concentrations for Lower Edney Creek (E1 [Exposed]; EDC-D [Reference]), 2019 to 2022**

Parameter	Data Transformation	Two-way ANOVA P-values			(Exposed – Reference) Contrasts Among Periods[a]				Magnitude of Difference in (Exposed – Reference) Relative to Baseline Period (%)[b]				Magnitude of Difference for E1 Mean Relative to EDC-D (%)[c]			
		Area	Year	Area × Year	Post-Breach Period				Post-Breach Period				Post-Breach Period			
					2019	2020	2021	2022	2019	2020	2021	2022	2019	2020	2021	2022
Aluminum	MLE	0.036	0.414	0.992	A	A	A	A	baseline	ns	ns	ns	44			
Antimony	MLE	0.587	<0.001	0.389	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns
Arsenic	MLE	0.326	<0.001	0.292	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns
Barium	MLE	0.607	0.045	0.989	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns
Beryllium	MLE	0.030	0.243	0.943	A	A	A	A	baseline	ns	ns	ns	45			
Bismuth	MLE	0.756	0.424	0.351	<LRL	<LRL	A	A	<LRL	<LRL	baseline	ns	<LRL	<LRL	ns	ns
Boron	MLE	0.139	<0.001	0.008	B	B	A	A	baseline	ns	161	153	-51	-58	ns	ns
Cadmium	MLE	<0.001	<0.001	0.322	A	A	A	A	baseline	ns	ns	ns	87			
Calcium	MLE	0.138	0.002	0.140	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns
Cesium	MLE	0.602	0.044	0.800	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns
Chromium	MLE	0.515	0.019	0.920	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns
Cobalt	MLE	0.002	0.010	0.506	A	A	A	A	baseline	ns	ns	ns	45			
Copper	MLE	0.002	0.008	0.037	B	AB	A	AB	baseline	ns	116	ns	ns	ns	107	46
Iron	MLE	0.054	0.164	0.994	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns
Lead	MLE	0.068	0.587	0.946	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns
Lithium	MLE	0.018	0.738	0.979	A	A	A	A	baseline	ns	ns	ns	45			
Magnesium	MLE	0.521	0.231	0.021	B	AB	AB	A	baseline	ns	ns	66	-24	ns	ns	26
Manganese	MLE	0.282	<0.001	0.550	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns
Mercury	MLE	0.827	0.312	0.013	A	AB	B	B	baseline	ns	-42	-57	53	ns	ns	-35
Molybdenum	MLE	0.434	0.031	0.038	A	B	A	AB	baseline	-51	ns	ns	ns	ns	55	ns
Nickel	MLE	0.336	0.060	0.053	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns
Phosphorus	MLE	0.186	<0.001	0.019	B	B	AB	A	baseline	ns	ns	30	-14	-13	ns	ns
Potassium	MLE	0.463	0.001	0.006	A	B	AB	A	baseline	-21	ns	ns	ns	-22	ns	18
Rubidium	MLE	0.638	0.002	<0.001	B	C	AB	A	baseline	-40	ns	58	ns	-40	ns	58
Selenium	MLE	0.396	<0.001	0.985	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns
Silver	MLE	<0.001	0.215	0.232	A	A	A	A	baseline	ns	ns	ns	-46			
Sodium	MLE	<0.001	0.220	0.068	A	A	A	A	baseline	ns	ns	ns	45			
Strontium	MLE	0.009	0.001	0.014	B	AB	A	A	baseline	ns	102	99	-52	ns	ns	ns
Tellurium	MLE	nt	nt	nt	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL	<LRL
Thallium	MLE	0.457	0.211	0.692	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns
Tin	MLE	0.499	<0.001	0.321	A	A	<LRL	<LRL	baseline	ns	<LRL	<LRL	ns	ns	<LRL	<LRL
Titanium	MLE	<0.001	0.149	0.922	A	A	A	A	baseline	ns	ns	ns	83			
Uranium	MLE	0.317	0.273	0.727	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns
Vanadium	MLE	0.005	0.128	0.938	A	A	A	A	baseline	ns	ns	ns	67			
Zinc	MLE	<0.001	0.247	0.820	A	A	A	A	baseline	ns	ns	ns	-21			
Zirconium	MLE	0.073	<0.001	0.701	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns

Area x Year or Area P-value < 0.05.

Contrast is significant (α = 0.05) and magnitude of difference is positive.

Contrast is significant (α = 0.05) and magnitude of difference is negative.

Notes: "-" = no data available, ANOVA = two way analysis of variance, MLE = censored regression using maximum likelihood estimation, MOD = Magnitude of Difference, nt = not tested because all data were reported below the laboratory reporting limit (<LRL) or because there were only data for a single time period, ns = not significant, baseline= first year of data included in analysis, <LRL = greater than 50% LRL data for both stations so the time period was omitted from the analysis. Merged cells across years indicate that the Area × Time term was not significant, therefore MOD is for all years combined. Only years with samples from both reference and exposed were included in the analysis. Data were analysed in units of mg/kg dry weight.

[a] Years that share a letter (e.g., A,B,C) had ratios of concentrations (E1:EDC-D) that do not differ significantly among years. Letters are assigned such that A is assigned to the year with the highest ratio of concentrations (E1:EDC-D).

[b] Magnitude of difference (MOD) calculated on backtransformed least-squares means for the observed time period as $(Exp_{observed} - Exp_{predicted})/(Exp_{predicted})\times 100\%$ where $Exp_{predicted} = Ref_{observed} + (Exp_{baseline} - Ref_{baseline})$.

[c] Magnitude of difference (MOD) calculated on backtransformed least-squares means as (Exp-Ref)/Ref x 100%.

Table F.4.28: **Statistical Comparisons of Exposed - Reference Relative Differences of Trophic Transfer Factors for Caddisfly Tissue Metal Concentrations for Lower Edney Creek (E1 [Exposed]; EDC-D [Reference]), 2019 to 2022**

Parameter	Data Transformation	Two-way ANOVA P-values			(Exposed – Reference) Contrasts Among Periods[a]				Magnitude of Difference in (Exposed – Reference) Relative to Baseline Period (%)[b]				Magnitude of Difference for E1 Mean Relative to EDC-D (%)[c]			
		Area	Year	Area × Year	Post-Breach Period				Post-Breach Period				Post-Breach Period			
					2019	2020	2021	2022	2019	2020	2021	2022	2019	2020	2021	2022
Aluminum	Log_{10}	0.013	<0.001	0.010	B	B	B	A	baseline	ns	ns	626	ns	ns	-83	ns
Antimony	Log_{10}	0.304	<0.001	0.108	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns
Arsenic	Log_{10}	0.709	0.004	0.002	B	B	B	A	baseline	ns	ns	269	ns	-57	ns	185
Barium	Log_{10}	0.180	<0.001	0.013	AB	B	B	A	baseline	ns	ns	ns	ns	ns	-83	ns
Beryllium	Log_{10}	0.881	0.042	<0.001	AB	B	AB	A	baseline	ns	ns	ns	ns	-75	ns	233
Bismuth	Log_{10}	0.707	0.065	0.091	-	A	-	A	-	baseline	-	ns	-	ns	-	ns
Boron	Log_{10}	0.303	0.154	0.013	A	B	-	A	baseline	-84	-	ns	ns	-64	-	ns
Cadmium	Log_{10}	<0.001	<0.001	0.033	B	AB	A	A	baseline	ns	313	561	ns	154	208	393
Calcium	Log_{10}	<0.001	<0.001	<0.001	B	B	C	A	baseline	ns	-65	379	-57	-58	-85	105
Cesium	Log_{10}	0.412	<0.001	0.009	B	B	B	A	baseline	ns	ns	593	ns	-63	ns	238
Chromium	Log_{10}	0.068	<0.001	0.022	A	A	B	A	baseline	ns	-86	ns	ns	ns	-89	ns
Cobalt	Log_{10}	0.962	<0.001	0.044	B	B	AB	A	baseline	ns	ns	541	ns	ns	ns	259
Copper	Log_{10}	<0.001	0.029	0.061	A	A	A	A	baseline	ns	ns	ns	-61			
Iron	Log_{10}	0.065	<0.001	0.016	B	B	B	A	baseline	ns	ns	578	ns	-68	ns	ns
Lead	Log_{10}	0.272	<0.001	0.028	B	B	B	A	baseline	ns	ns	312	ns	ns	ns	173
Lithium	Log_{10}	0.251	0.073	<0.001	-	B	-	A	-	baseline	-	892	-	-75	-	151
Magnesium	Log_{10}	0.031	<0.001	<0.001	B	B	B	A	baseline	ns	ns	262	-45	-39	-46	100
Manganese	Log_{10}	0.001	<0.001	0.038	B	B	AB	A	baseline	ns	ns	497	ns	ns	ns	556
Mercury	Log_{10}	0.335	<0.001	0.798	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns
Molybdenum	Log_{10}	0.186	0.615	0.980	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns
Nickel	Log_{10}	0.340	<0.001	0.073	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns
Phosphorus	Log_{10}	0.417	0.101	0.296	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns
Potassium	Log_{10}	0.070	<0.001	0.200	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns
Rubidium	Log_{10}	0.010	<0.001	0.003	B	B	B	A	baseline	ns	ns	213	ns	ns	ns	243
Selenium	Log_{10}	<0.001	<0.001	0.531	A	A	A	A	baseline	ns	ns	ns	64			
Silver	Log_{10}	0.612	<0.001	0.002	B	B	AB	A	baseline	ns	ns	408	ns	-58	ns	156
Sodium	Log_{10}	0.003	<0.001	0.012	AB	AB	B	A	baseline	ns	ns	ns	ns	ns	-53	ns
Strontium	Log_{10}	<0.001	<0.001	<0.001	B	BC	C	A	baseline	ns	-65	244	-46	-58	-81	86
Tellurium	Log_{10}	nt	nt	nt	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	Log_{10}	0.074	<0.001	0.015	AB	B	B	A	baseline	ns	ns	ns	ns	ns	ns	271
Tin	Log_{10}	0.490	0.126	0.690	A	A	-	-	baseline	ns	-	-	ns	ns	-	-
Titanium	Log_{10}	0.011	<0.001	0.007	B	B	B	A	baseline	ns	ns	806	-70	ns	-83	ns
Uranium	Log_{10}	0.424	<0.001	0.034	B	B	AB	A	baseline	ns	ns	750	ns	ns	ns	268
Vanadium	Log_{10}	0.015	<0.001	0.028	B	B	B	A	baseline	ns	ns	636	-69	-70	-71	ns
Zinc	Log_{10}	<0.001	<0.001	0.006	B	A	A	A	baseline	86	85	171	ns	53	52	123
Zirconium	Log_{10}	0.499	0.240	0.003	AB	B	-	A	baseline	ns	-	ns	ns	-65	-	280

Area x Year or Area P-value < 0.05.

Contrast is significant (α = 0.05) and magnitude of difference is positive.

Contrast is significant (α = 0.05) and magnitude of difference is negative.

Notes: "-" = no data available or samples reported below the laboratory reporting limit (<LRL) so TTF ratio was not calculated, ANOVA = two way analysis of variance, MLE = censored regression using maximum likelihood estimation, MOD = Magnitude of Difference, nt = not tested because all data were <LRL or because there were only data for a single time period, ns = not significant, baseline= first year of data included in analysis, <LRL = greater than 50% LRL data for both stations so the time period was omitted from the analysis. Merged cells across years indicate that the Area × Time term was not significant, therefore MOD is for all years combined. Only years with samples from both reference and exposed were included in the analysis.

[a] Years that share a letter (e.g., A,B,C) had ratios of concentrations (E1:EDC-D) that do not differ significantly among years. Letters are assigned such that A is assigned to the year with the highest ratio of concentrations (E1:EDC-D).

[b] Magnitude of difference (MOD) calculated on backtransformed least-squares means for the observed time period as $(Exp_{observed} - Exp_{predicted})/(Exp_{predicted})\times 100\%$ where $Exp_{predicted} = Ref_{observed} + (Exp_{baseline} - Ref_{baseline})$.

[c] Magnitude of difference (MOD) calculated on backtransformed least-squares means as (Exp-Ref)/Ref x 100%.

Table F.4.29: **Statistical Comparisons of Exposed - Reference Relative Differences of Trophic Transfer Factors for Composite-Taxa Benthic Invertebrate Tissue Metal Concentrations for Lower Edney Creek (E1 [Exposed]; EDC-D [Reference]), 2019 to 2022**

Parameter	Data Transformation	Two-way ANOVA P-values			(Exposed – Reference) Contrasts Among Periods[a]				Magnitude of Difference in (Exposed – Reference) Relative to Baseline Period (%)[b]				Magnitude of Difference for E1 Mean Relative to EDC-D (%)[c]			
		Area	Year	Area × Year	Post-Breach Period				Post-Breach Period				Post-Breach Period			
					2019	2020	2021	2022	2019	2020	2021	2022	2019	2020	2021	2022
Aluminum	Log_{10}	0.234	0.063	0.234	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns
Antimony	Log_{10}	0.634	0.318	0.178	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns
Arsenic	Log_{10}	0.060	<0.001	0.025	AB	B	A	A	baseline	ns	ns	ns	ns	ns	ns	142
Barium	Log_{10}	0.145	0.534	0.020	A	AB	B	A	baseline	ns	-86	ns	ns	ns	-81	ns
Beryllium	Log_{10}	0.166	0.002	0.480	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns
Bismuth	Log_{10}	0.247	0.158	0.290	A	-	A	A	baseline	-	ns	ns	ns	-	ns	ns
Boron	Log_{10}	0.235	<0.001	0.142	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns
Cadmium	Log_{10}	<0.001	<0.001	0.813	A	A	A	A	baseline	ns	ns	ns	167			
Calcium	Log_{10}	<0.001	<0.001	<0.001	B	B	C	A	baseline	ns	-64	153	ns	-45	-79	ns
Cesium	Log_{10}	0.080	<0.001	0.192	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns
Chromium	Log_{10}	0.474	0.683	0.165	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns
Cobalt	Log_{10}	<0.001	<0.001	0.138	A	A	A	A	baseline	ns	ns	ns	82			
Copper	Log_{10}	<0.001	0.132	0.493	A	A	A	A	baseline	ns	ns	ns	-69			
Iron	Log_{10}	0.052	<0.001	0.417	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns
Lead	Log_{10}	0.025	0.924	0.634	A	A	A	A	baseline	ns	ns	ns	52			
Lithium	Log_{10}	0.084	<0.001	0.082	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns
Magnesium	Log_{10}	0.122	0.009	<0.001	B	B	B	A	baseline	ns	ns	324	-54	ns	ns	94
Manganese	Log_{10}	<0.001	<0.001	0.308	A	A	A	A	baseline	ns	ns	ns	88			
Mercury	Log_{10}	0.203	0.002	0.279	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns
Molybdenum	Log_{10}	0.036	0.025	0.168	A	A	A	A	baseline	ns	ns	ns	52			
Nickel	Log_{10}	0.092	0.003	0.061	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns
Phosphorus	Log_{10}	0.955	0.046	0.115	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns
Potassium	Log_{10}	0.116	0.006	0.529	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns
Rubidium	Log_{10}	0.008	<0.001	0.004	BC	C	AB	A	baseline	ns	ns	149	ns	ns	103	162
Selenium	Log_{10}	0.015	0.508	0.150	A	A	A	A	baseline	ns	ns	ns	41			
Silver	Log_{10}	<0.001	0.045	0.031	A	B	AB	A	baseline	-57	ns	ns	ns	-73	-62	ns
Sodium	Log_{10}	0.476	<0.001	0.005	A	A	B	A	baseline	ns	-57	ns	ns	ns	-46	93
Strontium	Log_{10}	<0.001	<0.001	0.014	B	AB	B	A	baseline	ns	ns	136	-51	ns	-71	ns
Tellurium	Log_{10}	nt	nt	nt	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	Log_{10}	0.001	<0.001	0.137	A	A	A	A	baseline	ns	ns	ns	63			
Tin	Log_{10}	0.353	0.701	0.036	A	B	-	-	baseline	-79	-	-	148	ns	-	-
Titanium	Log_{10}	0.035	0.004	0.052	A	A	A	A	baseline	ns	ns	ns	47			
Uranium	Log_{10}	0.220	0.005	0.470	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns
Vanadium	Log_{10}	0.081	0.003	0.294	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns
Zinc	Log_{10}	0.744	0.002	0.315	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns
Zirconium	Log_{10}	0.099	0.035	0.348	A	A	A	A	baseline	ns	ns	ns	ns	ns	ns	ns

Area x Year or Area P-value < 0.05.

Contrast is significant (α = 0.05) and magnitude of difference is positive.

Contrast is significant (α = 0.05) and magnitude of difference is negative.

Notes: "-" = no data available or samples reported below the laboratory reporting limit (<LRL) so TTF ratio was not calculated, ANOVA = two way analysis of variance, MLE = censored regression using maximum likelihood estimation, MOD = Magnitude of Difference, nt = not tested because all data were <LRL or because there were only data for a single time period, ns = not significant, baseline= first year of data included in analysis, <LRL = greater than 50% LRL data for both stations so the time period was omitted from the analysis. Merged cells across years indicate that the Area × Time term was not significant, therefore MOD is for all years combined. Only years with samples from both reference and exposed were included in the analysis.

[a] Years that share a letter (e.g., A,B,C) had ratios of concentrations (E1:EDC-D) that do not differ significantly among years. Letters are assigned such that A is assigned to the year with the highest ratio of concentrations (E1:EDC-D).

[b] Magnitude of difference (MOD) calculated on backtransformed least-squares means for the observed time period as $(Exp_{observed} - Exp_{predicted})/(Exp_{predicted}) \times 100\%$ where $Exp_{predicted} = Ref_{observed} + (Exp_{baseline} - Ref_{baseline})$.

[c] Magnitude of difference (MOD) calculated on backtransformed least-squares means as (Exp-Ref)/Ref x 100%.

APPENDIX G
ANALYTICAL REPORTS

WATER CHEMISTRY

ALS Laboratory Report VA22B4117

(Finalized July 8, 2022)

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **VA22B4117**	Page	: 1 of 6
Client	: **Mount Polley Mining Corporation**	Laboratory	: Vancouver - Environmental
Contact	: Kala Ivens	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: 250-790-2215 Ext 2112	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 22-Jun-2022 10:55
PO	: 5590008044 Q2 2022	Date Analysis Commenced	: 23-Jun-2022
C-O-C number	: ----	Issue Date	: 08-Jul-2022 15:48
Sampler	: ----		
Site	: ----		
Quote number	: VA22-MPMC100-006 - Minnow Env. - Water Quality		
No. of samples received	: 2		
No. of samples analysed	: 2		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Ann Joby	Lab Assistant	Metals, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia
Lindsay Gung	Supervisor - Water Chemistry	Inorganics, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Metals, Burnaby, British Columbia

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

Unit	*Description*
-	No Unit
µg/L	micrograms per litre
µS/cm	Microsiemens per centimetre
mg/L	milligrams per litre
NTU	nephelometric turbidity units
pH units	pH units

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BOL-B2_WS_DI-1_2022-06	POL-P2_WS_DI-1_2022-06	----	----	----
					Client sampling date / time	21-Jun-2022 14:25	21-Jun-2022 12:05	----	----	----
						VA22B4117-001	VA22B4117-002	--------	--------	--------
						Result	Result	----	----	----
Physical Tests										
alkalinity, total (as CaCO3)	----	E290	1.0	mg/L		38.1	88.2	----	----	----
conductivity	----	E100	2.0	µS/cm		92.2	242	----	----	----
hardness (as CaCO3), dissolved	----	EC100	0.50	mg/L		44.2	109	----	----	----
hardness (as CaCO3), from total Ca/Mg	----	EC100A	0.50	mg/L		44.2	106	----	----	----
pH	----	E108	0.10	pH units		7.72	8.12	----	----	----
solids, total dissolved [TDS]	----	E162	10	mg/L		79	162	----	----	----
solids, total suspended [TSS]	----	E164	1.0	mg/L		3.0	3.0	----	----	----
turbidity	----	E121	0.10	NTU		1.27	1.44	----	----	----
Anions and Nutrients										
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L		0.0052	<0.0050	----	----	----
chloride	16887-00-6	E235.Cl	0.50	mg/L		0.62	1.03	----	----	----
fluoride	16984-48-8	E235.F	0.020	mg/L		0.057	0.074	----	----	----
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L		<0.0050	<0.0050	----	----	----
nitrate + nitrite (as N)	----	EC235.N+N	0.0050	mg/L		<0.0051	<0.0051	----	----	----
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L		<0.0010	<0.0010	----	----	----
nitrogen, total	7727-37-9	E366	0.030	mg/L		0.314	0.367	----	----	----
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L		<0.0010	<0.0010	----	----	----
phosphorus, total	7723-14-0	E372-U	0.0020	mg/L		0.0130	0.0180	----	----	----
phosphorus, total dissolved	7723-14-0	E375-T	0.0020	mg/L		0.0061	0.0072	----	----	----
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L		7.16	33.8	----	----	----
Organic / Inorganic Carbon										
carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L		7.43	6.77	----	----	----
Total Metals										
aluminum, total	7429-90-5	E420	0.0030	mg/L		0.0586	0.103	----	----	----
antimony, total	7440-36-0	E420	0.00010	mg/L		0.00015	0.00012	----	----	----
arsenic, total	7440-38-2	E420	0.00010	mg/L		0.00058	0.00085	----	----	----
barium, total	7440-39-3	E420	0.00010	mg/L		0.0181	0.0126	----	----	----
beryllium, total	7440-41-7	E420	0.000100	mg/L		<0.000100	<0.000100	----	----	----
bismuth, total	7440-69-9	E420	0.000050	mg/L		<0.000050	<0.000050	----	----	----
boron, total	7440-42-8	E420	0.010	mg/L		0.045	0.020	----	----	----

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BOL-B2_WS_DI-1_2022-06	POL-P2_WS_DI-1_2022-06	----	----	----
					Client sampling date / time	21-Jun-2022 14:25	21-Jun-2022 12:05	----	----	----
						VA22B4117-001	VA22B4117-002	--------	--------	--------
						Result	Result	----	----	----
Total Metals										
cadmium, total	7440-43-9	E420	0.0000050	mg/L		0.0000120	0.0000070	----	----	----
calcium, total	7440-70-2	E420	0.050	mg/L		13.6	34.2	----	----	----
chromium, total	7440-47-3	E420	0.00050	mg/L		<0.00050	0.00053	----	----	----
cobalt, total	7440-48-4	E420	0.00010	mg/L		<0.00010	<0.00010	----	----	----
copper, total	7440-50-8	E420	0.00050	mg/L		0.00554	0.00807	----	----	----
iron, total	7439-89-6	E420	0.030	mg/L		0.074	0.101	----	----	----
lead, total	7439-92-1	E420	0.000050	mg/L		0.000098	0.000210	----	----	----
lithium, total	7439-93-2	E420	0.0010	mg/L		0.0011	0.0014	----	----	----
magnesium, total	7439-95-4	E420	0.100	mg/L		2.50	4.97	----	----	----
manganese, total	7439-96-5	E420	0.00010	mg/L		0.0140	0.00857	----	----	----
molybdenum, total	7439-98-7	E420	0.000050	mg/L		0.000788	0.00596	----	----	----
nickel, total	7440-02-0	E420	0.00050	mg/L		<0.00050	<0.00050	----	----	----
potassium, total	7440-09-7	E420	0.050	mg/L		0.517	1.28	----	----	----
selenium, total	7782-49-2	E420	0.000050	mg/L		0.000192	0.000509	----	----	----
silicon, total	7440-21-3	E420	0.10	mg/L		1.99	3.68	----	----	----
silver, total	7440-22-4	E420	0.000010	mg/L		<0.000010	0.000016	----	----	----
sodium, total	7440-23-5	E420	0.050	mg/L		2.43	7.00	----	----	----
strontium, total	7440-24-6	E420	0.00020	mg/L		0.126	0.233	----	----	----
thallium, total	7440-28-0	E420	0.000010	mg/L		<0.000010	<0.000010	----	----	----
tin, total	7440-31-5	E420	0.00010	mg/L		0.00023	0.00011	----	----	----
titanium, total	7440-32-6	E420	0.0100	mg/L		<0.0100	<0.0100	----	----	----
uranium, total	7440-61-1	E420	0.000010	mg/L		0.000041	0.000192	----	----	----
vanadium, total	7440-62-2	E420	0.00050	mg/L		<0.00050	0.00159	----	----	----
zinc, total	7440-66-6	E420	0.0030	mg/L		0.0045	0.0034	----	----	----
Dissolved Metals										
aluminum, dissolved	7429-90-5	E421	0.0030	mg/L		0.0103	0.0056	----	----	----
antimony, dissolved	7440-36-0	E421	0.00010	mg/L		<0.00010	<0.00010	----	----	----
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L		0.00029	0.00050	----	----	----
barium, dissolved	7440-39-3	E421	0.00010	mg/L		0.0173	0.0101	----	----	----
beryllium, dissolved	7440-41-7	E421	0.000100	mg/L		<0.000100	<0.000100	----	----	----
bismuth, dissolved	7440-69-9	E421	0.000050	mg/L		<0.000050	<0.000050	----	----	----

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BOL-B2_WS_DI-1_2022-06	POL-P2_WS_DI-1_2022-06	----	----	----
					Client sampling date / time	21-Jun-2022 14:25	21-Jun-2022 12:05	----	----	----
						VA22B4117-001	VA22B4117-002	--------	--------	--------
						Result	Result	----	----	----
Dissolved Metals										
boron, dissolved	7440-42-8	E421	0.010	mg/L		0.046	0.020	----	----	----
cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L		<0.0000050	<0.0000050	----	----	----
calcium, dissolved	7440-70-2	E421	0.050	mg/L		13.5	35.2	----	----	----
chromium, dissolved	7440-47-3	E421	0.00050	mg/L		<0.00050	<0.00050	----	----	----
cobalt, dissolved	7440-48-4	E421	0.00010	mg/L		<0.00010	<0.00010	----	----	----
copper, dissolved	7440-50-8	E421	0.00050	mg/L		0.00265	0.00435	----	----	----
iron, dissolved	7439-89-6	E421	0.030	mg/L		<0.030	<0.030	----	----	----
lead, dissolved	7439-92-1	E421	0.000050	mg/L		<0.000050	<0.000050	----	----	----
lithium, dissolved	7439-93-2	E421	0.0010	mg/L		<0.0010	0.0012	----	----	----
magnesium, dissolved	7439-95-4	E421	0.100	mg/L		2.54	5.11	----	----	----
manganese, dissolved	7439-96-5	E421	0.00010	mg/L		0.00233	0.00155	----	----	----
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L		0.000765	0.00586	----	----	----
nickel, dissolved	7440-02-0	E421	0.00050	mg/L		<0.00050	<0.00050	----	----	----
potassium, dissolved	7440-09-7	E421	0.050	mg/L		0.494	1.27	----	----	----
selenium, dissolved	7782-49-2	E421	0.000050	mg/L		0.000178	0.000469	----	----	----
silicon, dissolved	7440-21-3	E421	0.050	mg/L		1.99	3.44	----	----	----
silver, dissolved	7440-22-4	E421	0.000010	mg/L		<0.000010	<0.000010	----	----	----
sodium, dissolved	7440-23-5	E421	0.050	mg/L		2.62	7.35	----	----	----
strontium, dissolved	7440-24-6	E421	0.00020	mg/L		0.135	0.235	----	----	----
thallium, dissolved	7440-28-0	E421	0.000010	mg/L		<0.000010	<0.000010	----	----	----
tin, dissolved	7440-31-5	E421	0.00010	mg/L		<0.00010	<0.00010	----	----	----
titanium, dissolved	7440-32-6	E421	0.0100	mg/L		<0.0100	<0.0100	----	----	----
uranium, dissolved	7440-61-1	E421	0.000010	mg/L		0.000038	0.000190	----	----	----
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L		<0.00050	0.00136	----	----	----
zinc, dissolved	7440-66-6	E421	0.0030	mg/L		0.0050	<0.0030	----	----	----
dissolved metals filtration location	----	EP421	-	-		Field	Field	----	----	----
Plant Pigments										
chlorophyll a	479-61-8	E870	0.010	µg/L		6.60	2.30	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA22B4117**	Page	: 1 of 12
Client	: **Mount Polley Mining Corporation**	Laboratory	: Vancouver - Environmental
Contact	: Kala Ivens	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: 250-790-2215 Ext 2112	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 22-Jun-2022 10:55
PO	: 5590008044 Q2 2022	Issue Date	: 08-Jul-2022 15:48
C-O-C number	: ----		
Sampler	: ----		
Site	: ----		
Quote number	: VA22-MPMC100-006 - Minnow Env. - Water Quality		
No. of samples received	: 2		
No. of samples analysed	: 2		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- Analysis Holding Time Outliers exist - please see following pages for full details.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) BOL-B2_WS_DI-1_2022-06	E298	21-Jun-2022	05-Jul-2022	----	----		07-Jul-2022	28 days	16 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) POL-P2_WS_DI-1_2022-06	E298	21-Jun-2022	05-Jul-2022	----	----		07-Jul-2022	28 days	16 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE BOL-B2_WS_DI-1_2022-06	E235.Cl	21-Jun-2022	----	----	----		24-Jun-2022	28 days	3 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE POL-P2_WS_DI-1_2022-06	E235.Cl	21-Jun-2022	----	----	----		24-Jun-2022	28 days	3 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE BOL-B2_WS_DI-1_2022-06	E378-U	21-Jun-2022	----	----	----		25-Jun-2022	3 days	4 days	× EHT
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE POL-P2_WS_DI-1_2022-06	E378-U	21-Jun-2022	----	----	----		25-Jun-2022	3 days	4 days	× EHT
Anions and Nutrients : Fluoride in Water by IC										
HDPE BOL-B2_WS_DI-1_2022-06	E235.F	21-Jun-2022	----	----	----		24-Jun-2022	28 days	3 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Fluoride in Water by IC										
HDPE										
POL-P2_WS_DI-1_2022-06	E235.F	21-Jun-2022	----	----	----		24-Jun-2022	28 days	3 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
BOL-B2_WS_DI-1_2022-06	E235.NO3-L	21-Jun-2022	----	----	----		24-Jun-2022	3 days	3 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
POL-P2_WS_DI-1_2022-06	E235.NO3-L	21-Jun-2022	----	----	----		24-Jun-2022	3 days	3 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
BOL-B2_WS_DI-1_2022-06	E235.NO2-L	21-Jun-2022	----	----	----		24-Jun-2022	3 days	3 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
POL-P2_WS_DI-1_2022-06	E235.NO2-L	21-Jun-2022	----	----	----		24-Jun-2022	3 days	3 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
BOL-B2_WS_DI-1_2022-06	E235.SO4	21-Jun-2022	----	----	----		24-Jun-2022	28 days	3 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
POL-P2_WS_DI-1_2022-06	E235.SO4	21-Jun-2022	----	----	----		24-Jun-2022	28 days	3 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass dissolved (sulfuric acid)										
BOL-B2_WS_DI-1_2022-06	E375-T	21-Jun-2022	05-Jul-2022	----	----		06-Jul-2022	28 days	15 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass dissolved (sulfuric acid)										
POL-P2_WS_DI-1_2022-06	E375-T	21-Jun-2022	05-Jul-2022	----	----		06-Jul-2022	28 days	15 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid)										
BOL-B2_WS_DI-1_2022-06	E366	21-Jun-2022	05-Jul-2022	----	----		07-Jul-2022	28 days	16 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid)										
POL-P2_WS_DI-1_2022-06	E366	21-Jun-2022	05-Jul-2022	----	----		07-Jul-2022	28 days	16 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid)										
BOL-B2_WS_DI-1_2022-06	E372-U	21-Jun-2022	05-Jul-2022	----	----		06-Jul-2022	28 days	15 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid)										
POL-P2_WS_DI-1_2022-06	E372-U	21-Jun-2022	05-Jul-2022	----	----		06-Jul-2022	28 days	15 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved)										
BOL-B2_WS_DI-1_2022-06	E421	21-Jun-2022	01-Jul-2022	----	----		03-Jul-2022	180 days	12 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved)										
POL-P2_WS_DI-1_2022-06	E421	21-Jun-2022	01-Jul-2022	----	----		03-Jul-2022	180 days	12 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid)										
BOL-B2_WS_DI-1_2022-06	E358-L	21-Jun-2022	05-Jul-2022	----	----		05-Jul-2022	28 days	14 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid)										
POL-P2_WS_DI-1_2022-06	E358-L	21-Jun-2022	05-Jul-2022	----	----		05-Jul-2022	28 days	14 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE										
BOL-B2_WS_DI-1_2022-06	E290	21-Jun-2022	----	----	----		28-Jun-2022	14 days	7 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Alkalinity Species by Titration										
HDPE										
POL-P2_WS_DI-1_2022-06	E290	21-Jun-2022	----	----	----		28-Jun-2022	14 days	7 days	✓
Physical Tests : Conductivity in Water										
HDPE										
BOL-B2_WS_DI-1_2022-06	E100	21-Jun-2022	----	----	----		28-Jun-2022	28 days	7 days	✓
Physical Tests : Conductivity in Water										
HDPE										
POL-P2_WS_DI-1_2022-06	E100	21-Jun-2022	----	----	----		28-Jun-2022	28 days	7 days	✓
Physical Tests : pH by Meter										
HDPE										
BOL-B2_WS_DI-1_2022-06	E108	21-Jun-2022	----	----	----		28-Jun-2022	0.25 hrs	170 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE										
POL-P2_WS_DI-1_2022-06	E108	21-Jun-2022	----	----	----		28-Jun-2022	0.25 hrs	172 hrs	× EHTR-FM
Physical Tests : TDS by Gravimetry										
HDPE										
BOL-B2_WS_DI-1_2022-06	E162	21-Jun-2022	----	----	----		29-Jun-2022	7 days	8 days	× EHT
Physical Tests : TDS by Gravimetry										
HDPE										
POL-P2_WS_DI-1_2022-06	E162	21-Jun-2022	----	----	----		29-Jun-2022	7 days	8 days	× EHT
Physical Tests : TSS by Gravimetry (Whole Bottle)										
HDPE [TSS-WB]										
BOL-B2_WS_DI-1_2022-06	E164	21-Jun-2022	----	----	----		28-Jun-2022	7 days	7 days	✓
Physical Tests : TSS by Gravimetry (Whole Bottle)										
HDPE [TSS-WB]										
POL-P2_WS_DI-1_2022-06	E164	21-Jun-2022	----	----	----		28-Jun-2022	7 days	7 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Turbidity by Nephelometry										
HDPE										
BOL-B2_WS_DI-1_2022-06	E121	21-Jun-2022	----	----	----		23-Jun-2022	3 days	2 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE										
POL-P2_WS_DI-1_2022-06	E121	21-Jun-2022	----	----	----		23-Jun-2022	3 days	2 days	✓
Plant Pigments : Chlorophyll-a by Fluorometry										
Opaque HDPE										
BOL-B2_WS_DI-1_2022-06	E870	21-Jun-2022	23-Jun-2022	2 days	2 days	✓	23-Jun-2022	672 hrs	0 days	✓
Plant Pigments : Chlorophyll-a by Fluorometry										
Opaque HDPE										
POL-P2_WS_DI-1_2022-06	E870	21-Jun-2022	23-Jun-2022	2 days	2 days	✓	23-Jun-2022	672 hrs	0 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved)										
BOL-B2_WS_DI-1_2022-06	E420	21-Jun-2022	----	----	----		03-Jul-2022	180 days	12 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved)										
POL-P2_WS_DI-1_2022-06	E420	21-Jun-2022	----	----	----		03-Jul-2022	180 days	12 days	✓

Legend & Qualifier Definitions

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended

EHT: Exceeded ALS recommended hold time prior to analysis.

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Alkalinity Species by Titration	E290	537369	1	14	7.1	5.0	✓
Ammonia by Fluorescence	E298	549340	1	18	5.5	5.0	✓
Chloride in Water by IC	E235.Cl	537373	1	16	6.2	5.0	✓
Conductivity in Water	E100	537370	1	18	5.5	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	545635	1	19	5.2	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	549332	1	19	5.2	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	537379	1	13	7.6	5.0	✓
Fluoride in Water by IC	E235.F	537372	1	16	6.2	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	537375	1	19	5.2	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	537376	1	19	5.2	5.0	✓
pH by Meter	E108	537368	1	19	5.2	5.0	✓
Sulfate in Water by IC	E235.SO4	537377	1	16	6.2	5.0	✓
TDS by Gravimetry	E162	542739	1	20	5.0	5.0	✓
Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)	E375-T	549339	1	13	7.6	5.0	✓
Total Metals in Water by CRC ICPMS	E420	543730	1	20	5.0	5.0	✓
Total Nitrogen by Colourimetry	E366	549334	1	18	5.5	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	549338	1	18	5.5	5.0	✓
Turbidity by Nephelometry	E121	535695	1	20	5.0	5.0	✓
Laboratory Control Samples (LCS)							
Alkalinity Species by Titration	E290	537369	1	14	7.1	5.0	✓
Ammonia by Fluorescence	E298	549340	1	18	5.5	5.0	✓
Chloride in Water by IC	E235.Cl	537373	1	16	6.2	5.0	✓
Chlorophyll-a by Fluorometry	E870	535360	1	5	20.0	5.0	✓
Conductivity in Water	E100	537370	1	18	5.5	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	545635	1	19	5.2	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	549332	1	19	5.2	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	537379	1	13	7.6	5.0	✓
Fluoride in Water by IC	E235.F	537372	1	16	6.2	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	537375	1	19	5.2	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	537376	1	19	5.2	5.0	✓
pH by Meter	E108	537368	1	19	5.2	5.0	✓
Sulfate in Water by IC	E235.SO4	537377	1	16	6.2	5.0	✓
TDS by Gravimetry	E162	542739	1	20	5.0	5.0	✓
Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)	E375-T	549339	1	13	7.6	5.0	✓
Total Metals in Water by CRC ICPMS	E420	543730	1	20	5.0	5.0	✓
Total Nitrogen by Colourimetry	E366	549334	1	18	5.5	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	549338	1	18	5.5	5.0	✓

Matrix: **Water**

Evaluation: × = QC frequency outside specification; ✓ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Control Samples (LCS) - Continued							
TSS by Gravimetry (Whole Bottle)	E164	542051	1	20	5.0	5.0	✓
Turbidity by Nephelometry	E121	535695	1	20	5.0	5.0	✓
Method Blanks (MB)							
Alkalinity Species by Titration	E290	537369	1	14	7.1	5.0	✓
Ammonia by Fluorescence	E298	549340	1	18	5.5	5.0	✓
Chloride in Water by IC	E235.Cl	537373	1	16	6.2	5.0	✓
Chlorophyll-a by Fluorometry	E870	535360	1	5	20.0	5.0	✓
Conductivity in Water	E100	537370	1	18	5.5	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	545635	1	19	5.2	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	549332	1	19	5.2	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	537379	1	13	7.6	5.0	✓
Fluoride in Water by IC	E235.F	537372	1	16	6.2	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	537375	1	19	5.2	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	537376	1	19	5.2	5.0	✓
Sulfate in Water by IC	E235.SO4	537377	1	16	6.2	5.0	✓
TDS by Gravimetry	E162	542739	1	20	5.0	5.0	✓
Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)	E375-T	549339	1	13	7.6	5.0	✓
Total Metals in Water by CRC ICPMS	E420	543730	1	20	5.0	5.0	✓
Total Nitrogen by Colourimetry	E366	549334	1	18	5.5	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	549338	1	18	5.5	5.0	✓
TSS by Gravimetry (Whole Bottle)	E164	542051	1	20	5.0	5.0	✓
Turbidity by Nephelometry	E121	535695	1	20	5.0	5.0	✓
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	549340	1	18	5.5	5.0	✓
Chloride in Water by IC	E235.Cl	537373	1	16	6.2	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	545635	1	19	5.2	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	549332	1	19	5.2	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	537379	1	13	7.6	5.0	✓
Fluoride in Water by IC	E235.F	537372	1	16	6.2	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	537375	1	19	5.2	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	537376	1	19	5.2	5.0	✓
Sulfate in Water by IC	E235.SO4	537377	1	16	6.2	5.0	✓
Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)	E375-T	549339	1	13	7.6	5.0	✓
Total Metals in Water by CRC ICPMS	E420	543730	1	20	5.0	5.0	✓
Total Nitrogen by Colourimetry	E366	549334	1	18	5.5	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	549338	1	18	5.5	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Conductivity in Water	E100 Vancouver - Environmental	Water	APHA 2510 (mod)	Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a water sample. Conductivity measurements are temperature-compensated to 25°C.
pH by Meter	E108 Vancouver - Environmental	Water	APHA 4500-H (mod)	pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally 20 ± 5°C). For high accuracy test results, pH should be measured in the field within the recommended 15 minute hold time.
Turbidity by Nephelometry	E121 Vancouver - Environmental	Water	APHA 2130 B (mod)	Turbidity is measured by the nephelometric method, by measuring the intensity of light scatter under defined conditions.
TDS by Gravimetry	E162 Vancouver - Environmental	Water	APHA 2540 C (mod)	Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, with evaporation of the filtrate at 180 ± 2°C for 16 hours or to constant weight, with gravimetric measurement of the residue.
TSS by Gravimetry (Whole Bottle)	E164 Vancouver - Environmental	Water	APHA 2540 D (mod)	Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, following by drying of the filter at 104 ± 1°C, with gravimetric measurement of the filtered solids. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.
Chloride in Water by IC	E235.Cl Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Fluoride in Water by IC	E235.F Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrite in Water by IC (Low Level)	E235.NO2-L Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrate in Water by IC (Low Level)	E235.NO3-L Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Sulfate in Water by IC	E235.SO4 Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Alkalinity Species by Titration	E290 Vancouver - Environmental	Water	APHA 2320 B (mod)	Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.
Ammonia by Fluorescence	E298 Vancouver - Environmental	Water	Method Fialab 100, 2018	Ammonia in water is determined by automated continuous flow analysis with membrane diffusion and fluorescence detection, after reaction with OPA (ortho-phthalaldehyde). This method is approved under US EPA 40 CFR Part 136 (May 2021)
Dissolved Organic Carbon by Combustion (Low Level)	E358-L Vancouver - Environmental	Water	APHA 5310 B (mod)	Dissolved Organic Carbon (Non-Purgeable), also known as NPOC (dissolved), is a direct measurement of DOC after a filtered (0.45 micron) sample has been acidified and purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of DC (dissolved carbon) is comprised of IC (which is common), this method is more accurate and more reliable than the DOC by subtraction method (i.e. DC minus DIC).
Total Nitrogen by Colourimetry	E366 Vancouver - Environmental	Water	APHA 4500-P J (mod)	Total Nitrogen is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U Vancouver - Environmental	Water	APHA 4500-P E (mod).	Total Phosphorus is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)	E375-T Vancouver - Environmental	Water	APHA 4500-P E (mod).	Total Dissolved Phosphorus is determined colourimetrically using a discrete analyzer after filtration through a 0.45 micron filter followed by heated persulfate digestion of the sample.
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U Vancouver - Environmental	Water	APHA 4500-P F (mod)	Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter. Field filtration is recommended to ensure test results represent conditions at time of sampling.
Total Metals in Water by CRC ICPMS	E420 Vancouver - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Dissolved Metals in Water by CRC ICPMS	E421 Vancouver - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Chlorophyll-a by Fluorometry	E870 Vancouver - Environmental	Water	EPA 445.0 (mod)	Chlorophyll a is determined by solvent extraction followed with analysis by fluorometry using the non-acidification procedure. This method is not subject to interferences from chlorophyll b.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Hardness (Calculated)	EC100 Vancouver - Environmental	Water	APHA 2340B	"Hardness (as CaCO3), dissolved" is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.
Hardness (Calculated) from Total Ca/Mg	EC100A Vancouver - Environmental	Water	APHA 2340B	"Hardness (as CaCO3), from total Ca/Mg" is calculated from the sum of total Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations. Hardness from total Ca/Mg is normally comparable to Dissolved Hardness in non-turbid waters.
Nitrate and Nitrite (as N) (Calculation)	EC235.N+N Vancouver - Environmental	Water	EPA 300.0	Nitrate and Nitrite (as N) is a calculated parameter. Nitrate and Nitrite (as N) = Nitrite (as N) + Nitrate (as N).

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Ammonia	EP298 Vancouver - Environmental	Water		Sample preparation for Preserved Nutrients Water Quality Analysis.
Preparation for Dissolved Organic Carbon for Combustion	EP358 Vancouver - Environmental	Water	APHA 5310 B (mod)	Preparation for Dissolved Organic Carbon
Digestion for Total Nitrogen in water	EP366 Vancouver - Environmental	Water	APHA 4500-P J (mod)	Samples are heated with a persulfate digestion reagent.
Digestion for Total Phosphorus in water	EP372 Vancouver - Environmental	Water	APHA 4500-P E (mod).	Samples are heated with a persulfate digestion reagent.
Digestion for Dissolved Phosphorus in water	EP375 Vancouver - Environmental	Water	APHA 4500-P E (mod).	Samples are filtered through a 0.45 micron membrane filter and then heated with a persulfate digestion reagent.
Dissolved Metals Water Filtration	EP421 Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.
Chlorophyll-a Extraction	EP870 Vancouver - Environmental	Water	EPA 445.0 (mod)	Chlorophyll-a solvent extraction.

QUALITY CONTROL REPORT

Work Order	: **VA22B4117**	Page	: 1 of 14
Client	: Mount Polley Mining Corporation	Laboratory	: Vancouver - Environmental
Contact	: Kala Ivens	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: 250-790-2215 Ext 2112	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 22-Jun-2022 10:55
PO	: 5590008044 Q2 2022	Date Analysis Commenced	: 23-Jun-2022
C-O-C number	: ----	Issue Date	: 08-Jul-2022 15:48
Sampler	: ----		
Site	: ----		
Quote number	: VA22-MPMC100-006 - Minnow Env. - Water Quality		
No. of samples received	: 2		
No. of samples analysed	: 2		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Ann Joby	Lab Assistant	Vancouver Metals, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Vancouver Metals, Burnaby, British Columbia
Lindsay Gung	Supervisor - Water Chemistry	Vancouver Inorganics, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Vancouver Metals, Burnaby, British Columbia

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Physical Tests (QC Lot: 535695)											
KS2202234-001	Anonymous	turbidity	----	E121	0.10	NTU	2010	2010	0.159%	15%	----
Physical Tests (QC Lot: 537368)											
FJ2201649-003	Anonymous	pH	----	E108	0.10	pH units	8.33	8.34	0.120%	4%	----
Physical Tests (QC Lot: 537369)											
FJ2201649-003	Anonymous	alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	149	151	1.13%	20%	----
Physical Tests (QC Lot: 537370)											
FJ2201649-003	Anonymous	conductivity	----	E100	2.0	µS/cm	269	272	1.11%	10%	----
Physical Tests (QC Lot: 542739)											
KS2202298-002	Anonymous	solids, total dissolved [TDS]	----	E162	20	mg/L	1120	1120	0.624%	20%	----
Anions and Nutrients (QC Lot: 537372)											
FJ2201649-001	Anonymous	fluoride	16984-48-8	E235.F	0.020	mg/L	0.022	0.021	0.001	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 537373)											
FJ2201649-001	Anonymous	chloride	16887-00-6	E235.Cl	0.50	mg/L	<0.50	<0.50	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 537375)											
FJ2201649-001	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	0.337	0.337	0.0632%	20%	----
Anions and Nutrients (QC Lot: 537376)											
FJ2201649-001	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 537377)											
FJ2201649-001	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	2.64	2.63	0.01	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 537379)											
FJ2201649-001	Anonymous	phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	0.0014	0.0012	0.0002	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 549334)											
VA22B3826-001	Anonymous	nitrogen, total	7727-37-9	E366	0.030	mg/L	0.899	0.821	9.06%	20%	----
Anions and Nutrients (QC Lot: 549338)											
VA22B3826-001	Anonymous	phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.0060	0.0057	0.0003	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 549339)											
VA22B3826-001	Anonymous	phosphorus, total dissolved	7723-14-0	E375-T	0.0020	mg/L	0.0020	<0.0020	0.00002	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 549340)											
VA22B3826-001	Anonymous	ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.0054	<0.0050	0.0004	Diff <2x LOR	----
Organic / Inorganic Carbon (QC Lot: 549332)											
VA22B3826-001	Anonymous	carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L	0.80	0.92	0.12	Diff <2x LOR	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Total Metals (QC Lot: 543730)											
KS2202300-001	Anonymous	aluminum, total	7429-90-5	E420	0.0060	mg/L	0.0075	0.0063	0.0012	Diff <2x LOR	----
		antimony, total	7440-36-0	E420	0.00020	mg/L	0.00025	0.00023	0.00002	Diff <2x LOR	----
		arsenic, total	7440-38-2	E420	0.00020	mg/L	0.0972	0.0973	0.0937%	20%	----
		barium, total	7440-39-3	E420	0.00020	mg/L	0.0128	0.0128	0.397%	20%	----
		beryllium, total	7440-41-7	E420	0.000040	mg/L	<0.000040	<0.000040	0	Diff <2x LOR	----
		bismuth, total	7440-69-9	E420	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		boron, total	7440-42-8	E420	0.020	mg/L	0.480	0.460	4.35%	20%	----
		cadmium, total	7440-43-9	E420	0.000110	mg/L	<0.000110	<0.000110	0	Diff <2x LOR	----
		calcium, total	7440-70-2	E420	0.100	mg/L	21.4	20.9	1.98%	20%	----
		chromium, total	7440-47-3	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		cobalt, total	7440-48-4	E420	0.00020	mg/L	0.00023	0.00022	0.000009	Diff <2x LOR	----
		copper, total	7440-50-8	E420	0.00100	mg/L	0.00164	0.00164	0.0000002	Diff <2x LOR	----
		iron, total	7439-89-6	E420	0.020	mg/L	0.067	0.077	0.010	Diff <2x LOR	----
		lead, total	7439-92-1	E420	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		lithium, total	7439-93-2	E420	0.0020	mg/L	0.0102	0.0098	0.0004	Diff <2x LOR	----
		magnesium, total	7439-95-4	E420	0.0100	mg/L	38.0	38.1	0.129%	20%	----
		manganese, total	7439-96-5	E420	0.00020	mg/L	0.0865	0.0862	0.295%	20%	----
		molybdenum, total	7439-98-7	E420	0.000100	mg/L	0.468	0.436	7.13%	20%	----
		nickel, total	7440-02-0	E420	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		potassium, total	7440-09-7	E420	0.100	mg/L	8.84	9.08	2.67%	20%	----
		selenium, total	7782-49-2	E420	0.000100	mg/L	0.000177	0.000224	0.000047	Diff <2x LOR	----
		silicon, total	7440-21-3	E420	0.20	mg/L	3.50	3.51	0.322%	20%	----
		silver, total	7440-22-4	E420	0.000020	mg/L	<0.000020	<0.000020	0	Diff <2x LOR	----
		sodium, total	7440-23-5	E420	0.100	mg/L	457	455	0.403%	20%	----
		strontium, total	7440-24-6	E420	0.00040	mg/L	1.52	1.39	8.76%	20%	----
		thallium, total	7440-28-0	E420	0.000020	mg/L	<0.000020	<0.000020	0	Diff <2x LOR	----
		tin, total	7440-31-5	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		titanium, total	7440-32-6	E420	0.00060	mg/L	<0.00060	<0.00060	0	Diff <2x LOR	----
		uranium, total	7440-61-1	E420	0.000020	mg/L	0.00131	0.00115	12.9%	20%	----
		vanadium, total	7440-62-2	E420	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		zinc, total	7440-66-6	E420	0.0060	mg/L	<0.0060	<0.0060	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 545635)											
CG2208318-001	Anonymous	aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
		antimony, dissolved	7440-36-0	E421	0.00010	mg/L	0.00028	0.00028	0.000004	Diff <2x LOR	----
		arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Dissolved Metals (QC Lot: 545635) - continued											
CG2208318-001	Anonymous	barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0160	0.0170	5.90%	20%	----
		beryllium, dissolved	7440-41-7	E421	0.000020	mg/L	<0.020 µg/L	<0.000020	0	Diff <2x LOR	----
		bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, dissolved	7440-42-8	E421	0.010	mg/L	0.013	0.012	0.001	Diff <2x LOR	----
		cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	0.849 µg/L	0.000871	2.57%	20%	----
		calcium, dissolved	7440-70-2	E421	0.050	mg/L	193	179	7.29%	20%	----
		chromium, dissolved	7440-47-3	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	<0.10 µg/L	<0.00010	0	Diff <2x LOR	----
		copper, dissolved	7440-50-8	E421	0.00020	mg/L	0.00034	0.00034	0.000001	Diff <2x LOR	----
		iron, dissolved	7439-89-6	E421	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.0249	0.0226	9.94%	20%	----
		magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	132	135	1.85%	20%	----
		manganese, dissolved	7439-96-5	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.00121	0.00120	0.551%	20%	----
		nickel, dissolved	7440-02-0	E421	0.00050	mg/L	0.00821	0.00859	4.45%	20%	----
		potassium, dissolved	7440-09-7	E421	0.050	mg/L	2.64	2.66	0.625%	20%	----
		selenium, dissolved	7782-49-2	E421	0.000050	mg/L	186 µg/L	0.202	8.13%	20%	----
		silicon, dissolved	7440-21-3	E421	0.050	mg/L	1.96	2.02	2.80%	20%	----
		silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, dissolved	7440-23-5	E421	0.050	mg/L	3.43	3.50	2.14%	20%	----
		strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.166	0.162	2.36%	20%	----
		thallium, dissolved	7440-28-0	E421	0.000010	mg/L	0.000048	0.000045	0.000003	Diff <2x LOR	----
		tin, dissolved	7440-31-5	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		titanium, dissolved	7440-32-6	E421	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
		uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.00749	0.00726	3.12%	20%	----
		vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		zinc, dissolved	7440-66-6	E421	0.0010	mg/L	0.0089	0.0088	0.0001	Diff <2x LOR	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 535695)						
turbidity	----	E121	0.1	NTU	<0.10	----
Physical Tests (QCLot: 537369)						
alkalinity, total (as CaCO3)	----	E290	1	mg/L	<1.0	----
Physical Tests (QCLot: 537370)						
conductivity	----	E100	1	µS/cm	<1.0	----
Physical Tests (QCLot: 542051)						
solids, total suspended [TSS]	----	E164	1	mg/L	<1.0	----
Physical Tests (QCLot: 542739)						
solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Anions and Nutrients (QCLot: 537372)						
fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 537373)						
chloride	16887-00-6	E235.Cl	0.5	mg/L	<0.50	----
Anions and Nutrients (QCLot: 537375)						
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 537376)						
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 537377)						
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 537379)						
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 549334)						
nitrogen, total	7727-37-9	E366	0.03	mg/L	<0.030	----
Anions and Nutrients (QCLot: 549338)						
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----
Anions and Nutrients (QCLot: 549339)						
phosphorus, total dissolved	7723-14-0	E375-T	0.002	mg/L	<0.0020	----
Anions and Nutrients (QCLot: 549340)						
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Organic / Inorganic Carbon (QCLot: 549332)						
carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	<0.50	----
Total Metals (QCLot: 543730)						
aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 543730) - continued						
antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
chromium, total	7440-47-3	E420	0.0005	mg/L	<0.00050	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	----
magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	----
manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
silicon, total	7440-21-3	E420	0.1	mg/L	<0.10	----
silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	----
sodium, total	7440-23-5	E420	0.05	mg/L	<0.050	----
strontium, total	7440-24-6	E420	0.0002	mg/L	<0.00020	----
thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----
tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----
uranium, total	7440-61-1	E420	0.00001	mg/L	<0.000010	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	<0.00050	----
zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	----
Dissolved Metals (QCLot: 545635)						
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	<0.0010	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	<0.00010	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	<0.00010	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	<0.00010	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	<0.000020	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 545635) - continued						
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	<0.000050	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	<0.010	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	<0.0000050	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	<0.050	----
chromium, dissolved	7440-47-3	E421	0.0005	mg/L	<0.00050	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	<0.000050	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	<0.050	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	<0.000010	----
sodium, dissolved	7440-23-5	E421	0.05	mg/L	<0.050	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	<0.00020	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	<0.000010	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	<0.00050	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	<0.0010	----
Plant Pigments (QCLot: 535360)						
chlorophyll a	479-61-8	E870	0.01	µg/L	<0.010	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 535695)									
turbidity	----	E121	0.1	NTU	200 NTU	98.0	85.0	115	----
Physical Tests (QCLot: 537368)									
pH	----	E108	----	pH units	7 pH units	100	98.0	102	----
Physical Tests (QCLot: 537369)									
alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	100	85.0	115	----
Physical Tests (QCLot: 537370)									
conductivity	----	E100	1	µS/cm	146.9 µS/cm	96.6	90.0	110	----
Physical Tests (QCLot: 542051)									
solids, total suspended [TSS]	----	E164	1	mg/L	150 mg/L	88.3	85.0	115	----
Physical Tests (QCLot: 542739)									
solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	101	85.0	115	----
Anions and Nutrients (QCLot: 537372)									
fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	105	90.0	110	----
Anions and Nutrients (QCLot: 537373)									
chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 537375)									
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	104	90.0	110	----
Anions and Nutrients (QCLot: 537376)									
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 537377)									
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	103	90.0	110	----
Anions and Nutrients (QCLot: 537379)									
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	0.03 mg/L	95.7	80.0	120	----
Anions and Nutrients (QCLot: 549334)									
nitrogen, total	7727-37-9	E366	0.03	mg/L	0.5 mg/L	96.0	75.0	125	----
Anions and Nutrients (QCLot: 549338)									
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	0.05 mg/L	96.0	80.0	120	----
Anions and Nutrients (QCLot: 549339)									
phosphorus, total dissolved	7723-14-0	E375-T	0.002	mg/L	0.05 mg/L	96.2	80.0	120	----
Anions and Nutrients (QCLot: 549340)									
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	104	85.0	115	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Organic / Inorganic Carbon (QCLot: 549332)									
carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	8.57 mg/L	99.4	80.0	120	----
Total Metals (QCLot: 543730)									
aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	108	80.0	120	----
antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	112	80.0	120	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	102	80.0	120	----
barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	114	80.0	120	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	109	80.0	120	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	100	80.0	120	----
boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	99.6	80.0	120	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	99.3	80.0	120	----
calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	109	80.0	120	----
chromium, total	7440-47-3	E420	0.0005	mg/L	0.25 mg/L	104	80.0	120	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	91.8	80.0	120	----
copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	89.6	80.0	120	----
iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	95.9	80.0	120	----
lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	104	80.0	120	----
lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	110	80.0	120	----
magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	106	80.0	120	----
manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	97.0	80.0	120	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	101	80.0	120	----
nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	89.7	80.0	120	----
potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	109	80.0	120	----
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	90.6	80.0	120	----
silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	96.0	80.0	120	----
silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	98.8	80.0	120	----
sodium, total	7440-23-5	E420	0.05	mg/L	50 mg/L	113	80.0	120	----
strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	108	80.0	120	----
thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	105	80.0	120	----
tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	102	80.0	120	----
titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	89.3	80.0	120	----
uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	103	80.0	120	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	99.1	80.0	120	----
zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	93.5	80.0	120	----
Dissolved Metals (QCLot: 545635)									
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	105	80.0	120	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	110	80.0	120	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 545635) - continued									
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	104	80.0	120	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	103	80.0	120	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	106	80.0	120	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	103	80.0	120	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	98.5	80.0	120	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	106	80.0	120	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	105	80.0	120	----
chromium, dissolved	7440-47-3	E421	0.0005	mg/L	0.25 mg/L	102	80.0	120	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	104	80.0	120	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	103	80.0	120	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	107	80.0	120	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	102	80.0	120	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	104	80.0	120	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	104	80.0	120	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	104	80.0	120	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	104	80.0	120	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	105	80.0	120	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	108	80.0	120	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	107	80.0	120	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	107	80.0	120	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	103	80.0	120	----
sodium, dissolved	7440-23-5	E421	0.05	mg/L	50 mg/L	110	80.0	120	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	109	80.0	120	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	102	80.0	120	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	101	80.0	120	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	101	80.0	120	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	105	80.0	120	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	104	80.0	120	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	107	80.0	120	----
Plant Pigments (QCLot: 535360)									
chlorophyll a	479-61-8	E870	0.01	µg/L	5 µg/L	93.3	80.0	120	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 537372)										
FJ2201649-002	Anonymous	fluoride	16984-48-8	E235.F	1.07 mg/L	1 mg/L	107	75.0	125	----
Anions and Nutrients (QCLot: 537373)										
FJ2201649-002	Anonymous	chloride	16887-00-6	E235.Cl	106 mg/L	100 mg/L	106	75.0	125	----
Anions and Nutrients (QCLot: 537375)										
FJ2201649-002	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	2.69 mg/L	2.5 mg/L	107	75.0	125	----
Anions and Nutrients (QCLot: 537376)										
FJ2201649-002	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	0.523 mg/L	0.5 mg/L	105	75.0	125	----
Anions and Nutrients (QCLot: 537377)										
FJ2201649-002	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	105 mg/L	100 mg/L	105	75.0	125	----
Anions and Nutrients (QCLot: 537379)										
FJ2201649-002	Anonymous	phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0302 mg/L	0.03 mg/L	101	70.0	130	----
Anions and Nutrients (QCLot: 549334)										
VA22B3826-002	Anonymous	nitrogen, total	7727-37-9	E366	ND mg/L	0.4 mg/L	ND	70.0	130	----
Anions and Nutrients (QCLot: 549338)										
VA22B3826-002	Anonymous	phosphorus, total	7723-14-0	E372-U	ND mg/L	0.05 mg/L	ND	70.0	130	----
Anions and Nutrients (QCLot: 549339)										
VA22B3826-002	Anonymous	phosphorus, total dissolved	7723-14-0	E375-T	ND mg/L	0.05 mg/L	ND	70.0	130	----
Anions and Nutrients (QCLot: 549340)										
VA22B3826-002	Anonymous	ammonia, total (as N)	7664-41-7	E298	ND mg/L	0.1 mg/L	ND	75.0	125	MS-B
Organic / Inorganic Carbon (QCLot: 549332)										
VA22B3826-002	Anonymous	carbon, dissolved organic [DOC]	----	E358-L	ND mg/L	5 mg/L	ND	70.0	130	----
Total Metals (QCLot: 543730)										
KS2202213-022	Anonymous	aluminum, total	7429-90-5	E420	0.391 mg/L	0.4 mg/L	97.7	70.0	130	----
		antimony, total	7440-36-0	E420	0.0408 mg/L	0.04 mg/L	102	70.0	130	----
		arsenic, total	7440-38-2	E420	ND mg/L	0.04 mg/L	ND	70.0	130	----
		barium, total	7440-39-3	E420	ND mg/L	0.04 mg/L	ND	70.0	130	----
		beryllium, total	7440-41-7	E420	0.0811 mg/L	0.08 mg/L	101	70.0	130	----
		bismuth, total	7440-69-9	E420	0.0180 mg/L	0.02 mg/L	90.1	70.0	130	----
		boron, total	7440-42-8	E420	0.214 mg/L	0.2 mg/L	107	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Total Metals (QCLot: 543730) - continued										
KS2202213-022	Anonymous	cadmium, total	7440-43-9	E420	0.00784 mg/L	0.008 mg/L	98.0	70.0	130	----
		calcium, total	7440-70-2	E420	ND mg/L	8 mg/L	ND	70.0	130	----
		chromium, total	7440-47-3	E420	0.0763 mg/L	0.08 mg/L	95.4	70.0	130	----
		cobalt, total	7440-48-4	E420	0.0378 mg/L	0.04 mg/L	94.5	70.0	130	----
		copper, total	7440-50-8	E420	0.0378 mg/L	0.04 mg/L	94.4	70.0	130	----
		iron, total	7439-89-6	E420	3.61 mg/L	4 mg/L	90.3	70.0	130	----
		lead, total	7439-92-1	E420	0.0358 mg/L	0.04 mg/L	89.5	70.0	130	----
		lithium, total	7439-93-2	E420	0.194 mg/L	0.2 mg/L	96.9	70.0	130	----
		magnesium, total	7439-95-4	E420	ND mg/L	2 mg/L	ND	70.0	130	----
		manganese, total	7439-96-5	E420	ND mg/L	0.04 mg/L	ND	70.0	130	----
		molybdenum, total	7439-98-7	E420	0.0419 mg/L	0.04 mg/L	105	70.0	130	----
		nickel, total	7440-02-0	E420	0.0755 mg/L	0.08 mg/L	94.4	70.0	130	----
		potassium, total	7440-09-7	E420	8.08 mg/L	8 mg/L	101	70.0	130	----
		selenium, total	7782-49-2	E420	0.0797 mg/L	0.08 mg/L	99.7	70.0	130	----
		silicon, total	7440-21-3	E420	18.8 mg/L	20 mg/L	93.9	70.0	130	----
		silver, total	7440-22-4	E420	0.00779 mg/L	0.008 mg/L	97.4	70.0	130	----
		sodium, total	7440-23-5	E420	ND mg/L	4 mg/L	ND	70.0	130	----
		strontium, total	7440-24-6	E420	ND mg/L	0.04 mg/L	ND	70.0	130	----
		thallium, total	7440-28-0	E420	0.00702 mg/L	0.008 mg/L	87.8	70.0	130	----
		tin, total	7440-31-5	E420	0.0387 mg/L	0.04 mg/L	96.8	70.0	130	----
		titanium, total	7440-32-6	E420	ND mg/L	0.08 mg/L	ND	70.0	130	----
		uranium, total	7440-61-1	E420	0.00761 mg/L	0.008 mg/L	95.1	70.0	130	----
		vanadium, total	7440-62-2	E420	0.194 mg/L	0.2 mg/L	96.8	70.0	130	----
		zinc, total	7440-66-6	E420	0.784 mg/L	0.8 mg/L	98.0	70.0	130	----
Dissolved Metals (QCLot: 545635)										
FJ2201668-001	Anonymous	aluminum, dissolved	7429-90-5	E421	0.210 mg/L	0.2 mg/L	105	70.0	130	----
		antimony, dissolved	7440-36-0	E421	0.0196 mg/L	0.02 mg/L	98.2	70.0	130	----
		arsenic, dissolved	7440-38-2	E421	0.0201 mg/L	0.02 mg/L	101	70.0	130	----
		barium, dissolved	7440-39-3	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		beryllium, dissolved	7440-41-7	E421	0.0398 mg/L	0.04 mg/L	99.5	70.0	130	----
		bismuth, dissolved	7440-69-9	E421	0.00828 mg/L	0.01 mg/L	82.8	70.0	130	----
		boron, dissolved	7440-42-8	E421	0.092 mg/L	0.1 mg/L	91.5	70.0	130	----
		cadmium, dissolved	7440-43-9	E421	0.00373 mg/L	0.004 mg/L	93.3	70.0	130	----
		calcium, dissolved	7440-70-2	E421	ND mg/L	4 mg/L	ND	70.0	130	----
		chromium, dissolved	7440-47-3	E421	0.0384 mg/L	0.04 mg/L	96.1	70.0	130	----
		cobalt, dissolved	7440-48-4	E421	0.0188 mg/L	0.02 mg/L	93.9	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Dissolved Metals (QCLot: 545635) - continued										
FJ2201668-001	Anonymous	copper, dissolved	7440-50-8	E421	0.0177 mg/L	0.02 mg/L	88.6	70.0	130	----
		iron, dissolved	7439-89-6	E421	1.90 mg/L	2 mg/L	94.9	70.0	130	----
		lead, dissolved	7439-92-1	E421	0.0178 mg/L	0.02 mg/L	88.9	70.0	130	----
		lithium, dissolved	7439-93-2	E421	ND mg/L	0.1 mg/L	ND	70.0	130	----
		magnesium, dissolved	7439-95-4	E421	ND mg/L	1 mg/L	ND	70.0	130	----
		manganese, dissolved	7439-96-5	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		molybdenum, dissolved	7439-98-7	E421	0.0208 mg/L	0.02 mg/L	104	70.0	130	----
		nickel, dissolved	7440-02-0	E421	0.0361 mg/L	0.04 mg/L	90.2	70.0	130	----
		potassium, dissolved	7440-09-7	E421	3.93 mg/L	4 mg/L	98.2	70.0	130	----
		selenium, dissolved	7782-49-2	E421	0.0419 mg/L	0.04 mg/L	105	70.0	130	----
		silicon, dissolved	7440-21-3	E421	10.2 mg/L	10 mg/L	102	70.0	130	----
		silver, dissolved	7440-22-4	E421	0.00799 mg/L	0.008 mg/L	99.9	70.0	130	----
		sodium, dissolved	7440-23-5	E421	ND mg/L	2 mg/L	ND	70.0	130	----
		strontium, dissolved	7440-24-6	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		thallium, dissolved	7440-28-0	E421	0.00343 mg/L	0.004 mg/L	85.7	70.0	130	----
		tin, dissolved	7440-31-5	E421	0.0195 mg/L	0.02 mg/L	97.6	70.0	130	----
		titanium, dissolved	7440-32-6	E421	0.0393 mg/L	0.04 mg/L	98.3	70.0	130	----
		uranium, dissolved	7440-61-1	E421	ND mg/L	0.004 mg/L	ND	70.0	130	----
		vanadium, dissolved	7440-62-2	E421	0.104 mg/L	0.1 mg/L	104	70.0	130	----
		zinc, dissolved	7440-66-6	E421	0.372 mg/L	0.4 mg/L	93.1	70.0	130	----

Qualifiers

Qualifier	Description
MS-B	*Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.*

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

Affix ALS barcode label here (lab use only)

COC Number:

Report To	Contact and company name below will appear on the final report
Company:	Mount Polley Mining Corporation
Contact:	Gabriel Holmes
Phone:	236-317-4939
	Company address below will appear on the final report
Street:	PO Box 12
City/Province:	Likely, BC
Postal Code:	V0L 1N0
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☐ NO
Company:	
Contact:	

Report Format / Distribution	
Select Report Format:	☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)
Quality Control (QC) Report with Report	☑ ☐ NO
☐ Compare Results to Criteria on Report - provide details below if box checked	
Select Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	gabriel.holmes@mountpolley.com
Email 2	kala.iveris@mountpolley.com, pschnurr@minnow.ca
Email 3	pstecko@minnow.ca; kbatchelar@minnow.ca

Invoice Distribution	
Select Invoice Distribution:	☑ EMAIL ☑ MAIL ☐ FAX
Email 1 or Fax	gabriel.holmes@mountpolley.com
Email 2	

Project Information	
ALS Account # / Quote #:	VA22-MPMC100-006
Job #:	
PO / AFE:	
LSD:	

Oil and Gas Required Fields (client use)	
AFE/Cost Center:	PO#
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Lab Work Order # (lab use only):

ALS Contact: Can Dang **Sampler:**

Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply

Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days): 4 day [P4] ☐ | 3 day [P3] ☐ | 2 day [P2] ☐

EMERGENCY: 1 Business day [E1] ☐ | Same Day, Weekend or Statutory holiday [E0] ☐

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm

For tests that can not be performed according to the service level selected, you will

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P)

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUTRIENTS-1	Total Metals (ICPMS)	Dissolved Metals (ICPMS)	Total Nitrogen Ammonia	DOC	TSS (Whole bottle)		E87OB (Chl-a)					
	BOL-B2_WS_DI-1_2022-06	21-Jun-22	14:25	Water	R	R	R	R	R	R		R					67
	POL-P2_WS_DI-1_2022-06	21-Jun-22	12:05	Water	R	R	R	R	R	R		R					67
	~~QUL-ZOO-1_WS_DI-1_2022-06~~	~~Jun-22~~		~~Water~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~							~~X~~ 7
	~~QUL-ZOO-7_WS_DI-1_2022-06~~	~~Jun-22~~		~~Water~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~							~~X~~ 7
	~~WS_DI-1X_2022-06~~	~~Jun-22~~		~~Water~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~							~~X~~

Environmental Division Vancouver

Work Order Reference VA22B4117

Telephone : +1 604 253 4188

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ ☐

Are samples for human drinking water use? ☐ ☐

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

Pls filter + freeze chlorophyll but HOLD for analysis *

Regular analytes for Mount Polley Mine water sample package. Please also report ANIONS-N+N-CALC-VA (calculated nitrate and nitrite)

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ | SIF Observations Yes ☐ No ☐

Ice Packs ☐ Ice Cubes ☐ | Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
			5.6	8	

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by:	Date:	Time:	Received by:	Date:	Time:	Received by: IT	Date: June 22/22	Time: ~~10:55~~ 10:55 am

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

OCTOBER 2015 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

WATER CHEMISTRY

ALS Laboratory Report VA22B4435

(Finalized July 11, 2022)

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **VA22B4435**	Page	: 1 of 6
Client	: **Mount Polley Mining Corporation**	Laboratory	: Vancouver - Environmental
Contact	: Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: ----	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 24-Jun-2022 11:20
PO	: 5590008044 Q2 2022	Date Analysis Commenced	: 24-Jun-2022
C-O-C number	: ----	Issue Date	: 11-Jul-2022 14:23
Sampler	: ----		
Site	: ----		
Quote number	: VA22-MPMC100-006 - Minnow Env. - Water Quality		
No. of samples received	: 3		
No. of samples analysed	: 3		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Erin Sanchez		Metals, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Kyle Chang	Lab Assistant	Metals, Burnaby, British Columbia
Miles Gropen	Department Manager - Inorganics	Inorganics, Burnaby, British Columbia
Tracy Harley	Supervisor - Water Quality Instrumentation	Inorganics, Burnaby, British Columbia

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

Unit	*Description*
-	No Unit
µg/L	micrograms per litre
µS/cm	Microsiemens per centimetre
mg/L	milligrams per litre
NTU	nephelometric turbidity units
pH units	pH units

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Qualifiers

Qualifier	*Description*
DTC	*Dissolved concentration exceeds total. Results were confirmed by re-analysis.*
HTD	*Hold time exceeded for re-analysis or dilution, but initial testing was conducted within hold time.*

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	QUL-ZOO-1_WS_DI-1_2022-06	QUL-ZOO-7_WS_DI-1_2022-06	QUL-ZOO-1_WS_DI-1X_2022-06	----	----
					Client sampling date / time	22-Jun-2022 11:00	22-Jun-2022 09:55	22-Jun-2022 11:00	----	----
						VA22B4435-001	VA22B4435-002	VA22B4435-003	--------	--------
						Result	Result	Result	----	----
Physical Tests										
alkalinity, total (as CaCO3)	----	E290	1.0	mg/L		48.1	46.2	46.3	----	----
conductivity	----	E100	2.0	µS/cm		113	107	116	----	----
hardness (as CaCO3), dissolved	----	EC100	0.50	mg/L		49.4	46.0	50.5	----	----
hardness (as CaCO3), from total Ca/Mg	----	EC100A	0.50	mg/L		44.6	41.0	49.0	----	----
pH	----	E108	0.10	pH units		7.89	7.87	7.87	----	----
solids, total dissolved [TDS]	----	E162	10	mg/L		80	69	76	----	----
solids, total suspended [TSS]	----	E164	1.0	mg/L		1.5	2.2	1.2	----	----
turbidity	----	E121	0.10	NTU		1.25	2.16	1.03	----	----
Anions and Nutrients										
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L		<0.0050	<0.0050	<0.0050	----	----
chloride	16887-00-6	E235.Cl	0.50	mg/L		<0.50	<0.50	<0.50	----	----
fluoride	16984-48-8	E235.F	0.020	mg/L		0.033	0.031	0.033	----	----
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L		0.100	0.0750 HTD	0.0992	----	----
nitrate + nitrite (as N)	----	EC235.N+N	0.0050	mg/L		0.100	0.0750	0.0992	----	----
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L		<0.0010	<0.0010	<0.0010	----	----
nitrogen, total	7727-37-9	E366	0.030	mg/L		0.232	0.210	0.247	----	----
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L		<0.0010	<0.0010	<0.0010	----	----
phosphorus, total	7723-14-0	E372-U	0.0020	mg/L		0.0064	0.0088	0.0090	----	----
phosphorus, total dissolved	7723-14-0	E375-T	0.0020	mg/L		0.0030	0.0042	0.0025	----	----
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L		5.92	5.03	8.08	----	----
Organic / Inorganic Carbon										
carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L		2.92	3.60	3.40	----	----
Total Metals										
aluminum, total	7429-90-5	E420	0.0030	mg/L		0.0285	0.0443	0.0445	----	----
antimony, total	7440-36-0	E420	0.00010	mg/L		<0.00010	<0.00010	<0.00010	----	----
arsenic, total	7440-38-2	E420	0.00010	mg/L		0.00014	0.00022	0.00019	----	----
barium, total	7440-39-3	E420	0.00010	mg/L		0.00544	0.00605	0.00629	----	----
beryllium, total	7440-41-7	E420	0.000100	mg/L		<0.000100	<0.000100	<0.000100	----	----
bismuth, total	7440-69-9	E420	0.000050	mg/L		<0.000050	<0.000050	<0.000050	----	----

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	QUL-ZOO-1_WS_DI-1_2022-06	QUL-ZOO-7_WS_DI-1_2022-06	QUL-ZOO-1_WS_DI-1X_2022-06	----	----
					Client sampling date / time	22-Jun-2022 11:00	22-Jun-2022 09:55	22-Jun-2022 11:00	----	----
						VA22B4435-001	VA22B4435-002	VA22B4435-003	--------	--------
						Result	Result	Result	----	----
Total Metals										
boron, total	7440-42-8	E420	0.010	mg/L		<0.010	<0.010	<0.010	----	----
cadmium, total	7440-43-9	E420	0.0000050	mg/L		0.0000072	0.0000115	0.0000067	----	----
calcium, total	7440-70-2	E420	0.050	mg/L		14.8	13.4	16.2	----	----
chromium, total	7440-47-3	E420	0.00050	mg/L		<0.00050	<0.00050	<0.00050	----	----
cobalt, total	7440-48-4	E420	0.00010	mg/L		<0.00010	<0.00010	<0.00010	----	----
copper, total	7440-50-8	E420	0.00050	mg/L		0.00168	0.00166	0.00223	----	----
iron, total	7439-89-6	E420	0.030	mg/L		0.035	0.072	0.057	----	----
lead, total	7439-92-1	E420	0.000050	mg/L		<0.000050	<0.000050	0.000052	----	----
lithium, total	7439-93-2	E420	0.0010	mg/L		<0.0010	<0.0010	<0.0010	----	----
magnesium, total	7439-95-4	E420	0.100	mg/L		1.85	1.83	2.07	----	----
manganese, total	7439-96-5	E420	0.00010	mg/L		0.00224	0.00394	0.00327	----	----
molybdenum, total	7439-98-7	E420	0.000050	mg/L		0.000396	0.000414	0.000419	----	----
nickel, total	7440-02-0	E420	0.00050	mg/L		0.00092	0.00062	0.00102	----	----
potassium, total	7440-09-7	E420	0.050	mg/L		0.489	0.495	0.557	----	----
selenium, total	7782-49-2	E420	0.000050	mg/L		0.000156	0.000170	0.000141	----	----
silicon, total	7440-21-3	E420	0.10	mg/L		2.05	2.19	2.04	----	----
silver, total	7440-22-4	E420	0.000010	mg/L		<0.000010	<0.000010	<0.000010	----	----
sodium, total	7440-23-5	E420	0.050	mg/L		0.943	0.930	1.02	----	----
strontium, total	7440-24-6	E420	0.00020	mg/L		0.110	0.0983	0.129	----	----
thallium, total	7440-28-0	E420	0.000010	mg/L		<0.000010	<0.000010	<0.000010	----	----
tin, total	7440-31-5	E420	0.00010	mg/L		<0.00010	<0.00010	<0.00010	----	----
titanium, total	7440-32-6	E420	0.0100	mg/L		<0.0100	<0.0100	<0.0100	----	----
uranium, total	7440-61-1	E420	0.000010	mg/L		0.000140	0.000120	0.000154	----	----
vanadium, total	7440-62-2	E420	0.00050	mg/L		<0.00050	<0.00050	<0.00050	----	----
zinc, total	7440-66-6	E420	0.0030	mg/L		<0.0030	<0.0030	<0.0030	----	----
Dissolved Metals										
aluminum, dissolved	7429-90-5	E421	0.0030	mg/L		0.0142	0.0190	0.0129	----	----
antimony, dissolved	7440-36-0	E421	0.00010	mg/L		<0.00010	<0.00010	<0.00010	----	----
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L		0.00012	0.00018	0.00012	----	----
barium, dissolved	7440-39-3	E421	0.00010	mg/L		0.00568	0.00624	0.00561	----	----

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	QUL-ZOO-1_WS_DI-1_2022-06	QUL-ZOO-7_WS_DI-1_2022-06	QUL-ZOO-1_WS_DI-1X_2022-06	----	----
					Client sampling date / time	22-Jun-2022 11:00	22-Jun-2022 09:55	22-Jun-2022 11:00	----	----
						VA22B4435-001	VA22B4435-002	VA22B4435-003	--------	--------
						Result	Result	Result	----	----
Dissolved Metals										
beryllium, dissolved	7440-41-7	E421	0.000100	mg/L		<0.000100	<0.000100	<0.000100	----	----
bismuth, dissolved	7440-69-9	E421	0.000050	mg/L		<0.000050	<0.000050	<0.000050	----	----
boron, dissolved	7440-42-8	E421	0.010	mg/L		<0.010	<0.010	<0.010	----	----
cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L		0.0000090	0.0000160	0.0000054	----	----
calcium, dissolved	7440-70-2	E421	0.050	mg/L		16.5	15.1	16.9	----	----
chromium, dissolved	7440-47-3	E421	0.00050	mg/L		<0.00050	<0.00050	<0.00050	----	----
cobalt, dissolved	7440-48-4	E421	0.00010	mg/L		<0.00010	<0.00010	<0.00010	----	----
copper, dissolved	7440-50-8	E421	0.00050	mg/L		0.00120	0.00107	0.00100	----	----
iron, dissolved	7439-89-6	E421	0.030	mg/L		<0.030	<0.030	<0.030	----	----
lead, dissolved	7439-92-1	E421	0.000050	mg/L		<0.000050	<0.000050	<0.000050	----	----
lithium, dissolved	7439-93-2	E421	0.0010	mg/L		<0.0010	<0.0010	<0.0010	----	----
magnesium, dissolved	7439-95-4	E421	0.100	mg/L		2.00	2.01	2.01	----	----
manganese, dissolved	7439-96-5	E421	0.00010	mg/L		0.00086	0.00147	0.00070	----	----
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L		0.000488	0.000453	0.000397	----	----
nickel, dissolved	7440-02-0	E421	0.00050	mg/L		0.00089	0.00055	0.00086	----	----
potassium, dissolved	7440-09-7	E421	0.050	mg/L		0.532	0.545	0.526	----	----
selenium, dissolved	7782-49-2	E421	0.000050	mg/L		0.000140	0.000160	0.000146	----	----
silicon, dissolved	7440-21-3	E421	0.050	mg/L		2.03	2.26	1.97	----	----
silver, dissolved	7440-22-4	E421	0.000010	mg/L		<0.000010	<0.000010	<0.000010	----	----
sodium, dissolved	7440-23-5	E421	0.050	mg/L		0.983	0.972	0.963	----	----
strontium, dissolved	7440-24-6	E421	0.00020	mg/L		0.122	0.101	0.118	----	----
thallium, dissolved	7440-28-0	E421	0.000010	mg/L		<0.000010	<0.000010	<0.000010	----	----
tin, dissolved	7440-31-5	E421	0.00010	mg/L		0.00064 DTC	<0.00010	<0.00010	----	----
titanium, dissolved	7440-32-6	E421	0.0100	mg/L		<0.0100	<0.0100	<0.0100	----	----
uranium, dissolved	7440-61-1	E421	0.000010	mg/L		0.000144	0.000118	0.000138	----	----
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L		<0.00050	<0.00050	<0.00050	----	----
zinc, dissolved	7440-66-6	E421	0.0030	mg/L		<0.0030	<0.0030	<0.0030	----	----
dissolved metals filtration location	----	EP421	-	-		Field	Field	Field	----	----
Plant Pigments										
chlorophyll a	479-61-8	E870	0.010	µg/L		1.36	1.88	1.32	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA22B4435**	Page	: 1 of 14
Client	: **Mount Polley Mining Corporation**	Laboratory	: Vancouver - Environmental
Contact	: Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: ----	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 24-Jun-2022 11:20
PO	: 5590008044 Q2 2022	Issue Date	: 11-Jul-2022 14:22
C-O-C number	: ----		
Sampler	: ----		
Site	: ----		
Quote number	: VA22-MPMC100-006 - Minnow Env. - Water Quality		
No. of samples received	: 3		
No. of samples analysed	: 3		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- Analysis Holding Time Outliers exist - please see following pages for full details.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) QUL-ZOO-1_WS_DI-1_2022-06	E298	22-Jun-2022	07-Jul-2022	----	----		08-Jul-2022	28 days	16 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) QUL-ZOO-1_WS_DI-1X_2022-06	E298	22-Jun-2022	07-Jul-2022	----	----		08-Jul-2022	28 days	16 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) QUL-ZOO-7_WS_DI-1_2022-06	E298	22-Jun-2022	07-Jul-2022	----	----		08-Jul-2022	28 days	16 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE QUL-ZOO-1_WS_DI-1_2022-06	E235.Cl	22-Jun-2022	----	----	----		25-Jun-2022	28 days	3 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE QUL-ZOO-1_WS_DI-1X_2022-06	E235.Cl	22-Jun-2022	----	----	----		25-Jun-2022	28 days	3 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE QUL-ZOO-7_WS_DI-1_2022-06	E235.Cl	22-Jun-2022	----	----	----		25-Jun-2022	28 days	3 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE QUL-ZOO-1_WS_DI-1_2022-06	E378-U	22-Jun-2022	----	----	----		25-Jun-2022	3 days	3 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE QUL-ZOO-1_WS_DI-1X_2022-06	E378-U	22-Jun-2022	----	----	----		25-Jun-2022	3 days	3 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE QUL-ZOO-7_WS_DI-1_2022-06	E378-U	22-Jun-2022	----	----	----		25-Jun-2022	3 days	3 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE QUL-ZOO-1_WS_DI-1_2022-06	E235.F	22-Jun-2022	----	----	----		25-Jun-2022	28 days	3 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE QUL-ZOO-1_WS_DI-1X_2022-06	E235.F	22-Jun-2022	----	----	----		25-Jun-2022	28 days	3 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE QUL-ZOO-7_WS_DI-1_2022-06	E235.F	22-Jun-2022	----	----	----		25-Jun-2022	28 days	3 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE QUL-ZOO-1_WS_DI-1_2022-06	E235.NO3-L	22-Jun-2022	----	----	----		25-Jun-2022	3 days	3 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE QUL-ZOO-1_WS_DI-1X_2022-06	E235.NO3-L	22-Jun-2022	----	----	----		25-Jun-2022	3 days	3 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE QUL-ZOO-7_WS_DI-1_2022-06	E235.NO3-L	22-Jun-2022	----	----	----		25-Jun-2022	3 days	3 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE QUL-ZOO-1_WS_DI-1_2022-06	E235.NO2-L	22-Jun-2022	----	----	----		25-Jun-2022	3 days	3 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE QUL-ZOO-1_WS_DI-1X_2022-06	E235.NO2-L	22-Jun-2022	----	----	----		25-Jun-2022	3 days	3 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE QUL-ZOO-7_WS_DI-1_2022-06	E235.NO2-L	22-Jun-2022	----	----	----		25-Jun-2022	3 days	3 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE QUL-ZOO-1_WS_DI-1_2022-06	E235.SO4	22-Jun-2022	----	----	----		25-Jun-2022	28 days	3 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE QUL-ZOO-1_WS_DI-1X_2022-06	E235.SO4	22-Jun-2022	----	----	----		25-Jun-2022	28 days	3 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE QUL-ZOO-7_WS_DI-1_2022-06	E235.SO4	22-Jun-2022	----	----	----		25-Jun-2022	28 days	3 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass dissolved (sulfuric acid) QUL-ZOO-1_WS_DI-1_2022-06	E375-T	22-Jun-2022	07-Jul-2022	----	----		09-Jul-2022	28 days	17 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass dissolved (sulfuric acid) QUL-ZOO-1_WS_DI-1X_2022-06	E375-T	22-Jun-2022	07-Jul-2022	----	----		09-Jul-2022	28 days	17 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass dissolved (sulfuric acid) QUL-ZOO-7_WS_DI-1_2022-06	E375-T	22-Jun-2022	07-Jul-2022	----	----		09-Jul-2022	28 days	17 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid) QUL-ZOO-1_WS_DI-1_2022-06	E366	22-Jun-2022	07-Jul-2022	----	----		08-Jul-2022	28 days	16 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid)										
QUL-ZOO-1_WS_DI-1X_2022-06	E366	22-Jun-2022	07-Jul-2022	----	----		08-Jul-2022	28 days	16 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid)										
QUL-ZOO-7_WS_DI-1_2022-06	E366	22-Jun-2022	07-Jul-2022	----	----		08-Jul-2022	28 days	16 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid)										
QUL-ZOO-1_WS_DI-1_2022-06	E372-U	22-Jun-2022	07-Jul-2022	----	----		09-Jul-2022	28 days	17 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid)										
QUL-ZOO-1_WS_DI-1X_2022-06	E372-U	22-Jun-2022	07-Jul-2022	----	----		09-Jul-2022	28 days	17 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid)										
QUL-ZOO-7_WS_DI-1_2022-06	E372-U	22-Jun-2022	07-Jul-2022	----	----		09-Jul-2022	28 days	17 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved)										
QUL-ZOO-1_WS_DI-1_2022-06	E421	22-Jun-2022	03-Jul-2022	----	----		04-Jul-2022	180 days	12 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved)										
QUL-ZOO-1_WS_DI-1X_2022-06	E421	22-Jun-2022	03-Jul-2022	----	----		04-Jul-2022	180 days	12 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved)										
QUL-ZOO-7_WS_DI-1_2022-06	E421	22-Jun-2022	03-Jul-2022	----	----		04-Jul-2022	180 days	12 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid)										
QUL-ZOO-1_WS_DI-1_2022-06	E358-L	22-Jun-2022	07-Jul-2022	----	----		08-Jul-2022	28 days	15 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) QUL-ZOO-1_WS_DI-1X_2022-06	E358-L	22-Jun-2022	07-Jul-2022	----	----		08-Jul-2022	28 days	15 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) QUL-ZOO-7_WS_DI-1_2022-06	E358-L	22-Jun-2022	07-Jul-2022	----	----		08-Jul-2022	28 days	15 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE QUL-ZOO-1_WS_DI-1_2022-06	E290	22-Jun-2022	----	----	----		01-Jul-2022	14 days	9 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE QUL-ZOO-1_WS_DI-1X_2022-06	E290	22-Jun-2022	----	----	----		01-Jul-2022	14 days	9 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE QUL-ZOO-7_WS_DI-1_2022-06	E290	22-Jun-2022	----	----	----		01-Jul-2022	14 days	9 days	✓
Physical Tests : Conductivity in Water										
HDPE QUL-ZOO-1_WS_DI-1_2022-06	E100	22-Jun-2022	----	----	----		01-Jul-2022	28 days	9 days	✓
Physical Tests : Conductivity in Water										
HDPE QUL-ZOO-1_WS_DI-1X_2022-06	E100	22-Jun-2022	----	----	----		01-Jul-2022	28 days	9 days	✓
Physical Tests : Conductivity in Water										
HDPE QUL-ZOO-7_WS_DI-1_2022-06	E100	22-Jun-2022	----	----	----		01-Jul-2022	28 days	9 days	✓
Physical Tests : pH by Meter										
HDPE QUL-ZOO-1_WS_DI-1_2022-06	E108	22-Jun-2022	----	----	----		01-Jul-2022	0.25 hrs	213 hrs	× EHTR-FM

Matrix: **Water**

Evaluation: ✖ = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : pH by Meter										
HDPE QUL-ZOO-1_WS_DI-1X_2022-06	E108	22-Jun-2022	----	----	----		01-Jul-2022	0.25 hrs	213 hrs	✖ EHTR-FM
Physical Tests : pH by Meter										
HDPE QUL-ZOO-7_WS_DI-1_2022-06	E108	22-Jun-2022	----	----	----		01-Jul-2022	0.25 hrs	214 hrs	✖ EHTR-FM
Physical Tests : TDS by Gravimetry										
HDPE QUL-ZOO-7_WS_DI-1_2022-06	E162	22-Jun-2022	----	----	----		29-Jun-2022	7 days	7 days	✓
Physical Tests : TDS by Gravimetry										
HDPE QUL-ZOO-1_WS_DI-1_2022-06	E162	22-Jun-2022	----	----	----		30-Jun-2022	7 days	8 days	✖ EHT
Physical Tests : TDS by Gravimetry										
HDPE QUL-ZOO-1_WS_DI-1X_2022-06	E162	22-Jun-2022	----	----	----		30-Jun-2022	7 days	8 days	✖ EHT
Physical Tests : TSS by Gravimetry (Whole Bottle)										
HDPE [TSS-WB] QUL-ZOO-7_WS_DI-1_2022-06	E164	22-Jun-2022	----	----	----		29-Jun-2022	7 days	7 days	✓
Physical Tests : TSS by Gravimetry (Whole Bottle)										
HDPE [TSS-WB] QUL-ZOO-1_WS_DI-1_2022-06	E164	22-Jun-2022	----	----	----		30-Jun-2022	7 days	8 days	✖ EHT
Physical Tests : TSS by Gravimetry (Whole Bottle)										
HDPE [TSS-WB] QUL-ZOO-1_WS_DI-1X_2022-06	E164	22-Jun-2022	----	----	----		30-Jun-2022	7 days	8 days	✖ EHT
Physical Tests : Turbidity by Nephelometry										
HDPE QUL-ZOO-1_WS_DI-1_2022-06	E121	22-Jun-2022	----	----	----		25-Jun-2022	3 days	3 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Turbidity by Nephelometry										
HDPE										
QUL-ZOO-1_WS_DI-1X_2022-06	E121	22-Jun-2022	----	----	----		25-Jun-2022	3 days	3 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE										
QUL-ZOO-7_WS_DI-1_2022-06	E121	22-Jun-2022	----	----	----		25-Jun-2022	3 days	3 days	✓
Plant Pigments : Chlorophyll-a by Fluorometry										
Opaque HDPE										
QUL-ZOO-1_WS_DI-1_2022-06	E870	22-Jun-2022	24-Jun-2022	2 days	2 days	× EHTL	26-Jun-2022	672 hrs	2 days	✓
Plant Pigments : Chlorophyll-a by Fluorometry										
Opaque HDPE										
QUL-ZOO-1_WS_DI-1X_2022-06	E870	22-Jun-2022	24-Jun-2022	2 days	2 days	× EHTL	26-Jun-2022	672 hrs	2 days	✓
Plant Pigments : Chlorophyll-a by Fluorometry										
Opaque HDPE										
QUL-ZOO-7_WS_DI-1_2022-06	E870	22-Jun-2022	24-Jun-2022	2 days	2 days	× EHTR	26-Jun-2022	672 hrs	2 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved)										
QUL-ZOO-1_WS_DI-1_2022-06	E420	22-Jun-2022	----	----	----		04-Jul-2022	180 days	13 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved)										
QUL-ZOO-1_WS_DI-1X_2022-06	E420	22-Jun-2022	----	----	----		04-Jul-2022	180 days	13 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved)										
QUL-ZOO-7_WS_DI-1_2022-06	E420	22-Jun-2022	----	----	----		04-Jul-2022	180 days	13 days	✓

Legend & Qualifier Definitions

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended

EHTR: Exceeded ALS recommended hold time prior to sample receipt.

EHTL: Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.

EHT: Exceeded ALS recommended hold time prior to analysis.

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = QC frequency outside specification; ✓ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Alkalinity Species by Titration	E290	538163	1	13	7.6	5.0	✓
Ammonia by Fluorescence	E298	553525	1	5	20.0	5.0	✓
Chloride in Water by IC	E235.Cl	538166	1	19	5.2	5.0	✓
Conductivity in Water	E100	538164	1	10	10.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	546220	1	20	5.0	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	553520	1	20	5.0	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	538171	1	8	12.5	5.0	✓
Fluoride in Water by IC	E235.F	538165	1	16	6.2	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	538168	1	20	5.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	538169	1	19	5.2	5.0	✓
pH by Meter	E108	538162	1	13	7.6	5.0	✓
Sulfate in Water by IC	E235.SO4	538170	1	19	5.2	5.0	✓
TDS by Gravimetry	E162	543633	2	34	5.8	5.0	✓
Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)	E375-T	553523	1	8	12.5	5.0	✓
Total Metals in Water by CRC ICPMS	E420	545623	1	20	5.0	5.0	✓
Total Nitrogen by Colourimetry	E366	553524	1	5	20.0	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	553522	1	17	5.8	5.0	✓
Turbidity by Nephelometry	E121	538304	1	20	5.0	5.0	✓
Laboratory Control Samples (LCS)							
Alkalinity Species by Titration	E290	538163	1	13	7.6	5.0	✓
Ammonia by Fluorescence	E298	553525	1	5	20.0	5.0	✓
Chloride in Water by IC	E235.Cl	538166	1	19	5.2	5.0	✓
Chlorophyll-a by Fluorometry	E870	538063	1	3	33.3	5.0	✓
Conductivity in Water	E100	538164	1	10	10.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	546220	1	20	5.0	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	553520	1	20	5.0	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	538171	1	8	12.5	5.0	✓
Fluoride in Water by IC	E235.F	538165	1	16	6.2	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	538168	1	20	5.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	538169	1	19	5.2	5.0	✓
pH by Meter	E108	538162	1	13	7.6	5.0	✓
Sulfate in Water by IC	E235.SO4	538170	1	19	5.2	5.0	✓
TDS by Gravimetry	E162	543633	2	34	5.8	5.0	✓
Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)	E375-T	553523	1	8	12.5	5.0	✓
Total Metals in Water by CRC ICPMS	E420	545623	1	20	5.0	5.0	✓
Total Nitrogen by Colourimetry	E366	553524	1	5	20.0	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	553522	1	17	5.8	5.0	✓

Matrix: **Water**

Evaluation: × = QC frequency outside specification; ✓ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Control Samples (LCS) - Continued							
TSS by Gravimetry (Whole Bottle)	E164	543611	2	28	7.1	5.0	✓
Turbidity by Nephelometry	E121	538304	1	20	5.0	5.0	✓
Method Blanks (MB)							
Alkalinity Species by Titration	E290	538163	1	13	7.6	5.0	✓
Ammonia by Fluorescence	E298	553525	1	5	20.0	5.0	✓
Chloride in Water by IC	E235.Cl	538166	1	19	5.2	5.0	✓
Chlorophyll-a by Fluorometry	E870	538063	1	3	33.3	5.0	✓
Conductivity in Water	E100	538164	1	10	10.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	546220	1	20	5.0	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	553520	1	20	5.0	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	538171	1	8	12.5	5.0	✓
Fluoride in Water by IC	E235.F	538165	1	16	6.2	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	538168	1	20	5.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	538169	1	19	5.2	5.0	✓
Sulfate in Water by IC	E235.SO4	538170	1	19	5.2	5.0	✓
TDS by Gravimetry	E162	543633	2	34	5.8	5.0	✓
Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)	E375-T	553523	1	8	12.5	5.0	✓
Total Metals in Water by CRC ICPMS	E420	545623	1	20	5.0	5.0	✓
Total Nitrogen by Colourimetry	E366	553524	1	5	20.0	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	553522	1	17	5.8	5.0	✓
TSS by Gravimetry (Whole Bottle)	E164	543611	2	28	7.1	5.0	✓
Turbidity by Nephelometry	E121	538304	1	20	5.0	5.0	✓
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	553525	1	5	20.0	5.0	✓
Chloride in Water by IC	E235.Cl	538166	1	19	5.2	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	546220	1	20	5.0	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	553520	1	20	5.0	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	538171	1	8	12.5	5.0	✓
Fluoride in Water by IC	E235.F	538165	1	16	6.2	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	538168	1	20	5.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	538169	1	19	5.2	5.0	✓
Sulfate in Water by IC	E235.SO4	538170	1	19	5.2	5.0	✓
Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)	E375-T	553523	1	8	12.5	5.0	✓
Total Metals in Water by CRC ICPMS	E420	545623	1	20	5.0	5.0	✓
Total Nitrogen by Colourimetry	E366	553524	1	5	20.0	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	553522	1	17	5.8	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Conductivity in Water	E100 Vancouver - Environmental	Water	APHA 2510 (mod)	Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a water sample. Conductivity measurements are temperature-compensated to 25°C.
pH by Meter	E108 Vancouver - Environmental	Water	APHA 4500-H (mod)	pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally 20 ± 5°C). For high accuracy test results, pH should be measured in the field within the recommended 15 minute hold time.
Turbidity by Nephelometry	E121 Vancouver - Environmental	Water	APHA 2130 B (mod)	Turbidity is measured by the nephelometric method, by measuring the intensity of light scatter under defined conditions.
TDS by Gravimetry	E162 Vancouver - Environmental	Water	APHA 2540 C (mod)	Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, with evaporation of the filtrate at 180 ± 2°C for 16 hours or to constant weight, with gravimetric measurement of the residue.
TSS by Gravimetry (Whole Bottle)	E164 Vancouver - Environmental	Water	APHA 2540 D (mod)	Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, following by drying of the filter at 104 ± 1°C, with gravimetric measurement of the filtered solids. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.
Chloride in Water by IC	E235.Cl Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Fluoride in Water by IC	E235.F Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrite in Water by IC (Low Level)	E235.NO2-L Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrate in Water by IC (Low Level)	E235.NO3-L Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Sulfate in Water by IC	E235.SO4 Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Alkalinity Species by Titration	E290 Vancouver - Environmental	Water	APHA 2320 B (mod)	Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.
Ammonia by Fluorescence	E298 Vancouver - Environmental	Water	Method Fialab 100, 2018	Ammonia in water is determined by automated continuous flow analysis with membrane diffusion and fluorescence detection, after reaction with OPA (ortho-phthalaldehyde). This method is approved under US EPA 40 CFR Part 136 (May 2021)
Dissolved Organic Carbon by Combustion (Low Level)	E358-L Vancouver - Environmental	Water	APHA 5310 B (mod)	Dissolved Organic Carbon (Non-Purgeable), also known as NPOC (dissolved), is a direct measurement of DOC after a filtered (0.45 micron) sample has been acidified and purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of DC (dissolved carbon) is comprised of IC (which is common), this method is more accurate and more reliable than the DOC by subtraction method (i.e. DC minus DIC).
Total Nitrogen by Colourimetry	E366 Vancouver - Environmental	Water	APHA 4500-P J (mod)	Total Nitrogen is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U Vancouver - Environmental	Water	APHA 4500-P E (mod).	Total Phosphorus is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)	E375-T Vancouver - Environmental	Water	APHA 4500-P E (mod).	Total Dissolved Phosphorus is determined colourimetrically using a discrete analyzer after filtration through a 0.45 micron filter followed by heated persulfate digestion of the sample.
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U Vancouver - Environmental	Water	APHA 4500-P F (mod)	Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter. Field filtration is recommended to ensure test results represent conditions at time of sampling.
Total Metals in Water by CRC ICPMS	E420 Vancouver - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Dissolved Metals in Water by CRC ICPMS	E421 Vancouver - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Chlorophyll-a by Fluorometry	E870 Vancouver - Environmental	Water	EPA 445.0 (mod)	Chlorophyll a is determined by solvent extraction followed with analysis by fluorometry using the non-acidification procedure. This method is not subject to interferences from chlorophyll b.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Hardness (Calculated)	EC100 Vancouver - Environmental	Water	APHA 2340B	"Hardness (as CaCO3), dissolved" is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.
Hardness (Calculated) from Total Ca/Mg	EC100A Vancouver - Environmental	Water	APHA 2340B	"Hardness (as CaCO3), from total Ca/Mg" is calculated from the sum of total Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations. Hardness from total Ca/Mg is normally comparable to Dissolved Hardness in non-turbid waters.
Nitrate and Nitrite (as N) (Calculation)	EC235.N+N Vancouver - Environmental	Water	EPA 300.0	Nitrate and Nitrite (as N) is a calculated parameter. Nitrate and Nitrite (as N) = Nitrite (as N) + Nitrate (as N).

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Ammonia	EP298 Vancouver - Environmental	Water		Sample preparation for Preserved Nutrients Water Quality Analysis.
Preparation for Dissolved Organic Carbon for Combustion	EP358 Vancouver - Environmental	Water	APHA 5310 B (mod)	Preparation for Dissolved Organic Carbon
Digestion for Total Nitrogen in water	EP366 Vancouver - Environmental	Water	APHA 4500-P J (mod)	Samples are heated with a persulfate digestion reagent.
Digestion for Total Phosphorus in water	EP372 Vancouver - Environmental	Water	APHA 4500-P E (mod).	Samples are heated with a persulfate digestion reagent.
Digestion for Dissolved Phosphorus in water	EP375 Vancouver - Environmental	Water	APHA 4500-P E (mod).	Samples are filtered through a 0.45 micron membrane filter and then heated with a persulfate digestion reagent.
Dissolved Metals Water Filtration	EP421 Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.
Chlorophyll-a Extraction	EP870 Vancouver - Environmental	Water	EPA 445.0 (mod)	Chlorophyll-a solvent extraction.

QUALITY CONTROL REPORT

Work Order	: **VA22B4435**	Page	: 1 of 15
Client	: Mount Polley Mining Corporation	Laboratory	: Vancouver - Environmental
Contact	: Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: ----	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 24-Jun-2022 11:20
PO	: 5590008044 Q2 2022	Date Analysis Commenced	: 24-Jun-2022
C-O-C number	: ----	Issue Date	: 11-Jul-2022 14:22
Sampler	: ----		
Site	: ----		
Quote number	: VA22-MPMC100-006 - Minnow Env. - Water Quality		
No. of samples received	: 3		
No. of samples analysed	: 3		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Erin Sanchez		Vancouver Metals, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Vancouver Metals, Burnaby, British Columbia
Kyle Chang	Lab Assistant	Vancouver Metals, Burnaby, British Columbia
Miles Gropen	Department Manager - Inorganics	Vancouver Inorganics, Burnaby, British Columbia
Tracy Harley	Supervisor - Water Quality Instrumentation	Vancouver Inorganics, Burnaby, British Columbia

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 538162)											
FJ2201667-001	Anonymous	pH	----	E108	0.10	pH units	8.19	8.20	0.146%	4%	----
Physical Tests (QC Lot: 538163)											
FJ2201667-001	Anonymous	alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	106	106	0.565%	20%	----
Physical Tests (QC Lot: 538164)											
FJ2201667-001	Anonymous	conductivity	----	E100	2.0	µS/cm	525	527	0.380%	10%	----
Physical Tests (QC Lot: 538304)											
KS2202283-006	Anonymous	turbidity	----	E121	0.10	NTU	0.24	0.26	0.02	Diff <2x LOR	----
Physical Tests (QC Lot: 543633)											
KS2202224-001	Anonymous	solids, total dissolved [TDS]	----	E162	20	mg/L	5290	5280	0.189%	20%	----
Physical Tests (QC Lot: 545680)											
KS2202302-001	Anonymous	solids, total dissolved [TDS]	----	E162	20	mg/L	310	307	1.13%	20%	----
Anions and Nutrients (QC Lot: 538165)											
FJ2201667-001	Anonymous	fluoride	16984-48-8	E235.F	0.020	mg/L	0.188	0.184	0.004	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 538166)											
FJ2201667-001	Anonymous	chloride	16887-00-6	E235.Cl	0.50	mg/L	<0.50	<0.50	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 538168)											
FJ2201667-001	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	1.87	1.86	0.722%	20%	----
Anions and Nutrients (QC Lot: 538169)											
FJ2201667-001	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	0.0010	0.0011	0.00004	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 538170)											
FJ2201667-001	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	141	140	1.02%	20%	----
Anions and Nutrients (QC Lot: 538171)											
FJ2201667-001	Anonymous	phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	0.0040	0.0038	0.0002	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 553522)											
VA22B4435-001	QUL-ZOO-1_WS_DI-1_2022-06	phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.0064	0.0084	0.0020	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 553523)											
VA22B4435-001	QUL-ZOO-1_WS_DI-1_2022-06	phosphorus, total dissolved	7723-14-0	E375-T	0.0020	mg/L	0.0030	0.0034	0.0004	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 553524)											
VA22B4435-001	QUL-ZOO-1_WS_DI-1_2022-06	nitrogen, total	7727-37-9	E366	0.030	mg/L	0.232	0.268	0.036	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 553525)											

Sub-Matrix: **Water**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Laboratory Duplicate (DUP) Report						
					LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Anions and Nutrients (QC Lot: 553525) - continued											
VA22B4435-001	QUL-ZOO-1_WS_DI-1_2022-06	ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	<0.0050	0.0060	0.0010	Diff <2x LOR	----
Organic / Inorganic Carbon (QC Lot: 553520)											
VA22B4435-001	QUL-ZOO-1_WS_DI-1_2022-06	carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L	2.92	2.98	0.05	Diff <2x LOR	----
Total Metals (QC Lot: 545623)											
VA22B4433-001	Anonymous	aluminum, total	7429-90-5	E420	0.0030	mg/L	0.282	0.295	4.46%	20%	----
		antimony, total	7440-36-0	E420	0.00010	mg/L	0.00036	0.00037	0.000003	Diff <2x LOR	----
		arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00078	0.00080	0.00002	Diff <2x LOR	----
		barium, total	7440-39-3	E420	0.00010	mg/L	0.0438	0.0447	2.14%	20%	----
		beryllium, total	7440-41-7	E420	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, total	7440-42-8	E420	0.010	mg/L	0.076	0.075	0.001	Diff <2x LOR	----
		cadmium, total	7440-43-9	E420	0.000105	mg/L	<0.000105	<0.000105	0	Diff <2x LOR	----
		calcium, total	7440-70-2	E420	0.050	mg/L	113	113	0.157%	20%	----
		chromium, total	7440-47-3	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		cobalt, total	7440-48-4	E420	0.00010	mg/L	0.00211	0.00212	0.427%	20%	----
		copper, total	7440-50-8	E420	0.00050	mg/L	0.168	0.170	1.10%	20%	----
		iron, total	7439-89-6	E420	0.030	mg/L	0.180	0.181	0.001	Diff <2x LOR	----
		lead, total	7439-92-1	E420	0.000050	mg/L	0.000125	0.000124	0.0000008	Diff <2x LOR	----
		lithium, total	7439-93-2	E420	0.0010	mg/L	0.0070	0.0070	0.00007	Diff <2x LOR	----
		magnesium, total	7439-95-4	E420	0.100	mg/L	21.6	21.1	2.41%	20%	----
		manganese, total	7439-96-5	E420	0.00010	mg/L	0.193	0.191	0.726%	20%	----
		molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.121	0.117	3.79%	20%	----
		nickel, total	7440-02-0	E420	0.00050	mg/L	0.00236	0.00228	0.00008	Diff <2x LOR	----
		potassium, total	7440-09-7	E420	0.050	mg/L	4.38	4.38	0.0978%	20%	----
		selenium, total	7782-49-2	E420	0.000050	mg/L	0.0256	0.0255	0.458%	20%	----
		silicon, total	7440-21-3	E420	0.10	mg/L	3.38	3.36	0.721%	20%	----
		silver, total	7440-22-4	E420	0.000010	mg/L	0.000010	0.000010	0.000000008	Diff <2x LOR	----
		sodium, total	7440-23-5	E420	0.050	mg/L	26.0	26.5	1.66%	20%	----
		strontium, total	7440-24-6	E420	0.00020	mg/L	1.56	1.52	2.53%	20%	----
		thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		titanium, total	7440-32-6	E420	0.0100	mg/L	<0.0100	<0.0100	0	Diff <2x LOR	----
		uranium, total	7440-61-1	E420	0.000010	mg/L	0.000840	0.000849	0.999%	20%	----
		vanadium, total	7440-62-2	E420	0.00050	mg/L	0.00090	0.00092	0.00002	Diff <2x LOR	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Total Metals (QC Lot: 545623) - continued											
VA22B4433-001	Anonymous	zinc, total	7440-66-6	E420	0.0030	mg/L	0.0050	0.0049	0.0002	Diff <2x LOR	----
Dissolved Metals (QC Lot: 546220)											
VA22B4424-011	Anonymous	aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0442	0.0447	1.18%	20%	----
		antimony, dissolved	7440-36-0	E421	0.00010	mg/L	0.00014	0.00014	0.000002	Diff <2x LOR	----
		arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00032	0.00028	0.00004	Diff <2x LOR	----
		barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.00375	0.00377	0.622%	20%	----
		beryllium, dissolved	7440-41-7	E421	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, dissolved	7440-42-8	E421	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	0.0000102	0.0000113	0.0000011	Diff <2x LOR	----
		calcium, dissolved	7440-70-2	E421	0.050	mg/L	21.3	21.3	0.342%	20%	----
		chromium, dissolved	7440-47-3	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		copper, dissolved	7440-50-8	E421	0.00020	mg/L	0.00140	0.00153	0.00013	Diff <2x LOR	----
		iron, dissolved	7439-89-6	E421	0.010	mg/L	0.034	0.036	0.001	Diff <2x LOR	----
		lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		lithium, dissolved	7439-93-2	E421	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
		magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	2.81	2.84	0.993%	20%	----
		manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.00132	0.00130	1.93%	20%	----
		molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.000371	0.000383	0.000011	Diff <2x LOR	----
		nickel, dissolved	7440-02-0	E421	0.00050	mg/L	0.00052	0.00054	0.00002	Diff <2x LOR	----
		potassium, dissolved	7440-09-7	E421	0.050	mg/L	0.158	0.164	0.006	Diff <2x LOR	----
		selenium, dissolved	7782-49-2	E421	0.000050	mg/L	0.000151	0.000180	0.000029	Diff <2x LOR	----
		silicon, dissolved	7440-21-3	E421	0.050	mg/L	3.99	3.98	0.450%	20%	----
		silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, dissolved	7440-23-5	E421	0.050	mg/L	1.04	1.06	1.63%	20%	----
		strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.108	0.108	0.236%	20%	----
		thallium, dissolved	7440-28-0	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		tin, dissolved	7440-31-5	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		titanium, dissolved	7440-32-6	E421	0.00030	mg/L	0.00062	0.00070	0.00008	Diff <2x LOR	----
		uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.000028	0.000028	0.0000009	Diff <2x LOR	----
		vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		zinc, dissolved	7440-66-6	E421	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 538163)						
alkalinity, total (as CaCO3)	----	E290	1	mg/L	<1.0	----
Physical Tests (QCLot: 538164)						
conductivity	----	E100	1	µS/cm	<1.0	----
Physical Tests (QCLot: 538304)						
turbidity	----	E121	0.1	NTU	<0.10	----
Physical Tests (QCLot: 543611)						
solids, total suspended [TSS]	----	E164	1	mg/L	<1.0	----
Physical Tests (QCLot: 543633)						
solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Physical Tests (QCLot: 545195)						
solids, total suspended [TSS]	----	E164	1	mg/L	<1.0	----
Physical Tests (QCLot: 545680)						
solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Anions and Nutrients (QCLot: 538165)						
fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 538166)						
chloride	16887-00-6	E235.Cl	0.5	mg/L	<0.50	----
Anions and Nutrients (QCLot: 538168)						
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 538169)						
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 538170)						
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 538171)						
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 553522)						
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----
Anions and Nutrients (QCLot: 553523)						
phosphorus, total dissolved	7723-14-0	E375-T	0.002	mg/L	<0.0020	----
Anions and Nutrients (QCLot: 553524)						
nitrogen, total	7727-37-9	E366	0.03	mg/L	<0.030	----
Anions and Nutrients (QCLot: 553525)						
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Organic / Inorganic Carbon (QCLot: 553520)						
carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	<0.50	----
Total Metals (QCLot: 545623)						
aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----
antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
chromium, total	7440-47-3	E420	0.0005	mg/L	<0.00050	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	----
magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	----
manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
silicon, total	7440-21-3	E420	0.1	mg/L	<0.10	----
silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	----
sodium, total	7440-23-5	E420	0.05	mg/L	<0.050	----
strontium, total	7440-24-6	E420	0.0002	mg/L	<0.00020	----
thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----
tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----
uranium, total	7440-61-1	E420	0.00001	mg/L	<0.000010	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	<0.00050	----
zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	----
Dissolved Metals (QCLot: 546220)						
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	<0.0010	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	<0.00010	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 546220) - continued						
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	<0.00010	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	<0.00010	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	<0.000020	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	<0.000050	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	<0.010	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	<0.0000050	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	<0.050	----
chromium, dissolved	7440-47-3	E421	0.0005	mg/L	<0.00050	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	<0.000050	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	<0.050	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	<0.000010	----
sodium, dissolved	7440-23-5	E421	0.05	mg/L	<0.050	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	<0.00020	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	<0.000010	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	<0.00050	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	<0.0010	----
Plant Pigments (QCLot: 538063)						
chlorophyll a	479-61-8	E870	0.01	µg/L	<0.010	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 538162)									
pH	----	E108	----	pH units	7 pH units	99.8	98.0	102	----
Physical Tests (QCLot: 538163)									
alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	99.9	85.0	115	----
Physical Tests (QCLot: 538164)									
conductivity	----	E100	1	µS/cm	146.9 µS/cm	106	90.0	110	----
Physical Tests (QCLot: 538304)									
turbidity	----	E121	0.1	NTU	200 NTU	99.5	85.0	115	----
Physical Tests (QCLot: 543611)									
solids, total suspended [TSS]	----	E164	1	mg/L	150 mg/L	98.8	85.0	115	----
Physical Tests (QCLot: 543633)									
solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	103	85.0	115	----
Physical Tests (QCLot: 545195)									
solids, total suspended [TSS]	----	E164	1	mg/L	150 mg/L	108	85.0	115	----
Physical Tests (QCLot: 545680)									
solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	105	85.0	115	----
Anions and Nutrients (QCLot: 538165)									
fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	96.3	90.0	110	----
Anions and Nutrients (QCLot: 538166)									
chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	97.2	90.0	110	----
Anions and Nutrients (QCLot: 538168)									
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	99.4	90.0	110	----
Anions and Nutrients (QCLot: 538169)									
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	99.0	90.0	110	----
Anions and Nutrients (QCLot: 538170)									
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	99.4	90.0	110	----
Anions and Nutrients (QCLot: 538171)									
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	0.03 mg/L	97.4	80.0	120	----
Anions and Nutrients (QCLot: 553522)									
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	0.05 mg/L	99.0	80.0	120	----
Anions and Nutrients (QCLot: 553523)									
phosphorus, total dissolved	7723-14-0	E375-T	0.002	mg/L	0.05 mg/L	98.3	80.0	120	----
Anions and Nutrients (QCLot: 553524)									

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Anions and Nutrients (QCLot: 553524) - continued									
nitrogen, total	7727-37-9	E366	0.03	mg/L	0.5 mg/L	106	75.0	125	----
Anions and Nutrients (QCLot: 553525)									
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	102	85.0	115	----
Organic / Inorganic Carbon (QCLot: 553520)									
carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	8.57 mg/L	96.8	80.0	120	----
Total Metals (QCLot: 545623)									
aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	103	80.0	120	----
antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	106	80.0	120	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	101	80.0	120	----
barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	101	80.0	120	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	97.2	80.0	120	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	101	80.0	120	----
boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	95.5	80.0	120	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	97.6	80.0	120	----
calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	98.3	80.0	120	----
chromium, total	7440-47-3	E420	0.0005	mg/L	0.25 mg/L	98.2	80.0	120	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	96.3	80.0	120	----
copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	98.2	80.0	120	----
iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	101	80.0	120	----
lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	103	80.0	120	----
lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	99.2	80.0	120	----
magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	98.4	80.0	120	----
manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	98.5	80.0	120	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	102	80.0	120	----
nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	100	80.0	120	----
potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	100	80.0	120	----
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	97.9	80.0	120	----
silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	103	80.0	120	----
silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	98.1	80.0	120	----
sodium, total	7440-23-5	E420	0.05	mg/L	50 mg/L	105	80.0	120	----
strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	110	80.0	120	----
thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	105	80.0	120	----
tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	99.5	80.0	120	----
titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	95.7	80.0	120	----
uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	107	80.0	120	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	100	80.0	120	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Total Metals (QCLot: 545623) - continued									
zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	96.6	80.0	120	----
Dissolved Metals (QCLot: 546220)									
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	103	80.0	120	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	102	80.0	120	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	103	80.0	120	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	106	80.0	120	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	106	80.0	120	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	98.2	80.0	120	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	103	80.0	120	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	98.2	80.0	120	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	105	80.0	120	----
chromium, dissolved	7440-47-3	E421	0.0005	mg/L	0.25 mg/L	98.5	80.0	120	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	99.4	80.0	120	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	97.9	80.0	120	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	101	80.0	120	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	98.2	80.0	120	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	107	80.0	120	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	102	80.0	120	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	102	80.0	120	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	102	80.0	120	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	98.2	80.0	120	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	102	80.0	120	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	102	80.0	120	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	104	80.0	120	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	97.4	80.0	120	----
sodium, dissolved	7440-23-5	E421	0.05	mg/L	50 mg/L	106	80.0	120	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	102	80.0	120	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	100	80.0	120	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	99.3	80.0	120	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	101	80.0	120	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	97.2	80.0	120	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	102	80.0	120	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	102	80.0	120	----
Plant Pigments (QCLot: 538063)									
chlorophyll a	479-61-8	E870	0.01	µg/L	5 µg/L	99.5	80.0	120	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 538165)										
VA22B4270-001	Anonymous	fluoride	16984-48-8	E235.F	16.6 mg/L	20 mg/L	82.9	75.0	125	----
Anions and Nutrients (QCLot: 538166)										
VA22B4270-001	Anonymous	chloride	16887-00-6	E235.Cl	1880 mg/L	2000 mg/L	94.1	75.0	125	----
Anions and Nutrients (QCLot: 538168)										
VA22B4270-001	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	47.8 mg/L	50 mg/L	95.6	75.0	125	----
Anions and Nutrients (QCLot: 538169)										
VA22B4270-001	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	9.37 mg/L	10 mg/L	93.7	75.0	125	----
Anions and Nutrients (QCLot: 538170)										
VA22B4270-001	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	1870 mg/L	2000 mg/L	93.6	75.0	125	----
Anions and Nutrients (QCLot: 538171)										
VA22B4270-001	Anonymous	phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	1.70 mg/L	1.5 mg/L	113	70.0	130	----
Anions and Nutrients (QCLot: 553522)										
VA22B4435-002	QUL-ZOO-7_WS_DI-1_2022-06	phosphorus, total	7723-14-0	E372-U	0.0520 mg/L	0.05 mg/L	104	70.0	130	----
Anions and Nutrients (QCLot: 553523)										
VA22B4435-002	QUL-ZOO-7_WS_DI-1_2022-06	phosphorus, total dissolved	7723-14-0	E375-T	0.0513 mg/L	0.05 mg/L	102	70.0	130	----
Anions and Nutrients (QCLot: 553524)										
VA22B4435-002	QUL-ZOO-7_WS_DI-1_2022-06	nitrogen, total	7727-37-9	E366	0.356 mg/L	0.4 mg/L	89.1	70.0	130	----
Anions and Nutrients (QCLot: 553525)										
VA22B4435-002	QUL-ZOO-7_WS_DI-1_2022-06	ammonia, total (as N)	7664-41-7	E298	0.0966 mg/L	0.1 mg/L	96.6	75.0	125	----
Organic / Inorganic Carbon (QCLot: 553520)										
VA22B4435-002	QUL-ZOO-7_WS_DI-1_2022-06	carbon, dissolved organic [DOC]	----	E358-L	5.07 mg/L	5 mg/L	101	70.0	130	----
Total Metals (QCLot: 545623)										
VA22B4433-002	Anonymous	aluminum, total	7429-90-5	E420	0.195 mg/L	0.2 mg/L	97.5	70.0	130	----
		antimony, total	7440-36-0	E420	0.0196 mg/L	0.02 mg/L	98.3	70.0	130	----
		arsenic, total	7440-38-2	E420	0.0195 mg/L	0.02 mg/L	97.6	70.0	130	----
		barium, total	7440-39-3	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		beryllium, total	7440-41-7	E420	0.0369 mg/L	0.04 mg/L	92.4	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Total Metals (QCLot: 545623) - continued										
VA22B4433-002	Anonymous	bismuth, total	7440-69-9	E420	0.0101 mg/L	0.01 mg/L	101	70.0	130	----
		boron, total	7440-42-8	E420	ND mg/L	0.1 mg/L	ND	70.0	130	----
		cadmium, total	7440-43-9	E420	0.00393 mg/L	0.004 mg/L	98.2	70.0	130	----
		calcium, total	7440-70-2	E420	ND mg/L	4 mg/L	ND	70.0	130	----
		chromium, total	7440-47-3	E420	0.0390 mg/L	0.04 mg/L	97.6	70.0	130	----
		cobalt, total	7440-48-4	E420	0.0192 mg/L	0.02 mg/L	95.9	70.0	130	----
		copper, total	7440-50-8	E420	0.0187 mg/L	0.02 mg/L	93.5	70.0	130	----
		iron, total	7439-89-6	E420	1.85 mg/L	2 mg/L	92.4	70.0	130	----
		lead, total	7439-92-1	E420	0.0195 mg/L	0.02 mg/L	97.6	70.0	130	----
		lithium, total	7439-93-2	E420	0.0919 mg/L	0.1 mg/L	91.9	70.0	130	----
		magnesium, total	7439-95-4	E420	ND mg/L	1 mg/L	ND	70.0	130	----
		manganese, total	7439-96-5	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		molybdenum, total	7439-98-7	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		nickel, total	7440-02-0	E420	0.0390 mg/L	0.04 mg/L	97.6	70.0	130	----
		potassium, total	7440-09-7	E420	3.83 mg/L	4 mg/L	95.7	70.0	130	----
		selenium, total	7782-49-2	E420	0.0390 mg/L	0.04 mg/L	97.4	70.0	130	----
		silicon, total	7440-21-3	E420	8.71 mg/L	10 mg/L	87.1	70.0	130	----
		silver, total	7440-22-4	E420	0.00372 mg/L	0.004 mg/L	93.0	70.0	130	----
		sodium, total	7440-23-5	E420	ND mg/L	2 mg/L	ND	70.0	130	----
		strontium, total	7440-24-6	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		thallium, total	7440-28-0	E420	0.00378 mg/L	0.004 mg/L	94.6	70.0	130	----
		tin, total	7440-31-5	E420	0.0194 mg/L	0.02 mg/L	97.1	70.0	130	----
		titanium, total	7440-32-6	E420	0.0386 mg/L	0.04 mg/L	96.4	70.0	130	----
		uranium, total	7440-61-1	E420	0.00399 mg/L	0.004 mg/L	99.7	70.0	130	----
		vanadium, total	7440-62-2	E420	0.100 mg/L	0.1 mg/L	100	70.0	130	----
		zinc, total	7440-66-6	E420	0.380 mg/L	0.4 mg/L	95.0	70.0	130	----
Dissolved Metals (QCLot: 546220)										
VA22B4424-012	Anonymous	aluminum, dissolved	7429-90-5	E421	0.194 mg/L	0.2 mg/L	97.1	70.0	130	----
		antimony, dissolved	7440-36-0	E421	0.0198 mg/L	0.02 mg/L	99.2	70.0	130	----
		arsenic, dissolved	7440-38-2	E421	0.0200 mg/L	0.02 mg/L	100.0	70.0	130	----
		barium, dissolved	7440-39-3	E421	0.0200 mg/L	0.02 mg/L	99.8	70.0	130	----
		beryllium, dissolved	7440-41-7	E421	0.0426 mg/L	0.04 mg/L	107	70.0	130	----
		bismuth, dissolved	7440-69-9	E421	0.00900 mg/L	0.01 mg/L	90.0	70.0	130	----
		boron, dissolved	7440-42-8	E421	0.098 mg/L	0.1 mg/L	98.1	70.0	130	----
		cadmium, dissolved	7440-43-9	E421	0.00402 mg/L	0.004 mg/L	101	70.0	130	----
		calcium, dissolved	7440-70-2	E421	ND mg/L	4 mg/L	ND	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Dissolved Metals (QCLot: 546220) - continued										
VA22B4424-012	Anonymous	chromium, dissolved	7440-47-3	E421	0.0379 mg/L	0.04 mg/L	94.8	70.0	130	----
		cobalt, dissolved	7440-48-4	E421	0.0195 mg/L	0.02 mg/L	97.7	70.0	130	----
		copper, dissolved	7440-50-8	E421	0.0193 mg/L	0.02 mg/L	96.6	70.0	130	----
		iron, dissolved	7439-89-6	E421	1.90 mg/L	2 mg/L	95.0	70.0	130	----
		lead, dissolved	7439-92-1	E421	0.0192 mg/L	0.02 mg/L	95.9	70.0	130	----
		lithium, dissolved	7439-93-2	E421	0.107 mg/L	0.1 mg/L	107	70.0	130	----
		magnesium, dissolved	7439-95-4	E421	ND mg/L	1 mg/L	ND	70.0	130	----
		manganese, dissolved	7439-96-5	E421	0.0190 mg/L	0.02 mg/L	94.9	70.0	130	----
		molybdenum, dissolved	7439-98-7	E421	0.0200 mg/L	0.02 mg/L	100	70.0	130	----
		nickel, dissolved	7440-02-0	E421	0.0382 mg/L	0.04 mg/L	95.5	70.0	130	----
		potassium, dissolved	7440-09-7	E421	3.95 mg/L	4 mg/L	98.6	70.0	130	----
		selenium, dissolved	7782-49-2	E421	0.0405 mg/L	0.04 mg/L	101	70.0	130	----
		silicon, dissolved	7440-21-3	E421	9.32 mg/L	10 mg/L	93.2	70.0	130	----
		silver, dissolved	7440-22-4	E421	0.00391 mg/L	0.004 mg/L	97.8	70.0	130	----
		sodium, dissolved	7440-23-5	E421	1.98 mg/L	2 mg/L	98.9	70.0	130	----
		strontium, dissolved	7440-24-6	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		thallium, dissolved	7440-28-0	E421	0.00382 mg/L	0.004 mg/L	95.4	70.0	130	----
		tin, dissolved	7440-31-5	E421	0.0193 mg/L	0.02 mg/L	96.5	70.0	130	----
		titanium, dissolved	7440-32-6	E421	0.0402 mg/L	0.04 mg/L	100	70.0	130	----
		uranium, dissolved	7440-61-1	E421	0.00378 mg/L	0.004 mg/L	94.6	70.0	130	----
		vanadium, dissolved	7440-62-2	E421	0.0990 mg/L	0.1 mg/L	99.0	70.0	130	----
		zinc, dissolved	7440-66-6	E421	0.411 mg/L	0.4 mg/L	103	70.0	130	----

ALS Environmental

www.alsglobal.com

Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878

Affix ALS barcode label here (lab use only)

COC Number:

Page 1 of 1

COC # K0499

Page 1 of

Report To	Contact and company name below will appear on the final report
Company:	Mount Polley Mining Corporation
Contact:	Gabriel Holmes
Phone:	236-317-4939
	Company address below will appear on the final report
Street:	PO Box 12
City/Province:	Likely, BC
Postal Code:	V0L 1N0
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☐ NO
Company:	
Contact:	

Report Format / Distribution	
Select Report Format:	☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)
Quality Control (QC) Report with Report	☑ ☐ NO
☐ Compare Results to Criteria on Report - provide details below if box checked	
Select Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	gabriel.holmes@mountpolley.com
Email 2	kala.ivens@mountpolley.com; pschnurr@minnow.ca
Email 3	pstecko@minnow.ca; kbatchelar@minnow.ca

Invoice Distribution	
Select Invoice Distribution:	☑ EMAIL ☑ MAIL ☐ FAX
Email 1 or Fax	gabriel.holmes@mountpolley.com
Email 2	

Project Information	
ALS Account # / Quote #:	VA22-MPMC100-006
Job #:	
PO / AFE:	
LSD:	

Oil and Gas Required Fields (client use)	
AFE/Cost Center:	PO#
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Lab Work Order # (lab use only):

ALS Contact: Can Dang

Sampler:

Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply

Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days): 4 day [P4] ☐ | 3 day [P3] ☐ | 2 day [P2] ☐

EMERGENCY: 1 Business day [E1] ☐ | Same Day, Weekend or Statutory holiday [E0] ☐

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm

For tests that can not be performed according to the service level selected, you will be contacted.

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUTRIENTS-1	Total Metals (ICPMS)	Dissolved Metals (ICPMS)	Total Nitrogen Ammonia	DOC	TSS (Whole bottle)	Chlorophyll-a (F&P)	Number of Containers
	~~BGL-D2_WS_DI-1_2022-06~~	~~Jun-22~~		Water	R	R	R	R	R	R		6
	~~PGL-P2-WS_DI-1_2022-06~~	~~Jun-22~~		Water	R	R	R	R	R	R		6
	QUL-ZOO-1_WS_DI-1_2022-06	22 Jun-22	11:00	Water	R	R	R	R	R	R	R	7
	QUL-ZOO-7_WS_DI-1_2022-06	22 Jun-22	09:55	Water	R	R	R	R	R	R	R	7
	QUL-ZOO-1_WS_DI-1X_2022-06	22 Jun-22	11:00	Water	R	R	R	R	R	R	R	7

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

Pls filter and freeze Chl-a but HOLD for analysis.

Regular analytes for Mount Polley Mine water sample package. Please also report ANIONS-N+N-CALC-VA (calculated nitrate and nitrite)

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☑ | SIF Observations Yes ☐ No ☐

Ice Packs ☐ Ice Cubes ☐ | Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C	FINAL COOLER TEMPERATURES °C
	6.0 3.0

(client use)		INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
	Time:	Received by:	Date:	Time:	Received by:	Date:	Time:
					JW	June 24 2022	11:20 am

Environmental Division Vancouver
Work Order Reference
VA22B4435

Telephone : +1 604 253 4188

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

Service Requested: (rush - subject to availability)

- (●) Regular (Default)
- ( ) Priority (2-3 Business Days) - 50% Surcharge
- ( ) Emergency (1 Business Day) - 100% Surcharge
- ( ) For Emergency < 1 Day, ASAP or Weekend - Contact ALS

Analysis Request

Please indicate below Filtered, Preserved or both (F, P, F/P)

Sample Type	Nutrients-1	Total Metals (ICPMS)	Dissolved Metals (ICPMS)	TN/NH3	DOC	TSS (Whole bottle)	Hardness	TN / NH3	Dissolved metals	Total Metals
			F	P	F/P				F/P	P
Water	X	X	X	X	X	X				
Water	X	X	X	X	X	X				

Fax

Details

Please fill in this form LEGIBLY.
As specified on the back page of the white - report copy.

Temperature:	Verified by:	Date & Time:	Observations Yes / No ? If Yes attach
6.3°	JW	June 24/22 11:20 am	

PINK - FILE COPY, YELLOW - CLIENT COPY

GENF 18.00 Fr

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

Affix ALS barcode label here (lab use only)

COC Number:

Page 1 of 1

Report To	Contact and company name below will appear on the final report	Report Format / Distribution	Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply
Company:	Mount Polley Mining Corporation	Select Report Format: ☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)	Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply
Contact:	Gabriel Holmes	Quality Control (QC) Report with Report ☑ ☐ NO	PRIORITY (Business Days): 4 day [P4] ☐ / 3 day [P3] ☐ / 2 day [P2] ☐ — EMERGENCY: 1 Business day [E1] ☐ / Same Day, Weekend or Statutory holiday [E0] ☐
Phone:	236-317-4939	☐ Compare Results to Criteria on Report - provide details below if box checked	
	Company address below will appear on the final report	Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX	Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm
Street:	PO Box 12	Email 1 or Fax: gabriel.holmes@mountpolley.com	For tests that can not be performed according to the service level selected, you will be contacted.
City/Province:	Likely, BC	Email 2: kala.ivens@mountpolley.com, pschnurr@minnow.ca	
Postal Code:	V0L 1N0	Email 3: pstecko@minnow.ca; kbatchelar@minnow.ca	
Invoice To	Same as Report To ☑ YES ☐ NO	Invoice Distribution	
	Copy of Invoice with Report ☐ YES ☐ NO	Select Invoice Distribution: ☑ EMAIL ☑ MAIL ☐ FAX	
Company:		Email 1 or Fax: gabriel.holmes@mountpolley.com	
Contact:		Email 2:	

Project Information		Oil and Gas Required Fields (client use)	
ALS Account # / Quote #:	VA22-MPMC100-006	AFE/Cost Center:	PO#
Job #:		Major/Minor Code:	Routing Code:
PO / AFE:		Requisitioner:	
LSD:		Location:	
ALS Lab Work Order # (lab use only)		ALS Contact: Can Dang	Sampler:

Analysis Request — Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUTRIENTS-1	Total Metals (ICPMS)	Dissolved Metals (ICPMS)	Total Nitrogen Ammonia	DOC	TSS (Whole bottle)		Chlorophyll-a (F&P)						Number of Containers
	~~BOL-D2_WS_DI-1_2022-06~~	~~-Jun-22~~		Water	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~								~~8~~
	~~POL-P2_WS_DI-1_2022-06~~	~~-Jun-22~~		Water	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~								~~8~~
	QUL-ZOO-1_WS_DI-1_2022-06	22 -Jun-22	11:00	Water	R	R	R	R	R	R		R						8 7
	QUL-ZOO-7_WS_DI-1_2022-06	22 -Jun-22	09:55	Water	R	R	R	R	R	R		R						8 7
	Qul-Zoo-1_WS_DI-1X_2022-06	22 -Jun-22	11:00	Water	R	R	R	R	R	R		R						8 7

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

Pls filter and freeze Chl-a but HOLD for analysis.

Regular analytes for Mount Polley Mine water sample package. Please also report ANIONS-N+N-CALC-VA (calculated nitrate and nitrite)

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice Packs ☑ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
			6°	3°	

(client use)		INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
	Time:	Received by:	Date:	Time:	Received by:	Date:	Time:
						June 24 2022	1120 am

Environmental Division Vancouver
Work Order Reference
VA22B4435

Telephone : +1 604 253 4188

REFER BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

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OCTOBER 2015 FRONT

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1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

WATER CHEMISTRY

ALS Laboratory Report KS2202711

(Finalized August 11, 2022)

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **KS2202711**	Page	: 1 of 5
Client	: **Mount Polley Mining Corporation**	Laboratory	: Kamloops - Environmental
Contact	: Kala Ivens	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 1445 McGill Road, Unit 2B Kamloops BC Canada V2C 6K7
Telephone	: 250-790-2215 Ext 2112	Telephone	: +1 250 372 3588
Project	: ----	Date Samples Received	: 27-Jul-2022 11:00
PO	: 5590008044 Q2 2022	Date Analysis Commenced	: 28-Jul-2022
C-O-C number	: COC Number Provided	Issue Date	: 11-Aug-2022 09:00
Sampler	: Minnow		
Site	: ----		
Quote number	: Q77258 - WQ Analysis		
No. of samples received	: 5		
No. of samples analysed	: 5		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Inorganics, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Lindsay Gung	Supervisor - Water Chemistry	Inorganics, Burnaby, British Columbia
Ophelia Chiu	Department Manager - Organics	Inorganics, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Metals, Burnaby, British Columbia

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

Unit	*Description*
-	No Unit
µS/cm	Microsiemens per centimetre
mg/L	milligrams per litre
NTU	nephelometric turbidity units
pH units	pH units

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Qualifiers

Qualifier	*Description*
DTMF	*Dissolved concentration exceeds total for field-filtered metals sample. Metallic contaminants may have been introduced to dissolved sample during field filtration.*

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BOL-B2_WS_DI-1_2022-07	POL-P2_WS_DI-1_2022-07	POL-P2_WS_DI-1X_2022-07	FIELD_WS-1_2022-07	TRAVEL_WS-1_2022-07
					Client sampling date / time	26-Jul-2022 08:45	25-Jul-2022 11:56	25-Jul-2022 11:56	26-Jul-2022 09:00	25-Jul-2022
						KS2202711-001	KS2202711-002	KS2202711-003	KS2202711-004	KS2202711-005
						Result	Result	Result	Result	Result
Physical Tests										
alkalinity, total (as CaCO3)	----	E290	1.0	mg/L		41.8	91.7	92.3	<1.0	<1.0
conductivity	----	E100	2.0	µS/cm		95.8	239	241	<2.0	<2.0
hardness (as CaCO3), dissolved	----	EC100	0.50	mg/L		41.8	106	106	----	----
hardness (as CaCO3), from total Ca/Mg	----	EC100A	0.50	mg/L		41.0	105	103	<0.50	<0.50
pH	----	E108	0.10	pH units		7.80	8.20	8.20	5.74	5.61
solids, total dissolved [TDS]	----	E162	10	mg/L		91	169	181	<10	<10
solids, total suspended [TSS]	----	E164	1.0	mg/L		2.0	1.3	1.4	<1.0	<1.1
turbidity	----	E121	0.10	NTU		0.81	0.59	0.52	<0.10	<0.10
Anions and Nutrients										
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L		0.0052	0.0085	0.0054	<0.0050	<0.0050
chloride	16887-00-6	E235.Cl	0.50	mg/L		0.56	0.80	0.81	<0.50	<0.50
fluoride	16984-48-8	E235.F	0.020	mg/L		0.048	0.062	0.058	<0.020	<0.020
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
nitrate + nitrite (as N)	----	EC235.N+N	0.0050	mg/L		<0.0051	<0.0051	<0.0051	<0.0051	<0.0051
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
nitrogen, total	7727-37-9	E366	0.030	mg/L		0.287	0.324	0.296	<0.030	<0.030
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L		<0.0010	0.0037	0.0044	<0.0010	<0.0010
phosphorus, total	7723-14-0	E372-U	0.0020	mg/L		0.0120	0.0145	0.0155	<0.0020	<0.0020
phosphorus, total dissolved	7723-14-0	E375-T	0.0020	mg/L		0.0053	0.0126	0.0121	<0.0020	----
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L		6.98	34.1	34.2	<0.30	<0.30
Organic / Inorganic Carbon										
carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L		7.85	6.56	6.54	<0.50	----
Total Metals										
aluminum, total	7429-90-5	E420	0.0030	mg/L		0.0354	0.0242	0.0146	<0.0030	<0.0030
antimony, total	7440-36-0	E420	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
arsenic, total	7440-38-2	E420	0.00010	mg/L		0.00036	0.00051	0.00051	<0.00010	<0.00010
barium, total	7440-39-3	E420	0.00010	mg/L		0.0167	0.0103	0.0101	<0.00010	<0.00010
beryllium, total	7440-41-7	E420	0.000100	mg/L		<0.000100	<0.000100	<0.000100	<0.000100	<0.000100
bismuth, total	7440-69-9	E420	0.000050	mg/L		<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
boron, total	7440-42-8	E420	0.010	mg/L		0.046	0.021	0.021	<0.010	<0.010
cadmium, total	7440-43-9	E420	0.0000050	mg/L		0.0000222	0.0000379	0.0000872	<0.0000050	<0.0000050

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BOL-B2_WS_DI-1_2022-07	POL-P2_WS_DI-1_2022-07	POL-P2_WS_DI-1X_2022-07	FIELD_WS-1_2022-07	TRAVEL_WS-1_2022-07
					Client sampling date / time	26-Jul-2022 08:45	25-Jul-2022 11:56	25-Jul-2022 11:56	26-Jul-2022 09:00	25-Jul-2022
						KS2202711-001	KS2202711-002	KS2202711-003	KS2202711-004	KS2202711-005
						Result	Result	Result	Result	Result
Total Metals										
calcium, total	7440-70-2	E420	0.050	mg/L		12.4	33.6	33.2	<0.050	<0.050
chromium, total	7440-47-3	E420	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
cobalt, total	7440-48-4	E420	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
copper, total	7440-50-8	E420	0.00050	mg/L		0.00342	0.00543	0.00497	<0.00050	<0.00050
iron, total	7439-89-6	E420	0.030	mg/L		0.050	<0.030	<0.030	<0.030	<0.030
lead, total	7439-92-1	E420	0.000050	mg/L		0.000097	0.000117	0.000128	<0.000050	<0.000050
lithium, total	7439-93-2	E420	0.0010	mg/L		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
magnesium, total	7439-95-4	E420	0.100	mg/L		2.43	5.03	5.00	<0.100	<0.100
manganese, total	7439-96-5	E420	0.00010	mg/L		0.0212	0.00462	0.00404	<0.00010	<0.00010
molybdenum, total	7439-98-7	E420	0.000050	mg/L		0.000824	0.00666	0.00654	<0.000050	<0.000050
nickel, total	7440-02-0	E420	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
potassium, total	7440-09-7	E420	0.050	mg/L		0.496	1.11	1.10	<0.050	<0.050
selenium, total	7782-49-2	E420	0.000050	mg/L		0.000253	0.000565	0.000675	<0.000050	<0.000050
silicon, total	7440-21-3	E420	0.10	mg/L		1.89	3.11	3.10	<0.10	<0.10
silver, total	7440-22-4	E420	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
sodium, total	7440-23-5	E420	0.050	mg/L		2.45	7.27	7.46	<0.050	<0.050
strontium, total	7440-24-6	E420	0.00020	mg/L		0.127	0.242	0.235	<0.00020	<0.00020
thallium, total	7440-28-0	E420	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
tin, total	7440-31-5	E420	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
titanium, total	7440-32-6	E420	0.0100	mg/L		<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
uranium, total	7440-61-1	E420	0.000010	mg/L		0.000039	0.000197	0.000192	<0.000010	<0.000010
vanadium, total	7440-62-2	E420	0.00050	mg/L		<0.00050	0.00132	0.00129	<0.00050	<0.00050
zinc, total	7440-66-6	E420	0.0030	mg/L		<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
Dissolved Metals										
aluminum, dissolved	7429-90-5	E421	0.0030	mg/L		0.0069	0.0040	0.0049	----	----
antimony, dissolved	7440-36-0	E421	0.00010	mg/L		<0.00010	<0.00010	<0.00010	----	----
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L		0.00028	0.00047	0.00042	----	----
barium, dissolved	7440-39-3	E421	0.00010	mg/L		0.0142	0.00946	0.00876	----	----
beryllium, dissolved	7440-41-7	E421	0.000100	mg/L		<0.000100	<0.000100	<0.000100	----	----
bismuth, dissolved	7440-69-9	E421	0.000050	mg/L		<0.000050	<0.000050	<0.000050	----	----
boron, dissolved	7440-42-8	E421	0.010	mg/L		0.041	0.020	0.019	----	----
cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L		0.0000142	0.0000653 DTMF	0.0000504	----	----

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BOL-B2_WS_DI-1_2022-07	POL-P2_WS_DI-1_2022-07	POL-P2_WS_DI-1X_2022-07	FIELD_WS-1_2022-07	TRAVEL_WS-1_2022-07
					Client sampling date / time	26-Jul-2022 08:45	25-Jul-2022 11:56	25-Jul-2022 11:56	26-Jul-2022 09:00	25-Jul-2022
						KS2202711-001	KS2202711-002	KS2202711-003	KS2202711-004	KS2202711-005
						Result	Result	Result	Result	Result
Dissolved Metals										
calcium, dissolved	7440-70-2	E421	0.050	mg/L		12.9	34.2	34.9	----	----
chromium, dissolved	7440-47-3	E421	0.00050	mg/L		<0.00050	<0.00050	<0.00050	----	----
cobalt, dissolved	7440-48-4	E421	0.00010	mg/L		<0.00010	<0.00010	<0.00010	----	----
copper, dissolved	7440-50-8	E421	0.00050	mg/L		0.00232	0.00436	0.00419	----	----
iron, dissolved	7439-89-6	E421	0.030	mg/L		<0.030	<0.030	<0.030	----	----
lead, dissolved	7439-92-1	E421	0.000050	mg/L		<0.000050	<0.000050	<0.000050	----	----
lithium, dissolved	7439-93-2	E421	0.0010	mg/L		<0.0010	<0.0010	<0.0010	----	----
magnesium, dissolved	7439-95-4	E421	0.100	mg/L		2.33	4.90	4.56	----	----
manganese, dissolved	7439-96-5	E421	0.00010	mg/L		0.00279	0.00184	0.00194	----	----
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L		0.000794	0.00617	0.00634	----	----
nickel, dissolved	7440-02-0	E421	0.00050	mg/L		0.00050	0.00062	0.00059	----	----
potassium, dissolved	7440-09-7	E421	0.050	mg/L		0.495	1.05	0.995	----	----
selenium, dissolved	7782-49-2	E421	0.000050	mg/L		0.000180	0.000461	0.000476	----	----
silicon, dissolved	7440-21-3	E421	0.050	mg/L		1.83	3.10	2.94	----	----
silver, dissolved	7440-22-4	E421	0.000010	mg/L		<0.000010	<0.000010	<0.000010	----	----
sodium, dissolved	7440-23-5	E421	0.050	mg/L		2.38	7.71	7.42	----	----
strontium, dissolved	7440-24-6	E421	0.00020	mg/L		0.136	0.252	0.256	----	----
thallium, dissolved	7440-28-0	E421	0.000010	mg/L		<0.000010	<0.000010	<0.000010	----	----
tin, dissolved	7440-31-5	E421	0.00010	mg/L		<0.00010	<0.00010	<0.00010	----	----
titanium, dissolved	7440-32-6	E421	0.0100	mg/L		<0.0100	<0.0100	<0.0100	----	----
uranium, dissolved	7440-61-1	E421	0.000010	mg/L		0.000037	0.000196	0.000196	----	----
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L		<0.00050	0.00132	0.00122	----	----
zinc, dissolved	7440-66-6	E421	0.0030	mg/L		<0.0030	<0.0030	<0.0030	----	----
dissolved metals filtration location	----	EP421	-	-		Field	Field	Field	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **KS2202711**	Page	: 1 of 18
Client	: **Mount Polley Mining Corporation**	Laboratory	: Kamloops - Environmental
Contact	: Kala Ivens	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 1445 McGill Road, Unit 2B Kamloops, British Columbia Canada V2C 6K7
Telephone	: 250-790-2215 Ext 2112	Telephone	: +1 250 372 3588
Project	: ----	Date Samples Received	: 27-Jul-2022 11:00
PO	: 5590008044 Q2 2022	Issue Date	: 11-Aug-2022 09:01
C-O-C number	: COC Number Provided		
Sampler	: Minnow		
Site	: ----		
Quote number	: Q77258 - WQ Analysis		
No. of samples received	: 5		
No. of samples analysed	: 5		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- Analysis Holding Time Outliers exist - please see following pages for full details.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
BOL-B2_WS_DI-1_2022-07	E298	26-Jul-2022	30-Jul-2022	----	----		03-Aug-2022	28 days	8 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
FIELD_WS-1_2022-07	E298	26-Jul-2022	30-Jul-2022	----	----		03-Aug-2022	28 days	8 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
POL-P2_WS_DI-1_2022-07	E298	25-Jul-2022	30-Jul-2022	----	----		03-Aug-2022	28 days	9 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
POL-P2_WS_DI-1X_2022-07	E298	25-Jul-2022	30-Jul-2022	----	----		03-Aug-2022	28 days	9 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
TRAVEL_WS-1_2022-07	E298	25-Jul-2022	30-Jul-2022	----	----		03-Aug-2022	28 days	9 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE										
BOL-B2_WS_DI-1_2022-07	E235.Cl	26-Jul-2022	28-Jul-2022	----	----		28-Jul-2022	28 days	2 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE										
FIELD_WS-1_2022-07	E235.Cl	26-Jul-2022	28-Jul-2022	----	----		28-Jul-2022	28 days	2 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Chloride in Water by IC										
HDPE POL-P2_WS_DI-1_2022-07	E235.Cl	25-Jul-2022	28-Jul-2022	----	----		28-Jul-2022	28 days	3 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE POL-P2_WS_DI-1X_2022-07	E235.Cl	25-Jul-2022	28-Jul-2022	----	----		28-Jul-2022	28 days	3 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE TRAVEL_WS-1_2022-07	E235.Cl	25-Jul-2022	28-Jul-2022	----	----		28-Jul-2022	28 days	3 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE BOL-B2_WS_DI-1_2022-07	E378-U	26-Jul-2022	28-Jul-2022	----	----		28-Jul-2022	3 days	3 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE FIELD_WS-1_2022-07	E378-U	26-Jul-2022	28-Jul-2022	----	----		28-Jul-2022	3 days	3 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE POL-P2_WS_DI-1_2022-07	E378-U	25-Jul-2022	28-Jul-2022	----	----		28-Jul-2022	3 days	3 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE POL-P2_WS_DI-1X_2022-07	E378-U	25-Jul-2022	28-Jul-2022	----	----		28-Jul-2022	3 days	3 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE TRAVEL_WS-1_2022-07	E378-U	25-Jul-2022	28-Jul-2022	----	----		28-Jul-2022	3 days	3 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Fluoride in Water by IC										
HDPE BOL-B2_WS_DI-1_2022-07	E235.F	26-Jul-2022	28-Jul-2022	----	----		28-Jul-2022	28 days	2 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE FIELD_WS-1_2022-07	E235.F	26-Jul-2022	28-Jul-2022	----	----		28-Jul-2022	28 days	2 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE POL-P2_WS_DI-1_2022-07	E235.F	25-Jul-2022	28-Jul-2022	----	----		28-Jul-2022	28 days	3 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE POL-P2_WS_DI-1X_2022-07	E235.F	25-Jul-2022	28-Jul-2022	----	----		28-Jul-2022	28 days	3 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE TRAVEL_WS-1_2022-07	E235.F	25-Jul-2022	28-Jul-2022	----	----		28-Jul-2022	28 days	3 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE BOL-B2_WS_DI-1_2022-07	E235.NO3-L	26-Jul-2022	28-Jul-2022	----	----		28-Jul-2022	3 days	2 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE FIELD_WS-1_2022-07	E235.NO3-L	26-Jul-2022	28-Jul-2022	----	----		28-Jul-2022	3 days	2 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE POL-P2_WS_DI-1_2022-07	E235.NO3-L	25-Jul-2022	28-Jul-2022	----	----		28-Jul-2022	3 days	3 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE POL-P2_WS_DI-1X_2022-07	E235.NO3-L	25-Jul-2022	28-Jul-2022	----	----		28-Jul-2022	3 days	3 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
TRAVEL_WS-1_2022-07	E235.NO3-L	25-Jul-2022	28-Jul-2022	----	----		28-Jul-2022	3 days	3 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
BOL-B2_WS_DI-1_2022-07	E235.NO2-L	26-Jul-2022	28-Jul-2022	----	----		28-Jul-2022	3 days	2 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
FIELD_WS-1_2022-07	E235.NO2-L	26-Jul-2022	28-Jul-2022	----	----		28-Jul-2022	3 days	2 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
POL-P2_WS_DI-1_2022-07	E235.NO2-L	25-Jul-2022	28-Jul-2022	----	----		28-Jul-2022	3 days	3 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
POL-P2_WS_DI-1X_2022-07	E235.NO2-L	25-Jul-2022	28-Jul-2022	----	----		28-Jul-2022	3 days	3 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
TRAVEL_WS-1_2022-07	E235.NO2-L	25-Jul-2022	28-Jul-2022	----	----		28-Jul-2022	3 days	3 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
BOL-B2_WS_DI-1_2022-07	E235.SO4	26-Jul-2022	28-Jul-2022	----	----		28-Jul-2022	28 days	2 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
FIELD_WS-1_2022-07	E235.SO4	26-Jul-2022	28-Jul-2022	----	----		28-Jul-2022	28 days	2 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
POL-P2_WS_DI-1_2022-07	E235.SO4	25-Jul-2022	28-Jul-2022	----	----		28-Jul-2022	28 days	3 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
POL-P2_WS_DI-1X_2022-07	E235.SO4	25-Jul-2022	28-Jul-2022	----	----		28-Jul-2022	28 days	3 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
TRAVEL_WS-1_2022-07	E235.SO4	25-Jul-2022	28-Jul-2022	----	----		28-Jul-2022	28 days	3 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass dissolved (sulfuric acid)										
BOL-B2_WS_DI-1_2022-07	E375-T	26-Jul-2022	30-Jul-2022	----	----		03-Aug-2022	28 days	8 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass dissolved (sulfuric acid)										
FIELD_WS-1_2022-07	E375-T	26-Jul-2022	30-Jul-2022	----	----		03-Aug-2022	28 days	8 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass dissolved (sulfuric acid)										
POL-P2_WS_DI-1_2022-07	E375-T	25-Jul-2022	30-Jul-2022	----	----		03-Aug-2022	28 days	9 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass dissolved (sulfuric acid)										
POL-P2_WS_DI-1X_2022-07	E375-T	25-Jul-2022	30-Jul-2022	----	----		03-Aug-2022	28 days	9 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid)										
BOL-B2_WS_DI-1_2022-07	E366	26-Jul-2022	30-Jul-2022	----	----		03-Aug-2022	28 days	8 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid)										
FIELD_WS-1_2022-07	E366	26-Jul-2022	30-Jul-2022	----	----		03-Aug-2022	28 days	8 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid)										
POL-P2_WS_DI-1_2022-07	E366	25-Jul-2022	30-Jul-2022	----	----		03-Aug-2022	28 days	9 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid)										
POL-P2_WS_DI-1X_2022-07	E366	25-Jul-2022	30-Jul-2022	----	----		03-Aug-2022	28 days	9 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid)										
TRAVEL_WS-1_2022-07	E366	25-Jul-2022	30-Jul-2022	----	----		03-Aug-2022	28 days	9 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid)										
BOL-B2_WS_DI-1_2022-07	E372-U	26-Jul-2022	30-Jul-2022	----	----		03-Aug-2022	28 days	8 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid)										
FIELD_WS-1_2022-07	E372-U	26-Jul-2022	30-Jul-2022	----	----		03-Aug-2022	28 days	8 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid)										
POL-P2_WS_DI-1_2022-07	E372-U	25-Jul-2022	30-Jul-2022	----	----		03-Aug-2022	28 days	9 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid)										
POL-P2_WS_DI-1X_2022-07	E372-U	25-Jul-2022	30-Jul-2022	----	----		03-Aug-2022	28 days	9 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid)										
TRAVEL_WS-1_2022-07	E372-U	25-Jul-2022	30-Jul-2022	----	----		03-Aug-2022	28 days	9 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved)										
POL-P2_WS_DI-1_2022-07	E421	25-Jul-2022	01-Aug-2022	----	----		04-Aug-2022	180 days	10 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved)										
POL-P2_WS_DI-1X_2022-07	E421	25-Jul-2022	01-Aug-2022	----	----		04-Aug-2022	180 days	10 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) BOL-B2_WS_DI-1_2022-07	E421	26-Jul-2022	01-Aug-2022	----	----		04-Aug-2022	180 days	9 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) BOL-B2_WS_DI-1_2022-07	E358-L	26-Jul-2022	30-Jul-2022	----	----		02-Aug-2022	28 days	7 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) FIELD_WS-1_2022-07	E358-L	26-Jul-2022	30-Jul-2022	----	----		02-Aug-2022	28 days	7 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) POL-P2_WS_DI-1_2022-07	E358-L	25-Jul-2022	30-Jul-2022	----	----		02-Aug-2022	28 days	8 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) POL-P2_WS_DI-1X_2022-07	E358-L	25-Jul-2022	30-Jul-2022	----	----		02-Aug-2022	28 days	8 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE BOL-B2_WS_DI-1_2022-07	E290	26-Jul-2022	28-Jul-2022	----	----		29-Jul-2022	14 days	3 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE FIELD_WS-1_2022-07	E290	26-Jul-2022	28-Jul-2022	----	----		29-Jul-2022	14 days	3 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE POL-P2_WS_DI-1_2022-07	E290	25-Jul-2022	28-Jul-2022	----	----		29-Jul-2022	14 days	4 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE POL-P2_WS_DI-1X_2022-07	E290	25-Jul-2022	28-Jul-2022	----	----		29-Jul-2022	14 days	4 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Alkalinity Species by Titration										
HDPE TRAVEL_WS-1_2022-07	E290	25-Jul-2022	28-Jul-2022	----	----		29-Jul-2022	14 days	4 days	✓
Physical Tests : Conductivity in Water										
HDPE BOL-B2_WS_DI-1_2022-07	E100	26-Jul-2022	28-Jul-2022	----	----		29-Jul-2022	28 days	3 days	✓
Physical Tests : Conductivity in Water										
HDPE FIELD_WS-1_2022-07	E100	26-Jul-2022	28-Jul-2022	----	----		29-Jul-2022	28 days	3 days	✓
Physical Tests : Conductivity in Water										
HDPE POL-P2_WS_DI-1_2022-07	E100	25-Jul-2022	28-Jul-2022	----	----		29-Jul-2022	28 days	4 days	✓
Physical Tests : Conductivity in Water										
HDPE POL-P2_WS_DI-1X_2022-07	E100	25-Jul-2022	28-Jul-2022	----	----		29-Jul-2022	28 days	4 days	✓
Physical Tests : Conductivity in Water										
HDPE TRAVEL_WS-1_2022-07	E100	25-Jul-2022	28-Jul-2022	----	----		29-Jul-2022	28 days	4 days	✓
Physical Tests : pH by Meter										
HDPE BOL-B2_WS_DI-1_2022-07	E108	26-Jul-2022	28-Jul-2022	----	----		29-Jul-2022	0.25 hrs	69 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE FIELD_WS-1_2022-07	E108	26-Jul-2022	28-Jul-2022	----	----		29-Jul-2022	0.25 hrs	69 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE TRAVEL_WS-1_2022-07	E108	25-Jul-2022	28-Jul-2022	----	----		29-Jul-2022	0.25 hrs	87 hrs	× EHTR-FM

Matrix: **Water**

Evaluation: ✖ = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : pH by Meter										
HDPE POL-P2_WS_DI-1_2022-07	E108	25-Jul-2022	28-Jul-2022	----	----		29-Jul-2022	0.25 hrs	90 hrs	✖ EHTR-FM
Physical Tests : pH by Meter										
HDPE POL-P2_WS_DI-1X_2022-07	E108	25-Jul-2022	28-Jul-2022	----	----		29-Jul-2022	0.25 hrs	90 hrs	✖ EHTR-FM
Physical Tests : TDS by Gravimetry										
HDPE BOL-B2_WS_DI-1_2022-07	E162	26-Jul-2022	----	----	----		30-Jul-2022	7 days	4 days	✓
Physical Tests : TDS by Gravimetry										
HDPE FIELD_WS-1_2022-07	E162	26-Jul-2022	----	----	----		30-Jul-2022	7 days	4 days	✓
Physical Tests : TDS by Gravimetry										
HDPE POL-P2_WS_DI-1_2022-07	E162	25-Jul-2022	----	----	----		29-Jul-2022	7 days	4 days	✓
Physical Tests : TDS by Gravimetry										
HDPE POL-P2_WS_DI-1X_2022-07	E162	25-Jul-2022	----	----	----		29-Jul-2022	7 days	4 days	✓
Physical Tests : TDS by Gravimetry										
HDPE TRAVEL_WS-1_2022-07	E162	25-Jul-2022	----	----	----		30-Jul-2022	7 days	5 days	✓
Physical Tests : TSS by Gravimetry (Whole Bottle)										
HDPE [TSS-WB] POL-P2_WS_DI-1_2022-07	E164	25-Jul-2022	----	----	----		29-Jul-2022	7 days	4 days	✓
Physical Tests : TSS by Gravimetry (Whole Bottle)										
HDPE [TSS-WB] POL-P2_WS_DI-1X_2022-07	E164	25-Jul-2022	----	----	----		29-Jul-2022	7 days	4 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : TSS by Gravimetry (Whole Bottle)										
HDPE [TSS-WB] TRAVEL_WS-1_2022-07	E164	25-Jul-2022	----	----	----		29-Jul-2022	7 days	4 days	✓
Physical Tests : TSS by Gravimetry (Whole Bottle)										
HDPE [TSS-WB] BOL-B2_WS_DI-1_2022-07	E164	26-Jul-2022	----	----	----		02-Aug-2022	7 days	7 days	✓
Physical Tests : TSS by Gravimetry (Whole Bottle)										
HDPE [TSS-WB] FIELD_WS-1_2022-07	E164	26-Jul-2022	----	----	----		02-Aug-2022	7 days	7 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE BOL-B2_WS_DI-1_2022-07	E121	26-Jul-2022	----	----	----		28-Jul-2022	3 days	2 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE FIELD_WS-1_2022-07	E121	26-Jul-2022	----	----	----		28-Jul-2022	3 days	2 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE POL-P2_WS_DI-1_2022-07	E121	25-Jul-2022	----	----	----		28-Jul-2022	3 days	3 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE POL-P2_WS_DI-1X_2022-07	E121	25-Jul-2022	----	----	----		28-Jul-2022	3 days	3 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE TRAVEL_WS-1_2022-07	E121	25-Jul-2022	----	----	----		28-Jul-2022	3 days	3 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved) BOL-B2_WS_DI-1_2022-07	E420	26-Jul-2022	30-Jul-2022	----	----		03-Aug-2022	180 days	8 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved)										
FIELD_WS-1_2022-07	E420	26-Jul-2022	30-Jul-2022	----	----		03-Aug-2022	180 days	8 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved)										
POL-P2_WS_DI-1_2022-07	E420	25-Jul-2022	30-Jul-2022	----	----		03-Aug-2022	180 days	9 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved)										
POL-P2_WS_DI-1X_2022-07	E420	25-Jul-2022	30-Jul-2022	----	----		03-Aug-2022	180 days	9 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved)										
TRAVEL_WS-1_2022-07	E420	25-Jul-2022	30-Jul-2022	----	----		03-Aug-2022	180 days	9 days	✓

Legend & Qualifier Definitions

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = QC frequency outside specification; ✓ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Alkalinity Species by Titration	E290	581670	1	16	6.2	5.0	✓
Ammonia by Fluorescence	E298	584151	1	16	6.2	5.0	✓
Chloride in Water by IC	E235.Cl	581665	1	17	5.8	5.0	✓
Conductivity in Water	E100	581672	1	17	5.8	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	584057	1	20	5.0	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	584152	1	8	12.5	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	581674	1	14	7.1	5.0	✓
Fluoride in Water by IC	E235.F	581664	1	16	6.2	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	581662	1	19	5.2	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	581663	1	19	5.2	5.0	✓
pH by Meter	E108	581671	1	16	6.2	5.0	✓
Sulfate in Water by IC	E235.SO4	581666	1	16	6.2	5.0	✓
TDS by Gravimetry	E162	583440	2	39	5.1	5.0	✓
Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)	E375-T	584155	1	8	12.5	5.0	✓
Total Metals in Water by CRC ICPMS	E420	583612	1	19	5.2	5.0	✓
Total Nitrogen by Colourimetry	E366	584153	1	9	11.1	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	584154	1	9	11.1	5.0	✓
Turbidity by Nephelometry	E121	581565	2	30	6.6	5.0	✓
Laboratory Control Samples (LCS)							
Alkalinity Species by Titration	E290	581670	1	16	6.2	5.0	✓
Ammonia by Fluorescence	E298	584151	1	16	6.2	5.0	✓
Chloride in Water by IC	E235.Cl	581665	1	17	5.8	5.0	✓
Conductivity in Water	E100	581672	1	17	5.8	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	584057	1	20	5.0	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	584152	1	8	12.5	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	581674	1	14	7.1	5.0	✓
Fluoride in Water by IC	E235.F	581664	1	16	6.2	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	581662	1	19	5.2	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	581663	1	19	5.2	5.0	✓
pH by Meter	E108	581671	1	16	6.2	5.0	✓
Sulfate in Water by IC	E235.SO4	581666	1	16	6.2	5.0	✓
TDS by Gravimetry	E162	583440	2	39	5.1	5.0	✓
Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)	E375-T	584155	1	8	12.5	5.0	✓
Total Metals in Water by CRC ICPMS	E420	583612	1	19	5.2	5.0	✓
Total Nitrogen by Colourimetry	E366	584153	1	9	11.1	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	584154	1	9	11.1	5.0	✓
TSS by Gravimetry (Whole Bottle)	E164	583456	2	27	7.4	5.0	✓

Matrix: **Water**

Evaluation: × = QC frequency outside specification; ✓ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Control Samples (LCS) - Continued							
Turbidity by Nephelometry	E121	581565	2	30	6.6	5.0	✓
Method Blanks (MB)							
Alkalinity Species by Titration	E290	581670	1	16	6.2	5.0	✓
Ammonia by Fluorescence	E298	584151	1	16	6.2	5.0	✓
Chloride in Water by IC	E235.Cl	581665	1	17	5.8	5.0	✓
Conductivity in Water	E100	581672	1	17	5.8	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	584057	1	20	5.0	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	584152	1	8	12.5	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	581674	1	14	7.1	5.0	✓
Fluoride in Water by IC	E235.F	581664	1	16	6.2	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	581662	1	19	5.2	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	581663	1	19	5.2	5.0	✓
Sulfate in Water by IC	E235.SO4	581666	1	16	6.2	5.0	✓
TDS by Gravimetry	E162	583440	2	39	5.1	5.0	✓
Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)	E375-T	584155	1	8	12.5	5.0	✓
Total Metals in Water by CRC ICPMS	E420	583612	1	19	5.2	5.0	✓
Total Nitrogen by Colourimetry	E366	584153	1	9	11.1	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	584154	1	9	11.1	5.0	✓
TSS by Gravimetry (Whole Bottle)	E164	583456	2	27	7.4	5.0	✓
Turbidity by Nephelometry	E121	581565	2	30	6.6	5.0	✓
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	584151	1	16	6.2	5.0	✓
Chloride in Water by IC	E235.Cl	581665	1	17	5.8	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	584057	1	20	5.0	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	584152	1	8	12.5	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	581674	1	14	7.1	5.0	✓
Fluoride in Water by IC	E235.F	581664	1	16	6.2	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	581662	1	19	5.2	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	581663	1	19	5.2	5.0	✓
Sulfate in Water by IC	E235.SO4	581666	1	16	6.2	5.0	✓
Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)	E375-T	584155	1	8	12.5	5.0	✓
Total Metals in Water by CRC ICPMS	E420	583612	1	19	5.2	5.0	✓
Total Nitrogen by Colourimetry	E366	584153	1	9	11.1	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	584154	1	9	11.1	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Conductivity in Water	E100 Vancouver - Environmental	Water	APHA 2510 (mod)	Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a water sample. Conductivity measurements are temperature-compensated to 25°C.
pH by Meter	E108 Vancouver - Environmental	Water	APHA 4500-H (mod)	pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally 20 ± 5°C). For high accuracy test results, pH should be measured in the field within the recommended 15 minute hold time.
Turbidity by Nephelometry	E121 Vancouver - Environmental	Water	APHA 2130 B (mod)	Turbidity is measured by the nephelometric method, by measuring the intensity of light scatter under defined conditions.
TDS by Gravimetry	E162 Vancouver - Environmental	Water	APHA 2540 C (mod)	Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, with evaporation of the filtrate at 180 ± 2°C for 16 hours or to constant weight, with gravimetric measurement of the residue.
TSS by Gravimetry (Whole Bottle)	E164 Vancouver - Environmental	Water	APHA 2540 D (mod)	Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, following by drying of the filter at 104 ± 1°C, with gravimetric measurement of the filtered solids. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.
Chloride in Water by IC	E235.Cl Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Fluoride in Water by IC	E235.F Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrite in Water by IC (Low Level)	E235.NO2-L Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrate in Water by IC (Low Level)	E235.NO3-L Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Sulfate in Water by IC	E235.SO4 Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Alkalinity Species by Titration	E290 Vancouver - Environmental	Water	APHA 2320 B (mod)	Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.
Ammonia by Fluorescence	E298 Vancouver - Environmental	Water	Method Fialab 100, 2018	Ammonia in water is determined by automated continuous flow analysis with membrane diffusion and fluorescence detection, after reaction with OPA (ortho-phthalaldehyde). This method is approved under US EPA 40 CFR Part 136 (May 2021)
Dissolved Organic Carbon by Combustion (Low Level)	E358-L Vancouver - Environmental	Water	APHA 5310 B (mod)	Dissolved Organic Carbon (Non-Purgeable), also known as NPOC (dissolved), is a direct measurement of DOC after a filtered (0.45 micron) sample has been acidified and purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of DC (dissolved carbon) is comprised of IC (which is common), this method is more accurate and more reliable than the DOC by subtraction method (i.e. DC minus DIC).
Total Nitrogen by Colourimetry	E366 Vancouver - Environmental	Water	APHA 4500-P J (mod)	Total Nitrogen is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U Vancouver - Environmental	Water	APHA 4500-P E (mod).	Total Phosphorus is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)	E375-T Vancouver - Environmental	Water	APHA 4500-P E (mod).	Total Dissolved Phosphorus is determined colourimetrically using a discrete analyzer after filtration through a 0.45 micron filter followed by heated persulfate digestion of the sample.
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U Vancouver - Environmental	Water	APHA 4500-P F (mod)	Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter. Field filtration is recommended to ensure test results represent conditions at time of sampling.
Total Metals in Water by CRC ICPMS	E420 Vancouver - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Dissolved Metals in Water by CRC ICPMS	E421 Vancouver - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Hardness (Calculated)	EC100 Vancouver - Environmental	Water	APHA 2340B	"Hardness (as CaCO3), dissolved" is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.
Hardness (Calculated) from Total Ca/Mg	EC100A Vancouver - Environmental	Water	APHA 2340B	"Hardness (as CaCO3), from total Ca/Mg" is calculated from the sum of total Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations. Hardness from total Ca/Mg is normally comparable to Dissolved Hardness in non-turbid waters.
Nitrate and Nitrite (as N) (Calculation)	EC235.N+N Vancouver - Environmental	Water	EPA 300.0	Nitrate and Nitrite (as N) is a calculated parameter. Nitrate and Nitrite (as N) = Nitrite (as N) + Nitrate (as N).

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Ammonia	EP298 Vancouver - Environmental	Water		Sample preparation for Preserved Nutrients Water Quality Analysis.
Preparation for Dissolved Organic Carbon for Combustion	EP358 Vancouver - Environmental	Water	APHA 5310 B (mod)	Preparation for Dissolved Organic Carbon
Digestion for Total Nitrogen in water	EP366 Vancouver - Environmental	Water	APHA 4500-P J (mod)	Samples are heated with a persulfate digestion reagent.
Digestion for Total Phosphorus in water	EP372 Vancouver - Environmental	Water	APHA 4500-P E (mod).	Samples are heated with a persulfate digestion reagent.
Digestion for Dissolved Phosphorus in water	EP375 Vancouver - Environmental	Water	APHA 4500-P E (mod).	Samples are filtered through a 0.45 micron membrane filter and then heated with a persulfate digestion reagent.
Dissolved Metals Water Filtration	EP421 Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.

QUALITY CONTROL REPORT

Work Order	: **KS2202711**	Page	: 1 of 15
Client	: Mount Polley Mining Corporation	Laboratory	: Kamloops - Environmental
Contact	: Kala Ivens	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 1445 McGill Road, Unit 2B Kamloops, British Columbia Canada V2C 6K7
Telephone	: 250-790-2215 Ext 2112	Telephone	: +1 250 372 3588
Project	: ----	Date Samples Received	: 27-Jul-2022 11:00
PO	: 5590008044 Q2 2022	Date Analysis Commenced	: 28-Jul-2022
C-O-C number	: COC Number Provided	Issue Date	: 11-Aug-2022 09:01
Sampler	: Minnow		
Site	: ----		
Quote number	: Q77258 - WQ Analysis		
No. of samples received	: 5		
No. of samples analysed	: 5		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Vancouver Inorganics, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Vancouver Metals, Burnaby, British Columbia
Lindsay Gung	Supervisor - Water Chemistry	Vancouver Inorganics, Burnaby, British Columbia
Ophelia Chiu	Department Manager - Organics	Vancouver Inorganics, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Vancouver Metals, Burnaby, British Columbia

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Physical Tests (QC Lot: 581565)											
FJ2201981-009	Anonymous	turbidity	----	E121	0.10	NTU	0.75	0.69	0.06	Diff <2x LOR	----
Physical Tests (QC Lot: 581621)											
KS2202711-001	BOL-B2_WS_DI-1_2022-07	turbidity	----	E121	0.10	NTU	0.81	0.76	0.04	Diff <2x LOR	----
Physical Tests (QC Lot: 581670)											
KS2202706-001	Anonymous	alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	244	244	0.123%	20%	----
Physical Tests (QC Lot: 581671)											
KS2202706-001	Anonymous	pH	----	E108	0.10	pH units	8.37	8.37	0.00%	4%	----
Physical Tests (QC Lot: 581672)											
KS2202706-001	Anonymous	conductivity	----	E100	2.0	µS/cm	477	477	0.00%	10%	----
Physical Tests (QC Lot: 583440)											
KS2202662-001	Anonymous	solids, total dissolved [TDS]	----	E162	20	mg/L	204	206	0.978%	20%	----
Physical Tests (QC Lot: 584049)											
KS2202706-001	Anonymous	solids, total dissolved [TDS]	----	E162	20	mg/L	306	310	1.14%	20%	----
Anions and Nutrients (QC Lot: 581662)											
KS2202700-001	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	0.0250	mg/L	0.127	0.128	0.0008	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 581663)											
KS2202700-001	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 581664)											
KS2202700-001	Anonymous	fluoride	16984-48-8	E235.F	0.100	mg/L	<0.100	<0.100	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 581665)											
KS2202700-001	Anonymous	chloride	16887-00-6	E235.Cl	2.50	mg/L	32.8	33.0	0.839%	20%	----
Anions and Nutrients (QC Lot: 581666)											
KS2202700-001	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	1.50	mg/L	28.0	28.6	1.74%	20%	----
Anions and Nutrients (QC Lot: 581674)											
KS2202703-001	Anonymous	phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	0.0105	0.0106	0.983%	20%	----
Anions and Nutrients (QC Lot: 584151)											
KS2202710-001	Anonymous	ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.0314	0.0308	0.0007	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 584153)											
KS2202710-001	Anonymous	nitrogen, total	7727-37-9	E366	0.150	mg/L	4.76	4.71	1.07%	20%	----
Anions and Nutrients (QC Lot: 584154)											
KS2202710-001	Anonymous	phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.0087	0.0080	0.0007	Diff <2x LOR	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Anions and Nutrients (QC Lot: 584155)											
KS2202710-001	Anonymous	phosphorus, total dissolved	7723-14-0	E375-T	0.0020	mg/L	0.0026	0.0026	0.0001	Diff <2x LOR	----
Organic / Inorganic Carbon (QC Lot: 584152)											
KS2202710-001	Anonymous	carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L	2.46	2.50	0.04	Diff <2x LOR	----
Total Metals (QC Lot: 583612)											
KS2202711-001	BOL-B2_WS_DI-1_2022-07	aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0354	0.0367	3.75%	20%	----
		antimony, total	7440-36-0	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00036	0.00036	0.000007	Diff <2x LOR	----
		barium, total	7440-39-3	E420	0.00010	mg/L	0.0167	0.0169	1.03%	20%	----
		beryllium, total	7440-41-7	E420	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, total	7440-42-8	E420	0.010	mg/L	0.046	0.047	0.0006	Diff <2x LOR	----
		cadmium, total	7440-43-9	E420	0.0000050	mg/L	0.0000222	0.0000214	0.0000008	Diff <2x LOR	----
		calcium, total	7440-70-2	E420	0.050	mg/L	12.4	12.8	3.22%	20%	----
		chromium, total	7440-47-3	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		cobalt, total	7440-48-4	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		copper, total	7440-50-8	E420	0.00050	mg/L	0.00342	0.00317	0.00025	Diff <2x LOR	----
		iron, total	7439-89-6	E420	0.030	mg/L	0.050	0.051	0.0006	Diff <2x LOR	----
		lead, total	7439-92-1	E420	0.000050	mg/L	0.000097	0.000101	0.000004	Diff <2x LOR	----
		lithium, total	7439-93-2	E420	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
		magnesium, total	7439-95-4	E420	0.100	mg/L	2.43	2.49	2.33%	20%	----
		manganese, total	7439-96-5	E420	0.00010	mg/L	0.0212	0.0214	1.01%	20%	----
		molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.000824	0.000802	2.60%	20%	----
		nickel, total	7440-02-0	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		potassium, total	7440-09-7	E420	0.050	mg/L	0.496	0.506	1.96%	20%	----
		selenium, total	7782-49-2	E420	0.000050	mg/L	0.000253	0.000189	0.000064	Diff <2x LOR	----
		silicon, total	7440-21-3	E420	0.10	mg/L	1.89	1.95	2.99%	20%	----
		silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, total	7440-23-5	E420	0.050	mg/L	2.45	2.56	4.48%	20%	----
		strontium, total	7440-24-6	E420	0.00020	mg/L	0.127	0.126	0.670%	20%	----
		thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		titanium, total	7440-32-6	E420	0.0100	mg/L	<0.0100	<0.0100	0	Diff <2x LOR	----
		uranium, total	7440-61-1	E420	0.000010	mg/L	0.000039	0.000038	0.0000004	Diff <2x LOR	----
		vanadium, total	7440-62-2	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		zinc, total	7440-66-6	E420	0.0030	mg/L	<0.0030	<0.0030	0	Diff <2x LOR	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Dissolved Metals (QC Lot: 584057)											
KS2202708-001	Anonymous	aluminum, dissolved	7429-90-5	E421	0.0030	mg/L	<0.0030	<0.0030	0	Diff <2x LOR	----
		antimony, dissolved	7440-36-0	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00602	0.00555	8.13%	20%	----
		barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0179	0.0164	8.86%	20%	----
		beryllium, dissolved	7440-41-7	E421	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, dissolved	7440-42-8	E421	0.010	mg/L	0.059	0.058	0.001	Diff <2x LOR	----
		cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
		calcium, dissolved	7440-70-2	E421	0.050	mg/L	194	190	2.20%	20%	----
		chromium, dissolved	7440-47-3	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	0.00066	0.00064	0.00002	Diff <2x LOR	----
		copper, dissolved	7440-50-8	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		iron, dissolved	7439-89-6	E421	0.030	mg/L	1.01	0.976	3.71%	20%	----
		lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.0070	0.0069	0.0001	Diff <2x LOR	----
		magnesium, dissolved	7439-95-4	E421	0.100	mg/L	25.5	23.3	9.12%	20%	----
		manganese, dissolved	7439-96-5	E421	0.00010	mg/L	1.98	1.90	4.30%	20%	----
		molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.00771	0.00743	3.69%	20%	----
		nickel, dissolved	7440-02-0	E421	0.00050	mg/L	0.00050	<0.00050	0.000002	Diff <2x LOR	----
		potassium, dissolved	7440-09-7	E421	0.050	mg/L	0.899	0.833	7.59%	20%	----
		selenium, dissolved	7782-49-2	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		silicon, dissolved	7440-21-3	E421	0.050	mg/L	11.6	11.1	4.17%	20%	----
		silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, dissolved	7440-23-5	E421	0.050	mg/L	7.52	7.35	2.22%	20%	----
		strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.534	0.521	2.32%	20%	----
		thallium, dissolved	7440-28-0	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		tin, dissolved	7440-31-5	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		titanium, dissolved	7440-32-6	E421	0.0100	mg/L	<0.0100	<0.0100	0	Diff <2x LOR	----
		uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.000646	0.000622	3.68%	20%	----
		vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		zinc, dissolved	7440-66-6	E421	0.0030	mg/L	0.0154	0.0151	0.0004	Diff <2x LOR	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 581565)						
turbidity	----	E121	0.1	NTU	<0.10	----
Physical Tests (QCLot: 581621)						
turbidity	----	E121	0.1	NTU	<0.10	----
Physical Tests (QCLot: 581670)						
alkalinity, total (as CaCO3)	----	E290	1	mg/L	<1.0	----
Physical Tests (QCLot: 581672)						
conductivity	----	E100	1	µS/cm	1.4	----
Physical Tests (QCLot: 583440)						
solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Physical Tests (QCLot: 583456)						
solids, total suspended [TSS]	----	E164	1	mg/L	<1.0	----
Physical Tests (QCLot: 584049)						
solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Physical Tests (QCLot: 585196)						
solids, total suspended [TSS]	----	E164	1	mg/L	<1.0	----
Anions and Nutrients (QCLot: 581662)						
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 581663)						
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 581664)						
fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 581665)						
chloride	16887-00-6	E235.Cl	0.5	mg/L	<0.50	----
Anions and Nutrients (QCLot: 581666)						
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 581674)						
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 584151)						
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 584153)						
nitrogen, total	7727-37-9	E366	0.03	mg/L	<0.030	----
Anions and Nutrients (QCLot: 584154)						
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Anions and Nutrients (QCLot: 584155)						
phosphorus, total dissolved	7723-14-0	E375-T	0.002	mg/L	<0.0020	----
Organic / Inorganic Carbon (QCLot: 584152)						
carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	<0.50	----
Total Metals (QCLot: 583612)						
aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----
antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
chromium, total	7440-47-3	E420	0.0005	mg/L	<0.00050	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	----
magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	MBRR
manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
silicon, total	7440-21-3	E420	0.1	mg/L	<0.10	----
silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	MBRR
sodium, total	7440-23-5	E420	0.05	mg/L	<0.050	----
strontium, total	7440-24-6	E420	0.0002	mg/L	<0.00020	----
thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----
tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----
uranium, total	7440-61-1	E420	0.00001	mg/L	<0.000010	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	<0.00050	----
zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	----
Dissolved Metals (QCLot: 584057)						

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 584057) - continued						
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	<0.0010	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	<0.00010	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	<0.00010	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	<0.00010	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	<0.000020	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	<0.000050	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	<0.010	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	<0.0000050	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	<0.050	----
chromium, dissolved	7440-47-3	E421	0.0005	mg/L	<0.00050	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	<0.000050	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	<0.050	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	<0.000010	----
sodium, dissolved	7440-23-5	E421	0.05	mg/L	<0.050	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	<0.00020	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	<0.000010	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	<0.00050	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	<0.0010	----

Qualifiers

Qualifier	Description
MBRR	*Initial MB for this submission had positive results for flagged analyte (data not shown). Low level samples were repeated with new QC (2nd MB results shown). High level results (>5x initial MB level) and non-detect results were reported and are defensible*

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 581565)									
turbidity	----	E121	0.1	NTU	200 NTU	101	85.0	115	----
Physical Tests (QCLot: 581621)									
turbidity	----	E121	0.1	NTU	200 NTU	101	85.0	115	----
Physical Tests (QCLot: 581670)									
alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	110	85.0	115	----
Physical Tests (QCLot: 581671)									
pH	----	E108	----	pH units	7 pH units	100	98.0	102	----
Physical Tests (QCLot: 581672)									
conductivity	----	E100	1	µS/cm	146.9 µS/cm	97.1	90.0	110	----
Physical Tests (QCLot: 583440)									
solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	106	85.0	115	----
Physical Tests (QCLot: 583456)									
solids, total suspended [TSS]	----	E164	1	mg/L	150 mg/L	99.3	85.0	115	----
Physical Tests (QCLot: 584049)									
solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	101	85.0	115	----
Physical Tests (QCLot: 585196)									
solids, total suspended [TSS]	----	E164	1	mg/L	150 mg/L	93.0	85.0	115	----
Anions and Nutrients (QCLot: 581662)									
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 581663)									
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	99.1	90.0	110	----
Anions and Nutrients (QCLot: 581664)									
fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	99.2	90.0	110	----
Anions and Nutrients (QCLot: 581665)									
chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 581666)									
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 581674)									
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	0.03 mg/L	97.3	80.0	120	----
Anions and Nutrients (QCLot: 584151)									
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	101	85.0	115	----
Anions and Nutrients (QCLot: 584153)									

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Anions and Nutrients (QCLot: 584153) - continued									
nitrogen, total	7727-37-9	E366	0.03	mg/L	0.5 mg/L	105	75.0	125	----
Anions and Nutrients (QCLot: 584154)									
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	0.05 mg/L	95.4	80.0	120	----
Anions and Nutrients (QCLot: 584155)									
phosphorus, total dissolved	7723-14-0	E375-T	0.002	mg/L	0.05 mg/L	92.3	80.0	120	----
Organic / Inorganic Carbon (QCLot: 584152)									
carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	8.57 mg/L	97.7	80.0	120	----
Total Metals (QCLot: 583612)									
aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	112	80.0	120	----
antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	110	80.0	120	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	107	80.0	120	----
barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	111	80.0	120	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	107	80.0	120	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	106	80.0	120	----
boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	99.2	80.0	120	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	108	80.0	120	----
calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	102	80.0	120	----
chromium, total	7440-47-3	E420	0.0005	mg/L	0.25 mg/L	105	80.0	120	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	106	80.0	120	----
copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	103	80.0	120	----
iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	105	80.0	120	----
lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	104	80.0	120	----
lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	108	80.0	120	----
magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	105	80.0	120	----
manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	110	80.0	120	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	110	80.0	120	----
nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	103	80.0	120	----
potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	114	80.0	120	----
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	102	80.0	120	----
silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	102	80.0	120	----
silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	98.7	80.0	120	----
sodium, total	7440-23-5	E420	0.05	mg/L	50 mg/L	114	80.0	120	----
strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	108	80.0	120	----
thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	105	80.0	120	----
tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	105	80.0	120	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Total Metals (QCLot: 583612) - continued									
titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	103	80.0	120	----
uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	110	80.0	120	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	108	80.0	120	----
zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	104	80.0	120	----
Dissolved Metals (QCLot: 584057)									
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	106	80.0	120	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	111	80.0	120	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	104	80.0	120	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	105	80.0	120	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	101	80.0	120	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	112	80.0	120	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	96.1	80.0	120	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	103	80.0	120	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	101	80.0	120	----
chromium, dissolved	7440-47-3	E421	0.0005	mg/L	0.25 mg/L	101	80.0	120	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	101	80.0	120	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	100	80.0	120	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	95.2	80.0	120	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	104	80.0	120	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	96.7	80.0	120	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	101	80.0	120	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	106	80.0	120	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	112	80.0	120	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	97.3	80.0	120	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	101	80.0	120	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	104	80.0	120	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	100	80.0	120	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	107	80.0	120	----
sodium, dissolved	7440-23-5	E421	0.05	mg/L	50 mg/L	106	80.0	120	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	116	80.0	120	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	107	80.0	120	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	104	80.0	120	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	107	80.0	120	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	107	80.0	120	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	103	80.0	120	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	108	80.0	120	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 581662)										
KS2202701-001	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	2.52 mg/L	2.5 mg/L	101	75.0	125	----
Anions and Nutrients (QCLot: 581663)										
KS2202701-001	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	0.476 mg/L	0.5 mg/L	95.2	75.0	125	----
Anions and Nutrients (QCLot: 581664)										
KS2202701-001	Anonymous	fluoride	16984-48-8	E235.F	0.994 mg/L	1 mg/L	99.4	75.0	125	----
Anions and Nutrients (QCLot: 581665)										
KS2202701-001	Anonymous	chloride	16887-00-6	E235.Cl	99.5 mg/L	100 mg/L	99.5	75.0	125	----
Anions and Nutrients (QCLot: 581666)										
KS2202701-001	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	100 mg/L	100 mg/L	100	75.0	125	----
Anions and Nutrients (QCLot: 581674)										
KS2202711-001	BOL-B2_WS_DI-1_2022-07	phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0310 mg/L	0.03 mg/L	103	70.0	130	----
Anions and Nutrients (QCLot: 584151)										
KS2202710-002	Anonymous	ammonia, total (as N)	7664-41-7	E298	0.101 mg/L	0.1 mg/L	101	75.0	125	----
Anions and Nutrients (QCLot: 584153)										
KS2202710-002	Anonymous	nitrogen, total	7727-37-9	E366	ND mg/L	10 mg/L	ND	70.0	130	----
Anions and Nutrients (QCLot: 584154)										
KS2202710-002	Anonymous	phosphorus, total	7723-14-0	E372-U	0.104 mg/L	0.1 mg/L	104	70.0	130	----
Anions and Nutrients (QCLot: 584155)										
KS2202710-002	Anonymous	phosphorus, total dissolved	7723-14-0	E375-T	0.0485 mg/L	0.05 mg/L	97.0	70.0	130	----
Organic / Inorganic Carbon (QCLot: 584152)										
KS2202710-002	Anonymous	carbon, dissolved organic [DOC]	----	E358-L	5.31 mg/L	5 mg/L	106	70.0	130	----
Total Metals (QCLot: 583612)										
KS2202711-002	POL-P2_WS_DI-1_2022-07	aluminum, total	7429-90-5	E420	0.195 mg/L	0.2 mg/L	97.5	70.0	130	----
		antimony, total	7440-36-0	E420	0.0198 mg/L	0.02 mg/L	99.0	70.0	130	----
		arsenic, total	7440-38-2	E420	0.0195 mg/L	0.02 mg/L	97.4	70.0	130	----
		barium, total	7440-39-3	E420	0.0202 mg/L	0.02 mg/L	101	70.0	130	----
		beryllium, total	7440-41-7	E420	0.0411 mg/L	0.04 mg/L	103	70.0	130	----
		bismuth, total	7440-69-9	E420	0.00999 mg/L	0.01 mg/L	99.9	70.0	130	----
		boron, total	7440-42-8	E420	0.100 mg/L	0.1 mg/L	100	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Total Metals (QCLot: 583612) - continued										
KS2202711-002	POL-P2_WS_DI-1_2022-07	cadmium, total	7440-43-9	E420	0.00394 mg/L	0.004 mg/L	98.5	70.0	130	----
		calcium, total	7440-70-2	E420	ND mg/L	4 mg/L	ND	70.0	130	----
		chromium, total	7440-47-3	E420	0.0397 mg/L	0.04 mg/L	99.2	70.0	130	----
		cobalt, total	7440-48-4	E420	0.0196 mg/L	0.02 mg/L	98.0	70.0	130	----
		copper, total	7440-50-8	E420	0.0187 mg/L	0.02 mg/L	93.7	70.0	130	----
		iron, total	7439-89-6	E420	1.91 mg/L	2 mg/L	95.5	70.0	130	----
		lead, total	7439-92-1	E420	0.0195 mg/L	0.02 mg/L	97.5	70.0	130	----
		lithium, total	7439-93-2	E420	0.102 mg/L	0.1 mg/L	102	70.0	130	----
		magnesium, total	7439-95-4	E420	ND mg/L	1 mg/L	ND	70.0	130	----
		manganese, total	7439-96-5	E420	0.0198 mg/L	0.02 mg/L	98.9	70.0	130	----
		molybdenum, total	7439-98-7	E420	0.0204 mg/L	0.02 mg/L	102	70.0	130	----
		nickel, total	7440-02-0	E420	0.0381 mg/L	0.04 mg/L	95.3	70.0	130	----
		potassium, total	7440-09-7	E420	4.14 mg/L	4 mg/L	103	70.0	130	----
		selenium, total	7782-49-2	E420	0.0395 mg/L	0.04 mg/L	98.9	70.0	130	----
		silicon, total	7440-21-3	E420	9.41 mg/L	10 mg/L	94.1	70.0	130	----
		silver, total	7440-22-4	E420	0.00393 mg/L	0.004 mg/L	98.2	70.0	130	----
		sodium, total	7440-23-5	E420	ND mg/L	2 mg/L	ND	70.0	130	----
		strontium, total	7440-24-6	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		thallium, total	7440-28-0	E420	0.00384 mg/L	0.004 mg/L	96.1	70.0	130	----
		tin, total	7440-31-5	E420	0.0197 mg/L	0.02 mg/L	98.4	70.0	130	----
		titanium, total	7440-32-6	E420	0.0403 mg/L	0.04 mg/L	101	70.0	130	----
		uranium, total	7440-61-1	E420	0.00402 mg/L	0.004 mg/L	100	70.0	130	----
		vanadium, total	7440-62-2	E420	0.100 mg/L	0.1 mg/L	100	70.0	130	----
		zinc, total	7440-66-6	E420	0.371 mg/L	0.4 mg/L	92.9	70.0	130	----
Dissolved Metals (QCLot: 584057)										
KS2202708-002	Anonymous	aluminum, dissolved	7429-90-5	E421	0.217 mg/L	0.2 mg/L	108	70.0	130	----
		antimony, dissolved	7440-36-0	E421	0.0223 mg/L	0.02 mg/L	111	70.0	130	----
		arsenic, dissolved	7440-38-2	E421	0.0216 mg/L	0.02 mg/L	108	70.0	130	----
		barium, dissolved	7440-39-3	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		beryllium, dissolved	7440-41-7	E421	0.0412 mg/L	0.04 mg/L	103	70.0	130	----
		bismuth, dissolved	7440-69-9	E421	0.0105 mg/L	0.01 mg/L	105	70.0	130	----
		boron, dissolved	7440-42-8	E421	ND mg/L	0.1 mg/L	ND	70.0	130	----
		cadmium, dissolved	7440-43-9	E421	0.00416 mg/L	0.004 mg/L	104	70.0	130	----
		calcium, dissolved	7440-70-2	E421	ND mg/L	4 mg/L	ND	70.0	130	----
		chromium, dissolved	7440-47-3	E421	0.0414 mg/L	0.04 mg/L	104	70.0	130	----
		cobalt, dissolved	7440-48-4	E421	0.0204 mg/L	0.02 mg/L	102	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Dissolved Metals (QCLot: 584057) - continued										
KS2202708-002	Anonymous	copper, dissolved	7440-50-8	E421	0.0205 mg/L	0.02 mg/L	102	70.0	130	----
		iron, dissolved	7439-89-6	E421	2.04 mg/L	2 mg/L	102	70.0	130	----
		lead, dissolved	7439-92-1	E421	0.0208 mg/L	0.02 mg/L	104	70.0	130	----
		lithium, dissolved	7439-93-2	E421	0.0990 mg/L	0.1 mg/L	99.0	70.0	130	----
		magnesium, dissolved	7439-95-4	E421	ND mg/L	1 mg/L	ND	70.0	130	----
		manganese, dissolved	7439-96-5	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		molybdenum, dissolved	7439-98-7	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		nickel, dissolved	7440-02-0	E421	0.0396 mg/L	0.04 mg/L	99.1	70.0	130	----
		potassium, dissolved	7440-09-7	E421	4.03 mg/L	4 mg/L	101	70.0	130	----
		selenium, dissolved	7782-49-2	E421	0.0417 mg/L	0.04 mg/L	104	70.0	130	----
		silicon, dissolved	7440-21-3	E421	ND mg/L	10 mg/L	ND	70.0	130	----
		silver, dissolved	7440-22-4	E421	0.00435 mg/L	0.004 mg/L	109	70.0	130	----
		sodium, dissolved	7440-23-5	E421	ND mg/L	2 mg/L	ND	70.0	130	----
		strontium, dissolved	7440-24-6	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		thallium, dissolved	7440-28-0	E421	0.00415 mg/L	0.004 mg/L	104	70.0	130	----
		tin, dissolved	7440-31-5	E421	0.0208 mg/L	0.02 mg/L	104	70.0	130	----
		titanium, dissolved	7440-32-6	E421	0.0437 mg/L	0.04 mg/L	109	70.0	130	----
		uranium, dissolved	7440-61-1	E421	0.00447 mg/L	0.004 mg/L	112	70.0	130	----
		vanadium, dissolved	7440-62-2	E421	0.104 mg/L	0.1 mg/L	104	70.0	130	----
		zinc, dissolved	7440-66-6	E421	0.428 mg/L	0.4 mg/L	107	70.0	130	----

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

Affix ALS barcode label here (lab use only)

COC Number:

Page 1 of 1

Report To	Contact and company name below will appear on the final report
Company:	Mount Polley Mining Corporation
Contact:	Gabriel Holmes
Phone:	236-317-4939
	Company address below will appear on the final report
Street:	PO Box 12
City/Province:	Likely, BC
Postal Code:	V0L 1N0
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☐ NO
Company:	
Contact:	

Report Format / Distribution

Select Report Format: ☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)
Quality Control (QC) Report with Report ☑ YES ☐ NO
☐ Compare Results to Criteria on Report - provide details below if box checked
Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax: gabriel.holmes@mountpolley.com
Email 2: kala.ivens@mountpolley.com, pschnurr@minnow.ca
Email 3: pstecko@minnow.ca, kbatchelar@minnow.ca

Invoice Distribution

Select Invoice Distribution: ☑ EMAIL ☑ MAIL ☐ FAX
Email 1 or Fax: gabriel.holmes@mountpolley.com
Email 2:

Project Information

ALS Account # / Quote #: VA22-MPMC100-006
Job #:
PO / AFE:
LSD:

Oil and Gas Required Fields (client use)

AFE/Cost Center: PO#
Major/Minor Code: Routing Code:
Requisitioner:
Location:

ALS Lab Work Order # (lab use only):

ALS Contact: Can Dang Sampler: Minnow

Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply

Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days)		EMERGENCY	
4 day [P4]	☐	1 Business day [E1]	☐
3 day [P3]	☐	Same Day, Weekend or Statutory holiday [E0]	☐
2 day [P2]	☐		

Date and Time Required for all E&P TATs:

For tests that can not be performed according to the service level sel

Analysis Reque

Indicate Filtered (F), Preserved (P) or Filtered and Pres

Environmental Division Kamloops
Work Order Reference
KS2202711

Telephone : +1 250 372 3588

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUTRIENTS-1	Total Metals (ICPMS)	Dissolved Metals (ICPMS)	Total Nitrogen Ammonia	DOC	TSS (Whole bottle)	Hardness	TN/NH3						
					F		F	P	F/P									
1	BOL-B2_WS_DI-1_2022-07	26-July-22	08:45	Water	R	R	R	R	R	R								6
2	POL-P2_WS_DI-1_2022-07	25-July-22	11:56	Water	R	R	R	R	R	R								6
3	POL-P2_WS_DI-1X_2022-07	25-July-22	11:56	Water	R	R	R	R	R	R								6
4	FIELD_WS-1_2022-07	26-July-22	09:00	Water	R	R		R	R	R	R							5
5	TRAVEL_WS-1_2022-07	25-Jul-22	—	Water	R	R				R	R	R						4

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☐ NO
Are samples for human drinking water use? ☐ YES ☐ NO

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

Regular analytes for Mount Polley Mine water sample package. Please also report ANIONS-N+N-CALC-VA (calculated nitrate and nitrite)

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐
Ice Packs ☑ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐
Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
10					

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by:	Date:	Time:	Received by:	Date:	Time:	Received by:	Date:	Time:
				JUL 27 2022	1500			

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

OCTOBER 2015 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form**.

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

Affix ALS barcode label here (lab use only)

COC Number:

Page 1 of 1

Report To	Contact and company name below will appear on the final report
Company:	Mount Polley Mining Corporation
Contact:	Gabriel Holmes
Phone:	236-317-4939
	Company address below will appear on the final report
Street:	PO Box 12
City/Province:	Likely, BC
Postal Code:	V0L 1N0
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☐ NO
Company:	
Contact:	

Report Format / Distribution

Select Report Format: ☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)
Quality Control (QC) Report with Report ☑ YES ☐ NO
☐ Compare Results to Criteria on Report - provide details below if box checked
Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax: gabriel.holmes@mountpolley.com
Email 2: kala.ivens@mountpolley.com, pschnurr@minnow.ca
Email 3: pstecko@minnow.ca, kbatchelar@minnow.ca

Invoice Distribution

Select Invoice Distribution: ☑ EMAIL ☑ MAIL ☐ FAX
Email 1 or Fax: gabriel.holmes@mountpolley.com
Email 2:

Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply

Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days)		EMERGENCY	
4 day [P4]	☐	1 Business day [E1]	☐
3 day [P3]	☐	Same Day, Weekend or Statutory holiday [E0]	☐
2 day [P2]	☐		

Date and Time Required for all E&P TATs:

For tests that can not be performed according to the service level sel

Analysis Reque

Indicate Filtered (F), Preserved (P) or Filtered and Pres

Project Information

ALS Account # / Quote #:	VA22-MPMC100-006
Job #:	
PO / AFE:	
LSD:	

Oil and Gas Required Fields (client use)

AFE/Cost Center:	PO#
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Lab Work Order # (lab use only):

ALS Contact: Can Dang

Sampler: Minnow

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUTRIENTS-1	Total Metals (ICPMS)	Dissolved Metals (ICPMS)	F Total Nitrogen Ammonia	P DOC	F/P TSS (Whole bottle)	Hardness	TN/NH3					
1	BOL-B2_WS_DI-1_2022-07	26-July-22	08:45	Water	R	R	R	R	R	R							6
2	POL-P2_WS_DI-1_2022-07	25-July-22	11:56	Water	R	R	R	R	R	R							6
3	POL-P2_WS_DI-1X_2022-07	25-July-22	11:56	Water	R	R	R	R	R	R							6
4	FIELD_WS-1_2022-07	26-July-22	09:00	Water	R	R		R	R	R	R						5
5	TRAVEL_WS-1_2022-07	25-Jul-22	—	Water	R	R		R		R	R	R	F. H				4

Environmental Division Kamloops
Work Order Reference
KS2202711

Telephone : +1 250 372 3588

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☐ NO

Are samples for human drinking water use? ☐ YES ☐ NO

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

Regular analytes for Mount Polley Mine water sample package. Please also report ANIONS-N+N-CALC-VA (calculated nitrate and nitrite)

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐
Ice Packs ☑ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐
Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C	
10			8°C (avg 4)	

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by:	Date:	Time:	Received by:	Date: JUL 27 2022	Time: 1100	Received by: JC ice cube	Date: JUL 28 2022	Time: 9250

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

OCTOBER 2015 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

WATER CHEMISTRY

ALS Laboratory Report VA22B7687

(Finalized August 11, 2022)

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **VA22B7687**	Page	: 1 of 5
Client	: **Mount Polley Mining Corporation**	Laboratory	: Vancouver - Environmental
Contact	: Mr. Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: 250-790-2215 ext 2171	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 02-Aug-2022 11:40
PO	: 5590008044 Q2 2022	Date Analysis Commenced	: 03-Aug-2022
C-O-C number	: ----	Issue Date	: 11-Aug-2022 14:19
Sampler	: ----		
Site	: ----		
Quote number	: VA22-MPMC100-006 - Minnow Env. - Water Quality		
No. of samples received	: 2		
No. of samples analysed	: 2		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Angela Ren	Team Leader - Metals	Metals, Burnaby, British Columbia
Ann Joby	Lab Assistant	Metals, Burnaby, British Columbia
David Stewart	Analyst - Chemistry	Inorganics, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Lindsay Gung	Supervisor - Water Chemistry	Inorganics, Burnaby, British Columbia

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

Unit	*Description*
-	No Unit
µS/cm	Microsiemens per centimetre
mg/L	milligrams per litre
NTU	nephelometric turbidity units
pH units	pH units

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	QUL-ZOO-1_WS_DI-1_2022-07	QUL-ZOO-7_WS_DI-1_2022-07	----	----	----
					Client sampling date / time	27-Jul-2022 13:40	27-Jul-2022 09:00	----	----	----
						VA22B7687-001	VA22B7687-002	--------	--------	--------
						Result	Result	----	----	----
Physical Tests										
alkalinity, total (as CaCO3)	----	E290	1.0	mg/L		44.8	44.1	----	----	----
conductivity	----	E100	2.0	µS/cm		98.1	94.4	----	----	----
hardness (as CaCO3), dissolved	----	EC100	0.50	mg/L		46.2	46.6	----	----	----
hardness (as CaCO3), from total Ca/Mg	----	EC100A	0.50	mg/L		45.6	47.7	----	----	----
pH	----	E108	0.10	pH units		7.94	7.90	----	----	----
solids, total dissolved [TDS]	----	E162	10	mg/L		68	63	----	----	----
solids, total suspended [TSS]	----	E164	1.0	mg/L		<1.0	<1.0	----	----	----
turbidity	----	E121	0.10	NTU		0.33	0.72	----	----	----
Anions and Nutrients										
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L		0.0100	0.0073	----	----	----
chloride	16887-00-6	E235.Cl	0.50	mg/L		<0.50	<0.50	----	----	----
fluoride	16984-48-8	E235.F	0.020	mg/L		0.031	0.030	----	----	----
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L		0.0690	0.0694	----	----	----
nitrate + nitrite (as N)	----	EC235.N+N	0.0050	mg/L		0.0690	0.0694	----	----	----
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L		<0.0010	<0.0010	----	----	----
nitrogen, total	7727-37-9	E366	0.030	mg/L		0.209	0.156	----	----	----
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L		<0.0010	<0.0010	----	----	----
phosphorus, total	7723-14-0	E372-U	0.0020	mg/L		0.0075	0.0033	----	----	----
phosphorus, total dissolved	7723-14-0	E375-T	0.0020	mg/L		<0.0020	0.0022	----	----	----
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L		5.38	5.36	----	----	----
Organic / Inorganic Carbon										
carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L		2.42	2.69	----	----	----
Total Metals										
aluminum, total	7429-90-5	E420	0.0030	mg/L		0.0237	0.0303	----	----	----
antimony, total	7440-36-0	E420	0.00010	mg/L		<0.00010	<0.00010	----	----	----
arsenic, total	7440-38-2	E420	0.00010	mg/L		0.00014	0.00034	----	----	----
barium, total	7440-39-3	E420	0.00010	mg/L		0.00530	0.00606	----	----	----
beryllium, total	7440-41-7	E420	0.000100	mg/L		<0.000100	<0.000100	----	----	----
bismuth, total	7440-69-9	E420	0.000050	mg/L		<0.000050	<0.000050	----	----	----
boron, total	7440-42-8	E420	0.010	mg/L		<0.010	<0.010	----	----	----
cadmium, total	7440-43-9	E420	0.0000050	mg/L		0.0000119	0.0000309	----	----	----

Analytical Results

Sub-Matrix: Water (Matrix: Water)					Client sample ID	QUL-ZOO-1_WS_DI-1_2022-07	QUL-ZOO-7_WS_DI-1_2022-07	----	----	----
					Client sampling date / time	27-Jul-2022 13:40	27-Jul-2022 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit		VA22B7687-001	VA22B7687-002	--------	--------	--------
						Result	Result	----	----	----
Total Metals										
calcium, total	7440-70-2	E420	0.050	mg/L		15.3	16.1	----	----	----
chromium, total	7440-47-3	E420	0.00050	mg/L		<0.00050	<0.00050	----	----	----
cobalt, total	7440-48-4	E420	0.00010	mg/L		<0.00010	<0.00010	----	----	----
copper, total	7440-50-8	E420	0.00050	mg/L		0.00102	0.00195	----	----	----
iron, total	7439-89-6	E420	0.030	mg/L		<0.030	0.049	----	----	----
lead, total	7439-92-1	E420	0.000050	mg/L		0.000091	0.000093	----	----	----
lithium, total	7439-93-2	E420	0.0010	mg/L		<0.0010	<0.0010	----	----	----
magnesium, total	7439-95-4	E420	0.100	mg/L		1.80	1.83	----	----	----
manganese, total	7439-96-5	E420	0.00010	mg/L		0.00168	0.00341	----	----	----
molybdenum, total	7439-98-7	E420	0.000050	mg/L		0.000348	0.000432	----	----	----
nickel, total	7440-02-0	E420	0.00050	mg/L		<0.00050	<0.00050	----	----	----
potassium, total	7440-09-7	E420	0.050	mg/L		0.486	0.541	----	----	----
selenium, total	7782-49-2	E420	0.000050	mg/L		0.000101	0.000135	----	----	----
silicon, total	7440-21-3	E420	0.10	mg/L		1.76	1.86	----	----	----
silver, total	7440-22-4	E420	0.000010	mg/L		<0.000010	<0.000010	----	----	----
sodium, total	7440-23-5	E420	0.050	mg/L		0.856	0.879	----	----	----
strontium, total	7440-24-6	E420	0.00020	mg/L		0.117	0.116	----	----	----
thallium, total	7440-28-0	E420	0.000010	mg/L		<0.000010	<0.000010	----	----	----
tin, total	7440-31-5	E420	0.00010	mg/L		<0.00010	<0.00010	----	----	----
titanium, total	7440-32-6	E420	0.0100	mg/L		<0.0100	<0.0100	----	----	----
uranium, total	7440-61-1	E420	0.000010	mg/L		0.000146	0.000131	----	----	----
vanadium, total	7440-62-2	E420	0.00050	mg/L		<0.00050	<0.00050	----	----	----
zinc, total	7440-66-6	E420	0.0030	mg/L		<0.0030	<0.0030	----	----	----
Dissolved Metals										
aluminum, dissolved	7429-90-5	E421	0.0030	mg/L		0.0118	0.0125	----	----	----
antimony, dissolved	7440-36-0	E421	0.00010	mg/L		<0.00010	<0.00010	----	----	----
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L		0.00011	0.00017	----	----	----
barium, dissolved	7440-39-3	E421	0.00010	mg/L		0.00520	0.00557	----	----	----
beryllium, dissolved	7440-41-7	E421	0.000100	mg/L		<0.000100	<0.000100	----	----	----
bismuth, dissolved	7440-69-9	E421	0.000050	mg/L		<0.000050	<0.000050	----	----	----
boron, dissolved	7440-42-8	E421	0.010	mg/L		<0.010	<0.010	----	----	----
cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L		0.0000200	0.0000246	----	----	----

Analytical Results

Sub-Matrix: Water (Matrix: Water)					Client sample ID	QUL-ZOO-1_WS_DI-1_2022-07	QUL-ZOO-7_WS_DI-1_2022-07	----	----	----
					Client sampling date / time	27-Jul-2022 13:40	27-Jul-2022 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit		VA22B7687-001	VA22B7687-002	--------	--------	--------
						Result	Result	----	----	----
Dissolved Metals										
calcium, dissolved	7440-70-2	E421	0.050	mg/L		15.4	15.5	----	----	----
chromium, dissolved	7440-47-3	E421	0.00050	mg/L		<0.00050	<0.00050	----	----	----
cobalt, dissolved	7440-48-4	E421	0.00010	mg/L		<0.00010	<0.00010	----	----	----
copper, dissolved	7440-50-8	E421	0.00050	mg/L		0.00064	0.00138	----	----	----
iron, dissolved	7439-89-6	E421	0.030	mg/L		<0.030	<0.030	----	----	----
lead, dissolved	7439-92-1	E421	0.000050	mg/L		<0.000050	0.000057	----	----	----
lithium, dissolved	7439-93-2	E421	0.0010	mg/L		<0.0010	<0.0010	----	----	----
magnesium, dissolved	7439-95-4	E421	0.100	mg/L		1.88	1.91	----	----	----
manganese, dissolved	7439-96-5	E421	0.00010	mg/L		0.00056	0.00118	----	----	----
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L		0.000346	0.000371	----	----	----
nickel, dissolved	7440-02-0	E421	0.00050	mg/L		<0.00050	0.00052	----	----	----
potassium, dissolved	7440-09-7	E421	0.050	mg/L		0.541	0.598	----	----	----
selenium, dissolved	7782-49-2	E421	0.000050	mg/L		0.000112	0.000126	----	----	----
silicon, dissolved	7440-21-3	E421	0.050	mg/L		1.71	1.79	----	----	----
silver, dissolved	7440-22-4	E421	0.000010	mg/L		<0.000010	<0.000010	----	----	----
sodium, dissolved	7440-23-5	E421	0.050	mg/L		0.881	0.912	----	----	----
strontium, dissolved	7440-24-6	E421	0.00020	mg/L		0.120	0.113	----	----	----
thallium, dissolved	7440-28-0	E421	0.000010	mg/L		<0.000010	<0.000010	----	----	----
tin, dissolved	7440-31-5	E421	0.00010	mg/L		<0.00010	<0.00010	----	----	----
titanium, dissolved	7440-32-6	E421	0.0100	mg/L		<0.0100	<0.0100	----	----	----
uranium, dissolved	7440-61-1	E421	0.000010	mg/L		0.000135	0.000123	----	----	----
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L		<0.00050	<0.00050	----	----	----
zinc, dissolved	7440-66-6	E421	0.0030	mg/L		<0.0030	<0.0030	----	----	----
dissolved metals filtration location	----	EP421	-	-		Field	Field	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA22B7687**	Page	: 1 of 13
Client	: **Mount Polley Mining Corporation**	Laboratory	: Vancouver - Environmental
Contact	: Mr. Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: 250-790-2215 ext 2171	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 02-Aug-2022 11:40
PO	: 5590008044 Q2 2022	Issue Date	: 11-Aug-2022 14:12
C-O-C number	: ----		
Sampler	: ----		
Site	: ----		
Quote number	: VA22-MPMC100-006 - Minnow Env. - Water Quality		
No. of samples received	: 2		
No. of samples analysed	: 2		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- Method Blank value outliers occur - please see following pages for full details.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- Analysis Holding Time Outliers exist - please see following pages for full details.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **Water**

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment
Method Blank (MB) Values								
Physical Tests	QC-MRG2-5865170 01	----	alkalinity, total (as CaCO3)	----	E290	1.5 mg/L [B]	1.5 mg/L	Blank result exceeds permitted value

Result Qualifiers

Qualifier	Description
B	*Method Blank exceeds ALS DQO. Associated sample results which are < Limit of Reporting or > 5 times blank level are considered reliable.*

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) QUL-ZOO-7_WS_DI-1_2022-07	E298	27-Jul-2022	03-Aug-2022	----	----		06-Aug-2022	28 days	10 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) QUL-ZOO-1_WS_DI-1_2022-07	E298	27-Jul-2022	03-Aug-2022	----	----		06-Aug-2022	28 days	9 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE QUL-ZOO-1_WS_DI-1_2022-07	E235.Cl	27-Jul-2022	03-Aug-2022	----	----		03-Aug-2022	28 days	7 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE QUL-ZOO-7_WS_DI-1_2022-07	E235.Cl	27-Jul-2022	03-Aug-2022	----	----		03-Aug-2022	28 days	7 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE QUL-ZOO-1_WS_DI-1_2022-07	E378-U	27-Jul-2022	03-Aug-2022	----	----		03-Aug-2022	3 days	7 days	× EHTR-FM
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE QUL-ZOO-7_WS_DI-1_2022-07	E378-U	27-Jul-2022	03-Aug-2022	----	----		03-Aug-2022	3 days	7 days	× EHTR-FM
Anions and Nutrients : Fluoride in Water by IC										
HDPE QUL-ZOO-1_WS_DI-1_2022-07	E235.F	27-Jul-2022	03-Aug-2022	----	----		03-Aug-2022	28 days	7 days	✓

Matrix: **Water**

Evaluation: ✖ = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Fluoride in Water by IC										
HDPE QUL-ZOO-7_WS_DI-1_2022-07	E235.F	27-Jul-2022	03-Aug-2022	----	----		03-Aug-2022	28 days	7 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE QUL-ZOO-1_WS_DI-1_2022-07	E235.NO3-L	27-Jul-2022	03-Aug-2022	3 days	7 days	✖ EHTR	03-Aug-2022	3 days	0 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE QUL-ZOO-7_WS_DI-1_2022-07	E235.NO3-L	27-Jul-2022	03-Aug-2022	3 days	7 days	✖ EHTR	03-Aug-2022	3 days	0 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE QUL-ZOO-1_WS_DI-1_2022-07	E235.NO2-L	27-Jul-2022	03-Aug-2022	----	----		03-Aug-2022	3 days	7 days	✖ EHTR-FM
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE QUL-ZOO-7_WS_DI-1_2022-07	E235.NO2-L	27-Jul-2022	03-Aug-2022	----	----		03-Aug-2022	3 days	7 days	✖ EHTR-FM
Anions and Nutrients : Sulfate in Water by IC										
HDPE QUL-ZOO-1_WS_DI-1_2022-07	E235.SO4	27-Jul-2022	03-Aug-2022	----	----		03-Aug-2022	28 days	7 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE QUL-ZOO-7_WS_DI-1_2022-07	E235.SO4	27-Jul-2022	03-Aug-2022	----	----		03-Aug-2022	28 days	7 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass dissolved (sulfuric acid) QUL-ZOO-1_WS_DI-1_2022-07	E375-T	27-Jul-2022	03-Aug-2022	----	----		04-Aug-2022	28 days	8 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass dissolved (sulfuric acid) QUL-ZOO-7_WS_DI-1_2022-07	E375-T	27-Jul-2022	03-Aug-2022	----	----		04-Aug-2022	28 days	8 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid) QUL-ZOO-1_WS_DI-1_2022-07	E366	27-Jul-2022	03-Aug-2022	----	----		04-Aug-2022	28 days	7 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid) QUL-ZOO-7_WS_DI-1_2022-07	E366	27-Jul-2022	03-Aug-2022	----	----		04-Aug-2022	28 days	8 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) QUL-ZOO-1_WS_DI-1_2022-07	E372-U	27-Jul-2022	03-Aug-2022	----	----		04-Aug-2022	28 days	7 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) QUL-ZOO-7_WS_DI-1_2022-07	E372-U	27-Jul-2022	03-Aug-2022	----	----		04-Aug-2022	28 days	8 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) QUL-ZOO-1_WS_DI-1_2022-07	E421	27-Jul-2022	03-Aug-2022	----	----		04-Aug-2022	180 days	8 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) QUL-ZOO-7_WS_DI-1_2022-07	E421	27-Jul-2022	03-Aug-2022	----	----		04-Aug-2022	180 days	8 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) QUL-ZOO-1_WS_DI-1_2022-07	E358-L	27-Jul-2022	03-Aug-2022	----	----		04-Aug-2022	28 days	9 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) QUL-ZOO-7_WS_DI-1_2022-07	E358-L	27-Jul-2022	03-Aug-2022	----	----		04-Aug-2022	28 days	9 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE QUL-ZOO-1_WS_DI-1_2022-07	E290	27-Jul-2022	03-Aug-2022	----	----		03-Aug-2022	14 days	7 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Alkalinity Species by Titration										
HDPE QUL-ZOO-7_WS_DI-1_2022-07	E290	27-Jul-2022	03-Aug-2022	----	----		03-Aug-2022	14 days	7 days	✓
Physical Tests : Conductivity in Water										
HDPE QUL-ZOO-1_WS_DI-1_2022-07	E100	27-Jul-2022	03-Aug-2022	----	----		03-Aug-2022	28 days	7 days	✓
Physical Tests : Conductivity in Water										
HDPE QUL-ZOO-7_WS_DI-1_2022-07	E100	27-Jul-2022	03-Aug-2022	----	----		03-Aug-2022	28 days	7 days	✓
Physical Tests : pH by Meter										
HDPE QUL-ZOO-1_WS_DI-1_2022-07	E108	27-Jul-2022	03-Aug-2022	----	----		03-Aug-2022	0.25 hrs	3.25 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE QUL-ZOO-7_WS_DI-1_2022-07	E108	27-Jul-2022	03-Aug-2022	----	----		03-Aug-2022	0.25 hrs	3.25 hrs	× EHTR-FM
Physical Tests : TDS by Gravimetry										
HDPE QUL-ZOO-1_WS_DI-1_2022-07	E162	27-Jul-2022	----	----	----		03-Aug-2022	7 days	7 days	✓
Physical Tests : TDS by Gravimetry										
HDPE QUL-ZOO-7_WS_DI-1_2022-07	E162	27-Jul-2022	----	----	----		03-Aug-2022	7 days	7 days	✓
Physical Tests : TSS by Gravimetry (Whole Bottle)										
HDPE [TSS-WB] QUL-ZOO-1_WS_DI-1_2022-07	E164	27-Jul-2022	----	----	----		03-Aug-2022	7 days	7 days	✓
Physical Tests : TSS by Gravimetry (Whole Bottle)										
HDPE [TSS-WB] QUL-ZOO-7_WS_DI-1_2022-07	E164	27-Jul-2022	----	----	----		03-Aug-2022	7 days	7 days	✓

Matrix: **Water**

Evaluation: ✖ = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Turbidity by Nephelometry										
HDPE										
QUL-ZOO-1_WS_DI-1_2022-07	E121	27-Jul-2022	----	----	----		03-Aug-2022	3 days	7 days	✖ EHTR
Physical Tests : Turbidity by Nephelometry										
HDPE										
QUL-ZOO-7_WS_DI-1_2022-07	E121	27-Jul-2022	----	----	----		03-Aug-2022	3 days	7 days	✖ EHTR
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved)										
QUL-ZOO-1_WS_DI-1_2022-07	E420	27-Jul-2022	03-Aug-2022	----	----		04-Aug-2022	180 days	7 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved)										
QUL-ZOO-7_WS_DI-1_2022-07	E420	27-Jul-2022	03-Aug-2022	----	----		04-Aug-2022	180 days	8 days	✓

Legend & Qualifier Definitions

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended

EHTR: Exceeded ALS recommended hold time prior to sample receipt.

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = QC frequency outside specification; ✓ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Alkalinity Species by Titration	E290	586517	1	17	5.8	5.0	✓
Ammonia by Fluorescence	E298	586168	1	15	6.6	5.0	✓
Chloride in Water by IC	E235.Cl	586511	1	17	5.8	5.0	✓
Conductivity in Water	E100	586518	1	17	5.8	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	586097	1	9	11.1	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	586163	1	16	6.2	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	586509	1	18	5.5	5.0	✓
Fluoride in Water by IC	E235.F	586510	1	17	5.8	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	586512	1	18	5.5	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	586513	1	18	5.5	5.0	✓
pH by Meter	E108	586516	1	17	5.8	5.0	✓
Sulfate in Water by IC	E235.SO4	586514	1	17	5.8	5.0	✓
TDS by Gravimetry	E162	586171	2	39	5.1	5.0	✓
Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)	E375-T	586170	1	7	14.2	5.0	✓
Total Metals in Water by CRC ICPMS	E420	586158	1	19	5.2	5.0	✓
Total Nitrogen by Colourimetry	E366	586169	1	7	14.2	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	586165	1	18	5.5	5.0	✓
Turbidity by Nephelometry	E121	586961	1	20	5.0	5.0	✓
Laboratory Control Samples (LCS)							
Alkalinity Species by Titration	E290	586517	1	17	5.8	5.0	✓
Ammonia by Fluorescence	E298	586168	1	15	6.6	5.0	✓
Chloride in Water by IC	E235.Cl	586511	1	17	5.8	5.0	✓
Conductivity in Water	E100	586518	1	17	5.8	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	586097	1	9	11.1	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	586163	1	16	6.2	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	586509	1	18	5.5	5.0	✓
Fluoride in Water by IC	E235.F	586510	1	17	5.8	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	586512	1	18	5.5	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	586513	1	18	5.5	5.0	✓
pH by Meter	E108	586516	1	17	5.8	5.0	✓
Sulfate in Water by IC	E235.SO4	586514	1	17	5.8	5.0	✓
TDS by Gravimetry	E162	586171	2	39	5.1	5.0	✓
Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)	E375-T	586170	1	7	14.2	5.0	✓
Total Metals in Water by CRC ICPMS	E420	586158	1	19	5.2	5.0	✓
Total Nitrogen by Colourimetry	E366	586169	1	7	14.2	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	586165	1	18	5.5	5.0	✓
TSS by Gravimetry (Whole Bottle)	E164	587170	1	19	5.2	5.0	✓

Matrix: **Water**

Evaluation: × = QC frequency outside specification; ✓ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Control Samples (LCS) - Continued							
Turbidity by Nephelometry	E121	586961	1	20	5.0	5.0	✓
Method Blanks (MB)							
Alkalinity Species by Titration	E290	586517	1	17	5.8	5.0	✓
Ammonia by Fluorescence	E298	586168	1	15	6.6	5.0	✓
Chloride in Water by IC	E235.Cl	586511	1	17	5.8	5.0	✓
Conductivity in Water	E100	586518	1	17	5.8	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	586097	1	9	11.1	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	586163	1	16	6.2	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	586509	1	18	5.5	5.0	✓
Fluoride in Water by IC	E235.F	586510	1	17	5.8	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	586512	1	18	5.5	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	586513	1	18	5.5	5.0	✓
Sulfate in Water by IC	E235.SO4	586514	1	17	5.8	5.0	✓
TDS by Gravimetry	E162	586171	2	39	5.1	5.0	✓
Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)	E375-T	586170	1	7	14.2	5.0	✓
Total Metals in Water by CRC ICPMS	E420	586158	1	19	5.2	5.0	✓
Total Nitrogen by Colourimetry	E366	586169	1	7	14.2	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	586165	1	18	5.5	5.0	✓
TSS by Gravimetry (Whole Bottle)	E164	587170	1	19	5.2	5.0	✓
Turbidity by Nephelometry	E121	586961	1	20	5.0	5.0	✓
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	586168	1	15	6.6	5.0	✓
Chloride in Water by IC	E235.Cl	586511	1	17	5.8	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	586097	1	9	11.1	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	586163	1	16	6.2	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	586509	1	18	5.5	5.0	✓
Fluoride in Water by IC	E235.F	586510	1	17	5.8	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	586512	1	18	5.5	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	586513	1	18	5.5	5.0	✓
Sulfate in Water by IC	E235.SO4	586514	1	17	5.8	5.0	✓
Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)	E375-T	586170	1	7	14.2	5.0	✓
Total Metals in Water by CRC ICPMS	E420	586158	1	19	5.2	5.0	✓
Total Nitrogen by Colourimetry	E366	586169	1	7	14.2	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	586165	1	18	5.5	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Conductivity in Water	E100 Vancouver - Environmental	Water	APHA 2510 (mod)	Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a water sample. Conductivity measurements are temperature-compensated to 25°C.
pH by Meter	E108 Vancouver - Environmental	Water	APHA 4500-H (mod)	pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally 20 ± 5°C). For high accuracy test results, pH should be measured in the field within the recommended 15 minute hold time.
Turbidity by Nephelometry	E121 Vancouver - Environmental	Water	APHA 2130 B (mod)	Turbidity is measured by the nephelometric method, by measuring the intensity of light scatter under defined conditions.
TDS by Gravimetry	E162 Vancouver - Environmental	Water	APHA 2540 C (mod)	Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, with evaporation of the filtrate at 180 ± 2°C for 16 hours or to constant weight, with gravimetric measurement of the residue.
TSS by Gravimetry (Whole Bottle)	E164 Vancouver - Environmental	Water	APHA 2540 D (mod)	Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, following by drying of the filter at 104 ± 1°C, with gravimetric measurement of the filtered solids. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.
Chloride in Water by IC	E235.Cl Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Fluoride in Water by IC	E235.F Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrite in Water by IC (Low Level)	E235.NO2-L Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrate in Water by IC (Low Level)	E235.NO3-L Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Sulfate in Water by IC	E235.SO4 Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Alkalinity Species by Titration	E290 Vancouver - Environmental	Water	APHA 2320 B (mod)	Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.
Ammonia by Fluorescence	E298 Vancouver - Environmental	Water	Method Fialab 100, 2018	Ammonia in water is determined by automated continuous flow analysis with membrane diffusion and fluorescence detection, after reaction with OPA (ortho-phthalaldehyde). This method is approved under US EPA 40 CFR Part 136 (May 2021)
Dissolved Organic Carbon by Combustion (Low Level)	E358-L Vancouver - Environmental	Water	APHA 5310 B (mod)	Dissolved Organic Carbon (Non-Purgeable), also known as NPOC (dissolved), is a direct measurement of DOC after a filtered (0.45 micron) sample has been acidified and purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of DC (dissolved carbon) is comprised of IC (which is common), this method is more accurate and more reliable than the DOC by subtraction method (i.e. DC minus DIC).
Total Nitrogen by Colourimetry	E366 Vancouver - Environmental	Water	APHA 4500-P J (mod)	Total Nitrogen is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U Vancouver - Environmental	Water	APHA 4500-P E (mod).	Total Phosphorus is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)	E375-T Vancouver - Environmental	Water	APHA 4500-P E (mod).	Total Dissolved Phosphorus is determined colourimetrically using a discrete analyzer after filtration through a 0.45 micron filter followed by heated persulfate digestion of the sample.
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U Vancouver - Environmental	Water	APHA 4500-P F (mod)	Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter. Field filtration is recommended to ensure test results represent conditions at time of sampling.
Total Metals in Water by CRC ICPMS	E420 Vancouver - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Dissolved Metals in Water by CRC ICPMS	E421 Vancouver - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Hardness (Calculated)	EC100 Vancouver - Environmental	Water	APHA 2340B	"Hardness (as CaCO3), dissolved" is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.
Hardness (Calculated) from Total Ca/Mg	EC100A Vancouver - Environmental	Water	APHA 2340B	"Hardness (as CaCO3), from total Ca/Mg" is calculated from the sum of total Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations. Hardness from total Ca/Mg is normally comparable to Dissolved Hardness in non-turbid waters.
Nitrate and Nitrite (as N) (Calculation)	EC235.N+N Vancouver - Environmental	Water	EPA 300.0	Nitrate and Nitrite (as N) is a calculated parameter. Nitrate and Nitrite (as N) = Nitrite (as N) + Nitrate (as N).

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Ammonia	EP298 Vancouver - Environmental	Water		Sample preparation for Preserved Nutrients Water Quality Analysis.
Preparation for Dissolved Organic Carbon for Combustion	EP358 Vancouver - Environmental	Water	APHA 5310 B (mod)	Preparation for Dissolved Organic Carbon
Digestion for Total Nitrogen in water	EP366 Vancouver - Environmental	Water	APHA 4500-P J (mod)	Samples are heated with a persulfate digestion reagent.
Digestion for Total Phosphorus in water	EP372 Vancouver - Environmental	Water	APHA 4500-P E (mod).	Samples are heated with a persulfate digestion reagent.
Digestion for Dissolved Phosphorus in water	EP375 Vancouver - Environmental	Water	APHA 4500-P E (mod).	Samples are filtered through a 0.45 micron membrane filter and then heated with a persulfate digestion reagent.
Dissolved Metals Water Filtration	EP421 Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.

QUALITY CONTROL REPORT

Work Order	: **VA22B7687**	Page	: 1 of 14
Client	: Mount Polley Mining Corporation	Laboratory	: Vancouver - Environmental
Contact	: Mr. Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: 250-790-2215 ext 2171	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 02-Aug-2022 11:40
PO	: 5590008044 Q2 2022	Date Analysis Commenced	: 03-Aug-2022
C-O-C number	: ----	Issue Date	: 11-Aug-2022 14:11
Sampler	: ----		
Site	: ----		
Quote number	: VA22-MPMC100-006 - Minnow Env. - Water Quality		
No. of samples received	: 2		
No. of samples analysed	: 2		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Angela Ren	Team Leader - Metals	Vancouver Metals, Burnaby, British Columbia
Ann Joby	Lab Assistant	Vancouver Metals, Burnaby, British Columbia
David Stewart	Analyst - Chemistry	Vancouver Inorganics, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Vancouver Metals, Burnaby, British Columbia
Lindsay Gung	Supervisor - Water Chemistry	Vancouver Inorganics, Burnaby, British Columbia

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 586171)											
FJ2202041-001	Anonymous	solids, total dissolved [TDS]	----	E162	20	mg/L	318	326	2.48%	20%	----
Physical Tests (QC Lot: 586516)											
VA22B7752-003	Anonymous	pH	----	E108	0.10	pH units	8.32	8.30	0.241%	4%	----
Physical Tests (QC Lot: 586517)											
VA22B7752-003	Anonymous	alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	171	171	0.292%	20%	----
Physical Tests (QC Lot: 586518)											
VA22B7752-003	Anonymous	conductivity	----	E100	2.0	µS/cm	464	463	0.216%	10%	----
Physical Tests (QC Lot: 586961)											
FJ2202040-001	Anonymous	turbidity	----	E121	0.10	NTU	10.6	10.4	1.90%	15%	----
Physical Tests (QC Lot: 587197)											
VA22B7532-001	Anonymous	solids, total dissolved [TDS]	----	E162	20	mg/L	1470	1530	4.13%	20%	----
Anions and Nutrients (QC Lot: 586165)											
KS2202760-001	Anonymous	phosphorus, total	7723-14-0	E372-U	0.0200	mg/L	0.253	0.250	0.870%	20%	----
Anions and Nutrients (QC Lot: 586168)											
KS2202760-001	Anonymous	ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.0098	0.0090	0.0008	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 586169)											
VA22B7505-001	Anonymous	nitrogen, total	7727-37-9	E366	0.030	mg/L	0.224	0.228	0.003	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 586170)											
VA22B7505-001	Anonymous	phosphorus, total dissolved	7723-14-0	E375-T	0.0020	mg/L	0.0045	0.0046	0.00006	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 586509)											
VA22B7687-001	QUL-ZOO-1_WS_DI-1_2022-07	phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 586510)											
VA22B7752-001	Anonymous	fluoride	16984-48-8	E235.F	0.020	mg/L	<0.020	<0.020	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 586511)											
VA22B7752-001	Anonymous	chloride	16887-00-6	E235.Cl	0.50	mg/L	<0.50	<0.50	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 586512)											
VA22B7752-001	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 586513)											
VA22B7752-001	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 586514)											
VA22B7752-001	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	<0.30	<0.30	0	Diff <2x LOR	----

Sub-Matrix: **Water**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Laboratory Duplicate (DUP) Report						
					LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Organic / Inorganic Carbon (QC Lot: 586163)											
KS2202760-001	Anonymous	carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L	5.45	5.88	7.53%	20%	----
Total Metals (QC Lot: 586158)											
VA22B7660-004	Anonymous	aluminum, total	7429-90-5	E420	0.0030	mg/L	<0.0030	<0.0030	0	Diff <2x LOR	----
		antimony, total	7440-36-0	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		arsenic, total	7440-38-2	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		barium, total	7440-39-3	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		beryllium, total	7440-41-7	E420	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, total	7440-42-8	E420	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		cadmium, total	7440-43-9	E420	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
		calcium, total	7440-70-2	E420	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		chromium, total	7440-47-3	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		cobalt, total	7440-48-4	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		copper, total	7440-50-8	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		iron, total	7439-89-6	E420	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		lead, total	7439-92-1	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		lithium, total	7439-93-2	E420	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
		magnesium, total	7439-95-4	E420	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
		manganese, total	7439-96-5	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		molybdenum, total	7439-98-7	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		nickel, total	7440-02-0	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		potassium, total	7440-09-7	E420	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		selenium, total	7782-49-2	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		silicon, total	7440-21-3	E420	0.10	mg/L	<0.10	<0.10	0	Diff <2x LOR	----
		silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, total	7440-23-5	E420	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		strontium, total	7440-24-6	E420	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		titanium, total	7440-32-6	E420	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
		uranium, total	7440-61-1	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		vanadium, total	7440-62-2	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		zinc, total	7440-66-6	E420	0.0030	mg/L	<0.0030	<0.0030	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 586097)											
VA22B7687-001	QUL-ZOO-1_WS_DI-1_2022-07	aluminum, dissolved	7429-90-5	E421	0.0030	mg/L	0.0118	0.0122	0.0004	Diff <2x LOR	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Dissolved Metals (QC Lot: 586097) - continued											
VA22B7687-001	QUL-ZOO-1_WS_DI-1_2022-07	antimony, dissolved	7440-36-0	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00011	0.00012	0.000006	Diff <2x LOR	----
		barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.00520	0.00506	2.70%	20%	----
		beryllium, dissolved	7440-41-7	E421	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, dissolved	7440-42-8	E421	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	0.0000200	0.0000209	0.0000008	Diff <2x LOR	----
		calcium, dissolved	7440-70-2	E421	0.050	mg/L	15.4	15.5	0.997%	20%	----
		chromium, dissolved	7440-47-3	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		copper, dissolved	7440-50-8	E421	0.00050	mg/L	0.00064	0.00065	0.00001	Diff <2x LOR	----
		iron, dissolved	7439-89-6	E421	0.030	mg/L	<0.030	<0.030	0	Diff <2x LOR	----
		lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		lithium, dissolved	7439-93-2	E421	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
		magnesium, dissolved	7439-95-4	E421	0.100	mg/L	1.88	1.88	0.328%	20%	----
		manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.00056	0.00057	0.000008	Diff <2x LOR	----
		molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.000346	0.000372	0.000025	Diff <2x LOR	----
		nickel, dissolved	7440-02-0	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		potassium, dissolved	7440-09-7	E421	0.050	mg/L	0.541	0.535	1.20%	20%	----
		selenium, dissolved	7782-49-2	E421	0.000050	mg/L	0.000112	0.000080	0.000032	Diff <2x LOR	----
		silicon, dissolved	7440-21-3	E421	0.050	mg/L	1.71	1.75	2.47%	20%	----
		silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, dissolved	7440-23-5	E421	0.050	mg/L	0.881	0.890	1.02%	20%	----
		strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.120	0.123	2.04%	20%	----
		thallium, dissolved	7440-28-0	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		tin, dissolved	7440-31-5	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		titanium, dissolved	7440-32-6	E421	0.0100	mg/L	<0.0100	<0.0100	0	Diff <2x LOR	----
		uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.000135	0.000135	0.229%	20%	----
		vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		zinc, dissolved	7440-66-6	E421	0.0030	mg/L	<0.0030	<0.0030	0	Diff <2x LOR	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 586171)						
solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Physical Tests (QCLot: 586517)						
alkalinity, total (as CaCO3)	----	E290	1	mg/L	# 1.5	B
Physical Tests (QCLot: 586518)						
conductivity	----	E100	1	µS/cm	1.4	----
Physical Tests (QCLot: 586961)						
turbidity	----	E121	0.1	NTU	<0.10	----
Physical Tests (QCLot: 587170)						
solids, total suspended [TSS]	----	E164	1	mg/L	<1.0	----
Physical Tests (QCLot: 587197)						
solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Anions and Nutrients (QCLot: 586165)						
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----
Anions and Nutrients (QCLot: 586168)						
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 586169)						
nitrogen, total	7727-37-9	E366	0.03	mg/L	<0.030	----
Anions and Nutrients (QCLot: 586170)						
phosphorus, total dissolved	7723-14-0	E375-T	0.002	mg/L	<0.0020	----
Anions and Nutrients (QCLot: 586509)						
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 586510)						
fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 586511)						
chloride	16887-00-6	E235.Cl	0.5	mg/L	<0.50	----
Anions and Nutrients (QCLot: 586512)						
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 586513)						
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 586514)						
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Organic / Inorganic Carbon (QCLot: 586163)						
carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	<0.50	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 586158)						
aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----
antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
chromium, total	7440-47-3	E420	0.0005	mg/L	<0.00050	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	----
magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	----
manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
silicon, total	7440-21-3	E420	0.1	mg/L	<0.10	----
silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	----
sodium, total	7440-23-5	E420	0.05	mg/L	<0.050	----
strontium, total	7440-24-6	E420	0.0002	mg/L	<0.00020	----
thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----
tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----
uranium, total	7440-61-1	E420	0.00001	mg/L	<0.000010	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	<0.00050	----
zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	----
Dissolved Metals (QCLot: 586097)						
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	<0.0010	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	<0.00010	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	<0.00010	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	<0.00010	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 586097) - continued						
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	<0.000020	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	<0.000050	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	<0.010	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	<0.0000050	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	<0.050	----
chromium, dissolved	7440-47-3	E421	0.0005	mg/L	<0.00050	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	<0.000050	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	<0.050	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	<0.000010	----
sodium, dissolved	7440-23-5	E421	0.05	mg/L	<0.050	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	<0.00020	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	<0.000010	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	<0.00050	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	<0.0010	----

Qualifiers

Qualifier	Description
B	*Method Blank exceeds ALS DQO. Associated sample results which are < Limit of Reporting or > 5 times blank level are considered reliable.*

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 586171)									
solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	104	85.0	115	----
Physical Tests (QCLot: 586516)									
pH	----	E108	----	pH units	7 pH units	100	98.0	102	----
Physical Tests (QCLot: 586517)									
alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	110	85.0	115	----
Physical Tests (QCLot: 586518)									
conductivity	----	E100	1	µS/cm	146.9 µS/cm	98.0	90.0	110	----
Physical Tests (QCLot: 586961)									
turbidity	----	E121	0.1	NTU	200 NTU	98.0	85.0	115	----
Physical Tests (QCLot: 587170)									
solids, total suspended [TSS]	----	E164	1	mg/L	150 mg/L	104	85.0	115	----
Physical Tests (QCLot: 587197)									
solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	96.2	85.0	115	----
Anions and Nutrients (QCLot: 586165)									
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	0.05 mg/L	95.1	80.0	120	----
Anions and Nutrients (QCLot: 586168)									
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	103	85.0	115	----
Anions and Nutrients (QCLot: 586169)									
nitrogen, total	7727-37-9	E366	0.03	mg/L	0.5 mg/L	103	75.0	125	----
Anions and Nutrients (QCLot: 586170)									
phosphorus, total dissolved	7723-14-0	E375-T	0.002	mg/L	0.05 mg/L	96.1	80.0	120	----
Anions and Nutrients (QCLot: 586509)									
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	0.03 mg/L	91.2	80.0	120	----
Anions and Nutrients (QCLot: 586510)									
fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	100	90.0	110	----
Anions and Nutrients (QCLot: 586511)									
chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	103	90.0	110	----
Anions and Nutrients (QCLot: 586512)									
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	103	90.0	110	----
Anions and Nutrients (QCLot: 586513)									
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	98.8	90.0	110	----
Anions and Nutrients (QCLot: 586514)									

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Anions and Nutrients (QCLot: 586514) - continued									
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	104	90.0	110	----
Organic / Inorganic Carbon (QCLot: 586163)									
carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	8.57 mg/L	97.3	80.0	120	----
Total Metals (QCLot: 586158)									
aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	96.7	80.0	120	----
antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	115	80.0	120	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	99.8	80.0	120	----
barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	102	80.0	120	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	98.0	80.0	120	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	99.4	80.0	120	----
boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	93.0	80.0	120	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	100	80.0	120	----
calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	104	80.0	120	----
chromium, total	7440-47-3	E420	0.0005	mg/L	0.25 mg/L	97.5	80.0	120	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	99.4	80.0	120	----
copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	96.7	80.0	120	----
iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	113	80.0	120	----
lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	99.8	80.0	120	----
lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	102	80.0	120	----
magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	97.0	80.0	120	----
manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	104	80.0	120	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	109	80.0	120	----
nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	104	80.0	120	----
potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	100	80.0	120	----
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	99.8	80.0	120	----
silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	101	80.0	120	----
silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	102	80.0	120	----
sodium, total	7440-23-5	E420	0.05	mg/L	50 mg/L	102	80.0	120	----
strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	105	80.0	120	----
thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	98.5	80.0	120	----
tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	102	80.0	120	----
titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	93.7	80.0	120	----
uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	110	80.0	120	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	102	80.0	120	----
zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	93.4	80.0	120	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 586097)									
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	99.6	80.0	120	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	101	80.0	120	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	98.4	80.0	120	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	97.9	80.0	120	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	102	80.0	120	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	97.5	80.0	120	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	103	80.0	120	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	97.1	80.0	120	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	101	80.0	120	----
chromium, dissolved	7440-47-3	E421	0.0005	mg/L	0.25 mg/L	98.1	80.0	120	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	96.7	80.0	120	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	96.7	80.0	120	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	99.8	80.0	120	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	97.6	80.0	120	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	99.1	80.0	120	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	98.7	80.0	120	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	99.6	80.0	120	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	103	80.0	120	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	96.8	80.0	120	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	107	80.0	120	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	101	80.0	120	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	100	80.0	120	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	93.7	80.0	120	----
sodium, dissolved	7440-23-5	E421	0.05	mg/L	50 mg/L	99.8	80.0	120	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	103	80.0	120	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	99.8	80.0	120	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	99.3	80.0	120	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	99.7	80.0	120	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	94.8	80.0	120	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	100	80.0	120	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	97.9	80.0	120	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 586165)										
VA22B7505-001	Anonymous	phosphorus, total	7723-14-0	E372-U	0.0492 mg/L	0.05 mg/L	98.5	70.0	130	----
Anions and Nutrients (QCLot: 586168)										
VA22B7505-001	Anonymous	ammonia, total (as N)	7664-41-7	E298	0.105 mg/L	0.1 mg/L	105	75.0	125	----
Anions and Nutrients (QCLot: 586169)										
VA22B7505-002	Anonymous	nitrogen, total	7727-37-9	E366	ND mg/L	0.4 mg/L	ND	70.0	130	----
Anions and Nutrients (QCLot: 586170)										
VA22B7505-002	Anonymous	phosphorus, total dissolved	7723-14-0	E375-T	0.0486 mg/L	0.05 mg/L	97.3	70.0	130	----
Anions and Nutrients (QCLot: 586509)										
VA22B7687-002	QUL-ZOO-7_WS_DI-1_2022-07	phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0286 mg/L	0.03 mg/L	95.3	70.0	130	----
Anions and Nutrients (QCLot: 586510)										
VA22B7752-002	Anonymous	fluoride	16984-48-8	E235.F	1.02 mg/L	1 mg/L	102	75.0	125	----
Anions and Nutrients (QCLot: 586511)										
VA22B7752-002	Anonymous	chloride	16887-00-6	E235.Cl	104 mg/L	100 mg/L	104	75.0	125	----
Anions and Nutrients (QCLot: 586512)										
VA22B7752-002	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	2.62 mg/L	2.5 mg/L	105	75.0	125	----
Anions and Nutrients (QCLot: 586513)										
VA22B7752-002	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	0.505 mg/L	0.5 mg/L	101	75.0	125	----
Anions and Nutrients (QCLot: 586514)										
VA22B7752-002	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	103 mg/L	100 mg/L	103	75.0	125	----
Organic / Inorganic Carbon (QCLot: 586163)										
VA22B7505-001	Anonymous	carbon, dissolved organic [DOC]	----	E358-L	ND mg/L	5 mg/L	ND	70.0	130	----
Total Metals (QCLot: 586158)										
VA22B7687-001	QUL-ZOO-1_WS_DI-1_2022-07	aluminum, total	7429-90-5	E420	0.183 mg/L	0.2 mg/L	91.6	70.0	130	----
		antimony, total	7440-36-0	E420	0.0203 mg/L	0.02 mg/L	102	70.0	130	----
		arsenic, total	7440-38-2	E420	0.0186 mg/L	0.02 mg/L	92.8	70.0	130	----
		barium, total	7440-39-3	E420	0.0188 mg/L	0.02 mg/L	94.1	70.0	130	----
		beryllium, total	7440-41-7	E420	0.0386 mg/L	0.04 mg/L	96.4	70.0	130	----
		bismuth, total	7440-69-9	E420	0.00930 mg/L	0.01 mg/L	93.0	70.0	130	----
		boron, total	7440-42-8	E420	0.092 mg/L	0.1 mg/L	91.7	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Total Metals (QCLot: 586158) - continued										
VA22B7687-001	QUL-ZOO-1_WS_DI-1_2022-07	cadmium, total	7440-43-9	E420	0.00385 mg/L	0.004 mg/L	96.2	70.0	130	----
		calcium, total	7440-70-2	E420	ND mg/L	4 mg/L	ND	70.0	130	----
		chromium, total	7440-47-3	E420	0.0378 mg/L	0.04 mg/L	94.6	70.0	130	----
		cobalt, total	7440-48-4	E420	0.0186 mg/L	0.02 mg/L	93.0	70.0	130	----
		copper, total	7440-50-8	E420	0.0186 mg/L	0.02 mg/L	93.0	70.0	130	----
		iron, total	7439-89-6	E420	1.90 mg/L	2 mg/L	94.8	70.0	130	----
		lead, total	7439-92-1	E420	0.0184 mg/L	0.02 mg/L	91.8	70.0	130	----
		lithium, total	7439-93-2	E420	0.104 mg/L	0.1 mg/L	104	70.0	130	----
		magnesium, total	7439-95-4	E420	ND mg/L	1 mg/L	ND	70.0	130	----
		manganese, total	7439-96-5	E420	0.0195 mg/L	0.02 mg/L	97.4	70.0	130	----
		molybdenum, total	7439-98-7	E420	0.0210 mg/L	0.02 mg/L	105	70.0	130	----
		nickel, total	7440-02-0	E420	0.0401 mg/L	0.04 mg/L	100	70.0	130	----
		potassium, total	7440-09-7	E420	3.78 mg/L	4 mg/L	94.6	70.0	130	----
		selenium, total	7782-49-2	E420	0.0388 mg/L	0.04 mg/L	97.0	70.0	130	----
		silicon, total	7440-21-3	E420	9.16 mg/L	10 mg/L	91.6	70.0	130	----
		silver, total	7440-22-4	E420	0.00409 mg/L	0.004 mg/L	102	70.0	130	----
		sodium, total	7440-23-5	E420	1.85 mg/L	2 mg/L	92.6	70.0	130	----
		strontium, total	7440-24-6	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		thallium, total	7440-28-0	E420	0.00361 mg/L	0.004 mg/L	90.3	70.0	130	----
		tin, total	7440-31-5	E420	0.0194 mg/L	0.02 mg/L	96.8	70.0	130	----
		titanium, total	7440-32-6	E420	0.0346 mg/L	0.04 mg/L	86.6	70.0	130	----
		uranium, total	7440-61-1	E420	0.00406 mg/L	0.004 mg/L	102	70.0	130	----
		vanadium, total	7440-62-2	E420	0.0954 mg/L	0.1 mg/L	95.4	70.0	130	----
		zinc, total	7440-66-6	E420	0.358 mg/L	0.4 mg/L	89.6	70.0	130	----
Dissolved Metals (QCLot: 586097)										
VA22B7687-002	QUL-ZOO-7_WS_DI-1_2022-07	aluminum, dissolved	7429-90-5	E421	0.198 mg/L	0.2 mg/L	99.1	70.0	130	----
		antimony, dissolved	7440-36-0	E421	0.0200 mg/L	0.02 mg/L	100	70.0	130	----
		arsenic, dissolved	7440-38-2	E421	0.0199 mg/L	0.02 mg/L	99.5	70.0	130	----
		barium, dissolved	7440-39-3	E421	0.0187 mg/L	0.02 mg/L	93.5	70.0	130	----
		beryllium, dissolved	7440-41-7	E421	0.0404 mg/L	0.04 mg/L	101	70.0	130	----
		bismuth, dissolved	7440-69-9	E421	0.00934 mg/L	0.01 mg/L	93.4	70.0	130	----
		boron, dissolved	7440-42-8	E421	0.100 mg/L	0.1 mg/L	100	70.0	130	----
		cadmium, dissolved	7440-43-9	E421	0.00393 mg/L	0.004 mg/L	98.3	70.0	130	----
		calcium, dissolved	7440-70-2	E421	ND mg/L	4 mg/L	ND	70.0	130	----
		chromium, dissolved	7440-47-3	E421	0.0404 mg/L	0.04 mg/L	101	70.0	130	----
		cobalt, dissolved	7440-48-4	E421	0.0200 mg/L	0.02 mg/L	100.0	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Dissolved Metals (QCLot: 586097) - continued										
VA22B7687-002	QUL-ZOO-7_WS_DI-1_2022-07	copper, dissolved	7440-50-8	E421	0.0198 mg/L	0.02 mg/L	99.3	70.0	130	----
		iron, dissolved	7439-89-6	E421	1.91 mg/L	2 mg/L	95.4	70.0	130	----
		lead, dissolved	7439-92-1	E421	0.0190 mg/L	0.02 mg/L	94.9	70.0	130	----
		lithium, dissolved	7439-93-2	E421	0.0961 mg/L	0.1 mg/L	96.1	70.0	130	----
		magnesium, dissolved	7439-95-4	E421	ND mg/L	1 mg/L	ND	70.0	130	----
		manganese, dissolved	7439-96-5	E421	0.0200 mg/L	0.02 mg/L	100.0	70.0	130	----
		molybdenum, dissolved	7439-98-7	E421	0.0202 mg/L	0.02 mg/L	101	70.0	130	----
		nickel, dissolved	7440-02-0	E421	0.0396 mg/L	0.04 mg/L	98.9	70.0	130	----
		potassium, dissolved	7440-09-7	E421	4.26 mg/L	4 mg/L	107	70.0	130	----
		selenium, dissolved	7782-49-2	E421	0.0418 mg/L	0.04 mg/L	104	70.0	130	----
		silicon, dissolved	7440-21-3	E421	9.36 mg/L	10 mg/L	93.6	70.0	130	----
		silver, dissolved	7440-22-4	E421	0.00402 mg/L	0.004 mg/L	100	70.0	130	----
		sodium, dissolved	7440-23-5	E421	1.96 mg/L	2 mg/L	98.2	70.0	130	----
		strontium, dissolved	7440-24-6	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		thallium, dissolved	7440-28-0	E421	0.00372 mg/L	0.004 mg/L	93.1	70.0	130	----
		tin, dissolved	7440-31-5	E421	0.0197 mg/L	0.02 mg/L	98.4	70.0	130	----
		titanium, dissolved	7440-32-6	E421	0.0401 mg/L	0.04 mg/L	100	70.0	130	----
		uranium, dissolved	7440-61-1	E421	0.00376 mg/L	0.004 mg/L	94.1	70.0	130	----
		vanadium, dissolved	7440-62-2	E421	0.101 mg/L	0.1 mg/L	101	70.0	130	----
		zinc, dissolved	7440-66-6	E421	0.417 mg/L	0.4 mg/L	104	70.0	130	----

ALS Environmental

www.alsglobal.com

Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878

Affix ALS barcode label here (lab use only)

COC Number:

Page 1 of

Environmental Division Vancouver
Work Order Reference
VA22B7687

Telephone : +1 604 253 4188

Report To	Contact and company name below will appear on the final report
Company:	Mount Polley Mining Corporation
Contact:	Gabriel Holmes
Phone:	236-317-4939
	Company address below will appear on the final report
Street:	PO Box 12
City/Province:	Likely, BC
Postal Code:	V0L 1N0
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☐ NO
Company:	
Contact:	

Report Format / Distribution

Select Report Format: ☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)
Quality Control (QC) Report with Report ☑ YES ☐ NO
☐ Compare Results to Criteria on Report - provide details below if box checked
Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax: gabriel.holmes@mountpolley.com
Email 2: kala.ivens@mountpolley.com, pschnurr@minnow.ca
Email 3: pstecko@minnow.ca, kbatchelar@minnow.ca

Invoice Distribution

Select Invoice Distribution: ☑ EMAIL ☑ MAIL ☐ FAX
Email 1 or Fax: gabriel.holmes@mountpolley.com
Email 2:

Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will ap

Regular [R] ☑ Standard TAT if received by 3 pm - business days - r

PRIORITY (Business Days): 4 day [P4] ☐ | 3 day [P3] ☐ | 2 day [P2] ☐
EMERGENCY: 1 Business day [E1] | Same Day, Weekend o | Statutory holiday [E0

Date and Time Required for all E&P TATs: dd-mmm-yy

For tests that can not be performed according to the service level selected, you will be contacted.

Project Information		Oil and Gas Required Fields (client use)	
ALS Account # / Quote #:	VA22-MPMC100-006	AFE/Cost Center:	PO#
Job #:		Major/Minor Code:	Routing Code:
PO / AFE:		Requisitioner:	
LSD:		Location:	

ALS Lab Work Order # (lab use only): B7687
ALS Contact: Can Dang
Sampler:

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUTRIENTS-1 (F)	Total Metals (ICPMS) (P)	Dissolved Metals (ICPMS) (F)	Total Nitrogen Ammonia (P)	DOC (F/P)	TSS (Whole bottle)	Number of Containers
	QUL-ZOO-1_WS_DI-1_2022-07	27-July-22	13:40	Water	R	R	R	R	R	R	6
	QUL-ZOO-7_WS_DI-1_2022-07	27-July-22	09:00	Water	R	R	R	R	R	R	6
	~~TRAVEL_WS-1_2022-07~~	~~July 28~~		~~Water~~	R	R		R		R	

Drinking Water (DW) Samples[1] (client use)	Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)
Are samples taken from a Regulated DW System? ☐ YES ☐ NO	
Are samples for human drinking water use? ☐ YES ☐ NO	Regular analytes for Mount Polley Mine water sample package. Please also report ANIONS-N+N-CALC-VA (calculated nitrate and nitrite)

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☑ | SIF Observations Yes ☐ No ☐
Ice Packs ☑ Ice Cubes ☐ | Custody seal intact Yes ☐ No ☐
Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C	
			2.3°	3 coolers

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: S. Lahmer	Date: 28-Jul-22	Time: 1300	Received by:	Date:	Time:	Received by: IT	Date: Aug 2/22	Time: 11:40 AM

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

OCTOBER 2015 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

WATER CHEMISTRY

ALS Laboratory Report VA22B8478

(Finalized August 18, 2022)

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **VA22B8478**	Page	: 1 of 8
Client	: **Mount Polley Mining Corporation**	Laboratory	: Vancouver - Environmental
Contact	: Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: ----	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 10-Aug-2022 11:00
PO	: 5590008044 Q2 2022	Date Analysis Commenced	: 10-Aug-2022
C-O-C number	: ----	Issue Date	: 18-Aug-2022 16:44
Sampler	: KBA		
Site	: ----		
Quote number	: VA22-MPMC100-006 - Minnow Env. - Water Quality		
No. of samples received	: 9		
No. of samples analysed	: 9		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Angela Ren	Team Leader - Metals	Metals, Burnaby, British Columbia
Kyle Chang	Lab Assistant	Metals, Burnaby, British Columbia
Ophelia Chiu	Department Manager - Organics	Inorganics, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Inorganics, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Metals, Burnaby, British Columbia
Sukhman Khosa	Lab Assistant	Metals, Burnaby, British Columbia

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

Unit	*Description*
-	No Unit
µS/cm	Microsiemens per centimetre
mg/L	milligrams per litre
NTU	nephelometric turbidity units
pH units	pH units

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Qualifiers

Qualifier	*Description*
DLM	*Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).*
HTP	*Sample preparation or preservation hold time was exceeded.*
RRV	*Reported result verified by repeat analysis.*

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	FPC-R3_WS-1_2022-08	HAC-R1_WS-1_2022-08	HAC-U_WS-1_2022-08	HAC-D_WS-1_2022-08	EDC-U_WS-1_2022-08
					Client sampling date / time	08-Aug-2022 12:30	08-Aug-2022 10:30	08-Aug-2022 11:00	08-Aug-2022 12:35	08-Aug-2022 08:00
						VA22B8478-001	VA22B8478-002	VA22B8478-003	VA22B8478-004	VA22B8478-005
						Result	Result	Result	Result	Result
Physical Tests										
alkalinity, total (as CaCO3)	----	E290	1.0	mg/L		84.2	89.5	93.0	109	63.2
conductivity	----	E100	2.0	µS/cm		160	248	271	293	126
hardness (as CaCO3), dissolved	----	EC100	0.50	mg/L		74.8	100	114	125	59.2
hardness (as CaCO3), from total Ca/Mg	----	EC100A	0.50	mg/L		81.6	113	123	136	66.6
pH	----	E108	0.10	pH units		8.01	8.09	8.11	8.17	7.88
solids, total dissolved [TDS]	----	E162	10	mg/L		102	164	191	203	114
solids, total suspended [TSS]	----	E164	1.0	mg/L		2.5	1.8	1.6	1.6	<1.0
turbidity	----	E121	0.10	NTU		1.53	0.58	0.58	0.47	0.67
Anions and Nutrients										
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L		0.0205	0.0094	0.0227	0.0122	0.0101
chloride	16887-00-6	E235.Cl	0.50	mg/L		<0.50	0.74	0.92	0.87	<0.50
fluoride	16984-48-8	E235.F	0.020	mg/L		0.044	0.058	0.062	0.071	0.037
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L		0.0915	0.0068	0.0343	0.0239	0.0234
nitrate + nitrite (as N)	----	EC235.N+N	0.0050	mg/L		0.0915	0.0068	0.0343	0.0239	0.0234
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
nitrogen, total	7727-37-9	E366	0.030	mg/L		0.809	0.294	0.318	0.268	0.509
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L		0.0306	0.0010	0.0034	0.0046	0.0017
phosphorus, total	7723-14-0	E372-U	0.0020	mg/L		0.0489	0.0127 RRV	0.0138	0.0090	0.0107
phosphorus, total dissolved	7723-14-0	E375-T	0.0020	mg/L		0.0449	0.0069	0.0094	0.0121	0.0112
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L		<0.30	35.4	44.1	44.3	0.48
Organic / Inorganic Carbon										
carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L		17.4	6.40	5.83 HTP	5.65	16.9
Total Metals										
aluminum, total	7429-90-5	E420	0.0030	mg/L		0.397	0.0386	0.0297	0.0524	0.0593
antimony, total	7440-36-0	E420	0.00010	mg/L		<0.00010	<0.00010	<0.00010	0.00010	<0.00010
arsenic, total	7440-38-2	E420	0.00010	mg/L		0.00084	0.00051	0.00061	0.00081	0.00052
barium, total	7440-39-3	E420	0.00010	mg/L		0.00566	0.0108	0.0116	0.0174	0.0108
beryllium, total	7440-41-7	E420	0.000100	mg/L		<0.000100	<0.000100	<0.000100	<0.000100	<0.000100
bismuth, total	7440-69-9	E420	0.000050	mg/L		<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
boron, total	7440-42-8	E420	0.010	mg/L		<0.010	0.021	0.021	0.022	<0.010

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	FPC-R3_WS-1_2022-08	HAC-R1_WS-1_2022-08	HAC-U_WS-1_2022-08	HAC-D_WS-1_2022-08	EDC-U_WS-1_2022-08
					Client sampling date / time	08-Aug-2022 12:30	08-Aug-2022 10:30	08-Aug-2022 11:00	08-Aug-2022 12:35	08-Aug-2022 08:00
						VA22B8478-001	VA22B8478-002	VA22B8478-003	VA22B8478-004	VA22B8478-005
						Result	Result	Result	Result	Result
Total Metals										
cadmium, total	7440-43-9	E420	0.0000050	mg/L		0.0000064	<0.0000100 DLM	<0.0000050	<0.0000050	0.0000086
calcium, total	7440-70-2	E420	0.050	mg/L		24.9	36.2	38.9	42.4	17.4
chromium, total	7440-47-3	E420	0.00050	mg/L		0.00123	<0.00050	<0.00050	<0.00050	0.00069
cobalt, total	7440-48-4	E420	0.00010	mg/L		0.00032	<0.00010	<0.00010	<0.00010	<0.00010
copper, total	7440-50-8	E420	0.00050	mg/L		0.00270	0.00477	0.00506	0.00801	0.00221
iron, total	7439-89-6	E420	0.030	mg/L		0.719	0.043	0.036	0.060	0.140
lead, total	7439-92-1	E420	0.000050	mg/L		0.000097	<0.000050	<0.000050	<0.000050	<0.000050
lithium, total	7439-93-2	E420	0.0010	mg/L		<0.0010	<0.0010	<0.0010	0.0010	<0.0010
magnesium, total	7439-95-4	E420	0.100	mg/L		4.71	5.48	6.28	7.21	5.63
manganese, total	7439-96-5	E420	0.00010	mg/L		0.0408	0.0147	0.0385	0.0195	0.0199
molybdenum, total	7439-98-7	E420	0.000050	mg/L		0.000197	0.00685	0.00690	0.00718	0.000329
nickel, total	7440-02-0	E420	0.00050	mg/L		0.00107	<0.00050	<0.00050	<0.00050	0.00121
potassium, total	7440-09-7	E420	0.050	mg/L		0.305	0.987	1.00	1.12	0.510
selenium, total	7782-49-2	E420	0.000050	mg/L		0.000109	0.000607	0.00120	0.00122	0.000129
silicon, total	7440-21-3	E420	0.10	mg/L		7.43	3.13	3.45	3.90	3.34
silver, total	7440-22-4	E420	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
sodium, total	7440-23-5	E420	0.050	mg/L		4.83	7.16	7.50	7.98	2.44
strontium, total	7440-24-6	E420	0.00020	mg/L		0.0936	0.251	0.271	0.302	0.113
thallium, total	7440-28-0	E420	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
tin, total	7440-31-5	E420	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
titanium, total	7440-32-6	E420	0.0100	mg/L		0.0149	<0.0100	<0.0100	<0.0100	<0.0100
uranium, total	7440-61-1	E420	0.000010	mg/L		0.000042	0.000189	0.000230	0.000305	0.000060
vanadium, total	7440-62-2	E420	0.00050	mg/L		0.00289	0.00148	0.00143	0.00148	0.00080
zinc, total	7440-66-6	E420	0.0030	mg/L		0.0050	<0.0030	<0.0030	<0.0030	<0.0030
Dissolved Metals										
aluminum, dissolved	7429-90-5	E421	0.0030	mg/L		0.0392	0.0047	0.0041	0.0062	0.0333
antimony, dissolved	7440-36-0	E421	0.00010	mg/L		<0.00010	<0.00010	0.00010	0.00010	<0.00010
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L		0.00078	0.00046	0.00046	0.00078	0.00041
barium, dissolved	7440-39-3	E421	0.00010	mg/L		0.00274	0.00832	0.00932	0.0164	0.00842
beryllium, dissolved	7440-41-7	E421	0.000100	mg/L		<0.000100	<0.000100	<0.000100	<0.000100	<0.000100
bismuth, dissolved	7440-69-9	E421	0.000050	mg/L		<0.000050	<0.000050	<0.000050	<0.000050	<0.000050

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	FPC-R3_WS-1_2022-08	HAC-R1_WS-1_2022-08	HAC-U_WS-1_2022-08	HAC-D_WS-1_2022-08	EDC-U_WS-1_2022-08
					Client sampling date / time	08-Aug-2022 12:30	08-Aug-2022 10:30	08-Aug-2022 11:00	08-Aug-2022 12:35	08-Aug-2022 08:00
						VA22B8478-001	VA22B8478-002	VA22B8478-003	VA22B8478-004	VA22B8478-005
						Result	Result	Result	Result	Result
Dissolved Metals										
boron, dissolved	7440-42-8	E421	0.010	mg/L		<0.010	0.020	0.020	0.020	<0.010
cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L		0.0000050	<0.0000050	<0.0000050	<0.0000050	0.0000092
calcium, dissolved	7440-70-2	E421	0.050	mg/L		22.9	33.0	37.4	38.6	16.2
chromium, dissolved	7440-47-3	E421	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	0.00050
cobalt, dissolved	7440-48-4	E421	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
copper, dissolved	7440-50-8	E421	0.00050	mg/L		0.00177	0.00336	0.00367	0.00684	0.00181
iron, dissolved	7439-89-6	E421	0.030	mg/L		0.307	<0.030	<0.030	<0.030	0.106
lead, dissolved	7439-92-1	E421	0.000050	mg/L		<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
lithium, dissolved	7439-93-2	E421	0.0010	mg/L		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
magnesium, dissolved	7439-95-4	E421	0.100	mg/L		4.28	4.28	5.11	6.90	4.55
manganese, dissolved	7439-96-5	E421	0.00010	mg/L		0.0122	0.00504	0.0221	0.00766	0.0118
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L		0.000214	0.00673	0.00663	0.00691	0.000331
nickel, dissolved	7440-02-0	E421	0.00050	mg/L		0.00070	<0.00050	<0.00050	<0.00050	0.00100
potassium, dissolved	7440-09-7	E421	0.050	mg/L		0.247	0.782	0.821	1.05	0.402
selenium, dissolved	7782-49-2	E421	0.000050	mg/L		0.000090	0.000625	0.00126	0.00120	0.000130
silicon, dissolved	7440-21-3	E421	0.050	mg/L		6.64	2.83	3.11	3.76	3.11
silver, dissolved	7440-22-4	E421	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
sodium, dissolved	7440-23-5	E421	0.050	mg/L		4.75	6.14	6.42	8.12	2.08
strontium, dissolved	7440-24-6	E421	0.00020	mg/L		0.0903	0.242	0.252	0.289	0.110
thallium, dissolved	7440-28-0	E421	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
tin, dissolved	7440-31-5	E421	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
titanium, dissolved	7440-32-6	E421	0.0100	mg/L		<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
uranium, dissolved	7440-61-1	E421	0.000010	mg/L		0.000030	0.000194	0.000224	0.000310	0.000061
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L		0.00174	0.00114	0.00110	0.00128	0.00057
zinc, dissolved	7440-66-6	E421	0.0030	mg/L		<0.0030	<0.0030	<0.0030	0.0050	<0.0030
dissolved metals filtration location	----	EP421	-	-		Field	Field	Field	Field	Field

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	EDC-D_WS-1_2022-08	E1_WS-1_2022-08	HAC-R3_WS-1_2022-08	HAC-U_WS-1X_2022-08	----
					Client sampling date / time	08-Aug-2022 12:12	08-Aug-2022 11:15	08-Aug-2022 13:39	08-Aug-2022 11:00	----
						VA22B8478-006	VA22B8478-007	VA22B8478-008	VA22B8478-009	--------
						Result	Result	Result	Result	----
Physical Tests										
alkalinity, total (as CaCO3)	----	E290	1.0	mg/L		125	125	99.4	91.8	----
conductivity	----	E100	2.0	µS/cm		242	239	280	274	----
hardness (as CaCO3), dissolved	----	EC100	0.50	mg/L		114	116	119	114	----
hardness (as CaCO3), from total Ca/Mg	----	EC100A	0.50	mg/L		122	118	123	122	----
pH	----	E108	0.10	pH units		8.24	8.24	8.14	8.11	----
solids, total dissolved [TDS]	----	E162	10	mg/L		158	176	187	167	----
solids, total suspended [TSS]	----	E164	1.0	mg/L		<1.0	<1.0	1.2	<1.0	----
turbidity	----	E121	0.10	NTU		0.23	0.26	0.54	0.58	----
Anions and Nutrients										
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L		0.0107	0.0200	0.0065	0.0147	----
chloride	16887-00-6	E235.Cl	0.50	mg/L		<0.50	<0.50	0.90	0.92	----
fluoride	16984-48-8	E235.F	0.020	mg/L		0.060	0.059	0.065	0.062	----
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L		0.0066	0.0091	0.0351	0.0319	----
nitrate + nitrite (as N)	----	EC235.N+N	0.0050	mg/L		0.0066	0.0091	0.0351	0.0319	----
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L		<0.0010	<0.0010	<0.0010	<0.0010	----
nitrogen, total	7727-37-9	E366	0.030	mg/L		0.380	0.371	0.277	0.314	----
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L		0.0021	0.0023	0.0049	0.0033	----
phosphorus, total	7723-14-0	E372-U	0.0020	mg/L		0.0068	0.0068	0.0122	0.0116	----
phosphorus, total dissolved	7723-14-0	E375-T	0.0020	mg/L		0.0090	0.0057	0.0091	0.0092	----
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L		4.08	4.06	44.2	44.0	----
Organic / Inorganic Carbon										
carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L		13.2	13.2	5.91	6.54	----
Total Metals										
aluminum, total	7429-90-5	E420	0.0030	mg/L		0.0231	0.0272	0.0319	0.0258	----
antimony, total	7440-36-0	E420	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	----
arsenic, total	7440-38-2	E420	0.00010	mg/L		0.00154	0.00133	0.00069	0.00060	----
barium, total	7440-39-3	E420	0.00010	mg/L		0.0180	0.0193	0.0142	0.0116	----
beryllium, total	7440-41-7	E420	0.000100	mg/L		<0.000100	<0.000100	<0.000100	<0.000100	----
bismuth, total	7440-69-9	E420	0.000050	mg/L		<0.000050	<0.000050	<0.000050	<0.000050	----
boron, total	7440-42-8	E420	0.010	mg/L		0.014	0.014	0.023	0.023	----
cadmium, total	7440-43-9	E420	0.0000050	mg/L		0.0000072	<0.0000050	<0.0000100 DLM	<0.0000100 DLM	----

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	EDC-D_WS-1_2022-08	E1_WS-1_2022-08	HAC-R3_WS-1_2022-08	HAC-U_WS-1X_2022-08	----
					Client sampling date / time	08-Aug-2022 12:12	08-Aug-2022 11:15	08-Aug-2022 13:39	08-Aug-2022 11:00	----
						VA22B8478-006	VA22B8478-007	VA22B8478-008	VA22B8478-009	--------
						Result	Result	Result	Result	----
Total Metals										
calcium, total	7440-70-2	E420	0.050	mg/L		33.0	31.7	38.5	38.8	----
chromium, total	7440-47-3	E420	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	----
cobalt, total	7440-48-4	E420	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	----
copper, total	7440-50-8	E420	0.00050	mg/L		0.00179	0.00306	0.00784	0.00518	----
iron, total	7439-89-6	E420	0.030	mg/L		0.083	0.068	0.042	0.033	----
lead, total	7439-92-1	E420	0.000050	mg/L		<0.000050	<0.000050	<0.000050	<0.000050	----
lithium, total	7439-93-2	E420	0.0010	mg/L		0.0010	<0.0010	<0.0010	<0.0010	----
magnesium, total	7439-95-4	E420	0.100	mg/L		9.55	9.51	6.57	6.23	----
manganese, total	7439-96-5	E420	0.00010	mg/L		0.00795	0.00466	0.0201	0.0371	----
molybdenum, total	7439-98-7	E420	0.000050	mg/L		0.00103	0.00105	0.00703	0.00710	----
nickel, total	7440-02-0	E420	0.00050	mg/L		0.00116	0.00090	<0.00050	<0.00050	----
potassium, total	7440-09-7	E420	0.050	mg/L		0.909	0.907	1.07	1.01	----
selenium, total	7782-49-2	E420	0.000050	mg/L		0.000128	0.000155	0.00126	0.00135	----
silicon, total	7440-21-3	E420	0.10	mg/L		5.42	5.18	3.82	3.60	----
silver, total	7440-22-4	E420	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	----
sodium, total	7440-23-5	E420	0.050	mg/L		5.36	5.31	7.97	7.82	----
strontium, total	7440-24-6	E420	0.00020	mg/L		0.223	0.220	0.271	0.266	----
thallium, total	7440-28-0	E420	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	----
tin, total	7440-31-5	E420	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	----
titanium, total	7440-32-6	E420	0.0100	mg/L		<0.0100	<0.0100	<0.0100	<0.0100	----
uranium, total	7440-61-1	E420	0.000010	mg/L		0.000166	0.000185	0.000277	0.000247	----
vanadium, total	7440-62-2	E420	0.00050	mg/L		0.00064	0.00077	0.00147	0.00142	----
zinc, total	7440-66-6	E420	0.0030	mg/L		0.0061	<0.0030	<0.0030	<0.0030	----
Dissolved Metals										
aluminum, dissolved	7429-90-5	E421	0.0030	mg/L		0.0142	0.0150	0.0056	0.0034	----
antimony, dissolved	7440-36-0	E421	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	----
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L		0.00150	0.00130	0.00070	0.00046	----
barium, dissolved	7440-39-3	E421	0.00010	mg/L		0.0168	0.0193	0.0130	0.00919	----
beryllium, dissolved	7440-41-7	E421	0.000100	mg/L		<0.000100	<0.000100	<0.000100	<0.000100	----
bismuth, dissolved	7440-69-9	E421	0.000050	mg/L		<0.000050	<0.000050	<0.000050	<0.000050	----
boron, dissolved	7440-42-8	E421	0.010	mg/L		0.013	0.013	0.020	0.020	----

Analytical Results

Sub-Matrix: Water (Matrix: Water)					Client sample ID	EDC-D_WS-1_2022-08	E1_WS-1_2022-08	HAC-R3_WS-1_2022-08	HAC-U_WS-1X_2022-08	----
					Client sampling date / time	08-Aug-2022 12:12	08-Aug-2022 11:15	08-Aug-2022 13:39	08-Aug-2022 11:00	----
Analyte	CAS Number	Method	LOR	Unit		VA22B8478-006	VA22B8478-007	VA22B8478-008	VA22B8478-009	--------
						Result	Result	Result	Result	----
Dissolved Metals										
cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L		<0.0000050	0.0000051	0.0000061	<0.0000050	----
calcium, dissolved	7440-70-2	E421	0.050	mg/L		31.0	31.1	37.0	37.4	----
chromium, dissolved	7440-47-3	E421	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	----
cobalt, dissolved	7440-48-4	E421	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	----
copper, dissolved	7440-50-8	E421	0.00050	mg/L		0.00150	0.00287	0.00644	0.00371	----
iron, dissolved	7439-89-6	E421	0.030	mg/L		0.074	0.053	<0.030	<0.030	----
lead, dissolved	7439-92-1	E421	0.000050	mg/L		<0.000050	<0.000050	<0.000050	<0.000050	----
lithium, dissolved	7439-93-2	E421	0.0010	mg/L		<0.0010	<0.0010	<0.0010	<0.0010	----
magnesium, dissolved	7439-95-4	E421	0.100	mg/L		8.97	9.33	6.43	5.04	----
manganese, dissolved	7439-96-5	E421	0.00010	mg/L		0.00605	0.00356	0.00537	0.0214	----
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L		0.00102	0.00106	0.00694	0.00667	----
nickel, dissolved	7440-02-0	E421	0.00050	mg/L		0.00086	0.00088	<0.00050	<0.00050	----
potassium, dissolved	7440-09-7	E421	0.050	mg/L		0.862	0.906	1.02	0.815	----
selenium, dissolved	7782-49-2	E421	0.000050	mg/L		0.000148	0.000173	0.00129	0.00131	----
silicon, dissolved	7440-21-3	E421	0.050	mg/L		5.32	5.35	3.73	3.25	----
silver, dissolved	7440-22-4	E421	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	----
sodium, dissolved	7440-23-5	E421	0.050	mg/L		5.16	5.36	7.52	6.44	----
strontium, dissolved	7440-24-6	E421	0.00020	mg/L		0.211	0.214	0.275	0.259	----
thallium, dissolved	7440-28-0	E421	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	----
tin, dissolved	7440-31-5	E421	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	----
titanium, dissolved	7440-32-6	E421	0.0100	mg/L		<0.0100	<0.0100	<0.0100	<0.0100	----
uranium, dissolved	7440-61-1	E421	0.000010	mg/L		0.000171	0.000188	0.000266	0.000245	----
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L		0.00054	0.00062	0.00131	0.00110	----
zinc, dissolved	7440-66-6	E421	0.0030	mg/L		<0.0030	<0.0030	<0.0030	<0.0030	----
dissolved metals filtration location	----	EP421	-	-		Field	Field	Field	Field	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA22B8478**	Page	: 1 of 27
Client	: **Mount Polley Mining Corporation**	Laboratory	: Vancouver - Environmental
Contact	: Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: ----	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 10-Aug-2022 11:00
PO	: 5590008044 Q2 2022	Issue Date	: 18-Aug-2022 16:44
C-O-C number	: ----		
Sampler	: KBA		
Site	: ----		
Quote number	: VA22-MPMC100-006 - Minnow Env. - Water Quality		
No. of samples received	: 9		
No. of samples analysed	: 9		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- Analysis Holding Time Outliers exist - please see following pages for full details.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
E1_WS-1_2022-08	E298	08-Aug-2022	15-Aug-2022	----	----		16-Aug-2022	28 days	8 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
EDC-D_WS-1_2022-08	E298	08-Aug-2022	15-Aug-2022	----	----		16-Aug-2022	28 days	8 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
EDC-U_WS-1_2022-08	E298	08-Aug-2022	15-Aug-2022	----	----		16-Aug-2022	28 days	8 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
FPC-R3_WS-1_2022-08	E298	08-Aug-2022	15-Aug-2022	----	----		16-Aug-2022	28 days	8 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
HAC-D_WS-1_2022-08	E298	08-Aug-2022	15-Aug-2022	----	----		16-Aug-2022	28 days	8 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
HAC-R1_WS-1_2022-08	E298	08-Aug-2022	15-Aug-2022	----	----		16-Aug-2022	28 days	8 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
HAC-R3_WS-1_2022-08	E298	08-Aug-2022	15-Aug-2022	----	----		16-Aug-2022	28 days	8 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
HAC-U_WS-1_2022-08	E298	08-Aug-2022	15-Aug-2022	----	----		16-Aug-2022	28 days	8 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
HAC-U_WS-1X_2022-08	E298	08-Aug-2022	15-Aug-2022	----	----		16-Aug-2022	28 days	8 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE										
E1_WS-1_2022-08	E235.Cl	08-Aug-2022	11-Aug-2022	----	----		11-Aug-2022	28 days	3 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE										
EDC-D_WS-1_2022-08	E235.Cl	08-Aug-2022	11-Aug-2022	----	----		11-Aug-2022	28 days	3 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE										
EDC-U_WS-1_2022-08	E235.Cl	08-Aug-2022	11-Aug-2022	----	----		11-Aug-2022	28 days	3 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE										
FPC-R3_WS-1_2022-08	E235.Cl	08-Aug-2022	11-Aug-2022	----	----		11-Aug-2022	28 days	3 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE										
HAC-D_WS-1_2022-08	E235.Cl	08-Aug-2022	11-Aug-2022	----	----		11-Aug-2022	28 days	3 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE										
HAC-R1_WS-1_2022-08	E235.Cl	08-Aug-2022	11-Aug-2022	----	----		11-Aug-2022	28 days	3 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE										
HAC-R3_WS-1_2022-08	E235.Cl	08-Aug-2022	11-Aug-2022	----	----		11-Aug-2022	28 days	3 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Chloride in Water by IC										
HDPE HAC-U_WS-1_2022-08	E235.Cl	08-Aug-2022	11-Aug-2022	----	----		11-Aug-2022	28 days	3 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE HAC-U_WS-1X_2022-08	E235.Cl	08-Aug-2022	11-Aug-2022	----	----		11-Aug-2022	28 days	3 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE E1_WS-1_2022-08	E378-U	08-Aug-2022	11-Aug-2022	----	----		11-Aug-2022	3 days	3 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE EDC-D_WS-1_2022-08	E378-U	08-Aug-2022	11-Aug-2022	----	----		11-Aug-2022	3 days	3 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE EDC-U_WS-1_2022-08	E378-U	08-Aug-2022	11-Aug-2022	----	----		11-Aug-2022	3 days	3 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE FPC-R3_WS-1_2022-08	E378-U	08-Aug-2022	11-Aug-2022	----	----		11-Aug-2022	3 days	3 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE HAC-D_WS-1_2022-08	E378-U	08-Aug-2022	11-Aug-2022	----	----		11-Aug-2022	3 days	3 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE HAC-R1_WS-1_2022-08	E378-U	08-Aug-2022	11-Aug-2022	----	----		11-Aug-2022	3 days	3 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE HAC-R3_WS-1_2022-08	E378-U	08-Aug-2022	11-Aug-2022	----	----		11-Aug-2022	3 days	3 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE HAC-U_WS-1_2022-08	E378-U	08-Aug-2022	11-Aug-2022	----	----		11-Aug-2022	3 days	3 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE HAC-U_WS-1X_2022-08	E378-U	08-Aug-2022	11-Aug-2022	----	----		11-Aug-2022	3 days	3 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE E1_WS-1_2022-08	E235.F	08-Aug-2022	11-Aug-2022	----	----		11-Aug-2022	28 days	3 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE EDC-D_WS-1_2022-08	E235.F	08-Aug-2022	11-Aug-2022	----	----		11-Aug-2022	28 days	3 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE EDC-U_WS-1_2022-08	E235.F	08-Aug-2022	11-Aug-2022	----	----		11-Aug-2022	28 days	3 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE FPC-R3_WS-1_2022-08	E235.F	08-Aug-2022	11-Aug-2022	----	----		11-Aug-2022	28 days	3 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE HAC-D_WS-1_2022-08	E235.F	08-Aug-2022	11-Aug-2022	----	----		11-Aug-2022	28 days	3 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE HAC-R1_WS-1_2022-08	E235.F	08-Aug-2022	11-Aug-2022	----	----		11-Aug-2022	28 days	3 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Fluoride in Water by IC										
HDPE										
HAC-R3_WS-1_2022-08	E235.F	08-Aug-2022	11-Aug-2022	----	----		11-Aug-2022	28 days	3 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE										
HAC-U_WS-1_2022-08	E235.F	08-Aug-2022	11-Aug-2022	----	----		11-Aug-2022	28 days	3 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE										
HAC-U_WS-1X_2022-08	E235.F	08-Aug-2022	11-Aug-2022	----	----		11-Aug-2022	28 days	3 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
E1_WS-1_2022-08	E235.NO3-L	08-Aug-2022	11-Aug-2022	3 days	3 days	✓	11-Aug-2022	3 days	0 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
EDC-D_WS-1_2022-08	E235.NO3-L	08-Aug-2022	11-Aug-2022	3 days	3 days	✓	11-Aug-2022	3 days	0 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
EDC-U_WS-1_2022-08	E235.NO3-L	08-Aug-2022	11-Aug-2022	3 days	3 days	✓	11-Aug-2022	3 days	0 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
FPC-R3_WS-1_2022-08	E235.NO3-L	08-Aug-2022	11-Aug-2022	3 days	3 days	✓	11-Aug-2022	3 days	0 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
HAC-D_WS-1_2022-08	E235.NO3-L	08-Aug-2022	11-Aug-2022	3 days	3 days	✓	11-Aug-2022	3 days	0 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
HAC-R1_WS-1_2022-08	E235.NO3-L	08-Aug-2022	11-Aug-2022	3 days	3 days	✓	11-Aug-2022	3 days	0 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
HAC-R3_WS-1_2022-08	E235.NO3-L	08-Aug-2022	11-Aug-2022	3 days	3 days	✓	11-Aug-2022	3 days	0 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
HAC-U_WS-1_2022-08	E235.NO3-L	08-Aug-2022	11-Aug-2022	3 days	3 days	✓	11-Aug-2022	3 days	0 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
HAC-U_WS-1X_2022-08	E235.NO3-L	08-Aug-2022	11-Aug-2022	3 days	3 days	✓	11-Aug-2022	3 days	0 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
E1_WS-1_2022-08	E235.NO2-L	08-Aug-2022	11-Aug-2022	----	----		11-Aug-2022	3 days	3 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
EDC-D_WS-1_2022-08	E235.NO2-L	08-Aug-2022	11-Aug-2022	----	----		11-Aug-2022	3 days	3 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
EDC-U_WS-1_2022-08	E235.NO2-L	08-Aug-2022	11-Aug-2022	----	----		11-Aug-2022	3 days	3 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
FPC-R3_WS-1_2022-08	E235.NO2-L	08-Aug-2022	11-Aug-2022	----	----		11-Aug-2022	3 days	3 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
HAC-D_WS-1_2022-08	E235.NO2-L	08-Aug-2022	11-Aug-2022	----	----		11-Aug-2022	3 days	3 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
HAC-R1_WS-1_2022-08	E235.NO2-L	08-Aug-2022	11-Aug-2022	----	----		11-Aug-2022	3 days	3 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
HAC-R3_WS-1_2022-08	E235.NO2-L	08-Aug-2022	11-Aug-2022	----	----		11-Aug-2022	3 days	3 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
HAC-U_WS-1_2022-08	E235.NO2-L	08-Aug-2022	11-Aug-2022	----	----		11-Aug-2022	3 days	3 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
HAC-U_WS-1X_2022-08	E235.NO2-L	08-Aug-2022	11-Aug-2022	----	----		11-Aug-2022	3 days	3 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
E1_WS-1_2022-08	E235.SO4	08-Aug-2022	11-Aug-2022	----	----		11-Aug-2022	28 days	3 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
EDC-D_WS-1_2022-08	E235.SO4	08-Aug-2022	11-Aug-2022	----	----		11-Aug-2022	28 days	3 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
EDC-U_WS-1_2022-08	E235.SO4	08-Aug-2022	11-Aug-2022	----	----		11-Aug-2022	28 days	3 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
FPC-R3_WS-1_2022-08	E235.SO4	08-Aug-2022	11-Aug-2022	----	----		11-Aug-2022	28 days	3 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
HAC-D_WS-1_2022-08	E235.SO4	08-Aug-2022	11-Aug-2022	----	----		11-Aug-2022	28 days	3 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
HAC-R1_WS-1_2022-08	E235.SO4	08-Aug-2022	11-Aug-2022	----	----		11-Aug-2022	28 days	3 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
HAC-R3_WS-1_2022-08	E235.SO4	08-Aug-2022	11-Aug-2022	----	----		11-Aug-2022	28 days	3 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
HAC-U_WS-1_2022-08	E235.SO4	08-Aug-2022	11-Aug-2022	----	----		11-Aug-2022	28 days	3 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
HAC-U_WS-1X_2022-08	E235.SO4	08-Aug-2022	11-Aug-2022	----	----		11-Aug-2022	28 days	3 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass dissolved (sulfuric acid)										
E1_WS-1_2022-08	E375-T	08-Aug-2022	15-Aug-2022	----	----		17-Aug-2022	28 days	9 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass dissolved (sulfuric acid)										
EDC-D_WS-1_2022-08	E375-T	08-Aug-2022	15-Aug-2022	----	----		17-Aug-2022	28 days	9 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass dissolved (sulfuric acid)										
EDC-U_WS-1_2022-08	E375-T	08-Aug-2022	15-Aug-2022	----	----		17-Aug-2022	28 days	9 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass dissolved (sulfuric acid)										
FPC-R3_WS-1_2022-08	E375-T	08-Aug-2022	15-Aug-2022	----	----		17-Aug-2022	28 days	9 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass dissolved (sulfuric acid)										
HAC-D_WS-1_2022-08	E375-T	08-Aug-2022	15-Aug-2022	----	----		17-Aug-2022	28 days	9 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass dissolved (sulfuric acid)										
HAC-R1_WS-1_2022-08	E375-T	08-Aug-2022	15-Aug-2022	----	----		17-Aug-2022	28 days	9 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass dissolved (sulfuric acid)										
HAC-R3_WS-1_2022-08	E375-T	08-Aug-2022	15-Aug-2022	----	----		17-Aug-2022	28 days	9 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass dissolved (sulfuric acid)										
HAC-U_WS-1_2022-08	E375-T	08-Aug-2022	15-Aug-2022	----	----		17-Aug-2022	28 days	9 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass dissolved (sulfuric acid)										
HAC-U_WS-1X_2022-08	E375-T	08-Aug-2022	15-Aug-2022	----	----		17-Aug-2022	28 days	9 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid)										
E1_WS-1_2022-08	E366	08-Aug-2022	15-Aug-2022	----	----		17-Aug-2022	28 days	9 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid)										
EDC-D_WS-1_2022-08	E366	08-Aug-2022	15-Aug-2022	----	----		17-Aug-2022	28 days	9 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid)										
EDC-U_WS-1_2022-08	E366	08-Aug-2022	15-Aug-2022	----	----		17-Aug-2022	28 days	9 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid)										
FPC-R3_WS-1_2022-08	E366	08-Aug-2022	15-Aug-2022	----	----		17-Aug-2022	28 days	9 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid)										
HAC-D_WS-1_2022-08	E366	08-Aug-2022	15-Aug-2022	----	----		17-Aug-2022	28 days	9 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid)										
HAC-R1_WS-1_2022-08	E366	08-Aug-2022	15-Aug-2022	----	----		17-Aug-2022	28 days	9 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid)										
HAC-R3_WS-1_2022-08	E366	08-Aug-2022	15-Aug-2022	----	----		17-Aug-2022	28 days	9 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid)										
HAC-U_WS-1_2022-08	E366	08-Aug-2022	15-Aug-2022	----	----		17-Aug-2022	28 days	9 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid)										
HAC-U_WS-1X_2022-08	E366	08-Aug-2022	15-Aug-2022	----	----		17-Aug-2022	28 days	9 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid)										
E1_WS-1_2022-08	E372-U	08-Aug-2022	15-Aug-2022	----	----		16-Aug-2022	28 days	8 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid)										
EDC-D_WS-1_2022-08	E372-U	08-Aug-2022	15-Aug-2022	----	----		16-Aug-2022	28 days	8 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid)										
EDC-U_WS-1_2022-08	E372-U	08-Aug-2022	15-Aug-2022	----	----		16-Aug-2022	28 days	8 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid)										
FPC-R3_WS-1_2022-08	E372-U	08-Aug-2022	15-Aug-2022	----	----		16-Aug-2022	28 days	8 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid)										
HAC-D_WS-1_2022-08	E372-U	08-Aug-2022	15-Aug-2022	----	----		16-Aug-2022	28 days	8 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid)										
HAC-R1_WS-1_2022-08	E372-U	08-Aug-2022	15-Aug-2022	----	----		16-Aug-2022	28 days	8 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) HAC-R3_WS-1_2022-08	E372-U	08-Aug-2022	15-Aug-2022	----	----		16-Aug-2022	28 days	8 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) HAC-U_WS-1_2022-08	E372-U	08-Aug-2022	15-Aug-2022	----	----		16-Aug-2022	28 days	8 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) HAC-U_WS-1X_2022-08	E372-U	08-Aug-2022	15-Aug-2022	----	----		16-Aug-2022	28 days	8 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) HAC-R3_WS-1_2022-08	E421	08-Aug-2022	13-Aug-2022	----	----		13-Aug-2022	180 days	4 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) E1_WS-1_2022-08	E421	08-Aug-2022	13-Aug-2022	----	----		13-Aug-2022	180 days	5 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) EDC-D_WS-1_2022-08	E421	08-Aug-2022	13-Aug-2022	----	----		13-Aug-2022	180 days	5 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) EDC-U_WS-1_2022-08	E421	08-Aug-2022	13-Aug-2022	----	----		13-Aug-2022	180 days	5 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) FPC-R3_WS-1_2022-08	E421	08-Aug-2022	13-Aug-2022	----	----		13-Aug-2022	180 days	5 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) HAC-D_WS-1_2022-08	E421	08-Aug-2022	13-Aug-2022	----	----		13-Aug-2022	180 days	5 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved)										
HAC-R1_WS-1_2022-08	E421	08-Aug-2022	13-Aug-2022	----	----		13-Aug-2022	180 days	5 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved)										
HAC-U_WS-1_2022-08	E421	08-Aug-2022	13-Aug-2022	----	----		13-Aug-2022	180 days	5 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved)										
HAC-U_WS-1X_2022-08	E421	08-Aug-2022	13-Aug-2022	----	----		13-Aug-2022	180 days	5 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid)										
E1_WS-1_2022-08	E358-L	08-Aug-2022	15-Aug-2022	----	----		15-Aug-2022	28 days	7 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid)										
EDC-D_WS-1_2022-08	E358-L	08-Aug-2022	15-Aug-2022	----	----		15-Aug-2022	28 days	7 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid)										
EDC-U_WS-1_2022-08	E358-L	08-Aug-2022	15-Aug-2022	----	----		15-Aug-2022	28 days	7 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid)										
FPC-R3_WS-1_2022-08	E358-L	08-Aug-2022	15-Aug-2022	----	----		15-Aug-2022	28 days	7 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid)										
HAC-D_WS-1_2022-08	E358-L	08-Aug-2022	15-Aug-2022	----	----		15-Aug-2022	28 days	7 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid)										
HAC-R1_WS-1_2022-08	E358-L	08-Aug-2022	15-Aug-2022	----	----		15-Aug-2022	28 days	7 days	✓

Matrix: **Water**

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Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid)										
HAC-R3_WS-1_2022-08	E358-L	08-Aug-2022	15-Aug-2022	----	----		15-Aug-2022	28 days	7 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid)										
HAC-U_WS-1_2022-08	E358-L	08-Aug-2022	15-Aug-2022	----	----		15-Aug-2022	28 days	7 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid)										
HAC-U_WS-1X_2022-08	E358-L	08-Aug-2022	15-Aug-2022	----	----		15-Aug-2022	28 days	7 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE										
E1_WS-1_2022-08	E290	08-Aug-2022	11-Aug-2022	----	----		11-Aug-2022	14 days	3 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE										
EDC-D_WS-1_2022-08	E290	08-Aug-2022	11-Aug-2022	----	----		11-Aug-2022	14 days	3 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE										
EDC-U_WS-1_2022-08	E290	08-Aug-2022	11-Aug-2022	----	----		11-Aug-2022	14 days	3 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE										
FPC-R3_WS-1_2022-08	E290	08-Aug-2022	11-Aug-2022	----	----		11-Aug-2022	14 days	3 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE										
HAC-D_WS-1_2022-08	E290	08-Aug-2022	11-Aug-2022	----	----		11-Aug-2022	14 days	3 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE										
HAC-R1_WS-1_2022-08	E290	08-Aug-2022	11-Aug-2022	----	----		11-Aug-2022	14 days	3 days	✓

Matrix: **Water**

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Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Alkalinity Species by Titration										
HDPE										
HAC-R3_WS-1_2022-08	E290	08-Aug-2022	11-Aug-2022	----	----		11-Aug-2022	14 days	3 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE										
HAC-U_WS-1_2022-08	E290	08-Aug-2022	11-Aug-2022	----	----		11-Aug-2022	14 days	3 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE										
HAC-U_WS-1X_2022-08	E290	08-Aug-2022	11-Aug-2022	----	----		11-Aug-2022	14 days	3 days	✓
Physical Tests : Conductivity in Water										
HDPE										
E1_WS-1_2022-08	E100	08-Aug-2022	11-Aug-2022	----	----		11-Aug-2022	28 days	3 days	✓
Physical Tests : Conductivity in Water										
HDPE										
EDC-D_WS-1_2022-08	E100	08-Aug-2022	11-Aug-2022	----	----		11-Aug-2022	28 days	3 days	✓
Physical Tests : Conductivity in Water										
HDPE										
EDC-U_WS-1_2022-08	E100	08-Aug-2022	11-Aug-2022	----	----		11-Aug-2022	28 days	3 days	✓
Physical Tests : Conductivity in Water										
HDPE										
FPC-R3_WS-1_2022-08	E100	08-Aug-2022	11-Aug-2022	----	----		11-Aug-2022	28 days	3 days	✓
Physical Tests : Conductivity in Water										
HDPE										
HAC-D_WS-1_2022-08	E100	08-Aug-2022	11-Aug-2022	----	----		11-Aug-2022	28 days	3 days	✓
Physical Tests : Conductivity in Water										
HDPE										
HAC-R1_WS-1_2022-08	E100	08-Aug-2022	11-Aug-2022	----	----		11-Aug-2022	28 days	3 days	✓

Matrix: **Water**

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Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Conductivity in Water										
HDPE HAC-R3_WS-1_2022-08	E100	08-Aug-2022	11-Aug-2022	----	----		11-Aug-2022	28 days	3 days	✓
Physical Tests : Conductivity in Water										
HDPE HAC-U_WS-1_2022-08	E100	08-Aug-2022	11-Aug-2022	----	----		11-Aug-2022	28 days	3 days	✓
Physical Tests : Conductivity in Water										
HDPE HAC-U_WS-1X_2022-08	E100	08-Aug-2022	11-Aug-2022	----	----		11-Aug-2022	28 days	3 days	✓
Physical Tests : pH by Meter										
HDPE E1_WS-1_2022-08	E108	08-Aug-2022	11-Aug-2022	----	----		11-Aug-2022	0.25 hrs	8.25 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE EDC-D_WS-1_2022-08	E108	08-Aug-2022	11-Aug-2022	----	----		11-Aug-2022	0.25 hrs	8.25 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE EDC-U_WS-1_2022-08	E108	08-Aug-2022	11-Aug-2022	----	----		11-Aug-2022	0.25 hrs	8.25 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE FPC-R3_WS-1_2022-08	E108	08-Aug-2022	11-Aug-2022	----	----		11-Aug-2022	0.25 hrs	8.25 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE HAC-D_WS-1_2022-08	E108	08-Aug-2022	11-Aug-2022	----	----		11-Aug-2022	0.25 hrs	8.25 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE HAC-R1_WS-1_2022-08	E108	08-Aug-2022	11-Aug-2022	----	----		11-Aug-2022	0.25 hrs	8.25 hrs	× EHTR-FM

Matrix: **Water**

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Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : pH by Meter										
HDPE HAC-R3_WS-1_2022-08	E108	08-Aug-2022	11-Aug-2022	----	----		11-Aug-2022	0.25 hrs	8.25 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE HAC-U_WS-1_2022-08	E108	08-Aug-2022	11-Aug-2022	----	----		11-Aug-2022	0.25 hrs	8.25 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE HAC-U_WS-1X_2022-08	E108	08-Aug-2022	11-Aug-2022	----	----		11-Aug-2022	0.25 hrs	8.25 hrs	× EHTR-FM
Physical Tests : TDS by Gravimetry										
HDPE E1_WS-1_2022-08	E162	08-Aug-2022	----	----	----		14-Aug-2022	7 days	6 days	✓
Physical Tests : TDS by Gravimetry										
HDPE EDC-U_WS-1_2022-08	E162	08-Aug-2022	----	----	----		14-Aug-2022	7 days	6 days	✓
Physical Tests : TDS by Gravimetry										
HDPE FPC-R3_WS-1_2022-08	E162	08-Aug-2022	----	----	----		14-Aug-2022	7 days	6 days	✓
Physical Tests : TDS by Gravimetry										
HDPE HAC-D_WS-1_2022-08	E162	08-Aug-2022	----	----	----		14-Aug-2022	7 days	6 days	✓
Physical Tests : TDS by Gravimetry										
HDPE HAC-R1_WS-1_2022-08	E162	08-Aug-2022	----	----	----		14-Aug-2022	7 days	6 days	✓
Physical Tests : TDS by Gravimetry										
HDPE HAC-R3_WS-1_2022-08	E162	08-Aug-2022	----	----	----		14-Aug-2022	7 days	6 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : TDS by Gravimetry										
HDPE										
HAC-U_WS-1_2022-08	E162	08-Aug-2022	----	----	----		14-Aug-2022	7 days	6 days	✓
Physical Tests : TDS by Gravimetry										
HDPE										
HAC-U_WS-1X_2022-08	E162	08-Aug-2022	----	----	----		14-Aug-2022	7 days	6 days	✓
Physical Tests : TDS by Gravimetry										
HDPE										
EDC-D_WS-1_2022-08	E162	08-Aug-2022	----	----	----		15-Aug-2022	7 days	7 days	✓
Physical Tests : TSS by Gravimetry (Whole Bottle)										
HDPE [TSS-WB]										
EDC-D_WS-1_2022-08	E164	08-Aug-2022	----	----	----		12-Aug-2022	7 days	4 days	✓
Physical Tests : TSS by Gravimetry (Whole Bottle)										
HDPE [TSS-WB]										
FPC-R3_WS-1_2022-08	E164	08-Aug-2022	----	----	----		12-Aug-2022	7 days	4 days	✓
Physical Tests : TSS by Gravimetry (Whole Bottle)										
HDPE [TSS-WB]										
HAC-D_WS-1_2022-08	E164	08-Aug-2022	----	----	----		12-Aug-2022	7 days	4 days	✓
Physical Tests : TSS by Gravimetry (Whole Bottle)										
HDPE [TSS-WB]										
HAC-R3_WS-1_2022-08	E164	08-Aug-2022	----	----	----		12-Aug-2022	7 days	4 days	✓
Physical Tests : TSS by Gravimetry (Whole Bottle)										
HDPE [TSS-WB]										
E1_WS-1_2022-08	E164	08-Aug-2022	----	----	----		12-Aug-2022	7 days	5 days	✓
Physical Tests : TSS by Gravimetry (Whole Bottle)										
HDPE [TSS-WB]										
EDC-U_WS-1_2022-08	E164	08-Aug-2022	----	----	----		12-Aug-2022	7 days	5 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : TSS by Gravimetry (Whole Bottle)										
HDPE [TSS-WB] HAC-R1_WS-1_2022-08	E164	08-Aug-2022	----	----	----		12-Aug-2022	7 days	5 days	✓
Physical Tests : TSS by Gravimetry (Whole Bottle)										
HDPE [TSS-WB] HAC-U_WS-1_2022-08	E164	08-Aug-2022	----	----	----		12-Aug-2022	7 days	5 days	✓
Physical Tests : TSS by Gravimetry (Whole Bottle)										
HDPE [TSS-WB] HAC-U_WS-1X_2022-08	E164	08-Aug-2022	----	----	----		12-Aug-2022	7 days	5 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE E1_WS-1_2022-08	E121	08-Aug-2022	----	----	----		10-Aug-2022	3 days	2 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE EDC-D_WS-1_2022-08	E121	08-Aug-2022	----	----	----		10-Aug-2022	3 days	2 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE FPC-R3_WS-1_2022-08	E121	08-Aug-2022	----	----	----		10-Aug-2022	3 days	2 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE HAC-D_WS-1_2022-08	E121	08-Aug-2022	----	----	----		10-Aug-2022	3 days	2 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE HAC-R1_WS-1_2022-08	E121	08-Aug-2022	----	----	----		10-Aug-2022	3 days	2 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE HAC-R3_WS-1_2022-08	E121	08-Aug-2022	----	----	----		10-Aug-2022	3 days	2 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Turbidity by Nephelometry										
HDPE										
HAC-U_WS-1_2022-08	E121	08-Aug-2022	----	----	----		10-Aug-2022	3 days	2 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE										
HAC-U_WS-1X_2022-08	E121	08-Aug-2022	----	----	----		10-Aug-2022	3 days	2 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE										
EDC-U_WS-1_2022-08	E121	08-Aug-2022	----	----	----		11-Aug-2022	3 days	3 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved)										
HAC-R3_WS-1_2022-08	E420	08-Aug-2022	14-Aug-2022	----	----		15-Aug-2022	180 days	7 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved)										
HAC-U_WS-1X_2022-08	E420	08-Aug-2022	14-Aug-2022	----	----		15-Aug-2022	180 days	7 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved)										
E1_WS-1_2022-08	E420	08-Aug-2022	16-Aug-2022	----	----		17-Aug-2022	180 days	9 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved)										
EDC-D_WS-1_2022-08	E420	08-Aug-2022	16-Aug-2022	----	----		17-Aug-2022	180 days	9 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved)										
EDC-U_WS-1_2022-08	E420	08-Aug-2022	16-Aug-2022	----	----		17-Aug-2022	180 days	9 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved)										
FPC-R3_WS-1_2022-08	E420	08-Aug-2022	16-Aug-2022	----	----		17-Aug-2022	180 days	9 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved)										
HAC-D_WS-1_2022-08	E420	08-Aug-2022	16-Aug-2022	----	----		17-Aug-2022	180 days	9 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved)										
HAC-R1_WS-1_2022-08	E420	08-Aug-2022	16-Aug-2022	----	----		17-Aug-2022	180 days	9 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved)										
HAC-U_WS-1_2022-08	E420	08-Aug-2022	16-Aug-2022	----	----		17-Aug-2022	180 days	9 days	✓

Legend & Qualifier Definitions

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = QC frequency outside specification; ✓ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Alkalinity Species by Titration	E290	597435	1	15	6.6	5.0	✓
Ammonia by Fluorescence	E298	603261	1	19	5.2	5.0	✓
Chloride in Water by IC	E235.Cl	597438	1	17	5.8	5.0	✓
Conductivity in Water	E100	597436	1	16	6.2	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	599135	1	18	5.5	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	603262	1	12	8.3	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	597446	1	16	6.2	5.0	✓
Fluoride in Water by IC	E235.F	597437	1	15	6.6	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	597440	1	20	5.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	597441	1	17	5.8	5.0	✓
pH by Meter	E108	597434	1	18	5.5	5.0	✓
Sulfate in Water by IC	E235.SO4	597442	1	17	5.8	5.0	✓
TDS by Gravimetry	E162	602167	3	31	9.6	5.0	✓
Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)	E375-T	603260	1	19	5.2	5.0	✓
Total Metals in Water by CRC ICPMS	E420	600764	2	40	5.0	5.0	✓
Total Nitrogen by Colourimetry	E366	603256	1	19	5.2	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	603263	1	12	8.3	5.0	✓
Turbidity by Nephelometry	E121	597268	2	29	6.9	5.0	✓
Laboratory Control Samples (LCS)							
Alkalinity Species by Titration	E290	597435	1	15	6.6	5.0	✓
Ammonia by Fluorescence	E298	603261	1	19	5.2	5.0	✓
Chloride in Water by IC	E235.Cl	597438	1	17	5.8	5.0	✓
Conductivity in Water	E100	597436	1	16	6.2	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	599135	1	18	5.5	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	603262	1	12	8.3	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	597446	1	16	6.2	5.0	✓
Fluoride in Water by IC	E235.F	597437	1	15	6.6	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	597440	1	20	5.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	597441	1	17	5.8	5.0	✓
pH by Meter	E108	597434	1	18	5.5	5.0	✓
Sulfate in Water by IC	E235.SO4	597442	1	17	5.8	5.0	✓
TDS by Gravimetry	E162	602167	3	31	9.6	5.0	✓
Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)	E375-T	603260	1	19	5.2	5.0	✓
Total Metals in Water by CRC ICPMS	E420	600764	2	40	5.0	5.0	✓
Total Nitrogen by Colourimetry	E366	603256	1	19	5.2	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	603263	1	12	8.3	5.0	✓
TSS by Gravimetry (Whole Bottle)	E164	601035	2	27	7.4	5.0	✓

Matrix: **Water**

Evaluation: × = QC frequency outside specification; ✓ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Control Samples (LCS) - Continued							
Turbidity by Nephelometry	E121	597268	2	29	6.9	5.0	✓
Method Blanks (MB)							
Alkalinity Species by Titration	E290	597435	1	15	6.6	5.0	✓
Ammonia by Fluorescence	E298	603261	1	19	5.2	5.0	✓
Chloride in Water by IC	E235.Cl	597438	1	17	5.8	5.0	✓
Conductivity in Water	E100	597436	1	16	6.2	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	599135	1	18	5.5	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	603262	1	12	8.3	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	597446	1	16	6.2	5.0	✓
Fluoride in Water by IC	E235.F	597437	1	15	6.6	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	597440	1	20	5.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	597441	1	17	5.8	5.0	✓
Sulfate in Water by IC	E235.SO4	597442	1	17	5.8	5.0	✓
TDS by Gravimetry	E162	602167	3	31	9.6	5.0	✓
Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)	E375-T	603260	1	19	5.2	5.0	✓
Total Metals in Water by CRC ICPMS	E420	600764	2	40	5.0	5.0	✓
Total Nitrogen by Colourimetry	E366	603256	1	19	5.2	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	603263	1	12	8.3	5.0	✓
TSS by Gravimetry (Whole Bottle)	E164	601035	2	27	7.4	5.0	✓
Turbidity by Nephelometry	E121	597268	2	29	6.9	5.0	✓
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	603261	1	19	5.2	5.0	✓
Chloride in Water by IC	E235.Cl	597438	1	17	5.8	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	599135	1	18	5.5	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	603262	1	12	8.3	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	597446	1	16	6.2	5.0	✓
Fluoride in Water by IC	E235.F	597437	1	15	6.6	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	597440	1	20	5.0	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	597441	1	17	5.8	5.0	✓
Sulfate in Water by IC	E235.SO4	597442	1	17	5.8	5.0	✓
Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)	E375-T	603260	1	19	5.2	5.0	✓
Total Metals in Water by CRC ICPMS	E420	600764	2	40	5.0	5.0	✓
Total Nitrogen by Colourimetry	E366	603256	1	19	5.2	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	603263	1	12	8.3	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Conductivity in Water	E100 Vancouver - Environmental	Water	APHA 2510 (mod)	Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a water sample. Conductivity measurements are temperature-compensated to 25°C.
pH by Meter	E108 Vancouver - Environmental	Water	APHA 4500-H (mod)	pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally 20 ± 5°C). For high accuracy test results, pH should be measured in the field within the recommended 15 minute hold time.
Turbidity by Nephelometry	E121 Vancouver - Environmental	Water	APHA 2130 B (mod)	Turbidity is measured by the nephelometric method, by measuring the intensity of light scatter under defined conditions.
TDS by Gravimetry	E162 Vancouver - Environmental	Water	APHA 2540 C (mod)	Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, with evaporation of the filtrate at 180 ± 2°C for 16 hours or to constant weight, with gravimetric measurement of the residue.
TSS by Gravimetry (Whole Bottle)	E164 Vancouver - Environmental	Water	APHA 2540 D (mod)	Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, following by drying of the filter at 104 ± 1°C, with gravimetric measurement of the filtered solids. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.
Chloride in Water by IC	E235.Cl Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Fluoride in Water by IC	E235.F Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrite in Water by IC (Low Level)	E235.NO2-L Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrate in Water by IC (Low Level)	E235.NO3-L Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Sulfate in Water by IC	E235.SO4 Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Alkalinity Species by Titration	E290 Vancouver - Environmental	Water	APHA 2320 B (mod)	Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.
Ammonia by Fluorescence	E298 Vancouver - Environmental	Water	Method Fialab 100, 2018	Ammonia in water is determined by automated continuous flow analysis with membrane diffusion and fluorescence detection, after reaction with OPA (ortho-phthalaldehyde). This method is approved under US EPA 40 CFR Part 136 (May 2021)
Dissolved Organic Carbon by Combustion (Low Level)	E358-L Vancouver - Environmental	Water	APHA 5310 B (mod)	Dissolved Organic Carbon (Non-Purgeable), also known as NPOC (dissolved), is a direct measurement of DOC after a filtered (0.45 micron) sample has been acidified and purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of DC (dissolved carbon) is comprised of IC (which is common), this method is more accurate and more reliable than the DOC by subtraction method (i.e. DC minus DIC).
Total Nitrogen by Colourimetry	E366 Vancouver - Environmental	Water	APHA 4500-P J (mod)	Total Nitrogen is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U Vancouver - Environmental	Water	APHA 4500-P E (mod).	Total Phosphorus is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)	E375-T Vancouver - Environmental	Water	APHA 4500-P E (mod).	Total Dissolved Phosphorus is determined colourimetrically using a discrete analyzer after filtration through a 0.45 micron filter followed by heated persulfate digestion of the sample.
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U Vancouver - Environmental	Water	APHA 4500-P F (mod)	Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter. Field filtration is recommended to ensure test results represent conditions at time of sampling.
Total Metals in Water by CRC ICPMS	E420 Vancouver - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Dissolved Metals in Water by CRC ICPMS	E421 Vancouver - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Hardness (Calculated)	EC100 Vancouver - Environmental	Water	APHA 2340B	"Hardness (as CaCO3), dissolved" is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.
Hardness (Calculated) from Total Ca/Mg	EC100A Vancouver - Environmental	Water	APHA 2340B	"Hardness (as CaCO3), from total Ca/Mg" is calculated from the sum of total Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations. Hardness from total Ca/Mg is normally comparable to Dissolved Hardness in non-turbid waters.
Nitrate and Nitrite (as N) (Calculation)	EC235.N+N Vancouver - Environmental	Water	EPA 300.0	Nitrate and Nitrite (as N) is a calculated parameter. Nitrate and Nitrite (as N) = Nitrite (as N) + Nitrate (as N).

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Ammonia	EP298 Vancouver - Environmental	Water		Sample preparation for Preserved Nutrients Water Quality Analysis.
Preparation for Dissolved Organic Carbon for Combustion	EP358 Vancouver - Environmental	Water	APHA 5310 B (mod)	Preparation for Dissolved Organic Carbon
Digestion for Total Nitrogen in water	EP366 Vancouver - Environmental	Water	APHA 4500-P J (mod)	Samples are heated with a persulfate digestion reagent.
Digestion for Total Phosphorus in water	EP372 Vancouver - Environmental	Water	APHA 4500-P E (mod).	Samples are heated with a persulfate digestion reagent.
Digestion for Dissolved Phosphorus in water	EP375 Vancouver - Environmental	Water	APHA 4500-P E (mod).	Samples are filtered through a 0.45 micron membrane filter and then heated with a persulfate digestion reagent.
Dissolved Metals Water Filtration	EP421 Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.

QUALITY CONTROL REPORT

Work Order	: **VA22B8478**	Page	: 1 of 18
Client	: Mount Polley Mining Corporation	Laboratory	: Vancouver - Environmental
Contact	: Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: ----	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 10-Aug-2022 11:00
PO	: 5590008044 Q2 2022	Date Analysis Commenced	: 10-Aug-2022
C-O-C number	: ----	Issue Date	: 18-Aug-2022 16:44
Sampler	: KBA		
Site	: ----		
Quote number	: VA22-MPMC100-006 - Minnow Env. - Water Quality		
No. of samples received	: 9		
No. of samples analysed	: 9		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Angela Ren	Team Leader - Metals	Vancouver Metals, Burnaby, British Columbia
Kyle Chang	Lab Assistant	Vancouver Metals, Burnaby, British Columbia
Ophelia Chiu	Department Manager - Organics	Vancouver Inorganics, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Vancouver Inorganics, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Vancouver Metals, Burnaby, British Columbia
Sukhman Khosa	Lab Assistant	Vancouver Metals, Burnaby, British Columbia

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Physical Tests (QC Lot: 597268)											
VA22B8418-006	Anonymous	turbidity	----	E121	0.10	NTU	3.35	3.53	5.00%	15%	----
Physical Tests (QC Lot: 597434)											
FJ2202082-003	Anonymous	pH	----	E108	0.10	pH units	8.36	8.35	0.120%	4%	----
Physical Tests (QC Lot: 597435)											
FJ2202082-003	Anonymous	alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	184	184	0.217%	20%	----
Physical Tests (QC Lot: 597436)											
FJ2202082-003	Anonymous	conductivity	----	E100	2.0	µS/cm	1370	1360	0.660%	10%	----
Physical Tests (QC Lot: 598950)											
VA22B8478-005	EDC-U_WS-1_2022-08	turbidity	----	E121	0.10	NTU	0.67	0.74	0.07	Diff <2x LOR	----
Physical Tests (QC Lot: 602167)											
KS2202865-001	Anonymous	solids, total dissolved [TDS]	----	E162	20	mg/L	963	945	1.94%	20%	----
Physical Tests (QC Lot: 602168)											
VA22B8478-008	HAC-R3_WS-1_2022-08	solids, total dissolved [TDS]	----	E162	20	mg/L	187	184	3	Diff <2x LOR	----
Physical Tests (QC Lot: 603288)											
KS2202952-001	Anonymous	solids, total dissolved [TDS]	----	E162	20	mg/L	182	180	2	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 597437)											
FJ2202082-003	Anonymous	fluoride	16984-48-8	E235.F	0.100	mg/L	0.239	0.232	0.006	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 597438)											
FJ2202082-003	Anonymous	chloride	16887-00-6	E235.Cl	2.50	mg/L	<2.50	<2.50	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 597440)											
FJ2202082-003	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	0.0250	mg/L	17.4	17.5	0.236%	20%	----
Anions and Nutrients (QC Lot: 597441)											
FJ2202082-003	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	0.0050	mg/L	<0.0050	0.0056	0.0006	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 597442)											
FJ2202082-003	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	1.50	mg/L	560	560	0.0604%	20%	----
Anions and Nutrients (QC Lot: 597446)											
FJ2202082-003	Anonymous	phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 603256)											
KS2202913-001	Anonymous	nitrogen, total	7727-37-9	E366	0.300	mg/L	8.52	8.39	1.47%	20%	----
Anions and Nutrients (QC Lot: 603260)											
KS2202913-001	Anonymous	phosphorus, total dissolved	7723-14-0	E375-T	0.200	mg/L	4.34	4.40	1.28%	20%	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Anions and Nutrients (QC Lot: 603261)											
KS2202913-001	Anonymous	ammonia, total (as N)	7664-41-7	E298	0.0250	mg/L	4.44	4.33	2.52%	20%	----
Anions and Nutrients (QC Lot: 603263)											
VA22B8478-001	FPC-R3_WS-1_2022-08	phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.0489	0.0485	0.944%	20%	----
Organic / Inorganic Carbon (QC Lot: 603262)											
VA22B8478-001	FPC-R3_WS-1_2022-08	carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L	17.4	18.6	6.72%	20%	----
Total Metals (QC Lot: 600764)											
VA22B8451-001	Anonymous	aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0318	0.0346	8.17%	20%	----
		antimony, total	7440-36-0	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00025	0.00022	0.00002	Diff <2x LOR	----
		barium, total	7440-39-3	E420	0.00010	mg/L	0.0185	0.0184	0.485%	20%	----
		beryllium, total	7440-41-7	E420	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, total	7440-42-8	E420	0.010	mg/L	0.024	0.024	0.0002	Diff <2x LOR	----
		cadmium, total	7440-43-9	E420	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
		calcium, total	7440-70-2	E420	0.050	mg/L	16.5	15.9	3.63%	20%	----
		chromium, total	7440-47-3	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		cobalt, total	7440-48-4	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		copper, total	7440-50-8	E420	0.00050	mg/L	0.00174	0.00171	0.00003	Diff <2x LOR	----
		iron, total	7439-89-6	E420	0.010	mg/L	0.062	0.062	0.0004	Diff <2x LOR	----
		lead, total	7439-92-1	E420	0.000050	mg/L	0.000892	0.000860	3.58%	20%	----
		lithium, total	7439-93-2	E420	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
		magnesium, total	7439-95-4	E420	0.0050	mg/L	1.73	1.72	0.768%	20%	----
		manganese, total	7439-96-5	E420	0.00010	mg/L	0.0304	0.0301	1.04%	20%	----
		molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.000198	0.000208	0.000010	Diff <2x LOR	----
		nickel, total	7440-02-0	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		potassium, total	7440-09-7	E420	0.050	mg/L	0.333	0.329	0.004	Diff <2x LOR	----
		selenium, total	7782-49-2	E420	0.000050	mg/L	0.000082	0.000075	0.000006	Diff <2x LOR	----
		silicon, total	7440-21-3	E420	0.10	mg/L	2.76	2.64	4.28%	20%	----
		silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, total	7440-23-5	E420	0.050	mg/L	7.77	7.65	1.58%	20%	----
		strontium, total	7440-24-6	E420	0.00020	mg/L	0.0493	0.0490	0.631%	20%	----
		thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		titanium, total	7440-32-6	E420	0.00030	mg/L	0.00059	0.00048	0.00010	Diff <2x LOR	----
		uranium, total	7440-61-1	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----

Sub-Matrix: **Water**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Laboratory Duplicate (DUP) Report						
					LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Total Metals (QC Lot: 600764) - continued											
VA22B8451-001	Anonymous	vanadium, total	7440-62-2	E420	0.00050	mg/L	0.00064	0.00060	0.00003	Diff <2x LOR	----
		zinc, total	7440-66-6	E420	0.0030	mg/L	0.0263	0.0254	0.0009	Diff <2x LOR	----
Total Metals (QC Lot: 600784)											
VA22B8488-001	Anonymous	aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0120	0.0124	0.0004	Diff <2x LOR	----
		antimony, total	7440-36-0	E420	0.00010	mg/L	0.00032	0.00032	0.000006	Diff <2x LOR	----
		arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00193	0.00194	0.214%	20%	----
		barium, total	7440-39-3	E420	0.00010	mg/L	0.0135	0.0136	1.02%	20%	----
		beryllium, total	7440-41-7	E420	0.000020	mg/L	<0.000020	<0.000020	0	Diff <2x LOR	----
		bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, total	7440-42-8	E420	0.010	mg/L	0.587	0.595	1.38%	20%	----
		cadmium, total	7440-43-9	E420	0.0000200	mg/L	<0.0000200	<0.0000200	0	Diff <2x LOR	----
		calcium, total	7440-70-2	E420	0.050	mg/L	54.2	54.1	0.112%	20%	----
		chromium, total	7440-47-3	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		cobalt, total	7440-48-4	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		copper, total	7440-50-8	E420	0.00050	mg/L	0.00159	0.00155	0.00004	Diff <2x LOR	----
		iron, total	7439-89-6	E420	0.010	mg/L	0.014	0.014	0.00006	Diff <2x LOR	----
		lead, total	7439-92-1	E420	0.000050	mg/L	0.00120	0.00121	0.948%	20%	----
		lithium, total	7439-93-2	E420	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
		magnesium, total	7439-95-4	E420	0.0050	mg/L	60.7	61.3	1.01%	20%	----
		manganese, total	7439-96-5	E420	0.00010	mg/L	0.00355	0.00358	0.663%	20%	----
		molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.0350	0.0353	0.844%	20%	----
		nickel, total	7440-02-0	E420	0.00050	mg/L	0.00112	0.00106	0.00006	Diff <2x LOR	----
		potassium, total	7440-09-7	E420	0.050	mg/L	7.08	7.08	0.0888%	20%	----
		selenium, total	7782-49-2	E420	0.000050	mg/L	0.00105	0.00109	3.15%	20%	----
		silicon, total	7440-21-3	E420	0.10	mg/L	5.98	6.01	0.515%	20%	----
		silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, total	7440-23-5	E420	0.050	mg/L	255	254	0.425%	20%	----
		strontium, total	7440-24-6	E420	0.00020	mg/L	1.73	1.77	1.90%	20%	----
		thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		tin, total	7440-31-5	E420	0.00010	mg/L	0.00010	0.00011	0.000006	Diff <2x LOR	----
		titanium, total	7440-32-6	E420	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
		uranium, total	7440-61-1	E420	0.000010	mg/L	0.00106	0.00109	2.29%	20%	----
		vanadium, total	7440-62-2	E420	0.00050	mg/L	0.00319	0.00327	0.00008	Diff <2x LOR	----
		zinc, total	7440-66-6	E420	0.0030	mg/L	<0.0030	<0.0030	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 599135)											

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Dissolved Metals (QC Lot: 599135) - continued											
VA22B8488-001	Anonymous	aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0060	0.0063	0.0003	Diff <2x LOR	----
		antimony, dissolved	7440-36-0	E421	0.00010	mg/L	0.00027	0.00028	0.000010	Diff <2x LOR	----
		arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00215	0.00206	4.31%	20%	----
		barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0137	0.0131	4.50%	20%	----
		beryllium, dissolved	7440-41-7	E421	0.000020	mg/L	<0.000020	<0.000020	0	Diff <2x LOR	----
		bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, dissolved	7440-42-8	E421	0.010	mg/L	0.501	0.489	2.36%	20%	----
		cadmium, dissolved	7440-43-9	E421	0.0000150	mg/L	<0.0000150	<0.0000150	0	Diff <2x LOR	----
		calcium, dissolved	7440-70-2	E421	0.050	mg/L	51.0	52.8	3.41%	20%	----
		chromium, dissolved	7440-47-3	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		copper, dissolved	7440-50-8	E421	0.00020	mg/L	0.00104	0.00105	0.000008	Diff <2x LOR	----
		iron, dissolved	7439-89-6	E421	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		lead, dissolved	7439-92-1	E421	0.000050	mg/L	0.000263	0.000275	0.000012	Diff <2x LOR	----
		lithium, dissolved	7439-93-2	E421	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
		magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	59.7	61.6	3.17%	20%	----
		manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.00388	0.00385	0.804%	20%	----
		molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.0344	0.0348	1.16%	20%	----
		nickel, dissolved	7440-02-0	E421	0.00050	mg/L	0.00128	0.00127	0.00001	Diff <2x LOR	----
		potassium, dissolved	7440-09-7	E421	0.050	mg/L	7.24	7.29	0.612%	20%	----
		selenium, dissolved	7782-49-2	E421	0.000050	mg/L	0.00110	0.00104	5.45%	20%	----
		silicon, dissolved	7440-21-3	E421	0.050	mg/L	5.90	5.78	2.11%	20%	----
		silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, dissolved	7440-23-5	E421	0.050	mg/L	247	245	0.805%	20%	----
		strontium, dissolved	7440-24-6	E421	0.00020	mg/L	1.74	1.81	3.88%	20%	----
		thallium, dissolved	7440-28-0	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		tin, dissolved	7440-31-5	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		titanium, dissolved	7440-32-6	E421	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
		uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.00101	0.00106	3.89%	20%	----
		vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	0.00307	0.00308	0.00001	Diff <2x LOR	----
		zinc, dissolved	7440-66-6	E421	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 597268)						
turbidity	----	E121	0.1	NTU	<0.10	----
Physical Tests (QCLot: 597435)						
alkalinity, total (as CaCO3)	----	E290	1	mg/L	<1.0	----
Physical Tests (QCLot: 597436)						
conductivity	----	E100	1	µS/cm	<1.0	----
Physical Tests (QCLot: 598950)						
turbidity	----	E121	0.1	NTU	<0.10	----
Physical Tests (QCLot: 601035)						
solids, total suspended [TSS]	----	E164	1	mg/L	<1.0	----
Physical Tests (QCLot: 601036)						
solids, total suspended [TSS]	----	E164	1	mg/L	<1.0	----
Physical Tests (QCLot: 602167)						
solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Physical Tests (QCLot: 602168)						
solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Physical Tests (QCLot: 603288)						
solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Anions and Nutrients (QCLot: 597437)						
fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 597438)						
chloride	16887-00-6	E235.Cl	0.5	mg/L	<0.50	----
Anions and Nutrients (QCLot: 597440)						
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 597441)						
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 597442)						
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 597446)						
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 603256)						
nitrogen, total	7727-37-9	E366	0.03	mg/L	<0.030	----
Anions and Nutrients (QCLot: 603260)						
phosphorus, total dissolved	7723-14-0	E375-T	0.002	mg/L	<0.0020	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Anions and Nutrients (QCLot: 603261)						
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 603263)						
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----
Organic / Inorganic Carbon (QCLot: 603262)						
carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	<0.50	----
Total Metals (QCLot: 600764)						
aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	MBRR
antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
chromium, total	7440-47-3	E420	0.0005	mg/L	<0.00050	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	----
magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	----
manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
silicon, total	7440-21-3	E420	0.1	mg/L	<0.10	----
silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	----
sodium, total	7440-23-5	E420	0.05	mg/L	<0.050	----
strontium, total	7440-24-6	E420	0.0002	mg/L	<0.00020	----
thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----
tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----
uranium, total	7440-61-1	E420	0.00001	mg/L	<0.000010	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	<0.00050	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 600764) - continued						
zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	----
Total Metals (QCLot: 600784)						
aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----
antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
chromium, total	7440-47-3	E420	0.0005	mg/L	<0.00050	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	----
magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	----
manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
silicon, total	7440-21-3	E420	0.1	mg/L	<0.10	----
silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	----
sodium, total	7440-23-5	E420	0.05	mg/L	<0.050	----
strontium, total	7440-24-6	E420	0.0002	mg/L	<0.00020	----
thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----
tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----
uranium, total	7440-61-1	E420	0.00001	mg/L	<0.000010	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	<0.00050	----
zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	----
Dissolved Metals (QCLot: 599135)						
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	<0.0010	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	<0.00010	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 599135) - continued						
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	<0.00010	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	<0.00010	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	<0.000020	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	<0.000050	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	<0.010	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	<0.0000050	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	<0.050	----
chromium, dissolved	7440-47-3	E421	0.0005	mg/L	<0.00050	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	<0.000050	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	<0.050	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	<0.000010	----
sodium, dissolved	7440-23-5	E421	0.05	mg/L	<0.050	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	<0.00020	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	<0.000010	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	<0.00050	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	<0.0010	----

Qualifiers

Qualifier	Description
MBRR	*Initial MB for this submission had positive results for flagged analyte (data not shown). Low level samples were repeated with new QC (2nd MB results shown). High level results (>5x initial MB level) and non-detect results were reported and are defensible*

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 597268)									
turbidity	----	E121	0.1	NTU	200 NTU	95.8	85.0	115	----
Physical Tests (QCLot: 597434)									
pH	----	E108	----	pH units	7 pH units	100	98.0	102	----
Physical Tests (QCLot: 597435)									
alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	113	85.0	115	----
Physical Tests (QCLot: 597436)									
conductivity	----	E100	1	µS/cm	146.9 µS/cm	97.5	90.0	110	----
Physical Tests (QCLot: 598950)									
turbidity	----	E121	0.1	NTU	200 NTU	97.9	85.0	115	----
Physical Tests (QCLot: 601035)									
solids, total suspended [TSS]	----	E164	1	mg/L	150 mg/L	88.5	85.0	115	----
Physical Tests (QCLot: 601036)									
solids, total suspended [TSS]	----	E164	1	mg/L	150 mg/L	96.2	85.0	115	----
Physical Tests (QCLot: 602167)									
solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	96.2	85.0	115	----
Physical Tests (QCLot: 602168)									
solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	104	85.0	115	----
Physical Tests (QCLot: 603288)									
solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	103	85.0	115	----
Anions and Nutrients (QCLot: 597437)									
fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	97.3	90.0	110	----
Anions and Nutrients (QCLot: 597438)									
chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 597440)									
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 597441)									
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	95.6	90.0	110	----
Anions and Nutrients (QCLot: 597442)									
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	103	90.0	110	----
Anions and Nutrients (QCLot: 597446)									
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	0.03 mg/L	97.6	80.0	120	----
Anions and Nutrients (QCLot: 603256)									

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Anions and Nutrients (QCLot: 603256) - continued									
nitrogen, total	7727-37-9	E366	0.03	mg/L	0.5 mg/L	100	75.0	125	----
Anions and Nutrients (QCLot: 603260)									
phosphorus, total dissolved	7723-14-0	E375-T	0.002	mg/L	0.05 mg/L	91.5	80.0	120	----
Anions and Nutrients (QCLot: 603261)									
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	101	85.0	115	----
Anions and Nutrients (QCLot: 603263)									
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	0.05 mg/L	91.5	80.0	120	----
Organic / Inorganic Carbon (QCLot: 603262)									
carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	8.57 mg/L	96.2	80.0	120	----
Total Metals (QCLot: 600764)									
aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	103	80.0	120	----
antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	100	80.0	120	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	96.6	80.0	120	----
barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	97.5	80.0	120	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	98.6	80.0	120	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	102	80.0	120	----
boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	94.1	80.0	120	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	96.6	80.0	120	----
calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	98.2	80.0	120	----
chromium, total	7440-47-3	E420	0.0005	mg/L	0.25 mg/L	96.1	80.0	120	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	96.2	80.0	120	----
copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	96.2	80.0	120	----
iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	101	80.0	120	----
lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	98.4	80.0	120	----
lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	97.5	80.0	120	----
magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	99.3	80.0	120	----
manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	97.4	80.0	120	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	99.9	80.0	120	----
nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	97.2	80.0	120	----
potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	101	80.0	120	----
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	96.7	80.0	120	----
silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	103	80.0	120	----
silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	90.6	80.0	120	----
sodium, total	7440-23-5	E420	0.05	mg/L	50 mg/L	100	80.0	120	----
strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	104	80.0	120	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Total Metals (QCLot: 600764) - continued									
thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	102	80.0	120	----
tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	95.6	80.0	120	----
titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	94.3	80.0	120	----
uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	99.0	80.0	120	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	97.4	80.0	120	----
zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	95.4	80.0	120	----
Total Metals (QCLot: 600784)									
aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	110	80.0	120	----
antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	107	80.0	120	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	98.4	80.0	120	----
barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	103	80.0	120	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	106	80.0	120	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	101	80.0	120	----
boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	118	80.0	120	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	98.7	80.0	120	----
calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	102	80.0	120	----
chromium, total	7440-47-3	E420	0.0005	mg/L	0.25 mg/L	102	80.0	120	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	98.8	80.0	120	----
copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	98.2	80.0	120	----
iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	99.7	80.0	120	----
lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	102	80.0	120	----
lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	105	80.0	120	----
magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	104	80.0	120	----
manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	100	80.0	120	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	106	80.0	120	----
nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	99.2	80.0	120	----
potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	106	80.0	120	----
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	99.3	80.0	120	----
silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	110	80.0	120	----
silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	95.0	80.0	120	----
sodium, total	7440-23-5	E420	0.05	mg/L	50 mg/L	111	80.0	120	----
strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	104	80.0	120	----
thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	103	80.0	120	----
tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	101	80.0	120	----
titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	101	80.0	120	----
uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	99.7	80.0	120	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	100	80.0	120	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Total Metals (QCLot: 600784) - continued									
zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	98.4	80.0	120	----
Dissolved Metals (QCLot: 599135)									
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	107	80.0	120	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	101	80.0	120	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	103	80.0	120	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	102	80.0	120	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	96.0	80.0	120	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	102	80.0	120	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	95.6	80.0	120	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	103	80.0	120	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	97.7	80.0	120	----
chromium, dissolved	7440-47-3	E421	0.0005	mg/L	0.25 mg/L	98.8	80.0	120	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	98.6	80.0	120	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	99.1	80.0	120	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	110	80.0	120	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	105	80.0	120	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	97.6	80.0	120	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	100	80.0	120	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	106	80.0	120	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	104	80.0	120	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	100	80.0	120	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	103	80.0	120	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	102	80.0	120	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	105	80.0	120	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	88.9	80.0	120	----
sodium, dissolved	7440-23-5	E421	0.05	mg/L	50 mg/L	104	80.0	120	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	104	80.0	120	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	102	80.0	120	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	102	80.0	120	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	95.1	80.0	120	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	108	80.0	120	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	102	80.0	120	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	105	80.0	120	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 597437)										
FJ2202082-004	Anonymous	fluoride	16984-48-8	E235.F	9.42 mg/L	10 mg/L	94.2	75.0	125	----
Anions and Nutrients (QCLot: 597438)										
FJ2202082-004	Anonymous	chloride	16887-00-6	E235.Cl	1010 mg/L	1000 mg/L	101	75.0	125	----
Anions and Nutrients (QCLot: 597440)										
FJ2202082-004	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	25.4 mg/L	25 mg/L	101	75.0	125	----
Anions and Nutrients (QCLot: 597441)										
FJ2202082-004	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	4.67 mg/L	5 mg/L	93.4	75.0	125	----
Anions and Nutrients (QCLot: 597442)										
FJ2202082-004	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	981 mg/L	1000 mg/L	98.1	75.0	125	----
Anions and Nutrients (QCLot: 597446)										
FJ2202082-004	Anonymous	phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0374 mg/L	0.03 mg/L	125	70.0	130	----
Anions and Nutrients (QCLot: 603256)										
KS2202913-002	Anonymous	nitrogen, total	7727-37-9	E366	ND mg/L	0.4 mg/L	ND	70.0	130	----
Anions and Nutrients (QCLot: 603260)										
KS2202913-002	Anonymous	phosphorus, total dissolved	7723-14-0	E375-T	0.0502 mg/L	0.05 mg/L	100	70.0	130	----
Anions and Nutrients (QCLot: 603261)										
KS2202913-002	Anonymous	ammonia, total (as N)	7664-41-7	E298	0.102 mg/L	0.1 mg/L	102	75.0	125	----
Anions and Nutrients (QCLot: 603263)										
VA22B8478-002	HAC-R1_WS-1_2022-08	phosphorus, total	7723-14-0	E372-U	0.0442 mg/L	0.05 mg/L	88.4	70.0	130	----
Organic / Inorganic Carbon (QCLot: 603262)										
VA22B8478-002	HAC-R1_WS-1_2022-08	carbon, dissolved organic [DOC]	----	E358-L	ND mg/L	5 mg/L	ND	70.0	130	----
Total Metals (QCLot: 600764)										
VA22B8451-002	Anonymous	aluminum, total	7429-90-5	E420	0.204 mg/L	0.2 mg/L	102	70.0	130	----
		antimony, total	7440-36-0	E420	0.0196 mg/L	0.02 mg/L	98.1	70.0	130	----
		arsenic, total	7440-38-2	E420	0.0194 mg/L	0.02 mg/L	97.2	70.0	130	----
		barium, total	7440-39-3	E420	0.0201 mg/L	0.02 mg/L	100	70.0	130	----
		beryllium, total	7440-41-7	E420	0.0418 mg/L	0.04 mg/L	104	70.0	130	----
		bismuth, total	7440-69-9	E420	0.00991 mg/L	0.01 mg/L	99.1	70.0	130	----
		boron, total	7440-42-8	E420	0.100 mg/L	0.1 mg/L	100	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Total Metals (QCLot: 600764) - continued										
VA22B8451-002	Anonymous	cadmium, total	7440-43-9	E420	0.00397 mg/L	0.004 mg/L	99.2	70.0	130	----
		calcium, total	7440-70-2	E420	ND mg/L	4 mg/L	ND	70.0	130	----
		chromium, total	7440-47-3	E420	0.0394 mg/L	0.04 mg/L	98.4	70.0	130	----
		cobalt, total	7440-48-4	E420	0.0199 mg/L	0.02 mg/L	99.5	70.0	130	----
		copper, total	7440-50-8	E420	0.0198 mg/L	0.02 mg/L	98.8	70.0	130	----
		iron, total	7439-89-6	E420	1.93 mg/L	2 mg/L	96.5	70.0	130	----
		lead, total	7439-92-1	E420	0.0191 mg/L	0.02 mg/L	95.7	70.0	130	----
		lithium, total	7439-93-2	E420	0.0995 mg/L	0.1 mg/L	99.5	70.0	130	----
		magnesium, total	7439-95-4	E420	ND mg/L	1 mg/L	ND	70.0	130	----
		manganese, total	7439-96-5	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		molybdenum, total	7439-98-7	E420	0.0207 mg/L	0.02 mg/L	103	70.0	130	----
		nickel, total	7440-02-0	E420	0.0403 mg/L	0.04 mg/L	101	70.0	130	----
		potassium, total	7440-09-7	E420	3.98 mg/L	4 mg/L	99.6	70.0	130	----
		selenium, total	7782-49-2	E420	0.0397 mg/L	0.04 mg/L	99.3	70.0	130	----
		silicon, total	7440-21-3	E420	9.62 mg/L	10 mg/L	96.2	70.0	130	----
		silver, total	7440-22-4	E420	0.00398 mg/L	0.004 mg/L	99.6	70.0	130	----
		sodium, total	7440-23-5	E420	ND mg/L	2 mg/L	ND	70.0	130	----
		strontium, total	7440-24-6	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		thallium, total	7440-28-0	E420	0.00384 mg/L	0.004 mg/L	95.9	70.0	130	----
		tin, total	7440-31-5	E420	0.0196 mg/L	0.02 mg/L	98.2	70.0	130	----
		titanium, total	7440-32-6	E420	0.0402 mg/L	0.04 mg/L	101	70.0	130	----
		uranium, total	7440-61-1	E420	0.00384 mg/L	0.004 mg/L	96.0	70.0	130	----
		vanadium, total	7440-62-2	E420	0.0989 mg/L	0.1 mg/L	98.9	70.0	130	----
		zinc, total	7440-66-6	E420	0.391 mg/L	0.4 mg/L	97.7	70.0	130	----
Total Metals (QCLot: 600784)										
VA22B8488-002	Anonymous	aluminum, total	7429-90-5	E420	0.214 mg/L	0.2 mg/L	107	70.0	130	----
		antimony, total	7440-36-0	E420	0.0201 mg/L	0.02 mg/L	101	70.0	130	----
		arsenic, total	7440-38-2	E420	0.0196 mg/L	0.02 mg/L	98.0	70.0	130	----
		barium, total	7440-39-3	E420	0.0193 mg/L	0.02 mg/L	96.7	70.0	130	----
		beryllium, total	7440-41-7	E420	0.0433 mg/L	0.04 mg/L	108	70.0	130	----
		bismuth, total	7440-69-9	E420	0.00910 mg/L	0.01 mg/L	91.0	70.0	130	----
		boron, total	7440-42-8	E420	ND mg/L	0.1 mg/L	ND	70.0	130	----
		cadmium, total	7440-43-9	E420	0.00370 mg/L	0.004 mg/L	92.6	70.0	130	----
		calcium, total	7440-70-2	E420	ND mg/L	4 mg/L	ND	70.0	130	----
		chromium, total	7440-47-3	E420	0.0389 mg/L	0.04 mg/L	97.3	70.0	130	----
		cobalt, total	7440-48-4	E420	0.0187 mg/L	0.02 mg/L	93.6	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Total Metals (QCLot: 600784) - continued										
VA22B8488-002	Anonymous	copper, total	7440-50-8	E420	0.0176 mg/L	0.02 mg/L	88.1	70.0	130	----
		iron, total	7439-89-6	E420	1.89 mg/L	2 mg/L	94.6	70.0	130	----
		lead, total	7439-92-1	E420	0.0186 mg/L	0.02 mg/L	93.2	70.0	130	----
		lithium, total	7439-93-2	E420	0.105 mg/L	0.1 mg/L	105	70.0	130	----
		magnesium, total	7439-95-4	E420	ND mg/L	1 mg/L	ND	70.0	130	----
		manganese, total	7439-96-5	E420	0.0197 mg/L	0.02 mg/L	98.6	70.0	130	----
		molybdenum, total	7439-98-7	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		nickel, total	7440-02-0	E420	0.0368 mg/L	0.04 mg/L	92.1	70.0	130	----
		potassium, total	7440-09-7	E420	ND mg/L	4 mg/L	ND	70.0	130	----
		selenium, total	7782-49-2	E420	0.0428 mg/L	0.04 mg/L	107	70.0	130	----
		silicon, total	7440-21-3	E420	10.4 mg/L	10 mg/L	104	70.0	130	----
		silver, total	7440-22-4	E420	0.00390 mg/L	0.004 mg/L	97.5	70.0	130	----
		sodium, total	7440-23-5	E420	ND mg/L	2 mg/L	ND	70.0	130	----
		strontium, total	7440-24-6	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		thallium, total	7440-28-0	E420	0.00365 mg/L	0.004 mg/L	91.3	70.0	130	----
		tin, total	7440-31-5	E420	0.0193 mg/L	0.02 mg/L	96.7	70.0	130	----
		titanium, total	7440-32-6	E420	0.0425 mg/L	0.04 mg/L	106	70.0	130	----
		uranium, total	7440-61-1	E420	0.00377 mg/L	0.004 mg/L	94.3	70.0	130	----
		vanadium, total	7440-62-2	E420	0.100 mg/L	0.1 mg/L	100	70.0	130	----
		zinc, total	7440-66-6	E420	0.364 mg/L	0.4 mg/L	90.9	70.0	130	----
Dissolved Metals (QCLot: 599135)										
VA22B8461-002	Anonymous	aluminum, dissolved	7429-90-5	E421	0.254 mg/L	0.2 mg/L	127	70.0	130	----
		antimony, dissolved	7440-36-0	E421	0.0248 mg/L	0.02 mg/L	124	70.0	130	----
		arsenic, dissolved	7440-38-2	E421	0.0251 mg/L	0.02 mg/L	125	70.0	130	----
		barium, dissolved	7440-39-3	E421	0.0249 mg/L	0.02 mg/L	124	70.0	130	----
		beryllium, dissolved	7440-41-7	E421	0.0472 mg/L	0.04 mg/L	118	70.0	130	----
		bismuth, dissolved	7440-69-9	E421	0.0113 mg/L	0.01 mg/L	113	70.0	130	----
		boron, dissolved	7440-42-8	E421	0.117 mg/L	0.1 mg/L	117	70.0	130	----
		cadmium, dissolved	7440-43-9	E421	0.00500 mg/L	0.004 mg/L	125	70.0	130	----
		calcium, dissolved	7440-70-2	E421	ND mg/L	4 mg/L	ND	70.0	130	----
		chromium, dissolved	7440-47-3	E421	0.0482 mg/L	0.04 mg/L	120	70.0	130	----
		cobalt, dissolved	7440-48-4	E421	0.0241 mg/L	0.02 mg/L	121	70.0	130	----
		copper, dissolved	7440-50-8	E421	0.0242 mg/L	0.02 mg/L	121	70.0	130	----
		iron, dissolved	7439-89-6	E421	2.40 mg/L	2 mg/L	120	70.0	130	----
		lead, dissolved	7439-92-1	E421	0.0240 mg/L	0.02 mg/L	120	70.0	130	----
		lithium, dissolved	7439-93-2	E421	0.119 mg/L	0.1 mg/L	119	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Dissolved Metals (QCLot: 599135) - continued										
VA22B8461-002	Anonymous	magnesium, dissolved	7439-95-4	E421	ND mg/L	1 mg/L	ND	70.0	130	----
		manganese, dissolved	7439-96-5	E421	0.0254 mg/L	0.02 mg/L	127	70.0	130	----
		molybdenum, dissolved	7439-98-7	E421	0.0256 mg/L	0.02 mg/L	128	70.0	130	----
		nickel, dissolved	7440-02-0	E421	0.0487 mg/L	0.04 mg/L	122	70.0	130	----
		potassium, dissolved	7440-09-7	E421	5.00 mg/L	4 mg/L	125	70.0	130	----
		selenium, dissolved	7782-49-2	E421	0.0822 mg/L	0.08 mg/L	103	70.0	130	----
		silicon, dissolved	7440-21-3	E421	12.4 mg/L	10 mg/L	124	70.0	130	----
		silver, dissolved	7440-22-4	E421	0.00466 mg/L	0.004 mg/L	116	70.0	130	----
		sodium, dissolved	7440-23-5	E421	ND mg/L	2 mg/L	ND	70.0	130	----
		strontium, dissolved	7440-24-6	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		thallium, dissolved	7440-28-0	E421	0.00462 mg/L	0.004 mg/L	116	70.0	130	----
		tin, dissolved	7440-31-5	E421	0.0247 mg/L	0.02 mg/L	123	70.0	130	----
		titanium, dissolved	7440-32-6	E421	0.0471 mg/L	0.04 mg/L	118	70.0	130	----
		uranium, dissolved	7440-61-1	E421	0.00495 mg/L	0.004 mg/L	124	70.0	130	----
		vanadium, dissolved	7440-62-2	E421	0.126 mg/L	0.1 mg/L	126	70.0	130	----
		zinc, dissolved	7440-66-6	E421	0.506 mg/L	0.4 mg/L	126	70.0	130	----

ALS Environmental

www.alsglobal.com

Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878

Affix ALS barcode label here (lab use only)

COC Number: 15 -

Page 1 of 1

Report To	Contact and company name below will appear on the final report
Company:	Mount Polley Mining Corporation
Contact:	Gabriel Holmes
Phone:	236-317-4939
	Company address below will appear on the final report
Street:	PO Box 12
City/Province:	Likely, BC
Postal Code:	V0L 1N0
Invoice To	Same as Report To |✓| YES | | NO
	Copy of Invoice with Report | | YES | | NO
Company:	
Contact:	

Report Format / Distribution

Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)

Quality Control (QC) Report with Report ☑ \| \| NO

☐ Compare Results to Criteria on Report - provide details below if box checked

Select Distribution: ☑ EMAIL \| \| MAIL \| \| FAX

Email 1 or Fax: gabriel.holmes@mountpolley.com

Email 2: kala.ivens@mountpolley.com

Email 3: pstecko@minnow.ca, kbatchelar@minnow.ca

Invoice Distribution

Select Invoice Distribution: ☑ EMAIL ☑ MAIL ☐ FAX

Email 1 or Fax: gabriel.holmes@mountpolley.com

Email 2:

Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply

Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days): 4 day [P4] ☐ ; 3 day [P3] ☐ ; 2 day [P2] ☐

EMERGENCY: 1 Business day [E1] ☐ ; Same Day, Weekend or Statutory holiday [E0] ☐

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm

For tests that can not be performed according to the service level selected, you will be contacted.

Project Information	
ALS Account # / Quote #:	VA22-MPMC100-006
Job #:	
PO / AFE:	
LSD:	

Oil and Gas Required Fields (client use)	
AFE/Cost Center:	PO#
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Lab Work Order # (lab use only): 8478

ALS Contact: Can Dang

Sampler: KBa

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P)

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUTRIENTS-1 (F/P)	Total Metals (ICPMS) (P)	Dissolved Metals (ICPMS) (F)	Total Nitrogen Ammonia (P)	DOC (P)	TSS (Whole bottle) (P)							
1	FPC-R3_WS-1_2022-08	08-Aug-22	12:30	Water	R	R	R	R	R	R							6
2	HAC-R1_WS-1_2022-08	08-Aug-22	10:30	Water	R	R	R	R	R	R							6
3	HAC-U_WS-1_2022-08	08-Aug-22	11:00	Water	R	R	R	R	R	R							6
4	HAC-D_WS-1_2022-08	08-Aug-22	12:35	Water	R	R	R	R	R	R							6
5	EDC-U_WS-1_2022-08	08-Aug-22	08:00	Water	R	R	R	R	R	R							6
6	EDC-D_WS-1_2022-08	08-Aug-22	12:12	Water	R	R	R	R	R	R							6
7	E1_WS-1_2022-08	08-Aug-22	11:15	Water	R	R	R	R	R	R							6
8	HAC-R3_WS-1_2022-08	08-Aug-22	13:39	Water	R	R	R	R	R	R							6
9	HAC-U _WS-1X_2022-08	08-Aug-22	11:00	Water	R	R	R	R	R	R							6

Environmental Division Vancouver

Work Order Reference VA22B8478

Telephone : +1 604 253 4188

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ ☐

Are samples for human drinking water use? \| \| \| \|

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

Regular analytes for Mount Polley Mine water sample package. Please also report ANIONS-N+N-CALC-VA (calculated nitrate and nitrite)

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice Packs ☑ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
			8.1	10.6	

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Katharina Batchelar	Date: 9-Aug-22	Time: 08:00	Received by:	Date:	Time:	Received by:	Date: Aug 10/22	Time: 11 am

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

OCTOBER 2015 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

WATER CHEMISTRY

ALS Laboratory Report VA22C0064

(Finalized September 8, 2022)

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **VA22C0064**	Page	: 1 of 6
Client	: **Mount Polley Mining Corporation**	Laboratory	: Vancouver - Environmental
Contact	: Kala Ivens	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: 250-790-2215 Ext 2112	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 26-Aug-2022 10:15
PO	: 5590008044 Q2 2022	Date Analysis Commenced	: 26-Aug-2022
C-O-C number	: ----	Issue Date	: 08-Sep-2022 09:05
Sampler	: D. Schnurr, S. Latimer		
Site	: ----		
Quote number	: VA22-MPMC100-006 - Minnow Env. - Water Quality		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Angelo Salandanan	Lab Assistant	Metals, Burnaby, British Columbia
Cindy Tang	Team Leader - Inorganics	Inorganics, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Inorganics, Burnaby, British Columbia
Sukhman Khosa	Lab Assistant	Metals, Burnaby, British Columbia

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

Unit	*Description*
-	No Unit
µg/L	micrograms per litre
µS/cm	Microsiemens per centimetre
mg/L	milligrams per litre
NTU	nephelometric turbidity units
pH units	pH units

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	POL-P2_WS_DI -1_2022-08	----	----	----	----
					Client sampling date / time	25-Aug-2022 10:55	----	----	----	----
						VA22C0064-001	--------	--------	--------	--------
						Result	----	----	----	----
Physical Tests										
alkalinity, total (as CaCO3)	----	E290	1.0	mg/L		89.1	----	----	----	----
conductivity	----	E100	2.0	µS/cm		242	----	----	----	----
hardness (as CaCO3), dissolved	----	EC100	0.50	mg/L		111	----	----	----	----
hardness (as CaCO3), from total Ca/Mg	----	EC100A	0.50	mg/L		108	----	----	----	----
pH	----	E108	0.10	pH units		8.12	----	----	----	----
solids, total dissolved [TDS]	----	E162	10	mg/L		174	----	----	----	----
solids, total suspended [TSS]	----	E164	1.0	mg/L		2.8	----	----	----	----
turbidity	----	E121	0.10	NTU		1.73	----	----	----	----
Anions and Nutrients										
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L		0.0107	----	----	----	----
chloride	16887-00-6	E235.Cl	0.50	mg/L		0.87	----	----	----	----
fluoride	16984-48-8	E235.F	0.020	mg/L		0.080	----	----	----	----
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L		0.0078	----	----	----	----
nitrate + nitrite (as N)	----	EC235.N+N	0.0050	mg/L		0.0078	----	----	----	----
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L		<0.0010	----	----	----	----
nitrogen, total	7727-37-9	E366	0.030	mg/L		0.388	----	----	----	----
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L		<0.0010	----	----	----	----
phosphorus, total	7723-14-0	E372-U	0.0020	mg/L		0.0134	----	----	----	----
phosphorus, total dissolved	7723-14-0	E375-T	0.0020	mg/L		0.0059	----	----	----	----
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L		34.9	----	----	----	----
Organic / Inorganic Carbon										
carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L		7.40	----	----	----	----
Total Metals										
aluminum, total	7429-90-5	E420	0.0030	mg/L		0.0399	----	----	----	----
antimony, total	7440-36-0	E420	0.00010	mg/L		0.00010	----	----	----	----
arsenic, total	7440-38-2	E420	0.00010	mg/L		0.00058	----	----	----	----
barium, total	7440-39-3	E420	0.00010	mg/L		0.0111	----	----	----	----
beryllium, total	7440-41-7	E420	0.000100	mg/L		<0.000100	----	----	----	----
bismuth, total	7440-69-9	E420	0.000050	mg/L		<0.000050	----	----	----	----
boron, total	7440-42-8	E420	0.010	mg/L		0.020	----	----	----	----

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	POL-P2_WS_DI-1_2022-08	----	----	----	----
					Client sampling date / time	25-Aug-2022 10:55	----	----	----	----
						VA22C0064-001	--------	--------	--------	--------
						Result	----	----	----	----
Total Metals										
cadmium, total	7440-43-9	E420	0.0000050	mg/L		0.0000057	----	----	----	----
calcium, total	7440-70-2	E420	0.050	mg/L		34.6	----	----	----	----
chromium, total	7440-47-3	E420	0.00050	mg/L		<0.00050	----	----	----	----
cobalt, total	7440-48-4	E420	0.00010	mg/L		<0.00010	----	----	----	----
copper, total	7440-50-8	E420	0.00050	mg/L		0.00623	----	----	----	----
iron, total	7439-89-6	E420	0.030	mg/L		0.036	----	----	----	----
lead, total	7439-92-1	E420	0.000050	mg/L		0.000144	----	----	----	----
lithium, total	7439-93-2	E420	0.0010	mg/L		<0.0010	----	----	----	----
magnesium, total	7439-95-4	E420	0.100	mg/L		5.27	----	----	----	----
manganese, total	7439-96-5	E420	0.00010	mg/L		0.00746	----	----	----	----
molybdenum, total	7439-98-7	E420	0.000050	mg/L		0.00658	----	----	----	----
nickel, total	7440-02-0	E420	0.00050	mg/L		<0.00050	----	----	----	----
potassium, total	7440-09-7	E420	0.050	mg/L		1.07	----	----	----	----
selenium, total	7782-49-2	E420	0.000050	mg/L		0.000658	----	----	----	----
silicon, total	7440-21-3	E420	0.10	mg/L		3.32	----	----	----	----
silver, total	7440-22-4	E420	0.000010	mg/L		<0.000010	----	----	----	----
sodium, total	7440-23-5	E420	0.050	mg/L		7.04	----	----	----	----
strontium, total	7440-24-6	E420	0.00020	mg/L		0.258	----	----	----	----
thallium, total	7440-28-0	E420	0.000010	mg/L		<0.000010	----	----	----	----
tin, total	7440-31-5	E420	0.00010	mg/L		<0.00010	----	----	----	----
titanium, total	7440-32-6	E420	0.0100	mg/L		<0.0100	----	----	----	----
uranium, total	7440-61-1	E420	0.000010	mg/L		0.000192	----	----	----	----
vanadium, total	7440-62-2	E420	0.00050	mg/L		0.00141	----	----	----	----
zinc, total	7440-66-6	E420	0.0030	mg/L		<0.0030	----	----	----	----
Dissolved Metals										
aluminum, dissolved	7429-90-5	E421	0.0030	mg/L		0.0037	----	----	----	----
antimony, dissolved	7440-36-0	E421	0.00010	mg/L		<0.00010	----	----	----	----
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L		0.00052	----	----	----	----
barium, dissolved	7440-39-3	E421	0.00010	mg/L		0.00958	----	----	----	----
beryllium, dissolved	7440-41-7	E421	0.000100	mg/L		<0.000100	----	----	----	----
bismuth, dissolved	7440-69-9	E421	0.000050	mg/L		<0.000050	----	----	----	----

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	POL-P2_WS_DI -1_2022-08	----	----	----	----
					Client sampling date / time	25-Aug-2022 10:55	----	----	----	----
						VA22C0064-001	--------	--------	--------	--------
						Result	----	----	----	----
Dissolved Metals										
boron, dissolved	7440-42-8	E421	0.010	mg/L		0.020	----	----	----	----
cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L		<0.0000050	----	----	----	----
calcium, dissolved	7440-70-2	E421	0.050	mg/L		35.9	----	----	----	----
chromium, dissolved	7440-47-3	E421	0.00050	mg/L		<0.00050	----	----	----	----
cobalt, dissolved	7440-48-4	E421	0.00010	mg/L		<0.00010	----	----	----	----
copper, dissolved	7440-50-8	E421	0.00050	mg/L		0.00428	----	----	----	----
iron, dissolved	7439-89-6	E421	0.030	mg/L		<0.030	----	----	----	----
lead, dissolved	7439-92-1	E421	0.000050	mg/L		0.000158	----	----	----	----
lithium, dissolved	7439-93-2	E421	0.0010	mg/L		<0.0010	----	----	----	----
magnesium, dissolved	7439-95-4	E421	0.100	mg/L		5.16	----	----	----	----
manganese, dissolved	7439-96-5	E421	0.00010	mg/L		0.00176	----	----	----	----
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L		0.00629	----	----	----	----
nickel, dissolved	7440-02-0	E421	0.00050	mg/L		<0.00050	----	----	----	----
potassium, dissolved	7440-09-7	E421	0.050	mg/L		1.02	----	----	----	----
selenium, dissolved	7782-49-2	E421	0.000050	mg/L		0.000634	----	----	----	----
silicon, dissolved	7440-21-3	E421	0.050	mg/L		3.23	----	----	----	----
silver, dissolved	7440-22-4	E421	0.000010	mg/L		<0.000010	----	----	----	----
sodium, dissolved	7440-23-5	E421	0.050	mg/L		7.22	----	----	----	----
strontium, dissolved	7440-24-6	E421	0.00020	mg/L		0.229	----	----	----	----
thallium, dissolved	7440-28-0	E421	0.000010	mg/L		<0.000010	----	----	----	----
tin, dissolved	7440-31-5	E421	0.00010	mg/L		<0.00010	----	----	----	----
titanium, dissolved	7440-32-6	E421	0.0100	mg/L		<0.0100	----	----	----	----
uranium, dissolved	7440-61-1	E421	0.000010	mg/L		0.000191	----	----	----	----
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L		0.00130	----	----	----	----
zinc, dissolved	7440-66-6	E421	0.0030	mg/L		<0.0030	----	----	----	----
dissolved metals filtration location	----	EP421	-	-		Field	----	----	----	----
Plant Pigments										
chlorophyll a	479-61-8	E870	0.010	µg/L		3.47	----	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA22C0064**	Page	: 1 of 10
Client	: **Mount Polley Mining Corporation**	Laboratory	: Vancouver - Environmental
Contact	: Kala Ivens	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: 250-790-2215 Ext 2112	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 26-Aug-2022 10:15
PO	: 5590008044 Q2 2022	Issue Date	: 08-Sep-2022 09:05
C-O-C number	: ----		
Sampler	: D. Schnurr, S. Latimer		
Site	: ----		
Quote number	: VA22-MPMC100-006 - Minnow Env. - Water Quality		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- Analysis Holding Time Outliers exist - please see following pages for full details.

Outliers : Frequency of Quality Control Samples

- Quality Control Sample Frequency Outliers occur - please see following pages for full details.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
POL-P2_WS_DI-1_2022-08	E298	25-Aug-2022	02-Sep-2022	----	----		03-Sep-2022	28 days	9 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE										
POL-P2_WS_DI-1_2022-08	E235.Cl	25-Aug-2022	28-Aug-2022	----	----		28-Aug-2022	28 days	3 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE										
POL-P2_WS_DI-1_2022-08	E378-U	25-Aug-2022	28-Aug-2022	----	----		28-Aug-2022	3 days	3 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE										
POL-P2_WS_DI-1_2022-08	E235.F	25-Aug-2022	28-Aug-2022	----	----		28-Aug-2022	28 days	3 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
POL-P2_WS_DI-1_2022-08	E235.NO3-L	25-Aug-2022	28-Aug-2022	3 days	3 days	✓	28-Aug-2022	3 days	0 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
POL-P2_WS_DI-1_2022-08	E235.NO2-L	25-Aug-2022	28-Aug-2022	----	----		28-Aug-2022	3 days	3 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
POL-P2_WS_DI-1_2022-08	E235.SO4	25-Aug-2022	28-Aug-2022	----	----		28-Aug-2022	28 days	3 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass dissolved (sulfuric acid) POL-P2_WS_DI-1_2022-08	E375-T	25-Aug-2022	02-Sep-2022	----	----		03-Sep-2022	28 days	9 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid) POL-P2_WS_DI-1_2022-08	E366	25-Aug-2022	02-Sep-2022	----	----		06-Sep-2022	28 days	12 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) POL-P2_WS_DI-1_2022-08	E372-U	25-Aug-2022	02-Sep-2022	----	----		06-Sep-2022	28 days	12 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) POL-P2_WS_DI-1_2022-08	E421	25-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	180 days	5 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) POL-P2_WS_DI-1_2022-08	E358-L	25-Aug-2022	02-Sep-2022	----	----		02-Sep-2022	28 days	8 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE POL-P2_WS_DI-1_2022-08	E290	25-Aug-2022	28-Aug-2022	----	----		28-Aug-2022	14 days	3 days	✓
Physical Tests : Conductivity in Water										
HDPE POL-P2_WS_DI-1_2022-08	E100	25-Aug-2022	28-Aug-2022	----	----		28-Aug-2022	28 days	3 days	✓
Physical Tests : pH by Meter										
HDPE POL-P2_WS_DI-1_2022-08	E108	25-Aug-2022	28-Aug-2022	----	----		28-Aug-2022	0.25 hrs	2.25 hrs	× EHTR-FM
Physical Tests : TDS by Gravimetry										
HDPE POL-P2_WS_DI-1_2022-08	E162	25-Aug-2022	----	----	----		31-Aug-2022	7 days	7 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : TSS by Gravimetry (Whole Bottle)										
HDPE [TSS-WB]										
POL-P2_WS_DI-1_2022-08	E164	25-Aug-2022	----	----	----		31-Aug-2022	7 days	6 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE										
POL-P2_WS_DI-1_2022-08	E121	25-Aug-2022	----	----	----		28-Aug-2022	3 days	3 days	✓
Plant Pigments : Chlorophyll-a by Fluorometry										
Opaque HDPE										
POL-P2_WS_DI-1_2022-08	E870	25-Aug-2022	26-Aug-2022	2 days	1 days	✓	31-Aug-2022	672 hrs	5 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved)										
POL-P2_WS_DI-1_2022-08	E420	25-Aug-2022	29-Aug-2022	----	----		01-Sep-2022	180 days	7 days	✓

Legend & Qualifier Definitions

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Alkalinity Species by Titration	E290	622347	1	10	10.0	5.0	✓
Ammonia by Fluorescence	E298	630773	1	20	5.0	5.0	✓
Chloride in Water by IC	E235.Cl	622341	1	18	5.5	5.0	✓
Conductivity in Water	E100	622346	1	12	8.3	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	623614	1	19	5.2	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	630769	1	14	7.1	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	622344	1	13	7.6	5.0	✓
Fluoride in Water by IC	E235.F	622340	1	8	12.5	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	622338	1	13	7.6	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	622339	1	18	5.5	5.0	✓
pH by Meter	E108	622345	1	11	9.0	5.0	✓
Sulfate in Water by IC	E235.SO4	622337	1	18	5.5	5.0	✓
TDS by Gravimetry	E162	628028	1	18	5.5	5.0	✓
Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)	E375-T	630772	1	1	100.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	621231	1	20	5.0	5.0	✓
Total Nitrogen by Colourimetry	E366	630774	1	1	100.0	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	630770	1	17	5.8	5.0	✓
Turbidity by Nephelometry	E121	622440	1	20	5.0	5.0	✓
Laboratory Control Samples (LCS)							
Alkalinity Species by Titration	E290	622347	1	10	10.0	5.0	✓
Ammonia by Fluorescence	E298	630773	1	20	5.0	5.0	✓
Chloride in Water by IC	E235.Cl	622341	1	18	5.5	5.0	✓
Chlorophyll-a by Fluorometry	E870	620673	1	1	100.0	5.0	✓
Conductivity in Water	E100	622346	1	12	8.3	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	623614	1	19	5.2	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	630769	1	14	7.1	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	622344	1	13	7.6	5.0	✓
Fluoride in Water by IC	E235.F	622340	1	8	12.5	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	622338	1	13	7.6	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	622339	1	18	5.5	5.0	✓
pH by Meter	E108	622345	1	11	9.0	5.0	✓
Sulfate in Water by IC	E235.SO4	622337	1	18	5.5	5.0	✓
TDS by Gravimetry	E162	628028	1	18	5.5	5.0	✓
Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)	E375-T	630772	1	1	100.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	621231	1	20	5.0	5.0	✓
Total Nitrogen by Colourimetry	E366	630774	1	1	100.0	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	630770	1	17	5.8	5.0	✓

Matrix: **Water**

Evaluation: ✗ = QC frequency outside specification; ✓ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Control Samples (LCS) - Continued							
TSS by Gravimetry (Whole Bottle)	E164	627200	1	20	5.0	5.0	✓
Turbidity by Nephelometry	E121	622440	1	20	5.0	5.0	✓
Method Blanks (MB)							
Alkalinity Species by Titration	E290	622347	1	10	10.0	5.0	✓
Ammonia by Fluorescence	E298	630773	1	20	5.0	5.0	✓
Chloride in Water by IC	E235.Cl	622341	1	18	5.5	5.0	✓
Chlorophyll-a by Fluorometry	E870	620673	1	1	100.0	5.0	✓
Conductivity in Water	E100	622346	1	12	8.3	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	623614	1	19	5.2	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	630769	1	14	7.1	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	622344	1	13	7.6	5.0	✓
Fluoride in Water by IC	E235.F	622340	1	8	12.5	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	622338	1	13	7.6	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	622339	1	18	5.5	5.0	✓
Sulfate in Water by IC	E235.SO4	622337	1	18	5.5	5.0	✓
TDS by Gravimetry	E162	628028	1	18	5.5	5.0	✓
Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)	E375-T	630772	1	1	100.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	621231	1	20	5.0	5.0	✓
Total Nitrogen by Colourimetry	E366	630774	1	1	100.0	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	630770	1	17	5.8	5.0	✓
TSS by Gravimetry (Whole Bottle)	E164	627200	1	20	5.0	5.0	✓
Turbidity by Nephelometry	E121	622440	1	20	5.0	5.0	✓
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	630773	1	20	5.0	5.0	✓
Chloride in Water by IC	E235.Cl	622341	1	18	5.5	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	623614	1	19	5.2	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	630769	1	14	7.1	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	622344	1	13	7.6	5.0	✓
Fluoride in Water by IC	E235.F	622340	1	8	12.5	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	622338	1	13	7.6	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	622339	1	18	5.5	5.0	✓
Sulfate in Water by IC	E235.SO4	622337	1	18	5.5	5.0	✓
Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)	E375-T	630772	0	1	0.0	5.0	✗
Total Metals in Water by CRC ICPMS	E420	621231	1	20	5.0	5.0	✓
Total Nitrogen by Colourimetry	E366	630774	0	1	0.0	5.0	✗
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	630770	1	17	5.8	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Conductivity in Water	E100 Vancouver - Environmental	Water	APHA 2510 (mod)	Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a water sample. Conductivity measurements are temperature-compensated to 25°C.
pH by Meter	E108 Vancouver - Environmental	Water	APHA 4500-H (mod)	pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally 20 ± 5°C). For high accuracy test results, pH should be measured in the field within the recommended 15 minute hold time.
Turbidity by Nephelometry	E121 Vancouver - Environmental	Water	APHA 2130 B (mod)	Turbidity is measured by the nephelometric method, by measuring the intensity of light scatter under defined conditions.
TDS by Gravimetry	E162 Vancouver - Environmental	Water	APHA 2540 C (mod)	Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, with evaporation of the filtrate at 180 ± 2°C for 16 hours or to constant weight, with gravimetric measurement of the residue.
TSS by Gravimetry (Whole Bottle)	E164 Vancouver - Environmental	Water	APHA 2540 D (mod)	Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, following by drying of the filter at 104 ± 1°C, with gravimetric measurement of the filtered solids. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.
Chloride in Water by IC	E235.Cl Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Fluoride in Water by IC	E235.F Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrite in Water by IC (Low Level)	E235.NO2-L Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrate in Water by IC (Low Level)	E235.NO3-L Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Sulfate in Water by IC	E235.SO4 Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Alkalinity Species by Titration	E290 Vancouver - Environmental	Water	APHA 2320 B (mod)	Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.
Ammonia by Fluorescence	E298 Vancouver - Environmental	Water	Method Fialab 100, 2018	Ammonia in water is determined by automated continuous flow analysis with membrane diffusion and fluorescence detection, after reaction with OPA (ortho-phthalaldehyde). This method is approved under US EPA 40 CFR Part 136 (May 2021)
Dissolved Organic Carbon by Combustion (Low Level)	E358-L Vancouver - Environmental	Water	APHA 5310 B (mod)	Dissolved Organic Carbon (Non-Purgeable), also known as NPOC (dissolved), is a direct measurement of DOC after a filtered (0.45 micron) sample has been acidified and purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of DC (dissolved carbon) is comprised of IC (which is common), this method is more accurate and more reliable than the DOC by subtraction method (i.e. DC minus DIC).
Total Nitrogen by Colourimetry	E366 Vancouver - Environmental	Water	APHA 4500-P J (mod)	Total Nitrogen is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U Vancouver - Environmental	Water	APHA 4500-P E (mod).	Total Phosphorus is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)	E375-T Vancouver - Environmental	Water	APHA 4500-P E (mod).	Total Dissolved Phosphorus is determined colourimetrically using a discrete analyzer after filtration through a 0.45 micron filter followed by heated persulfate digestion of the sample.
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U Vancouver - Environmental	Water	APHA 4500-P F (mod)	Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter. Field filtration is recommended to ensure test results represent conditions at time of sampling.
Total Metals in Water by CRC ICPMS	E420 Vancouver - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Dissolved Metals in Water by CRC ICPMS	E421 Vancouver - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Chlorophyll-a by Fluorometry	E870 Vancouver - Environmental	Water	EPA 445.0 (mod)	Chlorophyll a is determined by solvent extraction followed with analysis by fluorometry using the non-acidification procedure. This method is not subject to interferences from chlorophyll b.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Hardness (Calculated)	EC100 Vancouver - Environmental	Water	APHA 2340B	"Hardness (as CaCO3), dissolved" is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.
Hardness (Calculated) from Total Ca/Mg	EC100A Vancouver - Environmental	Water	APHA 2340B	"Hardness (as CaCO3), from total Ca/Mg" is calculated from the sum of total Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations. Hardness from total Ca/Mg is normally comparable to Dissolved Hardness in non-turbid waters.
Nitrate and Nitrite (as N) (Calculation)	EC235.N+N Vancouver - Environmental	Water	EPA 300.0	Nitrate and Nitrite (as N) is a calculated parameter. Nitrate and Nitrite (as N) = Nitrite (as N) + Nitrate (as N).

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Ammonia	EP298 Vancouver - Environmental	Water		Sample preparation for Preserved Nutrients Water Quality Analysis.
Preparation for Dissolved Organic Carbon for Combustion	EP358 Vancouver - Environmental	Water	APHA 5310 B (mod)	Preparation for Dissolved Organic Carbon
Digestion for Total Nitrogen in water	EP366 Vancouver - Environmental	Water	APHA 4500-P J (mod)	Samples are heated with a persulfate digestion reagent.
Digestion for Total Phosphorus in water	EP372 Vancouver - Environmental	Water	APHA 4500-P E (mod).	Samples are heated with a persulfate digestion reagent.
Digestion for Dissolved Phosphorus in water	EP375 Vancouver - Environmental	Water	APHA 4500-P E (mod).	Samples are filtered through a 0.45 micron membrane filter and then heated with a persulfate digestion reagent.
Dissolved Metals Water Filtration	EP421 Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.
Chlorophyll-a Extraction	EP870 Vancouver - Environmental	Water	EPA 445.0 (mod)	Chlorophyll-a solvent extraction.

QUALITY CONTROL REPORT

Work Order	: **VA22C0064**	Page	: 1 of 15
Client	: Mount Polley Mining Corporation	Laboratory	: Vancouver - Environmental
Contact	: Kala Ivens	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: 250-790-2215 Ext 2112	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 26-Aug-2022 10:15
PO	: 5590008044 Q2 2022	Date Analysis Commenced	: 26-Aug-2022
C-O-C number	: ----	Issue Date	: 08-Sep-2022 09:06
Sampler	: D. Schnurr, S. Latimer		
Site	: ----		
Quote number	: VA22-MPMC100-006 - Minnow Env. - Water Quality		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Angelo Salandanan	Lab Assistant	Vancouver Metals, Burnaby, British Columbia
Cindy Tang	Team Leader - Inorganics	Vancouver Inorganics, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Vancouver Metals, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Vancouver Metals, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Vancouver Inorganics, Burnaby, British Columbia
Sukhman Khosa	Lab Assistant	Vancouver Metals, Burnaby, British Columbia

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 622345)											
KS2203176-001	Anonymous	pH	----	E108	0.10	pH units	8.10	8.10	0.00%	4%	----
Physical Tests (QC Lot: 622346)											
KS2203176-001	Anonymous	conductivity	----	E100	2.0	µS/cm	334	332	0.601%	10%	----
Physical Tests (QC Lot: 622347)											
KS2203176-001	Anonymous	alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	89.3	89.2	0.112%	20%	----
Physical Tests (QC Lot: 622440)											
FJ2202342-001	Anonymous	turbidity	----	E121	0.10	NTU	0.60	0.57	0.03	Diff <2x LOR	----
Physical Tests (QC Lot: 628028)											
KS2203171-001	Anonymous	solids, total dissolved [TDS]	----	E162	20	mg/L	1910	2000	4.56%	20%	----
Anions and Nutrients (QC Lot: 622337)											
FJ2202340-007	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	6.00	mg/L	73.8	72.2	2.23%	20%	----
Anions and Nutrients (QC Lot: 622338)											
FJ2202340-007	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	0.100	mg/L	<0.100	<0.100	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 622339)											
FJ2202340-007	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	0.0200	mg/L	<0.0200	<0.0200	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 622340)											
FJ2202340-007	Anonymous	fluoride	16984-48-8	E235.F	0.400	mg/L	<0.400	<0.400	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 622341)											
FJ2202340-007	Anonymous	chloride	16887-00-6	E235.Cl	10.0	mg/L	45.4	44.5	0.99	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 622344)											
VA22B9971-017	Anonymous	phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 630770)											
VA22C0064-001	POL-P2_WS_DI-1_2022-08	phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.0134	0.0134	0.00008	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 630772)											
VA22C0064-001	POL-P2_WS_DI-1_2022-08	phosphorus, total dissolved	7723-14-0	E375-T	0.0020	mg/L	0.0059	0.0058	0.00008	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 630773)											
VA22C0064-001	POL-P2_WS_DI-1_2022-08	ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.0107	0.0105	0.0002	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 630774)											
VA22C0064-001	POL-P2_WS_DI-1_2022-08	nitrogen, total	7727-37-9	E366	0.030	mg/L	0.388	0.354	9.01%	20%	----

Sub-Matrix: **Water**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Laboratory Duplicate (DUP) Report						
					LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Organic / Inorganic Carbon (QC Lot: 630769)											
VA22C0064-001	POL-P2_WS_DI-1_2022-08	carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L	7.40	7.74	4.55%	20%	----
Total Metals (QC Lot: 621231)											
KS2203144-002	Anonymous	aluminum, total	7429-90-5	E420	0.0030	mg/L	<0.0030	<0.0030	0	Diff <2x LOR	----
		antimony, total	7440-36-0	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00020	0.00020	0.0000002	Diff <2x LOR	----
		barium, total	7440-39-3	E420	0.00010	mg/L	0.0555	0.0568	2.42%	20%	----
		beryllium, total	7440-41-7	E420	0.000020	mg/L	<0.000020	<0.000020	0	Diff <2x LOR	----
		bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, total	7440-42-8	E420	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		cadmium, total	7440-43-9	E420	0.0000050	mg/L	0.0000507	0.0000499	1.51%	20%	----
		calcium, total	7440-70-2	E420	0.050	mg/L	58.0	55.7	3.96%	20%	----
		chromium, total	7440-47-3	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		cobalt, total	7440-48-4	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		copper, total	7440-50-8	E420	0.00050	mg/L	0.0188	0.0185	1.42%	20%	----
		iron, total	7439-89-6	E420	0.010	mg/L	0.028	0.028	0.0003	Diff <2x LOR	----
		lead, total	7439-92-1	E420	0.000050	mg/L	0.000142	0.000144	0.000001	Diff <2x LOR	----
		lithium, total	7439-93-2	E420	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
		magnesium, total	7439-95-4	E420	0.0050	mg/L	12.3	12.0	2.02%	20%	----
		manganese, total	7439-96-5	E420	0.00010	mg/L	0.00122	0.00115	6.21%	20%	----
		molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.00898	0.00927	3.20%	20%	----
		nickel, total	7440-02-0	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		potassium, total	7440-09-7	E420	0.050	mg/L	2.88	2.79	3.37%	20%	----
		selenium, total	7782-49-2	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		silicon, total	7440-21-3	E420	0.10	mg/L	5.94	5.81	2.16%	20%	----
		silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, total	7440-23-5	E420	0.050	mg/L	11.0	10.4	4.73%	20%	----
		strontium, total	7440-24-6	E420	0.00020	mg/L	0.590	0.606	2.62%	20%	----
		thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		titanium, total	7440-32-6	E420	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
		uranium, total	7440-61-1	E420	0.000010	mg/L	0.00556	0.00566	1.78%	20%	----
		vanadium, total	7440-62-2	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		zinc, total	7440-66-6	E420	0.0030	mg/L	0.0042	0.0041	0.0001	Diff <2x LOR	----
Dissolved Metals (QC Lot: 623614)											

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Dissolved Metals (QC Lot: 623614) - continued											
VA22C0064-001	POL-P2_WS_DI-1_2022-08	aluminum, dissolved	7429-90-5	E421	0.0030	mg/L	0.0037	0.0038	0.0001	Diff <2x LOR	----
		antimony, dissolved	7440-36-0	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00052	0.00052	0.000004	Diff <2x LOR	----
		barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.00958	0.00978	2.04%	20%	----
		beryllium, dissolved	7440-41-7	E421	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, dissolved	7440-42-8	E421	0.010	mg/L	0.020	0.019	0.0008	Diff <2x LOR	----
		cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	<0.0000050	0.0000054	0.0000004	Diff <2x LOR	----
		calcium, dissolved	7440-70-2	E421	0.050	mg/L	35.9	35.0	2.39%	20%	----
		chromium, dissolved	7440-47-3	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		copper, dissolved	7440-50-8	E421	0.00050	mg/L	0.00428	0.00430	0.00002	Diff <2x LOR	----
		iron, dissolved	7439-89-6	E421	0.030	mg/L	<0.030	<0.030	0	Diff <2x LOR	----
		lead, dissolved	7439-92-1	E421	0.000050	mg/L	0.000158	0.000160	0.000002	Diff <2x LOR	----
		lithium, dissolved	7439-93-2	E421	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
		magnesium, dissolved	7439-95-4	E421	0.100	mg/L	5.16	5.29	2.37%	20%	----
		manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.00176	0.00173	1.42%	20%	----
		molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.00629	0.00649	3.11%	20%	----
		nickel, dissolved	7440-02-0	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		potassium, dissolved	7440-09-7	E421	0.050	mg/L	1.02	1.02	0.0908%	20%	----
		selenium, dissolved	7782-49-2	E421	0.000050	mg/L	0.000634	0.000592	6.86%	20%	----
		silicon, dissolved	7440-21-3	E421	0.050	mg/L	3.23	3.22	0.450%	20%	----
		silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, dissolved	7440-23-5	E421	0.050	mg/L	7.22	7.26	0.488%	20%	----
		strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.229	0.238	3.65%	20%	----
		thallium, dissolved	7440-28-0	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		tin, dissolved	7440-31-5	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		titanium, dissolved	7440-32-6	E421	0.0100	mg/L	<0.0100	<0.0100	0	Diff <2x LOR	----
		uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.000191	0.000183	3.99%	20%	----
		vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	0.00130	0.00130	0.0000002	Diff <2x LOR	----
		zinc, dissolved	7440-66-6	E421	0.0030	mg/L	<0.0030	<0.0030	0	Diff <2x LOR	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 622346)						
conductivity	----	E100	1	µS/cm	<1.0	----
Physical Tests (QCLot: 622347)						
alkalinity, total (as CaCO3)	----	E290	1	mg/L	1.1	----
Physical Tests (QCLot: 622440)						
turbidity	----	E121	0.1	NTU	<0.10	----
Physical Tests (QCLot: 627200)						
solids, total suspended [TSS]	----	E164	1	mg/L	<1.0	----
Physical Tests (QCLot: 628028)						
solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Anions and Nutrients (QCLot: 622337)						
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 622338)						
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 622339)						
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 622340)						
fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 622341)						
chloride	16887-00-6	E235.Cl	0.5	mg/L	<0.50	----
Anions and Nutrients (QCLot: 622344)						
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 630770)						
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----
Anions and Nutrients (QCLot: 630772)						
phosphorus, total dissolved	7723-14-0	E375-T	0.002	mg/L	<0.0020	----
Anions and Nutrients (QCLot: 630773)						
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 630774)						
nitrogen, total	7727-37-9	E366	0.03	mg/L	<0.030	----
Organic / Inorganic Carbon (QCLot: 630769)						
carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	<0.50	----
Total Metals (QCLot: 621231)						
aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 621231) - continued						
antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
chromium, total	7440-47-3	E420	0.0005	mg/L	<0.00050	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	----
magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	----
manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
silicon, total	7440-21-3	E420	0.1	mg/L	<0.10	----
silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	----
sodium, total	7440-23-5	E420	0.05	mg/L	<0.050	----
strontium, total	7440-24-6	E420	0.0002	mg/L	<0.00020	----
thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----
tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----
uranium, total	7440-61-1	E420	0.00001	mg/L	<0.000010	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	<0.00050	----
zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	----
Dissolved Metals (QCLot: 623614)						
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	<0.0010	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	<0.00010	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	<0.00010	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	<0.00010	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	<0.000020	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 623614) - continued						
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	<0.000050	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	<0.010	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	<0.0000050	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	<0.050	----
chromium, dissolved	7440-47-3	E421	0.0005	mg/L	<0.00050	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	<0.000050	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	<0.050	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	<0.000010	----
sodium, dissolved	7440-23-5	E421	0.05	mg/L	<0.050	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	<0.00020	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	<0.000010	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	<0.00050	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	<0.0010	----
Plant Pigments (QCLot: 620673)						
chlorophyll a	479-61-8	E870	0.01	µg/L	<0.010	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 622345)									
pH	----	E108	----	pH units	7 pH units	100	98.0	102	----
Physical Tests (QCLot: 622346)									
conductivity	----	E100	1	µS/cm	146.9 µS/cm	98.2	90.0	110	----
Physical Tests (QCLot: 622347)									
alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	110	85.0	115	----
Physical Tests (QCLot: 622440)									
turbidity	----	E121	0.1	NTU	200 NTU	103	85.0	115	----
Physical Tests (QCLot: 627200)									
solids, total suspended [TSS]	----	E164	1	mg/L	150 mg/L	97.2	85.0	115	----
Physical Tests (QCLot: 628028)									
solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	106	85.0	115	----
Anions and Nutrients (QCLot: 622337)									
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	104	90.0	110	----
Anions and Nutrients (QCLot: 622338)									
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 622339)									
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	99.7	90.0	110	----
Anions and Nutrients (QCLot: 622340)									
fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	99.9	90.0	110	----
Anions and Nutrients (QCLot: 622341)									
chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 622344)									
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	0.03 mg/L	103	80.0	120	----
Anions and Nutrients (QCLot: 630770)									
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	0.05 mg/L	93.7	80.0	120	----
Anions and Nutrients (QCLot: 630772)									
phosphorus, total dissolved	7723-14-0	E375-T	0.002	mg/L	0.05 mg/L	89.4	80.0	120	----
Anions and Nutrients (QCLot: 630773)									
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	89.2	85.0	115	----
Anions and Nutrients (QCLot: 630774)									
nitrogen, total	7727-37-9	E366	0.03	mg/L	0.5 mg/L	102	75.0	125	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Organic / Inorganic Carbon (QCLot: 630769)									
carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	8.57 mg/L	101	80.0	120	----
Total Metals (QCLot: 621231)									
aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	110	80.0	120	----
antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	116	80.0	120	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	106	80.0	120	----
barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	105	80.0	120	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	101	80.0	120	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	103	80.0	120	----
boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	96.8	80.0	120	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	98.0	80.0	120	----
calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	103	80.0	120	----
chromium, total	7440-47-3	E420	0.0005	mg/L	0.25 mg/L	104	80.0	120	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	103	80.0	120	----
copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	104	80.0	120	----
iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	102	80.0	120	----
lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	107	80.0	120	----
lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	99.0	80.0	120	----
magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	107	80.0	120	----
manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	104	80.0	120	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	106	80.0	120	----
nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	103	80.0	120	----
potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	113	80.0	120	----
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	105	80.0	120	----
silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	107	80.0	120	----
silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	103	80.0	120	----
sodium, total	7440-23-5	E420	0.05	mg/L	50 mg/L	105	80.0	120	----
strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	113	80.0	120	----
thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	108	80.0	120	----
tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	97.5	80.0	120	----
titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	102	80.0	120	----
uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	101	80.0	120	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	105	80.0	120	----
zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	103	80.0	120	----
Dissolved Metals (QCLot: 623614)									
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	105	80.0	120	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	104	80.0	120	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 623614) - continued									
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	104	80.0	120	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	94.9	80.0	120	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	96.1	80.0	120	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	104	80.0	120	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	88.8	80.0	120	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	103	80.0	120	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	99.6	80.0	120	----
chromium, dissolved	7440-47-3	E421	0.0005	mg/L	0.25 mg/L	104	80.0	120	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	100	80.0	120	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	101	80.0	120	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	109	80.0	120	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	102	80.0	120	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	94.4	80.0	120	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	104	80.0	120	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	102	80.0	120	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	101	80.0	120	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	101	80.0	120	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	103	80.0	120	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	103	80.0	120	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	104	80.0	120	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	93.9	80.0	120	----
sodium, dissolved	7440-23-5	E421	0.05	mg/L	50 mg/L	106	80.0	120	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	101	80.0	120	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	106	80.0	120	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	99.7	80.0	120	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	102	80.0	120	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	103	80.0	120	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	104	80.0	120	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	104	80.0	120	----
Plant Pigments (QCLot: 620673)									
chlorophyll a	479-61-8	E870	0.01	µg/L	5 µg/L	90.2	80.0	120	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 622337)										
VA22B9992-001	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	106 mg/L	100 mg/L	106	75.0	125	----
Anions and Nutrients (QCLot: 622338)										
VA22B9992-001	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	2.64 mg/L	2.5 mg/L	106	75.0	125	----
Anions and Nutrients (QCLot: 622339)										
VA22B9992-001	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	0.516 mg/L	0.5 mg/L	103	75.0	125	----
Anions and Nutrients (QCLot: 622340)										
VA22B9992-001	Anonymous	fluoride	16984-48-8	E235.F	1.05 mg/L	1 mg/L	105	75.0	125	----
Anions and Nutrients (QCLot: 622341)										
VA22B9992-001	Anonymous	chloride	16887-00-6	E235.Cl	105 mg/L	100 mg/L	105	75.0	125	----
Anions and Nutrients (QCLot: 622344)										
VA22B9991-001	Anonymous	phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0280 mg/L	0.03 mg/L	93.3	70.0	130	----
Anions and Nutrients (QCLot: 630770)										
VA22C0101-010	Anonymous	phosphorus, total	7723-14-0	E372-U	4.66 mg/L	5 mg/L	93.1	70.0	130	----
Anions and Nutrients (QCLot: 630773)										
VA22C0101-010	Anonymous	ammonia, total (as N)	7664-41-7	E298	0.0942 mg/L	0.1 mg/L	94.2	75.0	125	----
Organic / Inorganic Carbon (QCLot: 630769)										
WR2200953-001	Anonymous	carbon, dissolved organic [DOC]	----	E358-L	5.01 mg/L	5 mg/L	100	70.0	130	----
Total Metals (QCLot: 621231)										
KS2203144-004	Anonymous	aluminum, total	7429-90-5	E420	0.182 mg/L	0.2 mg/L	91.2	70.0	130	----
		antimony, total	7440-36-0	E420	0.0194 mg/L	0.02 mg/L	97.2	70.0	130	----
		arsenic, total	7440-38-2	E420	0.0182 mg/L	0.02 mg/L	91.3	70.0	130	----
		barium, total	7440-39-3	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		beryllium, total	7440-41-7	E420	0.0370 mg/L	0.04 mg/L	92.4	70.0	130	----
		bismuth, total	7440-69-9	E420	0.00915 mg/L	0.01 mg/L	91.5	70.0	130	----
		boron, total	7440-42-8	E420	0.091 mg/L	0.1 mg/L	91.4	70.0	130	----
		cadmium, total	7440-43-9	E420	0.00359 mg/L	0.004 mg/L	89.8	70.0	130	----
		calcium, total	7440-70-2	E420	ND mg/L	4 mg/L	ND	70.0	130	----
		chromium, total	7440-47-3	E420	0.0360 mg/L	0.04 mg/L	89.9	70.0	130	----
		cobalt, total	7440-48-4	E420	0.0179 mg/L	0.02 mg/L	89.4	70.0	130	----
		copper, total	7440-50-8	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Total Metals (QCLot: 621231) - continued										
KS2203144-004	Anonymous	iron, total	7439-89-6	E420	1.81 mg/L	2 mg/L	90.4	70.0	130	----
		lead, total	7439-92-1	E420	0.0190 mg/L	0.02 mg/L	95.1	70.0	130	----
		lithium, total	7439-93-2	E420	0.0892 mg/L	0.1 mg/L	89.2	70.0	130	----
		magnesium, total	7439-95-4	E420	ND mg/L	1 mg/L	ND	70.0	130	----
		manganese, total	7439-96-5	E420	0.0180 mg/L	0.02 mg/L	90.2	70.0	130	----
		molybdenum, total	7439-98-7	E420	0.0194 mg/L	0.02 mg/L	97.2	70.0	130	----
		nickel, total	7440-02-0	E420	0.0357 mg/L	0.04 mg/L	89.4	70.0	130	----
		potassium, total	7440-09-7	E420	3.64 mg/L	4 mg/L	90.9	70.0	130	----
		selenium, total	7782-49-2	E420	0.0371 mg/L	0.04 mg/L	92.8	70.0	130	----
		silicon, total	7440-21-3	E420	8.53 mg/L	10 mg/L	85.3	70.0	130	----
		silver, total	7440-22-4	E420	0.00390 mg/L	0.004 mg/L	97.6	70.0	130	----
		sodium, total	7440-23-5	E420	ND mg/L	2 mg/L	ND	70.0	130	----
		strontium, total	7440-24-6	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		thallium, total	7440-28-0	E420	0.00368 mg/L	0.004 mg/L	92.1	70.0	130	----
		tin, total	7440-31-5	E420	0.0182 mg/L	0.02 mg/L	91.0	70.0	130	----
		titanium, total	7440-32-6	E420	0.0361 mg/L	0.04 mg/L	90.3	70.0	130	----
		uranium, total	7440-61-1	E420	ND mg/L	0.004 mg/L	ND	70.0	130	----
		vanadium, total	7440-62-2	E420	0.0920 mg/L	0.1 mg/L	92.0	70.0	130	----
		zinc, total	7440-66-6	E420	0.360 mg/L	0.4 mg/L	90.0	70.0	130	----
Dissolved Metals (QCLot: 623614)										
VA22C0053-001	Anonymous	aluminum, dissolved	7429-90-5	E421	0.203 mg/L	0.2 mg/L	101	70.0	130	----
		antimony, dissolved	7440-36-0	E421	0.0196 mg/L	0.02 mg/L	98.3	70.0	130	----
		arsenic, dissolved	7440-38-2	E421	0.0216 mg/L	0.02 mg/L	108	70.0	130	----
		barium, dissolved	7440-39-3	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		beryllium, dissolved	7440-41-7	E421	0.0384 mg/L	0.04 mg/L	95.9	70.0	130	----
		bismuth, dissolved	7440-69-9	E421	0.00872 mg/L	0.01 mg/L	87.2	70.0	130	----
		boron, dissolved	7440-42-8	E421	0.085 mg/L	0.1 mg/L	85.5	70.0	130	----
		cadmium, dissolved	7440-43-9	E421	0.00377 mg/L	0.004 mg/L	94.3	70.0	130	----
		calcium, dissolved	7440-70-2	E421	ND mg/L	4 mg/L	ND	70.0	130	----
		chromium, dissolved	7440-47-3	E421	0.0387 mg/L	0.04 mg/L	96.7	70.0	130	----
		cobalt, dissolved	7440-48-4	E421	0.0185 mg/L	0.02 mg/L	92.6	70.0	130	----
		copper, dissolved	7440-50-8	E421	0.0176 mg/L	0.02 mg/L	88.2	70.0	130	----
		iron, dissolved	7439-89-6	E421	1.83 mg/L	2 mg/L	91.7	70.0	130	----
		lead, dissolved	7439-92-1	E421	0.0184 mg/L	0.02 mg/L	91.8	70.0	130	----
		lithium, dissolved	7439-93-2	E421	0.0933 mg/L	0.1 mg/L	93.3	70.0	130	----
		magnesium, dissolved	7439-95-4	E421	ND mg/L	1 mg/L	ND	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Dissolved Metals (QCLot: 623614) - continued										
VA22C0053-001	Anonymous	manganese, dissolved	7439-96-5	E421	0.0199 mg/L	0.02 mg/L	99.7	70.0	130	----
		molybdenum, dissolved	7439-98-7	E421	0.0205 mg/L	0.02 mg/L	102	70.0	130	----
		nickel, dissolved	7440-02-0	E421	0.0368 mg/L	0.04 mg/L	92.0	70.0	130	----
		potassium, dissolved	7440-09-7	E421	ND mg/L	4 mg/L	ND	70.0	130	----
		selenium, dissolved	7782-49-2	E421	0.0447 mg/L	0.04 mg/L	112	70.0	130	----
		silicon, dissolved	7440-21-3	E421	ND mg/L	10 mg/L	ND	70.0	130	----
		silver, dissolved	7440-22-4	E421	0.00364 mg/L	0.004 mg/L	91.0	70.0	130	----
		sodium, dissolved	7440-23-5	E421	ND mg/L	2 mg/L	ND	70.0	130	----
		strontium, dissolved	7440-24-6	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		thallium, dissolved	7440-28-0	E421	0.00366 mg/L	0.004 mg/L	91.6	70.0	130	----
		tin, dissolved	7440-31-5	E421	0.0192 mg/L	0.02 mg/L	96.1	70.0	130	----
		titanium, dissolved	7440-32-6	E421	0.0400 mg/L	0.04 mg/L	100	70.0	130	----
		uranium, dissolved	7440-61-1	E421	ND mg/L	0.004 mg/L	ND	70.0	130	----
		vanadium, dissolved	7440-62-2	E421	0.102 mg/L	0.1 mg/L	102	70.0	130	----
		zinc, dissolved	7440-66-6	E421	0.383 mg/L	0.4 mg/L	95.7	70.0	130	----

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Affix ALS barcode label here (lab use only)

COC Number:

Page 1 of 1

Report To	Contact and company name below will appear on the final report
Company:	Mount Polley Mining Corporation
Contact:	Gabriel Holmes
Phone:	238-317-4939
	Company address below will appear on the final report
Street:	PO Box 12
City/Province:	Likely, BC
Postal Code:	V0L 1N0
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☐ NO
Company:	
Contact:	

Report Format / Distribution

Select Report Format: ☑ ☑ EXCEL ☐ EDD (DIGITAL)
Quality Control (QC) Report with Report ☑ YES ☐ NO
☐ Compare Results to Criteria on Report - provide details below if box checked
Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax: gabriel.holmes@mountpolley.com
Email 2: kala.ivens@mountpolley.com, pschnurr@minnow.ca
Email 3: pstecko@minnow.ca; kbatchelar@minnow.ca

Invoice Distribution

Select Invoice Distribution: ☑ EMAIL ☑ MAIL ☐ FAX
Email 1 or Fax: gabriel.holmes@mountpolley.com
Email 2:

Project Information

ALS Account # / Quote #: VA22-MPMC100-006
Job #:
PO / AFE:
LSD:

Oil and Gas Required Fields (client use)

AFE/Cost Center: PO#
Major/Minor Code: Routing Code:
Requisitioner:
Location:

ALS Lab Work Order # (lab use only): VA22C0064
ALS Contact: Can Dang
Sampler: D Schnurr S Lahmer

Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply

Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days): 4 day [P4] ☐ | 3 day [P3] ☐ | 2 day [P2] ☐
EMERGENCY: 1 Business day [E1] ☐ | Same Day, Weekend or Statutory holiday [E0] ☐

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm

For tests that can not be performed according to the service level selected, you will be contacted.

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUTRIENTS-1	Total Metals (ICPMS)	Dissolved Metals (ICPMS)	Total Nitrogen Ammonia	DOC	TSS (Whole bottle)	Chlorophyll a (E8708)	Number of Containers
	~~POL-P2_WS_DI-1_2022-08~~	~~Aug-22~~		~~Water~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	R		~~6~~
1	POL-P2_WS_DI-1_2022-08	25-Aug-22	10:55	Water	R	R	R	R	R	R	R	7
	~~WS_DI-2_2022-08~~	~~Aug-22~~		~~Water~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	R		~~6~~

Environmental Division Vancouver
Work Order Reference
VA22C0064

Telephone : +1 604 253 4188

Drinking Water (DW) Samples[1] (client u

Are samples taken from a Regulated DW System?
☐ NO

Are samples for human drinking water use?
☐ NO

dd on report by clicking on the drop-down list below
tronic COC only)

Regular analytes for Mount Polley Mine water sample package. Please also report ANIONS-N+N-CALC-VA (calculated nitrate and nitrite)

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐
Ice Packs ☒ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐
Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
			6.5	10	6

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: S.Lahmer	Date: 25 Aug 22	Time: 11:40	Received by:	Date:	Time:	Received by: JC	Date: AUG 26 2022	Time: 1015am

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

OCTOBER 2015 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form**.

WATER CHEMISTRY

ALS Laboratory Report VA22C0091

(Finalized September 6, 2022)

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **VA22C0091**	Page	: 1 of 17
Client	: **Mount Polley Mining Corporation**	Laboratory	: Vancouver - Environmental
Contact	: Kala Ivens	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: 250-790-2215 Ext 2112	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 26-Aug-2022 10:15
PO	: 5590008044 Q2 2022	Date Analysis Commenced	: 26-Aug-2022
C-O-C number	: ----	Issue Date	: 06-Sep-2022 14:19
Sampler	: D. Schnurr, S. Latimer		
Site	: ----		
Quote number	: VA22-MPMC100-006 - Minnow Env. - Water Quality		
No. of samples received	: 22		
No. of samples analysed	: 22		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Angelo Salandanan	Lab Assistant	Metals, Burnaby, British Columbia
Delson Resende	Lab Assistant	Metals, Burnaby, British Columbia
Greg Pokocky	Supervisor - Inorganic	Inorganics, Waterloo, Ontario
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Lindsay Gung	Supervisor - Water Chemistry	Inorganics, Burnaby, British Columbia
Miles Gropen	Department Manager - Inorganics	Inorganics, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Inorganics, Burnaby, British Columbia
Sukhman Khosa	Lab Assistant	Metals, Burnaby, British Columbia

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

Unit	*Description*
-	No Unit
µS/cm	Microsiemens per centimetre
mg/L	milligrams per litre
NTU	nephelometric turbidity units
pH units	pH units

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Workorder Comments

For sample POL_WS_1X_2022_08 total nutrients bottle is received empty, analysis will be carried out from the sub sample.

Qualifiers

Qualifier	*Description*
DLM	*Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).*
DTC	*Dissolved concentration exceeds total. Results were confirmed by re-analysis.*
DTMF	*Dissolved concentration exceeds total for field-filtered metals sample. Metallic contaminants may have been introduced to dissolved sample during field filtration.*

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	QUL-LNF1_WS-1_2022-08	QUL-LNF1_WS-2_2022-08	QUL-LNF1_WS-3_2022-08	QUL-LNF1_WS-4_2022-08	QUL-LNF1_WS-5_2022-08
					Client sampling date / time	24-Aug-2022 07:05	24-Aug-2022 07:20	24-Aug-2022 07:40	24-Aug-2022 08:00	24-Aug-2022 08:20
						VA22C0091-001	VA22C0091-002	VA22C0091-003	VA22C0091-004	VA22C0091-005
						Result	Result	Result	Result	Result
Physical Tests										
alkalinity, total (as CaCO3)	----	E290	1.0	mg/L		43.5	43.4	43.7	43.8	43.7
conductivity	----	E100	2.0	µS/cm		101	99.7	99.4	99.9	100
hardness (as CaCO3), dissolved	----	EC100	0.50	mg/L		46.9	47.6	48.3	48.2	47.7
hardness (as CaCO3), from total Ca/Mg	----	EC100A	0.50	mg/L		48.8	49.2	48.4	48.4	48.8
pH	----	E108	0.10	pH units		7.96	7.97	7.98	7.98	7.97
solids, total dissolved [TDS]	----	E162	10	mg/L		68	68	69	67	72
solids, total suspended [TSS]	----	E164	1.0	mg/L		<1.0	<1.0	<1.0	<1.0	<1.0
turbidity	----	E121	0.10	NTU		0.25	0.22	0.24	0.19	0.29
Anions and Nutrients										
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L		0.0107	0.0051	0.0076	0.0095	<0.0050
chloride	16887-00-6	E235.Cl	0.50	mg/L		<0.50	<0.50	<0.50	<0.50	<0.50
fluoride	16984-48-8	E235.F	0.020	mg/L		0.035	0.034	0.034	0.034	0.034
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L		0.0131	0.0127	0.0121	0.0125	0.0120
nitrate + nitrite (as N)	----	EC235.N+N	0.0050	mg/L		0.0131	0.0127	0.0121	0.0125	0.0120
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
nitrogen, total	7727-37-9	E366	0.030	mg/L		0.101	0.092	0.096	0.095	0.101
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
phosphorus, total	7723-14-0	E372-U	0.0020	mg/L		0.0027	0.0027	0.0027	0.0037	0.0039
phosphorus, total dissolved	7723-14-0	E375-T	0.0020	mg/L		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L		5.92	5.82	5.85	5.86	5.85
Organic / Inorganic Carbon										
carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L		2.80	2.58	2.52	2.38	2.38
Total Metals										
aluminum, total	7429-90-5	E420	0.0030	mg/L		0.0153	0.0141	0.0142	0.0152	0.0185
antimony, total	7440-36-0	E420	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
arsenic, total	7440-38-2	E420	0.00010	mg/L		0.00014	0.00014	0.00013	0.00014	0.00015
barium, total	7440-39-3	E420	0.00010	mg/L		0.00542	0.00557	0.00544	0.00544	0.00560
beryllium, total	7440-41-7	E420	0.000100	mg/L		<0.000100	<0.000100	<0.000100	<0.000100	<0.000100
bismuth, total	7440-69-9	E420	0.000050	mg/L		<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
boron, total	7440-42-8	E420	0.010	mg/L		<0.010	<0.010	<0.010	<0.010	<0.010

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	QUL-LNF1_WS-1_2022-08	QUL-LNF1_WS-2_2022-08	QUL-LNF1_WS-3_2022-08	QUL-LNF1_WS-4_2022-08	QUL-LNF1_WS-5_2022-08
					Client sampling date / time	24-Aug-2022 07:05	24-Aug-2022 07:20	24-Aug-2022 07:40	24-Aug-2022 08:00	24-Aug-2022 08:20
						VA22C0091-001	VA22C0091-002	VA22C0091-003	VA22C0091-004	VA22C0091-005
						Result	Result	Result	Result	Result
Total Metals										
cadmium, total	7440-43-9	E420	0.0000050	mg/L		0.0000191	0.0000101	0.0000077	0.0000074	<0.0000050
calcium, total	7440-70-2	E420	0.050	mg/L		16.3	16.4	16.1	16.2	16.2
chromium, total	7440-47-3	E420	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
cobalt, total	7440-48-4	E420	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
copper, total	7440-50-8	E420	0.00050	mg/L		0.00088	0.00069	0.00072	0.00066	0.00129
iron, total	7439-89-6	E420	0.030	mg/L		<0.030	<0.030	<0.030	<0.030	<0.030
lead, total	7439-92-1	E420	0.000050	mg/L		0.000088	<0.000050	<0.000050	<0.000050	0.000992
lithium, total	7439-93-2	E420	0.0010	mg/L		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
magnesium, total	7439-95-4	E420	0.100	mg/L		1.96	2.01	1.98	1.94	2.02
manganese, total	7439-96-5	E420	0.00010	mg/L		0.00174	0.00176	0.00175	0.00177	0.00187
molybdenum, total	7439-98-7	E420	0.000050	mg/L		0.000366	0.000377	0.000364	0.000354	0.000376
nickel, total	7440-02-0	E420	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
potassium, total	7440-09-7	E420	0.050	mg/L		0.450	0.462	0.459	0.450	0.452
selenium, total	7782-49-2	E420	0.000050	mg/L		0.000133	0.000101	0.000127	0.000117	0.000093
silicon, total	7440-21-3	E420	0.10	mg/L		1.59	1.61	1.60	1.66	1.62
silver, total	7440-22-4	E420	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
sodium, total	7440-23-5	E420	0.050	mg/L		0.878	0.894	0.886	0.868	0.900
strontium, total	7440-24-6	E420	0.00020	mg/L		0.117	0.119	0.119	0.119	0.118
thallium, total	7440-28-0	E420	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
tin, total	7440-31-5	E420	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
titanium, total	7440-32-6	E420	0.0100	mg/L		<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
uranium, total	7440-61-1	E420	0.000010	mg/L		0.000135	0.000137	0.000135	0.000133	0.000134
vanadium, total	7440-62-2	E420	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
zinc, total	7440-66-6	E420	0.0030	mg/L		0.0071	<0.0030	<0.0030	<0.0030	<0.0030
Dissolved Metals										
aluminum, dissolved	7429-90-5	E421	0.0030	mg/L		0.0097	0.0098	0.0106	0.0104	0.0105
antimony, dissolved	7440-36-0	E421	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L		0.00012	<0.00010	0.00012	0.00014	0.00012
barium, dissolved	7440-39-3	E421	0.00010	mg/L		0.00491	0.00474	0.00500	0.00479	0.00503
beryllium, dissolved	7440-41-7	E421	0.000100	mg/L		<0.000100	<0.000100	<0.000100	<0.000100	<0.000100
bismuth, dissolved	7440-69-9	E421	0.000050	mg/L		<0.000050	<0.000050	<0.000050	<0.000050	<0.000050

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	QUL-LNF1_WS-1_2022-08	QUL-LNF1_WS-2_2022-08	QUL-LNF1_WS-3_2022-08	QUL-LNF1_WS-4_2022-08	QUL-LNF1_WS-5_2022-08
					Client sampling date / time	24-Aug-2022 07:05	24-Aug-2022 07:20	24-Aug-2022 07:40	24-Aug-2022 08:00	24-Aug-2022 08:20
						VA22C0091-001	VA22C0091-002	VA22C0091-003	VA22C0091-004	VA22C0091-005
						Result	Result	Result	Result	Result
Dissolved Metals										
boron, dissolved	7440-42-8	E421	0.010	mg/L		<0.010	<0.010	<0.010	<0.010	<0.010
cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L		0.0000200	0.0000269 DTC	0.0000263 DTC	0.0000076	0.0000252 DTC
calcium, dissolved	7440-70-2	E421	0.050	mg/L		15.7	16.0	16.3	16.2	16.0
chromium, dissolved	7440-47-3	E421	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
cobalt, dissolved	7440-48-4	E421	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
copper, dissolved	7440-50-8	E421	0.00050	mg/L		0.00079	0.00068	0.00085	0.00063	0.00086
iron, dissolved	7439-89-6	E421	0.030	mg/L		<0.030	<0.030	<0.030	<0.030	<0.030
lead, dissolved	7439-92-1	E421	0.000050	mg/L		0.000085	0.000066	0.000117 DTC	<0.000050	0.000174
lithium, dissolved	7439-93-2	E421	0.0010	mg/L		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
magnesium, dissolved	7439-95-4	E421	0.100	mg/L		1.88	1.87	1.85	1.88	1.88
manganese, dissolved	7439-96-5	E421	0.00010	mg/L		0.00048	0.00044	0.00068	0.00051	0.00058
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L		0.000374	0.000344	0.000368	0.000360	0.000373
nickel, dissolved	7440-02-0	E421	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
potassium, dissolved	7440-09-7	E421	0.050	mg/L		0.475	0.466	0.474	0.471	0.483
selenium, dissolved	7782-49-2	E421	0.000050	mg/L		0.000117	0.000116	0.000103	0.000115	0.000124
silicon, dissolved	7440-21-3	E421	0.050	mg/L		1.53	1.53	1.53	1.53	1.58
silver, dissolved	7440-22-4	E421	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
sodium, dissolved	7440-23-5	E421	0.050	mg/L		0.855	0.847	0.847	0.862	0.862
strontium, dissolved	7440-24-6	E421	0.00020	mg/L		0.113	0.108	0.114	0.113	0.115
thallium, dissolved	7440-28-0	E421	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
tin, dissolved	7440-31-5	E421	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
titanium, dissolved	7440-32-6	E421	0.0100	mg/L		<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
uranium, dissolved	7440-61-1	E421	0.000010	mg/L		0.000135	0.000136	0.000134	0.000136	0.000138
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
zinc, dissolved	7440-66-6	E421	0.0030	mg/L		0.0109	0.0084 DTC	0.0076 DTC	<0.0030	0.0043
dissolved metals filtration location	----	EP421	-	-		Field	Field	Field	Field	Field

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	QUL-LREF1_WS-1_2022-08	QUL-LREF1_WS-2_2022-08	QUL-LREF1_WS-3_2022-08	QUL-LREF1_WS-4_2022-08	QUL-LREF1_WS-5_2022-08
					Client sampling date / time	24-Aug-2022 09:00	24-Aug-2022 09:15	24-Aug-2022 09:25	24-Aug-2022 09:45	24-Aug-2022 10:00
						VA22C0091-006	VA22C0091-007	VA22C0091-008	VA22C0091-009	VA22C0091-010
						Result	Result	Result	Result	Result
Physical Tests										
alkalinity, total (as CaCO3)	----	E290	1.0	mg/L		44.8	44.6	45.2	45.0	44.6
conductivity	----	E100	2.0	µS/cm		101	101	101	102	102
hardness (as CaCO3), dissolved	----	EC100	0.50	mg/L		50.3	48.0	47.6	48.1	47.4
hardness (as CaCO3), from total Ca/Mg	----	EC100A	0.50	mg/L		50.2	49.9	49.7	50.5	50.4
pH	----	E108	0.10	pH units		8.00	8.02	8.00	8.00	8.00
solids, total dissolved [TDS]	----	E162	10	mg/L		76	70	69	68	62
solids, total suspended [TSS]	----	E164	1.0	mg/L		<1.0	<1.2	<1.3	<1.0	<1.0
turbidity	----	E121	0.10	NTU		0.46	0.48	0.45	0.48	0.61
Anions and Nutrients										
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L		<0.0050	0.0074	<0.0050	<0.0050	<0.0050
chloride	16887-00-6	E235.Cl	0.50	mg/L		<0.50	<0.50	<0.50	<0.50	<0.50
fluoride	16984-48-8	E235.F	0.020	mg/L		0.036	0.036	0.036	0.036	0.036
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
nitrate + nitrite (as N)	----	EC235.N+N	0.0050	mg/L		<0.0051	<0.0051	<0.0051	<0.0051	<0.0051
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
nitrogen, total	7727-37-9	E366	0.030	mg/L		0.104	0.106	0.100	0.104	0.115
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
phosphorus, total	7723-14-0	E372-U	0.0020	mg/L		0.0047	0.0109	0.0050	0.0055	0.0054
phosphorus, total dissolved	7723-14-0	E375-T	0.0020	mg/L		0.0022	<0.0020	<0.0020	0.0024	0.0020
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L		5.85	5.80	5.85	5.83	5.83
Organic / Inorganic Carbon										
carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L		2.74	2.65	2.80	2.73	2.77
Total Metals										
aluminum, total	7429-90-5	E420	0.0030	mg/L		0.0185	0.0208	0.0261	0.0217	0.0247
antimony, total	7440-36-0	E420	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
arsenic, total	7440-38-2	E420	0.00010	mg/L		0.00026	0.00027	0.00022	0.00026	0.00023
barium, total	7440-39-3	E420	0.00010	mg/L		0.00711	0.00710	0.00720	0.00709	0.00723
beryllium, total	7440-41-7	E420	0.000100	mg/L		<0.000100	<0.000100	<0.000100	<0.000100	<0.000100
bismuth, total	7440-69-9	E420	0.000050	mg/L		<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
boron, total	7440-42-8	E420	0.010	mg/L		<0.010	<0.010	<0.010	<0.010	<0.010
cadmium, total	7440-43-9	E420	0.0000050	mg/L		0.0000125	0.0000069	0.0000098	0.0000056	0.0000053

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	QUL-LREF1_WS-1_2022-08	QUL-LREF1_WS-2_2022-08	QUL-LREF1_WS-3_2022-08	QUL-LREF1_WS-4_2022-08	QUL-LREF1_WS-5_2022-08
					Client sampling date / time	24-Aug-2022 09:00	24-Aug-2022 09:15	24-Aug-2022 09:25	24-Aug-2022 09:45	24-Aug-2022 10:00
						VA22C0091-006	VA22C0091-007	VA22C0091-008	VA22C0091-009	VA22C0091-010
						Result	Result	Result	Result	Result
Total Metals										
calcium, total	7440-70-2	E420	0.050	mg/L		16.3	16.2	16.2	16.4	16.5
chromium, total	7440-47-3	E420	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
cobalt, total	7440-48-4	E420	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
copper, total	7440-50-8	E420	0.00050	mg/L		0.00074	0.00102	0.00115	0.00096	0.00110
iron, total	7439-89-6	E420	0.030	mg/L		0.050	0.056	0.060	0.057	0.065
lead, total	7439-92-1	E420	0.000050	mg/L		0.000107	0.000780	0.000382	0.000348	0.000662
lithium, total	7439-93-2	E420	0.0010	mg/L		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
magnesium, total	7439-95-4	E420	0.100	mg/L		2.32	2.29	2.24	2.31	2.23
manganese, total	7439-96-5	E420	0.00010	mg/L		0.00668	0.00626	0.00692	0.00844	0.00842
molybdenum, total	7439-98-7	E420	0.000050	mg/L		0.000512	0.000498	0.000495	0.000515	0.000521
nickel, total	7440-02-0	E420	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
potassium, total	7440-09-7	E420	0.050	mg/L		0.502	0.464	0.478	0.496	0.473
selenium, total	7782-49-2	E420	0.000050	mg/L		0.000208	0.000163	0.000183	0.000129	0.000179
silicon, total	7440-21-3	E420	0.10	mg/L		2.00	1.92	1.94	1.97	1.91
silver, total	7440-22-4	E420	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
sodium, total	7440-23-5	E420	0.050	mg/L		1.08	1.04	1.04	1.08	1.04
strontium, total	7440-24-6	E420	0.00020	mg/L		0.108	0.109	0.107	0.108	0.114
thallium, total	7440-28-0	E420	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
tin, total	7440-31-5	E420	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
titanium, total	7440-32-6	E420	0.0100	mg/L		<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
uranium, total	7440-61-1	E420	0.000010	mg/L		0.000128	0.000127	0.000128	0.000120	0.000128
vanadium, total	7440-62-2	E420	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
zinc, total	7440-66-6	E420	0.0030	mg/L		<0.0030	<0.0030	0.0043	<0.0030	<0.0030
Dissolved Metals										
aluminum, dissolved	7429-90-5	E421	0.0030	mg/L		0.0113	0.0108	0.0103	0.0103	0.0097
antimony, dissolved	7440-36-0	E421	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L		0.00023	0.00020	0.00023	0.00025	0.00021
barium, dissolved	7440-39-3	E421	0.00010	mg/L		0.00634	0.00639	0.00606	0.00623	0.00645
beryllium, dissolved	7440-41-7	E421	0.000100	mg/L		<0.000100	<0.000100	<0.000100	<0.000100	<0.000100
bismuth, dissolved	7440-69-9	E421	0.000050	mg/L		<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
boron, dissolved	7440-42-8	E421	0.010	mg/L		<0.010	<0.010	<0.010	<0.010	<0.010

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	QUL-LREF1_WS-1_2022-08	QUL-LREF1_WS-2_2022-08	QUL-LREF1_WS-3_2022-08	QUL-LREF1_WS-4_2022-08	QUL-LREF1_WS-5_2022-08
					Client sampling date / time	24-Aug-2022 09:00	24-Aug-2022 09:15	24-Aug-2022 09:25	24-Aug-2022 09:45	24-Aug-2022 10:00
						VA22C0091-006	VA22C0091-007	VA22C0091-008	VA22C0091-009	VA22C0091-010
						Result	Result	Result	Result	Result
Dissolved Metals										
cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L		0.0000205	0.0000091	0.0000193	0.0000118	<0.0000050
calcium, dissolved	7440-70-2	E421	0.050	mg/L		16.5	15.5	15.5	15.6	15.4
chromium, dissolved	7440-47-3	E421	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
cobalt, dissolved	7440-48-4	E421	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
copper, dissolved	7440-50-8	E421	0.00050	mg/L		0.00069	0.00088	0.00073	0.00094	0.00060
iron, dissolved	7439-89-6	E421	0.030	mg/L		<0.030	<0.030	<0.030	<0.030	<0.030
lead, dissolved	7439-92-1	E421	0.000050	mg/L		0.000052	0.000128	0.000123	0.000188	0.000101
lithium, dissolved	7439-93-2	E421	0.0010	mg/L		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
magnesium, dissolved	7439-95-4	E421	0.100	mg/L		2.20	2.26	2.17	2.23	2.17
manganese, dissolved	7439-96-5	E421	0.00010	mg/L		0.00131	0.00124	0.00148	0.00222	0.00193
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L		0.000468	0.000460	0.000466	0.000492	0.000486
nickel, dissolved	7440-02-0	E421	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
potassium, dissolved	7440-09-7	E421	0.050	mg/L		0.528	0.485	0.492	0.505	0.484
selenium, dissolved	7782-49-2	E421	0.000050	mg/L		0.000159	0.000159	0.000149	0.000197	0.000171
silicon, dissolved	7440-21-3	E421	0.050	mg/L		1.88	1.80	1.77	1.85	1.80
silver, dissolved	7440-22-4	E421	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
sodium, dissolved	7440-23-5	E421	0.050	mg/L		1.04	1.00	0.993	1.04	0.991
strontium, dissolved	7440-24-6	E421	0.00020	mg/L		0.101	0.103	0.0999	0.0986	0.0978
thallium, dissolved	7440-28-0	E421	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
tin, dissolved	7440-31-5	E421	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
titanium, dissolved	7440-32-6	E421	0.0100	mg/L		<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
uranium, dissolved	7440-61-1	E421	0.000010	mg/L		0.000118	0.000125	0.000122	0.000120	0.000121
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
zinc, dissolved	7440-66-6	E421	0.0030	mg/L		<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
dissolved metals filtration location	----	EP421	-	-		Field	Field	Field	Field	Field

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	POL-S_WS-1_2022-08	POL-S_WS-2_2022-08	POL-S_WS-3_2022-08	POL-S_WS-4_2022-08	POL-S_WS-5_2022-08
					Client sampling date / time	25-Aug-2022 08:50	25-Aug-2022 09:05	25-Aug-2022 09:25	25-Aug-2022 09:40	25-Aug-2022 09:55
						VA22C0091-011	VA22C0091-012	VA22C0091-013	VA22C0091-014	VA22C0091-015
						Result	Result	Result	Result	Result
Physical Tests										
alkalinity, total (as CaCO3)	----	E290	1.0	mg/L		87.9	88.3	88.8	89.9	88.9
conductivity	----	E100	2.0	µS/cm		246	244	247	247	245
hardness (as CaCO3), dissolved	----	EC100	0.50	mg/L		108	109	110	109	115
hardness (as CaCO3), from total Ca/Mg	----	EC100A	0.50	mg/L		112	112	116	114	114
pH	----	E108	0.10	pH units		8.34	8.36	8.36	8.36	8.36
solids, total dissolved [TDS]	----	E162	10	mg/L		203	196	196	185	199
solids, total suspended [TSS]	----	E164	1.0	mg/L		<1.0	<1.0	2.2	1.7	<1.0
turbidity	----	E121	0.10	NTU		0.34	0.46	0.35	0.33	0.32
Anions and Nutrients										
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
chloride	16887-00-6	E235.Cl	0.50	mg/L		0.80	0.81	0.82	0.82	0.83
fluoride	16984-48-8	E235.F	0.020	mg/L		0.080	0.082	0.082	0.081	0.080
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
nitrate + nitrite (as N)	----	EC235.N+N	0.0050	mg/L		<0.0051	<0.0051	<0.0051	<0.0051	<0.0051
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
nitrogen, total	7727-37-9	E366	0.030	mg/L		0.272	0.275	0.259	0.250	0.262
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
phosphorus, total	7723-14-0	E372-U	0.0020	mg/L		0.0091	0.0083	0.0297	0.0080	0.0097
phosphorus, total dissolved	7723-14-0	E375-T	0.0020	mg/L		0.0036	0.0041	0.0037	0.0042	0.0031
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L		36.1	36.2	36.6	36.6	36.7
Organic / Inorganic Carbon										
carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L		6.60	6.20	6.92	6.87	7.08
Total Metals										
aluminum, total	7429-90-5	E420	0.0030	mg/L		0.0085	0.0079	0.0120	0.0080	0.0208
antimony, total	7440-36-0	E420	0.00010	mg/L		<0.00010	<0.00010	<0.00010	0.00012	0.00012
arsenic, total	7440-38-2	E420	0.00010	mg/L		0.00055	0.00056	0.00057	0.00057	0.00064
barium, total	7440-39-3	E420	0.00010	mg/L		0.0106	0.0107	0.0107	0.0105	0.0108
beryllium, total	7440-41-7	E420	0.000100	mg/L		<0.000100	<0.000100	<0.000100	<0.000100	<0.000100
bismuth, total	7440-69-9	E420	0.000050	mg/L		<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
boron, total	7440-42-8	E420	0.010	mg/L		0.020	0.020	0.020	0.020	0.020
cadmium, total	7440-43-9	E420	0.0000050	mg/L		<0.0000100 DLM	<0.0000100 DLM	<0.0000050	<0.0000050	<0.0000100 DLM

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	POL-S_WS-1_2022-08	POL-S_WS-2_2022-08	POL-S_WS-3_2022-08	POL-S_WS-4_2022-08	POL-S_WS-5_2022-08
					Client sampling date / time	25-Aug-2022 08:50	25-Aug-2022 09:05	25-Aug-2022 09:25	25-Aug-2022 09:40	25-Aug-2022 09:55
						VA22C0091-011	VA22C0091-012	VA22C0091-013	VA22C0091-014	VA22C0091-015
						Result	Result	Result	Result	Result
Total Metals										
calcium, total	7440-70-2	E420	0.050	mg/L		36.1	35.9	37.5	36.5	36.8
chromium, total	7440-47-3	E420	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
cobalt, total	7440-48-4	E420	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
copper, total	7440-50-8	E420	0.00050	mg/L		0.00419	0.00393	0.00420	0.00389	0.00488
iron, total	7439-89-6	E420	0.030	mg/L		<0.030	<0.030	<0.030	<0.030	<0.030
lead, total	7439-92-1	E420	0.000050	mg/L		<0.000050	0.000171	0.000143	0.000158	0.000549
lithium, total	7439-93-2	E420	0.0010	mg/L		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
magnesium, total	7439-95-4	E420	0.100	mg/L		5.41	5.38	5.55	5.56	5.43
manganese, total	7439-96-5	E420	0.00010	mg/L		0.00711	0.00734	0.00678	0.00524	0.00556
molybdenum, total	7439-98-7	E420	0.000050	mg/L		0.00691	0.00694	0.00713	0.00694	0.00707
nickel, total	7440-02-0	E420	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
potassium, total	7440-09-7	E420	0.050	mg/L		0.942	0.928	0.962	0.949	0.939
selenium, total	7782-49-2	E420	0.000050	mg/L		0.000787	0.000749	0.000846	0.000873	0.000751
silicon, total	7440-21-3	E420	0.10	mg/L		2.87	2.83	3.02	3.02	2.98
silver, total	7440-22-4	E420	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
sodium, total	7440-23-5	E420	0.050	mg/L		7.51	7.48	7.57	7.58	7.45
strontium, total	7440-24-6	E420	0.00020	mg/L		0.252	0.252	0.255	0.254	0.256
thallium, total	7440-28-0	E420	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
tin, total	7440-31-5	E420	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
titanium, total	7440-32-6	E420	0.0100	mg/L		<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
uranium, total	7440-61-1	E420	0.000010	mg/L		0.000183	0.000186	0.000194	0.000192	0.000191
vanadium, total	7440-62-2	E420	0.00050	mg/L		0.00144	0.00136	0.00141	0.00140	0.00144
zinc, total	7440-66-6	E420	0.0030	mg/L		<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
Dissolved Metals										
aluminum, dissolved	7429-90-5	E421	0.0030	mg/L		0.0032	<0.0030	0.0041	0.0040	0.0036
antimony, dissolved	7440-36-0	E421	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L		0.00052	0.00055	0.00056	0.00054	0.00051
barium, dissolved	7440-39-3	E421	0.00010	mg/L		0.00991	0.00962	0.00936	0.00946	0.00950
beryllium, dissolved	7440-41-7	E421	0.000100	mg/L		<0.000100	<0.000100	<0.000100	<0.000100	<0.000100
bismuth, dissolved	7440-69-9	E421	0.000050	mg/L		<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
boron, dissolved	7440-42-8	E421	0.010	mg/L		0.018	0.018	0.018	0.018	0.019

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	POL-S_WS-1_2022-08	POL-S_WS-2_2022-08	POL-S_WS-3_2022-08	POL-S_WS-4_2022-08	POL-S_WS-5_2022-08
					Client sampling date / time	25-Aug-2022 08:50	25-Aug-2022 09:05	25-Aug-2022 09:25	25-Aug-2022 09:40	25-Aug-2022 09:55
						VA22C0091-011	VA22C0091-012	VA22C0091-013	VA22C0091-014	VA22C0091-015
						Result	Result	Result	Result	Result
Dissolved Metals										
cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L		0.0000188 DTMF	<0.0000050	<0.0000050	<0.0000050	0.0000058
calcium, dissolved	7440-70-2	E421	0.050	mg/L		34.6	34.7	35.4	34.5	37.0
chromium, dissolved	7440-47-3	E421	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
cobalt, dissolved	7440-48-4	E421	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
copper, dissolved	7440-50-8	E421	0.00050	mg/L		0.00372	0.00362	0.00370	0.00357	0.00355
iron, dissolved	7439-89-6	E421	0.030	mg/L		<0.030	<0.030	<0.030	<0.030	<0.030
lead, dissolved	7439-92-1	E421	0.000050	mg/L		0.000070	0.000054	0.000898 DTC	0.000061	0.000187
lithium, dissolved	7439-93-2	E421	0.0010	mg/L		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
magnesium, dissolved	7439-95-4	E421	0.100	mg/L		5.25	5.43	5.38	5.52	5.46
manganese, dissolved	7439-96-5	E421	0.00010	mg/L		0.00096	0.00092	0.00112	0.00073	0.00094
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L		0.00677	0.00691	0.00688	0.00698	0.00692
nickel, dissolved	7440-02-0	E421	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
potassium, dissolved	7440-09-7	E421	0.050	mg/L		0.924	0.950	0.953	0.953	0.938
selenium, dissolved	7782-49-2	E421	0.000050	mg/L		0.000763	0.000763	0.000799	0.000755	0.000813
silicon, dissolved	7440-21-3	E421	0.050	mg/L		2.69	2.68	2.82	2.86	2.84
silver, dissolved	7440-22-4	E421	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
sodium, dissolved	7440-23-5	E421	0.050	mg/L		6.99	7.26	7.13	7.14	7.18
strontium, dissolved	7440-24-6	E421	0.00020	mg/L		0.235	0.236	0.241	0.237	0.231
thallium, dissolved	7440-28-0	E421	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
tin, dissolved	7440-31-5	E421	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
titanium, dissolved	7440-32-6	E421	0.0100	mg/L		<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
uranium, dissolved	7440-61-1	E421	0.000010	mg/L		0.000189	0.000189	0.000196	0.000195	0.000184
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L		0.00124	0.00131	0.00131	0.00132	0.00137
zinc, dissolved	7440-66-6	E421	0.0030	mg/L		0.0059	<0.0030	0.0036	<0.0030	<0.0030
dissolved metals filtration location	----	EP421	-	-		Field	Field	Field	Field	Field

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BOL-S_WS-1_2022-08	BOL-S_WS-2_2022-08	BOL-S_WS-3_2022-08	BOL-S_WS-4_2022-08	BOL-S_WS-5_2022-08
					Client sampling date / time	24-Aug-2022 14:30	24-Aug-2022 14:45	24-Aug-2022 14:50	24-Aug-2022 15:10	24-Aug-2022 15:25
						VA22C0091-016	VA22C0091-017	VA22C0091-018	VA22C0091-019	VA22C0091-020
						Result	Result	Result	Result	Result
Physical Tests										
alkalinity, total (as CaCO3)	----	E290	1.0	mg/L		40.2	39.9	39.3	39.2	39.5
conductivity	----	E100	2.0	µS/cm		98.0	97.7	98.8	97.1	97.4
hardness (as CaCO3), dissolved	----	EC100	0.50	mg/L		43.4	44.6	42.7	43.3	43.8
hardness (as CaCO3), from total Ca/Mg	----	EC100A	0.50	mg/L		45.0	44.8	45.0	44.6	44.8
pH	----	E108	0.10	pH units		7.91	7.91	7.95	7.92	7.93
solids, total dissolved [TDS]	----	E162	10	mg/L		91	91	90	88	94
solids, total suspended [TSS]	----	E164	1.0	mg/L		<1.0	<1.0	1.2	1.0	1.3
turbidity	----	E121	0.10	NTU		0.41	0.42	0.34	0.33	0.41
Anions and Nutrients										
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
chloride	16887-00-6	E235.Cl	0.50	mg/L		0.58	0.58	0.58	0.58	0.59
fluoride	16984-48-8	E235.F	0.020	mg/L		0.059	0.062	0.062	0.063	0.063
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
nitrate + nitrite (as N)	----	EC235.N+N	0.0050	mg/L		<0.0051	<0.0051	<0.0051	<0.0051	<0.0051
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
nitrogen, total	7727-37-9	E366	0.030	mg/L		0.276	0.277	0.264	0.264	0.367
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L		0.0011	<0.0010	<0.0010	<0.0010	<0.0010
phosphorus, total	7723-14-0	E372-U	0.0020	mg/L		0.0160	0.0063	0.0070	0.0066	0.0088
phosphorus, total dissolved	7723-14-0	E375-T	0.0020	mg/L		0.0029	0.0027	0.0029	0.0030	0.0029
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L		7.57	7.56	7.58	7.53	7.54
Organic / Inorganic Carbon										
carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L		7.51	7.54	7.90	7.55	7.56
Total Metals										
aluminum, total	7429-90-5	E420	0.0030	mg/L		0.0107	0.0121	0.0070	0.0088	0.0071
antimony, total	7440-36-0	E420	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
arsenic, total	7440-38-2	E420	0.00010	mg/L		0.00034	0.00034	0.00034	0.00038	0.00035
barium, total	7440-39-3	E420	0.00010	mg/L		0.0156	0.0159	0.0156	0.0157	0.0160
beryllium, total	7440-41-7	E420	0.000100	mg/L		<0.000100	<0.000100	<0.000100	<0.000100	<0.000100
bismuth, total	7440-69-9	E420	0.000050	mg/L		<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
boron, total	7440-42-8	E420	0.010	mg/L		0.043	0.044	0.044	0.044	0.044
cadmium, total	7440-43-9	E420	0.0000050	mg/L		0.0000062	<0.0000050	<0.0000050	<0.0000050	0.0000071

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BOL-S_WS-1_2022-08	BOL-S_WS-2_2022-08	BOL-S_WS-3_2022-08	BOL-S_WS-4_2022-08	BOL-S_WS-5_2022-08
					Client sampling date / time	24-Aug-2022 14:30	24-Aug-2022 14:45	24-Aug-2022 14:50	24-Aug-2022 15:10	24-Aug-2022 15:25
						VA22C0091-016	VA22C0091-017	VA22C0091-018	VA22C0091-019	VA22C0091-020
						Result	Result	Result	Result	Result
Total Metals										
calcium, total	7440-70-2	E420	0.050	mg/L		13.7	13.7	13.7	13.6	13.7
chromium, total	7440-47-3	E420	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
cobalt, total	7440-48-4	E420	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
copper, total	7440-50-8	E420	0.00050	mg/L		0.00235	0.00248	0.00218	0.00279	0.00232
iron, total	7439-89-6	E420	0.030	mg/L		<0.030	<0.030	<0.030	<0.030	<0.030
lead, total	7439-92-1	E420	0.000050	mg/L		0.000088	0.000258	0.000144	0.000564	<0.000050
lithium, total	7439-93-2	E420	0.0010	mg/L		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
magnesium, total	7439-95-4	E420	0.100	mg/L		2.61	2.58	2.61	2.59	2.58
manganese, total	7439-96-5	E420	0.00010	mg/L		0.0122	0.0105	0.0113	0.0124	0.0140
molybdenum, total	7439-98-7	E420	0.000050	mg/L		0.000916	0.000906	0.000878	0.000885	0.000873
nickel, total	7440-02-0	E420	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
potassium, total	7440-09-7	E420	0.050	mg/L		0.431	0.454	0.437	0.439	0.431
selenium, total	7782-49-2	E420	0.000050	mg/L		0.000241	0.000235	0.000244	0.000189	0.000164
silicon, total	7440-21-3	E420	0.10	mg/L		1.55	1.58	1.54	1.56	1.53
silver, total	7440-22-4	E420	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
sodium, total	7440-23-5	E420	0.050	mg/L		2.42	2.41	2.44	2.40	2.42
strontium, total	7440-24-6	E420	0.00020	mg/L		0.134	0.133	0.133	0.133	0.135
thallium, total	7440-28-0	E420	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
tin, total	7440-31-5	E420	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
titanium, total	7440-32-6	E420	0.0100	mg/L		<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
uranium, total	7440-61-1	E420	0.000010	mg/L		0.000041	0.000044	0.000044	0.000045	0.000043
vanadium, total	7440-62-2	E420	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
zinc, total	7440-66-6	E420	0.0030	mg/L		<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
Dissolved Metals										
aluminum, dissolved	7429-90-5	E421	0.0030	mg/L		0.0052	0.0045	0.0043	0.0044	0.0051
antimony, dissolved	7440-36-0	E421	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L		0.00033	0.00030	0.00034	0.00031	0.00031
barium, dissolved	7440-39-3	E421	0.00010	mg/L		0.0145	0.0141	0.0139	0.0151	0.0148
beryllium, dissolved	7440-41-7	E421	0.000100	mg/L		<0.000100	<0.000100	<0.000100	<0.000100	<0.000100
bismuth, dissolved	7440-69-9	E421	0.000050	mg/L		<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
boron, dissolved	7440-42-8	E421	0.010	mg/L		0.040	0.042	0.040	0.042	0.042

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BOL-S_WS-1_2022-08	BOL-S_WS-2_2022-08	BOL-S_WS-3_2022-08	BOL-S_WS-4_2022-08	BOL-S_WS-5_2022-08
					Client sampling date / time	24-Aug-2022 14:30	24-Aug-2022 14:45	24-Aug-2022 14:50	24-Aug-2022 15:10	24-Aug-2022 15:25
						VA22C0091-016	VA22C0091-017	VA22C0091-018	VA22C0091-019	VA22C0091-020
						Result	Result	Result	Result	Result
Dissolved Metals										
cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L		0.0000089	<0.0000050	0.0000082	0.0000102 DTMF	0.0000117
calcium, dissolved	7440-70-2	E421	0.050	mg/L		13.2	13.7	13.0	13.2	13.4
chromium, dissolved	7440-47-3	E421	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
cobalt, dissolved	7440-48-4	E421	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
copper, dissolved	7440-50-8	E421	0.00050	mg/L		0.00218	0.00215	0.00199	0.00198	0.00209
iron, dissolved	7439-89-6	E421	0.030	mg/L		<0.030	<0.030	<0.030	<0.030	<0.030
lead, dissolved	7439-92-1	E421	0.000050	mg/L		<0.000050	0.000358	0.000058	0.000091	0.000053
lithium, dissolved	7439-93-2	E421	0.0010	mg/L		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
magnesium, dissolved	7439-95-4	E421	0.100	mg/L		2.54	2.52	2.49	2.51	2.52
manganese, dissolved	7439-96-5	E421	0.00010	mg/L		0.00364	0.00224	0.00255	0.00421	0.00506
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L		0.000846	0.000822	0.000809	0.000840	0.000858
nickel, dissolved	7440-02-0	E421	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
potassium, dissolved	7440-09-7	E421	0.050	mg/L		0.457	0.443	0.434	0.440	0.456
selenium, dissolved	7782-49-2	E421	0.000050	mg/L		0.000186	0.000158	0.000196	0.000246	0.000239
silicon, dissolved	7440-21-3	E421	0.050	mg/L		1.49	1.49	1.47	1.52	1.51
silver, dissolved	7440-22-4	E421	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
sodium, dissolved	7440-23-5	E421	0.050	mg/L		2.42	2.43	2.42	2.35	2.47
strontium, dissolved	7440-24-6	E421	0.00020	mg/L		0.121	0.122	0.121	0.125	0.123
thallium, dissolved	7440-28-0	E421	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
tin, dissolved	7440-31-5	E421	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
titanium, dissolved	7440-32-6	E421	0.0100	mg/L		<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
uranium, dissolved	7440-61-1	E421	0.000010	mg/L		0.000045	0.000041	0.000044	0.000043	0.000042
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
zinc, dissolved	7440-66-6	E421	0.0030	mg/L		0.0042	<0.0030	<0.0030	<0.0030	0.0030
dissolved metals filtration location	----	EP421	-	-		Field	Field	Field	Field	Field

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	QUL-LREF1_WS-1X_2022-08	POL-S_WS-1X_2022-08	----	----	----
					Client sampling date / time	24-Aug-2022 09:00	25-Aug-2022 08:50	----	----	----
						VA22C0091-021	VA22C0091-022	--------	--------	--------
						Result	Result	----	----	----
Physical Tests										
alkalinity, total (as CaCO3)	----	E290	1.0	mg/L		47.5	90.9	----	----	----
conductivity	----	E100	2.0	µS/cm		98.9	236	----	----	----
hardness (as CaCO3), dissolved	----	EC100	0.50	mg/L		48.7	111	----	----	----
hardness (as CaCO3), from total Ca/Mg	----	EC100A	0.50	mg/L		50.1	113	----	----	----
pH	----	E108	0.10	pH units		7.75	8.15	----	----	----
solids, total dissolved [TDS]	----	E162	10	mg/L		69	188	----	----	----
solids, total suspended [TSS]	----	E164	1.0	mg/L		<1.0	<1.0	----	----	----
turbidity	----	E121	0.10	NTU		0.38	0.36	----	----	----
Anions and Nutrients										
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L		<0.0050	<0.0050	----	----	----
chloride	16887-00-6	E235.Cl	0.50	mg/L		<0.50	0.78	----	----	----
fluoride	16984-48-8	E235.F	0.020	mg/L		0.035	0.074	----	----	----
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L		<0.0050	<0.0050	----	----	----
nitrate + nitrite (as N)	----	EC235.N+N	0.0050	mg/L		<0.0051	<0.0051	----	----	----
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L		<0.0010	<0.0010	----	----	----
nitrogen, total	7727-37-9	E366	0.030	mg/L		0.095	0.288	----	----	----
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L		<0.0010	<0.0010	----	----	----
phosphorus, total	7723-14-0	E372-U	0.0020	mg/L		0.0050	0.0061	----	----	----
phosphorus, total dissolved	7723-14-0	E375-T	0.0020	mg/L		<0.0020	0.0037	----	----	----
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L		5.65	35.1	----	----	----
Organic / Inorganic Carbon										
carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L		3.43	6.67	----	----	----
Total Metals										
aluminum, total	7429-90-5	E420	0.0030	mg/L		0.0188	0.0068	----	----	----
antimony, total	7440-36-0	E420	0.00010	mg/L		<0.00010	<0.00010	----	----	----
arsenic, total	7440-38-2	E420	0.00010	mg/L		0.00024	0.00052	----	----	----
barium, total	7440-39-3	E420	0.00010	mg/L		0.00715	0.0106	----	----	----
beryllium, total	7440-41-7	E420	0.000100	mg/L		<0.000100	<0.000100	----	----	----
bismuth, total	7440-69-9	E420	0.000050	mg/L		<0.000050	<0.000050	----	----	----
boron, total	7440-42-8	E420	0.010	mg/L		<0.010	0.020	----	----	----
cadmium, total	7440-43-9	E420	0.0000050	mg/L		0.0000098	<0.0000100 DLM	----	----	----

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	QUL-LREF1_WS-1X_2022-08	POL-S_WS-1X_2022-08	----	----	----
					Client sampling date / time	24-Aug-2022 09:00	25-Aug-2022 08:50	----	----	----
						VA22C0091-021	VA22C0091-022	--------	--------	--------
						Result	Result	----	----	----
Total Metals										
calcium, total	7440-70-2	E420	0.050	mg/L		16.3	36.5	----	----	----
chromium, total	7440-47-3	E420	0.00050	mg/L		<0.00050	<0.00050	----	----	----
cobalt, total	7440-48-4	E420	0.00010	mg/L		<0.00010	<0.00010	----	----	----
copper, total	7440-50-8	E420	0.00050	mg/L		0.00084	0.00419	----	----	----
iron, total	7439-89-6	E420	0.030	mg/L		0.049	<0.030	----	----	----
lead, total	7439-92-1	E420	0.000050	mg/L		0.000120	0.000060	----	----	----
lithium, total	7439-93-2	E420	0.0010	mg/L		<0.0010	<0.0010	----	----	----
magnesium, total	7439-95-4	E420	0.100	mg/L		2.29	5.31	----	----	----
manganese, total	7439-96-5	E420	0.00010	mg/L		0.00674	0.00682	----	----	----
molybdenum, total	7439-98-7	E420	0.000050	mg/L		0.000498	0.00702	----	----	----
nickel, total	7440-02-0	E420	0.00050	mg/L		<0.00050	<0.00050	----	----	----
potassium, total	7440-09-7	E420	0.050	mg/L		0.508	0.907	----	----	----
selenium, total	7782-49-2	E420	0.000050	mg/L		0.000165	0.000732	----	----	----
silicon, total	7440-21-3	E420	0.10	mg/L		1.89	2.67	----	----	----
silver, total	7440-22-4	E420	0.000010	mg/L		<0.000010	<0.000010	----	----	----
sodium, total	7440-23-5	E420	0.050	mg/L		1.07	7.40	----	----	----
strontium, total	7440-24-6	E420	0.00020	mg/L		0.111	0.256	----	----	----
thallium, total	7440-28-0	E420	0.000010	mg/L		<0.000010	<0.000010	----	----	----
tin, total	7440-31-5	E420	0.00010	mg/L		<0.00010	<0.00010	----	----	----
titanium, total	7440-32-6	E420	0.0100	mg/L		<0.0100	<0.0100	----	----	----
uranium, total	7440-61-1	E420	0.000010	mg/L		0.000125	0.000187	----	----	----
vanadium, total	7440-62-2	E420	0.00050	mg/L		<0.00050	0.00135	----	----	----
zinc, total	7440-66-6	E420	0.0030	mg/L		<0.0030	<0.0030	----	----	----
Dissolved Metals										
aluminum, dissolved	7429-90-5	E421	0.0030	mg/L		0.0107	<0.0030	----	----	----
antimony, dissolved	7440-36-0	E421	0.00010	mg/L		<0.00010	<0.00010	----	----	----
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L		0.00021	0.00051	----	----	----
barium, dissolved	7440-39-3	E421	0.00010	mg/L		0.00641	0.00939	----	----	----
beryllium, dissolved	7440-41-7	E421	0.000100	mg/L		<0.000100	<0.000100	----	----	----
bismuth, dissolved	7440-69-9	E421	0.000050	mg/L		<0.000050	<0.000050	----	----	----
boron, dissolved	7440-42-8	E421	0.010	mg/L		<0.010	0.019	----	----	----

Analytical Results

Sub-Matrix: Water (Matrix: Water)					Client sample ID	QUL-LREF1_WS-1X_2022-08	POL-S_WS-1X_2022-08	----	----	----
					Client sampling date / time	24-Aug-2022 09:00	25-Aug-2022 08:50	----	----	----
Analyte	CAS Number	Method	LOR	Unit		VA22C0091-021	VA22C0091-022	--------	--------	--------
						Result	Result	----	----	----
Dissolved Metals										
cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L		0.0000290 DTMF	0.0000100	----	----	----
calcium, dissolved	7440-70-2	E421	0.050	mg/L		16.0	35.6	----	----	----
chromium, dissolved	7440-47-3	E421	0.00050	mg/L		<0.00050	<0.00050	----	----	----
cobalt, dissolved	7440-48-4	E421	0.00010	mg/L		<0.00010	<0.00010	----	----	----
copper, dissolved	7440-50-8	E421	0.00050	mg/L		0.00080	0.00359	----	----	----
iron, dissolved	7439-89-6	E421	0.030	mg/L		<0.030	<0.030	----	----	----
lead, dissolved	7439-92-1	E421	0.000050	mg/L		0.000146	0.000293 DTC	----	----	----
lithium, dissolved	7439-93-2	E421	0.0010	mg/L		<0.0010	<0.0010	----	----	----
magnesium, dissolved	7439-95-4	E421	0.100	mg/L		2.13	5.42	----	----	----
manganese, dissolved	7439-96-5	E421	0.00010	mg/L		0.00117	0.00097	----	----	----
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L		0.000496	0.00675	----	----	----
nickel, dissolved	7440-02-0	E421	0.00050	mg/L		<0.00050	<0.00050	----	----	----
potassium, dissolved	7440-09-7	E421	0.050	mg/L		0.501	0.919	----	----	----
selenium, dissolved	7782-49-2	E421	0.000050	mg/L		0.000155	0.000702	----	----	----
silicon, dissolved	7440-21-3	E421	0.050	mg/L		1.83	2.70	----	----	----
silver, dissolved	7440-22-4	E421	0.000010	mg/L		<0.000010	<0.000010	----	----	----
sodium, dissolved	7440-23-5	E421	0.050	mg/L		0.973	7.00	----	----	----
strontium, dissolved	7440-24-6	E421	0.00020	mg/L		0.0978	0.240	----	----	----
thallium, dissolved	7440-28-0	E421	0.000010	mg/L		<0.000010	<0.000010	----	----	----
tin, dissolved	7440-31-5	E421	0.00010	mg/L		<0.00010	<0.00010	----	----	----
titanium, dissolved	7440-32-6	E421	0.0100	mg/L		<0.0100	<0.0100	----	----	----
uranium, dissolved	7440-61-1	E421	0.000010	mg/L		0.000122	0.000184	----	----	----
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L		<0.00050	0.00124	----	----	----
zinc, dissolved	7440-66-6	E421	0.0030	mg/L		<0.0030	0.0046	----	----	----
dissolved metals filtration location	----	EP421	-	-		Field	Field	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA22C0091**	Page	: 1 of 56
Client	: **Mount Polley Mining Corporation**	Laboratory	: Vancouver - Environmental
Contact	: Kala Ivens	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: 250-790-2215 Ext 2112	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 26-Aug-2022 10:15
PO	: 5590008044 Q2 2022	Issue Date	: 06-Sep-2022 14:19
C-O-C number	: ----		
Sampler	: D. Schnurr, S. Latimer		
Site	: ----		
Quote number	: VA22-MPMC100-006 - Minnow Env. - Water Quality		
No. of samples received	: 22		
No. of samples analysed	: 22		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- Method Blank value outliers occur - please see following pages for full details.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- Analysis Holding Time Outliers exist - please see following pages for full details.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **Water**

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment
Method Blank (MB) Values								
Total Metals	QC-621232-001	----	manganese, total	7439-96-5	E420	0.00012 [B] mg/L	0.0001 mg/L	Blank result exceeds permitted value

Result Qualifiers

Qualifier	Description
B	*Method Blank exceeds ALS DQO. Associated sample results which are < Limit of Reporting or > 5 times blank level are considered reliable.*

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
BOL-S_WS-1_2022-08	E298	24-Aug-2022	01-Sep-2022	----	----		01-Sep-2022	28 days	8 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
BOL-S_WS-2_2022-08	E298	24-Aug-2022	01-Sep-2022	----	----		01-Sep-2022	28 days	8 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
BOL-S_WS-3_2022-08	E298	24-Aug-2022	01-Sep-2022	----	----		01-Sep-2022	28 days	8 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
BOL-S_WS-4_2022-08	E298	24-Aug-2022	01-Sep-2022	----	----		01-Sep-2022	28 days	8 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
BOL-S_WS-5_2022-08	E298	24-Aug-2022	01-Sep-2022	----	----		01-Sep-2022	28 days	8 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
POL-S_WS-1_2022-08	E298	25-Aug-2022	01-Sep-2022	----	----		02-Sep-2022	28 days	8 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
POL-S_WS-2_2022-08	E298	25-Aug-2022	01-Sep-2022	----	----		02-Sep-2022	28 days	8 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
POL-S_WS-3_2022-08	E298	25-Aug-2022	01-Sep-2022	----	----		02-Sep-2022	28 days	8 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
POL-S_WS-4_2022-08	E298	25-Aug-2022	01-Sep-2022	----	----		02-Sep-2022	28 days	8 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
POL-S_WS-5_2022-08	E298	25-Aug-2022	01-Sep-2022	----	----		02-Sep-2022	28 days	8 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
QUL-LREF1_WS-1X_2022-08	E298	24-Aug-2022	01-Sep-2022	----	----		01-Sep-2022	28 days	8 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
QUL-LNF1_WS-1_2022-08	E298	24-Aug-2022	01-Sep-2022	----	----		02-Sep-2022	28 days	9 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
QUL-LNF1_WS-2_2022-08	E298	24-Aug-2022	01-Sep-2022	----	----		02-Sep-2022	28 days	9 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
QUL-LNF1_WS-3_2022-08	E298	24-Aug-2022	01-Sep-2022	----	----		02-Sep-2022	28 days	9 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
QUL-LNF1_WS-4_2022-08	E298	24-Aug-2022	01-Sep-2022	----	----		02-Sep-2022	28 days	9 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
QUL-LNF1_WS-5_2022-08	E298	24-Aug-2022	01-Sep-2022	----	----		02-Sep-2022	28 days	9 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
QUL-LREF1_WS-1_2022-08	E298	24-Aug-2022	01-Sep-2022	----	----		02-Sep-2022	28 days	9 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
QUL-LREF1_WS-2_2022-08	E298	24-Aug-2022	01-Sep-2022	----	----		02-Sep-2022	28 days	9 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
QUL-LREF1_WS-3_2022-08	E298	24-Aug-2022	01-Sep-2022	----	----		02-Sep-2022	28 days	9 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
QUL-LREF1_WS-4_2022-08	E298	24-Aug-2022	01-Sep-2022	----	----		02-Sep-2022	28 days	9 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
QUL-LREF1_WS-5_2022-08	E298	24-Aug-2022	01-Sep-2022	----	----		02-Sep-2022	28 days	9 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (lab preserved)										
POL-S_WS-1X_2022-08	E298	25-Aug-2022	26-Aug-2022	3 days	2 days	✓	27-Aug-2022	28 days	0 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE										
BOL-S_WS-1_2022-08	E235.Cl	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	28 days	2 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE										
BOL-S_WS-2_2022-08	E235.Cl	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	28 days	2 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE										
BOL-S_WS-3_2022-08	E235.Cl	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	28 days	2 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Chloride in Water by IC										
HDPE										
BOL-S_WS-4_2022-08	E235.Cl	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	28 days	2 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE										
BOL-S_WS-5_2022-08	E235.Cl	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	28 days	2 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE										
POL-S_WS-1_2022-08	E235.Cl	25-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	28 days	2 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE										
POL-S_WS-1X_2022-08	E235.Cl	25-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	28 days	2 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE										
POL-S_WS-2_2022-08	E235.Cl	25-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	28 days	2 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE										
POL-S_WS-3_2022-08	E235.Cl	25-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	28 days	2 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE										
POL-S_WS-4_2022-08	E235.Cl	25-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	28 days	2 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE										
POL-S_WS-5_2022-08	E235.Cl	25-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	28 days	2 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE										
QUL-LNF1_WS-1_2022-08	E235.Cl	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	28 days	3 days	✓

Matrix: **Water**

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Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Chloride in Water by IC										
HDPE QUL-LNF1_WS-2_2022-08	E235.Cl	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	28 days	3 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE QUL-LNF1_WS-3_2022-08	E235.Cl	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	28 days	3 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE QUL-LNF1_WS-4_2022-08	E235.Cl	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	28 days	3 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE QUL-LNF1_WS-5_2022-08	E235.Cl	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	28 days	3 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE QUL-LREF1_WS-1_2022-08	E235.Cl	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	28 days	3 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE QUL-LREF1_WS-1X_2022-08	E235.Cl	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	28 days	3 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE QUL-LREF1_WS-2_2022-08	E235.Cl	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	28 days	3 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE QUL-LREF1_WS-3_2022-08	E235.Cl	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	28 days	3 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE QUL-LREF1_WS-4_2022-08	E235.Cl	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	28 days	3 days	✓

Matrix: **Water**

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Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Chloride in Water by IC										
HDPE QUL-LREF1_WS-5_2022-08	E235.Cl	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	28 days	3 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE BOL-S_WS-1_2022-08	E378-U	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	3 days	2 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE BOL-S_WS-2_2022-08	E378-U	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	3 days	2 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE BOL-S_WS-3_2022-08	E378-U	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	3 days	2 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE BOL-S_WS-4_2022-08	E378-U	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	3 days	2 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE BOL-S_WS-5_2022-08	E378-U	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	3 days	2 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE POL-S_WS-1_2022-08	E378-U	25-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	3 days	2 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE POL-S_WS-1X_2022-08	E378-U	25-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	3 days	2 days	✓

Matrix: **Water**

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Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE POL-S_WS-2_2022-08	E378-U	25-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	3 days	2 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE POL-S_WS-3_2022-08	E378-U	25-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	3 days	2 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE POL-S_WS-4_2022-08	E378-U	25-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	3 days	2 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE POL-S_WS-5_2022-08	E378-U	25-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	3 days	2 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE QUL-LNF1_WS-1_2022-08	E378-U	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	3 days	3 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE QUL-LNF1_WS-2_2022-08	E378-U	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	3 days	3 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE QUL-LNF1_WS-3_2022-08	E378-U	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	3 days	3 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE QUL-LNF1_WS-4_2022-08	E378-U	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	3 days	3 days	✓

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Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE QUL-LNF1_WS-5_2022-08	E378-U	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	3 days	3 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE QUL-LREF1_WS-1_2022-08	E378-U	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	3 days	3 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE QUL-LREF1_WS-1X_2022-08	E378-U	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	3 days	3 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE QUL-LREF1_WS-2_2022-08	E378-U	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	3 days	3 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE QUL-LREF1_WS-3_2022-08	E378-U	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	3 days	3 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE QUL-LREF1_WS-4_2022-08	E378-U	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	3 days	3 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE QUL-LREF1_WS-5_2022-08	E378-U	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	3 days	3 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE BOL-S_WS-1_2022-08	E235.F	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	28 days	2 days	✓

Matrix: **Water**

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Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Fluoride in Water by IC										
HDPE										
BOL-S_WS-2_2022-08	E235.F	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	28 days	2 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE										
BOL-S_WS-3_2022-08	E235.F	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	28 days	2 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE										
BOL-S_WS-4_2022-08	E235.F	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	28 days	2 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE										
BOL-S_WS-5_2022-08	E235.F	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	28 days	2 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE										
POL-S_WS-1_2022-08	E235.F	25-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	28 days	2 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE										
POL-S_WS-1X_2022-08	E235.F	25-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	28 days	2 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE										
POL-S_WS-2_2022-08	E235.F	25-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	28 days	2 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE										
POL-S_WS-3_2022-08	E235.F	25-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	28 days	2 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE										
POL-S_WS-4_2022-08	E235.F	25-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	28 days	2 days	✓

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Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Fluoride in Water by IC										
HDPE										
POL-S_WS-5_2022-08	E235.F	25-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	28 days	2 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE										
QUL-LNF1_WS-1_2022-08	E235.F	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	28 days	3 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE										
QUL-LNF1_WS-2_2022-08	E235.F	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	28 days	3 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE										
QUL-LNF1_WS-3_2022-08	E235.F	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	28 days	3 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE										
QUL-LNF1_WS-4_2022-08	E235.F	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	28 days	3 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE										
QUL-LNF1_WS-5_2022-08	E235.F	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	28 days	3 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE										
QUL-LREF1_WS-1_2022-08	E235.F	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	28 days	3 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE										
QUL-LREF1_WS-1X_2022-08	E235.F	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	28 days	3 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE										
QUL-LREF1_WS-2_2022-08	E235.F	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	28 days	3 days	✓

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Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Fluoride in Water by IC										
HDPE										
QUL-LREF1_WS-3_2022-08	E235.F	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	28 days	3 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE										
QUL-LREF1_WS-4_2022-08	E235.F	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	28 days	3 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE										
QUL-LREF1_WS-5_2022-08	E235.F	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	28 days	3 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
BOL-S_WS-1_2022-08	E235.NO3-L	24-Aug-2022	27-Aug-2022	3 days	2 days	✓	27-Aug-2022	3 days	0 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
BOL-S_WS-2_2022-08	E235.NO3-L	24-Aug-2022	27-Aug-2022	3 days	2 days	✓	27-Aug-2022	3 days	0 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
BOL-S_WS-3_2022-08	E235.NO3-L	24-Aug-2022	27-Aug-2022	3 days	2 days	✓	27-Aug-2022	3 days	0 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
BOL-S_WS-4_2022-08	E235.NO3-L	24-Aug-2022	27-Aug-2022	3 days	2 days	✓	27-Aug-2022	3 days	0 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
BOL-S_WS-5_2022-08	E235.NO3-L	24-Aug-2022	27-Aug-2022	3 days	2 days	✓	27-Aug-2022	3 days	0 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
POL-S_WS-1_2022-08	E235.NO3-L	25-Aug-2022	27-Aug-2022	3 days	2 days	✓	27-Aug-2022	3 days	0 days	✓

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Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE POL-S_WS-1X_2022-08	E235.NO3-L	25-Aug-2022	27-Aug-2022	3 days	2 days	✓	27-Aug-2022	3 days	0 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE POL-S_WS-2_2022-08	E235.NO3-L	25-Aug-2022	27-Aug-2022	3 days	2 days	✓	27-Aug-2022	3 days	0 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE POL-S_WS-3_2022-08	E235.NO3-L	25-Aug-2022	27-Aug-2022	3 days	2 days	✓	27-Aug-2022	3 days	0 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE POL-S_WS-4_2022-08	E235.NO3-L	25-Aug-2022	27-Aug-2022	3 days	2 days	✓	27-Aug-2022	3 days	0 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE POL-S_WS-5_2022-08	E235.NO3-L	25-Aug-2022	27-Aug-2022	3 days	2 days	✓	27-Aug-2022	3 days	0 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE QUL-LNF1_WS-1_2022-08	E235.NO3-L	24-Aug-2022	27-Aug-2022	3 days	3 days	✓	27-Aug-2022	3 days	0 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE QUL-LNF1_WS-2_2022-08	E235.NO3-L	24-Aug-2022	27-Aug-2022	3 days	3 days	✓	27-Aug-2022	3 days	0 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE QUL-LNF1_WS-3_2022-08	E235.NO3-L	24-Aug-2022	27-Aug-2022	3 days	3 days	✓	27-Aug-2022	3 days	0 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE QUL-LNF1_WS-4_2022-08	E235.NO3-L	24-Aug-2022	27-Aug-2022	3 days	3 days	✓	27-Aug-2022	3 days	0 days	✓

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Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
QUL-LNF1_WS-5_2022-08	E235.NO3-L	24-Aug-2022	27-Aug-2022	3 days	3 days	✓	27-Aug-2022	3 days	0 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
QUL-LREF1_WS-1_2022-08	E235.NO3-L	24-Aug-2022	27-Aug-2022	3 days	3 days	✓	27-Aug-2022	3 days	0 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
QUL-LREF1_WS-1X_2022-08	E235.NO3-L	24-Aug-2022	27-Aug-2022	3 days	3 days	✓	27-Aug-2022	3 days	0 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
QUL-LREF1_WS-2_2022-08	E235.NO3-L	24-Aug-2022	27-Aug-2022	3 days	3 days	✓	27-Aug-2022	3 days	0 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
QUL-LREF1_WS-3_2022-08	E235.NO3-L	24-Aug-2022	27-Aug-2022	3 days	3 days	✓	27-Aug-2022	3 days	0 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
QUL-LREF1_WS-4_2022-08	E235.NO3-L	24-Aug-2022	27-Aug-2022	3 days	3 days	✓	27-Aug-2022	3 days	0 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
QUL-LREF1_WS-5_2022-08	E235.NO3-L	24-Aug-2022	27-Aug-2022	3 days	3 days	✓	27-Aug-2022	3 days	0 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
BOL-S_WS-1_2022-08	E235.NO2-L	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	3 days	2 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
BOL-S_WS-2_2022-08	E235.NO2-L	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	3 days	2 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
BOL-S_WS-3_2022-08	E235.NO2-L	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	3 days	2 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
BOL-S_WS-4_2022-08	E235.NO2-L	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	3 days	2 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
BOL-S_WS-5_2022-08	E235.NO2-L	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	3 days	2 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
POL-S_WS-1_2022-08	E235.NO2-L	25-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	3 days	2 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
POL-S_WS-1X_2022-08	E235.NO2-L	25-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	3 days	2 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
POL-S_WS-2_2022-08	E235.NO2-L	25-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	3 days	2 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
POL-S_WS-3_2022-08	E235.NO2-L	25-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	3 days	2 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
POL-S_WS-4_2022-08	E235.NO2-L	25-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	3 days	2 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
POL-S_WS-5_2022-08	E235.NO2-L	25-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	3 days	2 days	✓

Matrix: **Water**

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Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE QUL-LNF1_WS-1_2022-08	E235.NO2-L	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	3 days	3 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE QUL-LNF1_WS-2_2022-08	E235.NO2-L	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	3 days	3 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE QUL-LNF1_WS-3_2022-08	E235.NO2-L	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	3 days	3 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE QUL-LNF1_WS-4_2022-08	E235.NO2-L	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	3 days	3 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE QUL-LNF1_WS-5_2022-08	E235.NO2-L	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	3 days	3 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE QUL-LREF1_WS-1_2022-08	E235.NO2-L	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	3 days	3 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE QUL-LREF1_WS-1X_2022-08	E235.NO2-L	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	3 days	3 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE QUL-LREF1_WS-2_2022-08	E235.NO2-L	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	3 days	3 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE QUL-LREF1_WS-3_2022-08	E235.NO2-L	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	3 days	3 days	✓

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Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
QUL-LREF1_WS-4_2022-08	E235.NO2-L	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	3 days	3 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
QUL-LREF1_WS-5_2022-08	E235.NO2-L	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	3 days	3 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
BOL-S_WS-1_2022-08	E235.SO4	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	28 days	2 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
BOL-S_WS-2_2022-08	E235.SO4	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	28 days	2 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
BOL-S_WS-3_2022-08	E235.SO4	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	28 days	2 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
BOL-S_WS-4_2022-08	E235.SO4	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	28 days	2 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
BOL-S_WS-5_2022-08	E235.SO4	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	28 days	2 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
POL-S_WS-1_2022-08	E235.SO4	25-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	28 days	2 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
POL-S_WS-1X_2022-08	E235.SO4	25-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	28 days	2 days	✓

Matrix: **Water**

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Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
POL-S_WS-2_2022-08	E235.SO4	25-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	28 days	2 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
POL-S_WS-3_2022-08	E235.SO4	25-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	28 days	2 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
POL-S_WS-4_2022-08	E235.SO4	25-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	28 days	2 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
POL-S_WS-5_2022-08	E235.SO4	25-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	28 days	2 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
QUL-LNF1_WS-1_2022-08	E235.SO4	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	28 days	3 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
QUL-LNF1_WS-2_2022-08	E235.SO4	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	28 days	3 days	✓
Anions and Nutrients : Sulfate in Water by IC										
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QUL-LNF1_WS-3_2022-08	E235.SO4	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	28 days	3 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
QUL-LNF1_WS-4_2022-08	E235.SO4	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	28 days	3 days	✓
Anions and Nutrients : Sulfate in Water by IC										
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QUL-LNF1_WS-5_2022-08	E235.SO4	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	28 days	3 days	✓

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			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
QUL-LREF1_WS-1_2022-08	E235.SO4	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	28 days	3 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
QUL-LREF1_WS-1X_2022-08	E235.SO4	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	28 days	3 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
QUL-LREF1_WS-2_2022-08	E235.SO4	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	28 days	3 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
QUL-LREF1_WS-3_2022-08	E235.SO4	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	28 days	3 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
QUL-LREF1_WS-4_2022-08	E235.SO4	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	28 days	3 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
QUL-LREF1_WS-5_2022-08	E235.SO4	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	28 days	3 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass dissolved (sulfuric acid)										
POL-S_WS-1_2022-08	E375-T	25-Aug-2022	31-Aug-2022	----	----		01-Sep-2022	28 days	7 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass dissolved (sulfuric acid)										
POL-S_WS-1X_2022-08	E375-T	25-Aug-2022	31-Aug-2022	----	----		01-Sep-2022	28 days	7 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass dissolved (sulfuric acid)										
POL-S_WS-2_2022-08	E375-T	25-Aug-2022	31-Aug-2022	----	----		01-Sep-2022	28 days	7 days	✓

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Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass dissolved (sulfuric acid)										
POL-S_WS-3_2022-08	E375-T	25-Aug-2022	31-Aug-2022	----	----		01-Sep-2022	28 days	7 days	✓
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Amber glass dissolved (sulfuric acid)										
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POL-S_WS-5_2022-08	E375-T	25-Aug-2022	31-Aug-2022	----	----		01-Sep-2022	28 days	7 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass dissolved (sulfuric acid)										
BOL-S_WS-1_2022-08	E375-T	24-Aug-2022	31-Aug-2022	----	----		01-Sep-2022	28 days	8 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass dissolved (sulfuric acid)										
BOL-S_WS-2_2022-08	E375-T	24-Aug-2022	31-Aug-2022	----	----		01-Sep-2022	28 days	8 days	✓
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Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass dissolved (sulfuric acid)										
QUL-LNF1_WS-1_2022-08	E375-T	24-Aug-2022	31-Aug-2022	----	----		01-Sep-2022	28 days	8 days	✓

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			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass dissolved (sulfuric acid) QUL-LNF1_WS-2_2022-08	E375-T	24-Aug-2022	31-Aug-2022	----	----		01-Sep-2022	28 days	8 days	✓
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Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass dissolved (sulfuric acid) QUL-LNF1_WS-5_2022-08	E375-T	24-Aug-2022	31-Aug-2022	----	----		01-Sep-2022	28 days	8 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass dissolved (sulfuric acid) QUL-LREF1_WS-1_2022-08	E375-T	24-Aug-2022	31-Aug-2022	----	----		01-Sep-2022	28 days	8 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass dissolved (sulfuric acid) QUL-LREF1_WS-1X_2022-08	E375-T	24-Aug-2022	31-Aug-2022	----	----		01-Sep-2022	28 days	8 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass dissolved (sulfuric acid) QUL-LREF1_WS-2_2022-08	E375-T	24-Aug-2022	31-Aug-2022	----	----		01-Sep-2022	28 days	8 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass dissolved (sulfuric acid) QUL-LREF1_WS-3_2022-08	E375-T	24-Aug-2022	31-Aug-2022	----	----		01-Sep-2022	28 days	8 days	✓
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Amber glass dissolved (sulfuric acid) QUL-LREF1_WS-4_2022-08	E375-T	24-Aug-2022	31-Aug-2022	----	----		01-Sep-2022	28 days	8 days	✓

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Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass dissolved (sulfuric acid)										
QUL-LREF1_WS-5_2022-08	E375-T	24-Aug-2022	31-Aug-2022	----	----		01-Sep-2022	28 days	8 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid)										
POL-S_WS-1_2022-08	E366	25-Aug-2022	01-Sep-2022	----	----		02-Sep-2022	28 days	8 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid)										
POL-S_WS-2_2022-08	E366	25-Aug-2022	01-Sep-2022	----	----		02-Sep-2022	28 days	8 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid)										
POL-S_WS-3_2022-08	E366	25-Aug-2022	01-Sep-2022	----	----		02-Sep-2022	28 days	8 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid)										
POL-S_WS-4_2022-08	E366	25-Aug-2022	01-Sep-2022	----	----		02-Sep-2022	28 days	8 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid)										
POL-S_WS-5_2022-08	E366	25-Aug-2022	01-Sep-2022	----	----		02-Sep-2022	28 days	8 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid)										
BOL-S_WS-1_2022-08	E366	24-Aug-2022	01-Sep-2022	----	----		02-Sep-2022	28 days	9 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
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Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid)										
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Amber glass total (sulfuric acid)										
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QUL-LNF1_WS-3_2022-08	E366	24-Aug-2022	01-Sep-2022	----	----		02-Sep-2022	28 days	9 days	✓
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Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid)										
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Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid)										
QUL-LREF1_WS-1X_2022-08	E366	24-Aug-2022	01-Sep-2022	----	----		02-Sep-2022	28 days	9 days	✓

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			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid)										
QUL-LREF1_WS-2_2022-08	E366	24-Aug-2022	01-Sep-2022	----	----		02-Sep-2022	28 days	9 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid)										
QUL-LREF1_WS-3_2022-08	E366	24-Aug-2022	01-Sep-2022	----	----		02-Sep-2022	28 days	9 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid)										
QUL-LREF1_WS-4_2022-08	E366	24-Aug-2022	01-Sep-2022	----	----		02-Sep-2022	28 days	9 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (sulfuric acid)										
QUL-LREF1_WS-5_2022-08	E366	24-Aug-2022	01-Sep-2022	----	----		02-Sep-2022	28 days	9 days	✓
Anions and Nutrients : Total Nitrogen by Colourimetry										
Amber glass total (lab preserved)										
POL-S_WS-1X_2022-08	E366	25-Aug-2022	26-Aug-2022	3 days	2 days	✓	30-Aug-2022	28 days	3 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid)										
BOL-S_WS-1_2022-08	E372-U	24-Aug-2022	01-Sep-2022	----	----		03-Sep-2022	28 days	10 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid)										
BOL-S_WS-2_2022-08	E372-U	24-Aug-2022	01-Sep-2022	----	----		03-Sep-2022	28 days	10 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid)										
BOL-S_WS-3_2022-08	E372-U	24-Aug-2022	01-Sep-2022	----	----		03-Sep-2022	28 days	10 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid)										
BOL-S_WS-4_2022-08	E372-U	24-Aug-2022	01-Sep-2022	----	----		03-Sep-2022	28 days	10 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid)										
BOL-S_WS-5_2022-08	E372-U	24-Aug-2022	01-Sep-2022	----	----		03-Sep-2022	28 days	10 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid)										
QUL-LNF1_WS-1_2022-08	E372-U	24-Aug-2022	01-Sep-2022	----	----		03-Sep-2022	28 days	10 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid)										
QUL-LNF1_WS-2_2022-08	E372-U	24-Aug-2022	01-Sep-2022	----	----		03-Sep-2022	28 days	10 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid)										
QUL-LNF1_WS-3_2022-08	E372-U	24-Aug-2022	01-Sep-2022	----	----		03-Sep-2022	28 days	10 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid)										
QUL-LNF1_WS-4_2022-08	E372-U	24-Aug-2022	01-Sep-2022	----	----		03-Sep-2022	28 days	10 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid)										
QUL-LNF1_WS-5_2022-08	E372-U	24-Aug-2022	01-Sep-2022	----	----		03-Sep-2022	28 days	10 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid)										
QUL-LREF1_WS-1_2022-08	E372-U	24-Aug-2022	01-Sep-2022	----	----		03-Sep-2022	28 days	10 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid)										
QUL-LREF1_WS-1X_2022-08	E372-U	24-Aug-2022	01-Sep-2022	----	----		03-Sep-2022	28 days	10 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid)										
QUL-LREF1_WS-2_2022-08	E372-U	24-Aug-2022	01-Sep-2022	----	----		03-Sep-2022	28 days	10 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid)										
QUL-LREF1_WS-3_2022-08	E372-U	24-Aug-2022	01-Sep-2022	----	----		03-Sep-2022	28 days	10 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid)										
QUL-LREF1_WS-4_2022-08	E372-U	24-Aug-2022	01-Sep-2022	----	----		03-Sep-2022	28 days	10 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid)										
QUL-LREF1_WS-5_2022-08	E372-U	24-Aug-2022	01-Sep-2022	----	----		03-Sep-2022	28 days	10 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid)										
POL-S_WS-1_2022-08	E372-U	25-Aug-2022	01-Sep-2022	----	----		03-Sep-2022	28 days	9 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid)										
POL-S_WS-2_2022-08	E372-U	25-Aug-2022	01-Sep-2022	----	----		03-Sep-2022	28 days	9 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid)										
POL-S_WS-3_2022-08	E372-U	25-Aug-2022	01-Sep-2022	----	----		03-Sep-2022	28 days	9 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid)										
POL-S_WS-4_2022-08	E372-U	25-Aug-2022	01-Sep-2022	----	----		03-Sep-2022	28 days	9 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid)										
POL-S_WS-5_2022-08	E372-U	25-Aug-2022	01-Sep-2022	----	----		03-Sep-2022	28 days	9 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (lab preserved)										
POL-S_WS-1X_2022-08	E372-U	25-Aug-2022	26-Aug-2022	3 days	2 days	✓	28-Aug-2022	28 days	2 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) POL-S_WS-1_2022-08	E421	25-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	180 days	5 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) POL-S_WS-1X_2022-08	E421	25-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	180 days	5 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) POL-S_WS-2_2022-08	E421	25-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	180 days	5 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) POL-S_WS-3_2022-08	E421	25-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	180 days	5 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) POL-S_WS-4_2022-08	E421	25-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	180 days	5 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) POL-S_WS-5_2022-08	E421	25-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	180 days	5 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) BOL-S_WS-1_2022-08	E421	24-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	180 days	6 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) BOL-S_WS-2_2022-08	E421	24-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	180 days	6 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) BOL-S_WS-3_2022-08	E421	24-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	180 days	6 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) BOL-S_WS-4_2022-08	E421	24-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	180 days	6 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) BOL-S_WS-5_2022-08	E421	24-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	180 days	6 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) QUL-LNF1_WS-1_2022-08	E421	24-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	180 days	6 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) QUL-LNF1_WS-2_2022-08	E421	24-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	180 days	6 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) QUL-LNF1_WS-3_2022-08	E421	24-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	180 days	6 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) QUL-LNF1_WS-4_2022-08	E421	24-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	180 days	6 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) QUL-LNF1_WS-5_2022-08	E421	24-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	180 days	6 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) QUL-LREF1_WS-1_2022-08	E421	24-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	180 days	6 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) QUL-LREF1_WS-1X_2022-08	E421	24-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	180 days	6 days	✓

Matrix: **Water**

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Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) QUL-LREF1_WS-2_2022-08	E421	24-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	180 days	6 days	✓
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HDPE - dissolved (lab preserved) QUL-LREF1_WS-3_2022-08	E421	24-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	180 days	6 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) QUL-LREF1_WS-4_2022-08	E421	24-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	180 days	6 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) QUL-LREF1_WS-5_2022-08	E421	24-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	180 days	6 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) POL-S_WS-1_2022-08	E358-L	25-Aug-2022	31-Aug-2022	----	----		01-Sep-2022	28 days	7 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) POL-S_WS-1X_2022-08	E358-L	25-Aug-2022	31-Aug-2022	----	----		01-Sep-2022	28 days	7 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) POL-S_WS-2_2022-08	E358-L	25-Aug-2022	31-Aug-2022	----	----		01-Sep-2022	28 days	7 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) POL-S_WS-3_2022-08	E358-L	25-Aug-2022	31-Aug-2022	----	----		01-Sep-2022	28 days	7 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) POL-S_WS-4_2022-08	E358-L	25-Aug-2022	31-Aug-2022	----	----		01-Sep-2022	28 days	7 days	✓

Matrix: **Water**

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Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) POL-S_WS-5_2022-08	E358-L	25-Aug-2022	31-Aug-2022	----	----		01-Sep-2022	28 days	7 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) BOL-S_WS-1_2022-08	E358-L	24-Aug-2022	31-Aug-2022	----	----		01-Sep-2022	28 days	8 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) BOL-S_WS-2_2022-08	E358-L	24-Aug-2022	31-Aug-2022	----	----		01-Sep-2022	28 days	8 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) BOL-S_WS-3_2022-08	E358-L	24-Aug-2022	31-Aug-2022	----	----		01-Sep-2022	28 days	8 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) BOL-S_WS-4_2022-08	E358-L	24-Aug-2022	31-Aug-2022	----	----		01-Sep-2022	28 days	8 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) BOL-S_WS-5_2022-08	E358-L	24-Aug-2022	31-Aug-2022	----	----		01-Sep-2022	28 days	8 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) QUL-LNF1_WS-1_2022-08	E358-L	24-Aug-2022	31-Aug-2022	----	----		01-Sep-2022	28 days	8 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) QUL-LNF1_WS-2_2022-08	E358-L	24-Aug-2022	31-Aug-2022	----	----		01-Sep-2022	28 days	8 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) QUL-LNF1_WS-3_2022-08	E358-L	24-Aug-2022	31-Aug-2022	----	----		01-Sep-2022	28 days	8 days	✓

Matrix: **Water**

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Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) QUL-LNF1_WS-4_2022-08	E358-L	24-Aug-2022	31-Aug-2022	----	----		01-Sep-2022	28 days	8 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) QUL-LNF1_WS-5_2022-08	E358-L	24-Aug-2022	31-Aug-2022	----	----		01-Sep-2022	28 days	8 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) QUL-LREF1_WS-1_2022-08	E358-L	24-Aug-2022	31-Aug-2022	----	----		01-Sep-2022	28 days	8 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) QUL-LREF1_WS-1X_2022-08	E358-L	24-Aug-2022	31-Aug-2022	----	----		01-Sep-2022	28 days	8 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) QUL-LREF1_WS-2_2022-08	E358-L	24-Aug-2022	31-Aug-2022	----	----		01-Sep-2022	28 days	8 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) QUL-LREF1_WS-3_2022-08	E358-L	24-Aug-2022	31-Aug-2022	----	----		01-Sep-2022	28 days	8 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) QUL-LREF1_WS-4_2022-08	E358-L	24-Aug-2022	31-Aug-2022	----	----		01-Sep-2022	28 days	8 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) QUL-LREF1_WS-5_2022-08	E358-L	24-Aug-2022	31-Aug-2022	----	----		01-Sep-2022	28 days	8 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE BOL-S_WS-1_2022-08	E290	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	14 days	2 days	✓

Matrix: **Water**

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Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Alkalinity Species by Titration										
HDPE BOL-S_WS-2_2022-08	E290	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	14 days	2 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE BOL-S_WS-3_2022-08	E290	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	14 days	2 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE BOL-S_WS-4_2022-08	E290	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	14 days	2 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE BOL-S_WS-5_2022-08	E290	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	14 days	2 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE POL-S_WS-1_2022-08	E290	25-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	14 days	2 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE POL-S_WS-1X_2022-08	E290	25-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	14 days	2 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE POL-S_WS-2_2022-08	E290	25-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	14 days	2 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE POL-S_WS-3_2022-08	E290	25-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	14 days	2 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE POL-S_WS-4_2022-08	E290	25-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	14 days	2 days	✓

Matrix: **Water**

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Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Alkalinity Species by Titration										
HDPE POL-S_WS-5_2022-08	E290	25-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	14 days	2 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE QUL-LNF1_WS-1_2022-08	E290	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	14 days	3 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE QUL-LNF1_WS-2_2022-08	E290	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	14 days	3 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE QUL-LNF1_WS-3_2022-08	E290	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	14 days	3 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE QUL-LNF1_WS-4_2022-08	E290	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	14 days	3 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE QUL-LNF1_WS-5_2022-08	E290	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	14 days	3 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE QUL-LREF1_WS-1_2022-08	E290	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	14 days	3 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE QUL-LREF1_WS-1X_2022-08	E290	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	14 days	3 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE QUL-LREF1_WS-2_2022-08	E290	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	14 days	3 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Alkalinity Species by Titration										
HDPE										
QUL-LREF1_WS-3_2022-08	E290	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	14 days	3 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE										
QUL-LREF1_WS-4_2022-08	E290	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	14 days	3 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE										
QUL-LREF1_WS-5_2022-08	E290	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	14 days	3 days	✓
Physical Tests : Conductivity in Water										
HDPE										
BOL-S_WS-1_2022-08	E100	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	28 days	2 days	✓
Physical Tests : Conductivity in Water										
HDPE										
BOL-S_WS-2_2022-08	E100	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	28 days	2 days	✓
Physical Tests : Conductivity in Water										
HDPE										
BOL-S_WS-3_2022-08	E100	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	28 days	2 days	✓
Physical Tests : Conductivity in Water										
HDPE										
BOL-S_WS-4_2022-08	E100	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	28 days	2 days	✓
Physical Tests : Conductivity in Water										
HDPE										
BOL-S_WS-5_2022-08	E100	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	28 days	2 days	✓
Physical Tests : Conductivity in Water										
HDPE										
POL-S_WS-1_2022-08	E100	25-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	28 days	2 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Conductivity in Water										
HDPE POL-S_WS-1X_2022-08	E100	25-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	28 days	2 days	✓
Physical Tests : Conductivity in Water										
HDPE POL-S_WS-2_2022-08	E100	25-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	28 days	2 days	✓
Physical Tests : Conductivity in Water										
HDPE POL-S_WS-3_2022-08	E100	25-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	28 days	2 days	✓
Physical Tests : Conductivity in Water										
HDPE POL-S_WS-4_2022-08	E100	25-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	28 days	2 days	✓
Physical Tests : Conductivity in Water										
HDPE POL-S_WS-5_2022-08	E100	25-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	28 days	2 days	✓
Physical Tests : Conductivity in Water										
HDPE QUL-LNF1_WS-1_2022-08	E100	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	28 days	3 days	✓
Physical Tests : Conductivity in Water										
HDPE QUL-LNF1_WS-2_2022-08	E100	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	28 days	3 days	✓
Physical Tests : Conductivity in Water										
HDPE QUL-LNF1_WS-3_2022-08	E100	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	28 days	3 days	✓
Physical Tests : Conductivity in Water										
HDPE QUL-LNF1_WS-4_2022-08	E100	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	28 days	3 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Conductivity in Water										
HDPE QUL-LNF1_WS-5_2022-08	E100	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	28 days	3 days	✓
Physical Tests : Conductivity in Water										
HDPE QUL-LREF1_WS-1_2022-08	E100	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	28 days	3 days	✓
Physical Tests : Conductivity in Water										
HDPE QUL-LREF1_WS-1X_2022-08	E100	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	28 days	3 days	✓
Physical Tests : Conductivity in Water										
HDPE QUL-LREF1_WS-2_2022-08	E100	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	28 days	3 days	✓
Physical Tests : Conductivity in Water										
HDPE QUL-LREF1_WS-3_2022-08	E100	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	28 days	3 days	✓
Physical Tests : Conductivity in Water										
HDPE QUL-LREF1_WS-4_2022-08	E100	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	28 days	3 days	✓
Physical Tests : Conductivity in Water										
HDPE QUL-LREF1_WS-5_2022-08	E100	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	28 days	3 days	✓
Physical Tests : pH by Meter										
HDPE POL-S_WS-1X_2022-08	E108	25-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	0.25 hrs	1.11 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE QUL-LREF1_WS-1X_2022-08	E108	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	0.25 hrs	1.11 hrs	× EHTR-FM

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : pH by Meter										
HDPE BOL-S_WS-1_2022-08	E108	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	0.25 hrs	7.25 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE BOL-S_WS-2_2022-08	E108	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	0.25 hrs	7.25 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE BOL-S_WS-3_2022-08	E108	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	0.25 hrs	7.25 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE BOL-S_WS-4_2022-08	E108	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	0.25 hrs	7.25 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE BOL-S_WS-5_2022-08	E108	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	0.25 hrs	7.25 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE POL-S_WS-1_2022-08	E108	25-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	0.25 hrs	7.25 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE POL-S_WS-2_2022-08	E108	25-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	0.25 hrs	7.25 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE POL-S_WS-3_2022-08	E108	25-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	0.25 hrs	7.25 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE POL-S_WS-4_2022-08	E108	25-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	0.25 hrs	7.25 hrs	× EHTR-FM

Matrix: **Water**

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Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : pH by Meter										
HDPE POL-S_WS-5_2022-08	E108	25-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	0.25 hrs	7.25 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE QUL-LNF1_WS-1_2022-08	E108	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	0.25 hrs	7.25 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE QUL-LNF1_WS-2_2022-08	E108	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	0.25 hrs	7.25 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE QUL-LNF1_WS-3_2022-08	E108	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	0.25 hrs	7.25 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE QUL-LNF1_WS-4_2022-08	E108	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	0.25 hrs	7.25 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE QUL-LNF1_WS-5_2022-08	E108	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	0.25 hrs	7.25 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE QUL-LREF1_WS-1_2022-08	E108	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	0.25 hrs	7.25 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE QUL-LREF1_WS-2_2022-08	E108	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	0.25 hrs	7.25 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE QUL-LREF1_WS-3_2022-08	E108	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	0.25 hrs	7.25 hrs	× EHTR-FM

Matrix: **Water**

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Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : pH by Meter										
HDPE QUL-LREF1_WS-4_2022-08	E108	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	0.25 hrs	7.25 hrs	× EHTR-FM
Physical Tests : pH by Meter										
HDPE QUL-LREF1_WS-5_2022-08	E108	24-Aug-2022	27-Aug-2022	----	----		27-Aug-2022	0.25 hrs	7.25 hrs	× EHTR-FM
Physical Tests : TDS by Gravimetry										
HDPE POL-S_WS-1_2022-08	E162	25-Aug-2022	----	----	----		31-Aug-2022	7 days	6 days	✓
Physical Tests : TDS by Gravimetry										
HDPE POL-S_WS-1X_2022-08	E162	25-Aug-2022	----	----	----		31-Aug-2022	7 days	6 days	✓
Physical Tests : TDS by Gravimetry										
HDPE POL-S_WS-2_2022-08	E162	25-Aug-2022	----	----	----		31-Aug-2022	7 days	6 days	✓
Physical Tests : TDS by Gravimetry										
HDPE POL-S_WS-3_2022-08	E162	25-Aug-2022	----	----	----		31-Aug-2022	7 days	6 days	✓
Physical Tests : TDS by Gravimetry										
HDPE POL-S_WS-4_2022-08	E162	25-Aug-2022	----	----	----		31-Aug-2022	7 days	6 days	✓
Physical Tests : TDS by Gravimetry										
HDPE POL-S_WS-5_2022-08	E162	25-Aug-2022	----	----	----		31-Aug-2022	7 days	6 days	✓
Physical Tests : TDS by Gravimetry										
HDPE BOL-S_WS-1_2022-08	E162	24-Aug-2022	----	----	----		31-Aug-2022	7 days	7 days	✓

Matrix: **Water**

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Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : TDS by Gravimetry										
HDPE BOL-S_WS-2_2022-08	E162	24-Aug-2022	----	----	----		31-Aug-2022	7 days	7 days	✓
Physical Tests : TDS by Gravimetry										
HDPE BOL-S_WS-3_2022-08	E162	24-Aug-2022	----	----	----		31-Aug-2022	7 days	7 days	✓
Physical Tests : TDS by Gravimetry										
HDPE BOL-S_WS-4_2022-08	E162	24-Aug-2022	----	----	----		31-Aug-2022	7 days	7 days	✓
Physical Tests : TDS by Gravimetry										
HDPE BOL-S_WS-5_2022-08	E162	24-Aug-2022	----	----	----		31-Aug-2022	7 days	7 days	✓
Physical Tests : TDS by Gravimetry										
HDPE QUL-LNF1_WS-1_2022-08	E162	24-Aug-2022	----	----	----		30-Aug-2022	7 days	7 days	✓
Physical Tests : TDS by Gravimetry										
HDPE QUL-LNF1_WS-2_2022-08	E162	24-Aug-2022	----	----	----		30-Aug-2022	7 days	7 days	✓
Physical Tests : TDS by Gravimetry										
HDPE QUL-LNF1_WS-3_2022-08	E162	24-Aug-2022	----	----	----		30-Aug-2022	7 days	7 days	✓
Physical Tests : TDS by Gravimetry										
HDPE QUL-LNF1_WS-4_2022-08	E162	24-Aug-2022	----	----	----		30-Aug-2022	7 days	7 days	✓
Physical Tests : TDS by Gravimetry										
HDPE QUL-LNF1_WS-5_2022-08	E162	24-Aug-2022	----	----	----		30-Aug-2022	7 days	7 days	✓

Matrix: **Water**

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Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : TDS by Gravimetry										
HDPE										
QUL-LREF1_WS-1_2022-08	E162	24-Aug-2022	----	----	----		30-Aug-2022	7 days	7 days	✓
Physical Tests : TDS by Gravimetry										
HDPE										
QUL-LREF1_WS-1X_2022-08	E162	24-Aug-2022	----	----	----		30-Aug-2022	7 days	7 days	✓
Physical Tests : TDS by Gravimetry										
HDPE										
QUL-LREF1_WS-2_2022-08	E162	24-Aug-2022	----	----	----		30-Aug-2022	7 days	7 days	✓
Physical Tests : TDS by Gravimetry										
HDPE										
QUL-LREF1_WS-3_2022-08	E162	24-Aug-2022	----	----	----		30-Aug-2022	7 days	7 days	✓
Physical Tests : TDS by Gravimetry										
HDPE										
QUL-LREF1_WS-4_2022-08	E162	24-Aug-2022	----	----	----		30-Aug-2022	7 days	7 days	✓
Physical Tests : TDS by Gravimetry										
HDPE										
QUL-LREF1_WS-5_2022-08	E162	24-Aug-2022	----	----	----		30-Aug-2022	7 days	7 days	✓
Physical Tests : TSS by Gravimetry (Whole Bottle)										
HDPE [TSS-WB]										
POL-S_WS-1_2022-08	E164	25-Aug-2022	----	----	----		31-Aug-2022	7 days	6 days	✓
Physical Tests : TSS by Gravimetry (Whole Bottle)										
HDPE [TSS-WB]										
POL-S_WS-1X_2022-08	E164	25-Aug-2022	----	----	----		31-Aug-2022	7 days	6 days	✓
Physical Tests : TSS by Gravimetry (Whole Bottle)										
HDPE [TSS-WB]										
POL-S_WS-2_2022-08	E164	25-Aug-2022	----	----	----		31-Aug-2022	7 days	6 days	✓

Matrix: **Water**

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Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : TSS by Gravimetry (Whole Bottle)										
HDPE [TSS-WB] POL-S_WS-3_2022-08	E164	25-Aug-2022	----	----	----		31-Aug-2022	7 days	6 days	✓
Physical Tests : TSS by Gravimetry (Whole Bottle)										
HDPE [TSS-WB] POL-S_WS-4_2022-08	E164	25-Aug-2022	----	----	----		31-Aug-2022	7 days	6 days	✓
Physical Tests : TSS by Gravimetry (Whole Bottle)										
HDPE [TSS-WB] POL-S_WS-5_2022-08	E164	25-Aug-2022	----	----	----		31-Aug-2022	7 days	6 days	✓
Physical Tests : TSS by Gravimetry (Whole Bottle)										
HDPE [TSS-WB] BOL-S_WS-1_2022-08	E164	24-Aug-2022	----	----	----		31-Aug-2022	7 days	7 days	✓
Physical Tests : TSS by Gravimetry (Whole Bottle)										
HDPE [TSS-WB] BOL-S_WS-2_2022-08	E164	24-Aug-2022	----	----	----		31-Aug-2022	7 days	7 days	✓
Physical Tests : TSS by Gravimetry (Whole Bottle)										
HDPE [TSS-WB] BOL-S_WS-3_2022-08	E164	24-Aug-2022	----	----	----		31-Aug-2022	7 days	7 days	✓
Physical Tests : TSS by Gravimetry (Whole Bottle)										
HDPE [TSS-WB] BOL-S_WS-4_2022-08	E164	24-Aug-2022	----	----	----		31-Aug-2022	7 days	7 days	✓
Physical Tests : TSS by Gravimetry (Whole Bottle)										
HDPE [TSS-WB] BOL-S_WS-5_2022-08	E164	24-Aug-2022	----	----	----		31-Aug-2022	7 days	7 days	✓
Physical Tests : TSS by Gravimetry (Whole Bottle)										
HDPE [TSS-WB] QUL-LNF1_WS-1_2022-08	E164	24-Aug-2022	----	----	----		30-Aug-2022	7 days	7 days	✓

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Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : TSS by Gravimetry (Whole Bottle)										
HDPE [TSS-WB] QUL-LNF1_WS-2_2022-08	E164	24-Aug-2022	----	----	----		30-Aug-2022	7 days	7 days	✓
Physical Tests : TSS by Gravimetry (Whole Bottle)										
HDPE [TSS-WB] QUL-LNF1_WS-3_2022-08	E164	24-Aug-2022	----	----	----		30-Aug-2022	7 days	7 days	✓
Physical Tests : TSS by Gravimetry (Whole Bottle)										
HDPE [TSS-WB] QUL-LNF1_WS-4_2022-08	E164	24-Aug-2022	----	----	----		30-Aug-2022	7 days	7 days	✓
Physical Tests : TSS by Gravimetry (Whole Bottle)										
HDPE [TSS-WB] QUL-LNF1_WS-5_2022-08	E164	24-Aug-2022	----	----	----		30-Aug-2022	7 days	7 days	✓
Physical Tests : TSS by Gravimetry (Whole Bottle)										
HDPE [TSS-WB] QUL-LREF1_WS-1_2022-08	E164	24-Aug-2022	----	----	----		30-Aug-2022	7 days	7 days	✓
Physical Tests : TSS by Gravimetry (Whole Bottle)										
HDPE [TSS-WB] QUL-LREF1_WS-1X_2022-08	E164	24-Aug-2022	----	----	----		30-Aug-2022	7 days	7 days	✓
Physical Tests : TSS by Gravimetry (Whole Bottle)										
HDPE [TSS-WB] QUL-LREF1_WS-2_2022-08	E164	24-Aug-2022	----	----	----		30-Aug-2022	7 days	7 days	✓
Physical Tests : TSS by Gravimetry (Whole Bottle)										
HDPE [TSS-WB] QUL-LREF1_WS-3_2022-08	E164	24-Aug-2022	----	----	----		30-Aug-2022	7 days	7 days	✓
Physical Tests : TSS by Gravimetry (Whole Bottle)										
HDPE [TSS-WB] QUL-LREF1_WS-4_2022-08	E164	24-Aug-2022	----	----	----		30-Aug-2022	7 days	7 days	✓

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Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : TSS by Gravimetry (Whole Bottle)										
HDPE [TSS-WB] QUL-LREF1_WS-5_2022-08	E164	24-Aug-2022	----	----	----		30-Aug-2022	7 days	7 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE POL-S_WS-1_2022-08	E121	25-Aug-2022	----	----	----		27-Aug-2022	3 days	2 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE POL-S_WS-1X_2022-08	E121	25-Aug-2022	----	----	----		27-Aug-2022	3 days	2 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE POL-S_WS-2_2022-08	E121	25-Aug-2022	----	----	----		27-Aug-2022	3 days	2 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE POL-S_WS-3_2022-08	E121	25-Aug-2022	----	----	----		27-Aug-2022	3 days	2 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE POL-S_WS-4_2022-08	E121	25-Aug-2022	----	----	----		27-Aug-2022	3 days	2 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE POL-S_WS-5_2022-08	E121	25-Aug-2022	----	----	----		27-Aug-2022	3 days	2 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE BOL-S_WS-1_2022-08	E121	24-Aug-2022	----	----	----		27-Aug-2022	3 days	3 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE BOL-S_WS-2_2022-08	E121	24-Aug-2022	----	----	----		27-Aug-2022	3 days	3 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Turbidity by Nephelometry										
HDPE BOL-S_WS-3_2022-08	E121	24-Aug-2022	----	----	----		27-Aug-2022	3 days	3 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE BOL-S_WS-4_2022-08	E121	24-Aug-2022	----	----	----		27-Aug-2022	3 days	3 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE BOL-S_WS-5_2022-08	E121	24-Aug-2022	----	----	----		27-Aug-2022	3 days	3 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE QUL-LNF1_WS-1_2022-08	E121	24-Aug-2022	----	----	----		27-Aug-2022	3 days	3 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE QUL-LNF1_WS-2_2022-08	E121	24-Aug-2022	----	----	----		27-Aug-2022	3 days	3 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE QUL-LNF1_WS-3_2022-08	E121	24-Aug-2022	----	----	----		27-Aug-2022	3 days	3 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE QUL-LNF1_WS-4_2022-08	E121	24-Aug-2022	----	----	----		27-Aug-2022	3 days	3 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE QUL-LNF1_WS-5_2022-08	E121	24-Aug-2022	----	----	----		27-Aug-2022	3 days	3 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE QUL-LREF1_WS-1_2022-08	E121	24-Aug-2022	----	----	----		27-Aug-2022	3 days	3 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Turbidity by Nephelometry										
HDPE										
QUL-LREF1_WS-1X_2022-08	E121	24-Aug-2022	----	----	----		27-Aug-2022	3 days	3 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE										
QUL-LREF1_WS-2_2022-08	E121	24-Aug-2022	----	----	----		27-Aug-2022	3 days	3 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE										
QUL-LREF1_WS-3_2022-08	E121	24-Aug-2022	----	----	----		27-Aug-2022	3 days	3 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE										
QUL-LREF1_WS-4_2022-08	E121	24-Aug-2022	----	----	----		27-Aug-2022	3 days	3 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE										
QUL-LREF1_WS-5_2022-08	E121	24-Aug-2022	----	----	----		27-Aug-2022	3 days	3 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved)										
POL-S_WS-1_2022-08	E420	25-Aug-2022	29-Aug-2022	----	----		30-Aug-2022	180 days	5 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved)										
POL-S_WS-2_2022-08	E420	25-Aug-2022	29-Aug-2022	----	----		30-Aug-2022	180 days	5 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved)										
POL-S_WS-3_2022-08	E420	25-Aug-2022	29-Aug-2022	----	----		30-Aug-2022	180 days	5 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved)										
POL-S_WS-4_2022-08	E420	25-Aug-2022	29-Aug-2022	----	----		30-Aug-2022	180 days	5 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved)										
POL-S_WS-5_2022-08	E420	25-Aug-2022	29-Aug-2022	----	----		30-Aug-2022	180 days	5 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved)										
BOL-S_WS-1_2022-08	E420	24-Aug-2022	29-Aug-2022	----	----		30-Aug-2022	180 days	6 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved)										
BOL-S_WS-2_2022-08	E420	24-Aug-2022	29-Aug-2022	----	----		30-Aug-2022	180 days	6 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved)										
BOL-S_WS-3_2022-08	E420	24-Aug-2022	29-Aug-2022	----	----		30-Aug-2022	180 days	6 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved)										
BOL-S_WS-4_2022-08	E420	24-Aug-2022	29-Aug-2022	----	----		30-Aug-2022	180 days	6 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved)										
BOL-S_WS-5_2022-08	E420	24-Aug-2022	29-Aug-2022	----	----		30-Aug-2022	180 days	6 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved)										
POL-S_WS-1X_2022-08	E420	25-Aug-2022	29-Aug-2022	----	----		30-Aug-2022	180 days	6 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved)										
QUL-LNF1_WS-1_2022-08	E420	24-Aug-2022	29-Aug-2022	----	----		30-Aug-2022	180 days	6 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved)										
QUL-LNF1_WS-2_2022-08	E420	24-Aug-2022	29-Aug-2022	----	----		30-Aug-2022	180 days	6 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved) QUL-LNF1_WS-3_2022-08	E420	24-Aug-2022	29-Aug-2022	----	----		30-Aug-2022	180 days	6 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved) QUL-LNF1_WS-4_2022-08	E420	24-Aug-2022	29-Aug-2022	----	----		30-Aug-2022	180 days	6 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved) QUL-LNF1_WS-5_2022-08	E420	24-Aug-2022	29-Aug-2022	----	----		30-Aug-2022	180 days	6 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved) QUL-LREF1_WS-1_2022-08	E420	24-Aug-2022	29-Aug-2022	----	----		30-Aug-2022	180 days	6 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved) QUL-LREF1_WS-2_2022-08	E420	24-Aug-2022	29-Aug-2022	----	----		30-Aug-2022	180 days	6 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved) QUL-LREF1_WS-3_2022-08	E420	24-Aug-2022	29-Aug-2022	----	----		30-Aug-2022	180 days	6 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved) QUL-LREF1_WS-4_2022-08	E420	24-Aug-2022	29-Aug-2022	----	----		30-Aug-2022	180 days	6 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved) QUL-LREF1_WS-5_2022-08	E420	24-Aug-2022	29-Aug-2022	----	----		30-Aug-2022	180 days	6 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved) QUL-LREF1_WS-1X_2022-08	E420	24-Aug-2022	29-Aug-2022	----	----		30-Aug-2022	180 days	7 days	✓

Legend & Qualifier Definitions

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Alkalinity Species by Titration	E290	621330	2	39	5.1	5.0	✓
Ammonia by Fluorescence	E298	621279	3	41	7.3	5.0	✓
Chloride in Water by IC	E235.Cl	621335	2	39	5.1	5.0	✓
Conductivity in Water	E100	621328	2	39	5.1	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	623614	2	38	5.2	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	627354	2	40	5.0	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	621336	2	32	6.2	5.0	✓
Fluoride in Water by IC	E235.F	621334	2	39	5.1	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	621332	2	38	5.2	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	621333	2	39	5.1	5.0	✓
pH by Meter	E108	621329	2	38	5.2	5.0	✓
Sulfate in Water by IC	E235.SO4	621331	2	39	5.1	5.0	✓
TDS by Gravimetry	E162	626133	3	58	5.1	5.0	✓
Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)	E375-T	625825	2	31	6.4	5.0	✓
Total Metals in Water by CRC ICPMS	E420	621232	2	40	5.0	5.0	✓
Total Nitrogen by Colourimetry	E366	621280	3	40	7.5	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	621278	3	37	8.1	5.0	✓
Turbidity by Nephelometry	E121	621561	2	40	5.0	5.0	✓
Laboratory Control Samples (LCS)							
Alkalinity Species by Titration	E290	621330	2	39	5.1	5.0	✓
Ammonia by Fluorescence	E298	621279	3	41	7.3	5.0	✓
Chloride in Water by IC	E235.Cl	621335	2	39	5.1	5.0	✓
Conductivity in Water	E100	621328	2	39	5.1	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	623614	2	38	5.2	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	627354	2	40	5.0	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	621336	2	32	6.2	5.0	✓
Fluoride in Water by IC	E235.F	621334	2	39	5.1	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	621332	2	38	5.2	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	621333	2	39	5.1	5.0	✓
pH by Meter	E108	621329	2	38	5.2	5.0	✓
Sulfate in Water by IC	E235.SO4	621331	2	39	5.1	5.0	✓
TDS by Gravimetry	E162	626133	3	58	5.1	5.0	✓
Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)	E375-T	625825	2	31	6.4	5.0	✓
Total Metals in Water by CRC ICPMS	E420	621232	2	40	5.0	5.0	✓
Total Nitrogen by Colourimetry	E366	621280	3	40	7.5	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	621278	3	37	8.1	5.0	✓
TSS by Gravimetry (Whole Bottle)	E164	626145	3	60	5.0	5.0	✓

Matrix: **Water**

Evaluation: × = QC frequency outside specification; ✓ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Control Samples (LCS) - Continued							
Turbidity by Nephelometry	E121	621561	2	40	5.0	5.0	✓
Method Blanks (MB)							
Alkalinity Species by Titration	E290	621330	2	39	5.1	5.0	✓
Ammonia by Fluorescence	E298	621279	3	41	7.3	5.0	✓
Chloride in Water by IC	E235.Cl	621335	2	39	5.1	5.0	✓
Conductivity in Water	E100	621328	2	39	5.1	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	623614	2	38	5.2	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	627354	2	40	5.0	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	621336	2	32	6.2	5.0	✓
Fluoride in Water by IC	E235.F	621334	2	39	5.1	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	621332	2	38	5.2	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	621333	2	39	5.1	5.0	✓
Sulfate in Water by IC	E235.SO4	621331	2	39	5.1	5.0	✓
TDS by Gravimetry	E162	626133	3	58	5.1	5.0	✓
Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)	E375-T	625825	2	31	6.4	5.0	✓
Total Metals in Water by CRC ICPMS	E420	621232	2	40	5.0	5.0	✓
Total Nitrogen by Colourimetry	E366	621280	3	40	7.5	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	621278	3	37	8.1	5.0	✓
TSS by Gravimetry (Whole Bottle)	E164	626145	3	60	5.0	5.0	✓
Turbidity by Nephelometry	E121	621561	2	40	5.0	5.0	✓
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	621279	3	41	7.3	5.0	✓
Chloride in Water by IC	E235.Cl	621335	2	39	5.1	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	623614	2	38	5.2	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	627354	2	40	5.0	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	621336	2	32	6.2	5.0	✓
Fluoride in Water by IC	E235.F	621334	2	39	5.1	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	621332	2	38	5.2	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	621333	2	39	5.1	5.0	✓
Sulfate in Water by IC	E235.SO4	621331	2	39	5.1	5.0	✓
Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)	E375-T	625825	2	31	6.4	5.0	✓
Total Metals in Water by CRC ICPMS	E420	621232	2	40	5.0	5.0	✓
Total Nitrogen by Colourimetry	E366	621280	3	40	7.5	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	621278	2	37	5.4	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Conductivity in Water	E100 Vancouver - Environmental	Water	APHA 2510 (mod)	Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a water sample. Conductivity measurements are temperature-compensated to 25°C.
pH by Meter	E108 Vancouver - Environmental	Water	APHA 4500-H (mod)	pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally 20 ± 5°C). For high accuracy test results, pH should be measured in the field within the recommended 15 minute hold time.
Turbidity by Nephelometry	E121 Vancouver - Environmental	Water	APHA 2130 B (mod)	Turbidity is measured by the nephelometric method, by measuring the intensity of light scatter under defined conditions.
TDS by Gravimetry	E162 Vancouver - Environmental	Water	APHA 2540 C (mod)	Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, with evaporation of the filtrate at 180 ± 2°C for 16 hours or to constant weight, with gravimetric measurement of the residue.
TSS by Gravimetry (Whole Bottle)	E164 Vancouver - Environmental	Water	APHA 2540 D (mod)	Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, following by drying of the filter at 104 ± 1°C, with gravimetric measurement of the filtered solids. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.
Chloride in Water by IC	E235.Cl Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Fluoride in Water by IC	E235.F Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrite in Water by IC (Low Level)	E235.NO2-L Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrate in Water by IC (Low Level)	E235.NO3-L Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Sulfate in Water by IC	E235.SO4 Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Alkalinity Species by Titration	E290 Vancouver - Environmental	Water	APHA 2320 B (mod)	Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.
Ammonia by Fluorescence	E298 Vancouver - Environmental	Water	Method Fialab 100, 2018	Ammonia in water is determined by automated continuous flow analysis with membrane diffusion and fluorescence detection, after reaction with OPA (ortho-phthalaldehyde). This method is approved under US EPA 40 CFR Part 136 (May 2021)
Dissolved Organic Carbon by Combustion (Low Level)	E358-L Waterloo - Environmental	Water	APHA 5310 B (mod)	Dissolved Organic Carbon (Non-Purgeable), also known as NPOC (dissolved), is a direct measurement of DOC after a filtered (0.45 micron) sample has been acidified and purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of DC (dissolved carbon) is comprised of IC (which is common), this method is more accurate and more reliable than the DOC by subtraction method (i.e. DC minus DIC).
Total Nitrogen by Colourimetry	E366 Vancouver - Environmental	Water	APHA 4500-P J (mod)	Total Nitrogen is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U Vancouver - Environmental	Water	APHA 4500-P E (mod).	Total Phosphorus is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)	E375-T Waterloo - Environmental	Water	APHA 4500-P E (mod).	Total Dissolved Phosphorus is determined colourimetrically using a discrete analyzer after filtration through a 0.45 micron filter followed by heated persulfate digestion of the sample.
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U Vancouver - Environmental	Water	APHA 4500-P F (mod)	Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter. Field filtration is recommended to ensure test results represent conditions at time of sampling.
Total Metals in Water by CRC ICPMS	E420 Vancouver - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Dissolved Metals in Water by CRC ICPMS	E421 Vancouver - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Hardness (Calculated)	EC100 Vancouver - Environmental	Water	APHA 2340B	"Hardness (as CaCO3), dissolved" is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.
Hardness (Calculated) from Total Ca/Mg	EC100A Vancouver - Environmental	Water	APHA 2340B	"Hardness (as CaCO3), from total Ca/Mg" is calculated from the sum of total Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations. Hardness from total Ca/Mg is normally comparable to Dissolved Hardness in non-turbid waters.
Nitrate and Nitrite (as N) (Calculation)	EC235.N+N Vancouver - Environmental	Water	EPA 300.0	Nitrate and Nitrite (as N) is a calculated parameter. Nitrate and Nitrite (as N) = Nitrite (as N) + Nitrate (as N).

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Ammonia	EP298 Vancouver - Environmental	Water		Sample preparation for Preserved Nutrients Water Quality Analysis.
Preparation for Dissolved Organic Carbon for Combustion	EP358 Waterloo - Environmental	Water	APHA 5310 B (mod)	Preparation for Dissolved Organic Carbon
Digestion for Total Nitrogen in water	EP366 Vancouver - Environmental	Water	APHA 4500-P J (mod)	Samples are heated with a persulfate digestion reagent.
Digestion for Total Phosphorus in water	EP372 Vancouver - Environmental	Water	APHA 4500-P E (mod).	Samples are heated with a persulfate digestion reagent.
Digestion for Dissolved Phosphorus in water	EP375 Waterloo - Environmental	Water	APHA 4500-P E (mod).	Samples are filtered through a 0.45 micron membrane filter and then heated with a persulfate digestion reagent.
Dissolved Metals Water Filtration	EP421 Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.

QUALITY CONTROL REPORT

Work Order	: **VA22C0091**	Page	: 1 of 26
Client	: Mount Polley Mining Corporation	Laboratory	: Vancouver - Environmental
Contact	: Kala Ivens	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: 250-790-2215 Ext 2112	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 26-Aug-2022 10:15
PO	: 5590008044 Q2 2022	Date Analysis Commenced	: 26-Aug-2022
C-O-C number	: ----	Issue Date	: 06-Sep-2022 14:19
Sampler	: D. Schnurr, S. Latimer		
Site	: ----		
Quote number	: VA22-MPMC100-006 - Minnow Env. - Water Quality		
No. of samples received	: 22		
No. of samples analysed	: 22		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
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General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 621328)											
VA22C0091-001	QUL-LNF1_WS-1_2022-08	conductivity	----	E100	2.0	µS/cm	101	101	0.298%	10%	----
Physical Tests (QC Lot: 621329)											
VA22C0091-001	QUL-LNF1_WS-1_2022-08	pH	----	E108	0.10	pH units	7.96	7.98	0.251%	4%	----
Physical Tests (QC Lot: 621330)											
VA22C0091-001	QUL-LNF1_WS-1_2022-08	alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	43.5	43.5	0.00%	20%	----
Physical Tests (QC Lot: 621561)											
FJ2202341-001	Anonymous	turbidity	----	E121	0.10	NTU	2.98	2.99	0.603%	15%	----
Physical Tests (QC Lot: 621562)											
VA22C0091-015	POL-S_WS-5_2022-08	turbidity	----	E121	0.10	NTU	0.32	0.35	0.03	Diff <2x LOR	----
Physical Tests (QC Lot: 621831)											
VA22C0105-001	Anonymous	conductivity	----	E100	2.0	µS/cm	7220	7250	0.415%	10%	----
Physical Tests (QC Lot: 621832)											
VA22C0105-001	Anonymous	pH	----	E108	0.10	pH units	8.95	8.97	0.223%	4%	----
Physical Tests (QC Lot: 621833)											
VA22C0105-001	Anonymous	alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	61.5	61.9	0.648%	20%	----
Physical Tests (QC Lot: 626133)											
FJ2202313-001	Anonymous	solids, total dissolved [TDS]	----	E162	13	mg/L	116	118	2	Diff <2x LOR	----
Physical Tests (QC Lot: 626134)											
VA22C0091-009	QUL-LREF1_WS-4_2022-08	solids, total dissolved [TDS]	----	E162	13	mg/L	68	66	2	Diff <2x LOR	----
Physical Tests (QC Lot: 627540)											
VA22C0002-001	Anonymous	solids, total dissolved [TDS]	----	E162	20	mg/L	376	379	0.795%	20%	----
Anions and Nutrients (QC Lot: 621278)											
VA22C0091-022	POL-S_WS-1X_2022-08	phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.0061	0.0095	0.0033	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 621279)											
VA22C0019-001	Anonymous	ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 621280)											
VA22C0073-001	Anonymous	nitrogen, total	7727-37-9	E366	0.030	mg/L	0.234	0.240	0.006	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 621331)											
VA22C0091-001	QUL-LNF1_WS-1_2022-08	sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	5.92	5.90	0.339%	20%	----
Anions and Nutrients (QC Lot: 621332)											
VA22C0091-001	QUL-LNF1_WS-1_2022-08	nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L	0.0131	0.0132	0.00006	Diff <2x LOR	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Anions and Nutrients (QC Lot: 621333)											
VA22C0091-001	QUL-LNF1_WS-1_2022-08	nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 621334)											
VA22C0091-001	QUL-LNF1_WS-1_2022-08	fluoride	16984-48-8	E235.F	0.020	mg/L	0.035	0.034	0.0008	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 621335)											
VA22C0091-001	QUL-LNF1_WS-1_2022-08	chloride	16887-00-6	E235.Cl	0.50	mg/L	<0.50	<0.50	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 621336)											
VA22C0091-001	QUL-LNF1_WS-1_2022-08	phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 621834)											
VA22C0105-001	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	15.0	mg/L	4170	4150	0.602%	20%	----
Anions and Nutrients (QC Lot: 621835)											
VA22C0105-001	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	0.250	mg/L	9.94	9.87	0.658%	20%	----
Anions and Nutrients (QC Lot: 621836)											
VA22C0105-001	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	0.0500	mg/L	1.59	1.58	0.467%	20%	----
Anions and Nutrients (QC Lot: 621837)											
VA22C0105-001	Anonymous	fluoride	16984-48-8	E235.F	1.00	mg/L	1.43	1.45	0.016	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 621838)											
VA22C0105-001	Anonymous	chloride	16887-00-6	E235.Cl	25.0	mg/L	74.0	73.6	0.42	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 621841)											
VA22C0091-021	QUL-LREF1_WS-1X_2022-08	phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 625825)											
VA22C0085-001	Anonymous	phosphorus, total dissolved	7723-14-0	E375-T	0.0020	mg/L	0.0044	0.0047	0.0003	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 625831)											
VA22C0091-012	POL-S_WS-2_2022-08	phosphorus, total dissolved	7723-14-0	E375-T	0.0020	mg/L	0.0041	0.0043	0.0002	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 629498)											
KS2203163-001	Anonymous	nitrogen, total	7727-37-9	E366	0.030	mg/L	0.133	0.148	0.015	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 629499)											
KS2203163-001	Anonymous	phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.0071	0.0070	0.00004	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 629501)											
KS2203163-001	Anonymous	ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 629591)											
VA22C0085-001	Anonymous	nitrogen, total	7727-37-9	E366	0.030	mg/L	0.238	0.263	0.025	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 629592)											
VA22C0085-001	Anonymous	phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.0035	0.0035	0.00008	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 629593)											

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Anions and Nutrients (QC Lot: 629593) - continued											
VA22C0085-001	Anonymous	ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
Organic / Inorganic Carbon (QC Lot: 627354)											
VA22C0085-001	Anonymous	carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L	6.87	7.29	5.91%	20%	----
Organic / Inorganic Carbon (QC Lot: 627383)											
VA22C0091-012	POL-S_WS-2_2022-08	carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L	6.20	6.59	6.17%	20%	----
Total Metals (QC Lot: 621232)											
VA22C0091-001	QUL-LNF1_WS-1_2022-08	aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0153	0.0155	0.0002	Diff <2x LOR	----
		antimony, total	7440-36-0	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00014	0.00014	0.0000006	Diff <2x LOR	----
		barium, total	7440-39-3	E420	0.00010	mg/L	0.00542	0.00560	3.31%	20%	----
		beryllium, total	7440-41-7	E420	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, total	7440-42-8	E420	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		cadmium, total	7440-43-9	E420	0.0000050	mg/L	0.0000191	0.0000147	0.0000043	Diff <2x LOR	----
		calcium, total	7440-70-2	E420	0.050	mg/L	16.3	15.4	5.73%	20%	----
		chromium, total	7440-47-3	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		cobalt, total	7440-48-4	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		copper, total	7440-50-8	E420	0.00050	mg/L	0.00088	0.00090	0.00002	Diff <2x LOR	----
		iron, total	7439-89-6	E420	0.030	mg/L	<0.030	<0.030	0	Diff <2x LOR	----
		lead, total	7439-92-1	E420	0.000050	mg/L	0.000088	0.000095	0.000007	Diff <2x LOR	----
		lithium, total	7439-93-2	E420	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
		magnesium, total	7439-95-4	E420	0.100	mg/L	1.96	2.00	1.89%	20%	----
		manganese, total	7439-96-5	E420	0.00010	mg/L	0.00174	0.00175	0.632%	20%	----
		molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.000366	0.000382	0.000015	Diff <2x LOR	----
		nickel, total	7440-02-0	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		potassium, total	7440-09-7	E420	0.050	mg/L	0.450	0.460	0.010	Diff <2x LOR	----
		selenium, total	7782-49-2	E420	0.000050	mg/L	0.000133	0.000124	0.000008	Diff <2x LOR	----
		silicon, total	7440-21-3	E420	0.10	mg/L	1.59	1.58	0.765%	20%	----
		silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, total	7440-23-5	E420	0.050	mg/L	0.878	0.890	1.41%	20%	----
		strontium, total	7440-24-6	E420	0.00020	mg/L	0.117	0.112	4.29%	20%	----
		thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		titanium, total	7440-32-6	E420	0.0100	mg/L	<0.0100	<0.0100	0	Diff <2x LOR	----
		uranium, total	7440-61-1	E420	0.000010	mg/L	0.000135	0.000136	0.915%	20%	----

Sub-Matrix: **Water**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Laboratory Duplicate (DUP) Report						
					LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Total Metals (QC Lot: 621232) - continued											
VA22C0091-001	QUL-LNF1_WS-1_2022-08	vanadium, total	7440-62-2	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		zinc, total	7440-66-6	E420	0.0030	mg/L	0.0071	0.0068	0.0003	Diff <2x LOR	----
Total Metals (QC Lot: 623537)											
KS2203182-001	Anonymous	aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0182	0.0176	0.0007	Diff <2x LOR	----
		antimony, total	7440-36-0	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00019	0.00019	0.000006	Diff <2x LOR	----
		barium, total	7440-39-3	E420	0.00010	mg/L	0.115	0.118	2.00%	20%	----
		beryllium, total	7440-41-7	E420	0.000020	mg/L	<0.000020	<0.000020	0	Diff <2x LOR	----
		bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, total	7440-42-8	E420	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		cadmium, total	7440-43-9	E420	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
		calcium, total	7440-70-2	E420	0.050	mg/L	14.9	15.0	0.324%	20%	----
		chromium, total	7440-47-3	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		cobalt, total	7440-48-4	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		copper, total	7440-50-8	E420	0.00050	mg/L	0.0118	0.0120	1.64%	20%	----
		iron, total	7439-89-6	E420	0.010	mg/L	0.442	0.443	0.346%	20%	----
		lead, total	7439-92-1	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		lithium, total	7439-93-2	E420	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
		magnesium, total	7439-95-4	E420	0.0050	mg/L	2.04	2.08	1.76%	20%	----
		manganese, total	7439-96-5	E420	0.00010	mg/L	0.0559	0.0586	4.88%	20%	----
		molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.00560	0.00553	1.28%	20%	----
		nickel, total	7440-02-0	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		potassium, total	7440-09-7	E420	0.050	mg/L	0.484	0.512	0.027	Diff <2x LOR	----
		selenium, total	7782-49-2	E420	0.000050	mg/L	0.000059	0.000053	0.000006	Diff <2x LOR	----
		silicon, total	7440-21-3	E420	0.10	mg/L	5.74	5.70	0.594%	20%	----
		silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, total	7440-23-5	E420	0.050	mg/L	1.99	2.01	0.835%	20%	----
		strontium, total	7440-24-6	E420	0.00020	mg/L	0.170	0.173	1.93%	20%	----
		thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		titanium, total	7440-32-6	E420	0.00030	mg/L	0.00033	0.00040	0.00007	Diff <2x LOR	----
		uranium, total	7440-61-1	E420	0.000010	mg/L	0.000074	0.000074	0.0000002	Diff <2x LOR	----
		vanadium, total	7440-62-2	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		zinc, total	7440-66-6	E420	0.0030	mg/L	<0.0030	<0.0030	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 623614)											

Sub-Matrix: **Water**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Laboratory Duplicate (DUP) Report						
					LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Dissolved Metals (QC Lot: 623614) - continued											
VA22C0064-001	Anonymous	aluminum, dissolved	7429-90-5	E421	0.0030	mg/L	0.0037	0.0038	0.0001	Diff <2x LOR	----
		antimony, dissolved	7440-36-0	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00052	0.00052	0.000004	Diff <2x LOR	----
		barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.00958	0.00978	2.04%	20%	----
		beryllium, dissolved	7440-41-7	E421	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, dissolved	7440-42-8	E421	0.010	mg/L	0.020	0.019	0.0008	Diff <2x LOR	----
		cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	<0.0000050	0.0000054	0.0000004	Diff <2x LOR	----
		calcium, dissolved	7440-70-2	E421	0.050	mg/L	35.9	35.0	2.39%	20%	----
		chromium, dissolved	7440-47-3	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		copper, dissolved	7440-50-8	E421	0.00050	mg/L	0.00428	0.00430	0.00002	Diff <2x LOR	----
		iron, dissolved	7439-89-6	E421	0.030	mg/L	<0.030	<0.030	0	Diff <2x LOR	----
		lead, dissolved	7439-92-1	E421	0.000050	mg/L	0.000158	0.000160	0.000002	Diff <2x LOR	----
		lithium, dissolved	7439-93-2	E421	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
		magnesium, dissolved	7439-95-4	E421	0.100	mg/L	5.16	5.29	2.37%	20%	----
		manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.00176	0.00173	1.42%	20%	----
		molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.00629	0.00649	3.11%	20%	----
		nickel, dissolved	7440-02-0	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		potassium, dissolved	7440-09-7	E421	0.050	mg/L	1.02	1.02	0.0908%	20%	----
		selenium, dissolved	7782-49-2	E421	0.000050	mg/L	0.000634	0.000592	6.86%	20%	----
		silicon, dissolved	7440-21-3	E421	0.050	mg/L	3.23	3.22	0.450%	20%	----
		silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, dissolved	7440-23-5	E421	0.050	mg/L	7.22	7.26	0.488%	20%	----
		strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.229	0.238	3.65%	20%	----
		thallium, dissolved	7440-28-0	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		tin, dissolved	7440-31-5	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		titanium, dissolved	7440-32-6	E421	0.0100	mg/L	<0.0100	<0.0100	0	Diff <2x LOR	----
		uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.000191	0.000183	3.99%	20%	----
		vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	0.00130	0.00130	0.0000002	Diff <2x LOR	----
		zinc, dissolved	7440-66-6	E421	0.0030	mg/L	<0.0030	<0.0030	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 624084)											
VA22B9884-001	Anonymous	aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0013	0.0015	0.0002	Diff <2x LOR	----
		antimony, dissolved	7440-36-0	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00467	0.00458	2.02%	20%	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Dissolved Metals (QC Lot: 624084) - continued											
VA22B9884-001	Anonymous	barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0529	0.0533	0.765%	20%	----
		beryllium, dissolved	7440-41-7	E421	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, dissolved	7440-42-8	E421	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	0.0000092	0.0000101	0.0000008	Diff <2x LOR	----
		calcium, dissolved	7440-70-2	E421	0.050	mg/L	26.9	28.2	4.92%	20%	----
		chromium, dissolved	7440-47-3	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		copper, dissolved	7440-50-8	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		iron, dissolved	7439-89-6	E421	0.010	mg/L	0.013	0.014	0.0007	Diff <2x LOR	----
		lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.0027	0.0026	0.00002	Diff <2x LOR	----
		magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	2.69	2.66	0.962%	20%	----
		manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.112	0.113	0.758%	20%	----
		molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.00320	0.00315	1.57%	20%	----
		nickel, dissolved	7440-02-0	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		potassium, dissolved	7440-09-7	E421	0.050	mg/L	3.15	3.18	0.916%	20%	----
		selenium, dissolved	7782-49-2	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		silicon, dissolved	7440-21-3	E421	0.050	mg/L	5.27	5.32	0.826%	20%	----
		silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, dissolved	7440-23-5	E421	0.050	mg/L	6.21	6.22	0.148%	20%	----
		strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.232	0.231	0.335%	20%	----
		thallium, dissolved	7440-28-0	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		tin, dissolved	7440-31-5	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		titanium, dissolved	7440-32-6	E421	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
		uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.000494	0.000507	2.72%	20%	----
		vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		zinc, dissolved	7440-66-6	E421	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 621328)						
conductivity	----	E100	1	µS/cm	1.1	----
Physical Tests (QCLot: 621330)						
alkalinity, total (as CaCO3)	----	E290	1	mg/L	<1.0	----
Physical Tests (QCLot: 621561)						
turbidity	----	E121	0.1	NTU	<0.10	----
Physical Tests (QCLot: 621562)						
turbidity	----	E121	0.1	NTU	<0.10	----
Physical Tests (QCLot: 621831)						
conductivity	----	E100	1	µS/cm	1.3	----
Physical Tests (QCLot: 621833)						
alkalinity, total (as CaCO3)	----	E290	1	mg/L	<1.0	----
Physical Tests (QCLot: 626133)						
solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Physical Tests (QCLot: 626134)						
solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Physical Tests (QCLot: 626145)						
solids, total suspended [TSS]	----	E164	1	mg/L	<1.0	----
Physical Tests (QCLot: 627200)						
solids, total suspended [TSS]	----	E164	1	mg/L	<1.0	----
Physical Tests (QCLot: 627201)						
solids, total suspended [TSS]	----	E164	1	mg/L	<1.0	----
Physical Tests (QCLot: 627540)						
solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Anions and Nutrients (QCLot: 621278)						
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----
Anions and Nutrients (QCLot: 621279)						
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 621280)						
nitrogen, total	7727-37-9	E366	0.03	mg/L	<0.030	----
Anions and Nutrients (QCLot: 621331)						
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 621332)						
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Anions and Nutrients (QCLot: 621333)						
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 621334)						
fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 621335)						
chloride	16887-00-6	E235.Cl	0.5	mg/L	<0.50	----
Anions and Nutrients (QCLot: 621336)						
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 621834)						
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 621835)						
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 621836)						
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 621837)						
fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 621838)						
chloride	16887-00-6	E235.Cl	0.5	mg/L	<0.50	----
Anions and Nutrients (QCLot: 621841)						
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 625825)						
phosphorus, total dissolved	7723-14-0	E375-T	0.002	mg/L	<0.0020	----
Anions and Nutrients (QCLot: 625831)						
phosphorus, total dissolved	7723-14-0	E375-T	0.002	mg/L	<0.0020	----
Anions and Nutrients (QCLot: 629498)						
nitrogen, total	7727-37-9	E366	0.03	mg/L	<0.030	----
Anions and Nutrients (QCLot: 629499)						
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----
Anions and Nutrients (QCLot: 629501)						
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 629591)						
nitrogen, total	7727-37-9	E366	0.03	mg/L	<0.030	----
Anions and Nutrients (QCLot: 629592)						
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----
Anions and Nutrients (QCLot: 629593)						
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Organic / Inorganic Carbon (QCLot: 627354)						

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Organic / Inorganic Carbon (QCLot: 627354) - continued						
carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	<0.50	----
Organic / Inorganic Carbon (QCLot: 627383)						
carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	<0.50	----
Total Metals (QCLot: 621232)						
aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----
antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
chromium, total	7440-47-3	E420	0.0005	mg/L	<0.00050	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	----
magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	----
manganese, total	7439-96-5	E420	0.0001	mg/L	# 0.00012	B
molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
silicon, total	7440-21-3	E420	0.1	mg/L	<0.10	----
silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	----
sodium, total	7440-23-5	E420	0.05	mg/L	<0.050	----
strontium, total	7440-24-6	E420	0.0002	mg/L	<0.00020	----
thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----
tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----
uranium, total	7440-61-1	E420	0.00001	mg/L	<0.000010	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	<0.00050	----
zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	----
Total Metals (QCLot: 623537)						

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 623537) - continued						
aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----
antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
chromium, total	7440-47-3	E420	0.0005	mg/L	<0.00050	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	----
magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	----
manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
silicon, total	7440-21-3	E420	0.1	mg/L	<0.10	----
silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	----
sodium, total	7440-23-5	E420	0.05	mg/L	<0.050	----
strontium, total	7440-24-6	E420	0.0002	mg/L	<0.00020	----
thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----
tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----
uranium, total	7440-61-1	E420	0.00001	mg/L	<0.000010	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	<0.00050	----
zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	----
Dissolved Metals (QCLot: 623614)						
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	<0.0010	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	<0.00010	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	<0.00010	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	<0.00010	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 623614) - continued						
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	<0.000020	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	<0.000050	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	<0.010	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	<0.0000050	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	<0.050	----
chromium, dissolved	7440-47-3	E421	0.0005	mg/L	<0.00050	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	<0.000050	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	<0.050	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	<0.000010	----
sodium, dissolved	7440-23-5	E421	0.05	mg/L	<0.050	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	<0.00020	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	<0.000010	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	<0.00050	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	<0.0010	----
Dissolved Metals (QCLot: 624084)						
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	<0.0010	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	<0.00010	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	<0.00010	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	<0.00010	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	<0.000020	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	<0.000050	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	<0.010	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	<0.0000050	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 624084) - continued						
calcium, dissolved	7440-70-2	E421	0.05	mg/L	<0.050	----
chromium, dissolved	7440-47-3	E421	0.0005	mg/L	<0.00050	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	<0.000050	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	<0.050	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	<0.000010	----
sodium, dissolved	7440-23-5	E421	0.05	mg/L	<0.050	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	<0.00020	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	<0.000010	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	<0.00050	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	<0.0010	----

Qualifiers

Qualifier	Description
B	*Method Blank exceeds ALS DQO. Associated sample results which are < Limit of Reporting or > 5 times blank level are considered reliable.*

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 621328)									
conductivity	----	E100	1	µS/cm	146.9 µS/cm	99.9	90.0	110	----
Physical Tests (QCLot: 621329)									
pH	----	E108	----	pH units	7 pH units	100	98.0	102	----
Physical Tests (QCLot: 621330)									
alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	110	85.0	115	----
Physical Tests (QCLot: 621561)									
turbidity	----	E121	0.1	NTU	200 NTU	102	85.0	115	----
Physical Tests (QCLot: 621562)									
turbidity	----	E121	0.1	NTU	200 NTU	103	85.0	115	----
Physical Tests (QCLot: 621831)									
conductivity	----	E100	1	µS/cm	146.9 µS/cm	96.5	90.0	110	----
Physical Tests (QCLot: 621832)									
pH	----	E108	----	pH units	7 pH units	100	98.0	102	----
Physical Tests (QCLot: 621833)									
alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	109	85.0	115	----
Physical Tests (QCLot: 626133)									
solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	107	85.0	115	----
Physical Tests (QCLot: 626134)									
solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	109	85.0	115	----
Physical Tests (QCLot: 626145)									
solids, total suspended [TSS]	----	E164	1	mg/L	150 mg/L	105	85.0	115	----
Physical Tests (QCLot: 627200)									
solids, total suspended [TSS]	----	E164	1	mg/L	150 mg/L	97.2	85.0	115	----
Physical Tests (QCLot: 627201)									
solids, total suspended [TSS]	----	E164	1	mg/L	150 mg/L	92.6	85.0	115	----
Physical Tests (QCLot: 627540)									
solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	103	85.0	115	----
Anions and Nutrients (QCLot: 621278)									
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	0.05 mg/L	94.3	80.0	120	----
Anions and Nutrients (QCLot: 621279)									
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	103	85.0	115	----
Anions and Nutrients (QCLot: 621280)									

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Anions and Nutrients (QCLot: 621280) - continued									
nitrogen, total	7727-37-9	E366	0.03	mg/L	0.5 mg/L	99.9	75.0	125	----
Anions and Nutrients (QCLot: 621331)									
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	103	90.0	110	----
Anions and Nutrients (QCLot: 621332)									
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 621333)									
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	98.0	90.0	110	----
Anions and Nutrients (QCLot: 621334)									
fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	100	90.0	110	----
Anions and Nutrients (QCLot: 621335)									
chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 621336)									
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	0.03 mg/L	102	80.0	120	----
Anions and Nutrients (QCLot: 621834)									
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 621835)									
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 621836)									
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	98.8	90.0	110	----
Anions and Nutrients (QCLot: 621837)									
fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	98.7	90.0	110	----
Anions and Nutrients (QCLot: 621838)									
chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 621841)									
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	0.03 mg/L	97.2	80.0	120	----
Anions and Nutrients (QCLot: 625825)									
phosphorus, total dissolved	7723-14-0	E375-T	0.002	mg/L	0.53 mg/L	99.3	80.0	120	----
Anions and Nutrients (QCLot: 625831)									
phosphorus, total dissolved	7723-14-0	E375-T	0.002	mg/L	0.53 mg/L	99.1	80.0	120	----
Anions and Nutrients (QCLot: 629498)									
nitrogen, total	7727-37-9	E366	0.03	mg/L	0.5 mg/L	100.0	75.0	125	----
Anions and Nutrients (QCLot: 629499)									
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	0.05 mg/L	89.9	80.0	120	----
Anions and Nutrients (QCLot: 629501)									
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	106	85.0	115	----
Anions and Nutrients (QCLot: 629591)									

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Anions and Nutrients (QCLot: 629591) - continued									
nitrogen, total	7727-37-9	E366	0.03	mg/L	0.5 mg/L	97.9	75.0	125	----
Anions and Nutrients (QCLot: 629592)									
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	0.05 mg/L	89.7	80.0	120	----
Anions and Nutrients (QCLot: 629593)									
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	104	85.0	115	----
Organic / Inorganic Carbon (QCLot: 627354)									
carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	8.57 mg/L	96.1	80.0	120	----
Organic / Inorganic Carbon (QCLot: 627383)									
carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	8.57 mg/L	97.3	80.0	120	----
Total Metals (QCLot: 621232)									
aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	99.5	80.0	120	----
antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	112	80.0	120	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	102	80.0	120	----
barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	104	80.0	120	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	102	80.0	120	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	103	80.0	120	----
boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	96.5	80.0	120	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	102	80.0	120	----
calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	101	80.0	120	----
chromium, total	7440-47-3	E420	0.0005	mg/L	0.25 mg/L	99.4	80.0	120	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	97.2	80.0	120	----
copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	97.2	80.0	120	----
iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	96.3	80.0	120	----
lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	102	80.0	120	----
lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	102	80.0	120	----
magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	104	80.0	120	----
manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	97.8	80.0	120	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	105	80.0	120	----
nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	98.7	80.0	120	----
potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	101	80.0	120	----
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	104	80.0	120	----
silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	103	80.0	120	----
silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	98.2	80.0	120	----
sodium, total	7440-23-5	E420	0.05	mg/L	50 mg/L	101	80.0	120	----
strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	102	80.0	120	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Total Metals (QCLot: 621232) - continued									
thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	106	80.0	120	----
tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	101	80.0	120	----
titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	98.4	80.0	120	----
uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	99.8	80.0	120	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	100	80.0	120	----
zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	102	80.0	120	----
Total Metals (QCLot: 623537)									
aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	102	80.0	120	----
antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	110	80.0	120	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	101	80.0	120	----
barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	104	80.0	120	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	99.5	80.0	120	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	105	80.0	120	----
boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	94.7	80.0	120	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	103	80.0	120	----
calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	100	80.0	120	----
chromium, total	7440-47-3	E420	0.0005	mg/L	0.25 mg/L	100	80.0	120	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	97.6	80.0	120	----
copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	98.9	80.0	120	----
iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	95.4	80.0	120	----
lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	101	80.0	120	----
lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	98.6	80.0	120	----
magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	102	80.0	120	----
manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	98.6	80.0	120	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	104	80.0	120	----
nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	99.0	80.0	120	----
potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	102	80.0	120	----
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	103	80.0	120	----
silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	103	80.0	120	----
silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	97.0	80.0	120	----
sodium, total	7440-23-5	E420	0.05	mg/L	50 mg/L	102	80.0	120	----
strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	101	80.0	120	----
thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	106	80.0	120	----
tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	99.6	80.0	120	----
titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	98.1	80.0	120	----
uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	101	80.0	120	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	101	80.0	120	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Total Metals (QCLot: 623537) - continued									
zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	103	80.0	120	----
Dissolved Metals (QCLot: 623614)									
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	105	80.0	120	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	104	80.0	120	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	104	80.0	120	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	94.9	80.0	120	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	96.1	80.0	120	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	104	80.0	120	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	88.8	80.0	120	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	103	80.0	120	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	99.6	80.0	120	----
chromium, dissolved	7440-47-3	E421	0.0005	mg/L	0.25 mg/L	104	80.0	120	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	100	80.0	120	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	101	80.0	120	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	109	80.0	120	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	102	80.0	120	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	94.4	80.0	120	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	104	80.0	120	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	102	80.0	120	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	101	80.0	120	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	101	80.0	120	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	103	80.0	120	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	103	80.0	120	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	104	80.0	120	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	93.9	80.0	120	----
sodium, dissolved	7440-23-5	E421	0.05	mg/L	50 mg/L	106	80.0	120	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	101	80.0	120	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	106	80.0	120	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	99.7	80.0	120	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	102	80.0	120	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	103	80.0	120	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	104	80.0	120	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	104	80.0	120	----
Dissolved Metals (QCLot: 624084)									
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	102	80.0	120	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	102	80.0	120	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 624084) - continued									
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	101	80.0	120	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	94.9	80.0	120	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	101	80.0	120	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	100	80.0	120	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	92.9	80.0	120	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	96.1	80.0	120	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	99.1	80.0	120	----
chromium, dissolved	7440-47-3	E421	0.0005	mg/L	0.25 mg/L	98.5	80.0	120	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	97.8	80.0	120	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	98.2	80.0	120	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	108	80.0	120	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	97.6	80.0	120	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	97.9	80.0	120	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	102	80.0	120	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	102	80.0	120	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	100	80.0	120	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	99.4	80.0	120	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	101	80.0	120	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	102	80.0	120	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	103	80.0	120	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	92.3	80.0	120	----
sodium, dissolved	7440-23-5	E421	0.05	mg/L	50 mg/L	99.5	80.0	120	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	96.0	80.0	120	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	99.6	80.0	120	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	95.4	80.0	120	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	99.9	80.0	120	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	97.3	80.0	120	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	100	80.0	120	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	100	80.0	120	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 621279)										
VA22C0019-002	Anonymous	ammonia, total (as N)	7664-41-7	E298	0.107 mg/L	0.1 mg/L	107	75.0	125	----
Anions and Nutrients (QCLot: 621280)										
VA22C0075-001	Anonymous	nitrogen, total	7727-37-9	E366	0.390 mg/L	0.4 mg/L	97.5	70.0	130	----
Anions and Nutrients (QCLot: 621331)										
VA22C0091-002	QUL-LNF1_WS-2_2022-08	sulfate (as SO4)	14808-79-8	E235.SO4	104 mg/L	100 mg/L	104	75.0	125	----
Anions and Nutrients (QCLot: 621332)										
VA22C0091-002	QUL-LNF1_WS-2_2022-08	nitrate (as N)	14797-55-8	E235.NO3-L	2.56 mg/L	2.5 mg/L	102	75.0	125	----
Anions and Nutrients (QCLot: 621333)										
VA22C0091-002	QUL-LNF1_WS-2_2022-08	nitrite (as N)	14797-65-0	E235.NO2-L	0.492 mg/L	0.5 mg/L	98.4	75.0	125	----
Anions and Nutrients (QCLot: 621334)										
VA22C0091-002	QUL-LNF1_WS-2_2022-08	fluoride	16984-48-8	E235.F	1.03 mg/L	1 mg/L	103	75.0	125	----
Anions and Nutrients (QCLot: 621335)										
VA22C0091-002	QUL-LNF1_WS-2_2022-08	chloride	16887-00-6	E235.Cl	102 mg/L	100 mg/L	102	75.0	125	----
Anions and Nutrients (QCLot: 621336)										
VA22C0091-002	QUL-LNF1_WS-2_2022-08	phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0300 mg/L	0.03 mg/L	100	70.0	130	----
Anions and Nutrients (QCLot: 621834)										
VA22C0105-002	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	5040 mg/L	5000 mg/L	101	75.0	125	----
Anions and Nutrients (QCLot: 621835)										
VA22C0105-002	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	130 mg/L	125 mg/L	104	75.0	125	----
Anions and Nutrients (QCLot: 621836)										
VA22C0105-002	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	25.5 mg/L	25 mg/L	102	75.0	125	----
Anions and Nutrients (QCLot: 621837)										
VA22C0105-002	Anonymous	fluoride	16984-48-8	E235.F	51.3 mg/L	50 mg/L	102	75.0	125	----
Anions and Nutrients (QCLot: 621838)										
VA22C0105-002	Anonymous	chloride	16887-00-6	E235.Cl	5210 mg/L	5000 mg/L	104	75.0	125	----
Anions and Nutrients (QCLot: 621841)										
VA22C0091-022	POL-S_WS-1X_2022-08	phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0287 mg/L	0.03 mg/L	95.6	70.0	130	----
Anions and Nutrients (QCLot: 625825)										

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 625825) - continued										
VA22C0085-001	Anonymous	phosphorus, total dissolved	7723-14-0	E375-T	0.0874 mg/L	0.1 mg/L	87.4	70.0	130	----
Anions and Nutrients (QCLot: 625831)										
VA22C0091-012	POL-S_WS-2_2022-08	phosphorus, total dissolved	7723-14-0	E375-T	0.0914 mg/L	0.1 mg/L	91.4	70.0	130	----
Anions and Nutrients (QCLot: 629498)										
KS2203163-002	Anonymous	nitrogen, total	7727-37-9	E366	0.399 mg/L	0.4 mg/L	99.7	70.0	130	----
Anions and Nutrients (QCLot: 629499)										
KS2203163-002	Anonymous	phosphorus, total	7723-14-0	E372-U	0.0526 mg/L	0.05 mg/L	105	70.0	130	----
Anions and Nutrients (QCLot: 629501)										
KS2203163-002	Anonymous	ammonia, total (as N)	7664-41-7	E298	0.115 mg/L	0.1 mg/L	115	75.0	125	----
Anions and Nutrients (QCLot: 629591)										
VA22C0085-002	Anonymous	nitrogen, total	7727-37-9	E366	0.374 mg/L	0.4 mg/L	93.6	70.0	130	----
Anions and Nutrients (QCLot: 629592)										
VA22C0085-002	Anonymous	phosphorus, total	7723-14-0	E372-U	0.0500 mg/L	0.05 mg/L	99.9	70.0	130	----
Anions and Nutrients (QCLot: 629593)										
VA22C0085-002	Anonymous	ammonia, total (as N)	7664-41-7	E298	0.111 mg/L	0.1 mg/L	111	75.0	125	----
Organic / Inorganic Carbon (QCLot: 627354)										
VA22C0085-001	Anonymous	carbon, dissolved organic [DOC]	----	E358-L	ND mg/L	5 mg/L	ND	70.0	130	----
Organic / Inorganic Carbon (QCLot: 627383)										
VA22C0091-012	POL-S_WS-2_2022-08	carbon, dissolved organic [DOC]	----	E358-L	ND mg/L	5 mg/L	ND	70.0	130	----
Total Metals (QCLot: 621232)										
VA22C0091-002	QUL-LNF1_WS-2_2022-08	aluminum, total	7429-90-5	E420	0.204 mg/L	0.2 mg/L	102	70.0	130	----
		antimony, total	7440-36-0	E420	0.0202 mg/L	0.02 mg/L	101	70.0	130	----
		arsenic, total	7440-38-2	E420	0.0194 mg/L	0.02 mg/L	97.2	70.0	130	----
		barium, total	7440-39-3	E420	0.0202 mg/L	0.02 mg/L	101	70.0	130	----
		beryllium, total	7440-41-7	E420	0.0402 mg/L	0.04 mg/L	100	70.0	130	----
		bismuth, total	7440-69-9	E420	0.00998 mg/L	0.01 mg/L	99.8	70.0	130	----
		boron, total	7440-42-8	E420	0.096 mg/L	0.1 mg/L	95.6	70.0	130	----
		cadmium, total	7440-43-9	E420	0.00411 mg/L	0.004 mg/L	103	70.0	130	----
		calcium, total	7440-70-2	E420	ND mg/L	4 mg/L	ND	70.0	130	----
		chromium, total	7440-47-3	E420	0.0395 mg/L	0.04 mg/L	98.9	70.0	130	----
		cobalt, total	7440-48-4	E420	0.0197 mg/L	0.02 mg/L	98.3	70.0	130	----
		copper, total	7440-50-8	E420	0.0198 mg/L	0.02 mg/L	99.0	70.0	130	----
		iron, total	7439-89-6	E420	2.00 mg/L	2 mg/L	100	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Total Metals (QCLot: 621232) - continued										
VA22C0091-002	QUL-LNF1_WS-2_2022-08	lead, total	7439-92-1	E420	0.0197 mg/L	0.02 mg/L	98.6	70.0	130	----
		lithium, total	7439-93-2	E420	0.101 mg/L	0.1 mg/L	101	70.0	130	----
		magnesium, total	7439-95-4	E420	ND mg/L	1 mg/L	ND	70.0	130	----
		manganese, total	7439-96-5	E420	0.0192 mg/L	0.02 mg/L	96.0	70.0	130	----
		molybdenum, total	7439-98-7	E420	0.0201 mg/L	0.02 mg/L	100	70.0	130	----
		nickel, total	7440-02-0	E420	0.0398 mg/L	0.04 mg/L	99.5	70.0	130	----
		potassium, total	7440-09-7	E420	3.92 mg/L	4 mg/L	98.0	70.0	130	----
		selenium, total	7782-49-2	E420	0.0418 mg/L	0.04 mg/L	105	70.0	130	----
		silicon, total	7440-21-3	E420	9.76 mg/L	10 mg/L	97.6	70.0	130	----
		silver, total	7440-22-4	E420	0.00396 mg/L	0.004 mg/L	98.9	70.0	130	----
		sodium, total	7440-23-5	E420	1.94 mg/L	2 mg/L	97.2	70.0	130	----
		strontium, total	7440-24-6	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		thallium, total	7440-28-0	E420	0.00385 mg/L	0.004 mg/L	96.3	70.0	130	----
		tin, total	7440-31-5	E420	0.0199 mg/L	0.02 mg/L	99.5	70.0	130	----
		titanium, total	7440-32-6	E420	0.0397 mg/L	0.04 mg/L	99.3	70.0	130	----
		uranium, total	7440-61-1	E420	0.00397 mg/L	0.004 mg/L	99.2	70.0	130	----
		vanadium, total	7440-62-2	E420	0.0994 mg/L	0.1 mg/L	99.4	70.0	130	----
		zinc, total	7440-66-6	E420	0.412 mg/L	0.4 mg/L	103	70.0	130	----
Total Metals (QCLot: 623537)										
KS2203182-002	Anonymous	aluminum, total	7429-90-5	E420	0.203 mg/L	0.2 mg/L	102	70.0	130	----
		antimony, total	7440-36-0	E420	0.0203 mg/L	0.02 mg/L	101	70.0	130	----
		arsenic, total	7440-38-2	E420	0.0200 mg/L	0.02 mg/L	99.8	70.0	130	----
		barium, total	7440-39-3	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		beryllium, total	7440-41-7	E420	0.0388 mg/L	0.04 mg/L	97.0	70.0	130	----
		bismuth, total	7440-69-9	E420	0.00951 mg/L	0.01 mg/L	95.1	70.0	130	----
		boron, total	7440-42-8	E420	0.088 mg/L	0.1 mg/L	88.5	70.0	130	----
		cadmium, total	7440-43-9	E420	0.00401 mg/L	0.004 mg/L	100	70.0	130	----
		calcium, total	7440-70-2	E420	ND mg/L	4 mg/L	ND	70.0	130	----
		chromium, total	7440-47-3	E420	0.0385 mg/L	0.04 mg/L	96.3	70.0	130	----
		cobalt, total	7440-48-4	E420	0.0193 mg/L	0.02 mg/L	96.4	70.0	130	----
		copper, total	7440-50-8	E420	0.0191 mg/L	0.02 mg/L	95.7	70.0	130	----
		iron, total	7439-89-6	E420	ND mg/L	2 mg/L	ND	70.0	130	----
		lead, total	7439-92-1	E420	0.0193 mg/L	0.02 mg/L	96.5	70.0	130	----
		lithium, total	7439-93-2	E420	0.0959 mg/L	0.1 mg/L	95.9	70.0	130	----
		magnesium, total	7439-95-4	E420	ND mg/L	1 mg/L	ND	70.0	130	----
		manganese, total	7439-96-5	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Total Metals (QCLot: 623537) - continued										
KS2203182-002	Anonymous	molybdenum, total	7439-98-7	E420	0.0207 mg/L	0.02 mg/L	103	70.0	130	----
		nickel, total	7440-02-0	E420	0.0393 mg/L	0.04 mg/L	98.2	70.0	130	----
		potassium, total	7440-09-7	E420	3.99 mg/L	4 mg/L	99.7	70.0	130	----
		selenium, total	7782-49-2	E420	0.0418 mg/L	0.04 mg/L	104	70.0	130	----
		silicon, total	7440-21-3	E420	ND mg/L	10 mg/L	ND	70.0	130	----
		silver, total	7440-22-4	E420	0.00397 mg/L	0.004 mg/L	99.4	70.0	130	----
		sodium, total	7440-23-5	E420	ND mg/L	2 mg/L	ND	70.0	130	----
		strontium, total	7440-24-6	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		thallium, total	7440-28-0	E420	0.00377 mg/L	0.004 mg/L	94.4	70.0	130	----
		tin, total	7440-31-5	E420	0.0198 mg/L	0.02 mg/L	99.0	70.0	130	----
		titanium, total	7440-32-6	E420	0.0394 mg/L	0.04 mg/L	98.6	70.0	130	----
		uranium, total	7440-61-1	E420	0.00382 mg/L	0.004 mg/L	95.4	70.0	130	----
		vanadium, total	7440-62-2	E420	0.1000 mg/L	0.1 mg/L	100.0	70.0	130	----
		zinc, total	7440-66-6	E420	0.401 mg/L	0.4 mg/L	100	70.0	130	----
Dissolved Metals (QCLot: 623614)										
VA22C0053-001	Anonymous	aluminum, dissolved	7429-90-5	E421	0.203 mg/L	0.2 mg/L	101	70.0	130	----
		antimony, dissolved	7440-36-0	E421	0.0196 mg/L	0.02 mg/L	98.3	70.0	130	----
		arsenic, dissolved	7440-38-2	E421	0.0216 mg/L	0.02 mg/L	108	70.0	130	----
		barium, dissolved	7440-39-3	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		beryllium, dissolved	7440-41-7	E421	0.0384 mg/L	0.04 mg/L	95.9	70.0	130	----
		bismuth, dissolved	7440-69-9	E421	0.00872 mg/L	0.01 mg/L	87.2	70.0	130	----
		boron, dissolved	7440-42-8	E421	0.085 mg/L	0.1 mg/L	85.5	70.0	130	----
		cadmium, dissolved	7440-43-9	E421	0.00377 mg/L	0.004 mg/L	94.3	70.0	130	----
		calcium, dissolved	7440-70-2	E421	ND mg/L	4 mg/L	ND	70.0	130	----
		chromium, dissolved	7440-47-3	E421	0.0387 mg/L	0.04 mg/L	96.7	70.0	130	----
		cobalt, dissolved	7440-48-4	E421	0.0185 mg/L	0.02 mg/L	92.6	70.0	130	----
		copper, dissolved	7440-50-8	E421	0.0176 mg/L	0.02 mg/L	88.2	70.0	130	----
		iron, dissolved	7439-89-6	E421	1.83 mg/L	2 mg/L	91.7	70.0	130	----
		lead, dissolved	7439-92-1	E421	0.0184 mg/L	0.02 mg/L	91.8	70.0	130	----
		lithium, dissolved	7439-93-2	E421	0.0933 mg/L	0.1 mg/L	93.3	70.0	130	----
		magnesium, dissolved	7439-95-4	E421	ND mg/L	1 mg/L	ND	70.0	130	----
		manganese, dissolved	7439-96-5	E421	0.0199 mg/L	0.02 mg/L	99.7	70.0	130	----
		molybdenum, dissolved	7439-98-7	E421	0.0205 mg/L	0.02 mg/L	102	70.0	130	----
		nickel, dissolved	7440-02-0	E421	0.0368 mg/L	0.04 mg/L	92.0	70.0	130	----
		potassium, dissolved	7440-09-7	E421	ND mg/L	4 mg/L	ND	70.0	130	----
		selenium, dissolved	7782-49-2	E421	0.0447 mg/L	0.04 mg/L	112	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Dissolved Metals (QCLot: 623614) - continued										
VA22C0053-001	Anonymous	silicon, dissolved	7440-21-3	E421	ND mg/L	10 mg/L	ND	70.0	130	----
		silver, dissolved	7440-22-4	E421	0.00364 mg/L	0.004 mg/L	91.0	70.0	130	----
		sodium, dissolved	7440-23-5	E421	ND mg/L	2 mg/L	ND	70.0	130	----
		strontium, dissolved	7440-24-6	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		thallium, dissolved	7440-28-0	E421	0.00366 mg/L	0.004 mg/L	91.6	70.0	130	----
		tin, dissolved	7440-31-5	E421	0.0192 mg/L	0.02 mg/L	96.1	70.0	130	----
		titanium, dissolved	7440-32-6	E421	0.0400 mg/L	0.04 mg/L	100	70.0	130	----
		uranium, dissolved	7440-61-1	E421	ND mg/L	0.004 mg/L	ND	70.0	130	----
		vanadium, dissolved	7440-62-2	E421	0.102 mg/L	0.1 mg/L	102	70.0	130	----
		zinc, dissolved	7440-66-6	E421	0.383 mg/L	0.4 mg/L	95.7	70.0	130	----
Dissolved Metals (QCLot: 624084)										
VA22B9884-002	Anonymous	aluminum, dissolved	7429-90-5	E421	0.195 mg/L	0.2 mg/L	97.5	70.0	130	----
		antimony, dissolved	7440-36-0	E421	0.0188 mg/L	0.02 mg/L	94.3	70.0	130	----
		arsenic, dissolved	7440-38-2	E421	0.0201 mg/L	0.02 mg/L	100	70.0	130	----
		barium, dissolved	7440-39-3	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		beryllium, dissolved	7440-41-7	E421	0.0383 mg/L	0.04 mg/L	95.7	70.0	130	----
		bismuth, dissolved	7440-69-9	E421	0.00892 mg/L	0.01 mg/L	89.2	70.0	130	----
		boron, dissolved	7440-42-8	E421	0.086 mg/L	0.1 mg/L	86.2	70.0	130	----
		cadmium, dissolved	7440-43-9	E421	0.00370 mg/L	0.004 mg/L	92.4	70.0	130	----
		calcium, dissolved	7440-70-2	E421	ND mg/L	4 mg/L	ND	70.0	130	----
		chromium, dissolved	7440-47-3	E421	0.0372 mg/L	0.04 mg/L	92.9	70.0	130	----
		cobalt, dissolved	7440-48-4	E421	0.0184 mg/L	0.02 mg/L	91.8	70.0	130	----
		copper, dissolved	7440-50-8	E421	0.0181 mg/L	0.02 mg/L	90.7	70.0	130	----
		iron, dissolved	7439-89-6	E421	1.89 mg/L	2 mg/L	94.7	70.0	130	----
		lead, dissolved	7439-92-1	E421	0.0188 mg/L	0.02 mg/L	94.1	70.0	130	----
		lithium, dissolved	7439-93-2	E421	0.0951 mg/L	0.1 mg/L	95.1	70.0	130	----
		magnesium, dissolved	7439-95-4	E421	ND mg/L	1 mg/L	ND	70.0	130	----
		manganese, dissolved	7439-96-5	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		molybdenum, dissolved	7439-98-7	E421	0.0193 mg/L	0.02 mg/L	96.7	70.0	130	----
		nickel, dissolved	7440-02-0	E421	0.0373 mg/L	0.04 mg/L	93.3	70.0	130	----
		potassium, dissolved	7440-09-7	E421	ND mg/L	4 mg/L	ND	70.0	130	----
		selenium, dissolved	7782-49-2	E421	0.0424 mg/L	0.04 mg/L	106	70.0	130	----
		silicon, dissolved	7440-21-3	E421	8.96 mg/L	10 mg/L	89.6	70.0	130	----
		silver, dissolved	7440-22-4	E421	0.00365 mg/L	0.004 mg/L	91.2	70.0	130	----
		sodium, dissolved	7440-23-5	E421	1.70 mg/L	2 mg/L	85.2	70.0	130	----
		strontium, dissolved	7440-24-6	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Dissolved Metals (QCLot: 624084) - continued										
VA22B9884-002	Anonymous	thallium, dissolved	7440-28-0	E421	0.00380 mg/L	0.004 mg/L	94.9	70.0	130	----
		tin, dissolved	7440-31-5	E421	0.0183 mg/L	0.02 mg/L	91.6	70.0	130	----
		titanium, dissolved	7440-32-6	E421	0.0381 mg/L	0.04 mg/L	95.4	70.0	130	----
		uranium, dissolved	7440-61-1	E421	0.00378 mg/L	0.004 mg/L	94.5	70.0	130	----
		vanadium, dissolved	7440-62-2	E421	0.0976 mg/L	0.1 mg/L	97.6	70.0	130	----
		zinc, dissolved	7440-66-6	E421	0.394 mg/L	0.4 mg/L	98.4	70.0	130	----

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

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Canada Toll Free: 1 800 668 9878

Affix ALS barcode label here (lab use only)

COC Number: 15 -

Page 1 of 2

Report To	Contact and company name below will appear on the final report
Company:	Mount Polley Mining Corporation
Contact:	Gabriel Holmes
Phone:	236-317-4939
	Company address below will appear on the final report
Street:	PO Box 12
City/Province:	Likely, BC
Postal Code:	V0L 1N0
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☐ NO
Company:	
Contact:	

Report Format / Distribution	
Select Report Format:	☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)
Quality Control (QC) Report with Report	☑ YES ☐ NO
☐ Compare Results to Criteria on Report - provide details below if box checked	
Select Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	kala.ivens@mountpolley.com
Email 2	gabriel.holmes@mountpolley.com
Email 3	pstecko@minnow.ca; kbatchelar@minnow.ca

Invoice Distribution	
Select Invoice Distribution:	☑ EMAIL ☑ MAIL ☐ FAX
Email 1 or Fax	gabriel.holmes@mountpolley.com
Email 2	

Project Information	
ALS Account # / Quote #:	VA22-MPMC100-006
Job #:	
PO / AFE:	
LSD:	

Oil and Gas Required Fields (client use)	
AFE/Cost Center:	PO#
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Lab Work Order # (lab use only): 0091

ALS Contact: Can Dang

Sampler: P.Schnurr S.Lahmer

Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply

Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days)			EMERGENCY	
	4 day [P4]	☐	1 Business day [E1]	☐
	3 day [P3]	☐	Same Day, Weekend or Statutory holiday [E0]	☐
	2 day [P2]	☐		

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm

For tests that can not be performed according to the service level selected, you will be contacted.

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and

Environmental Division Vancouver

Work Order Reference VA22C0091

Telephone : +1 604 253 4188

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUTRIENTS-1	Total Metals (ICPMS)	Dissolved Metals (ICPMS)	Total Nitrogen Ammonia	DOC	TSS (Whole bottle)							
							F	P	F/P								
1	QUL-LNF1_WS-1_2022-08	24-Aug-22	07:05	Water	R	R	R	R	R	R							6
2	QUL-LNF1_WS-2_2022-08	24-Aug-22	07:20	Water	R	R	R	R	R	R							6
3	QUL-LNF1_WS-3_2022-08	24-Aug-22	07:40	Water	R	R	R	R	R	R							6
4	QUL-LNF1_WS-4_2022-08	24-Aug-22	08:00	Water	R	R	R	R	R	R							6
5	QUL-LNF1_WS-5_2022-08	24-Aug-22	08:20	Water	R	R	R	R	R	R							6
6	QUL-LREF1_WS-1_2022-08	24-Aug-22	09:00	Water	R	R	R	R	R	R							6
7	QUL-LREF1_WS-2_2022-08	24-Aug-22	09:15	Water	R	R	R	R	R	R							6
8	QUL-LREF1_WS-3_2022-08	24-Aug-22	09:25	Water	R	R	R	R	R	R							6
9	QUL-LREF1_WS-4_2022-08	24-Aug-22	09:45	Water	R	R	R	R	R	R							6
10	QUL-LREF1_WS-5_2022-08	24-Aug-22	10:00	Water	R	R	R	R	R	R							6
11	POL-S_WS-1_2022-08	25-Aug-22	08:50	Water	R	R	R	R	R	R							6
12	POL-S_WS-2_2022-08	25-Aug-22	09:05	Water	R	R	R	R	R	R							6

Drinking Water (DW) Samples[1] (client use)	Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)
Are samples taken from a Regulated DW System? ☐ YES ☐ NO	
Are samples for human drinking water use? ☐ YES ☐ NO	Regular analytes for Mount Polley Mine water sample package. Please also report ANIONS-N+N-CALC-VA (calculated nitrate and nitrite)

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice Packs ☑ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
			6.5	10	6

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by:	Date:	Time:	Received by:	Date:	Time:	Received by:	Date:	Time:
S.Lahmer	25 Aug 22	10:10				JC	AUG 26 2022	1015am

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

OCTOBER 2015 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

Affix ALS barcode label here (lab use only)

COC Number: 15 -

Report To	Contact and company name below will appear on the final report
Company:	Mount Polley Mining Corporation
Contact:	Gabriel Holmes
Phone:	236-317-4939
	Company address below will appear on the final report
Street:	PO Box 12
City/Province:	Likely, BC
Postal Code:	V0L 1N0
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☐ NO
Company:	
Contact:	

Report Format / Distribution

Select Report Format: ☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)

Quality Control (QC) Report with Report ☑ YES ☐ NO

☐ Compare Results to Criteria on Report - provide details below if box checked

Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: kala.ivens@mountpolley.com

Email 2: gabriel.holmes@mountpolley.com

Email 3: pstecko@minnow.ca; kbatchelar@minnow.ca

Invoice Distribution

Select Invoice Distribution: ☑ EMAIL ☑ MAIL ☐ FAX

Email 1 or Fax: gabriel.holmes@mountpolley.com

Email 2:

Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply

Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days)		EMERGENCY	
4 day [P4]	☐	1 Business day [E1]	☐
3 day [P3]	☐	Same Day, Weekend or Statutory holiday [E0]	☐
2 day [P2]	☐		

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm

For tests that can not be performed according to the service level selected, you will be contacted.

Project Information

ALS Account # / Quote #: VA22-MPMC100-006

Job #:

PO / AFE:

LSD:

Oil and Gas Required Fields (client use)

AFE/Cost Center: PO#

Major/Minor Code: Routing Code:

Requisitioner:

Location:

ALS Lab Work Order # (lab use only):

ALS Contact: Can Dang

Sampler: P.Schnurr S.Lahmer

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUTRIENTS-1	Total Metals (ICPMS)	Dissolved Metals (ICPMS) F	Total Nitrogen Ammonia P	DOC F/P	TSS (Whole bottle)	Number of Containers
12	POL-S_WS-3_2022-08	25-Aug-22	09:25	Water	R	R	R	R	R	R	6
14	POL-S_WS-4_2022-08	25-Aug-22	09:40	Water	R	R	R	R	R	R	6
15	POL-S_WS-5_2022-08	25-Aug-22	09:55	Water	R	R	R	R	R	R	6
16	BOL-S_WS-1_2022-08	24-Aug-22	14:30	Water	R	R	R	R	R	R	6
17	BOL-S_WS-2_2022-08	24-Aug-22	14:45	Water	R	R	R	R	R	R	6
18	BOL-S_WS-3_2022-08	24-Aug-22	14:50	Water	R	R	R	R	R	R	6
19	BOL-S_WS-4_2022-08	24-Aug-22	15:10	Water	R	R	R	R	R	R	6
20	BOL-S_WS-5_2022-08	24-Aug-22	15:25	Water	R	R	R	R	R	R	6
21	QUL-LREF1_WS-1X_2022-08 (no spaces)	24-Aug-22	09:00	Water	R	R	R	R	R	R	6
22	POL-S_WS-1X-2022-08	25-Aug-22	08:50	Water	R	R	R	R	R	R	6
	~~POL-P2_WS-DE-1-2022-08~~	~~Aug-22~~		~~Water~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~6~~

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☐ NO

Are samples for human drinking water use? ☐ YES ☐ NO

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

Regular analytes for Mount Polley Mine water sample package. Please also report ANIONS-N+N-CALC-VA (calculated nitrate and nitrite)

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice Packs ☑ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
			6,5	10	6

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by:	Date:	Time:	Received by:	Date:	Time:	Received by:	Date:	Time:
S.Lahmer	25Aug22	10:10				JL	26 Aug 22	10:15am

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

WATER CHEMISTRY

ALS Laboratory Report VA22C0362

(Finalized September 9, 2022)

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **VA22C0362**	Page	: 1 of 6
Client	: **Mount Polley Mining Corporation**	Laboratory	: Vancouver - Environmental
Contact	: Kala Ivens	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: 250-790-2215 Ext 2112	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 30-Aug-2022 10:50
PO	: 5590008044 Q2 2022	Date Analysis Commenced	: 30-Aug-2022
C-O-C number	: ----	Issue Date	: 09-Sep-2022 14:41
Sampler	: ----		
Site	: ----		
Quote number	: VA22-MPMC100-006 - Minnow Env. - Water Quality		
No. of samples received	: 4		
No. of samples analysed	: 4		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Angela Ren	Team Leader - Metals	Metals, Burnaby, British Columbia
Angelo Salandanan	Lab Assistant	Metals, Burnaby, British Columbia
Dan Gebert	Laboratory Analyst	Metals, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia
Lindsay Gung	Supervisor - Water Chemistry	Inorganics, Burnaby, British Columbia
Miles Gropen	Department Manager - Inorganics	Inorganics, Burnaby, British Columbia

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

Unit	*Description*
-	No Unit
µg/L	micrograms per litre
µS/cm	Microsiemens per centimetre
mg/L	milligrams per litre
NTU	nephelometric turbidity units
pH units	pH units

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Qualifiers

Qualifier	*Description*
DTC	*Dissolved concentration exceeds total. Results were confirmed by re-analysis.*

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	QUL-ZOO-1_WS_DI-1_2022-08	QUL-ZOO-7_WS_DI-1_2022-08	QUL-ZOO-1_WS_DI-1X_2022-08	BOL-B2_WS_DI-1_2022-08	----
					Client sampling date / time	28-Aug-2022 11:10	28-Aug-2022 12:45	28-Aug-2022 11:10	28-Aug-2022 08:10	----
						VA22C0362-001	VA22C0362-002	VA22C0362-003	VA22C0362-004	--------
						Result	Result	Result	Result	----
Physical Tests										
alkalinity, total (as CaCO3)	----	E290	1.0	mg/L		46.8	46.8	46.1	42.5	----
conductivity	----	E100	2.0	µS/cm		103	103	101	98.7	----
hardness (as CaCO3), dissolved	----	EC100	0.50	mg/L		46.3	49.1	49.3	45.0	----
hardness (as CaCO3), from total Ca/Mg	----	EC100A	0.50	mg/L		46.6	48.9	47.4	44.8	----
pH	----	E108	0.10	pH units		7.73	7.70	7.69	7.49	----
solids, total dissolved [TDS]	----	E162	10	mg/L		80	73	70	83	----
solids, total suspended [TSS]	----	E164	1.0	mg/L		2.5	2.7	1.9	3.6	----
turbidity	----	E121	0.10	NTU		1.67	1.83	1.54	2.47	----
Anions and Nutrients										
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L		0.0072	0.0090	0.0107	0.0072	----
chloride	16887-00-6	E235.Cl	0.50	mg/L		<0.50	<0.50	<0.50	0.64	----
fluoride	16984-48-8	E235.F	0.020	mg/L		0.030	0.030	0.037	0.056	----
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L		0.0696	0.0712	0.0642	0.0064	----
nitrate + nitrite (as N)	----	EC235.N+N	0.0050	mg/L		0.0696	0.0712	0.0642	0.0064	----
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L		<0.0010	<0.0010	<0.0010	<0.0010	----
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L		<0.0010	0.0016	<0.0010	0.0016	----
phosphorus, total	7723-14-0	E372-U	0.0020	mg/L		0.0092	0.0083	0.0074	0.0170	----
phosphorus, total dissolved	7723-14-0	E375-T	0.0020	mg/L		0.0029	0.0032	0.0029	0.0072	----
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L		5.58	5.63	6.01	6.78	----
Organic / Inorganic Carbon										
carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L		2.62	2.62	3.00	7.81	----
Total Metals										
aluminum, total	7429-90-5	E420	0.0030	mg/L		0.0111	0.0808	0.0631	0.0551	----
antimony, total	7440-36-0	E420	0.00010	mg/L		<0.00010	<0.00010	<0.00010	0.00012	----
arsenic, total	7440-38-2	E420	0.00010	mg/L		0.00012	0.00023	0.00021	0.00071	----
barium, total	7440-39-3	E420	0.00010	mg/L		0.00571	0.00648	0.00644	0.0168	----
beryllium, total	7440-41-7	E420	0.000100	mg/L		<0.000100	<0.000100	<0.000100	<0.000100	----
bismuth, total	7440-69-9	E420	0.000050	mg/L		<0.000050	<0.000050	<0.000050	<0.000050	----
boron, total	7440-42-8	E420	0.010	mg/L		<0.010	<0.010	<0.010	0.044	----

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	QUL-ZOO-1_WS_DI-1_2022-08	QUL-ZOO-7_WS_DI-1_2022-08	QUL-ZOO-1_WS_DI-1X_2022-08	BOL-B2_WS_DI-1_2022-08	----
					Client sampling date / time	28-Aug-2022 11:10	28-Aug-2022 12:45	28-Aug-2022 11:10	28-Aug-2022 08:10	----
						VA22C0362-001	VA22C0362-002	VA22C0362-003	VA22C0362-004	--------
						Result	Result	Result	Result	----
Total Metals										
cadmium, total	7440-43-9	E420	0.0000050	mg/L		0.000118	0.0000578	0.000261	0.0000075	----
calcium, total	7440-70-2	E420	0.050	mg/L		15.6	16.4	15.8	13.8	----
chromium, total	7440-47-3	E420	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	----
cobalt, total	7440-48-4	E420	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	----
copper, total	7440-50-8	E420	0.00050	mg/L		0.00091	0.00396	0.00328	0.00528	----
iron, total	7439-89-6	E420	0.030	mg/L		<0.030	0.072	0.059	0.089	----
lead, total	7439-92-1	E420	0.000050	mg/L		<0.000050	0.000183	0.000279	0.000107	----
lithium, total	7439-93-2	E420	0.0010	mg/L		<0.0010	<0.0010	<0.0010	<0.0010	----
magnesium, total	7439-95-4	E420	0.100	mg/L		1.86	1.94	1.92	2.52	----
manganese, total	7439-96-5	E420	0.00010	mg/L		0.00125	0.00422	0.00409	0.0431	----
molybdenum, total	7439-98-7	E420	0.000050	mg/L		0.000363	0.000364	0.000362	0.000853	----
nickel, total	7440-02-0	E420	0.00050	mg/L		<0.00050	0.00052	<0.00050	<0.00050	----
potassium, total	7440-09-7	E420	0.050	mg/L		0.460	0.569	0.524	0.541	----
selenium, total	7782-49-2	E420	0.000050	mg/L		0.000160	0.000113	0.000163	0.000180	----
silicon, total	7440-21-3	E420	0.10	mg/L		1.71	1.97	1.86	2.40	----
silver, total	7440-22-4	E420	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	----
sodium, total	7440-23-5	E420	0.050	mg/L		0.863	0.932	0.930	2.54	----
strontium, total	7440-24-6	E420	0.00020	mg/L		0.129	0.131	0.127	0.137	----
thallium, total	7440-28-0	E420	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	----
tin, total	7440-31-5	E420	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	----
titanium, total	7440-32-6	E420	0.0100	mg/L		<0.0100	<0.0100	<0.0100	<0.0100	----
uranium, total	7440-61-1	E420	0.000010	mg/L		0.000150	0.000147	0.000149	0.000041	----
vanadium, total	7440-62-2	E420	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	----
zinc, total	7440-66-6	E420	0.0030	mg/L		<0.0030	<0.0030	<0.0030	0.0037	----
Dissolved Metals										
aluminum, dissolved	7429-90-5	E421	0.0030	mg/L		0.0439 DTC	0.0122	0.0110	0.0089	----
antimony, dissolved	7440-36-0	E421	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	----
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L		0.00017	0.00012	0.00012	0.00034	----
barium, dissolved	7440-39-3	E421	0.00010	mg/L		0.00615	0.00582	0.00577	0.0160	----
beryllium, dissolved	7440-41-7	E421	0.000100	mg/L		<0.000100	<0.000100	<0.000100	<0.000100	----

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	QUL-ZOO-1_WS_DI-1_2022-08	QUL-ZOO-7_WS_DI-1_2022-08	QUL-ZOO-1_WS_DI-1X_2022-08	BOL-B2_WS_DI-1_2022-08	----
					Client sampling date / time	28-Aug-2022 11:10	28-Aug-2022 12:45	28-Aug-2022 11:10	28-Aug-2022 08:10	----
						VA22C0362-001	VA22C0362-002	VA22C0362-003	VA22C0362-004	--------
						Result	Result	Result	Result	----
Dissolved Metals										
bismuth, dissolved	7440-69-9	E421	0.000050	mg/L		<0.000050	<0.000050	<0.000050	<0.000050	----
boron, dissolved	7440-42-8	E421	0.010	mg/L		<0.010	<0.010	<0.010	0.048	----
cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L		0.000178 DTC	0.0000561	0.000189	0.0000068	----
calcium, dissolved	7440-70-2	E421	0.050	mg/L		15.4	16.4	16.5	13.8	----
chromium, dissolved	7440-47-3	E421	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	----
cobalt, dissolved	7440-48-4	E421	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	----
copper, dissolved	7440-50-8	E421	0.00050	mg/L		0.00240 DTC	0.00107	0.00092	0.00282	----
iron, dissolved	7439-89-6	E421	0.030	mg/L		0.044	<0.030	<0.030	<0.030	----
lead, dissolved	7439-92-1	E421	0.000050	mg/L		0.000167 DTC	<0.000050	<0.000050	<0.000050	----
lithium, dissolved	7439-93-2	E421	0.0010	mg/L		<0.0010	<0.0010	<0.0010	<0.0010	----
magnesium, dissolved	7439-95-4	E421	0.100	mg/L		1.91	1.99	1.96	2.56	----
manganese, dissolved	7439-96-5	E421	0.00010	mg/L		0.00309 DTC	0.00087	0.00113	0.00646	----
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L		0.000318	0.000328	0.000334	0.000777	----
nickel, dissolved	7440-02-0	E421	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	----
potassium, dissolved	7440-09-7	E421	0.050	mg/L		0.482	0.557	0.513	0.536	----
selenium, dissolved	7782-49-2	E421	0.000050	mg/L		0.000119	0.000096	0.000108	0.000185	----
silicon, dissolved	7440-21-3	E421	0.050	mg/L		1.64	1.71	1.63	2.19	----
silver, dissolved	7440-22-4	E421	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	----
sodium, dissolved	7440-23-5	E421	0.050	mg/L		0.856	0.916	0.906	2.55	----
strontium, dissolved	7440-24-6	E421	0.00020	mg/L		0.122	0.121	0.121	0.128	----
thallium, dissolved	7440-28-0	E421	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	----
tin, dissolved	7440-31-5	E421	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	----
titanium, dissolved	7440-32-6	E421	0.0100	mg/L		<0.0100	<0.0100	<0.0100	<0.0100	----
uranium, dissolved	7440-61-1	E421	0.000010	mg/L		0.000148	0.000138	0.000142	0.000038	----
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	----
zinc, dissolved	7440-66-6	E421	0.0030	mg/L		<0.0030	<0.0030	<0.0030	<0.0030	----
dissolved metals filtration location	----	EP421	-	-		Field	Field	Field	Field	----
Plant Pigments										
chlorophyll a	479-61-8	E870	0.010	µg/L		1.04	1.09	1.01	2.18	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA22C0362**	Page	: 1 of 16
Client	: **Mount Polley Mining Corporation**	Laboratory	: Vancouver - Environmental
Contact	: Kala Ivens	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: 250-790-2215 Ext 2112	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 30-Aug-2022 10:50
PO	: 5590008044 Q2 2022	Issue Date	: 09-Sep-2022 14:41
C-O-C number	: ----		
Sampler	: ----		
Site	: ----		
Quote number	: VA22-MPMC100-006 - Minnow Env. - Water Quality		
No. of samples received	: 4		
No. of samples analysed	: 4		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- Analysis Holding Time Outliers exist - please see following pages for full details.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
BOL-B2_WS_DI-1_2022-08	E298	28-Aug-2022	05-Sep-2022	----	----		07-Sep-2022	28 days	10 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
QUL-ZOO-1_WS_DI-1_2022-08	E298	28-Aug-2022	05-Sep-2022	----	----		07-Sep-2022	28 days	10 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
QUL-ZOO-1_WS_DI-1X_2022-08	E298	28-Aug-2022	05-Sep-2022	----	----		07-Sep-2022	28 days	10 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
QUL-ZOO-7_WS_DI-1_2022-08	E298	28-Aug-2022	05-Sep-2022	----	----		07-Sep-2022	28 days	10 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE										
QUL-ZOO-1_WS_DI-1_2022-08	E235.Cl	28-Aug-2022	30-Aug-2022	----	----		31-Aug-2022	28 days	2 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE										
QUL-ZOO-1_WS_DI-1X_2022-08	E235.Cl	28-Aug-2022	30-Aug-2022	----	----		31-Aug-2022	28 days	2 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE										
QUL-ZOO-7_WS_DI-1_2022-08	E235.Cl	28-Aug-2022	30-Aug-2022	----	----		31-Aug-2022	28 days	2 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Chloride in Water by IC										
HDPE BOL-B2_WS_DI-1_2022-08	E235.Cl	28-Aug-2022	30-Aug-2022	----	----		31-Aug-2022	28 days	3 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE QUL-ZOO-1_WS_DI-1_2022-08	E378-U	28-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	3 days	2 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE QUL-ZOO-1_WS_DI-1X_2022-08	E378-U	28-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	3 days	2 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE QUL-ZOO-7_WS_DI-1_2022-08	E378-U	28-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	3 days	2 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001										
HDPE BOL-B2_WS_DI-1_2022-08	E378-U	28-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	3 days	3 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE QUL-ZOO-1_WS_DI-1_2022-08	E235.F	28-Aug-2022	30-Aug-2022	----	----		31-Aug-2022	28 days	2 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE QUL-ZOO-1_WS_DI-1X_2022-08	E235.F	28-Aug-2022	30-Aug-2022	----	----		31-Aug-2022	28 days	2 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE QUL-ZOO-7_WS_DI-1_2022-08	E235.F	28-Aug-2022	30-Aug-2022	----	----		31-Aug-2022	28 days	2 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE BOL-B2_WS_DI-1_2022-08	E235.F	28-Aug-2022	30-Aug-2022	----	----		31-Aug-2022	28 days	3 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
QUL-ZOO-1_WS_DI-1_2022-08	E235.NO3-L	28-Aug-2022	30-Aug-2022	3 days	2 days	✓	31-Aug-2022	3 days	0 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
QUL-ZOO-1_WS_DI-1X_2022-08	E235.NO3-L	28-Aug-2022	30-Aug-2022	3 days	2 days	✓	31-Aug-2022	3 days	0 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
QUL-ZOO-7_WS_DI-1_2022-08	E235.NO3-L	28-Aug-2022	30-Aug-2022	3 days	2 days	✓	31-Aug-2022	3 days	0 days	✓
Anions and Nutrients : Nitrate in Water by IC (Low Level)										
HDPE										
BOL-B2_WS_DI-1_2022-08	E235.NO3-L	28-Aug-2022	30-Aug-2022	3 days	3 days	✓	31-Aug-2022	3 days	0 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
QUL-ZOO-1_WS_DI-1_2022-08	E235.NO2-L	28-Aug-2022	30-Aug-2022	----	----		31-Aug-2022	3 days	2 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
QUL-ZOO-1_WS_DI-1X_2022-08	E235.NO2-L	28-Aug-2022	30-Aug-2022	----	----		31-Aug-2022	3 days	2 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
QUL-ZOO-7_WS_DI-1_2022-08	E235.NO2-L	28-Aug-2022	30-Aug-2022	----	----		31-Aug-2022	3 days	2 days	✓
Anions and Nutrients : Nitrite in Water by IC (Low Level)										
HDPE										
BOL-B2_WS_DI-1_2022-08	E235.NO2-L	28-Aug-2022	30-Aug-2022	----	----		31-Aug-2022	3 days	3 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
QUL-ZOO-1_WS_DI-1_2022-08	E235.SO4	28-Aug-2022	30-Aug-2022	----	----		31-Aug-2022	28 days	2 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
QUL-ZOO-1_WS_DI-1X_2022-08	E235.SO4	28-Aug-2022	30-Aug-2022	----	----		31-Aug-2022	28 days	2 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
QUL-ZOO-7_WS_DI-1_2022-08	E235.SO4	28-Aug-2022	30-Aug-2022	----	----		31-Aug-2022	28 days	2 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE										
BOL-B2_WS_DI-1_2022-08	E235.SO4	28-Aug-2022	30-Aug-2022	----	----		31-Aug-2022	28 days	3 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass dissolved (sulfuric acid)										
BOL-B2_WS_DI-1_2022-08	E375-T	28-Aug-2022	05-Sep-2022	----	----		07-Sep-2022	28 days	10 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass dissolved (sulfuric acid)										
QUL-ZOO-1_WS_DI-1_2022-08	E375-T	28-Aug-2022	05-Sep-2022	----	----		07-Sep-2022	28 days	10 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass dissolved (sulfuric acid)										
QUL-ZOO-1_WS_DI-1X_2022-08	E375-T	28-Aug-2022	05-Sep-2022	----	----		07-Sep-2022	28 days	10 days	✓
Anions and Nutrients : Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass dissolved (sulfuric acid)										
QUL-ZOO-7_WS_DI-1_2022-08	E375-T	28-Aug-2022	05-Sep-2022	----	----		07-Sep-2022	28 days	10 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid)										
BOL-B2_WS_DI-1_2022-08	E372-U	28-Aug-2022	05-Sep-2022	----	----		07-Sep-2022	28 days	10 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid)										
QUL-ZOO-1_WS_DI-1_2022-08	E372-U	28-Aug-2022	05-Sep-2022	----	----		07-Sep-2022	28 days	10 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid)										
QUL-ZOO-1_WS_DI-1X_2022-08	E372-U	28-Aug-2022	05-Sep-2022	----	----		07-Sep-2022	28 days	10 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid)										
QUL-ZOO-7_WS_DI-1_2022-08	E372-U	28-Aug-2022	05-Sep-2022	----	----		07-Sep-2022	28 days	10 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved)										
BOL-B2_WS_DI-1_2022-08	E421	28-Aug-2022	02-Sep-2022	----	----		03-Sep-2022	180 days	6 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved)										
QUL-ZOO-1_WS_DI-1_2022-08	E421	28-Aug-2022	02-Sep-2022	----	----		03-Sep-2022	180 days	6 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved)										
QUL-ZOO-1_WS_DI-1X_2022-08	E421	28-Aug-2022	02-Sep-2022	----	----		03-Sep-2022	180 days	6 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved)										
QUL-ZOO-7_WS_DI-1_2022-08	E421	28-Aug-2022	02-Sep-2022	----	----		03-Sep-2022	180 days	6 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid)										
BOL-B2_WS_DI-1_2022-08	E358-L	28-Aug-2022	05-Sep-2022	----	----		05-Sep-2022	28 days	8 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid)										
QUL-ZOO-1_WS_DI-1_2022-08	E358-L	28-Aug-2022	05-Sep-2022	----	----		05-Sep-2022	28 days	8 days	✓
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid)										
QUL-ZOO-1_WS_DI-1X_2022-08	E358-L	28-Aug-2022	05-Sep-2022	----	----		05-Sep-2022	28 days	8 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid)										
QUL-ZOO-7_WS_DI-1_2022-08	E358-L	28-Aug-2022	05-Sep-2022	----	----		05-Sep-2022	28 days	8 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE										
QUL-ZOO-1_WS_DI-1_2022-08	E290	28-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	14 days	2 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE										
QUL-ZOO-1_WS_DI-1X_2022-08	E290	28-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	14 days	2 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE										
QUL-ZOO-7_WS_DI-1_2022-08	E290	28-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	14 days	2 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE										
BOL-B2_WS_DI-1_2022-08	E290	28-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	14 days	3 days	✓
Physical Tests : Conductivity in Water										
HDPE										
QUL-ZOO-1_WS_DI-1_2022-08	E100	28-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	28 days	2 days	✓
Physical Tests : Conductivity in Water										
HDPE										
QUL-ZOO-1_WS_DI-1X_2022-08	E100	28-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	28 days	2 days	✓
Physical Tests : Conductivity in Water										
HDPE										
QUL-ZOO-7_WS_DI-1_2022-08	E100	28-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	28 days	2 days	✓
Physical Tests : Conductivity in Water										
HDPE										
BOL-B2_WS_DI-1_2022-08	E100	28-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	28 days	3 days	✓

Matrix: **Water**

Evaluation: ✖ = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : pH by Meter										
HDPE BOL-B2_WS_DI-1_2022-08	E108	28-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	0.25 hrs	1.71 hrs	✖ EHTR-FM
Physical Tests : pH by Meter										
HDPE QUL-ZOO-1_WS_DI-1_2022-08	E108	28-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	0.25 hrs	1.71 hrs	✖ EHTR-FM
Physical Tests : pH by Meter										
HDPE QUL-ZOO-1_WS_DI-1X_2022-08	E108	28-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	0.25 hrs	1.71 hrs	✖ EHTR-FM
Physical Tests : pH by Meter										
HDPE QUL-ZOO-7_WS_DI-1_2022-08	E108	28-Aug-2022	30-Aug-2022	----	----		30-Aug-2022	0.25 hrs	1.71 hrs	✖ EHTR-FM
Physical Tests : TDS by Gravimetry										
HDPE BOL-B2_WS_DI-1_2022-08	E162	28-Aug-2022	----	----	----		03-Sep-2022	7 days	6 days	✓
Physical Tests : TDS by Gravimetry										
HDPE QUL-ZOO-1_WS_DI-1_2022-08	E162	28-Aug-2022	----	----	----		03-Sep-2022	7 days	6 days	✓
Physical Tests : TDS by Gravimetry										
HDPE QUL-ZOO-1_WS_DI-1X_2022-08	E162	28-Aug-2022	----	----	----		03-Sep-2022	7 days	6 days	✓
Physical Tests : TDS by Gravimetry										
HDPE QUL-ZOO-7_WS_DI-1_2022-08	E162	28-Aug-2022	----	----	----		03-Sep-2022	7 days	6 days	✓
Physical Tests : TSS by Gravimetry (Whole Bottle)										
HDPE [TSS-WB] BOL-B2_WS_DI-1_2022-08	E164	28-Aug-2022	----	----	----		02-Sep-2022	7 days	5 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : TSS by Gravimetry (Whole Bottle)										
HDPE [TSS-WB] QUL-ZOO-1_WS_DI-1_2022-08	E164	28-Aug-2022	----	----	----		02-Sep-2022	7 days	5 days	✓
Physical Tests : TSS by Gravimetry (Whole Bottle)										
HDPE [TSS-WB] QUL-ZOO-1_WS_DI-1X_2022-08	E164	28-Aug-2022	----	----	----		02-Sep-2022	7 days	5 days	✓
Physical Tests : TSS by Gravimetry (Whole Bottle)										
HDPE [TSS-WB] QUL-ZOO-7_WS_DI-1_2022-08	E164	28-Aug-2022	----	----	----		02-Sep-2022	7 days	5 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE BOL-B2_WS_DI-1_2022-08	E121	28-Aug-2022	----	----	----		31-Aug-2022	3 days	3 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE QUL-ZOO-1_WS_DI-1_2022-08	E121	28-Aug-2022	----	----	----		31-Aug-2022	3 days	3 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE QUL-ZOO-1_WS_DI-1X_2022-08	E121	28-Aug-2022	----	----	----		31-Aug-2022	3 days	3 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE QUL-ZOO-7_WS_DI-1_2022-08	E121	28-Aug-2022	----	----	----		31-Aug-2022	3 days	3 days	✓
Plant Pigments : Chlorophyll-a by Fluorometry										
Opaque HDPE QUL-ZOO-1_WS_DI-1_2022-08	E870	28-Aug-2022	31-Aug-2022	2 days	3 days	× EHTL	01-Sep-2022	672 hrs	1 days	✓
Plant Pigments : Chlorophyll-a by Fluorometry										
Opaque HDPE QUL-ZOO-1_WS_DI-1X_2022-08	E870	28-Aug-2022	31-Aug-2022	2 days	3 days	× EHTL	01-Sep-2022	672 hrs	1 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Plant Pigments : Chlorophyll-a by Fluorometry										
Opaque HDPE										
QUL-ZOO-7_WS_DI-1_2022-08	E870	28-Aug-2022	31-Aug-2022	2 days	3 days	× EHTL	01-Sep-2022	672 hrs	1 days	✓
Plant Pigments : Chlorophyll-a by Fluorometry										
Opaque HDPE										
BOL-B2_WS_DI-1_2022-08	E870	28-Aug-2022	31-Aug-2022	2 days	3 days	× EHTR	01-Sep-2022	672 hrs	1 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved)										
BOL-B2_WS_DI-1_2022-08	E420	28-Aug-2022	02-Sep-2022	----	----		02-Sep-2022	180 days	6 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved)										
QUL-ZOO-1_WS_DI-1_2022-08	E420	28-Aug-2022	02-Sep-2022	----	----		02-Sep-2022	180 days	6 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved)										
QUL-ZOO-1_WS_DI-1X_2022-08	E420	28-Aug-2022	02-Sep-2022	----	----		02-Sep-2022	180 days	6 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE - total (lab preserved)										
QUL-ZOO-7_WS_DI-1_2022-08	E420	28-Aug-2022	02-Sep-2022	----	----		02-Sep-2022	180 days	6 days	✓

Legend & Qualifier Definitions

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended

EHTR: Exceeded ALS recommended hold time prior to sample receipt.

EHTL: Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = QC frequency outside specification; ✓ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Alkalinity Species by Titration	E290	626009	1	18	5.5	5.0	✓
Ammonia by Fluorescence	E298	633180	1	5	20.0	5.0	✓
Chloride in Water by IC	E235.Cl	626014	1	18	5.5	5.0	✓
Conductivity in Water	E100	626007	1	12	8.3	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	630246	1	20	5.0	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	633178	1	4	25.0	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	626017	1	10	10.0	5.0	✓
Fluoride in Water by IC	E235.F	626013	1	18	5.5	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	626011	1	19	5.2	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	626012	1	19	5.2	5.0	✓
pH by Meter	E108	626008	1	18	5.5	5.0	✓
Sulfate in Water by IC	E235.SO4	626010	1	18	5.5	5.0	✓
TDS by Gravimetry	E162	632304	1	10	10.0	5.0	✓
Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)	E375-T	633179	1	4	25.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	630139	1	20	5.0	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	633177	1	18	5.5	5.0	✓
Turbidity by Nephelometry	E121	626473	1	20	5.0	5.0	✓
Laboratory Control Samples (LCS)							
Alkalinity Species by Titration	E290	626009	1	18	5.5	5.0	✓
Ammonia by Fluorescence	E298	633180	1	5	20.0	5.0	✓
Chloride in Water by IC	E235.Cl	626014	1	18	5.5	5.0	✓
Chlorophyll-a by Fluorometry	E870	627043	1	19	5.2	5.0	✓
Conductivity in Water	E100	626007	1	12	8.3	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	630246	1	20	5.0	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	633178	1	4	25.0	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	626017	1	10	10.0	5.0	✓
Fluoride in Water by IC	E235.F	626013	1	18	5.5	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	626011	1	19	5.2	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	626012	1	19	5.2	5.0	✓
pH by Meter	E108	626008	1	18	5.5	5.0	✓
Sulfate in Water by IC	E235.SO4	626010	1	18	5.5	5.0	✓
TDS by Gravimetry	E162	632304	1	10	10.0	5.0	✓
Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)	E375-T	633179	1	4	25.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	630139	1	20	5.0	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	633177	1	18	5.5	5.0	✓
TSS by Gravimetry (Whole Bottle)	E164	631391	1	20	5.0	5.0	✓
Turbidity by Nephelometry	E121	626473	1	20	5.0	5.0	✓

Matrix: **Water**

Evaluation: × = QC frequency outside specification; ✓ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Method Blanks (MB)							
Alkalinity Species by Titration	E290	626009	1	18	5.5	5.0	✓
Ammonia by Fluorescence	E298	633180	1	5	20.0	5.0	✓
Chloride in Water by IC	E235.Cl	626014	1	18	5.5	5.0	✓
Chlorophyll-a by Fluorometry	E870	627043	1	19	5.2	5.0	✓
Conductivity in Water	E100	626007	1	12	8.3	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	630246	1	20	5.0	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	633178	1	4	25.0	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	626017	1	10	10.0	5.0	✓
Fluoride in Water by IC	E235.F	626013	1	18	5.5	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	626011	1	19	5.2	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	626012	1	19	5.2	5.0	✓
Sulfate in Water by IC	E235.SO4	626010	1	18	5.5	5.0	✓
TDS by Gravimetry	E162	632304	1	10	10.0	5.0	✓
Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)	E375-T	633179	1	4	25.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	630139	1	20	5.0	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	633177	1	18	5.5	5.0	✓
TSS by Gravimetry (Whole Bottle)	E164	631391	1	20	5.0	5.0	✓
Turbidity by Nephelometry	E121	626473	1	20	5.0	5.0	✓
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	633180	1	5	20.0	5.0	✓
Chloride in Water by IC	E235.Cl	626014	1	18	5.5	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	630246	1	20	5.0	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	633178	1	4	25.0	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	626017	1	10	10.0	5.0	✓
Fluoride in Water by IC	E235.F	626013	1	18	5.5	5.0	✓
Nitrate in Water by IC (Low Level)	E235.NO3-L	626011	1	19	5.2	5.0	✓
Nitrite in Water by IC (Low Level)	E235.NO2-L	626012	1	19	5.2	5.0	✓
Sulfate in Water by IC	E235.SO4	626010	1	18	5.5	5.0	✓
Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)	E375-T	633179	1	4	25.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	630139	1	20	5.0	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	633177	1	18	5.5	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Conductivity in Water	E100 Vancouver - Environmental	Water	APHA 2510 (mod)	Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a water sample. Conductivity measurements are temperature-compensated to 25°C.
pH by Meter	E108 Vancouver - Environmental	Water	APHA 4500-H (mod)	pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally 20 ± 5°C). For high accuracy test results, pH should be measured in the field within the recommended 15 minute hold time.
Turbidity by Nephelometry	E121 Vancouver - Environmental	Water	APHA 2130 B (mod)	Turbidity is measured by the nephelometric method, by measuring the intensity of light scatter under defined conditions.
TDS by Gravimetry	E162 Vancouver - Environmental	Water	APHA 2540 C (mod)	Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, with evaporation of the filtrate at 180 ± 2°C for 16 hours or to constant weight, with gravimetric measurement of the residue.
TSS by Gravimetry (Whole Bottle)	E164 Vancouver - Environmental	Water	APHA 2540 D (mod)	Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, following by drying of the filter at 104 ± 1°C, with gravimetric measurement of the filtered solids. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.
Chloride in Water by IC	E235.Cl Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Fluoride in Water by IC	E235.F Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrite in Water by IC (Low Level)	E235.NO2-L Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrate in Water by IC (Low Level)	E235.NO3-L Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Sulfate in Water by IC	E235.SO4 Vancouver - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Alkalinity Species by Titration	E290 Vancouver - Environmental	Water	APHA 2320 B (mod)	Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.
Ammonia by Fluorescence	E298 Vancouver - Environmental	Water	Method Fialab 100, 2018	Ammonia in water is determined by automated continuous flow analysis with membrane diffusion and fluorescence detection, after reaction with OPA (ortho-phthalaldehyde). This method is approved under US EPA 40 CFR Part 136 (May 2021)
Dissolved Organic Carbon by Combustion (Low Level)	E358-L Vancouver - Environmental	Water	APHA 5310 B (mod)	Dissolved Organic Carbon (Non-Purgeable), also known as NPOC (dissolved), is a direct measurement of DOC after a filtered (0.45 micron) sample has been acidified and purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of DC (dissolved carbon) is comprised of IC (which is common), this method is more accurate and more reliable than the DOC by subtraction method (i.e. DC minus DIC).
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U Vancouver - Environmental	Water	APHA 4500-P E (mod).	Total Phosphorus is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Total Dissolved Phosphorus by Colourimetry (0.002 mg/L)	E375-T Vancouver - Environmental	Water	APHA 4500-P E (mod).	Total Dissolved Phosphorus is determined colourimetrically using a discrete analyzer after filtration through a 0.45 micron filter followed by heated persulfate digestion of the sample.
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U Vancouver - Environmental	Water	APHA 4500-P F (mod)	Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter. Field filtration is recommended to ensure test results represent conditions at time of sampling.
Total Metals in Water by CRC ICPMS	E420 Vancouver - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Dissolved Metals in Water by CRC ICPMS	E421 Vancouver - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Chlorophyll-a by Fluorometry	E870 Vancouver - Environmental	Water	EPA 445.0 (mod)	Chlorophyll a is determined by solvent extraction followed with analysis by fluorometry using the non-acidification procedure. This method is not subject to interferences from chlorophyll b.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Hardness (Calculated)	EC100 Vancouver - Environmental	Water	APHA 2340B	"Hardness (as CaCO3), dissolved" is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.
Hardness (Calculated) from Total Ca/Mg	EC100A Vancouver - Environmental	Water	APHA 2340B	"Hardness (as CaCO3), from total Ca/Mg" is calculated from the sum of total Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations. Hardness from total Ca/Mg is normally comparable to Dissolved Hardness in non-turbid waters.
Nitrate and Nitrite (as N) (Calculation)	EC235.N+N Vancouver - Environmental	Water	EPA 300.0	Nitrate and Nitrite (as N) is a calculated parameter. Nitrate and Nitrite (as N) = Nitrite (as N) + Nitrate (as N).

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Ammonia	EP298 Vancouver - Environmental	Water		Sample preparation for Preserved Nutrients Water Quality Analysis.
Preparation for Dissolved Organic Carbon for Combustion	EP358 Vancouver - Environmental	Water	APHA 5310 B (mod)	Preparation for Dissolved Organic Carbon
Digestion for Total Phosphorus in water	EP372 Vancouver - Environmental	Water	APHA 4500-P E (mod).	Samples are heated with a persulfate digestion reagent.
Digestion for Dissolved Phosphorus in water	EP375 Vancouver - Environmental	Water	APHA 4500-P E (mod).	Samples are filtered through a 0.45 micron membrane filter and then heated with a persulfate digestion reagent.
Dissolved Metals Water Filtration	EP421 Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.
Chlorophyll-a Extraction	EP870 Vancouver - Environmental	Water	EPA 445.0 (mod)	Chlorophyll-a solvent extraction.

QUALITY CONTROL REPORT

Work Order	: **VA22C0362**	Page	: 1 of 14
Client	: Mount Polley Mining Corporation	Laboratory	: Vancouver - Environmental
Contact	: Kala Ivens	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: 250-790-2215 Ext 2112	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 30-Aug-2022 10:50
PO	: 5590008044 Q2 2022	Date Analysis Commenced	: 30-Aug-2022
C-O-C number	: ----	Issue Date	: 09-Sep-2022 14:41
Sampler	: ----		
Site	: ----		
Quote number	: VA22-MPMC100-006 - Minnow Env. - Water Quality		
No. of samples received	: 4		
No. of samples analysed	: 4		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Angela Ren	Team Leader - Metals	Vancouver Metals, Burnaby, British Columbia
Angelo Salandanan	Lab Assistant	Vancouver Metals, Burnaby, British Columbia
Dan Gebert	Laboratory Analyst	Vancouver Metals, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Vancouver Metals, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Vancouver Metals, Burnaby, British Columbia
Lindsay Gung	Supervisor - Water Chemistry	Vancouver Inorganics, Burnaby, British Columbia
Miles Gropen	Department Manager - Inorganics	Vancouver Inorganics, Burnaby, British Columbia

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 626007)											
FJ2202360-004	Anonymous	conductivity	----	E100	2.0	µS/cm	183	184	0.328%	10%	----
Physical Tests (QC Lot: 626008)											
FJ2202360-004	Anonymous	pH	----	E108	0.10	pH units	7.98	7.99	0.125%	4%	----
Physical Tests (QC Lot: 626009)											
FJ2202360-004	Anonymous	alkalinity, total (as CaCO3)	----	E290	1.0	mg/L	82.1	82.3	0.243%	20%	----
Physical Tests (QC Lot: 626473)											
VA22C0350-005	Anonymous	turbidity	----	E121	0.10	NTU	425	418	1.71%	15%	----
Physical Tests (QC Lot: 632304)											
VA22C0296-001	Anonymous	solids, total dissolved [TDS]	----	E162	20	mg/L	2260	2280	0.550%	20%	----
Anions and Nutrients (QC Lot: 626010)											
FJ2202364-001	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	3.00	mg/L	469	471	0.384%	20%	----
Anions and Nutrients (QC Lot: 626011)											
FJ2202364-001	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	0.0500	mg/L	0.487	0.490	0.0025	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 626012)											
FJ2202364-001	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	0.0100	mg/L	<0.0100	<0.0100	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 626013)											
FJ2202364-001	Anonymous	fluoride	16984-48-8	E235.F	0.200	mg/L	0.436	0.434	0.002	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 626014)											
FJ2202364-001	Anonymous	chloride	16887-00-6	E235.Cl	5.00	mg/L	27.7	27.8	0.04	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 626017)											
VA22C0362-001	QUL-ZOO-1_WS_DI-1_2022-08	phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 633177)											
VA22C0324-001	Anonymous	phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	0.0884	0.0880	0.453%	20%	----
Anions and Nutrients (QC Lot: 633179)											
VA22C0362-001	QUL-ZOO-1_WS_DI-1_2022-08	phosphorus, total dissolved	7723-14-0	E375-T	0.0020	mg/L	0.0029	0.0032	0.0004	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 633180)											
VA22C0352-001	Anonymous	ammonia, total (as N)	7664-41-7	E298	0.0250	mg/L	0.365	0.367	0.539%	20%	----
Organic / Inorganic Carbon (QC Lot: 633178)											
VA22C0362-001	QUL-ZOO-1_WS_DI-1_2022-08	carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L	2.62	2.40	0.22	Diff <2x LOR	----
Total Metals (QC Lot: 630139)											

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Total Metals (QC Lot: 630139) - continued											
VA22C0362-001	QUL-ZOO-1_WS_DI-1_2022-08	aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0111	0.0116	0.0005	Diff <2x LOR	----
		antimony, total	7440-36-0	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00012	0.00012	0.000006	Diff <2x LOR	----
		barium, total	7440-39-3	E420	0.00010	mg/L	0.00571	0.00579	1.38%	20%	----
		beryllium, total	7440-41-7	E420	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		bismuth, total	7440-69-9	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, total	7440-42-8	E420	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		cadmium, total	7440-43-9	E420	0.0000050	mg/L	0.000118	0.000128	8.56%	20%	----
		calcium, total	7440-70-2	E420	0.050	mg/L	15.6	15.7	0.489%	20%	----
		chromium, total	7440-47-3	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		cobalt, total	7440-48-4	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		copper, total	7440-50-8	E420	0.00050	mg/L	0.00091	0.00091	0.000002	Diff <2x LOR	----
		iron, total	7439-89-6	E420	0.030	mg/L	<0.030	<0.030	0	Diff <2x LOR	----
		lead, total	7439-92-1	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		lithium, total	7439-93-2	E420	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
		magnesium, total	7439-95-4	E420	0.100	mg/L	1.86	1.85	0.540%	20%	----
		manganese, total	7439-96-5	E420	0.00010	mg/L	0.00125	0.00123	1.35%	20%	----
		molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.000363	0.000362	0.000002	Diff <2x LOR	----
		nickel, total	7440-02-0	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		potassium, total	7440-09-7	E420	0.050	mg/L	0.460	0.461	0.0004	Diff <2x LOR	----
		selenium, total	7782-49-2	E420	0.000050	mg/L	0.000160	0.000136	0.000023	Diff <2x LOR	----
		silicon, total	7440-21-3	E420	0.10	mg/L	1.71	1.70	0.705%	20%	----
		silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		sodium, total	7440-23-5	E420	0.050	mg/L	0.863	0.841	2.60%	20%	----
		strontium, total	7440-24-6	E420	0.00020	mg/L	0.129	0.127	1.81%	20%	----
		thallium, total	7440-28-0	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		titanium, total	7440-32-6	E420	0.0100	mg/L	<0.0100	<0.0100	0	Diff <2x LOR	----
		uranium, total	7440-61-1	E420	0.000010	mg/L	0.000150	0.000150	0.207%	20%	----
		vanadium, total	7440-62-2	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		zinc, total	7440-66-6	E420	0.0030	mg/L	<0.0030	<0.0030	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 630246)											
VA22C0357-002	Anonymous	aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0314	0.0324	3.27%	20%	----
		antimony, dissolved	7440-36-0	E421	0.00010	mg/L	0.00269	0.00264	1.71%	20%	----
		arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00172	0.00173	0.942%	20%	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Dissolved Metals (QC Lot: 630246) - continued											
VA22C0357-002	Anonymous	barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.00100	0.00102	2.61%	20%	----
		beryllium, dissolved	7440-41-7	E421	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		boron, dissolved	7440-42-8	E421	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	0.000107	0.000107	0.176%	20%	----
		calcium, dissolved	7440-70-2	E421	0.050	mg/L	11.0	10.8	1.38%	20%	----
		chromium, dissolved	7440-47-3	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	0.00150	0.00157	4.99%	20%	----
		copper, dissolved	7440-50-8	E421	0.00020	mg/L	0.00148	0.00152	0.00005	Diff <2x LOR	----
		iron, dissolved	7439-89-6	E421	0.010	mg/L	0.018	0.019	0.0002	Diff <2x LOR	----
		lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.0019	0.0019	0.00002	Diff <2x LOR	----
		magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	1.82	1.87	2.59%	20%	----
		manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.168	0.173	2.80%	20%	----
		molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		nickel, dissolved	7440-02-0	E421	0.00050	mg/L	0.00231	0.00243	0.00012	Diff <2x LOR	----
		potassium, dissolved	7440-09-7	E421	0.050	mg/L	1.67	1.70	1.38%	20%	----
		selenium, dissolved	7782-49-2	E421	0.000050	mg/L	0.00171	0.00156	9.57%	20%	----
		silicon, dissolved	7440-21-3	E421	0.050	mg/L	0.763	0.759	0.478%	20%	----
		silver, dissolved	7440-22-4	E421	0.000010	mg/L	0.000015	0.000015	0.0000002	Diff <2x LOR	----
		sodium, dissolved	7440-23-5	E421	0.050	mg/L	0.063	0.066	0.002	Diff <2x LOR	----
		strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.0394	0.0396	0.498%	20%	----
		thallium, dissolved	7440-28-0	E421	0.000010	mg/L	0.000071	0.000072	0.000001	Diff <2x LOR	----
		tin, dissolved	7440-31-5	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		titanium, dissolved	7440-32-6	E421	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
		uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.000108	0.000108	0.0314%	20%	----
		vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		zinc, dissolved	7440-66-6	E421	0.0010	mg/L	0.0531	0.0541	1.91%	20%	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 626007)						
conductivity	----	E100	1	µS/cm	1.1	----
Physical Tests (QCLot: 626009)						
alkalinity, total (as CaCO3)	----	E290	1	mg/L	1.4	----
Physical Tests (QCLot: 626473)						
turbidity	----	E121	0.1	NTU	<0.10	----
Physical Tests (QCLot: 631391)						
solids, total suspended [TSS]	----	E164	1	mg/L	<1.0	----
Physical Tests (QCLot: 632304)						
solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Anions and Nutrients (QCLot: 626010)						
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 626011)						
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 626012)						
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 626013)						
fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 626014)						
chloride	16887-00-6	E235.Cl	0.5	mg/L	<0.50	----
Anions and Nutrients (QCLot: 626017)						
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 633177)						
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----
Anions and Nutrients (QCLot: 633179)						
phosphorus, total dissolved	7723-14-0	E375-T	0.002	mg/L	<0.0020	----
Anions and Nutrients (QCLot: 633180)						
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Organic / Inorganic Carbon (QCLot: 633178)						
carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	<0.50	----
Total Metals (QCLot: 630139)						
aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----
antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 630139) - continued						
barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	<0.000050	----
boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
chromium, total	7440-47-3	E420	0.0005	mg/L	<0.00050	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
lithium, total	7439-93-2	E420	0.001	mg/L	<0.0010	----
magnesium, total	7439-95-4	E420	0.005	mg/L	<0.0050	----
manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
potassium, total	7440-09-7	E420	0.05	mg/L	<0.050	----
selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
silicon, total	7440-21-3	E420	0.1	mg/L	<0.10	----
silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	----
sodium, total	7440-23-5	E420	0.05	mg/L	<0.050	----
strontium, total	7440-24-6	E420	0.0002	mg/L	<0.00020	----
thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----
tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----
uranium, total	7440-61-1	E420	0.00001	mg/L	<0.000010	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	<0.00050	----
zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	----
Dissolved Metals (QCLot: 630246)						
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	<0.0010	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	<0.00010	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	<0.00010	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	<0.00010	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	<0.000020	----
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	<0.000050	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	<0.010	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 630246) - continued						
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	<0.0000050	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	<0.050	----
chromium, dissolved	7440-47-3	E421	0.0005	mg/L	<0.00050	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	<0.000050	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	<0.050	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	<0.000010	----
sodium, dissolved	7440-23-5	E421	0.05	mg/L	<0.050	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	<0.00020	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	<0.000010	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	<0.00050	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	<0.0010	----
Plant Pigments (QCLot: 627043)						
chlorophyll a	479-61-8	E870	0.01	µg/L	<0.010	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 626007)									
conductivity	----	E100	1	µS/cm	146.9 µS/cm	99.3	90.0	110	----
Physical Tests (QCLot: 626008)									
pH	----	E108	----	pH units	7 pH units	99.7	98.0	102	----
Physical Tests (QCLot: 626009)									
alkalinity, total (as CaCO3)	----	E290	1	mg/L	500 mg/L	108	85.0	115	----
Physical Tests (QCLot: 626473)									
turbidity	----	E121	0.1	NTU	200 NTU	97.0	85.0	115	----
Physical Tests (QCLot: 631391)									
solids, total suspended [TSS]	----	E164	1	mg/L	150 mg/L	97.0	85.0	115	----
Physical Tests (QCLot: 632304)									
solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	100	85.0	115	----
Anions and Nutrients (QCLot: 626010)									
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	100	90.0	110	----
Anions and Nutrients (QCLot: 626011)									
nitrate (as N)	14797-55-8	E235.NO3-L	0.005	mg/L	2.5 mg/L	99.2	90.0	110	----
Anions and Nutrients (QCLot: 626012)									
nitrite (as N)	14797-65-0	E235.NO2-L	0.001	mg/L	0.5 mg/L	97.6	90.0	110	----
Anions and Nutrients (QCLot: 626013)									
fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	96.9	90.0	110	----
Anions and Nutrients (QCLot: 626014)									
chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	98.8	90.0	110	----
Anions and Nutrients (QCLot: 626017)									
phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	0.03 mg/L	92.1	80.0	120	----
Anions and Nutrients (QCLot: 633177)									
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	0.05 mg/L	99.1	80.0	120	----
Anions and Nutrients (QCLot: 633179)									
phosphorus, total dissolved	7723-14-0	E375-T	0.002	mg/L	0.05 mg/L	100	80.0	120	----
Anions and Nutrients (QCLot: 633180)									
ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	104	85.0	115	----
Organic / Inorganic Carbon (QCLot: 633178)									
carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	8.57 mg/L	104	80.0	120	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report: Spike Concentration	Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High	Qualifier
Total Metals (QCLot: 630139)									
aluminum, total	7429-90-5	E420	0.003	mg/L	2 mg/L	103	80.0	120	----
antimony, total	7440-36-0	E420	0.0001	mg/L	1 mg/L	105	80.0	120	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	1 mg/L	104	80.0	120	----
barium, total	7440-39-3	E420	0.0001	mg/L	0.25 mg/L	101	80.0	120	----
beryllium, total	7440-41-7	E420	0.00002	mg/L	0.1 mg/L	94.4	80.0	120	----
bismuth, total	7440-69-9	E420	0.00005	mg/L	1 mg/L	100	80.0	120	----
boron, total	7440-42-8	E420	0.01	mg/L	1 mg/L	92.5	80.0	120	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	0.1 mg/L	102	80.0	120	----
calcium, total	7440-70-2	E420	0.05	mg/L	50 mg/L	98.3	80.0	120	----
chromium, total	7440-47-3	E420	0.0005	mg/L	0.25 mg/L	99.5	80.0	120	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	0.25 mg/L	102	80.0	120	----
copper, total	7440-50-8	E420	0.0005	mg/L	0.25 mg/L	103	80.0	120	----
iron, total	7439-89-6	E420	0.01	mg/L	1 mg/L	98.3	80.0	120	----
lead, total	7439-92-1	E420	0.00005	mg/L	0.5 mg/L	101	80.0	120	----
lithium, total	7439-93-2	E420	0.001	mg/L	0.25 mg/L	99.1	80.0	120	----
magnesium, total	7439-95-4	E420	0.005	mg/L	50 mg/L	98.5	80.0	120	----
manganese, total	7439-96-5	E420	0.0001	mg/L	0.25 mg/L	100	80.0	120	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.25 mg/L	102	80.0	120	----
nickel, total	7440-02-0	E420	0.0005	mg/L	0.5 mg/L	102	80.0	120	----
potassium, total	7440-09-7	E420	0.05	mg/L	50 mg/L	106	80.0	120	----
selenium, total	7782-49-2	E420	0.00005	mg/L	1 mg/L	107	80.0	120	----
silicon, total	7440-21-3	E420	0.1	mg/L	10 mg/L	108	80.0	120	----
silver, total	7440-22-4	E420	0.00001	mg/L	0.1 mg/L	95.4	80.0	120	----
sodium, total	7440-23-5	E420	0.05	mg/L	50 mg/L	102	80.0	120	----
strontium, total	7440-24-6	E420	0.0002	mg/L	0.25 mg/L	103	80.0	120	----
thallium, total	7440-28-0	E420	0.00001	mg/L	1 mg/L	103	80.0	120	----
tin, total	7440-31-5	E420	0.0001	mg/L	0.5 mg/L	98.0	80.0	120	----
titanium, total	7440-32-6	E420	0.0003	mg/L	0.25 mg/L	96.1	80.0	120	----
uranium, total	7440-61-1	E420	0.00001	mg/L	0.005 mg/L	102	80.0	120	----
vanadium, total	7440-62-2	E420	0.0005	mg/L	0.5 mg/L	102	80.0	120	----
zinc, total	7440-66-6	E420	0.003	mg/L	0.5 mg/L	105	80.0	120	----
Dissolved Metals (QCLot: 630246)									
aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	106	80.0	120	----
antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	100	80.0	120	----
arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	109	80.0	120	----
barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	109	80.0	120	----
beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	105	80.0	120	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 630246) - continued									
bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	98.0	80.0	120	----
boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	106	80.0	120	----
cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	101	80.0	120	----
calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	103	80.0	120	----
chromium, dissolved	7440-47-3	E421	0.0005	mg/L	0.25 mg/L	103	80.0	120	----
cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	101	80.0	120	----
copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	102	80.0	120	----
iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	107	80.0	120	----
lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	101	80.0	120	----
lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	103	80.0	120	----
magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	102	80.0	120	----
manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	105	80.0	120	----
molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	101	80.0	120	----
nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	104	80.0	120	----
potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	108	80.0	120	----
selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	99.6	80.0	120	----
silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	105	80.0	120	----
silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	93.7	80.0	120	----
sodium, dissolved	7440-23-5	E421	0.05	mg/L	50 mg/L	104	80.0	120	----
strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	103	80.0	120	----
thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	100	80.0	120	----
tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	99.3	80.0	120	----
titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	102	80.0	120	----
uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	101	80.0	120	----
vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	104	80.0	120	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	107	80.0	120	----
Plant Pigments (QCLot: 627043)									
chlorophyll a	479-61-8	E870	0.01	µg/L	5 µg/L	93.0	80.0	120	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 626010)										
FJ2202365-001	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	2020 mg/L	2000 mg/L	101	75.0	125	----
Anions and Nutrients (QCLot: 626011)										
FJ2202365-001	Anonymous	nitrate (as N)	14797-55-8	E235.NO3-L	51.0 mg/L	50 mg/L	102	75.0	125	----
Anions and Nutrients (QCLot: 626012)										
FJ2202365-001	Anonymous	nitrite (as N)	14797-65-0	E235.NO2-L	9.98 mg/L	10 mg/L	99.8	75.0	125	----
Anions and Nutrients (QCLot: 626013)										
FJ2202365-001	Anonymous	fluoride	16984-48-8	E235.F	20.4 mg/L	20 mg/L	102	75.0	125	----
Anions and Nutrients (QCLot: 626014)										
FJ2202365-001	Anonymous	chloride	16887-00-6	E235.Cl	2040 mg/L	2000 mg/L	102	75.0	125	----
Anions and Nutrients (QCLot: 626017)										
VA22C0362-002	QUL-ZOO-7_WS_DI-1_2022-08	phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0260 mg/L	0.03 mg/L	86.8	70.0	130	----
Anions and Nutrients (QCLot: 633177)										
VA22C0325-001	Anonymous	phosphorus, total	7723-14-0	E372-U	ND mg/L	0.05 mg/L	ND	70.0	130	----
Anions and Nutrients (QCLot: 633179)										
VA22C0362-002	QUL-ZOO-7_WS_DI-1_2022-08	phosphorus, total dissolved	7723-14-0	E375-T	0.0519 mg/L	0.05 mg/L	104	70.0	130	----
Anions and Nutrients (QCLot: 633180)										
VA22C0362-001	QUL-ZOO-1_WS_DI-1_2022-08	ammonia, total (as N)	7664-41-7	E298	0.108 mg/L	0.1 mg/L	108	75.0	125	----
Organic / Inorganic Carbon (QCLot: 633178)										
VA22C0362-002	QUL-ZOO-7_WS_DI-1_2022-08	carbon, dissolved organic [DOC]	----	E358-L	4.98 mg/L	5 mg/L	99.6	70.0	130	----
Total Metals (QCLot: 630139)										
VA22C0362-002	QUL-ZOO-7_WS_DI-1_2022-08	aluminum, total	7429-90-5	E420	0.190 mg/L	0.2 mg/L	95.3	70.0	130	----
		antimony, total	7440-36-0	E420	0.0200 mg/L	0.02 mg/L	100	70.0	130	----
		arsenic, total	7440-38-2	E420	0.0201 mg/L	0.02 mg/L	100	70.0	130	----
		barium, total	7440-39-3	E420	0.0192 mg/L	0.02 mg/L	96.2	70.0	130	----
		beryllium, total	7440-41-7	E420	0.0386 mg/L	0.04 mg/L	96.4	70.0	130	----
		bismuth, total	7440-69-9	E420	0.00977 mg/L	0.01 mg/L	97.7	70.0	130	----
		boron, total	7440-42-8	E420	0.097 mg/L	0.1 mg/L	96.8	70.0	130	----
		cadmium, total	7440-43-9	E420	0.00406 mg/L	0.004 mg/L	101	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Total Metals (QCLot: 630139) - continued										
VA22C0362-002	QUL-ZOO-7_WS_DI-1_2022-08	calcium, total	7440-70-2	E420	ND mg/L	4 mg/L	ND	70.0	130	----
		chromium, total	7440-47-3	E420	0.0403 mg/L	0.04 mg/L	101	70.0	130	----
		cobalt, total	7440-48-4	E420	0.0202 mg/L	0.02 mg/L	101	70.0	130	----
		copper, total	7440-50-8	E420	0.0201 mg/L	0.02 mg/L	101	70.0	130	----
		iron, total	7439-89-6	E420	1.94 mg/L	2 mg/L	96.8	70.0	130	----
		lead, total	7439-92-1	E420	0.0194 mg/L	0.02 mg/L	97.2	70.0	130	----
		lithium, total	7439-93-2	E420	0.0999 mg/L	0.1 mg/L	99.9	70.0	130	----
		magnesium, total	7439-95-4	E420	ND mg/L	1 mg/L	ND	70.0	130	----
		manganese, total	7439-96-5	E420	0.0198 mg/L	0.02 mg/L	99.0	70.0	130	----
		molybdenum, total	7439-98-7	E420	0.0206 mg/L	0.02 mg/L	103	70.0	130	----
		nickel, total	7440-02-0	E420	0.0403 mg/L	0.04 mg/L	101	70.0	130	----
		potassium, total	7440-09-7	E420	4.18 mg/L	4 mg/L	104	70.0	130	----
		selenium, total	7782-49-2	E420	0.0419 mg/L	0.04 mg/L	105	70.0	130	----
		silicon, total	7440-21-3	E420	10.2 mg/L	10 mg/L	102	70.0	130	----
		silver, total	7440-22-4	E420	0.00413 mg/L	0.004 mg/L	103	70.0	130	----
		sodium, total	7440-23-5	E420	2.01 mg/L	2 mg/L	101	70.0	130	----
		strontium, total	7440-24-6	E420	ND mg/L	0.02 mg/L	ND	70.0	130	----
		thallium, total	7440-28-0	E420	0.00386 mg/L	0.004 mg/L	96.4	70.0	130	----
		tin, total	7440-31-5	E420	0.0193 mg/L	0.02 mg/L	96.4	70.0	130	----
		titanium, total	7440-32-6	E420	0.0400 mg/L	0.04 mg/L	100	70.0	130	----
		uranium, total	7440-61-1	E420	0.00400 mg/L	0.004 mg/L	100	70.0	130	----
		vanadium, total	7440-62-2	E420	0.101 mg/L	0.1 mg/L	101	70.0	130	----
		zinc, total	7440-66-6	E420	0.406 mg/L	0.4 mg/L	101	70.0	130	----
Dissolved Metals (QCLot: 630246)										
VA22C0357-003	Anonymous	aluminum, dissolved	7429-90-5	E421	0.206 mg/L	0.2 mg/L	103	70.0	130	----
		antimony, dissolved	7440-36-0	E421	0.0194 mg/L	0.02 mg/L	96.8	70.0	130	----
		arsenic, dissolved	7440-38-2	E421	0.0210 mg/L	0.02 mg/L	105	70.0	130	----
		barium, dissolved	7440-39-3	E421	0.0209 mg/L	0.02 mg/L	104	70.0	130	----
		beryllium, dissolved	7440-41-7	E421	0.0414 mg/L	0.04 mg/L	104	70.0	130	----
		bismuth, dissolved	7440-69-9	E421	0.00950 mg/L	0.01 mg/L	95.0	70.0	130	----
		boron, dissolved	7440-42-8	E421	0.104 mg/L	0.1 mg/L	104	70.0	130	----
		cadmium, dissolved	7440-43-9	E421	0.00406 mg/L	0.004 mg/L	102	70.0	130	----
		calcium, dissolved	7440-70-2	E421	4.05 mg/L	4 mg/L	101	70.0	130	----
		chromium, dissolved	7440-47-3	E421	0.0412 mg/L	0.04 mg/L	103	70.0	130	----
		cobalt, dissolved	7440-48-4	E421	0.0205 mg/L	0.02 mg/L	102	70.0	130	----
		copper, dissolved	7440-50-8	E421	0.0210 mg/L	0.02 mg/L	105	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Dissolved Metals (QCLot: 630246) - continued										
VA22C0357-003	Anonymous	iron, dissolved	7439-89-6	E421	1.99 mg/L	2 mg/L	99.6	70.0	130	----
		lead, dissolved	7439-92-1	E421	0.0196 mg/L	0.02 mg/L	98.2	70.0	130	----
		lithium, dissolved	7439-93-2	E421	0.0991 mg/L	0.1 mg/L	99.1	70.0	130	----
		magnesium, dissolved	7439-95-4	E421	1.00 mg/L	1 mg/L	100	70.0	130	----
		manganese, dissolved	7439-96-5	E421	0.0210 mg/L	0.02 mg/L	105	70.0	130	----
		molybdenum, dissolved	7439-98-7	E421	0.0203 mg/L	0.02 mg/L	102	70.0	130	----
		nickel, dissolved	7440-02-0	E421	0.0417 mg/L	0.04 mg/L	104	70.0	130	----
		potassium, dissolved	7440-09-7	E421	4.26 mg/L	4 mg/L	106	70.0	130	----
		selenium, dissolved	7782-49-2	E421	0.0401 mg/L	0.04 mg/L	100	70.0	130	----
		silicon, dissolved	7440-21-3	E421	9.78 mg/L	10 mg/L	97.8	70.0	130	----
		silver, dissolved	7440-22-4	E421	0.00410 mg/L	0.004 mg/L	103	70.0	130	----
		sodium, dissolved	7440-23-5	E421	2.04 mg/L	2 mg/L	102	70.0	130	----
		strontium, dissolved	7440-24-6	E421	0.0208 mg/L	0.02 mg/L	104	70.0	130	----
		thallium, dissolved	7440-28-0	E421	0.00390 mg/L	0.004 mg/L	97.5	70.0	130	----
		tin, dissolved	7440-31-5	E421	0.0197 mg/L	0.02 mg/L	98.3	70.0	130	----
		titanium, dissolved	7440-32-6	E421	0.0414 mg/L	0.04 mg/L	103	70.0	130	----
		uranium, dissolved	7440-61-1	E421	0.00392 mg/L	0.004 mg/L	98.0	70.0	130	----
		vanadium, dissolved	7440-62-2	E421	0.102 mg/L	0.1 mg/L	102	70.0	130	----
		zinc, dissolved	7440-66-6	E421	0.420 mg/L	0.4 mg/L	105	70.0	130	----

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

Affix ALS barcode label here (lab use only)

COC Number:

Report To	Contact and company name below will appear on the final report
Company:	Mount Polley Mining Corporation
Contact:	Gabriel Holmes
Phone:	236-317-4939
	Company address below will appear on the final report
Street:	PO Box 12
City/Province:	Likely, BC
Postal Code:	V0L 1N0
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☐ NO
Company:	
Contact:	

Report Format / Distribution

Select Report Format: ☑ ☑ EXCEL ☐ EDD (DIGITAL)

Quality Control (QC) Report with Report ☑ YES ☐ NO

☐ Compare Results to Criteria on Report - provide details below if box checked

Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: gabriel.holmes@mountpolley.com

Email 2: kala.ivens@mountpolley.com, pschnurr@minnow.ca

Email 3: pstecko@minnow.ca; kbatchelar@minnow.ca

Invoice Distribution

Select Invoice Distribution: ☑ EMAIL ☑ MAIL ☐ FAX

Email 1 or Fax: gabriel.holmes@mountpolley.com

Email 2:

Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply

Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days)		EMERGENCY	
4 day [P4]	☐	1 Business day [E1]	☐
3 day [P3]	☐	Same Day, Weekend or Statutory holiday [E0]	☐
2 day [P2]	☐		

Date and Time Required for all E&P TATs: dd-m

For tests that can not be performed according to the service level selected, you will

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) b

Project Information

ALS Account # / Quote #:	VA22-MPMC100-006
Job #:	
PO / AFE:	
LSD:	

Oil and Gas Required Fields (client use)

AFE/Cost Center:	PO#
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Lab Work Order # (lab use only): VA22C0362

ALS Contact: Can Dang

Sampler:

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUTRIENTS-1	Total Metals (ICPMS)	Dissolved Metals (ICPMS)	Total Nitrogen Ammonia	DOC	TSS (Whole bottle)	Chlorophyll-a (E8708)						
							F	P	F/P								
	QUL-ZOO-1_WS_DI-1_2022-08	28-Aug-22	11:10	Water	R	R	R	R	R	R	R						6 7
	QUL-ZOO-7_WS_DI-1_2022-08	28-Aug-22	12:45	Water	R	R	R	R	R	R	R						6 7
	QUL-ZOO1_WS_DI-1X_2022-08	28-Aug-22	11:10	Water	R	R	R	R	R	R	R						6 7
	BOL-B2_WS_DI-1_2022-08	28-Aug-22	08:10	water	R	R	R	R	R	R	R						7

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ NO

Are samples for human drinking water use? ☐ NO

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

Regular analytes for Mount Polley Mine water sample package. Please also report ANIONS-N+N-CALC-VA (calculated nitrate and nitrite)

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice Packs ☑ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
				9	

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: S. Lahmer	Date: 29 AUG 22	Time: 0830	Received by:	Date:	Time:	Received by: JC	Date: AUG 30 2022	Time: 10 50 am

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

OCTOBER 2015 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

Environmental Division Vancouver

Work Order Reference VA22C0362

Telephone : +1 604 253 4188

SEDIMENT CHEMISTRY

ALS Laboratory Report VA22B8489

(Finalized August 31, 2022)

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **VA22B8489**	Page	: 1 of 12
Client	: **Mount Polley Mining Corporation**	Laboratory	: Vancouver - Environmental
Contact	: Kala Ivens	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: 250-790-2215 Ext 2112	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 10-Aug-2022 11:00
PO	: 5590008044 Q2 2022	Date Analysis Commenced	: 15-Aug-2022
C-O-C number	: ----	Issue Date	: 31-Aug-2022 14:49
Sampler	: KBA		
Site	: ----		
Quote number	: VA22-MPMC100-005 - Minnow Environmental-Sediment Quality		
No. of samples received	: 66		
No. of samples analysed	: 22		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Hedy Lai	Team Leader - Inorganics	Inorganics, Saskatoon, Saskatchewan
Janice Leung	Supervisor - Organics Instrumentation	Organics, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia
Ophelia Chiu	Department Manager - Organics	Organics, Burnaby, British Columbia
Owen Cheng		Metals, Burnaby, British Columbia
Parnian Sane	Analyst	Metals, Burnaby, British Columbia

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

Unit	*Description*
%	percent
mg/kg	milligrams per kilogram
pH units	pH units

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Sample Comments

Sample	Client Id	*Comment*
VA22B8489-045	HAC-U_SE-1_2022-08	Sample(s) XXX: Limited sample was available for PSA (100g minimum is standard). Measurement Uncertainty for PSA results may be higher than usual.
VA22B8489-046	HAC-U_SE-2_2022-08	Sample(s) XXX: Limited sample was available for PSA (100g minimum is standard). Measurement Uncertainty for PSA results may be higher than usual.
VA22B8489-047	HAC-U_SE-3_2022-08	Sample(s) XXX: Limited sample was available for PSA (100g minimum is standard). Measurement Uncertainty for PSA results may be higher than usual.
VA22B8489-048	HAC-U_SE-4_2022-08	Sample(s) XXX: Limited sample was available for PSA (100g minimum is standard). Measurement Uncertainty for PSA results may be higher than usual.
VA22B8489-049	HAC-U_SE-5_2022-08	Sample(s) XXX: Limited sample was available for PSA (100g minimum is standard). Measurement Uncertainty for PSA results may be higher than usual.
VA22B8489-065	HAC-D_SE-5X_2022-08	Sample(s) XXX: Limited sample was available for PSA (100g minimum is standard). Measurement Uncertainty for PSA results may be higher than usual.

Analytical Results

Sub-Matrix: **Soil**
(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	HAC-U_SE-1_2022-08	HAC-U_SE-2_2022-08	HAC-U_SE-3_2022-08	HAC-U_SE-4_2022-08	HAC-U_SE-5_2022-08
					Client sampling date / time	06-Aug-2022	06-Aug-2022	06-Aug-2022	06-Aug-2022	06-Aug-2022
						VA22B8489-045	VA22B8489-046	VA22B8489-047	VA22B8489-048	VA22B8489-049
						Result	Result	Result	Result	Result
Physical Tests										
moisture	----	E144	0.25	%		88.4	85.0	87.1	85.8	90.3
pH (1:2 soil:water)	----	E108	0.10	pH units		7.03	7.19	7.27	7.18	7.22
Particle Size										
clay (<0.004mm)	----	EC184E	1.0	%		15.1	16.2	14.7	17.3	17.3
silt (0.063mm - 0.004mm)	----	EC184E	1.0	%		72.0	69.2	70.7	70.1	73.7
sand (2.0mm - 0.063mm)	----	EC184E	1.0	%		12.9	14.6	14.6	12.6	9.0
gravel (>2mm)	----	EC184E	1.0	%		<1.0	<1.0	<1.0	<1.0	<1.0
Anions and Nutrients										
nitrogen, total	7727-37-9	E366	0.020	%		0.895	0.629	0.662	0.818	0.821
Organic / Inorganic Carbon										
carbon, total organic [TOC], <63µm	----	EC356A	0.050	%		7.45	5.80	6.29	7.21	6.96
Inorganic Parameters										
sulfur, total	7704-34-9	E399	500	mg/kg		2120	2610	2520	2920	3420
Metals										
aluminum	7429-90-5	E440A	50	mg/kg		15700	16500	16400	15400	16600
antimony	7440-36-0	E440A	0.10	mg/kg		0.28	0.36	0.35	0.29	0.36
arsenic	7440-38-2	E440A	0.050	mg/kg		7.08	7.35	7.38	7.16	7.43
barium	7440-39-3	E440A	0.50	mg/kg		266	255	257	266	256
beryllium	7440-41-7	E440A	0.10	mg/kg		0.52	0.55	0.54	0.51	0.55
bismuth	7440-69-9	E440A	0.10	mg/kg		<0.10	<0.10	<0.10	<0.10	<0.10
boron	7440-42-8	E440A	5.0	mg/kg		23.3	15.1	16.6	22.2	21.8
cadmium	7440-43-9	E440A	0.020	mg/kg		0.395	0.374	0.328	0.330	0.344
calcium	7440-70-2	E440A	50	mg/kg		23600	20700	22800	21800	19300
chromium	7440-47-3	E440A	0.50	mg/kg		26.7	29.4	25.9	23.9	27.6
cobalt	7440-48-4	E440A	0.10	mg/kg		13.2	13.6	13.6	12.8	13.4
copper	7440-50-8	E440A	0.50	mg/kg		393	400	382	385	402
iron	7439-89-6	E440A	50	mg/kg		30700	31800	32300	32700	32500
lead	7439-92-1	E440A	0.10	mg/kg		5.50	5.99	5.82	5.69	5.87
lithium	7439-93-2	E440A	2.0	mg/kg		12.4	14.0	13.4	12.6	13.0
magnesium	7439-95-4	E440A	10	mg/kg		8460	8620	8420	8480	8560
manganese	7439-96-5	E440A	0.20	mg/kg		1860	1430	1880	2250	1780

Analytical Results

Sub-Matrix: **Soil**
(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	HAC-U_SE-1_2022-08	HAC-U_SE-2_2022-08	HAC-U_SE-3_2022-08	HAC-U_SE-4_2022-08	HAC-U_SE-5_2022-08
					Client sampling date / time	06-Aug-2022	06-Aug-2022	06-Aug-2022	06-Aug-2022	06-Aug-2022
						VA22B8489-045	VA22B8489-046	VA22B8489-047	VA22B8489-048	VA22B8489-049
						Result	Result	Result	Result	Result
Metals										
mercury	7439-97-6	E510A	0.0050	mg/kg		0.108	0.112	0.105	0.103	0.107
molybdenum	7439-98-7	E440A	0.10	mg/kg		4.06	3.67	4.16	3.40	3.92
nickel	7440-02-0	E440A	0.50	mg/kg		25.2	25.4	22.4	21.0	23.0
phosphorus	7723-14-0	E440A	50	mg/kg		1650	1340	1420	1580	1570
potassium	7440-09-7	E440A	100	mg/kg		1420	1610	1360	1340	1440
selenium	7782-49-2	E440A	0.10	mg/kg		4.43	3.39	3.36	4.57	4.52
silver	7440-22-4	E440A	0.050	mg/kg		0.185	0.198	0.193	0.178	0.181
sodium	7440-23-5	E440A	50	mg/kg		496	458	476	465	468
strontium	7440-24-6	E440A	0.10	mg/kg		147	143	151	143	134
thallium	7440-28-0	E440A	0.050	mg/kg		<0.050	0.063	0.053	<0.050	0.054
tin	7440-31-5	E440A	0.20	mg/kg		0.74	0.68	0.71	0.62	0.77
titanium	7440-32-6	E440A	1.0	mg/kg		707	727	737	678	871
uranium	7440-61-1	E440A	0.050	mg/kg		0.798	0.749	0.835	0.802	0.850
vanadium	7440-62-2	E440A	0.20	mg/kg		96.8	96.0	99.9	95.7	105
zinc	7440-66-6	E440A	1.0	mg/kg		68.3	71.1	69.8	67.8	70.6
zirconium	7440-67-7	E440A	1.0	mg/kg		1.9	2.1	2.0	1.9	2.2

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Soil**
(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	HAC-D_SE-1_2022-08	HAC-D_SE-2_2022-08	HAC-D_SE-3_2022-08	HAC-D_SE-4_2022-08	HAC-D_SE-5_2022-08
					Client sampling date / time	05-Aug-2022	05-Aug-2022	05-Aug-2022	05-Aug-2022	05-Aug-2022
						VA22B8489-050	VA22B8489-051	VA22B8489-052	VA22B8489-053	VA22B8489-054
						Result	Result	Result	Result	Result
Physical Tests										
moisture	----	E144	0.25	%		59.0	50.3	51.8	46.1	69.7
pH (1:2 soil:water)	----	E108	0.10	pH units		7.66	7.65	7.36	7.60	7.22
Particle Size										
clay (<0.004mm)	----	EC184E	1.0	%		6.8	6.6	11.5	7.3	10.0
silt (0.063mm - 0.004mm)	----	EC184E	1.0	%		42.5	38.6	54.8	35.5	65.4
sand (2.0mm - 0.063mm)	----	EC184E	1.0	%		50.5	54.3	33.7	57.0	23.7
gravel (>2mm)	----	EC184E	1.0	%		<1.0	<1.0	<1.0	<1.0	<1.0
Anions and Nutrients										
nitrogen, total	7727-37-9	E366	0.020	%		0.133	0.115	0.140	0.117	0.226
Organic / Inorganic Carbon										
carbon, total organic [TOC], <63µm	----	EC356A	0.050	%		1.67	1.47	1.77	1.43	1.91
Inorganic Parameters										
sulfur, total	7704-34-9	E399	500	mg/kg		1090	740	630	770	780
Metals										
aluminum	7429-90-5	E440A	50	mg/kg		14900	15600	16400	14200	14500
antimony	7440-36-0	E440A	0.10	mg/kg		0.48	0.53	0.50	0.49	0.49
arsenic	7440-38-2	E440A	0.050	mg/kg		13.3	15.9	15.4	15.5	15.5
barium	7440-39-3	E440A	0.50	mg/kg		239	268	220	227	244
beryllium	7440-41-7	E440A	0.10	mg/kg		0.53	0.59	0.58	0.55	0.57
bismuth	7440-69-9	E440A	0.10	mg/kg		0.13	0.12	0.14	0.12	0.13
boron	7440-42-8	E440A	5.0	mg/kg		11.5	13.6	11.1	11.2	11.3
cadmium	7440-43-9	E440A	0.020	mg/kg		0.280	0.293	0.312	0.267	0.272
calcium	7440-70-2	E440A	50	mg/kg		22900	24200	22200	24000	23400
chromium	7440-47-3	E440A	0.50	mg/kg		33.8	35.1	36.5	31.9	33.3
cobalt	7440-48-4	E440A	0.10	mg/kg		14.2	15.5	15.5	14.2	14.3
copper	7440-50-8	E440A	0.50	mg/kg		312	375	342	325	325
iron	7439-89-6	E440A	50	mg/kg		40900	46100	43600	43100	42800
lead	7439-92-1	E440A	0.10	mg/kg		8.52	8.45	8.96	8.29	8.61
lithium	7439-93-2	E440A	2.0	mg/kg		14.4	14.3	15.0	13.7	14.5
magnesium	7439-95-4	E440A	10	mg/kg		7900	8530	8680	8090	7710
manganese	7439-96-5	E440A	0.20	mg/kg		1030	1470	996	1310	1110
mercury	7439-97-6	E510A	0.0050	mg/kg		0.0926	0.115	0.101	0.0956	0.108

Analytical Results

Sub-Matrix: **Soil**
(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	HAC-D_SE-1_2022-08	HAC-D_SE-2_2022-08	HAC-D_SE-3_2022-08	HAC-D_SE-4_2022-08	HAC-D_SE-5_2022-08
					Client sampling date / time	05-Aug-2022	05-Aug-2022	05-Aug-2022	05-Aug-2022	05-Aug-2022
						VA22B8489-050	VA22B8489-051	VA22B8489-052	VA22B8489-053	VA22B8489-054
						Result	Result	Result	Result	Result
Metals										
molybdenum	7439-98-7	E440A	0.10	mg/kg		1.57	1.70	1.66	1.91	1.60
nickel	7440-02-0	E440A	0.50	mg/kg		25.8	24.9	26.5	24.4	24.4
phosphorus	7723-14-0	E440A	50	mg/kg		1220	1370	1200	1160	1220
potassium	7440-09-7	E440A	100	mg/kg		1290	1420	1500	1340	1360
selenium	7782-49-2	E440A	0.10	mg/kg		1.19	1.19	1.05	1.12	1.06
silver	7440-22-4	E440A	0.050	mg/kg		0.167	0.177	0.201	0.182	0.292
sodium	7440-23-5	E440A	50	mg/kg		340	417	412	371	357
strontium	7440-24-6	E440A	0.10	mg/kg		176	192	171	174	171
thallium	7440-28-0	E440A	0.050	mg/kg		0.106	0.108	0.123	0.113	0.116
tin	7440-31-5	E440A	0.20	mg/kg		0.61	0.73	0.66	0.66	0.63
titanium	7440-32-6	E440A	1.0	mg/kg		873	1090	1020	868	901
uranium	7440-61-1	E440A	0.050	mg/kg		0.979	1.02	1.02	0.966	0.992
vanadium	7440-62-2	E440A	0.20	mg/kg		125	152	133	130	129
zinc	7440-66-6	E440A	1.0	mg/kg		74.0	76.2	75.9	72.6	75.2
zirconium	7440-67-7	E440A	1.0	mg/kg		2.3	3.3	2.9	2.5	2.7

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Soil**
(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	EDC-U_SE-1_2022-08	EDC-U_SE-2_2022-08	EDC-U_SE-3_2022-08	EDC-U_SE-4_2022-08	EDC-U_SE-5_2022-08
					Client sampling date / time	07-Aug-2022	07-Aug-2022	07-Aug-2022	07-Aug-2022	07-Aug-2022
						VA22B8489-055	VA22B8489-056	VA22B8489-057	VA22B8489-058	VA22B8489-059
						Result	Result	Result	Result	Result
Physical Tests										
moisture	----	E144	0.25	%		63.9	70.8	64.9	64.5	45.5
pH (1:2 soil:water)	----	E108	0.10	pH units		6.67	6.64	6.44	7.03	6.97
Particle Size										
clay (<0.004mm)	----	EC184E	1.0	%		8.2	14.3	6.3	8.1	5.2
silt (0.063mm - 0.004mm)	----	EC184E	1.0	%		44.9	47.4	32.7	36.1	17.6
sand (2.0mm - 0.063mm)	----	EC184E	1.0	%		44.9	37.7	60.7	55.8	76.2
gravel (>2mm)	----	EC184E	1.0	%		2.0	<1.0	<1.0	<1.0	1.0
Anions and Nutrients										
nitrogen, total	7727-37-9	E366	0.020	%		0.424	0.303	0.248	0.271	0.167
Organic / Inorganic Carbon										
carbon, total organic [TOC], <63µm	----	EC356A	0.050	%		7.11	3.78	7.08	5.43	6.65
Inorganic Parameters										
sulfur, total	7704-34-9	E399	500	mg/kg		760	710	690	610	<500
Metals										
aluminum	7429-90-5	E440A	50	mg/kg		16600	12300	14600	14800	15400
antimony	7440-36-0	E440A	0.10	mg/kg		0.34	0.24	0.31	0.30	0.31
arsenic	7440-38-2	E440A	0.050	mg/kg		8.78	5.80	9.52	8.03	8.23
barium	7440-39-3	E440A	0.50	mg/kg		129	79.3	116	105	111
beryllium	7440-41-7	E440A	0.10	mg/kg		0.39	0.29	0.38	0.38	0.42
bismuth	7440-69-9	E440A	0.10	mg/kg		0.10	<0.10	<0.10	<0.10	<0.10
boron	7440-42-8	E440A	5.0	mg/kg		5.3	<5.0	<5.0	<5.0	<5.0
cadmium	7440-43-9	E440A	0.020	mg/kg		0.426	0.165	0.387	0.316	0.351
calcium	7440-70-2	E440A	50	mg/kg		8850	6170	7820	7950	8440
chromium	7440-47-3	E440A	0.50	mg/kg		49.5	37.2	47.4	47.3	53.2
cobalt	7440-48-4	E440A	0.10	mg/kg		13.0	8.18	12.5	11.9	12.2
copper	7440-50-8	E440A	0.50	mg/kg		32.2	20.2	28.2	25.5	27.6
iron	7439-89-6	E440A	50	mg/kg		26400	18400	26800	24700	27200
lead	7439-92-1	E440A	0.10	mg/kg		8.14	5.70	6.88	5.90	6.35
lithium	7439-93-2	E440A	2.0	mg/kg		12.8	10.4	12.2	11.8	12.8
magnesium	7439-95-4	E440A	10	mg/kg		6570	5210	6150	6150	6460
manganese	7439-96-5	E440A	0.20	mg/kg		560	541	852	1080	1010
mercury	7439-97-6	E510A	0.0050	mg/kg		0.0820	0.0530	0.0794	0.0747	0.0866

Analytical Results

Sub-Matrix: **Soil**
(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	EDC-U_SE-1_2022-08	EDC-U_SE-2_2022-08	EDC-U_SE-3_2022-08	EDC-U_SE-4_2022-08	EDC-U_SE-5_2022-08
					Client sampling date / time	07-Aug-2022	07-Aug-2022	07-Aug-2022	07-Aug-2022	07-Aug-2022
						VA22B8489-055	VA22B8489-056	VA22B8489-057	VA22B8489-058	VA22B8489-059
						Result	Result	Result	Result	Result
Metals										
molybdenum	7439-98-7	E440A	0.10	mg/kg		0.67	0.47	0.57	0.56	0.62
nickel	7440-02-0	E440A	0.50	mg/kg		28.2	19.0	26.2	25.6	27.2
phosphorus	7723-14-0	E440A	50	mg/kg		1060	954	1010	1020	1080
potassium	7440-09-7	E440A	100	mg/kg		1240	720	1030	1000	1100
selenium	7782-49-2	E440A	0.10	mg/kg		0.49	0.24	0.37	0.43	0.44
silver	7440-22-4	E440A	0.050	mg/kg		0.159	0.100	0.139	0.124	0.132
sodium	7440-23-5	E440A	50	mg/kg		289	200	255	262	269
strontium	7440-24-6	E440A	0.10	mg/kg		77.1	55.7	68.9	70.5	75.8
thallium	7440-28-0	E440A	0.050	mg/kg		0.128	0.084	0.107	0.103	0.114
tin	7440-31-5	E440A	0.20	mg/kg		0.46	0.25	0.33	0.34	0.43
titanium	7440-32-6	E440A	1.0	mg/kg		626	492	588	608	652
uranium	7440-61-1	E440A	0.050	mg/kg		1.48	1.15	1.23	1.19	1.33
vanadium	7440-62-2	E440A	0.20	mg/kg		67.1	48.4	64.7	63.6	68.2
zinc	7440-66-6	E440A	1.0	mg/kg		73.4	45.4	68.3	62.0	67.6
zirconium	7440-67-7	E440A	1.0	mg/kg		1.1	<1.0	1.0	<1.0	<1.0

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Soil**
(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	EDC-D_SE-1_2022-08	EDC-D_SE-2_2022-08	EDC-D_SE-3_2022-08	EDC-D_SE-4_2022-08	EDC-D_SE-5_2022-08
					Client sampling date / time	03-Aug-2022	03-Aug-2022	03-Aug-2022	03-Aug-2022	03-Aug-2022
						VA22B8489-060	VA22B8489-061	VA22B8489-062	VA22B8489-063	VA22B8489-064
						Result	Result	Result	Result	Result
Physical Tests										
moisture	----	E144	0.25	%		50.0	52.8	60.6	43.8	59.8
pH (1:2 soil:water)	----	E108	0.10	pH units		7.30	7.71	7.87	7.69	6.49
Particle Size										
clay (<0.004mm)	----	EC184E	1.0	%		6.6	7.4	7.0	5.8	6.8
silt (0.063mm - 0.004mm)	----	EC184E	1.0	%		33.5	38.7	40.9	24.1	34.0
sand (2.0mm - 0.063mm)	----	EC184E	1.0	%		59.5	52.7	51.2	70.0	58.1
gravel (>2mm)	----	EC184E	1.0	%		<1.0	1.2	<1.0	<1.0	1.1
Anions and Nutrients										
nitrogen, total	7727-37-9	E366	0.020	%		0.189	0.158	0.210	0.087	0.206
Organic / Inorganic Carbon										
carbon, total organic [TOC], <63µm	----	EC356A	0.050	%		3.43	2.84	3.56	3.05	5.29
Inorganic Parameters										
sulfur, total	7704-34-9	E399	500	mg/kg		620	530	570	<500	520
Metals										
aluminum	7429-90-5	E440A	50	mg/kg		13800	14600	14200	13100	13600
antimony	7440-36-0	E440A	0.10	mg/kg		0.34	0.33	0.36	0.35	0.32
arsenic	7440-38-2	E440A	0.050	mg/kg		9.30	8.39	10.5	11.3	9.49
barium	7440-39-3	E440A	0.50	mg/kg		110	111	118	126	122
beryllium	7440-41-7	E440A	0.10	mg/kg		0.35	0.40	0.36	0.37	0.35
bismuth	7440-69-9	E440A	0.10	mg/kg		0.11	0.11	0.11	0.12	0.12
boron	7440-42-8	E440A	5.0	mg/kg		<5.0	<5.0	5.0	<5.0	<5.0
cadmium	7440-43-9	E440A	0.020	mg/kg		0.264	0.213	0.265	0.278	0.288
calcium	7440-70-2	E440A	50	mg/kg		8300	8550	8940	8700	8480
chromium	7440-47-3	E440A	0.50	mg/kg		42.3	44.8	45.0	43.9	41.1
cobalt	7440-48-4	E440A	0.10	mg/kg		11.4	11.2	12.3	12.1	11.7
copper	7440-50-8	E440A	0.50	mg/kg		25.8	29.2	27.3	27.6	31.5
iron	7439-89-6	E440A	50	mg/kg		27100	26100	29300	28900	27200
lead	7439-92-1	E440A	0.10	mg/kg		6.44	7.26	6.73	6.87	6.77
lithium	7439-93-2	E440A	2.0	mg/kg		13.3	15.0	14.0	13.4	13.9
magnesium	7439-95-4	E440A	10	mg/kg		6450	6880	7100	6620	6760
manganese	7439-96-5	E440A	0.20	mg/kg		514	564	1000	904	541
mercury	7439-97-6	E510A	0.0050	mg/kg		0.0530	0.0689	0.0578	0.0533	0.0661

Analytical Results

Sub-Matrix: **Soil**
(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	EDC-D_SE-1_2022-08	EDC-D_SE-2_2022-08	EDC-D_SE-3_2022-08	EDC-D_SE-4_2022-08	EDC-D_SE-5_2022-08
					Client sampling date / time	03-Aug-2022	03-Aug-2022	03-Aug-2022	03-Aug-2022	03-Aug-2022
						VA22B8489-060	VA22B8489-061	VA22B8489-062	VA22B8489-063	VA22B8489-064
						Result	Result	Result	Result	Result
Metals										
molybdenum	7439-98-7	E440A	0.10	mg/kg		0.60	0.58	0.65	0.54	0.55
nickel	7440-02-0	E440A	0.50	mg/kg		26.9	28.0	28.7	27.9	28.2
phosphorus	7723-14-0	E440A	50	mg/kg		930	953	1050	960	968
potassium	7440-09-7	E440A	100	mg/kg		1120	1140	1240	1110	1080
selenium	7782-49-2	E440A	0.10	mg/kg		0.38	0.49	0.43	0.39	0.54
silver	7440-22-4	E440A	0.050	mg/kg		0.094	0.116	0.107	0.103	0.107
sodium	7440-23-5	E440A	50	mg/kg		280	267	290	257	226
strontium	7440-24-6	E440A	0.10	mg/kg		77.8	87.4	84.9	80.5	75.8
thallium	7440-28-0	E440A	0.050	mg/kg		0.093	0.106	0.097	0.092	0.090
tin	7440-31-5	E440A	0.20	mg/kg		0.34	0.35	0.41	0.37	0.35
titanium	7440-32-6	E440A	1.0	mg/kg		706	704	766	666	543
uranium	7440-61-1	E440A	0.050	mg/kg		1.06	1.06	1.03	0.965	0.894
vanadium	7440-62-2	E440A	0.20	mg/kg		63.1	62.3	67.2	68.5	59.2
zinc	7440-66-6	E440A	1.0	mg/kg		59.4	65.0	64.9	62.7	65.5
zirconium	7440-67-7	E440A	1.0	mg/kg		1.5	1.9	1.5	1.7	1.6

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Soil**
(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	HAC-D_SE-5X_2022-08	EDC-D_SE-4X_2022-08	----	----	----
					Client sampling date / time	05-Aug-2022	03-Aug-2022	----	----	----
						VA22B8489-065	VA22B8489-066	--------	--------	--------
						Result	Result	----	----	----
Physical Tests										
moisture	----	E144	0.25	%		63.4	40.8	----	----	----
pH (1:2 soil:water)	----	E108	0.10	pH units		7.39	7.47	----	----	----
Particle Size										
clay (<0.004mm)	----	EC184E	1.0	%		9.8	5.4	----	----	----
silt (0.063mm - 0.004mm)	----	EC184E	1.0	%		55.0	27.7	----	----	----
sand (2.0mm - 0.063mm)	----	EC184E	1.0	%		35.2	66.5	----	----	----
gravel (>2mm)	----	EC184E	1.0	%		<1.0	<1.0	----	----	----
Anions and Nutrients										
nitrogen, total	7727-37-9	E366	0.020	%		0.181	0.098	----	----	----
Organic / Inorganic Carbon										
carbon, total organic [TOC], <63µm	----	EC356A	0.050	%		1.84	2.59	----	----	----
Inorganic Parameters										
sulfur, total	7704-34-9	E399	500	mg/kg		870	580	----	----	----
Metals										
aluminum	7429-90-5	E440A	50	mg/kg		15300	14600	----	----	----
antimony	7440-36-0	E440A	0.10	mg/kg		0.82	0.38	----	----	----
arsenic	7440-38-2	E440A	0.050	mg/kg		17.8	12.0	----	----	----
barium	7440-39-3	E440A	0.50	mg/kg		229	115	----	----	----
beryllium	7440-41-7	E440A	0.10	mg/kg		0.53	0.38	----	----	----
bismuth	7440-69-9	E440A	0.10	mg/kg		0.12	0.12	----	----	----
boron	7440-42-8	E440A	5.0	mg/kg		10.8	<5.0	----	----	----
cadmium	7440-43-9	E440A	0.020	mg/kg		0.385	0.283	----	----	----
calcium	7440-70-2	E440A	50	mg/kg		21900	8670	----	----	----
chromium	7440-47-3	E440A	0.50	mg/kg		32.9	45.0	----	----	----
cobalt	7440-48-4	E440A	0.10	mg/kg		14.7	13.2	----	----	----
copper	7440-50-8	E440A	0.50	mg/kg		337	28.1	----	----	----
iron	7439-89-6	E440A	50	mg/kg		44700	30400	----	----	----
lead	7439-92-1	E440A	0.10	mg/kg		18.9	7.56	----	----	----
lithium	7439-93-2	E440A	2.0	mg/kg		14.8	14.6	----	----	----
magnesium	7439-95-4	E440A	10	mg/kg		8020	6790	----	----	----
manganese	7439-96-5	E440A	0.20	mg/kg		1050	839	----	----	----
mercury	7439-97-6	E510A	0.0050	mg/kg		0.106	0.0531	----	----	----

Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	HAC-D_SE-5X_2022-08	EDC-D_SE-4X_2022-08	----	----	----
					Client sampling date / time	05-Aug-2022	03-Aug-2022	----	----	----
Analyte	CAS Number	Method	LOR	Unit		VA22B8489-065	VA22B8489-066	--------	--------	--------
						Result	Result	----	----	----
Metals										
molybdenum	7439-98-7	E440A	0.10	mg/kg		1.78	0.57	----	----	----
nickel	7440-02-0	E440A	0.50	mg/kg		24.9	29.1	----	----	----
phosphorus	7723-14-0	E440A	50	mg/kg		1580	1240	----	----	----
potassium	7440-09-7	E440A	100	mg/kg		1260	1040	----	----	----
selenium	7782-49-2	E440A	0.10	mg/kg		1.03	0.45	----	----	----
silver	7440-22-4	E440A	0.050	mg/kg		0.314	0.105	----	----	----
sodium	7440-23-5	E440A	50	mg/kg		360	244	----	----	----
strontium	7440-24-6	E440A	0.10	mg/kg		149	67.7	----	----	----
thallium	7440-28-0	E440A	0.050	mg/kg		0.109	0.090	----	----	----
tin	7440-31-5	E440A	0.20	mg/kg		0.69	0.45	----	----	----
titanium	7440-32-6	E440A	1.0	mg/kg		953	683	----	----	----
uranium	7440-61-1	E440A	0.050	mg/kg		0.960	0.919	----	----	----
vanadium	7440-62-2	E440A	0.20	mg/kg		140	70.0	----	----	----
zinc	7440-66-6	E440A	1.0	mg/kg		86.9	65.0	----	----	----
zirconium	7440-67-7	E440A	1.0	mg/kg		2.9	1.8	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA22B8489**	Page	: 1 of 21
Client	: **Mount Polley Mining Corporation**	Laboratory	: Vancouver - Environmental
Contact	: Kala Ivens	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: 250-790-2215 Ext 2112	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 10-Aug-2022 11:00
PO	: 5590008044 Q2 2022	Issue Date	: 31-Aug-2022 14:50
C-O-C number	: ----		
Sampler	: KBA		
Site	: ----		
Quote number	: VA22-MPMC100-005 - Minnow Environmental-Sediment Quality		
No. of samples received	: 66		
No. of samples analysed	: 22		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- Duplicate outliers occur - please see following pages for full details.
- Laboratory Control Sample (LCS) outliers occur - please see following pages for full details.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **Soil/Solid**

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment
Duplicate (DUP) RPDs								
Metals	VA22B8489-065	HAC-D_SE-5X_2022-08	antimony	7440-36-0	E440A	40.3 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22B8489-065	HAC-D_SE-5X_2022-08	lead	7439-92-1	E440A	52.9 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.

Result Qualifiers

Qualifier	*Description*
DUP-H	*Duplicate results outside ALS DQO, due to sample heterogeneity.*

Laboratory Control Sample (LCS) Recoveries								
Metals	QC-MRG2-604968002	----	zirconium	7440-67-7	E440A	123 % MES	80.0-120%	Recovery greater than upper control limit

Result Qualifiers

Qualifier	*Description*
MES	*Data Quality Objective was marginally exceeded (by < 10% absolute) for < 10% of analytes in a Multi-Element Scan / Multi-Parameter Scan (considered acceptable as per OMOE & CCME).*

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Total Nitrogen by Combustion										
Glass soil jar/Teflon lined cap										
EDC-U_SE-1_2022-08	E366	07-Aug-2022	29-Aug-2022	----	----		29-Aug-2022	28 days	23 days	✓
Anions and Nutrients : Total Nitrogen by Combustion										
Glass soil jar/Teflon lined cap										
EDC-U_SE-2_2022-08	E366	07-Aug-2022	29-Aug-2022	----	----		29-Aug-2022	28 days	23 days	✓
Anions and Nutrients : Total Nitrogen by Combustion										
Glass soil jar/Teflon lined cap										
EDC-U_SE-3_2022-08	E366	07-Aug-2022	29-Aug-2022	----	----		29-Aug-2022	28 days	23 days	✓
Anions and Nutrients : Total Nitrogen by Combustion										
Glass soil jar/Teflon lined cap										
EDC-U_SE-4_2022-08	E366	07-Aug-2022	29-Aug-2022	----	----		29-Aug-2022	28 days	23 days	✓
Anions and Nutrients : Total Nitrogen by Combustion										
Glass soil jar/Teflon lined cap										
EDC-U_SE-5_2022-08	E366	07-Aug-2022	29-Aug-2022	----	----		29-Aug-2022	28 days	23 days	✓
Anions and Nutrients : Total Nitrogen by Combustion										
Glass soil jar/Teflon lined cap										
HAC-U_SE-1_2022-08	E366	06-Aug-2022	29-Aug-2022	----	----		29-Aug-2022	28 days	24 days	✓
Anions and Nutrients : Total Nitrogen by Combustion										
Glass soil jar/Teflon lined cap										
HAC-U_SE-2_2022-08	E366	06-Aug-2022	29-Aug-2022	----	----		29-Aug-2022	28 days	24 days	✓

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Total Nitrogen by Combustion										
Glass soil jar/Teflon lined cap										
HAC-U_SE-3_2022-08	E366	06-Aug-2022	29-Aug-2022	----	----		29-Aug-2022	28 days	24 days	✓
Anions and Nutrients : Total Nitrogen by Combustion										
Glass soil jar/Teflon lined cap										
HAC-U_SE-4_2022-08	E366	06-Aug-2022	29-Aug-2022	----	----		29-Aug-2022	28 days	24 days	✓
Anions and Nutrients : Total Nitrogen by Combustion										
Glass soil jar/Teflon lined cap										
HAC-U_SE-5_2022-08	E366	06-Aug-2022	29-Aug-2022	----	----		29-Aug-2022	28 days	24 days	✓
Anions and Nutrients : Total Nitrogen by Combustion										
Glass soil jar/Teflon lined cap										
HAC-D_SE-1_2022-08	E366	05-Aug-2022	29-Aug-2022	----	----		29-Aug-2022	28 days	25 days	✓
Anions and Nutrients : Total Nitrogen by Combustion										
Glass soil jar/Teflon lined cap										
HAC-D_SE-2_2022-08	E366	05-Aug-2022	29-Aug-2022	----	----		29-Aug-2022	28 days	25 days	✓
Anions and Nutrients : Total Nitrogen by Combustion										
Glass soil jar/Teflon lined cap										
HAC-D_SE-3_2022-08	E366	05-Aug-2022	29-Aug-2022	----	----		29-Aug-2022	28 days	25 days	✓
Anions and Nutrients : Total Nitrogen by Combustion										
Glass soil jar/Teflon lined cap										
HAC-D_SE-4_2022-08	E366	05-Aug-2022	29-Aug-2022	----	----		29-Aug-2022	28 days	25 days	✓
Anions and Nutrients : Total Nitrogen by Combustion										
Glass soil jar/Teflon lined cap										
HAC-D_SE-5_2022-08	E366	05-Aug-2022	29-Aug-2022	----	----		29-Aug-2022	28 days	25 days	✓
Anions and Nutrients : Total Nitrogen by Combustion										
Glass soil jar/Teflon lined cap										
HAC-D_SE-5X_2022-08	E366	05-Aug-2022	29-Aug-2022	----	----		29-Aug-2022	28 days	25 days	✓

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Total Nitrogen by Combustion										
Glass soil jar/Teflon lined cap										
EDC-D_SE-1_2022-08	E366	03-Aug-2022	29-Aug-2022	----	----		29-Aug-2022	28 days	27 days	✓
Anions and Nutrients : Total Nitrogen by Combustion										
Glass soil jar/Teflon lined cap										
EDC-D_SE-2_2022-08	E366	03-Aug-2022	29-Aug-2022	----	----		29-Aug-2022	28 days	27 days	✓
Anions and Nutrients : Total Nitrogen by Combustion										
Glass soil jar/Teflon lined cap										
EDC-D_SE-3_2022-08	E366	03-Aug-2022	29-Aug-2022	----	----		29-Aug-2022	28 days	27 days	✓
Anions and Nutrients : Total Nitrogen by Combustion										
Glass soil jar/Teflon lined cap										
EDC-D_SE-4_2022-08	E366	03-Aug-2022	29-Aug-2022	----	----		29-Aug-2022	28 days	27 days	✓
Anions and Nutrients : Total Nitrogen by Combustion										
Glass soil jar/Teflon lined cap										
EDC-D_SE-4X_2022-08	E366	03-Aug-2022	29-Aug-2022	----	----		29-Aug-2022	28 days	27 days	✓
Anions and Nutrients : Total Nitrogen by Combustion										
Glass soil jar/Teflon lined cap										
EDC-D_SE-5_2022-08	E366	03-Aug-2022	29-Aug-2022	----	----		29-Aug-2022	28 days	27 days	✓
Inorganic Parameters : Total Sulfur by high temperature combustion										
Glass soil jar/Teflon lined cap										
EDC-U_SE-1_2022-08	E399	07-Aug-2022	29-Aug-2022	----	----		29-Aug-2022	365 days	23 days	✓
Inorganic Parameters : Total Sulfur by high temperature combustion										
Glass soil jar/Teflon lined cap										
EDC-U_SE-2_2022-08	E399	07-Aug-2022	29-Aug-2022	----	----		29-Aug-2022	365 days	23 days	✓
Inorganic Parameters : Total Sulfur by high temperature combustion										
Glass soil jar/Teflon lined cap										
EDC-U_SE-3_2022-08	E399	07-Aug-2022	29-Aug-2022	----	----		29-Aug-2022	365 days	23 days	✓

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Inorganic Parameters : Total Sulfur by high temperature combustion										
Glass soil jar/Teflon lined cap										
EDC-U_SE-4_2022-08	E399	07-Aug-2022	29-Aug-2022	----	----		29-Aug-2022	365 days	23 days	✓
Inorganic Parameters : Total Sulfur by high temperature combustion										
Glass soil jar/Teflon lined cap										
EDC-U_SE-5_2022-08	E399	07-Aug-2022	29-Aug-2022	----	----		29-Aug-2022	365 days	23 days	✓
Inorganic Parameters : Total Sulfur by high temperature combustion										
Glass soil jar/Teflon lined cap										
HAC-U_SE-1_2022-08	E399	06-Aug-2022	29-Aug-2022	----	----		29-Aug-2022	365 days	24 days	✓
Inorganic Parameters : Total Sulfur by high temperature combustion										
Glass soil jar/Teflon lined cap										
HAC-U_SE-2_2022-08	E399	06-Aug-2022	29-Aug-2022	----	----		29-Aug-2022	365 days	24 days	✓
Inorganic Parameters : Total Sulfur by high temperature combustion										
Glass soil jar/Teflon lined cap										
HAC-U_SE-3_2022-08	E399	06-Aug-2022	29-Aug-2022	----	----		29-Aug-2022	365 days	24 days	✓
Inorganic Parameters : Total Sulfur by high temperature combustion										
Glass soil jar/Teflon lined cap										
HAC-U_SE-4_2022-08	E399	06-Aug-2022	29-Aug-2022	----	----		29-Aug-2022	365 days	24 days	✓
Inorganic Parameters : Total Sulfur by high temperature combustion										
Glass soil jar/Teflon lined cap										
HAC-U_SE-5_2022-08	E399	06-Aug-2022	29-Aug-2022	----	----		29-Aug-2022	365 days	24 days	✓
Inorganic Parameters : Total Sulfur by high temperature combustion										
Glass soil jar/Teflon lined cap										
HAC-D_SE-1_2022-08	E399	05-Aug-2022	29-Aug-2022	----	----		29-Aug-2022	365 days	25 days	✓
Inorganic Parameters : Total Sulfur by high temperature combustion										
Glass soil jar/Teflon lined cap										
HAC-D_SE-2_2022-08	E399	05-Aug-2022	29-Aug-2022	----	----		29-Aug-2022	365 days	25 days	✓

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Inorganic Parameters : Total Sulfur by high temperature combustion										
Glass soil jar/Teflon lined cap										
HAC-D_SE-3_2022-08	E399	05-Aug-2022	29-Aug-2022	----	----		29-Aug-2022	365 days	25 days	✓
Inorganic Parameters : Total Sulfur by high temperature combustion										
Glass soil jar/Teflon lined cap										
HAC-D_SE-4_2022-08	E399	05-Aug-2022	29-Aug-2022	----	----		29-Aug-2022	365 days	25 days	✓
Inorganic Parameters : Total Sulfur by high temperature combustion										
Glass soil jar/Teflon lined cap										
HAC-D_SE-5_2022-08	E399	05-Aug-2022	29-Aug-2022	----	----		29-Aug-2022	365 days	25 days	✓
Inorganic Parameters : Total Sulfur by high temperature combustion										
Glass soil jar/Teflon lined cap										
HAC-D_SE-5X_2022-08	E399	05-Aug-2022	29-Aug-2022	----	----		29-Aug-2022	365 days	25 days	✓
Inorganic Parameters : Total Sulfur by high temperature combustion										
Glass soil jar/Teflon lined cap										
EDC-D_SE-1_2022-08	E399	03-Aug-2022	29-Aug-2022	----	----		29-Aug-2022	365 days	27 days	✓
Inorganic Parameters : Total Sulfur by high temperature combustion										
Glass soil jar/Teflon lined cap										
EDC-D_SE-2_2022-08	E399	03-Aug-2022	29-Aug-2022	----	----		29-Aug-2022	365 days	27 days	✓
Inorganic Parameters : Total Sulfur by high temperature combustion										
Glass soil jar/Teflon lined cap										
EDC-D_SE-3_2022-08	E399	03-Aug-2022	29-Aug-2022	----	----		29-Aug-2022	365 days	27 days	✓
Inorganic Parameters : Total Sulfur by high temperature combustion										
Glass soil jar/Teflon lined cap										
EDC-D_SE-4_2022-08	E399	03-Aug-2022	29-Aug-2022	----	----		29-Aug-2022	365 days	27 days	✓
Inorganic Parameters : Total Sulfur by high temperature combustion										
Glass soil jar/Teflon lined cap										
EDC-D_SE-4X_2022-08	E399	03-Aug-2022	29-Aug-2022	----	----		29-Aug-2022	365 days	27 days	✓

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Inorganic Parameters : Total Sulfur by high temperature combustion										
Glass soil jar/Teflon lined cap EDC-D_SE-5_2022-08	E399	03-Aug-2022	29-Aug-2022	----	----		29-Aug-2022	365 days	27 days	✓
Metals : Mercury in Sediment by CVAAS (<63 µm)										
Glass soil jar/Teflon lined cap EDC-U_SE-1_2022-08	E510A	07-Aug-2022	18-Aug-2022	----	----		19-Aug-2022	28 days	12 days	✓
Metals : Mercury in Sediment by CVAAS (<63 µm)										
Glass soil jar/Teflon lined cap EDC-U_SE-2_2022-08	E510A	07-Aug-2022	18-Aug-2022	----	----		19-Aug-2022	28 days	12 days	✓
Metals : Mercury in Sediment by CVAAS (<63 µm)										
Glass soil jar/Teflon lined cap EDC-U_SE-3_2022-08	E510A	07-Aug-2022	18-Aug-2022	----	----		19-Aug-2022	28 days	12 days	✓
Metals : Mercury in Sediment by CVAAS (<63 µm)										
Glass soil jar/Teflon lined cap EDC-U_SE-4_2022-08	E510A	07-Aug-2022	18-Aug-2022	----	----		19-Aug-2022	28 days	12 days	✓
Metals : Mercury in Sediment by CVAAS (<63 µm)										
Glass soil jar/Teflon lined cap EDC-U_SE-5_2022-08	E510A	07-Aug-2022	18-Aug-2022	----	----		19-Aug-2022	28 days	12 days	✓
Metals : Mercury in Sediment by CVAAS (<63 µm)										
Glass soil jar/Teflon lined cap HAC-D_SE-5X_2022-08	E510A	05-Aug-2022	17-Aug-2022	----	----		18-Aug-2022	28 days	13 days	✓
Metals : Mercury in Sediment by CVAAS (<63 µm)										
Glass soil jar/Teflon lined cap HAC-U_SE-1_2022-08	E510A	06-Aug-2022	18-Aug-2022	----	----		19-Aug-2022	28 days	13 days	✓
Metals : Mercury in Sediment by CVAAS (<63 µm)										
Glass soil jar/Teflon lined cap HAC-U_SE-2_2022-08	E510A	06-Aug-2022	18-Aug-2022	----	----		19-Aug-2022	28 days	13 days	✓

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Sediment by CVAAS (<63 µm)										
Glass soil jar/Teflon lined cap										
HAC-U_SE-3_2022-08	E510A	06-Aug-2022	18-Aug-2022	----	----		19-Aug-2022	28 days	13 days	✓
Metals : Mercury in Sediment by CVAAS (<63 µm)										
Glass soil jar/Teflon lined cap										
HAC-U_SE-4_2022-08	E510A	06-Aug-2022	18-Aug-2022	----	----		19-Aug-2022	28 days	13 days	✓
Metals : Mercury in Sediment by CVAAS (<63 µm)										
Glass soil jar/Teflon lined cap										
HAC-U_SE-5_2022-08	E510A	06-Aug-2022	18-Aug-2022	----	----		19-Aug-2022	28 days	13 days	✓
Metals : Mercury in Sediment by CVAAS (<63 µm)										
Glass soil jar/Teflon lined cap										
HAC-D_SE-1_2022-08	E510A	05-Aug-2022	18-Aug-2022	----	----		19-Aug-2022	28 days	14 days	✓
Metals : Mercury in Sediment by CVAAS (<63 µm)										
Glass soil jar/Teflon lined cap										
HAC-D_SE-2_2022-08	E510A	05-Aug-2022	18-Aug-2022	----	----		19-Aug-2022	28 days	14 days	✓
Metals : Mercury in Sediment by CVAAS (<63 µm)										
Glass soil jar/Teflon lined cap										
HAC-D_SE-3_2022-08	E510A	05-Aug-2022	18-Aug-2022	----	----		19-Aug-2022	28 days	14 days	✓
Metals : Mercury in Sediment by CVAAS (<63 µm)										
Glass soil jar/Teflon lined cap										
HAC-D_SE-4_2022-08	E510A	05-Aug-2022	18-Aug-2022	----	----		19-Aug-2022	28 days	14 days	✓
Metals : Mercury in Sediment by CVAAS (<63 µm)										
Glass soil jar/Teflon lined cap										
HAC-D_SE-5_2022-08	E510A	05-Aug-2022	18-Aug-2022	----	----		19-Aug-2022	28 days	14 days	✓
Metals : Mercury in Sediment by CVAAS (<63 µm)										
Glass soil jar/Teflon lined cap										
EDC-D_SE-4X_2022-08	E510A	03-Aug-2022	17-Aug-2022	----	----		18-Aug-2022	28 days	15 days	✓

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Sediment by CVAAS (<63 µm)										
Glass soil jar/Teflon lined cap										
EDC-D_SE-1_2022-08	E510A	03-Aug-2022	18-Aug-2022	----	----		19-Aug-2022	28 days	16 days	✓
Metals : Mercury in Sediment by CVAAS (<63 µm)										
Glass soil jar/Teflon lined cap										
EDC-D_SE-2_2022-08	E510A	03-Aug-2022	18-Aug-2022	----	----		19-Aug-2022	28 days	16 days	✓
Metals : Mercury in Sediment by CVAAS (<63 µm)										
Glass soil jar/Teflon lined cap										
EDC-D_SE-3_2022-08	E510A	03-Aug-2022	18-Aug-2022	----	----		19-Aug-2022	28 days	16 days	✓
Metals : Mercury in Sediment by CVAAS (<63 µm)										
Glass soil jar/Teflon lined cap										
EDC-D_SE-4_2022-08	E510A	03-Aug-2022	18-Aug-2022	----	----		19-Aug-2022	28 days	16 days	✓
Metals : Mercury in Sediment by CVAAS (<63 µm)										
Glass soil jar/Teflon lined cap										
EDC-D_SE-5_2022-08	E510A	03-Aug-2022	18-Aug-2022	----	----		19-Aug-2022	28 days	16 days	✓
Metals : Metals in Sediment by CRC ICPMS (<63 µm)										
Glass soil jar/Teflon lined cap										
EDC-U_SE-1_2022-08	E440A	07-Aug-2022	18-Aug-2022	----	----		18-Aug-2022	180 days	11 days	✓
Metals : Metals in Sediment by CRC ICPMS (<63 µm)										
Glass soil jar/Teflon lined cap										
EDC-U_SE-2_2022-08	E440A	07-Aug-2022	18-Aug-2022	----	----		18-Aug-2022	180 days	11 days	✓
Metals : Metals in Sediment by CRC ICPMS (<63 µm)										
Glass soil jar/Teflon lined cap										
EDC-U_SE-3_2022-08	E440A	07-Aug-2022	18-Aug-2022	----	----		18-Aug-2022	180 days	11 days	✓
Metals : Metals in Sediment by CRC ICPMS (<63 µm)										
Glass soil jar/Teflon lined cap										
EDC-U_SE-4_2022-08	E440A	07-Aug-2022	18-Aug-2022	----	----		18-Aug-2022	180 days	11 days	✓

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Metals in Sediment by CRC ICPMS (<63 µm)										
Glass soil jar/Teflon lined cap										
EDC-U_SE-5_2022-08	E440A	07-Aug-2022	18-Aug-2022	----	----		18-Aug-2022	180 days	11 days	✓
Metals : Metals in Sediment by CRC ICPMS (<63 µm)										
Glass soil jar/Teflon lined cap										
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Metals : Metals in Sediment by CRC ICPMS (<63 µm)										
Glass soil jar/Teflon lined cap										
HAC-U_SE-2_2022-08	E440A	06-Aug-2022	18-Aug-2022	----	----		18-Aug-2022	180 days	12 days	✓
Metals : Metals in Sediment by CRC ICPMS (<63 µm)										
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HAC-D_SE-3_2022-08	E440A	05-Aug-2022	18-Aug-2022	----	----		18-Aug-2022	180 days	13 days	✓

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Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Metals in Sediment by CRC ICPMS (<63 µm)										
Glass soil jar/Teflon lined cap										
HAC-D_SE-4_2022-08	E440A	05-Aug-2022	18-Aug-2022	----	----		18-Aug-2022	180 days	13 days	✓
Metals : Metals in Sediment by CRC ICPMS (<63 µm)										
Glass soil jar/Teflon lined cap										
HAC-D_SE-5_2022-08	E440A	05-Aug-2022	18-Aug-2022	----	----		18-Aug-2022	180 days	13 days	✓
Metals : Metals in Sediment by CRC ICPMS (<63 µm)										
Glass soil jar/Teflon lined cap										
HAC-D_SE-5X_2022-08	E440A	05-Aug-2022	17-Aug-2022	----	----		17-Aug-2022	180 days	13 days	✓
Metals : Metals in Sediment by CRC ICPMS (<63 µm)										
Glass soil jar/Teflon lined cap										
EDC-D_SE-1_2022-08	E440A	03-Aug-2022	18-Aug-2022	----	----		18-Aug-2022	180 days	15 days	✓
Metals : Metals in Sediment by CRC ICPMS (<63 µm)										
Glass soil jar/Teflon lined cap										
EDC-D_SE-2_2022-08	E440A	03-Aug-2022	18-Aug-2022	----	----		18-Aug-2022	180 days	15 days	✓
Metals : Metals in Sediment by CRC ICPMS (<63 µm)										
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Metals : Metals in Sediment by CRC ICPMS (<63 µm)										
Glass soil jar/Teflon lined cap										
EDC-D_SE-4X_2022-08	E440A	03-Aug-2022	17-Aug-2022	----	----		17-Aug-2022	180 days	15 days	✓
Metals : Metals in Sediment by CRC ICPMS (<63 µm)										
Glass soil jar/Teflon lined cap										
EDC-D_SE-5_2022-08	E440A	03-Aug-2022	18-Aug-2022	----	----		18-Aug-2022	180 days	15 days	✓

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap										
EDC-D_SE-1_2022-08	E144	03-Aug-2022	----	----	----		15-Aug-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap										
EDC-D_SE-2_2022-08	E144	03-Aug-2022	----	----	----		15-Aug-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap										
EDC-D_SE-3_2022-08	E144	03-Aug-2022	----	----	----		15-Aug-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap										
EDC-D_SE-4_2022-08	E144	03-Aug-2022	----	----	----		15-Aug-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap										
EDC-D_SE-4X_2022-08	E144	03-Aug-2022	----	----	----		15-Aug-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap										
EDC-D_SE-5_2022-08	E144	03-Aug-2022	----	----	----		15-Aug-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap										
EDC-U_SE-1_2022-08	E144	07-Aug-2022	----	----	----		15-Aug-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap										
EDC-U_SE-2_2022-08	E144	07-Aug-2022	----	----	----		15-Aug-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap										
EDC-U_SE-3_2022-08	E144	07-Aug-2022	----	----	----		15-Aug-2022	----	----	

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap										
EDC-U_SE-4_2022-08	E144	07-Aug-2022	----	----	----		15-Aug-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap										
EDC-U_SE-5_2022-08	E144	07-Aug-2022	----	----	----		15-Aug-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap										
HAC-D_SE-1_2022-08	E144	05-Aug-2022	----	----	----		15-Aug-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap										
HAC-D_SE-2_2022-08	E144	05-Aug-2022	----	----	----		15-Aug-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap										
HAC-D_SE-3_2022-08	E144	05-Aug-2022	----	----	----		15-Aug-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap										
HAC-D_SE-4_2022-08	E144	05-Aug-2022	----	----	----		15-Aug-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap										
HAC-D_SE-5_2022-08	E144	05-Aug-2022	----	----	----		15-Aug-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap										
HAC-D_SE-5X_2022-08	E144	05-Aug-2022	----	----	----		15-Aug-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap										
HAC-U_SE-1_2022-08	E144	06-Aug-2022	----	----	----		15-Aug-2022	----	----	

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap										
HAC-U_SE-2_2022-08	E144	06-Aug-2022	----	----	----		15-Aug-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap										
HAC-U_SE-3_2022-08	E144	06-Aug-2022	----	----	----		15-Aug-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap										
HAC-U_SE-4_2022-08	E144	06-Aug-2022	----	----	----		15-Aug-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap										
HAC-U_SE-5_2022-08	E144	06-Aug-2022	----	----	----		15-Aug-2022	----	----	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
Glass soil jar/Teflon lined cap										
EDC-U_SE-1_2022-08	E108	07-Aug-2022	17-Aug-2022	----	----		17-Aug-2022	30 days	11 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
Glass soil jar/Teflon lined cap										
EDC-U_SE-2_2022-08	E108	07-Aug-2022	17-Aug-2022	----	----		17-Aug-2022	30 days	11 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
Glass soil jar/Teflon lined cap										
EDC-U_SE-3_2022-08	E108	07-Aug-2022	17-Aug-2022	----	----		17-Aug-2022	30 days	11 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
Glass soil jar/Teflon lined cap										
EDC-U_SE-4_2022-08	E108	07-Aug-2022	17-Aug-2022	----	----		17-Aug-2022	30 days	11 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
Glass soil jar/Teflon lined cap										
EDC-U_SE-5_2022-08	E108	07-Aug-2022	17-Aug-2022	----	----		17-Aug-2022	30 days	11 days	✓

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			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
Glass soil jar/Teflon lined cap										
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Glass soil jar/Teflon lined cap										
HAC-U_SE-2_2022-08	E108	06-Aug-2022	17-Aug-2022	----	----		17-Aug-2022	30 days	12 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
Glass soil jar/Teflon lined cap										
HAC-U_SE-3_2022-08	E108	06-Aug-2022	17-Aug-2022	----	----		17-Aug-2022	30 days	12 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
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HAC-U_SE-4_2022-08	E108	06-Aug-2022	17-Aug-2022	----	----		17-Aug-2022	30 days	12 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
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Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
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Glass soil jar/Teflon lined cap										
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HAC-D_SE-4_2022-08	E108	05-Aug-2022	17-Aug-2022	----	----		17-Aug-2022	30 days	13 days	✓

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			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
Glass soil jar/Teflon lined cap										
HAC-D_SE-5_2022-08	E108	05-Aug-2022	17-Aug-2022	----	----		17-Aug-2022	30 days	13 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
Glass soil jar/Teflon lined cap										
HAC-D_SE-5X_2022-08	E108	05-Aug-2022	17-Aug-2022	----	----		17-Aug-2022	30 days	13 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
Glass soil jar/Teflon lined cap										
EDC-D_SE-1_2022-08	E108	03-Aug-2022	17-Aug-2022	----	----		17-Aug-2022	30 days	15 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
Glass soil jar/Teflon lined cap										
EDC-D_SE-2_2022-08	E108	03-Aug-2022	17-Aug-2022	----	----		17-Aug-2022	30 days	15 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
Glass soil jar/Teflon lined cap										
EDC-D_SE-3_2022-08	E108	03-Aug-2022	17-Aug-2022	----	----		17-Aug-2022	30 days	15 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
Glass soil jar/Teflon lined cap										
EDC-D_SE-4_2022-08	E108	03-Aug-2022	17-Aug-2022	----	----		17-Aug-2022	30 days	15 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
Glass soil jar/Teflon lined cap										
EDC-D_SE-4X_2022-08	E108	03-Aug-2022	17-Aug-2022	----	----		17-Aug-2022	30 days	15 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
Glass soil jar/Teflon lined cap										
EDC-D_SE-5_2022-08	E108	03-Aug-2022	17-Aug-2022	----	----		17-Aug-2022	30 days	15 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Soil/Solid**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Mercury in Sediment by CVAAS (<63 µm)	E510A	604968	2	22	9.0	5.0	✓
Metals in Sediment by CRC ICPMS (<63 µm)	E440A	604969	2	22	9.0	5.0	✓
Moisture Content by Gravimetry	E144	602878	2	38	5.2	5.0	✓
pH by Meter (1:2 Soil:Water Extraction)	E108	604970	2	22	9.0	5.0	✓
Total Nitrogen by Combustion	E366	623543	2	22	9.0	5.0	✓
Total Sulfur by high temperature combustion	E399	623544	2	22	9.0	5.0	✓
Laboratory Control Samples (LCS)							
Mercury in Sediment by CVAAS (<63 µm)	E510A	604968	4	22	18.1	10.0	✓
Metals in Sediment by CRC ICPMS (<63 µm)	E440A	604969	4	22	18.1	10.0	✓
Moisture Content by Gravimetry	E144	602878	2	38	5.2	5.0	✓
pH by Meter (1:2 Soil:Water Extraction)	E108	604970	2	22	9.0	5.0	✓
Total Nitrogen by Combustion	E366	623543	4	22	18.1	10.0	✓
Total Sulfur by high temperature combustion	E399	623544	4	22	18.1	10.0	✓
Method Blanks (MB)							
Mercury in Sediment by CVAAS (<63 µm)	E510A	604968	2	22	9.0	5.0	✓
Metals in Sediment by CRC ICPMS (<63 µm)	E440A	604969	2	22	9.0	5.0	✓
Moisture Content by Gravimetry	E144	602878	2	38	5.2	5.0	✓
Total Nitrogen by Combustion	E366	623543	2	22	9.0	5.0	✓
Total Sulfur by high temperature combustion	E399	623544	2	22	9.0	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
pH by Meter (1:2 Soil:Water Extraction)	E108 Vancouver - Environmental	Soil/Solid	BC Lab Manual	pH is determined by potentiometric measurement with a pH electrode at ambient laboratory temperature (normally 20 ± 5°C), and is carried out in accordance with procedures described in the BC Lab Manual (prescriptive method). The procedure involves mixing the dried (at <60 ºC) and sieved (10mesh/2mm) sample with ultra pure water at a 1:2 ratio of sediment to water. The pH is then measured by a standard pH probe.
Moisture Content by Gravimetry	E144 Vancouver - Environmental	Soil/Solid	CCME PHC in Soil - Tier 1	Moisture is measured gravimetrically by drying the sample at 105°C. Moisture content is calculated as the weight loss (due to water) divided by the wet weight of the sample, expressed as a percentage.
Total Nitrogen by Combustion	E366 Saskatoon - Environmental	Soil/Solid	CSSS (2008) 22.4	The sample is ignited in a combustion analyzer where nitrogen in the reduced nitrous oxide gas is determined using a thermal conductivity detector.
Total Sulfur by high temperature combustion	E399 Saskatoon - Environmental	Soil/Solid	ISO 15178:2000	Air-dried sample is ignited in a combustion analyzer where sulfur in the reduced SO_2 gas is determined using a thermal conductivity detector.
Metals in Sediment by CRC ICPMS (<63 µm)	E440A Vancouver - Environmental	Soil/Solid	EPA 6020B (mod)	Samples are sieved through a 63 um sieve, and digested with HNO_3 and HCl. This method is intended to liberate metals that may be environmentally available. Silicate minerals are not solubilized. Dependent on sample matrix, some metals may be only partially recovered, including Al, Ba, Be, Cr, Sr, Ti, Tl, V, W, and Zr. Volatile forms of sulfur (including sulfide) may not be captured, as they may be lost during sampling, storage, or digestion. Elemental Sulfur may be poorly recovered by this method. Analysis is by Collision/Reaction Cell ICPMS.
Mercury in Sediment by CVAAS (<63 µm)	E510A Vancouver - Environmental	Soil/Solid	EPA 200.2/1631 Appendix (mod)	Samples are sieved through a 63 µm sieve, and digested with HNO_3 and HCl, followed by CVAAS analysis.
Particle Size Analysis (Pipette) - MMER Classification	EC184E Saskatoon - Environmental	Soil/Solid	Metal Mining Technical Guidance for Environmental Effects Monitoring (2012)	The particle size determination is performed by various methods to generate a Grain Size curve. The data from the curve is then used to produce particle size ranges based on the Metal Mining Effluent Regulations (MMER) classification system for Environmental Effects Monitoring.
Total Organic Carbon (Calculated) in soil (<63 µm)	EC356A Saskatoon - Environmental	Soil/Solid	CSSS (2008) 21.2	Total Organic Carbon (TOC) is calculated by the difference between total carbon (TC) and total inorganic carbon (TIC) analyzed on material passing a 63 µm sieve.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Leach 1:2 Soil:Water for pH/EC	EP108 Vancouver - Environmental	Soil/Solid	BC WLAP METHOD: PH, ELECTROMETRIC, SOIL	The procedure involves mixing the dried (at <60°C) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water.
Digestion for Metals and Mercury (63 µm Sieve)	EP440A Vancouver - Environmental	Soil/Solid	EPA 200.2 (mod)	Samples are sieved through a 63 µm sieve, and digested with HNO3 and HCl. This method is intended to liberate metals that may be environmentally available.
Dry and Grind	EPP442 Saskatoon - Environmental	Soil/Solid	Soil Sampling and Methods of Analysis, Carter 2008	After removal of any coarse fragments and reservation of wet subsamples a portion of homogenized sample is set in a tray and dried at less than 60°C until dry. The sample is then particle size reduced with an automated crusher or mortar and pestle, typically to <2 mm. Further size reduction may be needed for particular tests.

QUALITY CONTROL REPORT

Work Order	: **VA22B8489**	Page	: 1 of 14
Client	: Mount Polley Mining Corporation	Laboratory	: Vancouver - Environmental
Contact	: Kala Ivens	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: 250-790-2215 Ext 2112	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 10-Aug-2022 11:00
PO	: 5590008044 Q2 2022	Date Analysis Commenced	: 15-Aug-2022
C-O-C number	: ----	Issue Date	: 31-Aug-2022 14:51
Sampler	: KBA		
Site	: ----		
Quote number	: VA22-MPMC100-005 - Minnow Environmental-Sediment Quality		
No. of samples received	: 66		
No. of samples analysed	: 22		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Reference Material (RM) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Hedy Lai	Team Leader - Inorganics	Saskatoon Inorganics, Saskatoon, Saskatchewan
Janice Leung	Supervisor - Organics Instrumentation	Vancouver Organics, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Vancouver Metals, Burnaby, British Columbia
Ophelia Chiu	Department Manager - Organics	Vancouver Organics, Burnaby, British Columbia
Owen Cheng		Vancouver Metals, Burnaby, British Columbia
Parnian Sane	Analyst	Vancouver Metals, Burnaby, British Columbia

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Physical Tests (QC Lot: 602878)											
VA22B7144-003	Anonymous	moisture	----	E144	0.25	%	48.5	48.3	0.358%	20%	----
Physical Tests (QC Lot: 602973)											
VA22B8489-049	HAC-U_SE-5_2022-08	moisture	----	E144	0.25	%	90.3	88.3	2.26%	20%	----
Physical Tests (QC Lot: 604817)											
VA22B8489-045	HAC-U_SE-1_2022-08	pH (1:2 soil:water)	----	E108	0.10	pH units	7.03	7.10	1.0%	5%	----
Physical Tests (QC Lot: 604970)											
VA22B8489-066	EDC-D_SE-4X_2022-08	pH (1:2 soil:water)	----	E108	0.10	pH units	7.47	7.44	0.4%	5%	----
Anions and Nutrients (QC Lot: 619438)											
VA22B8489-047	HAC-U_SE-3_2022-08	nitrogen, total	7727-37-9	E366	0.020	%	0.662	0.688	3.85%	20%	----
Anions and Nutrients (QC Lot: 623543)											
VA22B8489-065	HAC-D_SE-5X_2022-08	nitrogen, total	7727-37-9	E366	0.020	%	0.181	0.202	0.021	Diff <2x LOR	----
Inorganic Parameters (QC Lot: 619439)											
VA22B8489-047	HAC-U_SE-3_2022-08	sulfur, total	7704-34-9	E399	0.050	%	2520 mg/kg	0.202	0.050	Diff <2x LOR	----
Inorganic Parameters (QC Lot: 623544)											
VA22B8489-065	HAC-D_SE-5X_2022-08	sulfur, total	7704-34-9	E399	0.050	%	870 mg/kg	0.076	0.011	Diff <2x LOR	----
Metals (QC Lot: 604815)											
VA22B8489-045	HAC-U_SE-1_2022-08	mercury	7439-97-6	E510A	0.0050	mg/kg	0.108	0.0936	13.8%	40%	----
Metals (QC Lot: 604816)											
VA22B8489-045	HAC-U_SE-1_2022-08	aluminum	7429-90-5	E440A	50	mg/kg	15700	13600	14.7%	40%	----
		antimony	7440-36-0	E440A	0.10	mg/kg	0.28	0.19	0.09	Diff <2x LOR	----
		arsenic	7440-38-2	E440A	0.050	mg/kg	7.08	6.02	16.3%	30%	----
		barium	7440-39-3	E440A	0.50	mg/kg	266	234	12.8%	40%	----
		beryllium	7440-41-7	E440A	0.10	mg/kg	0.52	0.48	0.04	Diff <2x LOR	----
		bismuth	7440-69-9	E440A	0.10	mg/kg	<0.10	<0.10	0	Diff <2x LOR	----
		boron	7440-42-8	E440A	5.0	mg/kg	23.3	18.8	4.5	Diff <2x LOR	----
		cadmium	7440-43-9	E440A	0.020	mg/kg	0.395	0.326	19.1%	30%	----
		calcium	7440-70-2	E440A	50	mg/kg	23600	19900	16.9%	30%	----
		chromium	7440-47-3	E440A	0.50	mg/kg	26.7	22.8	15.6%	30%	----
		cobalt	7440-48-4	E440A	0.10	mg/kg	13.2	12.0	9.77%	30%	----
		copper	7440-50-8	E440A	0.50	mg/kg	393	336	15.5%	30%	----
		iron	7439-89-6	E440A	50	mg/kg	30700	27900	9.57%	30%	----

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Metals (QC Lot: 604816) - continued											
VA22B8489-045	HAC-U_SE-1_2022-08	lead	7439-92-1	E440A	0.10	mg/kg	5.50	5.05	8.64%	40%	----
		lithium	7439-93-2	E440A	2.0	mg/kg	12.4	11.2	1.1	Diff <2x LOR	----
		magnesium	7439-95-4	E440A	10	mg/kg	8460	7500	11.9%	30%	----
		manganese	7439-96-5	E440A	0.20	mg/kg	1860	1670	11.2%	30%	----
		molybdenum	7439-98-7	E440A	0.10	mg/kg	4.06	3.95	2.73%	40%	----
		nickel	7440-02-0	E440A	0.50	mg/kg	25.2	24.4	3.12%	30%	----
		phosphorus	7723-14-0	E440A	50	mg/kg	1650	1420	15.3%	30%	----
		potassium	7440-09-7	E440A	100	mg/kg	1420	1200	16.7%	40%	----
		selenium	7782-49-2	E440A	0.10	mg/kg	4.43	3.95	11.4%	30%	----
		silver	7440-22-4	E440A	0.050	mg/kg	0.185	0.181	0.003	Diff <2x LOR	----
		sodium	7440-23-5	E440A	50	mg/kg	496	435	13.1%	40%	----
		strontium	7440-24-6	E440A	0.10	mg/kg	147	132	10.7%	40%	----
		thallium	7440-28-0	E440A	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		tin	7440-31-5	E440A	0.20	mg/kg	0.74	0.58	0.15	Diff <2x LOR	----
		titanium	7440-32-6	E440A	1.0	mg/kg	707	484	37.4%	40%	----
		uranium	7440-61-1	E440A	0.050	mg/kg	0.798	0.686	15.0%	30%	----
		vanadium	7440-62-2	E440A	0.20	mg/kg	96.8	77.7	21.9%	30%	----
		zinc	7440-66-6	E440A	1.0	mg/kg	68.3	62.2	9.38%	30%	----
		zirconium	7440-67-7	E440A	1.0	mg/kg	1.9	1.6	0.2	Diff <2x LOR	----
Metals (QC Lot: 604968)											
VA22B8489-065	HAC-D_SE-5X_2022-08	mercury	7439-97-6	E510A	0.0050	mg/kg	0.106	0.101	4.93%	40%	----
Metals (QC Lot: 604969)											
VA22B8489-065	HAC-D_SE-5X_2022-08	aluminum	7429-90-5	E440A	50	mg/kg	15300	16300	6.50%	40%	----
		antimony	7440-36-0	E440A	0.10	mg/kg	0.82	0.55	40.3%	30%	DUP-H
		arsenic	7440-38-2	E440A	0.050	mg/kg	17.8	16.9	5.16%	30%	----
		barium	7440-39-3	E440A	0.50	mg/kg	229	242	5.47%	40%	----
		beryllium	7440-41-7	E440A	0.10	mg/kg	0.53	0.55	0.02	Diff <2x LOR	----
		bismuth	7440-69-9	E440A	0.10	mg/kg	0.12	0.12	0.0005	Diff <2x LOR	----
		boron	7440-42-8	E440A	5.0	mg/kg	10.8	10.4	0.3	Diff <2x LOR	----
		cadmium	7440-43-9	E440A	0.020	mg/kg	0.385	0.328	16.2%	30%	----
		calcium	7440-70-2	E440A	50	mg/kg	21900	21000	3.90%	30%	----
		chromium	7440-47-3	E440A	0.50	mg/kg	32.9	33.1	0.566%	30%	----
		cobalt	7440-48-4	E440A	0.10	mg/kg	14.7	15.3	3.77%	30%	----
		copper	7440-50-8	E440A	0.50	mg/kg	337	347	2.93%	30%	----
		iron	7439-89-6	E440A	50	mg/kg	44700	43400	2.93%	30%	----

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Metals (QC Lot: 604969) - continued											
VA22B8489-065	HAC-D_SE-5X_2022-08	lead	7439-92-1	E440A	0.10	mg/kg	18.9	11.0	52.9%	40%	DUP-H
		lithium	7439-93-2	E440A	2.0	mg/kg	14.8	15.4	3.61%	30%	----
		magnesium	7439-95-4	E440A	10	mg/kg	8020	8320	3.66%	30%	----
		manganese	7439-96-5	E440A	0.20	mg/kg	1050	1200	13.7%	30%	----
		molybdenum	7439-98-7	E440A	0.10	mg/kg	1.78	1.55	13.6%	40%	----
		nickel	7440-02-0	E440A	0.50	mg/kg	24.9	26.4	5.80%	30%	----
		phosphorus	7723-14-0	E440A	50	mg/kg	1580	1450	8.63%	30%	----
		potassium	7440-09-7	E440A	100	mg/kg	1260	1280	2.04%	40%	----
		selenium	7782-49-2	E440A	0.10	mg/kg	1.03	1.17	12.1%	30%	----
		silver	7440-22-4	E440A	0.050	mg/kg	0.314	0.223	34.0%	40%	----
		sodium	7440-23-5	E440A	50	mg/kg	360	362	0.411%	40%	----
		strontium	7440-24-6	E440A	0.10	mg/kg	149	134	9.99%	40%	----
		thallium	7440-28-0	E440A	0.050	mg/kg	0.109	0.111	0.001	Diff <2x LOR	----
		tin	7440-31-5	E440A	0.20	mg/kg	0.69	0.63	0.07	Diff <2x LOR	----
		titanium	7440-32-6	E440A	1.0	mg/kg	953	882	7.78%	40%	----
		uranium	7440-61-1	E440A	0.050	mg/kg	0.960	0.894	7.22%	30%	----
		vanadium	7440-62-2	E440A	0.20	mg/kg	140	130	7.67%	30%	----
		zinc	7440-66-6	E440A	1.0	mg/kg	86.9	80.8	7.35%	30%	----
		zirconium	7440-67-7	E440A	1.0	mg/kg	2.9	2.6	0.3	Diff <2x LOR	----

Qualifiers

Qualifier	*Description*
DUP-H	*Duplicate results outside ALS DQO, due to sample heterogeneity.*

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 602878)						
moisture	----	E144	0.25	%	<0.25	----
Physical Tests (QCLot: 602973)						
moisture	----	E144	0.25	%	<0.25	----
Anions and Nutrients (QCLot: 619438)						
nitrogen, total	7727-37-9	E366	0.02	%	<0.020	----
Anions and Nutrients (QCLot: 623543)						
nitrogen, total	7727-37-9	E366	0.02	%	<0.020	----
Inorganic Parameters (QCLot: 619439)						
sulfur, total	7704-34-9	E399	0.05	%	<0.050	----
Inorganic Parameters (QCLot: 623544)						
sulfur, total	7704-34-9	E399	0.05	%	<0.050	----
Metals (QCLot: 604815)						
mercury	7439-97-6	E510A	0.005	mg/kg	<0.0050	----
Metals (QCLot: 604816)						
aluminum	7429-90-5	E440A	50	mg/kg	<50	----
antimony	7440-36-0	E440A	0.1	mg/kg	<0.10	----
arsenic	7440-38-2	E440A	0.05	mg/kg	<0.050	----
barium	7440-39-3	E440A	0.5	mg/kg	<0.50	----
beryllium	7440-41-7	E440A	0.1	mg/kg	<0.10	----
bismuth	7440-69-9	E440A	0.1	mg/kg	<0.10	----
boron	7440-42-8	E440A	5	mg/kg	<5.0	----
cadmium	7440-43-9	E440A	0.02	mg/kg	<0.020	----
calcium	7440-70-2	E440A	50	mg/kg	<50	----
chromium	7440-47-3	E440A	0.5	mg/kg	<0.50	----
cobalt	7440-48-4	E440A	0.1	mg/kg	<0.10	----
copper	7440-50-8	E440A	0.5	mg/kg	<0.50	----
iron	7439-89-6	E440A	50	mg/kg	<50	----
lead	7439-92-1	E440A	0.1	mg/kg	<0.10	----
lithium	7439-93-2	E440A	2	mg/kg	<2.0	----
magnesium	7439-95-4	E440A	10	mg/kg	<10	----
manganese	7439-96-5	E440A	0.2	mg/kg	<0.20	----
molybdenum	7439-98-7	E440A	0.1	mg/kg	<0.10	----
nickel	7440-02-0	E440A	0.5	mg/kg	<0.50	----

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 604816) - continued						
phosphorus	7723-14-0	E440A	50	mg/kg	<50	----
potassium	7440-09-7	E440A	100	mg/kg	<100	----
selenium	7782-49-2	E440A	0.1	mg/kg	<0.10	----
silver	7440-22-4	E440A	0.05	mg/kg	<0.050	----
sodium	7440-23-5	E440A	50	mg/kg	<50	----
strontium	7440-24-6	E440A	0.1	mg/kg	<0.10	----
thallium	7440-28-0	E440A	0.05	mg/kg	<0.050	----
tin	7440-31-5	E440A	0.2	mg/kg	<0.20	----
titanium	7440-32-6	E440A	1	mg/kg	<1.0	----
uranium	7440-61-1	E440A	0.05	mg/kg	<0.050	----
vanadium	7440-62-2	E440A	0.2	mg/kg	<0.20	----
zinc	7440-66-6	E440A	1	mg/kg	<1.0	----
zirconium	7440-67-7	E440A	1	mg/kg	<1.0	----
Metals (QCLot: 604968)						
mercury	7439-97-6	E510A	0.005	mg/kg	<0.0050	----
Metals (QCLot: 604969)						
aluminum	7429-90-5	E440A	50	mg/kg	<50	----
antimony	7440-36-0	E440A	0.1	mg/kg	<0.10	----
arsenic	7440-38-2	E440A	0.05	mg/kg	<0.050	----
barium	7440-39-3	E440A	0.5	mg/kg	<0.50	----
beryllium	7440-41-7	E440A	0.1	mg/kg	<0.10	----
bismuth	7440-69-9	E440A	0.1	mg/kg	<0.10	----
boron	7440-42-8	E440A	5	mg/kg	<5.0	----
cadmium	7440-43-9	E440A	0.02	mg/kg	<0.020	----
calcium	7440-70-2	E440A	50	mg/kg	<50	----
chromium	7440-47-3	E440A	0.5	mg/kg	<0.50	----
cobalt	7440-48-4	E440A	0.1	mg/kg	<0.10	----
copper	7440-50-8	E440A	0.5	mg/kg	<0.50	----
iron	7439-89-6	E440A	50	mg/kg	<50	----
lead	7439-92-1	E440A	0.1	mg/kg	<0.10	----
lithium	7439-93-2	E440A	2	mg/kg	<2.0	----
magnesium	7439-95-4	E440A	10	mg/kg	<10	----
manganese	7439-96-5	E440A	0.2	mg/kg	<0.20	----
molybdenum	7439-98-7	E440A	0.1	mg/kg	<0.10	----
nickel	7440-02-0	E440A	0.5	mg/kg	<0.50	----
phosphorus	7723-14-0	E440A	50	mg/kg	<50	----

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 604969) - continued						
potassium	7440-09-7	E440A	100	mg/kg	<100	----
selenium	7782-49-2	E440A	0.1	mg/kg	<0.10	----
silver	7440-22-4	E440A	0.05	mg/kg	<0.050	----
sodium	7440-23-5	E440A	50	mg/kg	<50	----
strontium	7440-24-6	E440A	0.1	mg/kg	<0.10	----
thallium	7440-28-0	E440A	0.05	mg/kg	<0.050	----
tin	7440-31-5	E440A	0.2	mg/kg	<0.20	----
titanium	7440-32-6	E440A	1	mg/kg	<1.0	----
uranium	7440-61-1	E440A	0.05	mg/kg	<0.050	----
vanadium	7440-62-2	E440A	0.2	mg/kg	<0.20	----
zinc	7440-66-6	E440A	1	mg/kg	<1.0	----
zirconium	7440-67-7	E440A	1	mg/kg	<1.0	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 602878)									
moisture	----	E144	0.25	%	50 %	98.6	90.0	110	----
Physical Tests (QCLot: 602973)									
moisture	----	E144	0.25	%	50 %	100	90.0	110	----
Physical Tests (QCLot: 604817)									
pH (1:2 soil:water)	----	E108	----	pH units	6 pH units	99.7	95.0	105	----
Physical Tests (QCLot: 604970)									
pH (1:2 soil:water)	----	E108	----	pH units	6 pH units	99.2	95.0	105	----
Anions and Nutrients (QCLot: 619438)									
nitrogen, total	7727-37-9	E366	0.02	%	22.37 %	98.3	90.0	110	----
Anions and Nutrients (QCLot: 623543)									
nitrogen, total	7727-37-9	E366	0.02	%	22.37 %	101	90.0	110	----
Inorganic Parameters (QCLot: 619439)									
sulfur, total	7704-34-9	E399	0.05	%	12.81 %	96.5	90.0	110	----
Inorganic Parameters (QCLot: 623544)									
sulfur, total	7704-34-9	E399	0.05	%	12.81 %	99.5	90.0	110	----
Metals (QCLot: 604815)									
mercury	7439-97-6	E510A	0.005	mg/kg	0.1 mg/kg	103	80.0	120	----
Metals (QCLot: 604816)									
aluminum	7429-90-5	E440A	50	mg/kg	200 mg/kg	108	80.0	120	----
antimony	7440-36-0	E440A	0.1	mg/kg	100 mg/kg	119	80.0	120	----
arsenic	7440-38-2	E440A	0.05	mg/kg	100 mg/kg	108	80.0	120	----
barium	7440-39-3	E440A	0.5	mg/kg	25 mg/kg	107	80.0	120	----
beryllium	7440-41-7	E440A	0.1	mg/kg	10 mg/kg	103	80.0	120	----
bismuth	7440-69-9	E440A	0.1	mg/kg	100 mg/kg	102	80.0	120	----
boron	7440-42-8	E440A	5	mg/kg	100 mg/kg	103	80.0	120	----
cadmium	7440-43-9	E440A	0.02	mg/kg	10 mg/kg	108	80.0	120	----
calcium	7440-70-2	E440A	50	mg/kg	5000 mg/kg	106	80.0	120	----
chromium	7440-47-3	E440A	0.5	mg/kg	25 mg/kg	105	80.0	120	----
cobalt	7440-48-4	E440A	0.1	mg/kg	25 mg/kg	103	80.0	120	----
copper	7440-50-8	E440A	0.5	mg/kg	25 mg/kg	103	80.0	120	----
iron	7439-89-6	E440A	50	mg/kg	100 mg/kg	109	80.0	120	----

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Metals (QCLot: 604816) - continued									
lead	7439-92-1	E440A	0.1	mg/kg	50 mg/kg	110	80.0	120	----
lithium	7439-93-2	E440A	2	mg/kg	25 mg/kg	96.2	80.0	120	----
magnesium	7439-95-4	E440A	10	mg/kg	5000 mg/kg	111	80.0	120	----
manganese	7439-96-5	E440A	0.2	mg/kg	25 mg/kg	106	80.0	120	----
molybdenum	7439-98-7	E440A	0.1	mg/kg	25 mg/kg	114	80.0	120	----
nickel	7440-02-0	E440A	0.5	mg/kg	50 mg/kg	102	80.0	120	----
phosphorus	7723-14-0	E440A	50	mg/kg	1000 mg/kg	108	80.0	120	----
potassium	7440-09-7	E440A	100	mg/kg	5000 mg/kg	106	80.0	120	----
selenium	7782-49-2	E440A	0.1	mg/kg	100 mg/kg	110	80.0	120	----
silver	7440-22-4	E440A	0.05	mg/kg	10 mg/kg	96.5	80.0	120	----
sodium	7440-23-5	E440A	50	mg/kg	5000 mg/kg	107	80.0	120	----
strontium	7440-24-6	E440A	0.1	mg/kg	25 mg/kg	110	80.0	120	----
thallium	7440-28-0	E440A	0.05	mg/kg	100 mg/kg	107	80.0	120	----
tin	7440-31-5	E440A	0.2	mg/kg	50 mg/kg	105	80.0	120	----
titanium	7440-32-6	E440A	1	mg/kg	25 mg/kg	100	80.0	120	----
uranium	7440-61-1	E440A	0.05	mg/kg	0.5 mg/kg	105	80.0	120	----
vanadium	7440-62-2	E440A	0.2	mg/kg	50 mg/kg	107	80.0	120	----
zinc	7440-66-6	E440A	1	mg/kg	50 mg/kg	104	80.0	120	----
zirconium	7440-67-7	E440A	1	mg/kg	10 mg/kg	106	80.0	120	----
Metals (QCLot: 604968)									
mercury	7439-97-6	E510A	0.005	mg/kg	0.1 mg/kg	100	80.0	120	----
Metals (QCLot: 604969)									
aluminum	7429-90-5	E440A	50	mg/kg	200 mg/kg	102	80.0	120	----
antimony	7440-36-0	E440A	0.1	mg/kg	100 mg/kg	114	80.0	120	----
arsenic	7440-38-2	E440A	0.05	mg/kg	100 mg/kg	102	80.0	120	----
barium	7440-39-3	E440A	0.5	mg/kg	25 mg/kg	99.7	80.0	120	----
beryllium	7440-41-7	E440A	0.1	mg/kg	10 mg/kg	101	80.0	120	----
bismuth	7440-69-9	E440A	0.1	mg/kg	100 mg/kg	101	80.0	120	----
boron	7440-42-8	E440A	5	mg/kg	100 mg/kg	104	80.0	120	----
cadmium	7440-43-9	E440A	0.02	mg/kg	10 mg/kg	99.3	80.0	120	----
calcium	7440-70-2	E440A	50	mg/kg	5000 mg/kg	104	80.0	120	----
chromium	7440-47-3	E440A	0.5	mg/kg	25 mg/kg	96.7	80.0	120	----
cobalt	7440-48-4	E440A	0.1	mg/kg	25 mg/kg	100.0	80.0	120	----
copper	7440-50-8	E440A	0.5	mg/kg	25 mg/kg	99.1	80.0	120	----
iron	7439-89-6	E440A	50	mg/kg	100 mg/kg	99.5	80.0	120	----
lead	7439-92-1	E440A	0.1	mg/kg	50 mg/kg	105	80.0	120	----
lithium	7439-93-2	E440A	2	mg/kg	25 mg/kg	100	80.0	120	----

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Metals (QCLot: 604969) - continued									
magnesium	7439-95-4	E440A	10	mg/kg	5000 mg/kg	103	80.0	120	----
manganese	7439-96-5	E440A	0.2	mg/kg	25 mg/kg	99.4	80.0	120	----
molybdenum	7439-98-7	E440A	0.1	mg/kg	25 mg/kg	107	80.0	120	----
nickel	7440-02-0	E440A	0.5	mg/kg	50 mg/kg	95.3	80.0	120	----
phosphorus	7723-14-0	E440A	50	mg/kg	1000 mg/kg	117	80.0	120	----
potassium	7440-09-7	E440A	100	mg/kg	5000 mg/kg	102	80.0	120	----
selenium	7782-49-2	E440A	0.1	mg/kg	100 mg/kg	101	80.0	120	----
silver	7440-22-4	E440A	0.05	mg/kg	10 mg/kg	93.6	80.0	120	----
sodium	7440-23-5	E440A	50	mg/kg	5000 mg/kg	106	80.0	120	----
strontium	7440-24-6	E440A	0.1	mg/kg	25 mg/kg	103	80.0	120	----
thallium	7440-28-0	E440A	0.05	mg/kg	100 mg/kg	110	80.0	120	----
tin	7440-31-5	E440A	0.2	mg/kg	50 mg/kg	103	80.0	120	----
titanium	7440-32-6	E440A	1	mg/kg	25 mg/kg	100	80.0	120	----
uranium	7440-61-1	E440A	0.05	mg/kg	0.5 mg/kg	108	80.0	120	----
vanadium	7440-62-2	E440A	0.2	mg/kg	50 mg/kg	103	80.0	120	----
zinc	7440-66-6	E440A	1	mg/kg	50 mg/kg	102	80.0	120	----
zirconium	7440-67-7	E440A	1	mg/kg	10 mg/kg	# 123	80.0	120	MES

Qualifiers

Qualifier	Description
MES	*Data Quality Objective was marginally exceeded (by < 10% absolute) for < 10% of analytes in a Multi-Element Scan / Multi-Parameter Scan (considered acceptable as per OMOE & CCME).*

Reference Material (RM) Report

A Reference Material (RM) is a homogenous material with known and well-established analyte concentrations. RMs are processed in an identical manner to test samples, and are used to monitor and control the accuracy and precision of a test method for a typical sample matrix. RM results are expressed as percent recovery of the target analyte concentration. RM targets may be certified target concentrations provided by the RM supplier, or may be ALS long-term mean values (for empirical test methods).

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Anions and Nutrients (QCLot: 619438)									
	RM	nitrogen, total	7727-37-9	E366	0.11 %	116	80.0	120	----
Anions and Nutrients (QCLot: 623543)									
	RM	nitrogen, total	7727-37-9	E366	0.11 %	110	80.0	120	----
Inorganic Parameters (QCLot: 619439)									
	RM	sulfur, total	7704-34-9	E399	0.352 %	80.1	70.0	130	----
Inorganic Parameters (QCLot: 623544)									
	RM	sulfur, total	7704-34-9	E399	0.352 %	71.6	70.0	130	----
Metals (QCLot: 604815)									
	SCP SS-2	mercury	7439-97-6	E510A	0.059 mg/kg	104	70.0	130	----
Metals (QCLot: 604816)									
	SCP SS-2	aluminum	7429-90-5	E440A	9817 mg/kg	111	70.0	130	----
	SCP SS-2	antimony	7440-36-0	E440A	3.99 mg/kg	106	70.0	130	----
	SCP SS-2	arsenic	7440-38-2	E440A	3.73 mg/kg	105	70.0	130	----
	SCP SS-2	barium	7440-39-3	E440A	105 mg/kg	107	70.0	130	----
	SCP SS-2	beryllium	7440-41-7	E440A	0.349 mg/kg	119	70.0	130	----
	SCP SS-2	boron	7440-42-8	E440A	8.5 mg/kg	135	40.0	160	----
	SCP SS-2	cadmium	7440-43-9	E440A	0.91 mg/kg	105	70.0	130	----
	SCP SS-2	calcium	7440-70-2	E440A	31082 mg/kg	115	70.0	130	----
	SCP SS-2	chromium	7440-47-3	E440A	101 mg/kg	116	70.0	130	----
	SCP SS-2	cobalt	7440-48-4	E440A	6.9 mg/kg	108	70.0	130	----
	SCP SS-2	copper	7440-50-8	E440A	123 mg/kg	105	70.0	130	----
	SCP SS-2	iron	7439-89-6	E440A	23558 mg/kg	108	70.0	130	----
	SCP SS-2	lead	7439-92-1	E440A	267 mg/kg	109	70.0	130	----
	SCP SS-2	lithium	7439-93-2	E440A	9.5 mg/kg	106	70.0	130	----
	SCP SS-2	magnesium	7439-95-4	E440A	5509 mg/kg	113	70.0	130	----
	SCP SS-2	manganese	7439-96-5	E440A	269 mg/kg	111	70.0	130	----
	SCP SS-2	molybdenum	7439-98-7	E440A	1.03 mg/kg	113	70.0	130	----
	SCP SS-2	nickel	7440-02-0	E440A	26.7 mg/kg	107	70.0	130	----
	SCP SS-2	phosphorus	7723-14-0	E440A	752 mg/kg	96.9	70.0	130	----

Sub-Matrix:

Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Reference Material (RM) Report: RM Target Concentration	Recovery (%): RM	Recovery Limits (%): Low	Recovery Limits (%): High	Qualifier
Metals (QCLot: 604816) - continued									
	SCP SS-2	potassium	7440-09-7	E440A	1587 mg/kg	118	70.0	130	----
	SCP SS-2	sodium	7440-23-5	E440A	797 mg/kg	112	70.0	130	----
	SCP SS-2	strontium	7440-24-6	E440A	86.1 mg/kg	116	70.0	130	----
	SCP SS-2	thallium	7440-28-0	E440A	0.0786 mg/kg	104	40.0	160	----
	SCP SS-2	tin	7440-31-5	E440A	10.6 mg/kg	100	70.0	130	----
	SCP SS-2	titanium	7440-32-6	E440A	839 mg/kg	119	70.0	130	----
	SCP SS-2	uranium	7440-61-1	E440A	0.52 mg/kg	111	70.0	130	----
	SCP SS-2	vanadium	7440-62-2	E440A	32.7 mg/kg	112	70.0	130	----
	SCP SS-2	zinc	7440-66-6	E440A	297 mg/kg	125	70.0	130	----
	SCP SS-2	zirconium	7440-67-7	E440A	5.73 mg/kg	103	70.0	130	----
Metals (QCLot: 604968)									
	SCP SS-2	mercury	7439-97-6	E510A	0.059 mg/kg	104	70.0	130	----
Metals (QCLot: 604969)									
	SCP SS-2	aluminum	7429-90-5	E440A	9817 mg/kg	106	70.0	130	----
	SCP SS-2	antimony	7440-36-0	E440A	3.99 mg/kg	114	70.0	130	----
	SCP SS-2	arsenic	7440-38-2	E440A	3.73 mg/kg	101	70.0	130	----
	SCP SS-2	barium	7440-39-3	E440A	105 mg/kg	99.8	70.0	130	----
	SCP SS-2	beryllium	7440-41-7	E440A	0.349 mg/kg	104	70.0	130	----
	SCP SS-2	boron	7440-42-8	E440A	8.5 mg/kg	127	40.0	160	----
	SCP SS-2	cadmium	7440-43-9	E440A	0.91 mg/kg	105	70.0	130	----
	SCP SS-2	calcium	7440-70-2	E440A	31082 mg/kg	115	70.0	130	----
	SCP SS-2	chromium	7440-47-3	E440A	101 mg/kg	107	70.0	130	----
	SCP SS-2	cobalt	7440-48-4	E440A	6.9 mg/kg	104	70.0	130	----
	SCP SS-2	copper	7440-50-8	E440A	123 mg/kg	98.5	70.0	130	----
	SCP SS-2	iron	7439-89-6	E440A	23558 mg/kg	99.4	70.0	130	----
	SCP SS-2	lead	7439-92-1	E440A	267 mg/kg	110	70.0	130	----
	SCP SS-2	lithium	7439-93-2	E440A	9.5 mg/kg	104	70.0	130	----
	SCP SS-2	magnesium	7439-95-4	E440A	5509 mg/kg	101	70.0	130	----
	SCP SS-2	manganese	7439-96-5	E440A	269 mg/kg	103	70.0	130	----
	SCP SS-2	molybdenum	7439-98-7	E440A	1.03 mg/kg	102	70.0	130	----
	SCP SS-2	nickel	7440-02-0	E440A	26.7 mg/kg	97.5	70.0	130	----
	SCP SS-2	phosphorus	7723-14-0	E440A	752 mg/kg	110	70.0	130	----
	SCP SS-2	potassium	7440-09-7	E440A	1587 mg/kg	107	70.0	130	----

Sub-Matrix:

Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Reference Material (RM) Report: RM Target Concentration	Reference Material (RM) Report: Recovery (%) RM	Reference Material (RM) Report: Recovery Limits (%) Low	Reference Material (RM) Report: Recovery Limits (%) High	Reference Material (RM) Report: Qualifier
Metals (QCLot: 604969) - continued									
	SCP SS-2	sodium	7440-23-5	E440A	797 mg/kg	107	70.0	130	----
	SCP SS-2	strontium	7440-24-6	E440A	86.1 mg/kg	101	70.0	130	----
	SCP SS-2	thallium	7440-28-0	E440A	0.0786 mg/kg	108	40.0	160	----
	SCP SS-2	tin	7440-31-5	E440A	10.6 mg/kg	100	70.0	130	----
	SCP SS-2	titanium	7440-32-6	E440A	839 mg/kg	114	70.0	130	----
	SCP SS-2	uranium	7440-61-1	E440A	0.52 mg/kg	116	70.0	130	----
	SCP SS-2	vanadium	7440-62-2	E440A	32.7 mg/kg	106	70.0	130	----
	SCP SS-2	zinc	7440-66-6	E440A	297 mg/kg	102	70.0	130	----
	SCP SS-2	zirconium	7440-67-7	E440A	5.73 mg/kg	92.4	70.0	130	----

Chain of Custody (COC) / Analytical Request Form

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Page 1 of 4

Report To	Contact and company name below will appear on the final report
Company:	Mount Polley Mining Corporation
Contact:	Gabriel Holmes
Phone:	236-317-4939
	Company address below will appear on the final report
Street:	PO Box 12
City/Province:	Likely, BC
Postal Code:	V0L 1N0
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☐ NO
Company:	
Contact:	

Report Format / Distribution	
Select Report Format:	☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)
Quality Control (QC) Report with Report	☑ YES ☐ NO
	☐ Compare Results to Criteria on Report - provide details below if box checked
Select Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	kala.ivens@mountpolley.com
Email 2	gabriel.holmes@mountpolley.com
Email 3	pstecko@minnow.ca, kbatchelar@minnow.ca
Invoice Distribution	
Select Invoice Distribution:	☑ EMAIL ☑ MAIL ☐ FAX
Email 1 or Fax	gabriel.holmes@mountpolley.com
Email 2	

Project Information	
ALS Account # / Quote #:	VA22-MPMC100-005
Job #:	
PO / AFE:	
LSD:	
ALS Lab Work Order # (lab use only)	

Oil and Gas Required Fields (client use)	
AFE/Cost Center:	PO#
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	
ALS Contact: Can Dang	Sampler: KBa

Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply

Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days)		EMERGENCY	
4 day [P4]	☐	1 Business day [E1]	☐
3 day [P3]	☐	Same Day, Weekend or Statutory holiday [E0]	☐
2 day [P2]	☐		

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm

For tests that can not be performed according to the service level selected, you will be contacted.

Analysis Requ

Indicate Filtered (F), Preserved (P) or Filtered and Pre

Environmental Division Vancouver

Work Order Reference

VA22B8489

Telephone : +1 604 253 4188

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Metals in Sediment by CRC ICPMS (<63µm) (E440A)	TC, TOC, TIC in Soil (<63 µm) (S351A)	pH by Meter (1:2 Soil:Water Extraction) (E108)	Total Nitrogen by combustion method (0.02 %) (E366)	Total Sulfur by high temperature combustion (E399)	Particle Size Analysis (Pipette+gravel) (S184EA)	Moisture Content by Gravimetry (E144)	Mercury in Sediment by CVAAS (<63µm) (E510A)	
	HAC-U_SE-1_2022-08 A	6-Aug-22	—	Sediment	R	R	R	R	R	R	R	R	1
	HAC-U_SE-1_2022-08 B	6-Aug-22	—	Sediment									1
	HAC-U_SE-2_2022-08 A	6-Aug-22	—	Sediment	R	R	R	R	R	R	R	R	1
	HAC-U_SE-2_2022-08 B	6-Aug-22	—	Sediment									1
	HAC-U_SE-3_2022-08 A	6-Aug-22	—	Sediment	R	R	R	R	R	R	R	R	1
	HAC-U_SE-3_2022-08 B	6-Aug-22	—	Sediment									1
	HAC-U_SE-4_2022-08 A	6-Aug-22	—	Sediment	R	R	R	R	R	R	R	R	1
	HAC-U_SE-4_2022-08 B	6-Aug-22	—	Sediment									1
	HAC-U_SE-5_2022-08 A	6-Aug-22	—	Sediment	R	R	R	R	R	R	R	R	1
	HAC-U_SE-5_2022-08 B	6-Aug-22	—	Sediment									1
	HAC-D_SE-1_2022-08 A	5 -Aug-22	—	Sediment	R	R	R	R	R	R	R	R	1
	HAC-D_SE-1_2022-08 B	5 -Aug-22	—	Sediment									1

Drinking Water (DW) Samples[1] (client use)	Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)
Are samples taken from a Regulated DW System? ☐ YES ☐ NO	
Are samples for human drinking water use? ☐ YES ☐ NO	Samples consist of 2 jars (denoted -A and -B). Please combine and homogenize the 2 jars before running analyses. Analyses are intended for the homogenized samples so are only listed for once for each A&B pairing.

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice Packs ☑ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
			8.10.6°		

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Katharina Batchelar	Date: 9-Aug-22	Time: 08:00	Received by:	Date:	Time:	Received by:	Date: Aug 10 '22	Time: 11am

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

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1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Affix ALS barcode label here (lab use only)

COC Number: 15 -

Page 3 of 4

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Contact:	Gabriel Holmes
Phone:	236-317-4939
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Postal Code:	V0L 1N0
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☐ NO
Company:	
Contact:	

Report Format / Distribution	
Select Report Format:	☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)
Quality Control (QC) Report with Report	☑ YES ☐ NO
☐ Compare Results to Criteria on Report - provide details below if box checked	
Select Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	kala.ivens@mountpolley.com
Email 2	gabriel.holmes@mountpolley.com
Email 3	pstecko@minnow.ca, kbatchelar@minnow.ca

Invoice Distribution	
Select Invoice Distribution:	☑ EMAIL ☑ MAIL ☐ FAX
Email 1 or Fax	gabriel.holmes@mountpolley.com
Email 2	

Project Information	
ALS Account # / Quote #:	VA22-MPMC100-005
Job #:	
PO / AFE:	
LSD:	

Oil and Gas Required Fields (client use)	
AFE/Cost Center:	PO#:
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Lab Work Order # (lab use only):

ALS Contact: Can Dang **Sampler:** KBa

Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply

Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days)		EMERGENCY	
4 day [P4]	☐	1 Business day [E1]	☐
3 day [P3]	☐	Same Day, Weekend or Statutory holiday [E0]	☐
2 day [P2]	☐		

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm

For tests that can not be performed according to the service level selected, you will be contacted.

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Metals in Sediment by CRC ICPMS (<63µm) (E440A)	TC, TOC, TIC in Soil (<63 µm) (S351A)	pH by Meter (1:2 Soil:Water Extraction) (E108)	Total Nitrogen by combustion method (0.02 %) (E366)	Total Sulfur by high temperature combustion (E399)	Particle Size Analysis (Pipette+gravel) (S184EA)	Moisture Content by Gravimetry (E144)	Mercury in Sediment by CVAAS (<63µm) (E510A)	Number of Containers
	EDC-U_SE-3_2022-08 A	7-Aug-22	—	Sediment	R	R	R	R	R	R	R	R	1
	EDC-U_SE-3_2022-08 B	7-Aug-22	—	Sediment									1
	EDC-U_SE-4_2022-08 A	7-Aug-22	—	Sediment	R	R	R	R	R	R	R	R	1
	EDC-U_SE-4_2022-08 B	7-Aug-22	—	Sediment									1
	EDC-U_SE-5_2022-08 A	7-Aug-22	—	Sediment	R	R	R	R	R	R	R	R	1
	EDC-U_SE-5_2022-08 B	7-Aug-22	—	Sediment									1
	EDC-D_SE-1_2022-08 A	3-Aug-22	—	Sediment	R	R	R	R	R	R	R	R	1
	EDC-D_SE-1_2022-08 B	3-Aug-22	—	Sediment									1
	EDC-D_SE-2_2022-08 A	3-Aug-22	—	Sediment	R	R	R	R	R	R	R	R	1
	EDC-D_SE-2_2022-08 B	3-Aug-22	—	Sediment									1
	EDC-D_SE-3_2022-08 A	3-Aug-22	—	Sediment	R	R	R	R	R	R	R	R	1
	EDC-D_SE-3_2022-08 B	3-Aug-22	—	Sediment									1

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☐ NO

Are samples for human drinking water use? ☐ YES ☐ NO

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

Samples consist of 2 jars (denoted -A and -B). Please combine and homogenize the 2 jars before running analyses. Analyses are intended for the homogenized samples so are only listed for once for each A&B pairing.

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice Packs ☑ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
			8.1	10.6	

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Kathrina Batchelar	Date: 9-Aug-22	Time: 08:00	Received by:	Date:	Time:	Received by: JW	Date: Aug. 10 2022	Time: 11am

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

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Chain of Custody (COC) / Analytical Request Form

ALS Environmental

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Affix ALS barcode label here (lab use only)

COC Number: 15 -

Report To	Contact and company name below will appear on the final report
Company:	Mount Polley Mining Corporation
Contact:	Gabriel Holmes
Phone:	236-317-4939
	Company address below will appear on the final report
Street:	PO Box 12
City/Province:	Likely, BC
Postal Code:	V0L 1N0
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☐ NO
Company:	
Contact:	

Report Format / Distribution

Select Report Format: ☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)

Quality Control (QC) Report with Report ☑ YES ☐ NO

☐ Compare Results to Criteria on Report - provide details below if box checked

Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: kala.ivens@mountpolley.com

Email 2: gabriel.holmes@mountpolley.com

Email 3: pstecko@minnow.ca, kbatchelar@minnow.ca

Invoice Distribution

Select Invoice Distribution: ☑ EMAIL ☑ MAIL ☐ FAX

Email 1 or Fax: gabriel.holmes@mountpolley.com

Email 2:

Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply

Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days)		EMERGENCY	
	4 day [P4] ☐		1 Business day [E1] ☐
	3 day [P3] ☐		Same Day, Weekend or Statutory holiday [E0] ☐
	2 day [P2] ☐		

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm

For tests that can not be performed according to the service level selected, you will be contacted.

Project Information

ALS Account # / Quote #: VA22-MPMC100-005

Job #:

PO / AFE:

LSD:

Oil and Gas Required Fields (client use)

AFE/Cost Center: PO#

Major/Minor Code: Routing Code:

Requisitioner:

Location:

ALS Lab Work Order # (lab use only):

ALS Contact: Can Dang Sampler: KBa

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Metals in Sediment by CRC ICPMS (<63µm) (E440A)	TC, TOC, TIC in Soil (<63 µm) (S351A)	pH by Meter (1:2 Soil:Water Extraction) (E108)	Total Nitrogen by combustion method (0.02 %) (E366)	Total Sulfur by high temperature combustion (E399)	Particle Size Analysis (Pipette+gravel) (S184EA)	Moisture Content by Gravimetry (E144)	Mercury in Sediment by CVAAS (<63µm) (E510A)	Number of Containers
	HAC-D_SE-2_2022-08 A	5 -Aug-22	—	Sediment	R	R	R	R	R	R	R	R	1
	HAC-D_SE-2_2022-08 B	5 -Aug-22	—	Sediment									1
	HAC-D_SE-3_2022-08 A	5 -Aug-22	—	Sediment	R	R	R	R	R	R	R	R	1
	HAC-D_SE-3_2022-08 B	5 -Aug-22	—	Sediment									1
	HAC-D_SE-4_2022-08 A	5 -Aug-22	—	Sediment	R	R	R	R	R	R	R	R	1
	HAC-D_SE-4_2022-08 B	5 -Aug-22	—	Sediment									1
	HAC-D_SE-5_2022-08 A	5 -Aug-22	—	Sediment	R	R	R	R	R	R	R	R	1
	HAC-D_SE-5_2022-08 B	5 -Aug-22	—	Sediment									1
	EDC-U_SE-1_2022-08 A	7 -Aug-22	—	Sediment	R	R	R	R	R	R	R	R	1
	EDC-U_SE-1_2022-08 B	7 -Aug-22	—	Sediment									1
	EDC-U_SE-2_2022-08 A	7 -Aug-22	—	Sediment	R	R	R	R	R	R	R	R	1
	EDC-U_SE-2_2022-08 B	7 -Aug-22	—	Sediment									1

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☐ NO

Are samples for human drinking water use? ☐ YES ☐ NO

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

Samples consist of 2 jars (denoted -A and -B). Please combine and homogenize the 2 jars before running analyses. Analyses are intended for the homogenized samples so are only listed for once for each A&B pairing.

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice Packs ☑ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
			8	10	6

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Katmarina Batchelar	Date: 9-Aug-22	Time: 08:10	Received by:	Date:	Time:	Received by:	Date: Aug. 10 2022	Time: 11am

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

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ALS Environmental

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Page 4 of 4

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Postal Code:	V0L 1N0
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☐ NO
Company:	
Contact:	

Report Format / Distribution

Select Report Format: ☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)
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Email 1 or Fax: kala.ivens@mountpolley.com
Email 2: gabriel.holmes@mountpolley.com
Email 3: pstecko@minnow.ca, kbatchelar@minnow.ca

Invoice Distribution

Select Invoice Distribution: ☑ EMAIL ☑ MAIL ☐ FAX
Email 1 or Fax: gabriel.holmes@mountpolley.com
Email 2:

Project Information

ALS Account # / Quote #: VA22-MPMC100-005
Job #:
PO / AFE:
LSD:

Oil and Gas Required Fields (client use)

AFE/Cost Center: PO#
Major/Minor Code: Routing Code:
Requisitioner:
Location:

ALS Lab Work Order # (lab use only):

ALS Contact: Can Dang Sampler: KBa

Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply

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PRIORITY (Business Days): 4 day [P4] ☐ | 3 day [P3] ☐ | 2 day [P2] ☐

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Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Metals in Sediment by CRC ICPMS (<63µm) (E440A)	TC, TOC, TIC in Soil (<63 µm) (S351A)	pH by Meter (1:2 Soil:Water Extraction) (E108)	Total Nitrogen by combustion method (0.02 %) (E366)	Total Sulfur by high temperature combustion (E399)	Particle Size Analysis (Pipette+gravel) (S184EA)	Moisture Content by Gravimetry (E144)	Mercury in Sediment by CVAAS (<63µm) (E510A)	Number of Containers
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	EDC-D_SE-5_2022-08 A	2 -Aug-22	—	Sediment	R	R	R	R	R	R	R	R	1
	EDC-D_SE-5_2022-08 B	3 -Aug-22	—	Sediment									1
	HAC-D_SE-5X_2022-08 A	5-Aug-22	—	Sediment	R	R	R	R	R	R	R	R	1
	HAC-D_SE-5X_2022-08 B	5-Aug-22	—	Sediment									1
	EDC-D_SE-4X_2022-08 A	3-Aug-22	—	Sediment	R	R	R	R	R	R	R	R	1
	EDC-D_SE-4X_2022-08 B	3-Aug-22	—	Sediment									1

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☐ NO

Are samples for human drinking water use? ☐ YES ☐ NO

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Ice Packs ☑ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐
Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
			8.1	10.5	6.9

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by:	Date:	Time:	Received by:	Date:	Time:	Received by:	Date:	Time:
Katherine Batchelar	9-Aug-22	08:00					Aug. 10 2022	11am

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1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

SEDIMENT CHEMISTRY

ALS Laboratory Report VA22C0370

(Finalized November 23, 2022)

ALS Canada Ltd.

right solutions. right partner.

CERTIFICATE OF ANALYSIS

Work Order	: **VA22C0370**	Page	: 1 of 14
Amendment	: **1**		
Client	: **Mount Polley Mining Corporation**	Laboratory	: Vancouver - Environmental
Contact	: Kala Ivens	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: 250-790-2215 Ext 2112	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 30-Aug-2022 10:50
PO	: 5590008044 Q2 2022	Date Analysis Commenced	: 08-Sep-2022
C-O-C number	: ----	Issue Date	: 23-Nov-2022 22:09
Sampler	: P. Rosette, Sarah Latimer		
Site	: ----		
Quote number	: VA22-MPMC100-005 - Minnow Environmental-Sediment Quality		
No. of samples received	: 84		
No. of samples analysed	: 28		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Alex Thornton	Analyst	Metals, Burnaby, British Columbia
Colby Bingham	Quality Systems Coordinator	Inorganics, Saskatoon, Saskatchewan
Hedy Lai	Team Leader - Inorganics	Inorganics, Saskatoon, Saskatchewan
Hedy Lai	Team Leader - Inorganics	Sask Soils, Saskatoon, Saskatchewan
Justin Kuzek	Team Leader - Organics	Organics, Saskatoon, Saskatchewan
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Nancy Cruse	Laboratory Assistant	Inorganics, Saskatoon, Saskatchewan
Owen Cheng		Metals, Burnaby, British Columbia

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances

LOR: Limit of Reporting (detection limit).

Unit	*Description*
%	percent
mg/kg	milligrams per kilogram
pH units	pH units

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Workorder Comments

Amendment (23/11/2022): This report has been amended as a result of a request to correct the sample collection date. All analysis results are as per the previous report.

Sample Comments

Sample	Client Id	*Comment*
VA22C0370-079	BOL-S_SE-3_2022-08	Sample(s) XXX: Limited sample was available for PSA (100g minimum is standard). Measurement Uncertainty for PSA results may be higher than usual.
VA22C0370-080	BOL-S_SE-4_2022-08	Sample(s) XXX: Limited sample was available for PSA (100g minimum is standard). Measurement Uncertainty for PSA results may be higher than usual.

Analytical Results

Sub-Matrix: **Sediment**
(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	QUL-LNF1_SE-1_2022-08	QUL-LNF1_SE-2_2022-08	QUL-LNF1_SE-3_2022-08	QUL-LNF1_SE-4_2022-08	QUL-LNF1_SE-5_2022-08
					Client sampling date / time	23-Aug-2022	23-Aug-2022	23-Aug-2022	23-Aug-2022	23-Aug-2022
						VA22C0370-057	VA22C0370-058	VA22C0370-059	VA22C0370-060	VA22C0370-061
						Result	Result	Result	Result	Result
Physical Tests										
moisture	----	E144	0.25	%		22.2	25.8	24.7	23.5	23.1
pH (1:2 soil:water)	----	E108	0.10	pH units		8.38	8.19	8.54	8.06	8.56
Particle Size										
clay (<0.004mm)	----	EC184E	1.0	%		1.1	1.1	<1.0	1.4	<1.0
silt (0.063mm - 0.004mm)	----	EC184E	1.0	%		8.9	7.7	7.8	2.9	2.8
sand (2.0mm - 0.063mm)	----	EC184E	1.0	%		90.0	90.6	92.2	94.5	96.7
gravel (>2mm)	----	EC184E	1.0	%		<1.0	<1.0	<1.0	1.2	<1.0
Anions and Nutrients										
nitrogen, total	7727-37-9	E366	0.020	%		0.033	<0.020	<0.020	<0.020	0.025
Organic / Inorganic Carbon										
carbon, total organic [TOC], <63µm	----	EC356A	0.050	%		0.483	1.03	0.452	1.25	0.917
Inorganics										
sulfur, total	7704-34-9	E399	500	mg/kg		810	720	790	690	730
Metals										
aluminum	7429-90-5	E440A	50	mg/kg		10400	15800	11400	16500	15800
antimony	7440-36-0	E440A	0.10	mg/kg		0.48	0.45	0.43	0.47	0.56
arsenic	7440-38-2	E440A	0.050	mg/kg		14.3	13.3	14.4	14.7	20.4
barium	7440-39-3	E440A	0.50	mg/kg		83.2	104	85.6	138	146
beryllium	7440-41-7	E440A	0.10	mg/kg		0.41	0.53	0.43	0.55	0.56
bismuth	7440-69-9	E440A	0.10	mg/kg		0.12	0.11	0.12	0.14	0.16
boron	7440-42-8	E440A	5.0	mg/kg		6.4	7.8	6.5	7.0	8.8
cadmium	7440-43-9	E440A	0.020	mg/kg		0.183	0.349	0.248	0.477	0.456
calcium	7440-70-2	E440A	50	mg/kg		15800	16700	17900	14000	19500
chromium	7440-47-3	E440A	0.50	mg/kg		68.6	38.0	57.0	46.0	47.3
cobalt	7440-48-4	E440A	0.10	mg/kg		40.8	18.5	34.1	19.8	26.7
copper	7440-50-8	E440A	0.50	mg/kg		693	900	938	1080	2000
iron	7439-89-6	E440A	50	mg/kg		291000	74300	218000	67300	112000
lead	7439-92-1	E440A	0.10	mg/kg		6.46	7.48	6.97	9.56	10.3
lithium	7439-93-2	E440A	2.0	mg/kg		11.8	14.2	12.2	15.6	15.8
magnesium	7439-95-4	E440A	10	mg/kg		5690	8370	6610	9020	9330

Analytical Results

Sub-Matrix: **Sediment**
(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	QUL-LNF1_SE-1_2022-08	QUL-LNF1_SE-2_2022-08	QUL-LNF1_SE-3_2022-08	QUL-LNF1_SE-4_2022-08	QUL-LNF1_SE-5_2022-08
					Client sampling date / time	23-Aug-2022	23-Aug-2022	23-Aug-2022	23-Aug-2022	23-Aug-2022
						VA22C0370-057	VA22C0370-058	VA22C0370-059	VA22C0370-060	VA22C0370-061
						Result	Result	Result	Result	Result
Metals										
manganese	7439-96-5	E440A	0.20	mg/kg		945	1030	927	1280	1550
mercury	7439-97-6	E510A	0.0050	mg/kg		0.0842	0.126	0.109	0.143	0.184
molybdenum	7439-98-7	E440A	0.10	mg/kg		2.23	2.50	2.47	2.37	3.82
nickel	7440-02-0	E440A	0.50	mg/kg		25.6	23.3	23.5	29.6	25.8
phosphorus	7723-14-0	E440A	50	mg/kg		1500	1470	1770	1410	1560
potassium	7440-09-7	E440A	100	mg/kg		710	1180	740	1210	1110
selenium	7782-49-2	E440A	0.10	mg/kg		1.18	1.20	1.31	1.22	2.15
silver	7440-22-4	E440A	0.050	mg/kg		0.391	0.402	0.460	0.448	0.906
sodium	7440-23-5	E440A	50	mg/kg		365	540	389	517	530
strontium	7440-24-6	E440A	0.10	mg/kg		78.1	116	83.3	112	113
thallium	7440-28-0	E440A	0.050	mg/kg		<0.050	0.066	<0.050	0.080	0.064
tin	7440-31-5	E440A	0.20	mg/kg		1.83	1.20	1.42	1.17	1.58
titanium	7440-32-6	E440A	1.0	mg/kg		1870	1380	1510	1110	1480
uranium	7440-61-1	E440A	0.050	mg/kg		1.45	1.18	1.04	1.00	1.02
vanadium	7440-62-2	E440A	0.20	mg/kg		1140	266	831	227	409
zinc	7440-66-6	E440A	1.0	mg/kg		94.2	64.5	86.1	77.4	85.3
zirconium	7440-67-7	E440A	1.0	mg/kg		5.6	5.1	5.1	4.0	4.8

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Sediment**
(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	QUL-LREF1_SE-1_2022-08	QUL-LREF1_SE-2_2022-08	QUL-LREF1_SE-3_2022-08	QUL-LREF1_SE-4_2022-08	QUL-LREF1_SE-5_2022-08
					Client sampling date / time	23-Aug-2022	23-Aug-2022	23-Aug-2022	23-Aug-2022	23-Aug-2022
						VA22C0370-062	VA22C0370-063	VA22C0370-064	VA22C0370-065	VA22C0370-066
						Result	Result	Result	Result	Result
Physical Tests										
moisture	----	E144	0.25	%		30.6	26.6	30.6	34.9	29.6
pH (1:2 soil:water)	----	E108	0.10	pH units		6.19	5.97	6.07	6.38	6.01
Particle Size										
clay (<0.004mm)	----	EC184E	1.0	%		4.1	2.6	3.9	3.6	4.4
silt (0.063mm - 0.004mm)	----	EC184E	1.0	%		33.6	29.0	32.3	22.5	44.9
sand (2.0mm - 0.063mm)	----	EC184E	1.0	%		60.3	64.4	60.4	73.3	48.6
gravel (>2mm)	----	EC184E	1.0	%		2.0	4.0	3.4	<1.0	2.1
Anions and Nutrients										
nitrogen, total	7727-37-9	E366	0.020	%		0.078	0.058	0.093	0.074	0.087
Organic / Inorganic Carbon										
carbon, total organic [TOC], <63µm	----	EC356A	0.050	%		1.55	0.984	1.48	1.87	1.12
Inorganics										
sulfur, total	7704-34-9	E399	500	mg/kg		530	<500	<500	<500	510
Metals										
aluminum	7429-90-5	E440A	50	mg/kg		15600	14200	16300	17800	15100
antimony	7440-36-0	E440A	0.10	mg/kg		0.29	0.25	0.34	0.30	0.26
arsenic	7440-38-2	E440A	0.050	mg/kg		4.68	4.14	5.08	5.71	3.97
barium	7440-39-3	E440A	0.50	mg/kg		128	108	130	138	124
beryllium	7440-41-7	E440A	0.10	mg/kg		0.43	0.38	0.41	0.45	0.39
bismuth	7440-69-9	E440A	0.10	mg/kg		0.11	<0.10	0.10	0.13	<0.10
boron	7440-42-8	E440A	5.0	mg/kg		<5.0	<5.0	<5.0	<5.0	<5.0
cadmium	7440-43-9	E440A	0.020	mg/kg		0.358	0.268	0.328	0.388	0.289
calcium	7440-70-2	E440A	50	mg/kg		7790	7970	8230	8680	7680
chromium	7440-47-3	E440A	0.50	mg/kg		53.9	58.0	55.6	59.0	52.6
cobalt	7440-48-4	E440A	0.10	mg/kg		11.8	10.1	12.2	12.9	10.5
copper	7440-50-8	E440A	0.50	mg/kg		34.1	26.9	33.0	36.6	29.7
iron	7439-89-6	E440A	50	mg/kg		25300	25000	27200	28500	24200
lead	7439-92-1	E440A	0.10	mg/kg		5.96	4.88	5.69	6.47	5.14
lithium	7439-93-2	E440A	2.0	mg/kg		12.6	10.0	12.1	13.7	10.9
magnesium	7439-95-4	E440A	10	mg/kg		7570	6770	7670	8320	7350

Analytical Results

Sub-Matrix: **Sediment**
(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	QUL-LREF1_SE-1_2022-08	QUL-LREF1_SE-2_2022-08	QUL-LREF1_SE-3_2022-08	QUL-LREF1_SE-4_2022-08	QUL-LREF1_SE-5_2022-08
					Client sampling date / time	23-Aug-2022	23-Aug-2022	23-Aug-2022	23-Aug-2022	23-Aug-2022
						VA22C0370-062	VA22C0370-063	VA22C0370-064	VA22C0370-065	VA22C0370-066
						Result	Result	Result	Result	Result
Metals										
manganese	7439-96-5	E440A	0.20	mg/kg		353	306	430	407	320
mercury	7439-97-6	E510A	0.0050	mg/kg		0.0370	0.0292	0.0357	0.0439	0.0310
molybdenum	7439-98-7	E440A	0.10	mg/kg		0.86	0.61	0.85	0.94	0.62
nickel	7440-02-0	E440A	0.50	mg/kg		32.7	28.2	32.3	34.8	29.6
phosphorus	7723-14-0	E440A	50	mg/kg		1090	1160	1210	1110	1120
potassium	7440-09-7	E440A	100	mg/kg		1360	1150	1510	1630	1300
selenium	7782-49-2	E440A	0.10	mg/kg		0.71	0.52	0.70	0.88	0.58
silver	7440-22-4	E440A	0.050	mg/kg		0.159	0.127	0.140	0.167	0.128
sodium	7440-23-5	E440A	50	mg/kg		463	496	546	560	515
strontium	7440-24-6	E440A	0.10	mg/kg		74.3	70.2	77.2	83.7	72.0
thallium	7440-28-0	E440A	0.050	mg/kg		0.130	0.105	0.129	0.147	0.112
tin	7440-31-5	E440A	0.20	mg/kg		0.49	0.51	0.49	0.57	0.45
titanium	7440-32-6	E440A	1.0	mg/kg		991	1090	1140	1080	1080
uranium	7440-61-1	E440A	0.050	mg/kg		1.20	1.19	1.30	1.39	1.06
vanadium	7440-62-2	E440A	0.20	mg/kg		61.6	65.5	65.1	67.8	61.8
zinc	7440-66-6	E440A	1.0	mg/kg		66.4	56.2	65.0	70.3	61.2
zirconium	7440-67-7	E440A	1.0	mg/kg		3.2	3.6	3.4	3.0	3.5

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Sediment**
(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	QUL-PNF_SE-1_2022-08	QUL-PNF_SE-2_2022-08	QUL-PNF_SE-3_2022-08	QUL-PNF_SE-4_2022-08	QUL-PNF_SE-5_2022-08
					Client sampling date / time	26-Aug-2022	26-Aug-2022	27-Aug-2022	27-Aug-2022	27-Aug-2022
						VA22C0370-067	VA22C0370-068	VA22C0370-069	VA22C0370-070	VA22C0370-071
						Result	Result	Result	Result	Result
Physical Tests										
moisture	----	E144	0.25	%		60.1	63.0	49.4	61.0	61.2
pH (1:2 soil:water)	----	E108	0.10	pH units		8.01	8.02	8.22	8.07	8.16
Particle Size										
clay (<0.004mm)	----	EC184E	1.0	%		41.8	46.4	33.4	49.6	47.6
silt (0.063mm - 0.004mm)	----	EC184E	1.0	%		45.4	50.5	43.6	42.9	47.7
sand (2.0mm - 0.063mm)	----	EC184E	1.0	%		12.8	3.1	23.0	7.5	4.7
gravel (>2mm)	----	EC184E	1.0	%		<1.0	<1.0	<1.0	<1.0	<1.0
Anions and Nutrients										
nitrogen, total	7727-37-9	E366	0.020	%		0.080	0.103	0.056	0.084	0.070
Organic / Inorganic Carbon										
carbon, total organic [TOC], <63µm	----	EC356A	0.050	%		0.622	0.695	0.456	0.736	0.559
Inorganics										
sulfur, total	7704-34-9	E399	500	mg/kg		1190	880	900	860	870
Metals										
aluminum	7429-90-5	E440A	50	mg/kg		31900	29900	26800	31700	32500
antimony	7440-36-0	E440A	0.10	mg/kg		0.50	0.50	0.50	0.50	0.53
arsenic	7440-38-2	E440A	0.050	mg/kg		15.8	15.3	15.1	15.5	16.3
barium	7440-39-3	E440A	0.50	mg/kg		279	265	244	280	286
beryllium	7440-41-7	E440A	0.10	mg/kg		1.04	0.97	0.88	1.05	1.08
bismuth	7440-69-9	E440A	0.10	mg/kg		0.15	0.16	0.15	0.17	0.16
boron	7440-42-8	E440A	5.0	mg/kg		11.1	9.8	9.3	9.9	11.3
cadmium	7440-43-9	E440A	0.020	mg/kg		0.246	0.242	0.241	0.251	0.250
calcium	7440-70-2	E440A	50	mg/kg		24800	20300	21200	19700	24200
chromium	7440-47-3	E440A	0.50	mg/kg		27.1	30.5	28.7	32.0	28.9
cobalt	7440-48-4	E440A	0.10	mg/kg		27.8	24.9	23.4	25.5	27.6
copper	7440-50-8	E440A	0.50	mg/kg		925	794	745	797	915
iron	7439-89-6	E440A	50	mg/kg		46100	43100	50600	42000	43700
lead	7439-92-1	E440A	0.10	mg/kg		11.8	12.0	11.2	12.6	12.4
lithium	7439-93-2	E440A	2.0	mg/kg		32.6	29.0	26.6	30.3	32.1
magnesium	7439-95-4	E440A	10	mg/kg		20100	17600	15300	18100	19800

Analytical Results

Sub-Matrix: **Sediment**
(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	QUL-PNF_SE-1_2022-08	QUL-PNF_SE-2_2022-08	QUL-PNF_SE-3_2022-08	QUL-PNF_SE-4_2022-08	QUL-PNF_SE-5_2022-08
					Client sampling date / time	26-Aug-2022	26-Aug-2022	27-Aug-2022	27-Aug-2022	27-Aug-2022
						VA22C0370-067	VA22C0370-068	VA22C0370-069	VA22C0370-070	VA22C0370-071
						Result	Result	Result	Result	Result
Metals										
manganese	7439-96-5	E440A	0.20	mg/kg		1190	1360	1220	1320	1370
mercury	7439-97-6	E510A	0.0050	mg/kg		0.0997	0.100	0.0922	0.0999	0.103
molybdenum	7439-98-7	E440A	0.10	mg/kg		3.61	3.35	3.19	3.24	3.66
nickel	7440-02-0	E440A	0.50	mg/kg		25.7	28.3	25.9	29.6	27.2
phosphorus	7723-14-0	E440A	50	mg/kg		1280	1200	1310	1180	1330
potassium	7440-09-7	E440A	100	mg/kg		2780	2620	2420	2910	2950
selenium	7782-49-2	E440A	0.10	mg/kg		1.23	1.08	1.02	1.10	1.22
silver	7440-22-4	E440A	0.050	mg/kg		0.363	0.351	0.334	0.343	0.372
sodium	7440-23-5	E440A	50	mg/kg		1150	1110	1030	1190	1230
strontium	7440-24-6	E440A	0.10	mg/kg		211	207	195	224	228
thallium	7440-28-0	E440A	0.050	mg/kg		0.077	0.085	0.076	0.096	0.084
tin	7440-31-5	E440A	0.20	mg/kg		1.86	1.68	1.62	1.66	1.87
titanium	7440-32-6	E440A	1.0	mg/kg		1920	1690	1660	1720	1940
uranium	7440-61-1	E440A	0.050	mg/kg		1.53	1.44	1.32	1.52	1.59
vanadium	7440-62-2	E440A	0.20	mg/kg		142	130	166	125	137
zinc	7440-66-6	E440A	1.0	mg/kg		106	99.6	90.4	103	107
zirconium	7440-67-7	E440A	1.0	mg/kg		5.6	4.8	5.3	4.7	5.5

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Sediment**
(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	POL-S_SE-1_2022-08	POL-S_SE-2_2022-08	POL-S_SE-3_2022-08	POL-S_SE-4_2022-08	POL-S_SE-5_2022-08
					Client sampling date / time	25-Aug-2022	25-Aug-2022	25-Aug-2022	25-Aug-2022	25-Aug-2022
						VA22C0370-072	VA22C0370-073	VA22C0370-074	VA22C0370-075	VA22C0370-076
						Result	Result	Result	Result	Result
Physical Tests										
moisture	----	E144	0.25	%		40.6	37.6	38.9	48.9	46.6
pH (1:2 soil:water)	----	E108	0.10	pH units		7.63	7.57	7.55	7.51	7.44
Particle Size										
clay (<0.004mm)	----	EC184E	1.0	%		10.3	7.0	4.2	9.1	7.5
silt (0.063mm - 0.004mm)	----	EC184E	1.0	%		55.8	47.8	45.8	60.7	58.3
sand (2.0mm - 0.063mm)	----	EC184E	1.0	%		33.9	45.0	49.1	30.2	34.2
gravel (>2mm)	----	EC184E	1.0	%		<1.0	<1.0	<1.0	<1.0	<1.0
Anions and Nutrients										
nitrogen, total	7727-37-9	E366	0.020	%		0.081	0.092	0.061	0.118	0.127
Organic / Inorganic Carbon										
carbon, total organic [TOC], <63µm	----	EC356A	0.050	%		0.872	1.02	0.914	1.12	1.20
Inorganics										
sulfur, total	7704-34-9	E399	500	mg/kg		1740	2270	1550	2140	2280
Metals										
aluminum	7429-90-5	E440A	50	mg/kg		22900	20900	19200	22100	21200
antimony	7440-36-0	E440A	0.10	mg/kg		0.50	0.45	0.45	0.45	0.42
arsenic	7440-38-2	E440A	0.050	mg/kg		15.3	13.9	13.7	13.9	13.4
barium	7440-39-3	E440A	0.50	mg/kg		192	180	169	189	179
beryllium	7440-41-7	E440A	0.10	mg/kg		0.86	0.80	0.71	0.78	0.77
bismuth	7440-69-9	E440A	0.10	mg/kg		<0.10	<0.10	<0.10	<0.10	<0.10
boron	7440-42-8	E440A	5.0	mg/kg		11.5	10.5	10.6	10.6	10.5
cadmium	7440-43-9	E440A	0.020	mg/kg		0.146	0.119	0.128	0.124	0.143
calcium	7440-70-2	E440A	50	mg/kg		29900	28900	24200	29100	27300
chromium	7440-47-3	E440A	0.50	mg/kg		13.0	13.2	13.3	12.6	13.2
cobalt	7440-48-4	E440A	0.10	mg/kg		21.2	20.8	19.7	20.7	20.2
copper	7440-50-8	E440A	0.50	mg/kg		756	672	646	647	646
iron	7439-89-6	E440A	50	mg/kg		61500	65500	76700	58900	61500
lead	7439-92-1	E440A	0.10	mg/kg		5.78	4.77	4.27	4.50	4.69
lithium	7439-93-2	E440A	2.0	mg/kg		20.5	18.3	15.6	19.1	18.4
magnesium	7439-95-4	E440A	10	mg/kg		13600	12500	10900	13400	12500

Analytical Results

Sub-Matrix: **Sediment**
(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	POL-S_SE-1_2022-08	POL-S_SE-2_2022-08	POL-S_SE-3_2022-08	POL-S_SE-4_2022-08	POL-S_SE-5_2022-08
					Client sampling date / time	25-Aug-2022	25-Aug-2022	25-Aug-2022	25-Aug-2022	25-Aug-2022
						VA22C0370-072	VA22C0370-073	VA22C0370-074	VA22C0370-075	VA22C0370-076
						Result	Result	Result	Result	Result
Metals										
manganese	7439-96-5	E440A	0.20	mg/kg		862	764	735	730	730
mercury	7439-97-6	E510A	0.0050	mg/kg		0.0735	0.0676	0.0695	0.0669	0.0689
molybdenum	7439-98-7	E440A	0.10	mg/kg		5.05	4.96	4.35	5.18	4.80
nickel	7440-02-0	E440A	0.50	mg/kg		10.9	10.6	10.1	10.7	10.7
phosphorus	7723-14-0	E440A	50	mg/kg		1910	1860	1980	1820	1930
potassium	7440-09-7	E440A	100	mg/kg		1780	1690	1480	1780	1670
selenium	7782-49-2	E440A	0.10	mg/kg		1.43	1.43	1.23	1.50	1.59
silver	7440-22-4	E440A	0.050	mg/kg		0.337	0.292	0.312	0.274	0.288
sodium	7440-23-5	E440A	50	mg/kg		956	936	849	994	928
strontium	7440-24-6	E440A	0.10	mg/kg		204	217	195	230	221
thallium	7440-28-0	E440A	0.050	mg/kg		<0.050	<0.050	<0.050	<0.050	<0.050
tin	7440-31-5	E440A	0.20	mg/kg		2.35	2.16	2.06	2.19	1.95
titanium	7440-32-6	E440A	1.0	mg/kg		2120	1820	1790	1930	1780
uranium	7440-61-1	E440A	0.050	mg/kg		1.46	1.36	1.29	1.31	1.28
vanadium	7440-62-2	E440A	0.20	mg/kg		238	268	300	234	243
zinc	7440-66-6	E440A	1.0	mg/kg		70.9	63.1	58.1	61.6	61.0
zirconium	7440-67-7	E440A	1.0	mg/kg		8.3	5.1	5.5	5.4	5.4

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Sediment**
(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BOL-S_SE-1_2022-08	BOL-S_SE-2_2022-08	BOL-S_SE-3_2022-08	BOL-S_SE-4_2022-08	BOL-S_SE-5_2022-08
					Client sampling date / time	24-Aug-2022	24-Aug-2022	24-Aug-2022	24-Aug-2022	24-Aug-2022
						VA22C0370-077	VA22C0370-078	VA22C0370-079	VA22C0370-080	VA22C0370-081
						Result	Result	Result	Result	Result
Physical Tests										
moisture	----	E144	0.25	%		51.5	68.8	83.7	69.3	65.1
pH (1:2 soil:water)	----	E108	0.10	pH units		6.34	7.67	6.37	7.67	7.69
Particle Size										
clay (<0.004mm)	----	EC184E	1.0	%		1.9	5.9	7.2	5.3	5.3
silt (0.063mm - 0.004mm)	----	EC184E	1.0	%		18.2	63.0	50.8	39.1	38.3
sand (2.0mm - 0.063mm)	----	EC184E	1.0	%		79.3	30.5	40.8	52.1	50.6
gravel (>2mm)	----	EC184E	1.0	%		<1.0	<1.0	1.2	3.5	5.8
Anions and Nutrients										
nitrogen, total	7727-37-9	E366	0.020	%		0.195	0.341	0.961	0.371	0.369
Organic / Inorganic Carbon										
carbon, total organic [TOC], <63µm	----	EC356A	0.050	%		8.11	5.98	14.6	7.55	7.77
Inorganics										
sulfur, total	7704-34-9	E399	500	mg/kg		910	2810	4730	1130	1470
Metals										
aluminum	7429-90-5	E440A	50	mg/kg		9710	6470	10200	6380	6630
antimony	7440-36-0	E440A	0.10	mg/kg		0.41	0.35	0.52	0.14	0.34
arsenic	7440-38-2	E440A	0.050	mg/kg		3.92	2.80	5.72	3.94	4.36
barium	7440-39-3	E440A	0.50	mg/kg		124	143	123	132	123
beryllium	7440-41-7	E440A	0.10	mg/kg		0.36	0.19	0.41	0.26	0.24
bismuth	7440-69-9	E440A	0.10	mg/kg		<0.10	<0.10	<0.10	<0.10	<0.10
boron	7440-42-8	E440A	5.0	mg/kg		9.1	7.5	10.2	5.3	7.5
cadmium	7440-43-9	E440A	0.020	mg/kg		0.136	0.172	0.228	0.175	0.172
calcium	7440-70-2	E440A	50	mg/kg		7850	183000	8840	168000	158000
chromium	7440-47-3	E440A	0.50	mg/kg		19.9	16.2	19.6	11.9	13.6
cobalt	7440-48-4	E440A	0.10	mg/kg		4.60	4.59	6.58	4.03	3.95
copper	7440-50-8	E440A	0.50	mg/kg		100	37.8	151	82.5	79.1
iron	7439-89-6	E440A	50	mg/kg		12000	11200	14700	10600	11800
lead	7439-92-1	E440A	0.10	mg/kg		2.83	2.20	3.17	2.30	2.25
lithium	7439-93-2	E440A	2.0	mg/kg		5.7	4.6	6.4	4.2	4.4
magnesium	7439-95-4	E440A	10	mg/kg		2810	5600	3070	4850	4570

Analytical Results

Sub-Matrix: **Sediment**
(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BOL-S_SE-1_2022-08	BOL-S_SE-2_2022-08	BOL-S_SE-3_2022-08	BOL-S_SE-4_2022-08	BOL-S_SE-5_2022-08
					Client sampling date / time	24-Aug-2022	24-Aug-2022	24-Aug-2022	24-Aug-2022	24-Aug-2022
						VA22C0370-077	VA22C0370-078	VA22C0370-079	VA22C0370-080	VA22C0370-081
						Result	Result	Result	Result	Result
Metals										
manganese	7439-96-5	E440A	0.20	mg/kg		384	635	904	775	747
mercury	7439-97-6	E510A	0.0050	mg/kg		0.0906	0.0321	0.119	0.0521	0.0549
molybdenum	7439-98-7	E440A	0.10	mg/kg		1.27	1.87	2.68	3.35	3.74
nickel	7440-02-0	E440A	0.50	mg/kg		11.5	9.77	15.5	10.3	10.1
phosphorus	7723-14-0	E440A	50	mg/kg		694	528	549	488	547
potassium	7440-09-7	E440A	100	mg/kg		750	590	790	460	510
selenium	7782-49-2	E440A	0.10	mg/kg		1.11	2.21	1.81	2.08	2.68
silver	7440-22-4	E440A	0.050	mg/kg		0.100	0.051	0.143	0.068	0.079
sodium	7440-23-5	E440A	50	mg/kg		248	230	227	175	186
strontium	7440-24-6	E440A	0.10	mg/kg		78.8	1030	88.6	768	694
thallium	7440-28-0	E440A	0.050	mg/kg		<0.050	<0.050	0.068	<0.050	<0.050
tin	7440-31-5	E440A	0.20	mg/kg		0.33	<0.20	0.22	<0.20	0.23
titanium	7440-32-6	E440A	1.0	mg/kg		578	455	419	187	284
uranium	7440-61-1	E440A	0.050	mg/kg		1.13	0.958	1.36	2.10	2.15
vanadium	7440-62-2	E440A	0.20	mg/kg		35.3	28.3	36.8	22.3	24.9
zinc	7440-66-6	E440A	1.0	mg/kg		29.8	28.5	39.4	25.7	25.8
zirconium	7440-67-7	E440A	1.0	mg/kg		3.7	2.8	4.1	1.4	1.8

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Sediment**
(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	QUL-LNF1_SE-2X_2022-08	POL-S_SE-1X_2022-08	QUL-PNF_SE-2X_2022-08	----	----
					Client sampling date / time	23-Aug-2022	25-Aug-2022	26-Aug-2022	----	----
						VA22C0370-082	VA22C0370-083	VA22C0370-084	--------	--------
						Result	Result	Result	----	----
Physical Tests										
moisture	----	E144	0.25	%		25.4	42.2	63.5	----	----
pH (1:2 soil:water)	----	E108	0.10	pH units		8.21	7.63	8.03	----	----
Particle Size										
clay (<0.004mm)	----	EC184E	1.0	%		1.2	10.6	44.5	----	----
silt (0.063mm - 0.004mm)	----	EC184E	1.0	%		7.4	58.2	51.8	----	----
sand (2.0mm - 0.063mm)	----	EC184E	1.0	%		91.3	31.2	3.7	----	----
gravel (>2mm)	----	EC184E	1.0	%		<1.0	<1.0	<1.0	----	----
Anions and Nutrients										
nitrogen, total	7727-37-9	E366	0.020	%		0.033	0.095	0.090	----	----
Organic / Inorganic Carbon										
carbon, total organic [TOC], <63µm	----	EC356A	0.050	%		1.02	1.00	0.752	----	----
Inorganics										
sulfur, total	7704-34-9	E399	500	mg/kg		850	2090	1080	----	----
Metals										
aluminum	7429-90-5	E440A	50	mg/kg		15500	21800	31300	----	----
antimony	7440-36-0	E440A	0.10	mg/kg		0.35	0.50	0.54	----	----
arsenic	7440-38-2	E440A	0.050	mg/kg		10.4	14.3	15.2	----	----
barium	7440-39-3	E440A	0.50	mg/kg		109	189	272	----	----
beryllium	7440-41-7	E440A	0.10	mg/kg		0.53	0.82	1.03	----	----
bismuth	7440-69-9	E440A	0.10	mg/kg		0.10	<0.10	0.16	----	----
boron	7440-42-8	E440A	5.0	mg/kg		6.6	11.4	11.4	----	----
cadmium	7440-43-9	E440A	0.020	mg/kg		0.374	0.151	0.237	----	----
calcium	7440-70-2	E440A	50	mg/kg		16300	29600	21600	----	----
chromium	7440-47-3	E440A	0.50	mg/kg		34.3	12.4	30.6	----	----
cobalt	7440-48-4	E440A	0.10	mg/kg		17.6	20.6	24.8	----	----
copper	7440-50-8	E440A	0.50	mg/kg		864	739	793	----	----
iron	7439-89-6	E440A	50	mg/kg		66000	59900	42900	----	----
lead	7439-92-1	E440A	0.10	mg/kg		7.07	5.43	12.0	----	----
lithium	7439-93-2	E440A	2.0	mg/kg		14.0	20.0	29.6	----	----
magnesium	7439-95-4	E440A	10	mg/kg		8330	13400	17500	----	----

Analytical Results

Sub-Matrix: Sediment (Matrix: Soil/Solid)					Client sample ID	QUL-LNF1_SE-2X_2022-08	POL-S_SE-1X_2022-08	QUL-PNF_SE-2X_2022-08	----	----
					Client sampling date / time	23-Aug-2022	25-Aug-2022	26-Aug-2022	----	----
Analyte	CAS Number	Method	LOR	Unit		VA22C0370-082	VA22C0370-083	VA22C0370-084	--------	--------
						Result	Result	Result	----	----
Metals										
manganese	7439-96-5	E440A	0.20	mg/kg		959	843	1350	----	----
mercury	7439-97-6	E510A	0.0050	mg/kg		0.131	0.0784	0.106	----	----
molybdenum	7439-98-7	E440A	0.10	mg/kg		2.87	5.22	3.44	----	----
nickel	7440-02-0	E440A	0.50	mg/kg		22.0	10.3	27.9	----	----
phosphorus	7723-14-0	E440A	50	mg/kg		1150	1870	1170	----	----
potassium	7440-09-7	E440A	100	mg/kg		1150	1760	2980	----	----
selenium	7782-49-2	E440A	0.10	mg/kg		0.99	1.48	1.20	----	----
silver	7440-22-4	E440A	0.050	mg/kg		0.406	0.320	0.358	----	----
sodium	7440-23-5	E440A	50	mg/kg		537	950	1160	----	----
strontium	7440-24-6	E440A	0.10	mg/kg		115	201	223	----	----
thallium	7440-28-0	E440A	0.050	mg/kg		0.063	<0.050	0.091	----	----
tin	7440-31-5	E440A	0.20	mg/kg		1.06	2.16	1.67	----	----
titanium	7440-32-6	E440A	1.0	mg/kg		692	1970	1870	----	----
uranium	7440-61-1	E440A	0.050	mg/kg		0.934	1.36	1.48	----	----
vanadium	7440-62-2	E440A	0.20	mg/kg		230	229	129	----	----
zinc	7440-66-6	E440A	1.0	mg/kg		63.2	66.5	98.4	----	----
zirconium	7440-67-7	E440A	1.0	mg/kg		2.2	7.9	5.3	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

ALS Canada Ltd.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA22C0370**	Page	: 1 of 24
Amendment	: **1**		
Client	: **Mount Polley Mining Corporation**	Laboratory	: Vancouver - Environmental
Contact	: Kala Ivens	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: 250-790-2215 Ext 2112	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 30-Aug-2022 10:50
PO	: 5590008044 Q2 2022	Issue Date	: 23-Nov-2022 22:09
C-O-C number	: ----		
Sampler	: P. Rosette, Sarah Latimer		
Site	: ----		
Quote number	: VA22-MPMC100-005 - Minnow Environmental-Sediment Quality		
No. of samples received	: 84		
No. of samples analysed	: 28		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Total Nitrogen by Combustion										
Glass soil jar/Teflon lined cap										
QUL-PNF_SE-3_2022-08	E366	27-Aug-2022	13-Sep-2022	----	----		13-Sep-2022	28 days	18 days	✓
Anions and Nutrients : Total Nitrogen by Combustion										
Glass soil jar/Teflon lined cap										
QUL-PNF_SE-4_2022-08	E366	27-Aug-2022	13-Sep-2022	----	----		13-Sep-2022	28 days	18 days	✓
Anions and Nutrients : Total Nitrogen by Combustion										
Glass soil jar/Teflon lined cap										
QUL-PNF_SE-5_2022-08	E366	27-Aug-2022	13-Sep-2022	----	----		13-Sep-2022	28 days	18 days	✓
Anions and Nutrients : Total Nitrogen by Combustion										
Glass soil jar/Teflon lined cap										
QUL-PNF_SE-1_2022-08	E366	26-Aug-2022	13-Sep-2022	----	----		13-Sep-2022	28 days	19 days	✓
Anions and Nutrients : Total Nitrogen by Combustion										
Glass soil jar/Teflon lined cap										
QUL-PNF_SE-2_2022-08	E366	26-Aug-2022	13-Sep-2022	----	----		13-Sep-2022	28 days	19 days	✓
Anions and Nutrients : Total Nitrogen by Combustion										
Glass soil jar/Teflon lined cap										
QUL-PNF_SE-2X_2022-08	E366	26-Aug-2022	13-Sep-2022	----	----		13-Sep-2022	28 days	19 days	✓
Anions and Nutrients : Total Nitrogen by Combustion										
Glass soil jar/Teflon lined cap										
POL-S_SE-1_2022-08	E366	25-Aug-2022	13-Sep-2022	----	----		13-Sep-2022	28 days	20 days	✓

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Total Nitrogen by Combustion										
Glass soil jar/Teflon lined cap										
POL-S_SE-1X_2022-08	E366	25-Aug-2022	13-Sep-2022	----	----		13-Sep-2022	28 days	20 days	✓
Anions and Nutrients : Total Nitrogen by Combustion										
Glass soil jar/Teflon lined cap										
POL-S_SE-2_2022-08	E366	25-Aug-2022	13-Sep-2022	----	----		13-Sep-2022	28 days	20 days	✓
Anions and Nutrients : Total Nitrogen by Combustion										
Glass soil jar/Teflon lined cap										
POL-S_SE-3_2022-08	E366	25-Aug-2022	13-Sep-2022	----	----		13-Sep-2022	28 days	20 days	✓
Anions and Nutrients : Total Nitrogen by Combustion										
Glass soil jar/Teflon lined cap										
POL-S_SE-4_2022-08	E366	25-Aug-2022	13-Sep-2022	----	----		13-Sep-2022	28 days	20 days	✓
Anions and Nutrients : Total Nitrogen by Combustion										
Glass soil jar/Teflon lined cap										
POL-S_SE-5_2022-08	E366	25-Aug-2022	13-Sep-2022	----	----		13-Sep-2022	28 days	20 days	✓
Anions and Nutrients : Total Nitrogen by Combustion										
Glass soil jar/Teflon lined cap										
BOL-S_SE-1_2022-08	E366	24-Aug-2022	13-Sep-2022	----	----		13-Sep-2022	28 days	21 days	✓
Anions and Nutrients : Total Nitrogen by Combustion										
Glass soil jar/Teflon lined cap										
BOL-S_SE-2_2022-08	E366	24-Aug-2022	13-Sep-2022	----	----		13-Sep-2022	28 days	21 days	✓
Anions and Nutrients : Total Nitrogen by Combustion										
Glass soil jar/Teflon lined cap										
BOL-S_SE-3_2022-08	E366	24-Aug-2022	13-Sep-2022	----	----		13-Sep-2022	28 days	21 days	✓
Anions and Nutrients : Total Nitrogen by Combustion										
Glass soil jar/Teflon lined cap										
BOL-S_SE-4_2022-08	E366	24-Aug-2022	13-Sep-2022	----	----		13-Sep-2022	28 days	21 days	✓

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Total Nitrogen by Combustion										
Glass soil jar/Teflon lined cap										
BOL-S_SE-5_2022-08	E366	24-Aug-2022	13-Sep-2022	----	----		13-Sep-2022	28 days	21 days	✓
Anions and Nutrients : Total Nitrogen by Combustion										
Glass soil jar/Teflon lined cap										
QUL-LNF1_SE-1_2022-08	E366	23-Aug-2022	13-Sep-2022	----	----		13-Sep-2022	28 days	22 days	✓
Anions and Nutrients : Total Nitrogen by Combustion										
Glass soil jar/Teflon lined cap										
QUL-LNF1_SE-2_2022-08	E366	23-Aug-2022	13-Sep-2022	----	----		13-Sep-2022	28 days	22 days	✓
Anions and Nutrients : Total Nitrogen by Combustion										
Glass soil jar/Teflon lined cap										
QUL-LNF1_SE-2X_2022-08	E366	23-Aug-2022	13-Sep-2022	----	----		13-Sep-2022	28 days	22 days	✓
Anions and Nutrients : Total Nitrogen by Combustion										
Glass soil jar/Teflon lined cap										
QUL-LNF1_SE-3_2022-08	E366	23-Aug-2022	13-Sep-2022	----	----		13-Sep-2022	28 days	22 days	✓
Anions and Nutrients : Total Nitrogen by Combustion										
Glass soil jar/Teflon lined cap										
QUL-LNF1_SE-4_2022-08	E366	23-Aug-2022	13-Sep-2022	----	----		13-Sep-2022	28 days	22 days	✓
Anions and Nutrients : Total Nitrogen by Combustion										
Glass soil jar/Teflon lined cap										
QUL-LNF1_SE-5_2022-08	E366	23-Aug-2022	13-Sep-2022	----	----		13-Sep-2022	28 days	22 days	✓
Anions and Nutrients : Total Nitrogen by Combustion										
Glass soil jar/Teflon lined cap										
QUL-LREF1_SE-1_2022-08	E366	23-Aug-2022	13-Sep-2022	----	----		13-Sep-2022	28 days	22 days	✓
Anions and Nutrients : Total Nitrogen by Combustion										
Glass soil jar/Teflon lined cap										
QUL-LREF1_SE-2_2022-08	E366	23-Aug-2022	13-Sep-2022	----	----		13-Sep-2022	28 days	22 days	✓

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Total Nitrogen by Combustion										
Glass soil jar/Teflon lined cap										
QUL-LREF1_SE-3_2022-08	E366	23-Aug-2022	13-Sep-2022	----	----		13-Sep-2022	28 days	22 days	✓
Anions and Nutrients : Total Nitrogen by Combustion										
Glass soil jar/Teflon lined cap										
QUL-LREF1_SE-4_2022-08	E366	23-Aug-2022	13-Sep-2022	----	----		13-Sep-2022	28 days	22 days	✓
Anions and Nutrients : Total Nitrogen by Combustion										
Glass soil jar/Teflon lined cap										
QUL-LREF1_SE-5_2022-08	E366	23-Aug-2022	13-Sep-2022	----	----		13-Sep-2022	28 days	22 days	✓
Inorganics : Total Sulfur by high temperature combustion										
Glass soil jar/Teflon lined cap										
QUL-PNF_SE-3_2022-08	E399	27-Aug-2022	13-Sep-2022	----	----		13-Sep-2022	365 days	18 days	✓
Inorganics : Total Sulfur by high temperature combustion										
Glass soil jar/Teflon lined cap										
QUL-PNF_SE-4_2022-08	E399	27-Aug-2022	13-Sep-2022	----	----		13-Sep-2022	365 days	18 days	✓
Inorganics : Total Sulfur by high temperature combustion										
Glass soil jar/Teflon lined cap										
QUL-PNF_SE-5_2022-08	E399	27-Aug-2022	13-Sep-2022	----	----		13-Sep-2022	365 days	18 days	✓
Inorganics : Total Sulfur by high temperature combustion										
Glass soil jar/Teflon lined cap										
QUL-PNF_SE-1_2022-08	E399	26-Aug-2022	13-Sep-2022	----	----		13-Sep-2022	365 days	19 days	✓
Inorganics : Total Sulfur by high temperature combustion										
Glass soil jar/Teflon lined cap										
QUL-PNF_SE-2_2022-08	E399	26-Aug-2022	13-Sep-2022	----	----		13-Sep-2022	365 days	19 days	✓
Inorganics : Total Sulfur by high temperature combustion										
Glass soil jar/Teflon lined cap										
QUL-PNF_SE-2X_2022-08	E399	26-Aug-2022	13-Sep-2022	----	----		13-Sep-2022	365 days	19 days	✓

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Inorganics : Total Sulfur by high temperature combustion										
Glass soil jar/Teflon lined cap POL-S_SE-1_2022-08	E399	25-Aug-2022	13-Sep-2022	----	----		13-Sep-2022	365 days	20 days	✓
Inorganics : Total Sulfur by high temperature combustion										
Glass soil jar/Teflon lined cap POL-S_SE-1X_2022-08	E399	25-Aug-2022	13-Sep-2022	----	----		13-Sep-2022	365 days	20 days	✓
Inorganics : Total Sulfur by high temperature combustion										
Glass soil jar/Teflon lined cap POL-S_SE-2_2022-08	E399	25-Aug-2022	13-Sep-2022	----	----		13-Sep-2022	365 days	20 days	✓
Inorganics : Total Sulfur by high temperature combustion										
Glass soil jar/Teflon lined cap POL-S_SE-3_2022-08	E399	25-Aug-2022	13-Sep-2022	----	----		13-Sep-2022	365 days	20 days	✓
Inorganics : Total Sulfur by high temperature combustion										
Glass soil jar/Teflon lined cap POL-S_SE-4_2022-08	E399	25-Aug-2022	13-Sep-2022	----	----		13-Sep-2022	365 days	20 days	✓
Inorganics : Total Sulfur by high temperature combustion										
Glass soil jar/Teflon lined cap POL-S_SE-5_2022-08	E399	25-Aug-2022	13-Sep-2022	----	----		13-Sep-2022	365 days	20 days	✓
Inorganics : Total Sulfur by high temperature combustion										
Glass soil jar/Teflon lined cap BOL-S_SE-1_2022-08	E399	24-Aug-2022	13-Sep-2022	----	----		13-Sep-2022	365 days	21 days	✓
Inorganics : Total Sulfur by high temperature combustion										
Glass soil jar/Teflon lined cap BOL-S_SE-2_2022-08	E399	24-Aug-2022	13-Sep-2022	----	----		13-Sep-2022	365 days	21 days	✓
Inorganics : Total Sulfur by high temperature combustion										
Glass soil jar/Teflon lined cap BOL-S_SE-3_2022-08	E399	24-Aug-2022	13-Sep-2022	----	----		13-Sep-2022	365 days	21 days	✓

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Inorganics : Total Sulfur by high temperature combustion										
Glass soil jar/Teflon lined cap BOL-S_SE-4_2022-08	E399	24-Aug-2022	13-Sep-2022	----	----		13-Sep-2022	365 days	21 days	✓
Inorganics : Total Sulfur by high temperature combustion										
Glass soil jar/Teflon lined cap BOL-S_SE-5_2022-08	E399	24-Aug-2022	13-Sep-2022	----	----		13-Sep-2022	365 days	21 days	✓
Inorganics : Total Sulfur by high temperature combustion										
Glass soil jar/Teflon lined cap QUL-LNF1_SE-1_2022-08	E399	23-Aug-2022	13-Sep-2022	----	----		13-Sep-2022	365 days	22 days	✓
Inorganics : Total Sulfur by high temperature combustion										
Glass soil jar/Teflon lined cap QUL-LNF1_SE-2_2022-08	E399	23-Aug-2022	13-Sep-2022	----	----		13-Sep-2022	365 days	22 days	✓
Inorganics : Total Sulfur by high temperature combustion										
Glass soil jar/Teflon lined cap QUL-LNF1_SE-2X_2022-08	E399	23-Aug-2022	13-Sep-2022	----	----		13-Sep-2022	365 days	22 days	✓
Inorganics : Total Sulfur by high temperature combustion										
Glass soil jar/Teflon lined cap QUL-LNF1_SE-3_2022-08	E399	23-Aug-2022	13-Sep-2022	----	----		13-Sep-2022	365 days	22 days	✓
Inorganics : Total Sulfur by high temperature combustion										
Glass soil jar/Teflon lined cap QUL-LNF1_SE-4_2022-08	E399	23-Aug-2022	13-Sep-2022	----	----		13-Sep-2022	365 days	22 days	✓
Inorganics : Total Sulfur by high temperature combustion										
Glass soil jar/Teflon lined cap QUL-LNF1_SE-5_2022-08	E399	23-Aug-2022	13-Sep-2022	----	----		13-Sep-2022	365 days	22 days	✓
Inorganics : Total Sulfur by high temperature combustion										
Glass soil jar/Teflon lined cap QUL-LREF1_SE-1_2022-08	E399	23-Aug-2022	13-Sep-2022	----	----		13-Sep-2022	365 days	22 days	✓

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Inorganics : Total Sulfur by high temperature combustion										
Glass soil jar/Teflon lined cap QUL-LREF1_SE-2_2022-08	E399	23-Aug-2022	13-Sep-2022	----	----		13-Sep-2022	365 days	22 days	✓
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Glass soil jar/Teflon lined cap QUL-LREF1_SE-3_2022-08	E399	23-Aug-2022	13-Sep-2022	----	----		13-Sep-2022	365 days	22 days	✓
Inorganics : Total Sulfur by high temperature combustion										
Glass soil jar/Teflon lined cap QUL-LREF1_SE-4_2022-08	E399	23-Aug-2022	13-Sep-2022	----	----		13-Sep-2022	365 days	22 days	✓
Inorganics : Total Sulfur by high temperature combustion										
Glass soil jar/Teflon lined cap QUL-LREF1_SE-5_2022-08	E399	23-Aug-2022	13-Sep-2022	----	----		13-Sep-2022	365 days	22 days	✓
Metals : Mercury in Sediment by CVAAS (<63 µm)										
Glass soil jar/Teflon lined cap QUL-PNF_SE-3_2022-08	E510A	27-Aug-2022	09-Sep-2022	----	----		10-Sep-2022	28 days	14 days	✓
Metals : Mercury in Sediment by CVAAS (<63 µm)										
Glass soil jar/Teflon lined cap QUL-PNF_SE-4_2022-08	E510A	27-Aug-2022	09-Sep-2022	----	----		10-Sep-2022	28 days	14 days	✓
Metals : Mercury in Sediment by CVAAS (<63 µm)										
Glass soil jar/Teflon lined cap QUL-PNF_SE-5_2022-08	E510A	27-Aug-2022	09-Sep-2022	----	----		10-Sep-2022	28 days	14 days	✓
Metals : Mercury in Sediment by CVAAS (<63 µm)										
Glass soil jar/Teflon lined cap QUL-PNF_SE-1_2022-08	E510A	26-Aug-2022	09-Sep-2022	----	----		10-Sep-2022	28 days	15 days	✓
Metals : Mercury in Sediment by CVAAS (<63 µm)										
Glass soil jar/Teflon lined cap QUL-PNF_SE-2_2022-08	E510A	26-Aug-2022	09-Sep-2022	----	----		10-Sep-2022	28 days	15 days	✓

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Sediment by CVAAS (<63 µm)										
Glass soil jar/Teflon lined cap										
POL-S_SE-1_2022-08	E510A	25-Aug-2022	09-Sep-2022	----	----		10-Sep-2022	28 days	16 days	✓
Metals : Mercury in Sediment by CVAAS (<63 µm)										
Glass soil jar/Teflon lined cap										
POL-S_SE-2_2022-08	E510A	25-Aug-2022	09-Sep-2022	----	----		10-Sep-2022	28 days	16 days	✓
Metals : Mercury in Sediment by CVAAS (<63 µm)										
Glass soil jar/Teflon lined cap										
POL-S_SE-3_2022-08	E510A	25-Aug-2022	09-Sep-2022	----	----		10-Sep-2022	28 days	16 days	✓
Metals : Mercury in Sediment by CVAAS (<63 µm)										
Glass soil jar/Teflon lined cap										
POL-S_SE-4_2022-08	E510A	25-Aug-2022	09-Sep-2022	----	----		10-Sep-2022	28 days	16 days	✓
Metals : Mercury in Sediment by CVAAS (<63 µm)										
Glass soil jar/Teflon lined cap										
POL-S_SE-5_2022-08	E510A	25-Aug-2022	09-Sep-2022	----	----		10-Sep-2022	28 days	16 days	✓
Metals : Mercury in Sediment by CVAAS (<63 µm)										
Glass soil jar/Teflon lined cap										
QUL-PNF_SE-2X_2022-08	E510A	26-Aug-2022	09-Sep-2022	----	----		11-Sep-2022	28 days	16 days	✓
Metals : Mercury in Sediment by CVAAS (<63 µm)										
Glass soil jar/Teflon lined cap										
POL-S_SE-1X_2022-08	E510A	25-Aug-2022	09-Sep-2022	----	----		11-Sep-2022	28 days	17 days	✓
Metals : Mercury in Sediment by CVAAS (<63 µm)										
Glass soil jar/Teflon lined cap										
BOL-S_SE-1_2022-08	E510A	24-Aug-2022	09-Sep-2022	----	----		11-Sep-2022	28 days	18 days	✓
Metals : Mercury in Sediment by CVAAS (<63 µm)										
Glass soil jar/Teflon lined cap										
BOL-S_SE-2_2022-08	E510A	24-Aug-2022	09-Sep-2022	----	----		11-Sep-2022	28 days	18 days	✓

Matrix: **Soil/Solid**

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Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Sediment by CVAAS (<63 µm)										
Glass soil jar/Teflon lined cap										
BOL-S_SE-3_2022-08	E510A	24-Aug-2022	09-Sep-2022	----	----		11-Sep-2022	28 days	18 days	✓
Metals : Mercury in Sediment by CVAAS (<63 µm)										
Glass soil jar/Teflon lined cap										
BOL-S_SE-4_2022-08	E510A	24-Aug-2022	09-Sep-2022	----	----		11-Sep-2022	28 days	18 days	✓
Metals : Mercury in Sediment by CVAAS (<63 µm)										
Glass soil jar/Teflon lined cap										
BOL-S_SE-5_2022-08	E510A	24-Aug-2022	09-Sep-2022	----	----		11-Sep-2022	28 days	18 days	✓
Metals : Mercury in Sediment by CVAAS (<63 µm)										
Glass soil jar/Teflon lined cap										
QUL-LNF1_SE-1_2022-08	E510A	23-Aug-2022	09-Sep-2022	----	----		10-Sep-2022	28 days	18 days	✓
Metals : Mercury in Sediment by CVAAS (<63 µm)										
Glass soil jar/Teflon lined cap										
QUL-LNF1_SE-2_2022-08	E510A	23-Aug-2022	09-Sep-2022	----	----		10-Sep-2022	28 days	18 days	✓
Metals : Mercury in Sediment by CVAAS (<63 µm)										
Glass soil jar/Teflon lined cap										
QUL-LNF1_SE-3_2022-08	E510A	23-Aug-2022	09-Sep-2022	----	----		10-Sep-2022	28 days	18 days	✓
Metals : Mercury in Sediment by CVAAS (<63 µm)										
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QUL-LNF1_SE-4_2022-08	E510A	23-Aug-2022	09-Sep-2022	----	----		10-Sep-2022	28 days	18 days	✓
Metals : Mercury in Sediment by CVAAS (<63 µm)										
Glass soil jar/Teflon lined cap										
QUL-LNF1_SE-5_2022-08	E510A	23-Aug-2022	09-Sep-2022	----	----		10-Sep-2022	28 days	18 days	✓
Metals : Mercury in Sediment by CVAAS (<63 µm)										
Glass soil jar/Teflon lined cap										
QUL-LREF1_SE-1_2022-08	E510A	23-Aug-2022	09-Sep-2022	----	----		10-Sep-2022	28 days	18 days	✓

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Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Sediment by CVAAS (<63 µm)										
Glass soil jar/Teflon lined cap QUL-LREF1_SE-2_2022-08	E510A	23-Aug-2022	09-Sep-2022	----	----		10-Sep-2022	28 days	18 days	✓
Metals : Mercury in Sediment by CVAAS (<63 µm)										
Glass soil jar/Teflon lined cap QUL-LREF1_SE-3_2022-08	E510A	23-Aug-2022	09-Sep-2022	----	----		10-Sep-2022	28 days	18 days	✓
Metals : Mercury in Sediment by CVAAS (<63 µm)										
Glass soil jar/Teflon lined cap QUL-LREF1_SE-4_2022-08	E510A	23-Aug-2022	09-Sep-2022	----	----		10-Sep-2022	28 days	18 days	✓
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Glass soil jar/Teflon lined cap QUL-LREF1_SE-5_2022-08	E510A	23-Aug-2022	09-Sep-2022	----	----		10-Sep-2022	28 days	18 days	✓
Metals : Mercury in Sediment by CVAAS (<63 µm)										
Glass soil jar/Teflon lined cap QUL-LNF1_SE-2X_2022-08	E510A	23-Aug-2022	09-Sep-2022	----	----		11-Sep-2022	28 days	19 days	✓
Metals : Metals in Sediment by CRC ICPMS (<63 µm)										
Glass soil jar/Teflon lined cap QUL-PNF_SE-3_2022-08	E440A	27-Aug-2022	09-Sep-2022	----	----		11-Sep-2022	180 days	16 days	✓
Metals : Metals in Sediment by CRC ICPMS (<63 µm)										
Glass soil jar/Teflon lined cap QUL-PNF_SE-4_2022-08	E440A	27-Aug-2022	09-Sep-2022	----	----		11-Sep-2022	180 days	16 days	✓
Metals : Metals in Sediment by CRC ICPMS (<63 µm)										
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Metals : Metals in Sediment by CRC ICPMS (<63 µm)										
Glass soil jar/Teflon lined cap QUL-PNF_SE-1_2022-08	E440A	26-Aug-2022	09-Sep-2022	----	----		11-Sep-2022	180 days	17 days	✓

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			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Metals in Sediment by CRC ICPMS (<63 µm)										
Glass soil jar/Teflon lined cap QUL-PNF_SE-2_2022-08	E440A	26-Aug-2022	09-Sep-2022	----	----		11-Sep-2022	180 days	17 days	✓
Metals : Metals in Sediment by CRC ICPMS (<63 µm)										
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Metals : Metals in Sediment by CRC ICPMS (<63 µm)										
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			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Metals in Sediment by CRC ICPMS (<63 µm)										
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Glass soil jar/Teflon lined cap QUL-LNF1_SE-2X_2022-08	E440A	23-Aug-2022	09-Sep-2022	----	----		11-Sep-2022	180 days	20 days	✓
Metals : Metals in Sediment by CRC ICPMS (<63 µm)										
Glass soil jar/Teflon lined cap QUL-LNF1_SE-3_2022-08	E440A	23-Aug-2022	09-Sep-2022	----	----		11-Sep-2022	180 days	20 days	✓
Metals : Metals in Sediment by CRC ICPMS (<63 µm)										
Glass soil jar/Teflon lined cap QUL-LNF1_SE-4_2022-08	E440A	23-Aug-2022	09-Sep-2022	----	----		11-Sep-2022	180 days	20 days	✓

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Metals in Sediment by CRC ICPMS (<63 µm)										
Glass soil jar/Teflon lined cap QUL-LNF1_SE-5_2022-08	E440A	23-Aug-2022	09-Sep-2022	----	----		11-Sep-2022	180 days	20 days	✓
Metals : Metals in Sediment by CRC ICPMS (<63 µm)										
Glass soil jar/Teflon lined cap QUL-LREF1_SE-1_2022-08	E440A	23-Aug-2022	09-Sep-2022	----	----		11-Sep-2022	180 days	20 days	✓
Metals : Metals in Sediment by CRC ICPMS (<63 µm)										
Glass soil jar/Teflon lined cap QUL-LREF1_SE-2_2022-08	E440A	23-Aug-2022	09-Sep-2022	----	----		11-Sep-2022	180 days	20 days	✓
Metals : Metals in Sediment by CRC ICPMS (<63 µm)										
Glass soil jar/Teflon lined cap QUL-LREF1_SE-3_2022-08	E440A	23-Aug-2022	09-Sep-2022	----	----		11-Sep-2022	180 days	20 days	✓
Metals : Metals in Sediment by CRC ICPMS (<63 µm)										
Glass soil jar/Teflon lined cap QUL-LREF1_SE-4_2022-08	E440A	23-Aug-2022	09-Sep-2022	----	----		11-Sep-2022	180 days	20 days	✓
Metals : Metals in Sediment by CRC ICPMS (<63 µm)										
Glass soil jar/Teflon lined cap QUL-LREF1_SE-5_2022-08	E440A	23-Aug-2022	09-Sep-2022	----	----		11-Sep-2022	180 days	20 days	✓
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap BOL-S_SE-1_2022-08	E144	24-Aug-2022	----	----	----		09-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap BOL-S_SE-2_2022-08	E144	24-Aug-2022	----	----	----		09-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap BOL-S_SE-3_2022-08	E144	24-Aug-2022	----	----	----		09-Sep-2022	----	----	

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap										
BOL-S_SE-4_2022-08	E144	24-Aug-2022	----	----	----		09-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap										
BOL-S_SE-5_2022-08	E144	24-Aug-2022	----	----	----		09-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap										
POL-S_SE-1_2022-08	E144	25-Aug-2022	----	----	----		08-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap										
POL-S_SE-1X_2022-08	E144	25-Aug-2022	----	----	----		09-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap										
POL-S_SE-2_2022-08	E144	25-Aug-2022	----	----	----		08-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap										
POL-S_SE-3_2022-08	E144	25-Aug-2022	----	----	----		08-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap										
POL-S_SE-4_2022-08	E144	25-Aug-2022	----	----	----		08-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap										
POL-S_SE-5_2022-08	E144	25-Aug-2022	----	----	----		08-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap										
QUL-LNF1_SE-1_2022-08	E144	23-Aug-2022	----	----	----		08-Sep-2022	----	----	

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap QUL-LNF1_SE-2_2022-08	E144	23-Aug-2022	----	----	----		08-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap QUL-LNF1_SE-2X_2022-08	E144	23-Aug-2022	----	----	----		09-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap QUL-LNF1_SE-3_2022-08	E144	23-Aug-2022	----	----	----		08-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap QUL-LNF1_SE-4_2022-08	E144	23-Aug-2022	----	----	----		08-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap QUL-LNF1_SE-5_2022-08	E144	23-Aug-2022	----	----	----		08-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap QUL-LREF1_SE-1_2022-08	E144	23-Aug-2022	----	----	----		08-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap QUL-LREF1_SE-2_2022-08	E144	23-Aug-2022	----	----	----		08-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap QUL-LREF1_SE-3_2022-08	E144	23-Aug-2022	----	----	----		08-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap QUL-LREF1_SE-4_2022-08	E144	23-Aug-2022	----	----	----		08-Sep-2022	----	----	

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap										
QUL-LREF1_SE-5_2022-08	E144	23-Aug-2022	----	----	----		08-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap										
QUL-PNF_SE-1_2022-08	E144	26-Aug-2022	----	----	----		08-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap										
QUL-PNF_SE-2_2022-08	E144	26-Aug-2022	----	----	----		08-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap										
QUL-PNF_SE-2X_2022-08	E144	26-Aug-2022	----	----	----		09-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap										
QUL-PNF_SE-3_2022-08	E144	27-Aug-2022	----	----	----		08-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap										
QUL-PNF_SE-4_2022-08	E144	27-Aug-2022	----	----	----		08-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap										
QUL-PNF_SE-5_2022-08	E144	27-Aug-2022	----	----	----		08-Sep-2022	----	----	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
Glass soil jar/Teflon lined cap										
QUL-PNF_SE-3_2022-08	E108	27-Aug-2022	12-Sep-2022	----	----		12-Sep-2022	30 days	16 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
Glass soil jar/Teflon lined cap										
QUL-PNF_SE-4_2022-08	E108	27-Aug-2022	12-Sep-2022	----	----		12-Sep-2022	30 days	16 days	✓

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
Glass soil jar/Teflon lined cap QUL-PNF_SE-5_2022-08	E108	27-Aug-2022	12-Sep-2022	----	----		12-Sep-2022	30 days	16 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
Glass soil jar/Teflon lined cap QUL-PNF_SE-1_2022-08	E108	26-Aug-2022	12-Sep-2022	----	----		12-Sep-2022	30 days	17 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
Glass soil jar/Teflon lined cap QUL-PNF_SE-2_2022-08	E108	26-Aug-2022	12-Sep-2022	----	----		12-Sep-2022	30 days	17 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
Glass soil jar/Teflon lined cap POL-S_SE-1_2022-08	E108	25-Aug-2022	12-Sep-2022	----	----		12-Sep-2022	30 days	18 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
Glass soil jar/Teflon lined cap QUL-PNF_SE-2X_2022-08	E108	26-Aug-2022	12-Sep-2022	----	----		13-Sep-2022	30 days	19 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
Glass soil jar/Teflon lined cap POL-S_SE-1X_2022-08	E108	25-Aug-2022	12-Sep-2022	----	----		13-Sep-2022	30 days	20 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
Glass soil jar/Teflon lined cap POL-S_SE-2_2022-08	E108	25-Aug-2022	12-Sep-2022	----	----		13-Sep-2022	30 days	20 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
Glass soil jar/Teflon lined cap POL-S_SE-3_2022-08	E108	25-Aug-2022	12-Sep-2022	----	----		13-Sep-2022	30 days	20 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
Glass soil jar/Teflon lined cap POL-S_SE-4_2022-08	E108	25-Aug-2022	12-Sep-2022	----	----		13-Sep-2022	30 days	20 days	✓

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
Glass soil jar/Teflon lined cap										
POL-S_SE-5_2022-08	E108	25-Aug-2022	12-Sep-2022	----	----		13-Sep-2022	30 days	20 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
Glass soil jar/Teflon lined cap										
QUL-LNF1_SE-1_2022-08	E108	23-Aug-2022	12-Sep-2022	----	----		12-Sep-2022	30 days	20 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
Glass soil jar/Teflon lined cap										
QUL-LNF1_SE-2_2022-08	E108	23-Aug-2022	12-Sep-2022	----	----		12-Sep-2022	30 days	20 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
Glass soil jar/Teflon lined cap										
QUL-LNF1_SE-3_2022-08	E108	23-Aug-2022	12-Sep-2022	----	----		12-Sep-2022	30 days	20 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
Glass soil jar/Teflon lined cap										
QUL-LNF1_SE-4_2022-08	E108	23-Aug-2022	12-Sep-2022	----	----		12-Sep-2022	30 days	20 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
Glass soil jar/Teflon lined cap										
QUL-LNF1_SE-5_2022-08	E108	23-Aug-2022	12-Sep-2022	----	----		12-Sep-2022	30 days	20 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
Glass soil jar/Teflon lined cap										
QUL-LREF1_SE-1_2022-08	E108	23-Aug-2022	12-Sep-2022	----	----		12-Sep-2022	30 days	20 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
Glass soil jar/Teflon lined cap										
QUL-LREF1_SE-2_2022-08	E108	23-Aug-2022	12-Sep-2022	----	----		12-Sep-2022	30 days	20 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
Glass soil jar/Teflon lined cap										
QUL-LREF1_SE-3_2022-08	E108	23-Aug-2022	12-Sep-2022	----	----		12-Sep-2022	30 days	20 days	✓

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
Glass soil jar/Teflon lined cap										
QUL-LREF1_SE-4_2022-08	E108	23-Aug-2022	12-Sep-2022	----	----		12-Sep-2022	30 days	20 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
Glass soil jar/Teflon lined cap										
QUL-LREF1_SE-5_2022-08	E108	23-Aug-2022	12-Sep-2022	----	----		12-Sep-2022	30 days	20 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
Glass soil jar/Teflon lined cap										
BOL-S_SE-1_2022-08	E108	24-Aug-2022	12-Sep-2022	----	----		13-Sep-2022	30 days	21 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
Glass soil jar/Teflon lined cap										
BOL-S_SE-2_2022-08	E108	24-Aug-2022	12-Sep-2022	----	----		13-Sep-2022	30 days	21 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
Glass soil jar/Teflon lined cap										
BOL-S_SE-3_2022-08	E108	24-Aug-2022	12-Sep-2022	----	----		13-Sep-2022	30 days	21 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
Glass soil jar/Teflon lined cap										
BOL-S_SE-4_2022-08	E108	24-Aug-2022	12-Sep-2022	----	----		13-Sep-2022	30 days	21 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
Glass soil jar/Teflon lined cap										
BOL-S_SE-5_2022-08	E108	24-Aug-2022	12-Sep-2022	----	----		13-Sep-2022	30 days	21 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
Glass soil jar/Teflon lined cap										
QUL-LNF1_SE-2X_2022-08	E108	23-Aug-2022	12-Sep-2022	----	----		13-Sep-2022	30 days	22 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Soil/Solid**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Mercury in Sediment by CVAAS (<63 µm)	E510A	635467	2	28	7.1	5.0	✓
Metals in Sediment by CRC ICPMS (<63 µm)	E440A	636186	2	28	7.1	5.0	✓
Moisture Content by Gravimetry	E144	639723	2	36	5.5	5.0	✓
pH by Meter (1:2 Soil:Water Extraction)	E108	640209	2	40	5.0	5.0	✓
Total Nitrogen by Combustion	E366	644811	2	34	5.8	5.0	✓
Total Sulfur by high temperature combustion	E399	644812	2	28	7.1	5.0	✓
Laboratory Control Samples (LCS)							
Mercury in Sediment by CVAAS (<63 µm)	E510A	635467	4	28	14.2	10.0	✓
Metals in Sediment by CRC ICPMS (<63 µm)	E440A	636186	4	28	14.2	10.0	✓
Moisture Content by Gravimetry	E144	639723	2	36	5.5	5.0	✓
pH by Meter (1:2 Soil:Water Extraction)	E108	640209	4	40	10.0	10.0	✓
Total Nitrogen by Combustion	E366	644811	4	34	11.7	10.0	✓
Total Sulfur by high temperature combustion	E399	644812	4	28	14.2	10.0	✓
Method Blanks (MB)							
Mercury in Sediment by CVAAS (<63 µm)	E510A	635467	2	28	7.1	5.0	✓
Metals in Sediment by CRC ICPMS (<63 µm)	E440A	636186	2	28	7.1	5.0	✓
Moisture Content by Gravimetry	E144	639723	2	36	5.5	5.0	✓
Total Nitrogen by Combustion	E366	644811	2	34	5.8	5.0	✓
Total Sulfur by high temperature combustion	E399	644812	2	28	7.1	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
pH by Meter (1:2 Soil:Water Extraction)	E108 Saskatoon - Environmental	Soil/Solid	BC Lab Manual	pH is determined by potentiometric measurement with a pH electrode at ambient laboratory temperature (normally 20 ± 5°C), and is carried out in accordance with procedures described in the BC Lab Manual (prescriptive method). The procedure involves mixing the dried (at <60 ºC) and sieved (10mesh/2mm) sample with ultra pure water at a 1:2 ratio of sediment to water. The pH is then measured by a standard pH probe.
Moisture Content by Gravimetry	E144 Saskatoon - Environmental	Soil/Solid	CCME PHC in Soil - Tier 1	Moisture is measured gravimetrically by drying the sample at 105°C. Moisture content is calculated as the weight loss (due to water) divided by the wet weight of the sample, expressed as a percentage.
Total Nitrogen by Combustion	E366 Saskatoon - Environmental	Soil/Solid	CSSS (2008) 22.4	The sample is ignited in a combustion analyzer where nitrogen in the reduced nitrous oxide gas is determined using a thermal conductivity detector.
Total Sulfur by high temperature combustion	E399 Saskatoon - Environmental	Soil/Solid	ISO 15178:2000	Air-dried sample is ignited in a combustion analyzer where sulfur in the reduced SO_2 gas is determined using a thermal conductivity detector.
Metals in Sediment by CRC ICPMS (<63 µm)	E440A Vancouver - Environmental	Soil/Solid	EPA 6020B (mod)	Samples are sieved through a 63 um sieve, and digested with HNO_3 and HCl. This method is intended to liberate metals that may be environmentally available. Silicate minerals are not solubilized. Dependent on sample matrix, some metals may be only partially recovered, including Al, Ba, Be, Cr, Sr, Ti, Tl, V, W, and Zr. Volatile forms of sulfur (including sulfide) may not be captured, as they may be lost during sampling, storage, or digestion. Elemental Sulfur may be poorly recovered by this method. Analysis is by Collision/Reaction Cell ICPMS.
Mercury in Sediment by CVAAS (<63 µm)	E510A Vancouver - Environmental	Soil/Solid	EPA 200.2/1631 Appendix (mod)	Samples are sieved through a 63 µm sieve, and digested with HNO_3 and HCl, followed by CVAAS analysis.
Particle Size Analysis (Pipette) - MMER Classification	EC184E Saskatoon - Environmental	Soil/Solid	Metal Mining Technical Guidance for Environmental Effects Monitoring (2012)	The particle size determination is performed by various methods to generate a Grain Size curve. The data from the curve is then used to produce particle size ranges based on the Metal Mining Effluent Regulations (MMER) classification system for Environmental Effects Monitoring.
Total Organic Carbon (Calculated) in soil (<63 µm)	EC356A Saskatoon - Environmental	Soil/Solid	CSSS (2008) 21.2	Total Organic Carbon (TOC) is calculated by the difference between total carbon (TC) and total inorganic carbon (TIC) analyzed on material passing a 63 µm sieve.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Leach 1:2 Soil:Water for pH/EC	EP108 Saskatoon - Environmental	Soil/Solid	BC WLAP METHOD: PH, ELECTROMETRIC, SOIL	The procedure involves mixing the dried (at <60°C) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water.
Digestion for Metals and Mercury (63 µm Sieve)	EP440A Vancouver - Environmental	Soil/Solid	EPA 200.2 (mod)	Samples are sieved through a 63 µm sieve, and digested with HNO3 and HCl. This method is intended to liberate metals that may be environmentally available.
Dry and Grind in Soil/Solid <60°C	EPP442 Saskatoon - Environmental	Soil/Solid	Soil Sampling and Methods of Analysis, Carter 2008	After removal of any coarse fragments and reservation of wet subsamples a portion of homogenized sample is set in a tray and dried at less than 60°C until dry. The sample is then particle size reduced with an automated crusher or mortar and pestle, typically to <2 mm. Further size reduction may be needed for particular tests.

ALS Canada Ltd.

QUALITY CONTROL REPORT

Work Order	: **VA22C0370**	Page	: 1 of 14
Amendment	: **1**		
Client	: Mount Polley Mining Corporation	Laboratory	: Vancouver - Environmental
Contact	: Kala Ivens	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 30-Aug-2022 10:50
PO	: 5590008044 Q2 2022	Date Analysis Commenced	: 08-Sep-2022
C-O-C number	: ----	Issue Date	: 23-Nov-2022 22:09
Sampler	: P. Rosette, Sarah -Latimer 250-790-2215 Ext 2112		
Site	: ----		
Quote number	: VA22-MPMC100-005 - Minnow Environmental-Sediment Quality		
No. of samples received	: 84		
No. of samples analysed	: 28		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Reference Material (RM) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

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General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Physical Tests (QC Lot: 638498)											
VA22C0370-057	QUL-LNF1_SE-1_2022-08	moisture	----	E144	0.25	%	22.2	22.4	0.966%	20%	----
Physical Tests (QC Lot: 639723)											
RG2201202-076	Anonymous	moisture	----	E144	0.25	%	20.1	24.2	18.3%	20%	----
Physical Tests (QC Lot: 640203)											
VA22C0370-057	QUL-LNF1_SE-1_2022-08	pH (1:2 soil:water)	----	E108	0.10	pH units	8.38	8.43	0.595%	10%	----
Physical Tests (QC Lot: 640209)											
VA22C0370-073	POL-S_SE-2_2022-08	pH (1:2 soil:water)	----	E108	0.10	pH units	7.57	7.57	0.00%	10%	----
Anions and Nutrients (QC Lot: 639719)											
VA22C0370-062	QUL-LREF1_SE-1_2022-08	nitrogen, total	7727-37-9	E366	0.020	%	0.078	0.102	0.024	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 644811)											
VA22C0370-078	BOL-S_SE-2_2022-08	nitrogen, total	7727-37-9	E366	0.020	%	0.341	0.338	0.884%	20%	----
Inorganics (QC Lot: 639720)											
VA22C0370-062	QUL-LREF1_SE-1_2022-08	sulfur, total	7704-34-9	E399	0.050	%	530 mg/kg	0.054	0.001	Diff <2x LOR	----
Inorganics (QC Lot: 644812)											
VA22C0370-078	BOL-S_SE-2_2022-08	sulfur, total	7704-34-9	E399	0.050	%	2810 mg/kg	0.359	0.078	Diff <2x LOR	----
Metals (<63 µm) (QC Lot: 635467)											
VA22C0370-057	QUL-LNF1_SE-1_2022-08	mercury	7439-97-6	E510A	0.0050	mg/kg	0.0842	0.0860	2.19%	40%	----
Metals (<63 µm) (QC Lot: 635468)											
VA22C0370-057	QUL-LNF1_SE-1_2022-08	aluminum	7429-90-5	E440A	50	mg/kg	10400	10800	3.01%	40%	----
		antimony	7440-36-0	E440A	0.10	mg/kg	0.48	0.46	0.02	Diff <2x LOR	----
		arsenic	7440-38-2	E440A	0.050	mg/kg	14.3	13.7	4.07%	30%	----
		barium	7440-39-3	E440A	0.50	mg/kg	83.2	84.6	1.66%	40%	----
		beryllium	7440-41-7	E440A	0.10	mg/kg	0.41	0.44	0.02	Diff <2x LOR	----
		bismuth	7440-69-9	E440A	0.10	mg/kg	0.12	0.12	0.007	Diff <2x LOR	----
		boron	7440-42-8	E440A	5.0	mg/kg	6.4	6.0	0.4	Diff <2x LOR	----
		cadmium	7440-43-9	E440A	0.020	mg/kg	0.183	0.223	19.9%	30%	----
		calcium	7440-70-2	E440A	50	mg/kg	15800	16000	1.34%	30%	----
		chromium	7440-47-3	E440A	0.50	mg/kg	68.6	61.2	11.4%	30%	----
		cobalt	7440-48-4	E440A	0.10	mg/kg	40.8	38.0	7.10%	30%	----

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Metals (<63 µm) (QC Lot: 635468) - continued											
VA22C0370-057	QUL-LNF1_SE-1_2022-08	copper	7440-50-8	E440A	0.50	mg/kg	693	725	4.58%	30%	----
		iron	7439-89-6	E440A	50	mg/kg	291000	264000	9.81%	30%	----
		lead	7439-92-1	E440A	0.10	mg/kg	6.46	6.73	4.19%	40%	----
		lithium	7439-93-2	E440A	2.0	mg/kg	11.8	12.3	0.5	Diff <2x LOR	----
		magnesium	7439-95-4	E440A	10	mg/kg	5690	5980	4.89%	30%	----
		manganese	7439-96-5	E440A	0.20	mg/kg	945	918	2.84%	30%	----
		molybdenum	7439-98-7	E440A	0.10	mg/kg	2.23	2.16	3.53%	40%	----
		nickel	7440-02-0	E440A	0.50	mg/kg	25.6	24.7	3.49%	30%	----
		phosphorus	7723-14-0	E440A	50	mg/kg	1500	1520	0.810%	30%	----
		potassium	7440-09-7	E440A	100	mg/kg	710	750	4.74%	40%	----
		selenium	7782-49-2	E440A	0.10	mg/kg	1.18	1.20	1.12%	30%	----
		silver	7440-22-4	E440A	0.050	mg/kg	0.391	0.434	10.4%	40%	----
		sodium	7440-23-5	E440A	50	mg/kg	365	358	1.94%	40%	----
		strontium	7440-24-6	E440A	0.10	mg/kg	78.1	77.8	0.366%	40%	----
		thallium	7440-28-0	E440A	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		tin	7440-31-5	E440A	0.20	mg/kg	1.83	1.59	13.9%	40%	----
		titanium	7440-32-6	E440A	1.0	mg/kg	1870	1710	9.14%	40%	----
		uranium	7440-61-1	E440A	0.050	mg/kg	1.45	1.08	29.3%	30%	----
		vanadium	7440-62-2	E440A	0.20	mg/kg	1140	1030	10.5%	30%	----
		zinc	7440-66-6	E440A	1.0	mg/kg	94.2	91.2	3.21%	30%	----
		zirconium	7440-67-7	E440A	1.0	mg/kg	5.6	5.2	0.4	Diff <2x LOR	----
Metals (<63 µm) (QC Lot: 636186)											
VA22C0370-077	BOL-S_SE-1_2022-08	aluminum	7429-90-5	E440A	50	mg/kg	9710	9690	0.258%	40%	----
		antimony	7440-36-0	E440A	0.10	mg/kg	0.41	0.40	0.006	Diff <2x LOR	----
		arsenic	7440-38-2	E440A	0.050	mg/kg	3.92	3.92	0.0775%	30%	----
		barium	7440-39-3	E440A	0.50	mg/kg	124	126	2.08%	40%	----
		beryllium	7440-41-7	E440A	0.10	mg/kg	0.36	0.36	0.002	Diff <2x LOR	----
		bismuth	7440-69-9	E440A	0.10	mg/kg	<0.10	<0.10	0	Diff <2x LOR	----
		boron	7440-42-8	E440A	5.0	mg/kg	9.1	8.9	0.2	Diff <2x LOR	----
		cadmium	7440-43-9	E440A	0.020	mg/kg	0.136	0.133	2.21%	30%	----
		calcium	7440-70-2	E440A	50	mg/kg	7850	8120	3.32%	30%	----
		chromium	7440-47-3	E440A	0.50	mg/kg	19.9	19.9	0.00269%	30%	----
		cobalt	7440-48-4	E440A	0.10	mg/kg	4.60	4.63	0.829%	30%	----
		copper	7440-50-8	E440A	0.50	mg/kg	100	98.5	1.90%	30%	----

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Metals (<63 µm) (QC Lot: 636186) - continued											
VA22C0370-077	BOL-S_SE-1_2022-08	iron	7439-89-6	E440A	50	mg/kg	12000	12000	0.721%	30%	----
		lead	7439-92-1	E440A	0.10	mg/kg	2.83	2.80	1.25%	40%	----
		lithium	7439-93-2	E440A	2.0	mg/kg	5.7	5.6	0.08	Diff <2x LOR	----
		magnesium	7439-95-4	E440A	10	mg/kg	2810	2820	0.450%	30%	----
		manganese	7439-96-5	E440A	0.20	mg/kg	384	403	4.64%	30%	----
		molybdenum	7439-98-7	E440A	0.10	mg/kg	1.27	1.21	4.53%	40%	----
		nickel	7440-02-0	E440A	0.50	mg/kg	11.5	11.4	1.27%	30%	----
		phosphorus	7723-14-0	E440A	50	mg/kg	694	751	7.79%	30%	----
		potassium	7440-09-7	E440A	100	mg/kg	750	730	2.46%	40%	----
		selenium	7782-49-2	E440A	0.10	mg/kg	1.11	0.93	18.0%	30%	----
		silver	7440-22-4	E440A	0.050	mg/kg	0.100	0.094	0.006	Diff <2x LOR	----
		sodium	7440-23-5	E440A	50	mg/kg	248	248	0.2	Diff <2x LOR	----
		strontium	7440-24-6	E440A	0.10	mg/kg	78.8	83.3	5.58%	40%	----
		thallium	7440-28-0	E440A	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		tin	7440-31-5	E440A	0.20	mg/kg	0.33	0.31	0.02	Diff <2x LOR	----
		titanium	7440-32-6	E440A	1.0	mg/kg	578	561	3.07%	40%	----
		uranium	7440-61-1	E440A	0.050	mg/kg	1.13	1.12	0.977%	30%	----
		vanadium	7440-62-2	E440A	0.20	mg/kg	35.3	35.6	0.718%	30%	----
		zinc	7440-66-6	E440A	1.0	mg/kg	29.8	29.2	1.84%	30%	----
		zirconium	7440-67-7	E440A	1.0	mg/kg	3.7	3.8	0.1	Diff <2x LOR	----
Metals (<63 µm) (QC Lot: 636187)											
VA22C0370-077	BOL-S_SE-1_2022-08	mercury	7439-97-6	E510A	0.0050	mg/kg	0.0906	0.0834	8.33%	40%	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 638498)						
moisture	----	E144	0.25	%	<0.25	----
Physical Tests (QCLot: 639723)						
moisture	----	E144	0.25	%	<0.25	----
Anions and Nutrients (QCLot: 639719)						
nitrogen, total	7727-37-9	E366	0.02	%	<0.020	----
Anions and Nutrients (QCLot: 644811)						
nitrogen, total	7727-37-9	E366	0.02	%	<0.020	----
Inorganics (QCLot: 639720)						
sulfur, total	7704-34-9	E399	0.05	%	<0.050	----
Inorganics (QCLot: 644812)						
sulfur, total	7704-34-9	E399	0.05	%	<0.050	----
Metals (<63 µm) (QCLot: 635467)						
mercury	7439-97-6	E510A	0.005	mg/kg	<0.0050	----
Metals (<63 µm) (QCLot: 635468)						
aluminum	7429-90-5	E440A	50	mg/kg	<50	----
antimony	7440-36-0	E440A	0.1	mg/kg	<0.10	----
arsenic	7440-38-2	E440A	0.05	mg/kg	<0.050	----
barium	7440-39-3	E440A	0.5	mg/kg	<0.50	----
beryllium	7440-41-7	E440A	0.1	mg/kg	<0.10	----
bismuth	7440-69-9	E440A	0.1	mg/kg	<0.10	----
boron	7440-42-8	E440A	5	mg/kg	<5.0	----
cadmium	7440-43-9	E440A	0.02	mg/kg	<0.020	----
calcium	7440-70-2	E440A	50	mg/kg	<50	----
chromium	7440-47-3	E440A	0.5	mg/kg	<0.50	----
cobalt	7440-48-4	E440A	0.1	mg/kg	<0.10	----
copper	7440-50-8	E440A	0.5	mg/kg	<0.50	----
iron	7439-89-6	E440A	50	mg/kg	<50	----
lead	7439-92-1	E440A	0.1	mg/kg	<0.10	----
lithium	7439-93-2	E440A	2	mg/kg	<2.0	----
magnesium	7439-95-4	E440A	10	mg/kg	<10	----
manganese	7439-96-5	E440A	0.2	mg/kg	<0.20	----
molybdenum	7439-98-7	E440A	0.1	mg/kg	<0.10	----

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (<63 µm) (QCLot: 635468) - continued						
nickel	7440-02-0	E440A	0.5	mg/kg	<0.50	----
phosphorus	7723-14-0	E440A	50	mg/kg	<50	----
potassium	7440-09-7	E440A	100	mg/kg	<100	----
selenium	7782-49-2	E440A	0.1	mg/kg	<0.10	----
silver	7440-22-4	E440A	0.05	mg/kg	<0.050	----
sodium	7440-23-5	E440A	50	mg/kg	<50	----
strontium	7440-24-6	E440A	0.1	mg/kg	<0.10	----
thallium	7440-28-0	E440A	0.05	mg/kg	<0.050	----
tin	7440-31-5	E440A	0.2	mg/kg	<0.20	----
titanium	7440-32-6	E440A	1	mg/kg	<1.0	----
uranium	7440-61-1	E440A	0.05	mg/kg	<0.050	----
vanadium	7440-62-2	E440A	0.2	mg/kg	<0.20	----
zinc	7440-66-6	E440A	1	mg/kg	<1.0	----
zirconium	7440-67-7	E440A	1	mg/kg	<1.0	----
Metals (<63 µm) (QCLot: 636186)						
aluminum	7429-90-5	E440A	50	mg/kg	<50	----
antimony	7440-36-0	E440A	0.1	mg/kg	<0.10	----
arsenic	7440-38-2	E440A	0.05	mg/kg	<0.050	----
barium	7440-39-3	E440A	0.5	mg/kg	<0.50	----
beryllium	7440-41-7	E440A	0.1	mg/kg	<0.10	----
bismuth	7440-69-9	E440A	0.1	mg/kg	<0.10	----
boron	7440-42-8	E440A	5	mg/kg	<5.0	----
cadmium	7440-43-9	E440A	0.02	mg/kg	<0.020	----
calcium	7440-70-2	E440A	50	mg/kg	<50	----
chromium	7440-47-3	E440A	0.5	mg/kg	<0.50	----
cobalt	7440-48-4	E440A	0.1	mg/kg	<0.10	----
copper	7440-50-8	E440A	0.5	mg/kg	<0.50	----
iron	7439-89-6	E440A	50	mg/kg	<50	----
lead	7439-92-1	E440A	0.1	mg/kg	<0.10	----
lithium	7439-93-2	E440A	2	mg/kg	<2.0	----
magnesium	7439-95-4	E440A	10	mg/kg	<10	----
manganese	7439-96-5	E440A	0.2	mg/kg	<0.20	----
molybdenum	7439-98-7	E440A	0.1	mg/kg	<0.10	----
nickel	7440-02-0	E440A	0.5	mg/kg	<0.50	----
phosphorus	7723-14-0	E440A	50	mg/kg	<50	----

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (<63 µm) (QCLot: 636186) - continued						
potassium	7440-09-7	E440A	100	mg/kg	<100	----
selenium	7782-49-2	E440A	0.1	mg/kg	<0.10	----
silver	7440-22-4	E440A	0.05	mg/kg	<0.050	----
sodium	7440-23-5	E440A	50	mg/kg	<50	----
strontium	7440-24-6	E440A	0.1	mg/kg	<0.10	----
thallium	7440-28-0	E440A	0.05	mg/kg	<0.050	----
tin	7440-31-5	E440A	0.2	mg/kg	<0.20	----
titanium	7440-32-6	E440A	1	mg/kg	<1.0	----
uranium	7440-61-1	E440A	0.05	mg/kg	<0.050	----
vanadium	7440-62-2	E440A	0.2	mg/kg	<0.20	----
zinc	7440-66-6	E440A	1	mg/kg	<1.0	----
zirconium	7440-67-7	E440A	1	mg/kg	<1.0	----
Metals (<63 µm) (QCLot: 636187)						
mercury	7439-97-6	E510A	0.005	mg/kg	<0.0050	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 638498)									
moisture	----	E144	0.25	%	50 %	100	90.0	110	----
Physical Tests (QCLot: 639723)									
moisture	----	E144	0.25	%	50 %	97.4	90.0	110	----
Physical Tests (QCLot: 640203)									
pH (1:2 soil:water)	----	E108	----	pH units	6.86 pH units	100	97.0	103	----
Physical Tests (QCLot: 640209)									
pH (1:2 soil:water)	----	E108	----	pH units	6.86 pH units	101	97.0	103	----
Anions and Nutrients (QCLot: 639719)									
nitrogen, total	7727-37-9	E366	0.02	%	22.37 %	101	90.0	110	----
Anions and Nutrients (QCLot: 644811)									
nitrogen, total	7727-37-9	E366	0.02	%	22.37 %	99.5	90.0	110	----
Inorganics (QCLot: 639720)									
sulfur, total	7704-34-9	E399	0.05	%	12.81 %	101	90.0	110	----
Inorganics (QCLot: 644812)									
sulfur, total	7704-34-9	E399	0.05	%	12.81 %	97.8	90.0	110	----
Metals (<63 µm) (QCLot: 635467)									
mercury	7439-97-6	E510A	0.005	mg/kg	0.1 mg/kg	104	80.0	120	----
Metals (<63 µm) (QCLot: 635468)									
aluminum	7429-90-5	E440A	50	mg/kg	200 mg/kg	109	80.0	120	----
antimony	7440-36-0	E440A	0.1	mg/kg	100 mg/kg	109	80.0	120	----
arsenic	7440-38-2	E440A	0.05	mg/kg	100 mg/kg	105	80.0	120	----
barium	7440-39-3	E440A	0.5	mg/kg	25 mg/kg	100	80.0	120	----
beryllium	7440-41-7	E440A	0.1	mg/kg	10 mg/kg	101	80.0	120	----
bismuth	7440-69-9	E440A	0.1	mg/kg	100 mg/kg	101	80.0	120	----
boron	7440-42-8	E440A	5	mg/kg	100 mg/kg	97.5	80.0	120	----
cadmium	7440-43-9	E440A	0.02	mg/kg	10 mg/kg	102	80.0	120	----
calcium	7440-70-2	E440A	50	mg/kg	5000 mg/kg	104	80.0	120	----
chromium	7440-47-3	E440A	0.5	mg/kg	25 mg/kg	100	80.0	120	----
cobalt	7440-48-4	E440A	0.1	mg/kg	25 mg/kg	101	80.0	120	----
copper	7440-50-8	E440A	0.5	mg/kg	25 mg/kg	100	80.0	120	----

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Metals (<63 µm) (QCLot: 635468) - continued									
iron	7439-89-6	E440A	50	mg/kg	100 mg/kg	109	80.0	120	----
lead	7439-92-1	E440A	0.1	mg/kg	50 mg/kg	104	80.0	120	----
lithium	7439-93-2	E440A	2	mg/kg	25 mg/kg	99.1	80.0	120	----
magnesium	7439-95-4	E440A	10	mg/kg	5000 mg/kg	107	80.0	120	----
manganese	7439-96-5	E440A	0.2	mg/kg	25 mg/kg	101	80.0	120	----
molybdenum	7439-98-7	E440A	0.1	mg/kg	25 mg/kg	104	80.0	120	----
nickel	7440-02-0	E440A	0.5	mg/kg	50 mg/kg	102	80.0	120	----
phosphorus	7723-14-0	E440A	50	mg/kg	1000 mg/kg	101	80.0	120	----
potassium	7440-09-7	E440A	100	mg/kg	5000 mg/kg	107	80.0	120	----
selenium	7782-49-2	E440A	0.1	mg/kg	100 mg/kg	97.9	80.0	120	----
silver	7440-22-4	E440A	0.05	mg/kg	10 mg/kg	93.6	80.0	120	----
sodium	7440-23-5	E440A	50	mg/kg	5000 mg/kg	107	80.0	120	----
strontium	7440-24-6	E440A	0.1	mg/kg	25 mg/kg	107	80.0	120	----
thallium	7440-28-0	E440A	0.05	mg/kg	100 mg/kg	103	80.0	120	----
tin	7440-31-5	E440A	0.2	mg/kg	50 mg/kg	103	80.0	120	----
titanium	7440-32-6	E440A	1	mg/kg	25 mg/kg	98.4	80.0	120	----
uranium	7440-61-1	E440A	0.05	mg/kg	0.5 mg/kg	105	80.0	120	----
vanadium	7440-62-2	E440A	0.2	mg/kg	50 mg/kg	104	80.0	120	----
zinc	7440-66-6	E440A	1	mg/kg	50 mg/kg	99.4	80.0	120	----
zirconium	7440-67-7	E440A	1	mg/kg	10 mg/kg	100	80.0	120	----
Metals (<63 µm) (QCLot: 636186)									
aluminum	7429-90-5	E440A	50	mg/kg	200 mg/kg	103	80.0	120	----
antimony	7440-36-0	E440A	0.1	mg/kg	100 mg/kg	101	80.0	120	----
arsenic	7440-38-2	E440A	0.05	mg/kg	100 mg/kg	99.3	80.0	120	----
barium	7440-39-3	E440A	0.5	mg/kg	25 mg/kg	95.7	80.0	120	----
beryllium	7440-41-7	E440A	0.1	mg/kg	10 mg/kg	97.8	80.0	120	----
bismuth	7440-69-9	E440A	0.1	mg/kg	100 mg/kg	96.9	80.0	120	----
boron	7440-42-8	E440A	5	mg/kg	100 mg/kg	92.0	80.0	120	----
cadmium	7440-43-9	E440A	0.02	mg/kg	10 mg/kg	99.2	80.0	120	----
calcium	7440-70-2	E440A	50	mg/kg	5000 mg/kg	98.2	80.0	120	----
chromium	7440-47-3	E440A	0.5	mg/kg	25 mg/kg	96.2	80.0	120	----
cobalt	7440-48-4	E440A	0.1	mg/kg	25 mg/kg	97.3	80.0	120	----
copper	7440-50-8	E440A	0.5	mg/kg	25 mg/kg	96.0	80.0	120	----
iron	7439-89-6	E440A	50	mg/kg	100 mg/kg	99.3	80.0	120	----
lead	7439-92-1	E440A	0.1	mg/kg	50 mg/kg	100	80.0	120	----
lithium	7439-93-2	E440A	2	mg/kg	25 mg/kg	95.0	80.0	120	----

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Metals (<63 µm) (QCLot: 636186) - continued									
magnesium	7439-95-4	E440A	10	mg/kg	5000 mg/kg	106	80.0	120	----
manganese	7439-96-5	E440A	0.2	mg/kg	25 mg/kg	97.1	80.0	120	----
molybdenum	7439-98-7	E440A	0.1	mg/kg	25 mg/kg	101	80.0	120	----
nickel	7440-02-0	E440A	0.5	mg/kg	50 mg/kg	97.3	80.0	120	----
phosphorus	7723-14-0	E440A	50	mg/kg	1000 mg/kg	100	80.0	120	----
potassium	7440-09-7	E440A	100	mg/kg	5000 mg/kg	100.0	80.0	120	----
selenium	7782-49-2	E440A	0.1	mg/kg	100 mg/kg	97.6	80.0	120	----
silver	7440-22-4	E440A	0.05	mg/kg	10 mg/kg	89.0	80.0	120	----
sodium	7440-23-5	E440A	50	mg/kg	5000 mg/kg	101	80.0	120	----
strontium	7440-24-6	E440A	0.1	mg/kg	25 mg/kg	105	80.0	120	----
thallium	7440-28-0	E440A	0.05	mg/kg	100 mg/kg	98.7	80.0	120	----
tin	7440-31-5	E440A	0.2	mg/kg	50 mg/kg	97.8	80.0	120	----
titanium	7440-32-6	E440A	1	mg/kg	25 mg/kg	92.1	80.0	120	----
uranium	7440-61-1	E440A	0.05	mg/kg	0.5 mg/kg	99.8	80.0	120	----
vanadium	7440-62-2	E440A	0.2	mg/kg	50 mg/kg	99.5	80.0	120	----
zinc	7440-66-6	E440A	1	mg/kg	50 mg/kg	98.1	80.0	120	----
zirconium	7440-67-7	E440A	1	mg/kg	10 mg/kg	98.7	80.0	120	----
Metals (<63 µm) (QCLot: 636187)									
mercury	7439-97-6	E510A	0.005	mg/kg	0.1 mg/kg	105	80.0	120	----

Reference Material (RM) Report

A Reference Material (RM) is a homogenous material with known and well-established analyte concentrations. RMs are processed in an identical manner to test samples, and are used to monitor and control the accuracy and precision of a test method for a typical sample matrix. RM results are expressed as percent recovery of the target analyte concentration. RM targets may be certified target concentrations provided by the RM supplier, or may be ALS long-term mean values (for empirical test methods).

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Physical Tests (QCLot: 640203)									
	RM	pH (1:2 soil:water)	----	E108	8.13 pH units	99.9	96.0	104	----
Physical Tests (QCLot: 640209)									
	RM	pH (1:2 soil:water)	----	E108	8.13 pH units	99.9	96.0	104	----
Anions and Nutrients (QCLot: 639719)									
	RM	nitrogen, total	7727-37-9	E366	0.11 %	97.3	80.0	120	----
Anions and Nutrients (QCLot: 644811)									
	RM	nitrogen, total	7727-37-9	E366	0.11 %	98.2	80.0	120	----
Inorganics (QCLot: 639720)									
	RM	sulfur, total	7704-34-9	E399	0.352 %	105	70.0	130	----
Inorganics (QCLot: 644812)									
	RM	sulfur, total	7704-34-9	E399	0.352 %	90.0	70.0	130	----
Metals (<63 µm) (QCLot: 635467)									
	SCP SS-2	mercury	7439-97-6	E510A	0.059 mg/kg	103	70.0	130	----
Metals (<63 µm) (QCLot: 635468)									
	SCP SS-2	aluminum	7429-90-5	E440A	9817 mg/kg	113	70.0	130	----
	SCP SS-2	antimony	7440-36-0	E440A	3.99 mg/kg	96.3	70.0	130	----
	SCP SS-2	arsenic	7440-38-2	E440A	3.73 mg/kg	102	70.0	130	----
	SCP SS-2	barium	7440-39-3	E440A	105 mg/kg	101	70.0	130	----
	SCP SS-2	beryllium	7440-41-7	E440A	0.349 mg/kg	113	70.0	130	----
	SCP SS-2	boron	7440-42-8	E440A	8.5 mg/kg	126	40.0	160	----
	SCP SS-2	cadmium	7440-43-9	E440A	0.91 mg/kg	96.4	70.0	130	----
	SCP SS-2	calcium	7440-70-2	E440A	31082 mg/kg	102	70.0	130	----
	SCP SS-2	chromium	7440-47-3	E440A	101 mg/kg	115	70.0	130	----
	SCP SS-2	cobalt	7440-48-4	E440A	6.9 mg/kg	103	70.0	130	----
	SCP SS-2	copper	7440-50-8	E440A	123 mg/kg	99.5	70.0	130	----
	SCP SS-2	iron	7439-89-6	E440A	23558 mg/kg	107	70.0	130	----
	SCP SS-2	lead	7439-92-1	E440A	267 mg/kg	102	70.0	130	----
	SCP SS-2	lithium	7439-93-2	E440A	9.5 mg/kg	106	70.0	130	----

Sub-Matrix:

Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Reference Material (RM) Report				
					RM Target Concentration	Recovery (%) RM	Recovery Limits (%) Low	Recovery Limits (%) High	Qualifier
Metals (<63 µm) (QCLot: 635468) - continued									
	SCP SS-2	magnesium	7439-95-4	E440A	5509 mg/kg	110	70.0	130	----
	SCP SS-2	manganese	7439-96-5	E440A	269 mg/kg	110	70.0	130	----
	SCP SS-2	molybdenum	7439-98-7	E440A	1.03 mg/kg	106	70.0	130	----
	SCP SS-2	nickel	7440-02-0	E440A	26.7 mg/kg	103	70.0	130	----
	SCP SS-2	phosphorus	7723-14-0	E440A	752 mg/kg	95.0	70.0	130	----
	SCP SS-2	potassium	7440-09-7	E440A	1587 mg/kg	125	70.0	130	----
	SCP SS-2	sodium	7440-23-5	E440A	797 mg/kg	110	70.0	130	----
	SCP SS-2	strontium	7440-24-6	E440A	86.1 mg/kg	106	70.0	130	----
	SCP SS-2	thallium	7440-28-0	E440A	0.0786 mg/kg	103	40.0	160	----
	SCP SS-2	tin	7440-31-5	E440A	10.6 mg/kg	101	70.0	130	----
	SCP SS-2	titanium	7440-32-6	E440A	839 mg/kg	120	70.0	130	----
	SCP SS-2	uranium	7440-61-1	E440A	0.52 mg/kg	119	70.0	130	----
	SCP SS-2	vanadium	7440-62-2	E440A	32.7 mg/kg	110	70.0	130	----
	SCP SS-2	zinc	7440-66-6	E440A	297 mg/kg	98.7	70.0	130	----
	SCP SS-2	zirconium	7440-67-7	E440A	5.73 mg/kg	102	70.0	130	----
Metals (<63 µm) (QCLot: 636186)									
	SCP SS-2	aluminum	7429-90-5	E440A	9817 mg/kg	108	70.0	130	----
	SCP SS-2	antimony	7440-36-0	E440A	3.99 mg/kg	94.3	70.0	130	----
	SCP SS-2	arsenic	7440-38-2	E440A	3.73 mg/kg	96.3	70.0	130	----
	SCP SS-2	barium	7440-39-3	E440A	105 mg/kg	95.9	70.0	130	----
	SCP SS-2	beryllium	7440-41-7	E440A	0.349 mg/kg	102	70.0	130	----
	SCP SS-2	boron	7440-42-8	E440A	8.5 mg/kg	117	40.0	160	----
	SCP SS-2	cadmium	7440-43-9	E440A	0.91 mg/kg	101	70.0	130	----
	SCP SS-2	calcium	7440-70-2	E440A	31082 mg/kg	99.5	70.0	130	----
	SCP SS-2	chromium	7440-47-3	E440A	101 mg/kg	114	70.0	130	----
	SCP SS-2	cobalt	7440-48-4	E440A	6.9 mg/kg	100	70.0	130	----
	SCP SS-2	copper	7440-50-8	E440A	123 mg/kg	96.4	70.0	130	----
	SCP SS-2	iron	7439-89-6	E440A	23558 mg/kg	99.7	70.0	130	----
	SCP SS-2	lead	7439-92-1	E440A	267 mg/kg	105	70.0	130	----
	SCP SS-2	lithium	7439-93-2	E440A	9.5 mg/kg	103	70.0	130	----
	SCP SS-2	magnesium	7439-95-4	E440A	5509 mg/kg	108	70.0	130	----

Sub-Matrix:

Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Reference Material (RM) Report: RM Target Concentration	Recovery (%): RM	Recovery Limits (%): Low	Recovery Limits (%): High	Qualifier
Metals (<63 µm) (QCLot: 636186) - continued									
	SCP SS-2	manganese	7439-96-5	E440A	269 mg/kg	105	70.0	130	----
	SCP SS-2	molybdenum	7439-98-7	E440A	1.03 mg/kg	108	70.0	130	----
	SCP SS-2	nickel	7440-02-0	E440A	26.7 mg/kg	99.0	70.0	130	----
	SCP SS-2	phosphorus	7723-14-0	E440A	752 mg/kg	91.7	70.0	130	----
	SCP SS-2	potassium	7440-09-7	E440A	1587 mg/kg	120	70.0	130	----
	SCP SS-2	sodium	7440-23-5	E440A	797 mg/kg	107	70.0	130	----
	SCP SS-2	strontium	7440-24-6	E440A	86.1 mg/kg	104	70.0	130	----
	SCP SS-2	thallium	7440-28-0	E440A	0.0786 mg/kg	97.0	40.0	160	----
	SCP SS-2	tin	7440-31-5	E440A	10.6 mg/kg	85.6	70.0	130	----
	SCP SS-2	titanium	7440-32-6	E440A	839 mg/kg	103	70.0	130	----
	SCP SS-2	uranium	7440-61-1	E440A	0.52 mg/kg	105	70.0	130	----
	SCP SS-2	vanadium	7440-62-2	E440A	32.7 mg/kg	104	70.0	130	----
	SCP SS-2	zinc	7440-66-6	E440A	297 mg/kg	96.8	70.0	130	----
	SCP SS-2	zirconium	7440-67-7	E440A	5.73 mg/kg	85.4	70.0	130	----
Metals (<63 µm) (QCLot: 636187)									
	SCP SS-2	mercury	7439-97-6	E510A	0.059 mg/kg	104	70.0	130	----

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

Affix ALS barcode label here (lab use only)

COC Numb

Environmental Division Vancouver
Work Order Reference
VA22C0370

Telephone : + 1 604 253 4188

Report To	Contact and company name below will appear on the final report	Report Format / Distribution	Select Service Level Below - Please confirm all E&P TATs with you
Company:	Mount Polley Mining Corporation	Select Report Format: ☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)	Regular [R] ☑ Standard TAT if received by
Contact:	Gabriel Holmes	Quality Control (QC) Report with Report ☑ YES ☐ NO	PRIORITY (Business Days): 4 day [P4] ☐ / 3 day [P3] ☐ / 2 day [P2] ☐ — EMERGENCY: 1 B / Sa / St
Phone:	236-317-4939	☐ Compare Results to Criteria on Report - provide details below if box checked	
	Company address below will appear on the final report	Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX	Date and Time Required for all E&P TATs:
Street:	PO Box 12	Email 1 or Fax kala.ivens@mountpolley.com	For tests that can not be performed according to the service level
City/Province:	Likely, BC	Email 2 gabriel.holmes@mountpolley.com	Analysis Reque
Postal Code:	V0L 1N0	Email 3 pstecko@minnow.ca; kbatchelar@minnow.ca	
Invoice To	Same as Report To ☑ YES ☐ NO	Invoice Distribution	Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below
	Copy of Invoice with Report ☐ YES ☐ NO	Select Invoice Distribution: ☑ EMAIL ☑ MAIL ☐ FAX	
Company:		Email 1 or Fax gabriel.holmes@mountpolley.com	
Contact:		Email 2	

Project Information		Oil and Gas Required Fields (client use)	
ALS Account # / Quote #:	VA22-MPMC100-005	AFE/Cost Center:	PO#
Job #:		Major/Minor Code:	Routing Code:
PO / AFE:		Requisitioner:	
LSD:		Location:	
ALS Lab Work Order # (lab use only)		ALS Contact: Can Dang	Sampler: P. Schnurr S. Latimer

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Metals in Sediment by CRC ICPMS (<63µm) (E440A)	TC, TOC, TIC in Soil (<63 µm) (S351A)	pH by Meter (1:2 Soil:Water Extraction) (E108)	Total Nitrogen by combustion method (0.02 %) (E366)	Total Sulfur by high temperature combustion (E399)	Particle Size Analysis (Pipette+gravel) (S184EA)	Moisture Content by Gravimetry (E144)	Mercury in Sediment by CVAAS (<63µm) (E510A)	Number of Containers
1	QUL-LNF1_SE-1_2022-08 A	23-Aug-22	—	Sediment	R	R	R	R	R	R	R	R	1
2	QUL-LNF1_SE-1_2022-08 B	23-Aug-22	—	Sediment									1
3	QUL-LNF1_SE-2_2022-08 A	23-Aug-22	—	Sediment	R	R	R	R	R	R	R	R	1
4	QUL-LNF1_SE-2_2022-08 B	23-Aug-22	—	Sediment									1
5	QUL-LNF1_SE-3_2022-08 A →	23-Aug-22	—	Sediment	R	R	R	R	R	R	R	R	1
6	QUL-LNF1_SE-3_2022-08 B →	23-Aug-22	—	Sediment									1
7	QUL-LNF1_SE-4_2022-08 A	23-Aug-22	—	Sediment	R	R	R	R	R	R	R	R	1
8	QUL-LNF1_SE-4_2022-08 B	23-Aug-22	—	Sediment									1
9	QUL-LNF1_SE-5_2022-08 A	23-Aug-22	—	Sediment	R	R	R	R	R	R	R	R	1
10	QUL-LNF1_SE-5_2022-08 B	23-Aug-22	—	Sediment									1
11	QUL-LREF1_SE-1_2022-08 A	23-Aug-22	—	Sediment	R	R	R	R	R	R	R	R	1
12	QUL-LREF1_SE-1_2022-08 B	23-Aug-22	—	Sediment									1

Drinking Water (DW) Samples[1] (client use)	Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)
Are samples taken from a Regulated DW System? ☐ YES ☐ NO	
Are samples for human drinking water use? ☐ NO	Samples consist of 2 jars (denoted -A and -B). Please combine and homogenize the 2 jars before running analyses. Analyses are intended for the homogenized samples so are only listed for once for each A&B pairing.

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐
Ice Packs ☑ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐
Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
			12	12	

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: S. Latimer	Date: 29 Aug 22	Time: 0810	Received by:	Date:	Time:	Received by: JC	Date: AUG 30 2022	Time: 1050am

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

OCTOBER 2015 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

ALS Environmental

www.alsglobal.com

Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878

Affix ALS barcode label here (lab use only)

COC Number: 15 -

Report To	Contact and company name below will appear on the final report
Company:	Mount Polley Mining Corporation
Contact:	Gabriel Holmes
Phone:	236-317-4939
	Company address below will appear on the final report
Street:	PO Box 12
City/Province:	Likely, BC
Postal Code:	V0L 1N0
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☐ NO
Company:	
Contact:	

Report Format / Distribution

Select Report Format: ☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)

Quality Control (QC) Report with Report ☑ YES ☐ NO

☐ Compare Results to Criteria on Report - provide details below if box checked

Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax	kala.ivens@mountpolley.com
Email 2	gabriel.holmes@mountpolley.com
Email 3	pstecko@minnow.ca; kbatchelar@minnow.ca

Invoice Distribution

Select Invoice Distribution: ☑ EMAIL ☑ MAIL ☐ FAX

Email 1 or Fax	gabriel.holmes@mountpolley.com
Email 2	

Project Information

ALS Account # / Quote #:	VA22-MPMC100-005
Job #:	
PO / AFE:	
LSD:	

Oil and Gas Required Fields (client use)

AFE/Cost Center:	PO#:
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Lab Work Order # (lab use only):

ALS Contact: Can Dang

Sampler: P. Schnurr, S. Lahmer

Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply

Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days)		EMERGENCY	
	4 day [P4] ☐		1 Business day [E1] ☐
	3 day [P3] ☐		Same Day, Weekend or Statutory holiday [E0] ☐
	2 day [P2] ☐		

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm

For tests that can not be performed according to the service level selected, you will be contacted.

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Metals in Sediment by CRC ICPMS (<63µm) (E440A)	TC, TOC, TIC in Soil (<63 µm) (S351A)	pH by Meter (1:2 Soil:Water Extraction) (E108)	Total Nitrogen by combustion method (0.02 %) (E366)	Total Sulfur by high temperature combustion (E399)	Particle Size Analysis (Pipette+gravel) (S184EA)	Moisture Content by Gravimetry (E144)	Mercury in Sediment by CVAAS (<63µm) (E510A)	Number of Containers
13	QUL-LREF1_SE-2_2022-08 A	23-Aug-22	—	Sediment	R	R	R	R	R	R	R	R	1
14	QUL-LREF1_SE-2_2022-08 B	23-Aug-22	—	Sediment									1
15	QUL-LREF1_SE-3_2022-08 A	23-Aug-22	—	Sediment	R	R	R	R	R	R	R	R	1
16	QUL-LREF1_SE-3_2022-08 B	23-Aug-22	—	Sediment									1
17	QUL-LREF1_SE-4_2022-08 A	23-Aug-22	—	Sediment	R	R	R	R	R	R	R	R	1
18	QUL-LREF1_SE-4_2022-08 B	23-Aug-22	—	Sediment									1
19	QUL-LREF1_SE-5_2022-08 A	23-Aug-22	—	Sediment	R	R	R	R	R	R	R	R	1
20	QUL-LREF1_SE-5_2022-08 B	23-Aug-22	—	Sediment									1
21	QUL-PNF_SE-1_2022-08 A	26-Aug-22	—	Sediment	R	R	R	R	R	R	R	R	1
22	QUL-PNF_SE-1_2022-08 B	26-Aug-22	—	Sediment									1
23	QUL-PNF_SE-2_2022-08 A	26-Aug-22	—	Sediment	R	R	R	R	R	R	R	R	1
24	QUL-PNF_SE-2_2022-08 B	26-Aug-22	—	Sediment									1

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☐ NO

Are samples for human drinking water use? ☐ NO

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

Samples consist of 2 jars (denoted -A and -B). Please combine and homogenize the 2 jars before running analyses. Analyses are intended for the homogenized samples so are only listed for once for each A&B pairing.

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice Packs ☐ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
			12	12	

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: S. Lahmer	Date: 29-Aug-22	Time: 0610	Received by:	Date:	Time:	Received by: JC	Date: AUG 30 2022	Time: 10:50am

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

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1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form**.

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Affix ALS barcode label here (lab use only)

COC Number: 15 -

Report To	Contact and company name below will appear on the final report
Company:	Mount Polley Mining Corporation
Contact:	Gabriel Holmes
Phone:	236-317-4939
	Company address below will appear on the final report
Street:	PO Box 12
City/Province:	Likely, BC
Postal Code:	V0L 1N0
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☐ NO
Company:	
Contact:	

Report Format / Distribution

Select Report Format: ☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)

Quality Control (QC) Report with Report ☑ YES ☐ NO

☐ Compare Results to Criteria on Report - provide details below if box checked

Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: kala.ivens@mountpolley.com

Email 2: gabriel.holmes@mountpolley.com

Email 3: pstecko@minnow.ca; kbatchelar@minnow.ca

Invoice Distribution

Select Invoice Distribution: ☑ EMAIL ☑ MAIL ☐ FAX

Email 1 or Fax: gabriel.holmes@mountpolley.com

Email 2:

Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply

Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days)		EMERGENCY	
4 day [P4]	☐	1 Business day [E1]	☐
3 day [P3]	☐	Same Day, Weekend or Statutory holiday [E0]	☐
2 day [P2]	☐		

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm

For tests that can not be performed according to the service level selected, you will be contacted.

Project Information

ALS Account # / Quote #: VA22-MPMC100-005

Job #:

PO / AFE:

LSD:

Oil and Gas Required Fields (client use)

AFE/Cost Center: PO#:

Major/Minor Code: Routing Code:

Requisitioner:

Location:

ALS Lab Work Order # (lab use only):

ALS Contact: Can Dang

Sampler: P.Schnurr S.Lahmer

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Metals in Sediment by CRC ICPMS (<63µm) (E440A)	TC, TOC, TIC in Soil (<63 µm) (S351A)	pH by Meter (1:2 Soil:Water Extraction) (E108)	Total Nitrogen by combustion method (0.02 %) (E386)	Total Sulfur by high temperature combustion (E399)	Particle Size Analysis (Pipette-gravel) (S184EA)	Moisture Content by Gravimetry (E144)	Mercury in Sediment by CVAAS (<63µm) (E510A)	Number of Containers
37	POL-S_SE-4_2022-08 A	25-Aug-22	—	Sediment	R	R	R	R	R	R	R	R	1
38	POL-S_SE-4_2022-08 B	25-Aug-22	—	Sediment									1
39	POL-S_SE-5_2022-08 A	25-Aug-22	—	Sediment	R	R	R	R	R	R	R	R	1
40	POL-S_SE-5_2022-08 B	25-Aug-22	—	Sediment									1
41	BOL-S_SE-1_2022-08 A	24-Aug-22	—	Sediment	R	R	R	R	R	R	R	R	1
42	BOL-S_SE-1_2022-08 B	24-Aug-22	—	Sediment									1
43	BOL-S_SE-2_2022-08 A	24-Aug-22	—	Sediment	R	R	R	R	R	R	R	R	1
44	BOL-S_SE-2_2022-08 B	24-Aug-22	—	Sediment									1
45	BOL-S_SE-3_2022-08 A	24-Aug-22	—	Sediment	R	R	R	R	R	R	R	R	1
46	BOL-S_SE-3_2022-08 B	24-Aug-22	—	Sediment									1
47	BOL-S_SE-4_2022-08 A	24-Aug-22	—	Sediment	R	R	R	R	R	R	R	R	1
48	BOL-S_SE-4_2022-08 B	24-Aug-22	—	Sediment									1

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☐ NO

Are samples for human drinking water use? ☐ NO

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

Samples consist of 2 jars (denoted -A and -B). Please combine and homogenize the 2 jars before running analyses. Analyses are intended for the homogenized samples so are only listed for once for each A&B pairing.

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice Packs ☐ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
			12	12	

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: S.Lahmer	Date: 29 Aug 22	Time: 0810	Received by:	Date:	Time:	Received by: JC	Date: AUG 30 2022	Time: 1055am

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

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ALS Environmental

www.alsglobal.com

Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878

Affix ALS barcode label here (lab use only)

COC Number: 15 -

Report To	Contact and company name below will appear on the final report
Company:	Mount Polley Mining Corporation
Contact:	Gabriel Holmes
Phone:	236-317-4939
	Company address below will appear on the final report
Street:	PO Box 12
City/Province:	Likely, BC
Postal Code:	V0L 1N0
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☐ NO
Company:	
Contact:	

Report Format / Distribution

Select Report Format: ☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)
Quality Control (QC) Report with Report ☑ YES ☐ NO
☐ Compare Results to Criteria on Report - provide details below if box checked
Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax: kala.ivens@mountpolley.com
Email 2: gabriel.holmes@mountpolley.com
Email 3: pstecko@minnow.ca; kbatchelar@minnow.ca

Invoice Distribution

Select Invoice Distribution: ☑ EMAIL ☑ MAIL ☐ FAX
Email 1 or Fax: gabriel.holmes@mountpolley.com
Email 2:

Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply

Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days)		EMERGENCY	
4 day [P4]	☐	1 Business day [E1]	☐
3 day [P3]	☐	Same Day, Weekend or Statutory holiday [E0]	☐
2 day [P2]	☐		

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm

For tests that can not be performed according to the service level selected, you will be contacted.

Project Information

ALS Account # / Quote #: VA22-MPMC100-005
Job #:
PO / AFE:
LSD:

Oil and Gas Required Fields (client use)

AFE/Cost Center: PO#
Major/Minor Code: Routing Code:
Requisitioner:
Location:

ALS Lab Work Order # (lab use only):

ALS Contact: Can Dang Sampler: P.Schnurr S.Latimer

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Metals in Sediment by CRC ICPMS (<63µm) (E440A)	TC, TOC, TIC in Soil (<63 µm) (S351A)	pH by Meter (1:2 Soil:Water Extraction) (E108)	Total Nitrogen by combustion method (0.02 %) (E386)	Total Sulfur by high temperature combustion (E399)	Particle Size Analysis (Pipette+gravel) (S184EA)	Moisture Content by Gravimetry (E144)	Mercury in Sediment by CVAAS (<63µm) (E510A)	Number of Containers
49	BOL-S_SE-5_2022-08 A	24-Aug-22	—	Sediment	R	R	R	R	R	R	R	R	1
50	BOL-S_SE-5_2022-08 B	24-Aug-22	—	Sediment									1
51	QUL-LNF1_SE-2X_2022-08 A ← (no spaces)	23-Aug-22	—	Sediment	R	R	R	R	R	R	R	R	1
52	QUL-LNF1_SE-2X_2022-08 B ← (no spaces)	23-Aug-22	—	Sediment									1
53	POL-S_SE-1X_2022-08 A ← (no spaces)	25-Aug-22	—	Sediment	R	R	R	R	R	R	R	R	1
54	POL-S_SE-1X_2022-08 B ← (no spaces)	25-Aug-22	—	Sediment									1
55	QUL-PNF_SE-2X_2022-08 A ← (no spaces)	26-Aug-22	—	Sediment	R	R	R	R	R	R	R	R	1
56	QUL-PNF_SE-2X_2022-08 B ← (no spaces)	26-Aug-22	—	Sediment									1

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☐ NO

Are samples for human drinking water use? ☐ NO

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

Samples consist of 2 jars (denoted -A and -B). Please combine and homogenize the 2 jars before running analyses. Analyses are intended for the homogenized samples so are only listed for once for each A&B pairing.

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐
Ice Packs ☐ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐
Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C	
			12	12

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: S.Latimer	Date: 29-Aug-22	Time: 0810	Received by:	Date:	Time:	Received by: JC	Date: AUG 30 2022	Time: 1055a

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1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form**.

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Affix ALS barcode label here (lab use only)

COC Numb

Environmental Division Vancouver

Work Order Reference VA22C0370

Telephone : +1 604 253 4188

Report To	Contact and company name below will appear on the final report
Company:	Mount Polley Mining Corporation
Contact:	Gabriel Holmes
Phone:	236-317-4939
	Company address below will appear on the final report
Street:	PO Box 12
City/Province:	Likely, BC
Postal Code:	V0L 1N0
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☐ NO
Company:	
Contact:	

Report Format / Distribution

Select Report Format: ☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)

Quality Control (QC) Report with Report ☑ YES ☐ NO

☐ Compare Results to Criteria on Report - provide details below if box checked

Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: kala.ivens@mountpolley.com

Email 2: gabriel.holmes@mountpolley.com

Email 3: pstecko@minnow.ca; kbatchelar@minnow.ca

Invoice Distribution

Select Invoice Distribution: ☑ EMAIL ☑ MAIL ☐ FAX

Email 1 or Fax: gabriel.holmes@mountpolley.com

Email 2:

Select Service Level Below - Please confirm all E&P TATs with you

Regular [R] ☑ Standard TAT if received by

PRIORITY (Business Days)		EMERGENCY	
4 day [P4]	☐	1 B	
3 day [P3]	☐	Sa	
2 day [P2]	☐	St	

Date and Time Required for all E&P TATs:

For tests that can not be performed according to the service level s

Project Information

ALS Account # / Quote #: VA22-MPMC100-005

Job #:

PO / AFE:

LSD:

Oil and Gas Required Fields (client use)

AFE/Cost Center: PO#:

Major/Minor Code: Routing Code:

Requisitioner:

Location:

ALS Lab Work Order # (lab use only):

ALS Contact: Can Dang

Sampler: P. Schnurr S. Latimer

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Metals in Sediment by CRC ICPMS (<63µm) (E440A)	TC, TOC, TIC in Soil (<63 µm) (S351A)	pH by Meter (1:2 Soil:Water Extraction) (E108)	Total Nitrogen by combustion method (0.02 %) (E366)	Total Sulfur by high temperature combustion (E399)	Particle Size Analysis (Pipette+gravel) (S184EA)	Moisture Content by Gravimetry (E144)	Mercury in Sediment by CVAAS (<63µm) (E510A)	Number of Containers
1	QUL-LNF1_SE-1_2022-08 A	23-Aug-22	—	Sediment	R	R	R	R	R	R	R	R	1
2	QUL-LNF1_SE-1_2022-08 B	23-Aug-22	—	Sediment									1
3	QUL-LNF1_SE-2_2022-08 A	23-Aug-22	—	Sediment	R	R	R	R	R	R	R	R	1
4	QUL-LNF1_SE-2_2022-08 B	23-Aug-22	—	Sediment									1
5	QUL-LNF1_SE-3_2022-08 A	23-Aug-22	—	Sediment	R	R	R	R	R	R	R	R	1
6	QUL-LNF1_SE-3_2022-08 B	23-Aug-22	—	Sediment									1
7	QUL-LNF1_SE-4_2022-08 A	23-Aug-22	—	Sediment	R	R	R	R	R	R	R	R	1
8	QUL-LNF1_SE-4_2022-08 B	23-Aug-22	—	Sediment									1
9	QUL-LNF1_SE-5_2022-08 A	23-Aug-22	—	Sediment	R	R	R	R	R	R	R	R	1
10	QUL-LNF1_SE-5_2022-08 B	23-Aug-22	—	Sediment									1
11	QUL-LREF1_SE-1_2022-08 A	23-Aug-22	—	Sediment	R	R	R	R	R	R	R	R	1
12	QUL-LREF1_SE-1_2022-08 B	23-Aug-22	—	Sediment									1

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☐ NO

Are samples for human drinking water use? ☐ NO

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

Samples consist of 2 jars (denoted -A and -B). Please combine and homogenize the 2 jars before running analyses. Analyses are intended for the homogenized samples so are only listed for once for each A&B pairing.

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice Packs ☑ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
			12	12	

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: S. Latimer	Date: 29 Aug 22	Time: 0810	Received by:	Date:	Time:	Received by: JC	Date: AUG 30 2022	Time: 1050am

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

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Canada Toll Free: 1 800 668 9878

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COC Number: 15 -

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Contact:	Gabriel Holmes
Phone:	236-317-4939
	Company address below will appear on the final report
Street:	PO Box 12
City/Province:	Likely, BC
Postal Code:	V0L 1N0
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☐ NO
Company:	
Contact:	

Report Format / Distribution	
Select Report Format:	☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)
Quality Control (QC) Report with Report	☑ YES ☐ NO
☐ Compare Results to Criteria on Report - provide details below if box checked	
Select Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	kala.ivens@mountpolley.com
Email 2	gabriel.holmes@mountpolley.com
Email 3	pstecko@minnow.ca; kbatchelar@minnow.ca

Invoice Distribution	
Select Invoice Distribution:	☑ EMAIL ☑ MAIL ☐ FAX
Email 1 or Fax	gabriel.holmes@mountpolley.com
Email 2	

Project Information		Oil and Gas Required Fields (client use)	
ALS Account # / Quote #:	VA22-MPMC100-005	AFE/Cost Center:	PO#:
Job #:		Major/Minor Code:	Routing Code:
PO / AFE:		Requisitioner:	
LSD:		Location:	
ALS Lab Work Order # (lab use only)		ALS Contact: Can Dang	Sampler: P. Schnurr, S. Lahmer

Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply

Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days)		EMERGENCY	
4 day [P4]	☐	1 Business day [E1]	☐
3 day [P3]	☐	Same Day, Weekend or Statutory holiday [E0]	☐
2 day [P2]	☐		

Date and Time Required for all E&P TATs: dd-mmm-yy hh mm

For tests that can not be performed according to the service level selected, you will be contacted.

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Metals in Sediment by CRC ICPMS (<63µm) (E440A)	TC, TOC, TIC in Soil (<63 µm) (S351A)	pH by Meter (1:2 Soil:Water Extraction) (E108)	Total Nitrogen by combustion method (0.02 %) (E366)	Total Sulfur by high temperature combustion (E399)	Particle Size Analysis (Pipette+gravel) (S184EA)	Moisture Content by Gravimetry (E144)	Mercury in Sediment by CVAAS (<63µm) (E510A)	Number of Containers
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14	QUL-LREF1_SE-2_2022-08 B	23-Aug-22	—	Sediment									1
15	QUL-LREF1_SE-3_2022-08 A	23-Aug-22	—	Sediment	R	R	R	R	R	R	R	R	1
16	QUL-LREF1_SE-3_2022-08 B	23-Aug-22	—	Sediment									1
17	QUL-LREF1_SE-4_2022-08 A	23-Aug-22	—	Sediment	R	R	R	R	R	R	R	R	1
18	QUL-LREF1_SE-4_2022-08 B	23-Aug-22	—	Sediment									1
19	QUL-LREF1_SE-5_2022-08 A	23-Aug-22	—	Sediment	R	R	R	R	R	R	R	R	1
20	QUL-LREF1_SE-5_2022-08 B	23-Aug-22	—	Sediment									1
21	QUL-PNF_SE-1_2022-08 A	26-Aug-22	—	Sediment	R	R	R	R	R	R	R	R	1
22	QUL-PNF_SE-1_2022-08 B	26-Aug-22	—	Sediment									1
23	QUL-PNF_SE-2_2022-08 A	26-Aug-22	—	Sediment	R	R	R	R	R	R	R	R	1
24	QUL-PNF_SE-2_2022-08 B	26-Aug-22	—	Sediment									1

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☐ NO

Are samples for human drinking water use? ☐ NO

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

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SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice Packs ☐ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
			12	12	

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: S. Lahmer	Date: 29-Aug-22	Time: 0810	Received by:	Date:	Time:	Received by: JC	Date: AUG 30 2022	Time: 10 50am

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Contact:	Gabriel Holmes
Phone:	236-317-4939
	Company address below will appear on the final report
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City/Province:	Likely, BC
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Email 2: gabriel.holmes@mountpolley.com

Email 3: pstecko@minnow.ca; kbatchelar@minnow.ca

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ALS Contact: Can Dang

Sampler: P.Schnurr S.Lahmer

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25	QUL-PNF_SE-3_2022-08 A	27-Aug-22	—	Sediment	R	R	R	R	R	R	R	R	1
26	QUL-PNF_SE-3_2022-08 B	27-Aug-22	—	Sediment									1
27	QUL-PNF_SE-4_2022-08 A	27-Aug-22	—	Sediment	R	R	R	R	R	R	R	R	1
28	QUL-PNF_SE-4_2022-08 B	27-Aug-22	—	Sediment									1
29	QUL-PNF_SE-5_2022-08 A	27-Aug-22	—	Sediment	R	R	R	R	R	R	R	R	1
30	QUL-PNF_SE-5_2022-08 B	27-Aug-22	—	Sediment									1
31	POL-S_SE-1_2022-08 A	25-Aug-22	—	Sediment	R	R	R	R	R	R	R	R	1
32	POL-S_SE-1_2022-08 B	25-Aug-22	—	Sediment									1
33	POL-S_SE-2_2022-08 A	25-Aug-22	—	Sediment	R	R	R	R	R	R	R	R	1
34	POL-S_SE-2_2022-08 B	25-Aug-22	—	Sediment									1
35	POL-S_SE-3_2022-08 A	25-Aug-22	—	Sediment	R	R	R	R	R	R	R	R	1
36	POL-S_SE-3_2022-08 B	25-Aug-22	—	Sediment									1

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Are samples taken from a Regulated DW System? ☐ YES ☐ NO

Are samples for human drinking water use? ☐ NO

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Ice Packs ☐ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
			12	12	

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Sampler: P.Schnurr S.Lahmer

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37	POL-S_SE-4_2022-08 A	25 -Aug-22	—	Sediment	R	R	R	R	R	R	R	R						1
38	POL-S_SE-4_2022-08 B	25 -Aug-22	—	Sediment														1
39	POL-S_SE-5_2022-08 A	25 -Aug-22	—	Sediment	R	R	R	R	R	R	R	R						1
40	POL-S_SE-5_2022-08 B	25 -Aug-22	—	Sediment														1
41	BOL-S_SE-1_2022-08 A	24 -Aug-22	—	Sediment	R	R	R	R	R	R	R	R						1
42	BOL-S_SE-1_2022-08 B	24 -Aug-22	—	Sediment														1
43	BOL-S_SE-2_2022-08 A	24 -Aug-22	—	Sediment	R	R	R	R	R	R	R	R						1
44	BOL-S_SE-2_2022-08 B	24 -Aug-22	—	Sediment														1
45	BOL-S_SE-3_2022-08 A	24 -Aug-22	—	Sediment	R	R	R	R	R	R	R	R						1
46	BOL-S_SE-3_2022-08 B	24 -Aug-22	—	Sediment														1
47	BOL-S_SE-4_2022-08 A	24 -Aug-22	—	Sediment	R	R	R	R	R	R	R	R						1
48	BOL-S_SE-4_2022-08 B	24 -Aug-22	—	Sediment														1

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50	BOL-S_SE-5_2022-08 B	24-Aug-22	—	Sediment									1
51	QUL-LNF1_SE-2_X_2022-08 A ← (no spaces)	23-Aug-22	—	Sediment	R	R	R	R	R	R	R	R	1
52	QUL-LNF1_SE-2_X_2022-08 B ← (no spaces)	23-Aug-22	—	Sediment									1
53	POL-S_SE-1_X_2022-08 A ← (no spaces)	25-Aug-22	—	Sediment	R	R	R	R	R	R	R	R	1
54	POL-S_SE-1_X_2022-08 B ← (no spaces)	25-Aug-22	—	Sediment									1
55	QUL-PNF_SE-2_X_2022-08 A ← (no spaces)	26-Aug-22	—	Sediment	R	R	R	R	R	R	R	R	1
56	QUL-PNF_SE-2_X_2022-08 B ← (no spaces)	26-Aug-22	—	Sediment									1

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Cooling Initiated ☐

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SEDIMENT TOXICITY

Nautilus Environmental Laboratory Report WO221769

(Finalized November 10, 2022)

Toxicity testing using *Hyalella azteca*

Sample collected August 2022

Final Report

November 10, 2022

Submitted to: **Minnow Environmental Inc**
Victoria, BC

8664 Commerce Court, Burnaby, BC V5A 4N7

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APPENDIX A – *Hyalella azteca* Toxicity Test Data

APPENDIX B – Analytical Chemistry

APPENDIX C – Chain-of-Custody Forms

SIGNATURE PAGE

Report By:
Rachel Sakurdeep, B. Sc.
Laboratory Biologist

Reviewed By:
Mimi Tran, Dipl. T.
Biologist

Report By:
Carley Winter, B. Sc.
Laboratory Biologist

This report has been prepared by Nautilus Environmental Company Inc. based on data and/or samples provided by our client and the results of this study are for their sole benefit. Any reliance on the data by a third party is at the sole and exclusive risk of that party. The results presented here relate only to the samples tested.

SUMMARY

Sample and Test Type Information

Sample ID	QUL-LNF1, QUL-LREF1, POL-S, BOL-S
Sample collection date	August 23-25, 2022
Sample receipt date	August 30, 2022
Sample receipt temperature	11.2°C
Test types	14-d *Hyalella azteca* survival and growth

Results

Endpoint	**Sample ID**				
(mean + SD)	**Control Sediment**	**QUL-LNF1**	**QUL-LREF1**	**POL-S**	**BOL-S**
H. azteca survival (%)	96.0 ± 5.5	54.0 ± 23.0*β	84.0 ± 5.5	94.0 ± 8.9	90.0 ± 7.1
H. azteca growth (mg)	0.19 ± 0.03	0.04 ± 0.01*β	0.23 ± 0.04	0.24 ± 0.03	0.21 ± 0.01

SD = Standard Deviation

(*) Indicates a statistically significant effect relative to control sediment

(β) Indicates a statistically significant effect relative to the reference sediment QUL-LREF1

1.0 INTRODUCTION

Nautilus Environmental Company Inc. conducted freshwater sediment toxicity tests for Minnow Environmental Inc. Samples QUL-LNF1, QUL-LREF1, POL-S, BOL-S were collected between August 23-25, 2022, and delivered to the Nautilus Environmental Laboratory in Burnaby, BC on August 30, 2022. Each sample was transported in five 500-mL containers, and each was received at a temperature of 11.2°C. The samples were stored in the dark at 4 ± 2°C prior to testing. The 14-d *Hyalella azteca* survival and growth sediment toxicity test was conducted on these samples.

This report describes the results of these toxicity tests. Copies of raw laboratory data sheets and statistical analyses for each sample are provided in Appendix A, analytical chemistry is provided in Appendix B and the chain-of-custody forms are provided in Appendix C.

2.0 METHODS

Methods for the toxicity test are summarized in Table 1. Testing was conducted according to procedures described by Environment Canada (2017). Statistical analyses for all tests were performed using CETIS (Tidepool Scientific Software, 2021).

Ammonia concentrations were measured in-house three times per week on the reference sediment samples QUL-LREF1 and BOL-S to ensure that un-ionized ammonia was below 0.2 mg/L N. Subsamples of dissolved copper were collected at test termination as requested by the client, and sent to ALS Environmental (Burnaby, BC) for analysis. Samples of overlying water were collected at test initiation and termination, and then analyzed by ALS Environmental for total ammonia concentration. Analytical results are provided in Appendix B.

Table 1. Summary of test conditions: *Hyalella azteca* survival and growth test.

Test species	*Hyalella azteca*
Organism source	Aquatic BioSystems, Fort Collins, CO
Organism age	7- to 9-days old
Test type	Static
Test duration	14 days
Test vessel	375-mL glass container
Test volume	100 mL sediment; 175 mL overlying water
Test replicates	5 per sample
Number of organisms	10 per replicate
Control water	Reconstituted water; recipe from Borgmann (1996)
Test solution renewal	None
Test temperature	23 ± 1°C
Feeding	0.75 mL of YCT and 1.35 mg of Tetramin per replicate daily
Light intensity	500 to 1000 lux at water surface
Photoperiod	16 hours light/8 hours dark
Aeration	Continuous gentle aeration
Test measurements	Temperature, dissolved oxygen, pH and conductivity of overlying water measured daily; total ammonia of overlying water measured at test initiation and termination; unionized ammonia measured three times weekly in overlying water of reference sample
Test protocol	Environment Canada (2017), EPS 1/RM/33
Statistical software	CETIS Version 2.1.1
Test endpoints	Survival and dry weight
Test acceptability criteria for controls	≥80% survival and ≥0.1 mg/amphipod dry weight
Reference toxicant	Sodium chloride (NaCl)

3.0 RESULTS

Results of the toxicity tests are summarized in Table 2. Adverse effects were observed on the survival and growth of *H. azteca* in sample QUL-LNF1 compared to the control sediment and the reference sediment, QUL-LREF1. No significant effects were observed on survival or growth in the remaining samples.

Measured total overlying ammonia concentrations in the *H. azteca* tests are summarized in Table 3. These concentrations were at levels that are not expected to cause adverse effects to the species. Unionized ammonia measurements on the reference samples were below 0.2 mg/L throughout the test.

Table 2. Results: *Hyalella azteca* survival and growth test.

Sample ID	Mean ± SD	
	Survival (%)	Average Dry Weight (mg/org)
Control Sediment	96.0 ± 5.5	0.19 ± 0.03
QUL-LNF1	54.0 ± 23.0*β	0.04 ± 0.01*β
QUL-LREF1	84.0 ± 5.5	0.23 ± 0.04
POL-S	94.0 ± 8.9	0.24 ± 0.03
BOL-S	90.0 ± 7.1	0.21 ± 0.01

SD = Standard Deviation

(*) Indicates a statistically significant effect relative to control sediment

(β) Indicates a statistically significant effect relative to the reference sediment QUL-LREF1

Table 3. Summary of total overlying ammonia concentrations (mg/L N) measured in the *Hyalella azteca* toxicity tests.

Sample ID	Day 0	Day 14
Control	0.0195	0.145
QUL-LNF1	0.0891	0.0232
QUL-LREF1	0.419	0.0699
POL-S	0.0899	0.0322
BOL-S	0.380	0.0545

Table 4. Summary of dissolved copper (mg/L Cu) measured in the *Hyalella azteca* toxicity tests at Day 14.

Replicate	Control	QUL-LNF1	QUL-LREF1	POL-S	BOL-S
A	0.00436	0.0936	0.00343	0.0361	0.00518
B	0.00396	0.00281	0.0775	0.0289	0.00434
C	0.00410	0.105	0.00297	0.0277	0.00494
D	0.00379	0.0728	0.00413	0.0233	0.00588
E	0.00424	0.0939	0.00240	0.0231	0.00439

4.0 QA/QC

The health history of the test organisms used in the exposures was acceptable and met the requirement of the Environment Canada protocol. *H. azteca* organisms were not received from the supplier on the date requested and therefore were not held for the required one-day holding period before test initiation. The delay did not appear to affect the test results as water quality was within the acceptable ranges and there were no mortalities upon arrival. During the test, pH measurements exceeded 8.0 in both reference sites, QUL_LREF1 and BOL-S; the client requested the test remain static, unless the unionized ammonia was greater than 0.2mg/L. There were no other deviations from the test methodology. Uncertainties associated with the test are best described by the standard deviations around the mean.

Results of the reference toxicant test conducted during the testing program are summarized in Table 5. Results for the test fell within the acceptable range for organism performance of mean and two standard deviations, based on historical results obtained by the laboratory with this test. Thus, the sensitivity of the organisms used in the test was appropriate.

Table 5. Reference toxicant test result.

Test Species	Endpoint	Historical Mean (2 SD Range)	CV (%)	Test Date
H. azteca	Survival (LC50): 6.1 g/L NaCl	6.5 (5.1 – 8.3)	12	September 8, 2022

SD = Standard Deviation, CV = Coefficient of Variation, LC = Lethal Concentration

5.0 REFERENCES

Borgmann, U. 1996. Systematic Analysis of Aqueous Ion Requirements of *Hyalella azteca*: A Standard Artificial Medium Including the Essential Bromide Ion, Arch. Environ. Contam. Toxicol. 30: 356- 363 pp.

Environment Canada. 2017. Biological test method: test for survival and growth in sediment and water using the freshwater amphipod, *Hyalella azteca*. EPS 1/RM/33, Second Edition, September 2017.

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APPENDIX A – *Hyalella azteca* Toxicity Test Data

Hyalella azteca Sediment Test Summary Sheet

Client: Minnow Environmental Inc
Work Order No.: 221769

Start Date: Sept 8/22
Set up by: CZW / RZS

Sample Information:

Sample ID: various - see below
Sample Date: August 23-25, 2022
Date Received: August 30, 2022
Sample Volume: 5x500mL per sample

Test Organism Information:

Species: *Hyalella azteca*
Supplier: Aquatic Biosystems
Date received: Sept 8, 2022
Age or size (Day 0): 7-9 days
% Mortality in 24 h prior to testing 0%

NaCl Reference Toxicant Results:

Reference Toxicant ID: HA232
Stock Solution ID: n/a
Date Initiated: sept 8/22

96-h LC50 (95% CL): 6.1 (4.9-7.5) g/L NaCl

96-h LC50 Reference Toxicant Mean and Range: 6.5 (5.1-8.3) g/L NaCl CV (%): 12 % ~~13%~~ CZW

Test Results:

Sample ID	Survival ± SD (%)	Average Dry Wt. ± SD (mg)
control sediment	96.0 ± 5.5	0.19 ± 0.03
QUL-LNF1	54.0 ± 23.0 (*)(B)	0.04 ± 0.01 (*)(B)
QUL-LREF1	84.0 ± 5.5	0.23 ± 0.04
POL-S	94.0 ± 8.9	0.24 ± 0.03
BOL-S	90.0 ± 7.1	0.21 ± 0.01
	±	±
	±	±
	±	±

(*) indicates a significant effect compared to control sediment
(B) indicates a significant effect compared to reference sediment, QUL-LREF1

Reviewed by: [signature] Date reviewed: ~~Sept 30~~, 22

Chronic *H. azteca* Sediment Toxicity Test Data Sheet

Freshwater Sediment Water Quality

Client: Minnow Environmental Inc.
Work Order No.: 221769

Start Date: Sept 8/22 ~~@ 1150h~~ CZW
Termination Date: Sept 22/22
CER #: 10
Test Organism: *Hyalella azteca*

Temperature (°C)

Sample ID	Day 0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Control Sediment	22.0	22.0	22.0	22.0	22.0	22.0	22.0	23.0	22.5	22.5	23.0	22.0	23.0	23.0	23.0
QUL-LNF1	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	22.5	↓	22.5	22.5	22.5
QUL-LREF1	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓
POL-S	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	23.0	↓	↓	↓	↓
BOL-S	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓					
Technician Initials	CZW	CZW	GM	KML	CZW	CZW	RZS	CZW	CZW	MML	KML	RZS	CZW	CZW	CZW

Thermometer: CER #6

Conductivity (µS)

Sample ID	Day 0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
control sediment	394	421	423	438	446	451	489	489	494	499	504	516	513	522	531
QUL-LNF1	413	437	448	462	468	480	556	560	568	575	585	598	586	597	6016
QUL-LREF1	440	470	495	523	530	543	562	581	6004	620	631	637	612	624	6033
POL-S	441	476	492	516	518	528	536	544	560	579	595	623	622	644	662
BOL-S	407	439	449	467	472	480	488	494	504	515	525	535	528	539	549
Technician Initials	CZW	CZW	GM	KML	CZW	CZW	RZS	CZW	CZW	MML	KML	RZS	CZW	CZW	CZW

Conductivity meter/probe: 3 / 3

Comments:

Reviewed by:

Date Reviewed: Sept 30, 2022

Chronic *H. azteca* Sediment Toxicity Test Data Sheet
Freshwater Sediment Water Quality

Client: Minnow Environmental
Work Order No.: 221769

Start Date: Sept 8/22 ~~@1150h~~ ow
Termination Date: Sept 22/22
CER #: 6
Test Organism: *Hyalella azteca*

Dissolved oxygen (mg/L)

Sample ID	Day														
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
control sediment	8.2	8.1	8.3	8.2	8.2	8.1	8.3	8.1	7.9	7.9	8.2	8.1	8.0	8.1	8.0
QUL-LNF1	8.3	8.2	8.4	8.3	8.3	8.2	8.4	8.2	7.9	7.8	8.3	8.3	8.1	8.1	8.0
QUL-LREF1	8.3	8.2	8.3	8.2	8.3	8.2	8.3	8.1	8.0	7.9	8.3	8.3	8.2	8.2	8.1
POL-S	8.3	8.2	8.3	8.3	8.3	8.2	8.4	8.2	8.0	7.9	8.3	8.3	8.2	8.2	8.1
BOL-S	8.3	8.3	8.3	8.3	8.3	8.2	8.4	8.2	8.1	7.9	8.3	8.3	8.2	8.2	8.1
Technician Initials	CZW	CZW	GM	KUL	CZW	CZW	RZS	CZW	CZW	UUL	KUL	RZS	CZW	CZW	CZW

DO meter/probe: 3 / 3

pH

Sample ID	Day														
	0	1	2	① 3	① 4	5 ⊛	6	7	8	9	10	11	12	13	14
control sediment	7.8	7.8	7.8	7.8	7.6	7.8	7.9	7.9	7.8	8.0	7.8	7.9	7.8	7.8	7.8
QUL-LNF1	7.9	8.0	7.8	7.9	7.9	8.2	8.2	8.2	8.2	8.3	8.2	8.3	8.2	8.2	8.2
QUL-LREF1	7.7	7.8	7.9	7.9	8.0	8.4	8.3	8.4	8.4	8.4	8.4	8.4	8.3	8.4	8.4
POL-S	8.0	7.9	8.0	8.0	7.9	8.4	8.3	8.3	8.3	8.4	8.3	8.4	8.4	8.4	8.4
BOL-S	8.0	8.0	7.9	7.9	7.9	8.4	8.3	8.3	8.3	8.3	8.2	8.3	8.3	8.3	8.3
Technician Initials	CZW	CZW	GM	KUL	RZS	CZW	RZS	CZW	CZW	UUL	KUL	RZS	CZW	CZW	CZW

pH meter/probe: 3 / 3

Light meter: lit-1

Light intensity (Lux): 500-910

Comments: ① pH meter/probe: 5/6 used ⊛ pH on day 5 confirmed w/ pH meter/probe 1/1

Reviewed by: [signature]

Date Reviewed: Sept. 30, 2022

H. azteca Sediment Toxicity Test Data Sheet

Freshwater Sediment 14-d Survival and Weight

Client: Minnow Environmental
Work Order No: 221769
Sample ID: various - see below

Start Date: Sept 8/22
Termination Date: sept 22/22
Test Organism: *Hyalella azteca*
Balance: 6

Sample ID	Pan No.	Rep	No. alive	No. dead	No. missing	Initials	Pan weight (mg)	Pan + organism (mg)	No. weighed	Initials
Control Sediment	1	A	9	1	0	CZW	991.47	992.92	9	CZW/CZW
	2	B	9	0	1		1000.92	1002.36	9	
	3	C	10		0		995.06	997.14	10	
	4	D					995.16	996.98		
	5	E	↓	↓	↓	↓	998.84	1000.98	↓	
QUL-LWF1	6	A	8	0	2	KV	1014.55	1014.92	8	
	7	B	5		5		1013.84	1014.10	5	
	8	C	5		5		1008.79	1008.98	5	
	9	D	7		3		1011.28	1011.60	7	
	10	E	2	↓	8	↓	1013.64	1013.70	2	
QUL-LREF	11	A	8 (*)	0	2	CZW	1004.67	1006.95	8	
	12	B	8		2	KYL	1035.80	1037.48	8	
	13	C	9		1	↓	1035.90	1038.16	9	
	14	D	9		1	CZW	1036.62	1038.68	9	
	15	E	8	↓	2	KYL	1028.06	1029.51	8	
	16	A	8	0	2	KYL	1027.81	1029.57	8	
POL-S	17	B	10		0		1027.02	1029.10	10	
	18	C	9		1		1036.97	1038.92	9	
	19	D	10		0		999.00	1001.63	10	
	20	E	10	↓	0	↓	1004.75	1007.48	10	↓

Date/time pan placed in oven: sept 8/22 @ 1430h
Date/time pan removed from oven: sept 9/22 @ 1430h

Date/time pan + organisms placed in oven: sept 22/22 @ 1230h
Date/time pan + organisms removed from oven: sept 23/22 @ 1230h

Comments: (*) live leech-like organism found in test jar
10% reweigh: pan 10: 1013.67mg; pan 20: 1007.45mg; pan 24: 1018.73mg

Reviewed by: [signature]

Date Reviewed: Sept. 30, 2022

H. azteca Sediment Toxicity Test Data Sheet

Freshwater Sediment 14-d Survival and Weight

Client: Minnow Environmental
Work Order No: 221769
Sample ID: various - see below

Start Date: Sept 8/22
Termination Date: Sept 22/22
Test Organism: *Hyalella azteca*
Balance: 6

Sample ID	Pan No.	Rep	No. alive	No. dead	No. missing	Initials	Pan weight (mg)	Pan + organism (mg)	No. weighed	Initials
~~Control Sediment~~	21	A	9	0	1	CZW	1005.04	1006.99	9	CZW/CZW
BOL-S	22	B	10	↓	0	↓	1010.75	1012.80	10	↓
	23	C	9①	↓	1	↓	1021.48	1023.40	9	↓
	24	D	9	↓	1	↓	1017.16	1018.82	9	↓
	25	E	8	↓	2	↓	993.35	995.05	8	↓
		A								
		B								
		C								
		D								
		E								
		A								
		B								
		C								
		D								
		E								
		A								
		B								
		C								
		D								
		E								

Date/time pan placed in oven: Sept 8/22 @ 1430h
Date/time pan removed from oven: Sept 9/22 @ 1430h

Date/time pan + organisms placed in oven: Sept 22/22 @ 1230h
Date/time pan + organisms removed from oven: Sept 23/22 @ 1230h

Comments: ① one organism smaller than others

Reviewed by: [signature]

Date Reviewed: Sept 30, 2022

CETIS Summary Report

Hyalella 14-d Survival and Growth Sediment Test — **Nautilus Environmental**

Batch ID:	04-8223-2973	**Test Type:**	Growth-Survival (~~10d~~) 14 CW	**Analyst:**	Carley Winter		
Start Date:	08 Sep-22	**Protocol:**	EC/EPS 1/RM/32	**Diluent:**	Reconstituted Water		
Ending Date:	22 Sep-22	**Species:**	Hyalella azteca	**Brine:**			
Test Length:	14d 0h	**Taxon:**	Malacostraca	**Source:**	Aquatic Biosystems, CO	**Age:**	7-9d

Sample ID:	10-7042-0697	**Code:**	Control Sed	**Project:**	
Sample Date:	08 Sep-22	**Material:**	Sediment Sample	**Source:**	Minnow Environmental
Receipt Date:	08 Sep-22	**CAS (PC):**		**Station:**	Control Sediment
Sample Age:	---	**Client:**	Minnow Environmental		

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
Control Sed	10-7042-0697	08 Sep-22	08 Sep-22	---	Minnow Environmental	
QUL-LNF1	00-4438-3904	23 Aug-22	30 Aug-22 10:40	16d 0h (11.2 °C)		
QUL-LREF1	13-7106-0450	23 Aug-22	30 Aug-22 10:40	16d 0h (11.2 °C)		
POL-S	05-8645-7879	25 Aug-22	30 Aug-22 10:40	14d 0h (11.2 °C)		
BOL-S	15-1832-2783	24 Aug-22	30 Aug-22 10:40	15d 0h (11.2 °C)		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
Control Sed	Sediment Sample	Minnow Environmental	Control Sediment	
QUL-LNF1	Sediment Sample	Minnow Environmental	QUL-LNF1	
QUL-LREF1	Sediment Sample	Minnow Environmental	QUL-LREF1	
POL-S	Sediment Sample	Minnow Environmental	POL-S	
BOL-S	Sediment Sample	Minnow Environmental	BOL-S	

Single Comparison Summary

Analysis ID	Endpoint	Comparison Method	P-Value	Comparison Result	S
05-5596-9208	10d Survival Rate	Fisher Exact/Bonferroni-Holm Test	<1.0E-05	QUL-LNF1 failed 10d survival rate	1
05-5596-9208	10d Survival Rate	Fisher Exact/Bonferroni-Holm Test	0.1375	QUL-LREF1 passed 10d survival rate	1
05-5596-9208	10d Survival Rate	Fisher Exact/Bonferroni-Holm Test	0.5000	POL-S passed 10d survival rate	1
05-5596-9208	10d Survival Rate	Fisher Exact/Bonferroni-Holm Test	0.4360	BOL-S passed 10d survival rate	1
11-8864-9223	Mean Dry Weight-mg	Dunnett Multiple Comparison Test	<1.0E-05	QUL-LNF1 failed mean dry weight-mg	1
11-8864-9223	Mean Dry Weight-mg	Dunnett Multiple Comparison Test	0.9999	QUL-LREF1 passed mean dry weight-mg	1
11-8864-9223	Mean Dry Weight-mg	Dunnett Multiple Comparison Test	1.0000	POL-S passed mean dry weight-mg	1
11-8864-9223	Mean Dry Weight-mg	Dunnett Multiple Comparison Test	0.9895	BOL-S passed mean dry weight-mg	1

14 ~~10d~~ Survival Rate Summary CW

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
Control Sed	N	5	0.9600	0.8920	1.0280	0.9000	1.0000	0.0245	0.0548	5.71%	0.00%
QUL-LNF1		5	0.5400	0.2541	0.8259	0.2000	0.8000	0.1030	0.2302	42.63%	43.75%
QUL-LREF1		5	0.8400	0.7720	0.9080	0.8000	0.9000	0.0245	0.0548	6.52%	12.50%
POL-S		5	0.9400	0.8289	1.0510	0.8000	1.0000	0.0400	0.0894	9.52%	2.08%
BOL-S		5	0.9000	0.8122	0.9878	0.8000	1.0000	0.0316	0.0707	7.86%	6.25%

Mean Dry Weight-mg Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
Control Sed	N	5	0.185	0.1535	0.2165	0.16	0.214	0.01135	0.02537	13.71%	0.00%
QUL-LNF1		5	0.04239	0.0318	0.05298	0.03	0.05199	0.003814	0.008527	20.12%	77.09%
QUL-LREF1		5	0.2312	0.1822	0.2803	0.1812	0.285	0.01767	0.0395	17.08%	-24.98%
POL-S		5	0.2361	0.1993	0.2729	0.208	0.273	0.01325	0.02963	12.55%	-27.62%
BOL-S		5	0.2064	0.1903	0.2225	0.1844	0.2167	0.005808	0.01299	6.29%	-11.55%

Analyst: CW QA: DB 10/3/22

Hyalella 14-d Survival and Growth Sediment Test **Nautilus Environmental**

14d Survival Rate Detail CZW MD5: F45C656FE4287E678399DA15D9403CE8

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
Control Sed	N	0.9000	0.9000	1.0000	1.0000	1.0000
QUL-LNF1		0.8000	0.5000	0.5000	0.7000	0.2000
QUL-LREF1		0.8000	0.8000	0.9000	0.9000	0.8000
POL-S		0.8000	1.0000	0.9000	1.0000	1.0000
BOL-S		0.9000	1.0000	0.9000	0.9000	0.8000

Mean Dry Weight-mg Detail MD5: E59EEFE7DCCA2AAF916BE721E9D935DE

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
Control Sed	N	0.1611	0.16	0.208	0.182	0.214
QUL-LNF1		0.04625	0.05199	0.038	0.04571	0.03
QUL-LREF1		0.285	0.21	0.2511	0.2289	0.1812
POL-S		0.22	0.208	0.2167	0.263	0.273
BOL-S		0.2167	0.205	0.2133	0.1844	0.2125

14d Survival Rate Binomials CZW

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
Control Sed	N	9/10	9/10	10/10	10/10	10/10
QUL-LNF1		8/10	5/10	5/10	7/10	2/10
QUL-LREF1		8/10	8/10	9/10	9/10	8/10
POL-S		8/10	10/10	9/10	10/10	10/10
BOL-S		9/10	10/10	9/10	9/10	8/10

CETIS Analytical Report

Hyalella 14-d Survival and Growth Sediment Test — **Nautilus Environmental**

Analysis ID:	05-5596-9208	**Endpoint:**	14d Survival Rate	**CETIS Version:**	CETISv2.1.1
Analyzed:	03 Oct-22 10:05	**Analysis:**	STP 2xK Contingency Tables	**Status Level:**	1
Edit Date:	28 Sep-22 11:14	**MD5 Hash:**	F45C656FE4287E678399DA15D9403CE8	**Editor ID:**	007-585-424-0
Batch ID:	04-8223-2973	**Test Type:**	Growth-Survival (14d)	**Analyst:**	Carley Winter
Start Date:	08 Sep-22	**Protocol:**	EC/EPS 1/RM/32	**Diluent:**	Reconstituted Water
Ending Date:	22 Sep-22	**Species:**	Hyalella azteca	**Brine:**	
Test Length:	14d 0h	**Taxon:**	Malacostraca	**Source:**	Aquatic Biosystems, CO **Age:** 7-9d

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
Control Sed	10-7042-0697	08 Sep-22	08 Sep-22	---	Minnow Environmental	
QUL-LNF1	00-4438-3904	23 Aug-22	30 Aug-22 10:40	16d 0h (11.2 °C)		
QUL-LREF1	13-7106-0450	23 Aug-22	30 Aug-22 10:40	16d 0h (11.2 °C)		
POL-S	05-8645-7879	25 Aug-22	30 Aug-22 10:40	14d 0h (11.2 °C)		
BOL-S	15-1832-2783	24 Aug-22	30 Aug-22 10:40	15d 0h (11.2 °C)		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
Control Sed	Sediment Sample	Minnow Environmental	Control Sediment	
QUL-LNF1	Sediment Sample	Minnow Environmental	QUL-LNF1	
QUL-LREF1	Sediment Sample	Minnow Environmental	QUL-LREF1	
POL-S	Sediment Sample	Minnow Environmental	POL-S	
BOL-S	Sediment Sample	Minnow Environmental	BOL-S	

Fisher Exact/Bonferroni-Holm Test

Sample I	vs	Sample II	Test Stat	P-Type	P-Value	Decision(α:5%)
Negative Control		QUL-LNF1*	0.0000	Exact	<1.0E-05	Significant Effect
		QUL-LREF1	0.0458	Exact	0.1375	Non-Significant Effect
		POL-S	0.5000	Exact	0.5000	Non-Significant Effect
		BOL-S	0.2180	Exact	0.4360	Non-Significant Effect

14d Survival Rate Frequencies

Sample	Code	NR	R	NR + R	Prop NR	Prop R	%Effect
Control Sed	N	48	2	50	0.9600	0.0400	0.00%
QUL-LNF1		27	23	50	0.5400	0.4600	43.75%
QUL-LREF1		42	8	50	0.8400	0.1600	12.50%
POL-S		47	3	50	0.9400	0.0600	2.08%
BOL-S		45	5	50	0.9000	0.1000	6.25%

14d Survival Rate Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
Control Sed	N	5	0.9600	0.8920	1.0000	1.0000	0.9000	1.0000	0.0245	5.71%	0.00%
QUL-LNF1		5	0.5400	0.2541	0.8259	0.5000	0.2000	0.8000	0.1030	42.63%	43.75%
QUL-LREF1		5	0.8400	0.7720	0.9080	0.8000	0.8000	0.9000	0.0245	6.52%	12.50%
POL-S		5	0.9400	0.8289	1.0000	1.0000	0.8000	1.0000	0.0400	9.52%	2.08%
BOL-S		5	0.9000	0.8122	0.9878	0.9000	0.8000	1.0000	0.0316	7.86%	6.25%

14d Survival Rate Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
Control Sed	N	0.9000	0.9000	1.0000	1.0000	1.0000
QUL-LNF1		0.8000	0.5000	0.5000	0.7000	0.2000
QUL-LREF1		0.8000	0.8000	0.9000	0.9000	0.8000
POL-S		0.8000	1.0000	0.9000	1.0000	1.0000
BOL-S		0.9000	1.0000	0.9000	0.9000	0.8000

Hyalella 14-d Survival and Growth Sediment Test

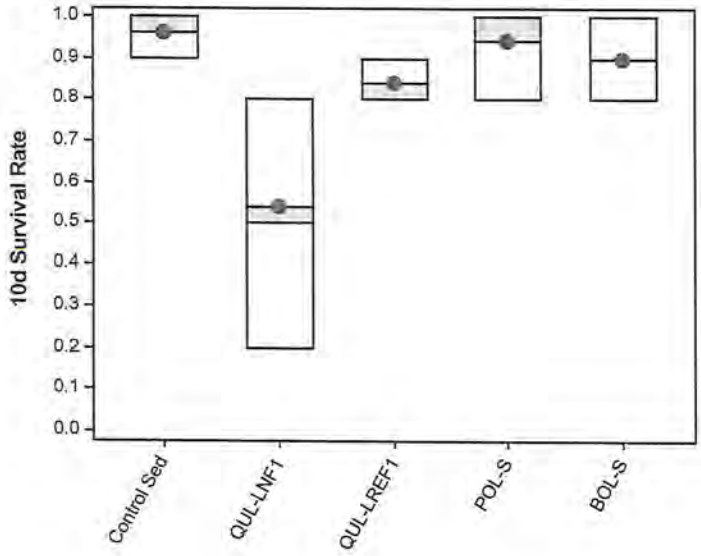
Nautilus Environmental

Analysis ID:	05-5596-9208	**Endpoint:**	14d Survival Rate	**CETIS Version:**	CETISv2.1.1
Analyzed:	03 Oct-22 10:05	**Analysis:**	STP 2xK Contingency Tables	**Status Level:**	1
Edit Date:	28 Sep-22 11:14	**MD5 Hash:**	F45C656FE4287E678399DA15D9403CE8	**Editor ID:**	007-585-424-0

10d Survival Rate Binomials

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
Control Sed	N	9/10	9/10	10/10	10/10	10/10
QUL-LNF1		8/10	5/10	5/10	7/10	2/10
QUL-LREF1		8/10	8/10	9/10	9/10	8/10
POL-S		8/10	10/10	9/10	10/10	10/10
BOL-S		9/10	10/10	9/10	9/10	8/10

Graphics



CETIS Analytical Report

Hyalella 14-d Survival and Growth Sediment Test

Nautilus Environmental

Analysis ID:	11-8864-9223	**Endpoint:**	Mean Dry Weight-mg	**CETIS Version:**	CETISv2.1.1
Analyzed:	03 Oct-22 10:05	**Analysis:**	Parametric-Control vs Treatments	**Status Level:**	1
Edit Date:	28 Sep-22 11:14	**MD5 Hash:**	E59EEFE7DCCA2AAF916BE721E9D935D	**Editor ID:**	007-585-424-0
Batch ID:	04-8223-2973	**Test Type:**	Growth-Survival (~~10d~~) 14 CZW	**Analyst:**	Carley Winter
Start Date:	08 Sep-22	**Protocol:**	EC/EPS 1/RM/32	**Diluent:**	Reconstituted Water
Ending Date:	22 Sep-22	**Species:**	Hyalella azteca	**Brine:**	
Test Length:	14d 0h	**Taxon:**	Malacostraca	**Source:**	Aquatic Biosystems, CO **Age:** 7-9d

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
Control Sed	10-7042-0697	08 Sep-22	08 Sep-22	---	Minnow Environmental	
QUL-LNF1	00-4438-3904	23 Aug-22	30 Aug-22 10:40	16d 0h (11.2 °C)		
QUL-LREF1	13-7106-0450	23 Aug-22	30 Aug-22 10:40	16d 0h (11.2 °C)		
POL-S	05-8645-7879	25 Aug-22	30 Aug-22 10:40	14d 0h (11.2 °C)		
BOL-S	15-1832-2783	24 Aug-22	30 Aug-22 10:40	15d 0h (11.2 °C)		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
Control Sed	Sediment Sample	Minnow Environmental	Control Sediment	
QUL-LNF1	Sediment Sample	Minnow Environmental	QUL-LNF1	
QUL-LREF1	Sediment Sample	Minnow Environmental	QUL-LREF1	
POL-S	Sediment Sample	Minnow Environmental	POL-S	
BOL-S	Sediment Sample	Minnow Environmental	BOL-S	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C > T	QUL-LNF1 failed mean dry weight-mg endpoint	20.31%
		QUL-LREF1 passed mean dry weight-mg endpoint	20.31%
		POL-S passed mean dry weight-mg endpoint	20.31%
		BOL-S passed mean dry weight-mg endpoint	20.31%

Dunnett Multiple Comparison Test

Sample I	vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Negative Control		QUL-LNF1*	8	8.747	2.305	0.03758	CDF	<1.0E-05	Significant Effect
		QUL-LREF1	8	-2.835	2.305	0.03758	CDF	0.9999	Non-Significant Effect
		POL-S	8	-3.134	2.305	0.03758	CDF	1.0000	Non-Significant Effect
		BOL-S	8	-1.311	2.305	0.03758	CDF	0.9895	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.127177	0.0317942	4	47.83	<1.0E-05	Significant Effect
Error	0.0132939	0.0006647	20			
Total	0.140471		24			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Bartlett Equality of Variance Test	9.035	13.28	0.0602	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.9844	0.8877	0.9565	Normal Distribution

Mean Dry Weight-mg Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
Control Sed	N	5	0.185	0.1535	0.2165	0.182	0.16	0.214	0.01135	13.71%	0.00%
QUL-LNF1		5	0.04239	0.0318	0.05298	0.04571	0.03	0.05199	0.003814	20.12%	77.09%
QUL-LREF1		5	0.2312	0.1822	0.2803	0.2289	0.1812	0.285	0.01767	17.08%	-24.98%
POL-S		5	0.2361	0.1993	0.2729	0.22	0.208	0.273	0.01325	12.55%	-27.62%
BOL-S		5	0.2064	0.1903	0.2225	0.2125	0.1844	0.2167	0.005808	6.29%	-11.55%

Analyst: CZW QA: 10-3/22

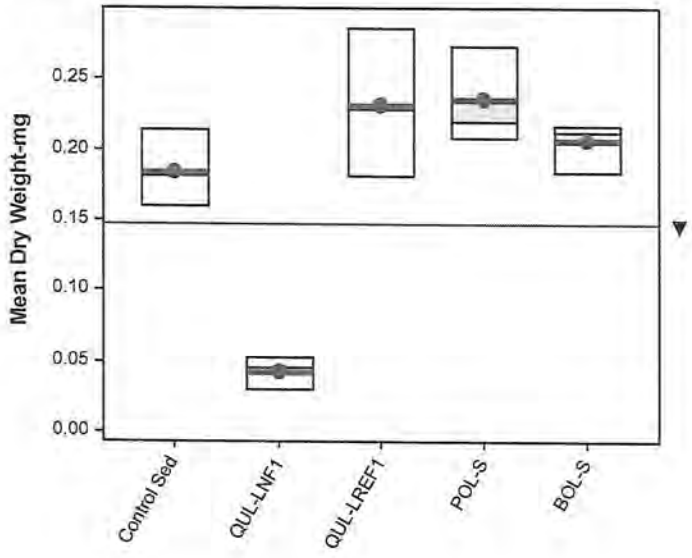
Hyalella 14-d Survival and Growth Sediment Test — **Nautilus Environmental**

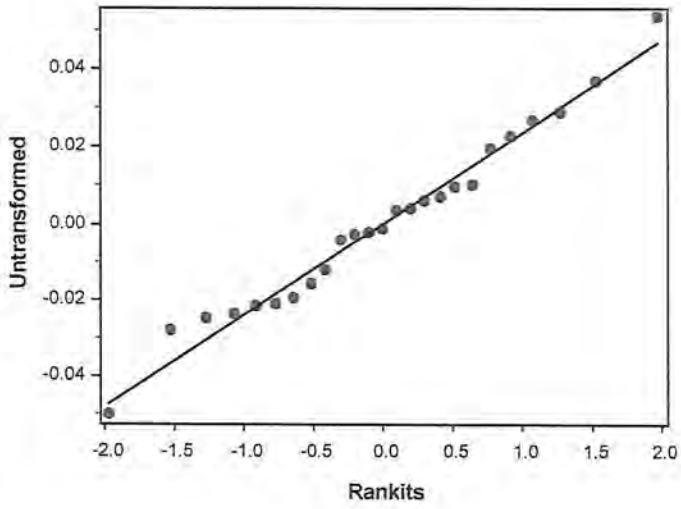
Analysis ID:	11-8864-9223	**Endpoint:**	Mean Dry Weight-mg	**CETIS Version:**	CETISv2.1.1
Analyzed:	03 Oct-22 10:05	**Analysis:**	Parametric-Control vs Treatments	**Status Level:**	1
Edit Date:	28 Sep-22 11:14	**MD5 Hash:**	E59EEFE7DCCA2AAF916BE721E9D935D	**Editor ID:**	007-585-424-0

Mean Dry Weight-mg Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
Control Sed	N	0.1611	0.16	0.208	0.182	0.214
QUL-LNF1		0.04625	0.05199	0.038	0.04571	0.03
QUL-LREF1		0.285	0.21	0.2511	0.2289	0.1812
POL-S		0.22	0.208	0.2167	0.263	0.273
BOL-S		0.2167	0.205	0.2133	0.1844	0.2125

Graphics





CETIS Analytical Report

Hyalella 14-d Survival and Growth Sediment Test — **Nautilus Environmental**

Analysis ID:	15-0634-4916	**Endpoint:**	14d Survival Rate	**CETIS Version:**	CETISv2.1.1
Analyzed:	03 Oct-22 10:00	**Analysis:**	Single 2x2 Contingency Table	**Status Level:**	1
Edit Date:	28 Sep-22 11:14	**MD5 Hash:**	BAE583E9A02959B6AB8ED16F74D3A12A	**Editor ID:**	007-585-424-0
Batch ID:	04-8223-2973	**Test Type:**	Growth-Survival (14d)	**Analyst:**	Carley Winter
Start Date:	08 Sep-22	**Protocol:**	EC/EPS 1/RM/32	**Diluent:**	Reconstituted Water
Ending Date:	22 Sep-22	**Species:**	Hyalella azteca	**Brine:**	
Test Length:	14d 0h	**Taxon:**	Malacostraca	**Source:**	Aquatic Biosystems, CO **Age:** 7-9d

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
QUL-LNF1	00-4438-3904	23 Aug-22	30 Aug-22 10:40	16d 0h (11.2 °C)	Minnow Environmental	
QUL-LREF1	13-7106-0450	23 Aug-22	30 Aug-22 10:40	16d 0h (11.2 °C)		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
QUL-LNF1	Sediment Sample	Minnow Environmental	QUL-LNF1	
QUL-LREF1	Sediment Sample	Minnow Environmental	QUL-LREF1	

Fisher Exact Test

Sample I	vs	Sample II	Test Stat	P-Type	P-Value	Decision(α:5%)
Reference Sed		QUL-LNF1*	0.0011	Exact	0.0011	Significant Effect

14d Survival Rate Frequencies

Sample	Code	NR	R	NR + R	Prop NR	Prop R	%Effect
QUL-LNF1		27	23	50	0.5400	0.4600	35.71%
QUL-LREF1	RS	42	8	50	0.8400	0.1600	0.00%

14d Survival Rate Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
QUL-LNF1		5	0.5400	0.2541	0.8259	0.5000	0.2000	0.8000	0.1030	42.63%	35.71%
QUL-LREF1	RS	5	0.8400	0.7720	0.9080	0.8000	0.8000	0.9000	0.0245	6.52%	0.00%

14d Survival Rate Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
QUL-LNF1		0.8000	0.5000	0.5000	0.7000	0.2000
QUL-LREF1	RS	0.8000	0.8000	0.9000	0.9000	0.8000

14d Survival Rate Binomials

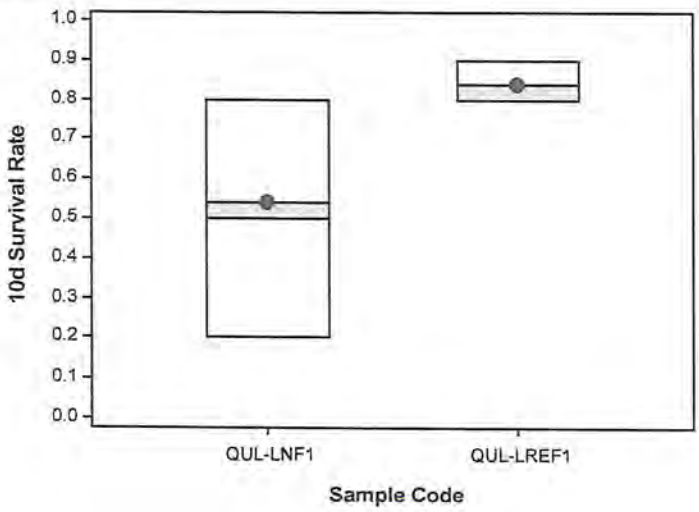
Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
QUL-LNF1		8/10	5/10	5/10	7/10	2/10
QUL-LREF1	RS	8/10	8/10	9/10	9/10	8/10

Reference Sediment (RS): QUL-LREF1

Hyalella 14-d Survival and Growth Sediment Test — **Nautilus Environmental**

Analysis ID:	15-0634-4916	**Endpoint:**	10d Survival Rate	**CETIS Version:**	CETISv2.1.1
Analyzed:	03 Oct-22 10:00	**Analysis:**	Single 2x2 Contingency Table	**Status Level:**	1
Edit Date:	28 Sep-22 11:14	**MD5 Hash:**	BAE583E9A02959B6AB8ED16F74D3A12A	**Editor ID:**	007-585-424-0

Graphics



Analyst: CZW QA: 10.25.22

Hyalella 14-d Survival and Growth Sediment Test

Nautilus Environmental

Analysis ID:	08-1695-6629	**Endpoint:**	Mean Dry Weight-mg	**CETIS Version:**	CETISv2.1.1
Analyzed:	03 Oct-22 10:00	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	28 Sep-22 11:14	**MD5 Hash:**	A067BF58C73E5E70F7450C588BD75926	**Editor ID:**	007-585-424-0
Batch ID:	04-8223-2973	**Test Type:**	Growth-Survival (~~10d~~) 14 CAW	**Analyst:**	Carley Winter
Start Date:	08 Sep-22	**Protocol:**	EC/EPS 1/RM/32	**Diluent:**	Reconstituted Water
Ending Date:	22 Sep-22	**Species:**	Hyalella azteca	**Brine:**	
Test Length:	14d 0h	**Taxon:**	Malacostraca	**Source:**	Aquatic Biosystems, CO **Age:** 7-9d

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
QUL-LNF1	00-4438-3904	23 Aug-22	30 Aug-22 10:40	16d 0h (11.2 °C)	Minnow Environmental	
QUL-LREF1	13-7106-0450	23 Aug-22	30 Aug-22 10:40	16d 0h (11.2 °C)		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
QUL-LNF1	Sediment Sample	Minnow Environmental	QUL-LNF1	
QUL-LREF1	Sediment Sample	Minnow Environmental	QUL-LREF1	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C > T	QUL-LNF1 failed mean dry weight-mg endpoint	14.53%

Equal Variance t Two-Sample Test

Sample I	vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed		QUL-LNF1*	8	10.45	1.86	0.03361	CDF	<1.0E-05	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0891706	0.0891706	1	109.2	<1.0E-05	Significant Effect
Error	0.0065329	0.0008166	8			
Total	0.0957035		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	21.46	23.15	0.0115	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.9556	0.7411	0.7343	Normal Distribution

Mean Dry Weight-mg Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
QUL-LNF1		5	0.04239	0.0318	0.05298	0.04571	0.03	0.05199	0.003814	20.12%	81.67%
QUL-LREF1	RS	5	0.2312	0.1822	0.2803	0.2289	0.1812	0.285	0.01767	17.08%	0.00%

Mean Dry Weight-mg Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
QUL-LNF1		0.04625	0.05199	0.038	0.04571	0.03
QUL-LREF1	RS	0.285	0.21	0.2511	0.2289	0.1812

Reference sediment (RS): QUL-LREF1

Hyalella 14-d Survival and Growth Sediment Test **Nautilus Environmental**

Analysis ID:	08-1695-6629	**Endpoint:**	Mean Dry Weight-mg	**CETIS Version:**	CETISv2.1.1
Analyzed:	03 Oct-22 10:00	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	28 Sep-22 11:14	**MD5 Hash:**	A067BF58C73E5E70F7450C588BD75926	**Editor ID:**	007-585-424-0

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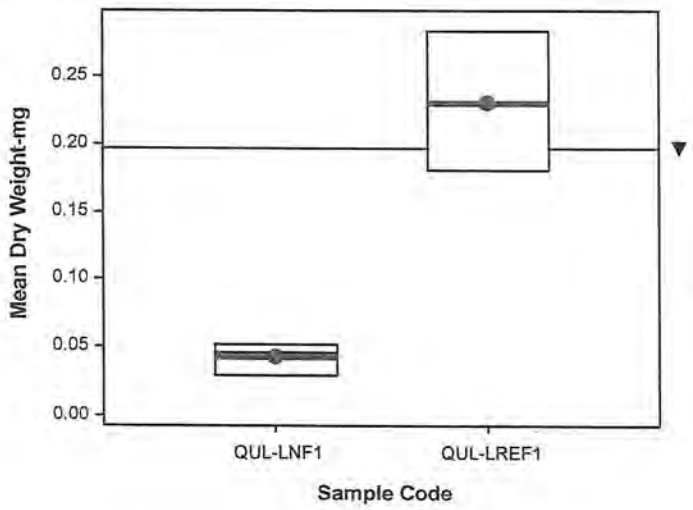

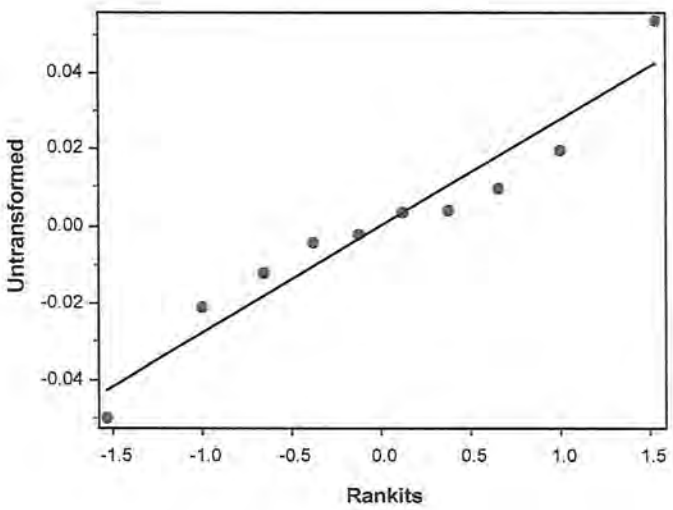

Hyalella 14-d Survival and Growth Sediment Test

Nautilus Environmental

Analysis ID:	17-4782-4649	**Endpoint:**	14/10d Survival Rate CZW	**CETIS Version:**	CETISv2.1.1
Analyzed:	28 Sep-22 11:43	**Analysis:**	Single 2x2 Contingency Table	**Status Level:**	1
Edit Date:	28 Sep-22 11:14	**MD5 Hash:**	EE5EA727D356F7C8270D6BA39481FFFE	**Editor ID:**	007-585-424-0
Batch ID:	04-8223-2973	**Test Type:**	Growth-Survival (10d)/14 CZW	**Analyst:**	Carley Winter
Start Date:	08 Sep-22	**Protocol:**	EC/EPS 1/RM/32	**Diluent:**	Reconstituted Water
Ending Date:	22 Sep-22	**Species:**	Hyalella azteca	**Brine:**	
Test Length:	14d 0h	**Taxon:**	Malacostraca	**Source:**	Aquatic Biosystems, CO **Age:** 7-9d

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
POL-S	05-8645-7879	25 Aug-22	30 Aug-22 10:40	14d 0h (11.2 °C)	Minnow Environmental	
BOL-S	15-1832-2783	24 Aug-22	30 Aug-22 10:40	15d 0h (11.2 °C)		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
POL-S	Sediment Sample	Minnow Environmental	POL-S	
BOL-S	Sediment Sample	Minnow Environmental	BOL-S	

Fisher Exact Test

Sample I	vs	Sample II	Test Stat	P-Type	P-Value	Decision(α:5%)
Reference Sed		POL-S	0.8657	Exact	0.8657	Non-Significant Effect

14/10d Survival Rate Frequencies CZW

Sample	Code	NR	R	NR + R	Prop NR	Prop R	%Effect
POL-S		47	3	50	0.9400	0.0600	-4.44%
BOL-S	RS	45	5	50	0.9000	0.1000	0.00%

14/10d Survival Rate Summary CZW

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
POL-S		5	0.9400	0.8289	1.0000	1.0000	0.8000	1.0000	0.0400	9.52%	-4.44%
BOL-S	RS	5	0.9000	0.8122	0.9878	0.9000	0.8000	1.0000	0.0316	7.86%	0.00%

14/10d Survival Rate Detail CZW

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
POL-S		0.8000	1.0000	0.9000	1.0000	1.0000
BOL-S	RS	0.9000	1.0000	0.9000	0.9000	0.8000

14/10d Survival Rate Binomials CZW

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
POL-S		8/10	10/10	9/10	10/10	10/10
BOL-S	RS	9/10	10/10	9/10	9/10	8/10

Reference Sediment (RS): BOL-S

Hyalella 14-d Survival and Growth Sediment Test — **Nautilus Environmental**

Analysis ID:	17-4782-4649	**Endpoint:**	10d Survival Rate	**CETIS Version:**	CETISv2.1.1
Analyzed:	28 Sep-22 11:43	**Analysis:**	Single 2x2 Contingency Table	**Status Level:**	1
Edit Date:	28 Sep-22 11:14	**MD5 Hash:**	EE5EA727D356F7C8270D6BA39481FFFE	**Editor ID:**	007-585-424-0

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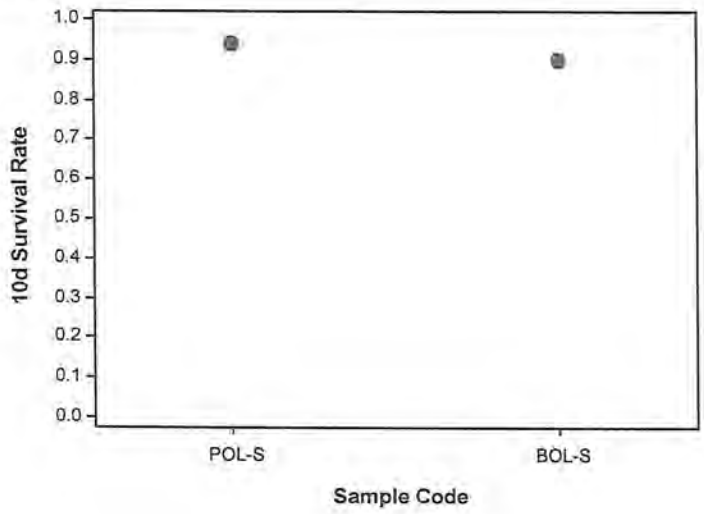

Hyalella 14-d Survival and Growth Sediment Test

Nautilus Environmental

Analysis ID:	11-3304-6217	**Endpoint:**	Mean Dry Weight-mg	**CETIS Version:**	CETISv2.1.1
Analyzed:	28 Sep-22 11:44	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	28 Sep-22 11:14	**MD5 Hash:**	F2D0F2A689BFCB4C2103C5CB4A930C5	**Editor ID:**	007-585-424-0
Batch ID:	04-8223-2973	**Test Type:**	Growth-Survival (10d) 14 CAW	**Analyst:**	Carley Winter
Start Date:	08 Sep-22	**Protocol:**	EC/EPS 1/RM/32	**Diluent:**	Reconstituted Water
Ending Date:	22 Sep-22	**Species:**	Hyalella azteca	**Brine:**	
Test Length:	14d 0h	**Taxon:**	Malacostraca	**Source:**	Aquatic Biosystems, CO **Age:** 7-9d

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
POL-S	05-8645-7879	25 Aug-22	30 Aug-22 10:40	14d 0h (11.2 °C)	Minnow Environmental	
BOL-S	15-1832-2783	24 Aug-22	30 Aug-22 10:40	15d 0h (11.2 °C)		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
POL-S	Sediment Sample	Minnow Environmental	POL-S	
BOL-S	Sediment Sample	Minnow Environmental	BOL-S	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C > T	POL-S passed mean dry weight-mg endpoint	13.04%

Equal Variance t Two-Sample Test

Sample I	vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed		POL-S	8	-2.056	1.86	0.0269	CDF	0.9631	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0022112	0.0022112	1	4.225	0.0739	Non-Significant Effect
Error	0.0041866	0.0005233	8			
Total	0.0063978		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	5.206	23.15	0.1391	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.9438	0.7411	0.5963	Normal Distribution

Mean Dry Weight-mg Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
POL-S		5	0.2361	0.1993	0.2729	0.22	0.208	0.273	0.01325	12.55%	-14.41%
BOL-S	RS	5	0.2064	0.1903	0.2225	0.2125	0.1844	0.2167	0.005808	6.29%	0.00%

Mean Dry Weight-mg Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
POL-S		0.22	0.208	0.2167	0.263	0.273
BOL-S	RS	0.2167	0.205	0.2133	0.1844	0.2125

Reference sediment (RS): BOL-S

Hyalella 14-d Survival and Growth Sediment Test **Nautilus Environmental**

Analysis ID:	11-3304-6217	**Endpoint:**	Mean Dry Weight-mg	**CETIS Version:**	CETISv2.1.1
Analyzed:	28 Sep-22 11:44	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	28 Sep-22 11:14	**MD5 Hash:**	F2D0F2A689BFCB4C2103C5CB4A930C5	**Editor ID:**	007-585-424-0

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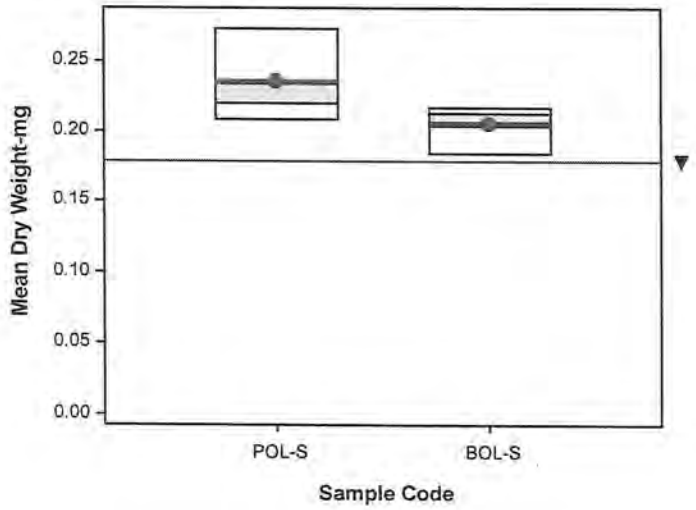

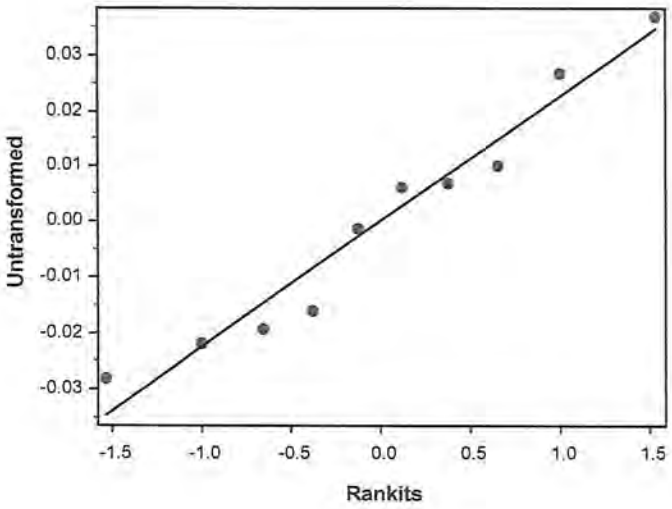

Analyst: CAN QA: Sept 30/22

Client : Minnow Environmental
W.O.: 221769
Date see below

Table of PKa values

	TDS (mg/L)			Salinity (g/kg)		
Temperature (°C)	*0*	*250*	*2000*	*10*	*20*	*30*
12	9.662	9.699	9.754	9.788	9.819	9.837
15	9.564	9.601	9.655	9.688	9.719	9.737
18	9.465	9.502	9.557	9.588	9.619	9.636
20	9.401	9.438	9.492	9.523	9.554	9.571
22		9.391				
23	9.307	9.344	9.398	9.426	9.459	9.476
24		9.314				
25	9.246	9.283	9.337	9.366	9.397	9.414

Date	Sample ID	Temperature (C)	pH	Salinity (ppt)	Total Ammonia as N (mg/L)	pKa	Unionized Ammonia (mg/L N)
Sept. 9/22	QUL-LREF1	22	7.8		0.04	9.391	0.001000
Sept. 9/22	BOL-S	22	8		0.54	9.391	0.021091
Sept 12/22	QUL-LREF1	22	8		1.50	9.391	0.058585
Sept 12/22	BOL-S	22	7.9		0.41	9.391	0.012823
Sept 14/22	QUL-LREF1	22	8.3		0.30	9.391	0.022504
Sept 14/22	BOL-S	22	8.3		0.10	9.391	0.007501
Sept 16/22	QUL-LREF1	22.5	8.4		2.00	9.391	0.185273
Sept 16/22	BOL-S	22.5	8.3		0.06	9.391	0.004501
Sept 19/22	QUL-LREF1	22	8.4		0.20	9.391	0.018527
Sept 19/22	BOL-S	22	8.3		0.05	9.391	0.003751
Sept 21/22	QUL-LREF1	22.5	8.4		0.08	9.391	0.007411
Sept 21/22	BOL-S	22.5	8.3		0.05	9.391	0.003751

Sept. 30, 2022

Nautilus Environmental
Water Quality Data For Ammonia

Client: Minnow Environmental Inc **Species:** H. azteca

Work Order No: 221769 **Sample Type:** overlying water

Date Measured: see below

Date	Sample ID	Temperature (°C)	pH	Total Ammonia as N (mg/L)	Unionized Ammonia as N (mg/L)	Tech. Init.
Sept 9/22	QUL-LREF1	22.0	7.8	0.04	0.001	CZW
↓	BOL-S	22.0	8.0	0.54	0.021	CZW
Sept 12/22	QUL-LREF1	22.0	8.0	0.15 x10	0.059	CZW
↓	BOLS	22.0	7.9	0.41	0.013	CZW
Sept 14/22	QUL-LREF1	22.0	8.3	0.03 x10	0.023	CZW
↓	BOL-S	22.0	8.3	0.01 x10	0.008	CZW
Sept 16/22	QUL-LREF1	22.5	8.4	0.20x10	0.185	CZW
↓	BOLS	22.5	8.3	0.06	0.005	CZW
Sept 19/22	QUL-LREF1	22.0	8.4	0.02 x10	0.0189	CZW
↓	BOL-S	22.0	8.3	0.05	0.004	CZW

Ammonia Salicylate Lot #: A20408

Ammonia Cyanurate Lot #: A2005

Comments: _____

Reviewed by: _____ **Date Reviewed:** Sept-30, 2022

Nautilus Environmental
Water Quality Data For Ammonia

Client: Minnow Environmental Inc. **Species:** H. azteca

Work Order No: 221769 **Sample Type:** overlying water

Date Measured: see below

Date	Sample ID	Temperature (°C)	pH	Total Ammonia as N (mg/L)	Unionized Ammonia as N (mg/L)	Tech. Init.
sept 21/22	QUL-LREF1	22.5	8.4	0.08	0.007	CZW
↓	BCL-S	22.5	8.3	0.05	0.004	↓

Ammonia Salicylate Lot #: A20408

Ammonia Cyanurate Lot #: A2005

Comments:

Reviewed by: **Date Reviewed:** Sept. 30, 2022

Sediment Description Data Sheet

Client: Minnow Environmental Inc.
Work Order No.: 221769

Date: Sept 7/22
Test Organism: *Hyalella azteca*

Sample ID	Grain Size	Colour	Odour	Debris	Other	Initials
Control Sediment	sand	grey	none	none	none	RZS
QUL-LNF1-1	sand	grey/brown	none	none	none	CZW
-2	sand	↓	faint sulphide	roots	none	↓
-3	sand	brown	none	none	none	
-4	sand	↓	sulphide	grass	none	
-5	sand	reddish brown	faint sulphide	none	none	↓
QUL-LREF1-1	sand/silt	brown	strong sulphide	roots	none	CZW
-2	↓	brown/grey	strong sulphide	grass, roots	↓	↓
-3		↓	↓	↓		
-4						
-5	↓	↓	↓	↓	↓	↓
POL-S-1	silt/clay	brown	strong sulphide	roots	none	RZS
-2	↓	↓	↓	↓	↓	↓
-3						
-4						
-5	↓	↓	↓	↓	↓	↓

Reviewed by: [signature]

Date Reviewed: Sept. 30, 2022

Sediment Description Data Sheet

Client: Minnow Environmental Inc.
Work Order No.: 221769

Date: Sept 7/22
Test Organism: *Hyalella azteca*

Sample ID	Grain Size	Colour	Odour	Debris	Other	Initials
~~Control Sediment~~ CZW						
BOL-S-1	silt / clay	brown	sulfide	none		CZW/EZS
-2	↓	grey / brown	strong sulfide	roots / twigs		↓
-3	↓	brown	sulfide	none		↓
-4	sand / silt	light grey	sulfide	pebbles		↓
-5	silt / clay	dark brown	sulfide	none		↓

Reviewed by: [signature]

Date Reviewed: Sept. 30, 2022

APPENDIX B – Analytical Chemistry

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **VA22C2841**	Page	: 1 of 3
Client	: **Nautilus Environmental Company Inc.**	Laboratory	: Vancouver - Environmental
Contact	: C Winter	Account Manager	: Emmanuel Mariano
Address	: 8664 Commerce Court Imperial Square Lake City Burnaby BC Canada V5A 4N7	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: ----	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 22-Sep-2022 15:20
PO	: 2223-027BC	Date Analysis Commenced	: 25-Sep-2022
C-O-C number	: ----	Issue Date	: 26-Sep-2022 11:33
Sampler	: ----		
Site	: Tissue, Water and Sediment Testing		
Quote number	: Q69439 (Vancouver Blanket Quote)		
No. of samples received	: 10		
No. of samples analysed	: 10		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Parker Sgarbossa	Laboratory Analyst	Inorganics, Calgary, Alberta

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

Unit	*Description*
mg/L	milligrams per litre

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	Control Day 0	QUL-LNF1 Day 0	QUL-LREF1 Day 0	POL-S Day 0	BOL-S Day 0
					Client sampling date / time	08-Sep-2022	08-Sep-2022	08-Sep-2022	08-Sep-2022	08-Sep-2022
						VA22C2841-001	VA22C2841-002	VA22C2841-003	VA22C2841-004	VA22C2841-005
						Result	Result	Result	Result	Result
Anions and Nutrients										
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L		0.0195	0.0891	0.419	0.0899	0.380

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	Control Day 14	QUL-LNF1 Day 14	QUL-LREF1 Day 14	POL-S Day 14	BOL-S Day 14
					Client sampling date / time	22-Sep-2022	22-Sep-2022	22-Sep-2022	22-Sep-2022	22-Sep-2022
						VA22C2841-006	VA22C2841-007	VA22C2841-008	VA22C2841-009	VA22C2841-010
						Result	Result	Result	Result	Result
Anions and Nutrients										
ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L		0.145	0.0232	0.0699	0.0322	0.0545

Please refer to the General Comments section for an explanation of any qualifiers detected.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA22C2841**	Page	: 1 of 6
Client	: **Nautilus Environmental Company Inc.**	Laboratory	: Vancouver - Environmental
Contact	: C Winter	Account Manager	: Emmanuel Mariano
Address	: 8664 Commerce Court Imperial Square Lake City Burnaby BC Canada V5A 4N7	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: ----	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 22-Sep-2022 15:20
PO	: 2223-027BC	Issue Date	: 26-Sep-2022 11:34
C-O-C number	: ----		
Sampler	: ----		
Site	: Tissue, Water and Sediment Testing		
Quote number	: Q69439 (Vancouver Blanket Quote)		
No. of samples received	: 10		
No. of samples analysed	: 10		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
BOL-S Day 0	E298	08-Sep-2022	25-Sep-2022	----	----		25-Sep-2022	28 days	17 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
Control Day 0	E298	08-Sep-2022	25-Sep-2022	----	----		25-Sep-2022	28 days	17 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
POL-S Day 0	E298	08-Sep-2022	25-Sep-2022	----	----		25-Sep-2022	28 days	17 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
QUL-LNF1 Day 0	E298	08-Sep-2022	25-Sep-2022	----	----		25-Sep-2022	28 days	17 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
QUL-LREF1 Day 0	E298	08-Sep-2022	25-Sep-2022	----	----		25-Sep-2022	28 days	17 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
BOL-S Day 14	E298	22-Sep-2022	25-Sep-2022	----	----		25-Sep-2022	28 days	3 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
Control Day 14	E298	22-Sep-2022	25-Sep-2022	----	----		25-Sep-2022	28 days	3 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
POL-S Day 14	E298	22-Sep-2022	25-Sep-2022	----	----		25-Sep-2022	28 days	3 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
QUL-LNF1 Day 14	E298	22-Sep-2022	25-Sep-2022	----	----		25-Sep-2022	28 days	3 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid)										
QUL-LREF1 Day 14	E298	22-Sep-2022	25-Sep-2022	----	----		25-Sep-2022	28 days	3 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Ammonia by Fluorescence	E298	664879	1	20	5.0	5.0	✓
Laboratory Control Samples (LCS)							
Ammonia by Fluorescence	E298	664879	1	20	5.0	5.0	✓
Method Blanks (MB)							
Ammonia by Fluorescence	E298	664879	1	20	5.0	5.0	✓
Matrix Spikes (MS)							
Ammonia by Fluorescence	E298	664879	1	20	5.0	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Ammonia by Fluorescence	E298 Calgary - Environmental	Water	Method Fialab 100, 2018	Ammonia in water is determined by automated continuous flow analysis with membrane diffusion and fluorescence detection, after reaction with OPA (ortho-phthalaldehyde). This method is approved under US EPA 40 CFR Part 136 (May 2021)

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Ammonia	EP298 Calgary - Environmental	Water		Sample preparation for Preserved Nutrients Water Quality Analysis.

NAUTILUS ENVIRONMENTAL

TESTING LOCATION (Please Circle)

Burnaby (●)
8664 Commerce Court
Burnaby, British Columbia, Canada
V5A 4N7
Phone 604.420.8773

Calgary ( )
10823 27 Street SE
Calgary, Alberta, Canada
T2Z 3V9
Phone 403.253.7121

Point Edward ( )
704 Mara Street, Suite 122
Point Edward, Ontario, Canada
N7V 1X4
Phone 519.339.8787

Chain of Custody

Date_____Page___of___

Report to:		**Invoice To:**	
Company	Nautilus Environmental	**Company**	Nautilus Environmental
Address	8664 Commerce Court	**Address**	8664 Commerce Court
City/Prov/PC	Burnaby,BC	**City/Prov/PC**	Burnaby,BC
Contact	Carley Winter	**Contact**	Nair
Phone	6044208773	**Phone**	6044208773
Email	cwinter@nautilusenvironmental.ca	**Email**	nair@nautilusenvironmental.ca
	rachel@nautilusenvironmental.ca	**PO No.**	cnb 2022-2223-027BC

Sample Collection By: **Sample Type:** Grab ( ) OR Composite ( )

ANALYSES REQUIRED

	SAMPLE ID	DATE (DD/MM/YY)	TIME	MATRIX	# OF CONTAINERS AND VOLUME (e.g. 1 x 20 L)	COMMENTS	Overlying Ammonia
1	Control	08/09/22			1 x 125 mL	Day 0	✓
2	QUL-LNF1	08/09/22			1 x 125 mL	Day 0	✓
3	QUL-LREF1	08/09/22			1 x 125 mL	Day 0	✓
4	POL-S	08/09/22			1 x 125 mL	Day 0	✓
5	BOL-S	08/09/22			1 x 125 mL	Day 0	✓
6	Control	22/09/22			1 x 125 mL	Day 14	✓
7	QUL-LNF1	22/09/22			1 x 125 mL	Day 14	✓
8	QUL-LREF1	22/09/22			1 x 125 mL	Day 14	✓
9	POL-S	22/09/22			1 x 125 mL	Day 14	✓
10	BOL-S	22/09/22			1 x 125 mL	Day 14	✓

Receipt Temperature (°C) 22

Environmental Division
Vancouver
Work Order Reference
VA22C2841

Telephone : +1 604 253 4188

SPECIAL INSTRUCTIONS/COMMENTS (CLIENT)

-Preserved with Sulphuric acid

SAMPLE RECEIPT DETAILS (LABORATORY)

1. Total No. of Containers		4. Ice Present in Cooler?	Y / N
2. Courier		5. Seal Present?	Y / N
3. Good Condition?	Y / N	6. Initials Present on Seal?	Y / N

SAMPLE DESCRIPTION AND COMMENTS (LABORATORY)

RELINQUISHED BY (CLIENT)	**RECEIVED BY (LABORATORY)**
CARLEY WINTER (Printed Name) (Signature)	HPA (Printed Name) (Signature)
Nautilus Environmental 22/09/22 (Company) (Date DD/MM/YY and Time)	3120P 9/22 (Company) (Date DD/MM/YY and Time)

Our liability is limited to the cost of the test requested. The test results only relate to the sample as received. No liability in whole or in part is assumed for the collection, handling, or transport of the sample, application or interpretation of the test data or results in part or in whole.

Additional costs may be required for sample disposal or storage. Payment net 30 unless otherwise contracted.

Form 020; Revised by TP 2021/11/17

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **VA22C2842**	Page	: 1 of 4
Client	: **Nautilus Environmental Company Inc.**	Laboratory	: Vancouver - Environmental
Contact	: Rachel Sakurdeep	Account Manager	: Emmanuel Mariano
Address	: 8664 Commerce Court Imperial Square Lake City Burnaby BC Canada V5A 4N7	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: ----	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 22-Sep-2022 15:20
PO	: 2223-028BC	Date Analysis Commenced	: 27-Sep-2022
C-O-C number	: ----	Issue Date	: 29-Sep-2022 16:46
Sampler	: ----		
Site	: Tissue, Water and Sediment Testing		
Quote number	: Q69439 (Vancouver Blanket Quote)		
No. of samples received	: 25		
No. of samples analysed	: 25		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Ann Joby	Lab Assistant	Metals, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia
Kyle Chang	Lab Assistant	Metals, Burnaby, British Columbia

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

Unit	*Description*
-	No Unit
mg/L	milligrams per litre

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical Results

Sub-Matrix: **Water** (Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	QUL-LREF1 Day 14 - Rep A	QUL-LREF1 Day 14 - Rep B	QUL-LREF1 Day 14 - Rep C	QUL-LREF1 Day 14 - Rep D	QUL-LREF1 Day 14 - Rep E
					Client sampling date / time	22-Sep-2022	22-Sep-2022	22-Sep-2022	22-Sep-2022	22-Sep-2022
						VA22C2842-001	VA22C2842-002	VA22C2842-003	VA22C2842-004	VA22C2842-005
						Result	Result	Result	Result	Result
Dissolved Metals										
copper, dissolved	7440-50-8	E421	0.00020	mg/L		0.00343	0.0775	0.00297	0.00413	0.00240
dissolved metals filtration location	----	EP421	-	-		Field	Field	Field	Field	Field

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Water** (Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	POL-S Day 14 - Rep A	POL-S Day 14 - Rep B	POL-S Day 14 - Rep C	POL-S Day 14 - Rep D	POL-S Day 14 - Rep E
					Client sampling date / time	22-Sep-2022	22-Sep-2022	22-Sep-2022	22-Sep-2022	22-Sep-2022
						VA22C2842-006	VA22C2842-007	VA22C2842-008	VA22C2842-009	VA22C2842-010
						Result	Result	Result	Result	Result
Dissolved Metals										
copper, dissolved	7440-50-8	E421	0.00020	mg/L		0.0361	0.0289	0.0277	0.0233	0.0231
dissolved metals filtration location	----	EP421	-	-		Field	Field	Field	Field	Field

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Water** (Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	Control Sediment Day 14 - Rep A	Control Sediment Day 14 - Rep B	Control Sediment Day 14 - Rep C	Control Sediment Day 14 - Rep D	Control Sediment Day 14 - Rep E
					Client sampling date / time	22-Sep-2022	22-Sep-2022	22-Sep-2022	22-Sep-2022	22-Sep-2022
						VA22C2842-011	VA22C2842-012	VA22C2842-013	VA22C2842-014	VA22C2842-015
						Result	Result	Result	Result	Result
Dissolved Metals										
copper, dissolved	7440-50-8	E421	0.00020	mg/L		0.00436	0.00396	0.00410	0.00379	0.00424
dissolved metals filtration location	----	EP421	-	-		Field	Field	Field	Field	Field

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Water** (Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	QUL-LNF1 Day 14 - Rep A	QUL-LNF1 Day 14 - Rep B	QUL-LNF1 Day 14 - Rep C	QUL-LNF1 Day 14 - Rep D	QUL-LNF1 Day 14 - Rep E
					Client sampling date / time	22-Sep-2022	22-Sep-2022	22-Sep-2022	22-Sep-2022	22-Sep-2022
						VA22C2842-016	VA22C2842-017	VA22C2842-018	VA22C2842-019	VA22C2842-020
						Result	Result	Result	Result	Result
Dissolved Metals										
copper, dissolved	7440-50-8	E421	0.00020	mg/L		0.0936	0.00281	0.105	0.0728	0.0939
dissolved metals filtration location	----	EP421	-	-		Field	Field	Field	Field	Field

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Water** (Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BOL-S Day 14 - Rep A	BOL-S Day 14 - Rep B	BOL-S Day 14 - Rep C	BOL-S Day 14 - Rep D	BOL-S Day 14 - Rep E
					Client sampling date / time	22-Sep-2022	22-Sep-2022	22-Sep-2022	22-Sep-2022	22-Sep-2022
						VA22C2842-021	VA22C2842-022	VA22C2842-023	VA22C2842-024	VA22C2842-025
						Result	Result	Result	Result	Result
Dissolved Metals										
copper, dissolved	7440-50-8	E421	0.00020	mg/L		0.00518	0.00434	0.00494	0.00588	0.00439
dissolved metals filtration location	----	EP421	-	-		Field	Field	Field	Field	Field

Please refer to the General Comments section for an explanation of any qualifiers detected.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA22C2842**	Page	: 1 of 7
Client	: **Nautilus Environmental Company Inc.**	Laboratory	: Vancouver - Environmental
Contact	: Rachel Sakurdeep	Account Manager	: Emmanuel Mariano
Address	: 8664 Commerce Court Imperial Square Lake City Burnaby BC Canada V5A 4N7	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: ----	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 22-Sep-2022 15:20
PO	: 2223-028BC	Issue Date	: 29-Sep-2022 16:46
C-O-C number	: ----		
Sampler	: ----		
Site	: Tissue, Water and Sediment Testing		
Quote number	: Q69439 (Vancouver Blanket Quote)		
No. of samples received	: 25		
No. of samples analysed	: 25		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid)										
Control Sediment Day 14 - Rep A	E421	22-Sep-2022	27-Sep-2022	----	----		27-Sep-2022	180 days	6 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid)										
Control Sediment Day 14 - Rep B	E421	22-Sep-2022	27-Sep-2022	----	----		27-Sep-2022	180 days	6 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid)										
Control Sediment Day 14 - Rep C	E421	22-Sep-2022	27-Sep-2022	----	----		27-Sep-2022	180 days	6 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid)										
Control Sediment Day 14 - Rep D	E421	22-Sep-2022	27-Sep-2022	----	----		27-Sep-2022	180 days	6 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid)										
Control Sediment Day 14 - Rep E	E421	22-Sep-2022	27-Sep-2022	----	----		27-Sep-2022	180 days	6 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid)										
POL-S Day 14 - Rep A	E421	22-Sep-2022	27-Sep-2022	----	----		27-Sep-2022	180 days	6 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid)										
POL-S Day 14 - Rep B	E421	22-Sep-2022	27-Sep-2022	----	----		27-Sep-2022	180 days	6 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) POL-S Day 14 - Rep C	E421	22-Sep-2022	27-Sep-2022	----	----		27-Sep-2022	180 days	6 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) POL-S Day 14 - Rep D	E421	22-Sep-2022	27-Sep-2022	----	----		27-Sep-2022	180 days	6 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) POL-S Day 14 - Rep E	E421	22-Sep-2022	27-Sep-2022	----	----		27-Sep-2022	180 days	6 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) QUL-LNF1 Day 14 - Rep A	E421	22-Sep-2022	27-Sep-2022	----	----		27-Sep-2022	180 days	6 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) QUL-LNF1 Day 14 - Rep B	E421	22-Sep-2022	27-Sep-2022	----	----		27-Sep-2022	180 days	6 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) QUL-LNF1 Day 14 - Rep C	E421	22-Sep-2022	27-Sep-2022	----	----		27-Sep-2022	180 days	6 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) QUL-LNF1 Day 14 - Rep D	E421	22-Sep-2022	27-Sep-2022	----	----		27-Sep-2022	180 days	6 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) QUL-LNF1 Day 14 - Rep E	E421	22-Sep-2022	27-Sep-2022	----	----		27-Sep-2022	180 days	6 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) QUL-LREF1 Day 14 - Rep A	E421	22-Sep-2022	27-Sep-2022	----	----		27-Sep-2022	180 days	6 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) QUL-LREF1 Day 14 - Rep B	E421	22-Sep-2022	27-Sep-2022	----	----		27-Sep-2022	180 days	6 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) QUL-LREF1 Day 14 - Rep C	E421	22-Sep-2022	27-Sep-2022	----	----		27-Sep-2022	180 days	6 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) QUL-LREF1 Day 14 - Rep D	E421	22-Sep-2022	27-Sep-2022	----	----		27-Sep-2022	180 days	6 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) QUL-LREF1 Day 14 - Rep E	E421	22-Sep-2022	27-Sep-2022	----	----		27-Sep-2022	180 days	6 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) BOL-S Day 14 - Rep A	E421	22-Sep-2022	28-Sep-2022	----	----		28-Sep-2022	180 days	7 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) BOL-S Day 14 - Rep B	E421	22-Sep-2022	28-Sep-2022	----	----		28-Sep-2022	180 days	7 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) BOL-S Day 14 - Rep C	E421	22-Sep-2022	28-Sep-2022	----	----		28-Sep-2022	180 days	7 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) BOL-S Day 14 - Rep D	E421	22-Sep-2022	28-Sep-2022	----	----		28-Sep-2022	180 days	7 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) BOL-S Day 14 - Rep E	E421	22-Sep-2022	28-Sep-2022	----	----		28-Sep-2022	180 days	7 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Dissolved Metals in Water by CRC ICPMS	E421	667395	2	39	5.1	5.0	✓
Laboratory Control Samples (LCS)							
Dissolved Metals in Water by CRC ICPMS	E421	667395	2	39	5.1	5.0	✓
Method Blanks (MB)							
Dissolved Metals in Water by CRC ICPMS	E421	667395	2	39	5.1	5.0	✓
Matrix Spikes (MS)							
Dissolved Metals in Water by CRC ICPMS	E421	667395	2	39	5.1	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Metals in Water by CRC ICPMS	E421 Vancouver - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Metals Water Filtration	EP421 Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.

NAUTILUS ENVIRONMENTAL

TESTING LOCATION (Please Circle)

Burnaby (●)
8664 Commerce Court
Burnaby, British Columbia, Canada
V5A 4N7
Phone 604.420.8773

Calgary ( )
10823 27 Street SE
Calgary, Alberta, Canada
T2Z 3V9
Phone 403.253.7121

Point Edward ( )
704 Mara Street, Suite 122
Point Edward, Ontario, Canada
N7V 1X4
Phone 519.339.8787

Chain of Custody

Date_____Page___of___

Report to:		**Invoice To:**	
Company	Nautilus Environmental	**Company**	Nautilus Environmental
Address	8664 Commerce Court	**Address**	8664 Commerce Court
City/Prov/PC	Burnaby,BC	**City/Prov/PC**	Burnaby,BC
Contact	Rachel Sakurdeep	**Contact**	Nair
Phone	6044208773	**Phone**	6044208773
Email	rachel@nautilusenvironmental.ca	**Email**	nair@nautilusenvironmental.ca
	cwinter@nautilusenvironmental.ca	**PO No.**	2223-028BC

Sample Collection By: **Sample Type:** Grab ( ) OR Composite ( )

	SAMPLE ID	DATE (DD/MM/YY)	TIME	MATRIX	# OF CONTAINERS AND VOLUME (e.g. 1 x 20 L)	COMMENTS	ANALYSES REQUIRED: Dissolved Copper	Receipt Temperature (°C)
1	QUL-LREF1	22/09/22			1 x 125 mL	Day 14 - Rep A	✓	22
2	QUL-LREF1	22/09/22			1 x 125 mL	Day 14 - Rep B	✓	
3	QUL-LREF1	22/09/22			1 x 125 mL	Day 14 - Rep C	✓	
4	QUL-LREF1	22/09/22			1 x 125 mL	Day 14 - Rep D	✓	
5	QUL-LREF1	22/09/22			1 x 125 mL	Day 14 - Rep E	✓	
6	POL-S	22/09/22			1 x 125 mL	Day 14 - Rep A	✓	
7	POL-S	22/09/22			1 x 125 mL	Day 14 - Rep B	✓	
8	POL-S	22/09/22			1 x 125 mL	Day 14 - Rep C	✓	
9	POL-S	22/09/22			1 x 125 mL	Day 14 - Rep D	✓	
10	POL-S	22/09/22			1 x 125 mL	Day 14 - Rep E	✓	

Environmental Division
Vancouver
Work Order Reference
VA22C2842

Telephone : +1 604 253 4188

SPECIAL INSTRUCTIONS/COMMENTS (CLIENT)

-Preserved with nitric acid

SAMPLE RECEIPT DETAILS (LABORATORY)

1. Total No. of Containers		4. Ice Present in Cooler?	Y / N
2. Courier		5. Seal Present?	Y / N
3. Good Condition?	Y / N	6. Initials Present on Seal?	Y / N

RELINQUISHED BY (CLIENT)

CARLEY WINTER (Printed Name) (Signature)

Nautilus Environmental (Company) 22/09/22 (Date DD/MM/YY and Time)

RECEIVED BY (LABORATORY)

(Printed Name) (Signature)

(Company) 9/22 (Date DD/MM/YY and Time)

Our liability is limited to the cost of the test requested. The test results only relate to the sample as received. No liability in whole or in part is assumed for the collection, handling, or transport of the sample, application or interpretation of the test data or results in part or in whole.

Additional costs may be required for sample disposal or storage. Payment net 30 unless otherwise contracted.

NAUTILUS ENVIRONMENTAL

TESTING LOCATION (Please Circle)

Burnaby (●)
8664 Commerce Court
Burnaby, British Columbia, Canada
V5A 4N7
Phone 604.420.8773

Calgary ( )
10823 27 Street SE
Calgary, Alberta, Canada
T2Z 3V9
Phone 403.253.7121

Point Edward ( )
704 Mara Street, Suite 122
Point Edward, Ontario, Canada
N7V 1X4
Phone 519.339.8787

Chain of Custody

Date_____Page__of__

Report to:		**Invoice To:**	
Company	Nautilus Environmental	**Company**	Nautilus Environmental
Address	8664 Commerce Court	**Address**	8664 Commerce Court
City/Prov/PC	Burnaby,BC	**City/Prov/PC**	Burnaby,BC
Contact	Rachel Sakurdeep	**Contact**	Nair
Phone	6044208773	**Phone**	6044208773
Email	rachel@nautilusenvironmental.ca	**Email**	nair@nautilusenvironmental.ca
	cwinter@nautilusenvironmental.ca	**PO No.**	2223-028BC

Sample Collection By: **Sample Type:** Grab ( ) OR Composite ( )

	SAMPLE ID	DATE (DD/MM/YY)	TIME	MATRIX	# OF CONTAINERS AND VOLUME (e.g. 1 x 20 L)	COMMENTS	ANALYSES REQUIRED: Dissolved Copper	Receipt Temperature (°C)
1	Control Sediment	22/09/22			1 x 125 mL	Day 14 - Rep A	✓	22
2	Control Sediment	22/09/22			1 x 125 mL	Day 14 - Rep B	✓	
3	Control Sediment	22/09/22			1 x 125 mL	Day 14 - Rep C	✓	
4	Control Sediment	22/09/22			1 x 125 mL	Day 14 - Rep D	✓	
5	Control Sediment	22/09/22			1 x 125 mL	Day 14 - Rep E	✓	
6	QUL-LNF1	22/09/22			1 x 125 mL	Day 14 - Rep A	✓	
7	QUL-LNF1	22/09/22			1 x 125 mL	Day 14 - Rep B	✓	
8	QUL-LNF1	22/09/22			1 x 125 mL	Day 14 - Rep C	✓	
9	QUL-LNF1	22/09/22			1 x 125 mL	Day 14 - Rep D	✓	
10	QUL-LNF1	22/09/22			1 x 125 mL	Day 14 - Rep E	✓	

SPECIAL INSTRUCTIONS/COMMENTS (CLIENT)

-Preserved with nitric acid

SAMPLE RECEIPT DETAILS (LABORATORY)

1. Total No. of Containers		4. Ice Present in Cooler?	Y / N
2. Courier		5. Seal Present?	Y / N
3. Good Condition?	Y / N	6. Initials Present on Seal?	Y / N

SAMPLE DESCRIPTION AND COMMENTS (LABORATORY)

RELINQUISHED BY (CLIENT)

CARLEY WINTER (Printed Name) (Signature)

Nautilus Environmental 22/09/22 (Company) (Date DD/MM/YY and Time)

RECEIVED BY (LABORATORY)

HM (Printed Name) (Signature)

3/20P 9/22 (Company) (Date DD/MM/YY and Time)

Our liability is limited to the cost of the test requested. The test results only relate to the sample as received. No liability in whole or in part is assumed for the collection, handling, or transport of the sample, application or interpretation of the test data or results in part or in whole.

Additional costs may be required for sample disposal or storage. Payment net 30 unless otherwise contracted.

Form 020; Revised by TP 2021/11/17

NAUTILUS ENVIRONMENTAL

TESTING LOCATION (Please Circle)

Burnaby (●)
8664 Commerce Court
Burnaby, British Columbia, Canada
V5A 4N7
Phone 604.420.8773

Calgary ( )
10823 27 Street SE
Calgary, Alberta, Canada
T2Z 3V9
Phone 403.253.7121

Point Edward ( )
704 Mara Street, Suite 122
Point Edward, Ontario, Canada
N7V 1X4
Phone 519.339.8787

Chain of Custody

Date_____Page__of__

Report to:		**Invoice To:**	
Company	Nautilus Environmental	**Company**	Nautilus Environmental
Address	8664 Commerce Court	**Address**	8664 Commerce Court
City/Prov/PC	Burnaby,BC	**City/Prov/PC**	Burnaby,BC
Contact	Rachel Sakurdeep	**Contact**	Nair
Phone	6044208773	**Phone**	6044208773
Email	rachel@nautilusenvironmental.ca	**Email**	nair@nautilusenvironmental.ca
	cwinter@nautilusenvironmental.ca	**PO No.**	2223-028BC

Sample Collection By: **Sample Type:** Grab ( ) OR Composite ( )

	SAMPLE ID	DATE (DD/MM/YY)	TIME	MATRIX	# OF CONTAINERS AND VOLUME (e.g. 1 x 20 L)	COMMENTS	ANALYSES REQUIRED: Dissolved Copper	Receipt Temperature (°C)
1	BOL-S	22/09/22			1 x 125 mL	Day 14 - Rep A	✓	
2	BOL-S	22/09/22			1 x 125 mL	Day 14 - Rep B	✓	
3	BOL-S	22/09/22			1 x 125 mL	Day 14 - Rep C	✓	
4	BOL-S	22/09/22			1 x 125 mL	Day 14 - Rep D	✓	
5	BOL-S	22/09/22			1 x 125 mL	Day 14 - Rep E	✓	
6								
7								
8								
9								
10								

SPECIAL INSTRUCTIONS/COMMENTS (CLIENT)

-Preserved with nitric acid

SAMPLE RECEIPT DETAILS (LABORATORY)

1. Total No. of Containers		4. Ice Present in Cooler?	Y / N
2. Courier		5. Seal Present?	Y / N
3. Good Condition?	Y / N	6. Initials Present on Seal?	Y / N

SAMPLE DESCRIPTION AND COMMENTS (LABORATORY)

RELINQUISHED BY (CLIENT)

CARLEY WINTER (Printed Name) (Signature)

Nautilus Environmental 22/09/22
(Company) (Date DD/MM/YY and Time)

RECEIVED BY (LABORATORY)

(Printed Name) (Signature)

(Company) (Date DD/MM/YY and Time)

Our liability is limited to the cost of the test requested. The test results only relate to the sample as received. No liability in whole or in part is assumed for the collection, handling, or transport of the sample, application or interpretation of the test data or results in part or in whole.

Additional costs may be required for sample disposal or storage. Payment net 30 unless otherwise contracted.

APPENDIX C – Chain-of-Custody Forms

TESTING LOCATION (Please Circle)

NAUTILUS ENVIRONMENTAL

Burnaby
8664 Commerce Court
Burnaby, British Columbia, Canada
4N7
604.420.8773

Calgary
#4 6125 12th St S.E.
V5A Calgary, Alberta, Canada
Phone T2H 2K1
Phone 403.253.7121

Ch[illegible] of Custody

Date_____Page__1_of_2__

Report to:		**Invoice To:**	
Company	Minnow Environmental	**Company**	Mount Polley Mining Corporation
Address	204-1006 Fort Street	**Address**	PO Box 12
City/State/Zip	Victoria, BC, V8V 3K4	**City/State/Zip**	Likely, BC, V0L 1N0
Contact	Katharina Batchelar	**Contact**	Gabriel Holmes
Phone	250-595-1627 ext. 22	**Phone**	236-317-4939
Email	katchelar@minnow.ca pstecko@minnow.ca	**Email**	gabriel.holmes@mountpolley.com
		PO No.	22-29-7

Sample Collection By: P.Schnurr, S.Lahmer **Sample Type:** **Grab** ○ **OR** **Composite** ○

	SAMPLE ID	DATE	TIME	MATRIX	# OF CONTAINERS AND VOLUME (e.g. 1 x 20 L)	COMMENTS	ANALYSES REQUIRED: 14 day *Hyallela azteca* test	221769	Receipt Temperature (°C)
1	QUL-LNF1_TOX-1_2022-08	23- Aug-22	—	sediment	1 x 500 mL glass	rep 1	✓		11.2
2	QUL-LNF1_TOX-2_2022-08	23- Aug-22	—	sediment	1 x 500 mL glass	rep 2	✓		
3	QUL-LNF1_TOX-3_2022-08	23 Aug-22	—	sediment	1 x 500 mL glass	rep 3	✓		
4	QUL-LNF1_TOX-4_2022-08	24- Aug-22	—	sediment	1 x 500 mL glass	rep 4	✓		
5	QUL-LNF1_TOX-5_2022-08	24- Aug-22	—	sediment	1 x 500 mL glass	rep 5	✓		
6	QUL-LREF1_TOX-1_2022-08	23- Aug-22	—	sediment	1 x 500 mL glass	rep 1	✓		
7	QUL-LREF1_TOX-2_2022-08	23-Aug-22	—	sediment	1 x 500 mL glass	rep 2	✓		
8	QUL-LREF1_TOX-3_2022-08	23- Aug-22	—	sediment	1 x 500 mL glass	rep 3	✓		
9	QUL-LREF1_TOX-4_2022-08	23- Aug-22	—	sediment	1 x 500 mL glass	rep 4	✓		
10	QUL-LREF1_TOX-5_2022-08	23- Aug-22	—	sediment	1 x 500 mL glass	rep 5	✓		

SPECIAL INSTRUCTIONS/COMMENTS (CLIENT)

Overlying water must be measured for dissolved copper concentrations in each toxicity replicate for all samples. Please contact Katharina Batchelar (kbatchelar@minnow.ca) to discuss.

SAMPLE RECEIPT DETAILS (LABORATORY)

1. Total No. of Containers	20	4. Ice Present in Cooler?	(Y) N
2. Courier	Vantem	5. Seal Present on Cooler?	Y / (N)
3. Good Condition?	(Y) / N	6. Initials Present on Seal?	Y / (N)

SAMPLE DESCRIPTION AND COMMENTS (LABORATORY)

RELINQUISHED BY (CLIENT)

(Printed Name) (Signature)

(Company) (Date and Time)

RECEIVED BY (LABORATORY)

Tyson (Printed Name) TH (Signature)

Nautilus (Company) Aug. 30/22 @10:40 (Date and Time)

Additional costs may be required for sample disposal or storage. Payment net 30 unless otherwise contracted.

TESTING LOCATION (Please Circle)

NAUTILUS ENVIRONMENTAL

Burnaby
8664 Commerce Court
Burnaby, British Columbia, Canada
4N7
604.420.8773

Calgary
#4 6125 12th St S.E.
V5A Calgary, Alberta, Canada
Phone T2H 2K1
Phone 403.253.7121

Ch of Custody

Date_____Page__2_of_2__

Report to:		**Invoice To:**	
Company	Minnow Environmental	**Company**	Mount Polley Mining Corporation
Address	204-1006 Fort Street	**Address**	PO Box 12
City/State/Zip	Victoria, BC, V8V 3K4	**City/State/Zip**	Likely, BC, V0L 1N0
Contact	Katharina Batchelar	**Contact**	Gabriel Holmes
Phone	250-595-1627 ext. 22	**Phone**	236-317-4939
Email	katchelar@minnow.ca pstecko@minnow.ca	**Email**	gabriel.holmes@mountpolley.com
		PO No.	22-29-7

Sample Collection By: P.Schnurr, S.Latimer **Sample Type:** Grab ○ **OR** Composite ○

	SAMPLE ID	DATE	TIME	MATRIX	# OF CONTAINERS AND VOLUME (e.g. 1 x 20 L)	COMMENTS	ANALYSES REQUIRED: 14 day *Hyallela azteca* test	22/769	Receipt Temperature (°C)
11	POL-S_TOX-1_2022-08	25-Aug-22	—	sediment	1 x 500 mL glass	rep 1	✓		11.2
12	POL-S_TOX-2_2022-08	25-Aug-22	—	sediment	1 x 500 mL glass	rep 2	✓		
13	POL-S_TOX-3_2022-08	25-Aug-22	—	sediment	1 x 500 mL glass	rep 3	✓		
14	POL-S_TOX-4_2022-08	25-Aug-22	—	sediment	1 x 500 mL glass	rep 4	✓		
15	POL-S_TOX-5_2022-08	25-Aug-22	—	sediment	1 x 500 mL glass	rep 5	✓		
16	BOL-S_TOX-1_2022-08	24-Aug-22	—	sediment	1 x 500 mL glass	rep 1	✓		
17	BOL-S_TOX-2_2022-08	24-Aug-22	—	sediment	1 x 500 mL glass	rep 2	✓		
18	BOL-S_TOX-3_2022-08	24-Aug-22	—	sediment	1 x 500 mL glass	rep 3	✓		
19	BOL-S_TOX-4_2022-08	24-Aug-22	—	sediment	1 x 500 mL glass	rep 4	✓		
20	BOL-S_TOX-5_2022-08	24-Aug-22	—	sediment	1 x 500 mL glass	rep 5	✓		6

SPECIAL INSTRUCTIONS/COMMENTS (CLIENT)

Overlying water must be measured for dissolved copper concentrations in each toxicity replicate for all samples. Please contact Katharina Batchelar (kbatchelar@minnow.ca) to discuss.

SAMPLE RECEIPT DETAILS (LABORATORY)

1. Total No. of Containers	20	4. Ice Present in Cooler?	(Y) / N
2. Courier	Van Kam	5. Seal Present on Cooler?	Y / (N)
3. Good Condition?	Y / N	6. Initials Present on Seal?	Y / (N)

SAMPLE DESCRIPTION AND COMMENTS (LABORATORY)

RELINQUISHED BY (CLIENT)

(Printed Name) (Signature)

(Company) (Date and Time)

RECEIVED BY (LABORATORY)

Tyrone (Printed Name) TN (Signature)

Nautilus (Company) Aug. 30/22 @ 10:40 (Date and Time)

Additional costs may be required for sample disposal or storage. Payment net 30 unless otherwise contracted.

END OF REPORT

PLANKTON COMMUNITY AND PRODUCTIVITY

Biologica Laboratory Reports fp22-078 Freshwater Phytoplankton

(Finalized November 16, 2022)

Freshwater Phytoplankton Enumeration and Identification Methods
Client: Minnow Environmental
Project: Mount Polley 2022

Sample Inventory

Sample arrival: 29-Jun-22; 15-Aug-22; 1-Sept-22
Number of samples: 28 (4, 20, 4)
Number of jars: 28
Biologica project number: fp22-078

Upon arrival, samples were examined, and Lugol's preservative was added to ensure adequate preservation of samples. An inventory form was created and verified with the chain of custody (COC) to ensure (1) all samples are accounted for, (2) each sample has the appropriate number of jars as indicated on the COC. Any discrepancies were reported to the client and were resolved before further sample handling.

Sample Processing

Samples were thoroughly mixed by shaking, and sub-samples (25-50 mL) were dispensed into Utermohl settling chambers and allowed to settle for 24-36 hours (depending on sub-sample volume). Sub-samples were then systematically scanned using a Zeiss Axio Vert A.1 inverted phase-contrast microscope at 400x magnification. All algal units were counted in a series of randomly located fields of view (FOV) until a minimum of 300 units were enumerated. Algal units represent single cells of all algal groups, as well as colonies or filaments of blue-green algae. Given that blue-green algal colonies/filaments may contain hundreds of cells, enumerating units rather than individual cells allows for a more equal representation of algal groups. The mean number of cells per unit (= 1 for single cells, >1 for all other algal forms) was estimated for all taxa and used to calculate total densities. Only "viable" cells (those that appeared to be alive at the time of collection) were identified and enumerated. Chrysophyte loricas were also counted (EPA, 2003).

Algae were identified to genus, where possible, following the most up-to-date taxonomic references and collaborations with international and local algal taxonomic experts. Species-level identifications were only given to identifiable taxa for which there are reliable taxonomic references available that encompass the species-level morphological diversity in North America. This approach ensures the long-term consistency of data sets and is in accordance with the trend in algal taxonomic practice to be more conservative with the delineation of species. Species-level identifications for some taxa are problematic due to widespread phenotypic plasticity that can artificially inflate species richness (Wehr *et al.* 2015). When applicable, the terms "cf." (*confertim*, possibly for species) and "sp.1" (a single undetermined species) were employed to distinguish between different species in the same genus.

Table 1. Summary of phytoplankton samples processed for Minnow Environmental Mount Polley, 2022.

Client Sample ID	Date Sampled	Biologica Sample ID	Subsample Volume (mL)	Fields of View Counted	Sum of Units Counted*
POL-P2_PHYTO-1_2022-06	21-Jun-22	fp22-078-001	50	13	316
BOL-B2_PHYTO-1_2022-06	21-Jun-22	fp22-078-002	25	30	323

Client Sample ID	Date Sampled	Biologica Sample ID	Subsample Volume (mL)	Fields of View Counted	Sum of Units Counted*
QUL-ZOO-7_PHYTO-1_2022-06	22-Jun-22	fp22-078-003	25	35	305
QUL-ZOO-1_PHYTO-1_2022-06	22-Jun-22	fp22-078-004	50	27	317
BOL-B2_PHYTO-1_2022-07	26-Jul-22	fp22-078-029	25	53	314
BOL-B2_PHYTO-2_2022-07	26-Jul-22	fp22-078-030	25	47	313
BOL-B2_PHYTO-3_2022-07	26-Jul-22	fp22-078-031	25	45	305
BOL-B2_PHYTO-4_2022-07	26-Jul-22	fp22-078-032	25	45	311
BOL-B2_PHYTO-5_2022-07	26-Jul-22	fp22-078-033	25	53	299
POL-P2_PHYTO-1_2022-07	25-Jul-22	fp22-078-034	25	15	323
POL-P2_PHYTO-2_2022-07	25-Jul-22	fp22-078-035	25	15	312
POL-P2_PHYTO-3_2022-07	25-Jul-22	fp22-078-036	25	15	312
POL-P2_PHYTO-4_2022-07	25-Jul-22	fp22-078-037	25	13	353
POL-P2_PHYTO-5_2022-07	25-Jul-22	fp22-078-038	25	15	301
QUL-ZOO-1_PHYTO-1_2022-07	27-Jul-22	fp22-078-039	25	13	325
QUL-ZOO-1_PHYTO-2_2022-07	27-Jul-22	fp22-078-040	25	17	317
QUL-ZOO-1_PHYTO-3_2022-07*	28-Jul-22	fp22-078-041	25	13	315
QUL-ZOO-1_PHYTO-4_2022-07	28-Jul-22	fp22-078-042	25	13	362
QUL-ZOO-1_PHYTO-5_2022-07	28-Jul-22	fp22-078-043	25	15	300
QUL-ZOO-7_PHYTO-1_2022-07	27-Jul-22	fp22-078-044	25	20	369
QUL-ZOO-7_PHYTO-2_2022-07	27-Jul-22	fp22-078-045	25	23	317
QUL-ZOO-7_PHYTO-3_2022-07	27-Jul-22	fp22-078-046	25	20	305
QUL-ZOO-7_PHYTO-4_2022-07	27-Jul-22	fp22-078-047	25	20	315
QUL-ZOO-7_PHYTO-5_2022-07	27-Jul-22	fp22-078-048	25	23	309
POL-P2_PHYTO-1_2022-08	25-Aug-22	fp22-078-049	25	30	300
BOL-B2_PHYTO-1_2022-08	28-Aug-22	fp22-078-050	25	80	279
QUL-ZOO-1_PHYTO-1_2022-08*	28-Aug-22	fp22-078-051	25	40	303
QUL-ZOO-7_PHYTO-1_2022-08	28-Aug-22	fp22-078-052	25	60	314

*Algal units represent single cells, colonies, coenobia or filaments.
*QUL-ZOO-1_PHYTO-3_2022-07 labelled as zooplankton but preserved in formalin. Processed as algae.
*QUL-ZOO-1_PHYTO-1_2022-08 algae sample preserved in formalin.

Data

Algal densities expressed as the number of cells per litre (cells/L) were derived for each sample from the sub-sample volume, number of FOV assessed, number of units counted, and number of cells per unit.

QA/QC

Three samples (10% of samples) were reanalyzed to assess sub-sampling and enumeration precision (Table 2). Samples were randomly selected and processed at different times to reduce counting and identification bias.

Table 2. Summary of enumeration QA/QC results for Minnow Environmental Mount Polley, 2022.

Client Sample ID	Biologica Sample ID	Original Density (cells/L)	QA Density (cells/L)	% Agreement
BOL-B2_PHYTO-1_2022-06	fp22-078-002	2,644,518	1,677,273	**84.43**

Client Sample ID	Biologica Sample ID	Original Density (cells/L)	QA Density (cells/L)	% Agreement
POL-P2_PHYTO-5_2022-07	fp22-078-038	5,177,576	6,607,277	**82.53**
QUL-ZOO-7_PHYTO-3_2022-07	fp22-078-046	1,225,803	1,225,803	**100.00**
			Average:	**88.99**

* Percent Agreement: [100- (difference in abundance between samples) / total abundance of the original sample)] %

Results were provided to the Minnow Environmental project manager in Excel spreadsheets via email.

Methodological and Taxonomic References

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Total phytoplankton density (cells/L) for Minnow Environmental Mount Polley Phytoplankton, 2022

Biologica Sample ID							fp22-078-001	fp22-078-002	fp22-078-003	fp22-078-004	fp22-078-029	fp22-078-030	fp22-078-031	fp22-078-032
Client Sample ID							POL-P2_PHYTO-1_2022-06	BOL-B2_PHYTO-1_2022-06	QUL-ZOO-7_PHYTO-1_2022-06	QUL-ZOO-1_PHYTO-1_2022-06	BOL-B2_PHYTO-1_2022-07	BOL-B2_PHYTO-2_2022-07	BOL-B2_PHYTO-3_2022-07	BOL-B2_PHYTO-4_2022-07
Date Sampled							21-Jun-22	21-Jun-22	22-Jun-22	22-Jun-22	26-Jul-22	26-Jul-22	26-Jul-22	26-Jul-22
Common Name	Phylum	Order	Family	Taxon	Grand Total		Total Density	Total Density	Total Density	Total Density	Total Density	Total Density	Total Density	Total Density
					Unique Taxa	Density (cells/L)	(cells/L)	(cells/L)	(cells/L)	(cells/L)	(cells/L)	(cells/L)	(cells/L)	(cells/L)
Diatoms	Bacillariophyta	Aulacoseirales	Aulacoseiraceae	Aulacoseira sp.	1	224,892	18,549	32,152			50,048		8,931	23,221
Diatoms	Bacillariophyta	Bacillariales	Bacillariaceae	Nitzschia sp.	1	68,146	9,275	5,359	20,669	4,466	1,517			1,786
Diatoms	Bacillariophyta	Cocconeidales	Achnanthidiaceae	Achnanthidium sp.	1	18,143			2,297	1,489				
Diatoms	Bacillariophyta	Cocconeidales	Cocconeidaceae	Cocconeis placentula	1	1,340								
Diatoms	Bacillariophyta	Cymbellales	Cymbellaceae	Didymosphenia geminata	1	4,019								
Diatoms	Bacillariophyta	Cymbellales	Gomphonemataceae	Encyonema sp.	1	1,489				1,489				
Diatoms	Bacillariophyta	Cymbellales	Gomphonemataceae	Gomphonema sp.	1	0								
Diatoms	Bacillariophyta	Eunotiales	Eunotiaceae	Eunotia sp.	1	20,186	12,366		4,593		1,517	1,710		
Diatoms	Bacillariophyta	Fragilariales	Fragilariaceae	Fragilaria capucina	1	75,022								
Diatoms	Bacillariophyta	Fragilariales	Fragilariaceae	Fragilaria crotonensis	1	149,523				1,489				
Diatoms	Bacillariophyta	Fragilariales	Fragilariaceae	Fragilaria sp.		105,171		10,717	6,890					
Diatoms	Bacillariophyta	Fragilariales	Staurosiraceae	Staurosira sp.	1	19,831						3,420		
Diatoms	Bacillariophyta	Fragilariales	Staurosiraceae	Staurosirella sp.	1	18,755		18,755						
Diatoms	Bacillariophyta	Licmophorales	Ulnariaceae	Ulnaria ulna	1	6,183	6,183							
Diatoms	Bacillariophyta	Naviculales	Sellaphoraceae	Sellaphora sp.	1	1,517								
Diatoms	Bacillariophyta	Rhabdonematales	Tabellariaceae	Asterionella formosa	1	682,648		109,853				10,261	21,435	3,572
Diatoms	Bacillariophyta	Rhabdonematales	Tabellariaceae	Diatoma sp.	1	2,344								
Diatoms	Bacillariophyta	Rhabdonematales	Tabellariaceae	Tabellaria fenestrata	1	168,933					6,066	34,204	32,152	19,649
Diatoms	Bacillariophyta	Rhizosoleniales	Rhizosoleniaceae	Urosolenia eriensis	1	21,779			4,593	1,489				
Diatoms	Bacillariophyta	Rhopalodiales	Rhopalodiaceae	Epithemia sorex	1	2,679								
Diatoms	Bacillariophyta	Stephanodiscales	Stephanodiscaceae	Cyclotella sp.		623,465		13,397	4,593	14,885	3,033	15,392	3,572	3,572
Diatoms	Bacillariophyta	Stephanodiscales	Stephanodiscaceae	Cyclotella cf. atomus	1	357,092	21,641			2,977				
Diatoms	Bacillariophyta	Stephanodiscales	Stephanodiscaceae	Lindavia sp.	1	6,606					3,033		3,572	
Diatoms	Bacillariophyta	Stephanodiscales	Stephanodiscaceae	Stephanodiscus sp.	1	16,811		10,717					1,786	1,786
Diatoms	Bacillariophyta			Centric diatom		1,662,793	442,093	10,717	43,635	86,335	4,550	3,420		
				Total Diatoms		**4,259,368**	**510,107**	**211,669**	**87,270**	**114,617**	**69,764**	**68,409**	**71,449**	**53,587**
Green Algae	Charophyta	Desmidiales	Desmidiaceae	Cosmarium sp.	1	9,532								
Green Algae	Charophyta	Desmidiales	Desmidiaceae	Staurastrum sp.	1	3,303					1,517			1,786
Green Algae	Charophyta	Klebsormidiales	Elakatotrichaceae	Elakatothrix gelatinosa	1	34,468						3,420		3,572
Green Algae	Charophyta	Klebsormidiales	Elakatotrichaceae	Elakatothrix sp.		85,448		24,114				1,710	3,572	
Green Algae	Charophyta	Klebsormidiales	Elakatotrichaceae	Elakatothrix viridis	1	53,848	12,366							
Green Algae	Chlorophyta	Chlamydomonadales	Sphaerocystidaceae	Sphaerocystis sp.	1	1,941,671		21,435			13,650	13,682	28,580	33,938
Green Algae	Chlorophyta	Chlorellales	Oocystaceae	Nephrocytium sp.	1	168,331								
Green Algae	Chlorophyta	Chlorellales	Oocystaceae	Oocystis sp.	1	713,404	34,007	10,717	4,593	4,466	30,332	37,625	16,076	39,297
Green Algae	Chlorophyta	Prasiolales	Prasiolaceae	Stichococcus sp.	1	65,036				2,977				
Green Algae	Chlorophyta	Pyramimonadales	Pyramimonadaceae	Pyramimonas sp.	1	15,360		8,038			1,517			1,786
Green Algae	Chlorophyta	Sphaeropleales	Characiaceae	Ankyra sp.	1	312,705		5,359			10,616	20,523	14,290	21,435
Green Algae	Chlorophyta	Sphaeropleales	Hydrodictyaceae	Pseudopediastrum boryanum	1	7,583					7,583			
Green Algae	Chlorophyta	Sphaeropleales	Hydrodictyaceae	Tetraedron sp.	1	8,676				1,489				
Green Algae	Chlorophyta	Sphaeropleales	Scenedesmaceae	Coelastrum sp.	1	0								
Green Algae	Chlorophyta	Sphaeropleales	Scenedesmaceae	Desmodesmus sp.	1	16,076								
Green Algae	Chlorophyta	Sphaeropleales	Scenedesmaceae	Scenedesmus arcuatus	1	169,359								
Green Algae	Chlorophyta	Sphaeropleales	Scenedesmaceae	Scenedesmus sp.		72,683			22,966	41,679				
Green Algae	Chlorophyta	Sphaeropleales	Schizochlamydaceae	Planktosphaeria sp.	1	39,378		5,359				5,131	1,786	
Green Algae	Chlorophyta	Sphaeropleales	Selenastraceae	Monoraphidium contortum	1	195,318	185,493	5,359		4,466				
Green Algae	Chlorophyta	Sphaeropleales	Selenastraceae	Monoraphidium sp.		62,583	21,641		4,593	1,489		5,131		1,786
Green Algae	Chlorophyta	Trebouxiales	Botryococcaceae	Botryococcus sp.	1	93,264						71,829		21,435
Green Algae	Chlorophyta	Trebouxiophyceae ordo incertae sedis	Trebouxiophyceae incertae sedis	Crucigenia sp.	1	261,974			9,186			6,841		
Green Algae	Chlorophyta			Chlorophyte		49,742					1,517	6,841		
				Total Green Algae		**4,379,742**	**253,508**	**80,381**	**41,339**	**56,564**	**66,731**	**172,733**	**64,304**	**125,036**

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Total phytoplankton density (cells/L) for Minnow Environmental Mount Polley Phytoplankton, 2022

Biologica Sample ID							fp22-078-001	fp22-078-002	fp22-078-003	fp22-078-004	fp22-078-029	fp22-078-030	fp22-078-031	fp22-078-032
Client Sample ID							POL-P2_PHYTO-1_2022-06	BOL-B2_PHYTO-1_2022-06	QUL-ZOO-7_PHYTO-1_2022-06	QUL-ZOO-1_PHYTO-1_2022-06	BOL-B2_PHYTO-1_2022-07	BOL-B2_PHYTO-2_2022-07	BOL-B2_PHYTO-3_2022-07	BOL-B2_PHYTO-4_2022-07
Date Sampled							21-Jun-22	21-Jun-22	22-Jun-22	22-Jun-22	26-Jul-22	26-Jul-22	26-Jul-22	26-Jul-22
Common Name	Phylum	Order	Family	Taxon	Grand Total		Total Density	Total Density	Total Density	Total Density	Total Density	Total Density	Total Density	Total Density
					Unique Taxa	Density (cells/L)	(cells/L)	(cells/L)	(cells/L)	(cells/L)	(cells/L)	(cells/L)	(cells/L)	(cells/L)
Golden Algae	Haptophyta	Prymnesiales	Chrysochromulinaceae	Chrysochromulina sp.	1	271,359	12,366	26,794	13,780	35,725	7,583	3,420	1,786	10,717
Golden Algae	Ochrophyta	Chromulinales	Chromulinaceae	Chromulina sp.	1	14,210			9,186					
Golden Algae	Ochrophyta	Chromulinales	Chromulinaceae	Uroglena sp.	1	10,121,266	9,275	5,359	6,890		40,949	13,682	28,580	23,221
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Chrysolykos sp.	1	55,379			6,890					
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Dinobryon borgei	1	49,426			13,780	8,931				
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Dinobryon crenulatum	1	226,800			25,262	11,908				
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Dinobryon divergens	1	3,260,808			6,890	8,931		17,102		
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Dinobryon sp.		1,124,947		2,679	34,449	14,885	1,517			3,572
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Epipyxis sp.	1	16,700							1,786	
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Kephyrion/Pseudokephyrion sp.	1	250,778			2,297	20,839				
Golden Algae	Ochrophyta	Hibberdinales	Stylococcaceae	Bitrichia sp.	1	6,029								
Golden Algae	Ochrophyta	Pedinellales	Pedinellaceae	Pseudopedinella sp.	1	168,125	12,366	13,397	2,297	5,954		1,710	1,786	1,786
Golden Algae	Ochrophyta	Phaeothamniales	Phaeothamniaceae	Stichogloea sp.	1	1,362,752		32,152			100,096	148,789	171,478	153,616
Golden Algae	Ochrophyta	Synurales	Mallomonadaceae	Mallomonas akrokomos	1	8,762						1,710		
Golden Algae	Ochrophyta	Synurales	Mallomonadaceae	Mallomonas sp.		374,542	3,092	238,462	22,966	13,397	10,616	10,261	16,076	14,290
Golden Algae	Ochrophyta	Synurales	Synuraceae	Spiniferomonas sp.	1	1,517								
Golden Algae	Ochrophyta	Synurales	Synuraceae	Synura sp.	1	153,207			142,388			1,710	3,572	
Golden Algae	Ochrophyta			Chrysophyte		139,201			32,152	7,443				
				Total Golden Algae		**17,605,807**	**37,099**	**318,843**	**319,225**	**128,013**	**160,761**	**198,386**	**225,065**	**207,203**
Cryptomonads	Cryptophyta	Cryptomonadales	Cryptomonadaceae	Cryptomonas sp.	1	523,654	6,183	42,870	13,780	7,443	19,716	20,523	21,435	23,221
Cryptomonads	Cryptophyta	Pyrenomonadales	Geminigeraceae	Plagioselmis nanoplanctica	1	4,338,590	160,761	174,158	183,727	120,571	119,812	102,613	130,395	128,609
Cryptomonads	Katablepharidophyta	Katablepharidales	Katablepharidaceae	Katablepharis ovalis	1	31,089		10,717			3,033		1,786	
				Total Cryptomonads		**4,893,333**	**166,944**	**227,745**	**197,506**	**128,013**	**142,562**	**123,136**	**153,616**	**151,830**
Euglenoids	Euglenozoa	Euglenida	Euglenidae	Trachelomonas sp.	1	2,010								
				Total Euglenoids		**2,010**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Blue-green Algae	Cyanophyta	Chroococcales	Aphanothecaceae	Aphanothece sp.	1	13,380,249		160,761			932,717	1,559,724	1,157,479	1,196,379
Blue-green Algae	Cyanophyta	Chroococcales	Chroococcaceae	Chroococcus sp.	1	165,117					18,199			25,007
Blue-green Algae	Cyanophyta	Chroococcales	Gomphosphaeriaceae	Gomphosphaeria sp.	1	310,835						34,204		
Blue-green Algae	Cyanophyta	Nostocales	Aphanizomenonaceae	Aphanizomenon sp.	1	522,780						129,977		
Blue-green Algae	Cyanophyta	Nostocales	Aphanizomenonaceae	Dolichospermum sp.	1	5,643,629	52,556		11,483		74,314	128,267	144,685	55,373
Blue-green Algae	Cyanophyta	Synechococcales	Coelosphaeriaceae	Coelomoron sp.	1	11,139,030								
Blue-green Algae	Cyanophyta	Synechococcales	Coelosphaeriaceae	Coelosphaerium sp.	1	1,140,291					197,160			
Blue-green Algae	Cyanophyta	Synechococcales	Coelosphaeriaceae	Snowella sp.	1	50,908								
Blue-green Algae	Cyanophyta	Synechococcales	Coelosphaeriaceae	Woronichinia sp.	1	180,856								
Blue-green Algae	Cyanophyta	Synechococcales	Merismopediaceae	Aphanocapsa sp.	1	2,202,527		1,071,740			84,930		176,837	107,174
Blue-green Algae	Cyanophyta	Synechococcales	Pseudanabaenaceae	Pseudanabaena sp.	1	77,869								
Blue-green Algae	Cyanophyta	Synechococcales	Synechococcaceae	Cyanodictyon sp.	1	2,918,502					166,827	1,668,038	535,870	1,786
Blue-green Algae	Cyanophyta	Synechococcales	Synechococcaceae	Synechococcus sp.	1	101,608			18,373	43,167				
Blue-green Algae	Cyanophyta			Cyanophyte (colony)		28,983					6,066	6,841		
				Total Blue-green Algae		**37,863,183**	**52,556**	**1,232,501**	**29,856**	**43,167**	**1,480,215**	**3,527,051**	**2,014,871**	**1,385,720**
Dinoflagellates	Miozoa	Gonyaulacales	Ceratiaceae	Ceratium hirundinella	1	18,557					1,517	3,420		3,572
Dinoflagellates	Miozoa	Gymnodiniales	Gymnodiniaceae	Gymnodinium fuscum	1	5,771	3,092	2,679						
Dinoflagellates	Miozoa	Gymnodiniales	Gymnodiniaceae	Gymnodinium sp.		82,818	3,092	5,359	29,856	1,489			1,786	1,786
Dinoflagellates	Miozoa	Peridiniales	Peridiniaceae	Peridinium sp.	1	19,097		2,679	4,593					
				Total Dinoflagellates		**126,242**	**6,183**	**10,717**	**34,449**	**1,489**	**1,517**	**3,420**	**1,786**	**5,359**
				Total Phytoplankton		**69,129,685**	**1,026,397**	**2,081,855**	**709,645**	**471,863**	**1,921,549**	**4,093,135**	**2,531,093**	**1,928,735**
				Total Unique Taxa	**76**		**16**	**27**	**27**	**22**	**27**	**28**	**26**	**29**

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Total phytoplankton density (cells/L) for Minnow Environmental Mount Polley Phytoplankton, 2022

Biologica Sample ID							fp22-078-033	fp22-078-034	fp22-078-035	fp22-078-036	fp22-078-037	fp22-078-038	fp22-078-039	fp22-078-040
Client Sample ID							BOL-B2_PHYTO-5_2022-07	POL-P2_PHYTO-1_2022-07	POL-P2_PHYTO-2_2022-07	POL-P2_PHYTO-3_2022-07	POL-P2_PHYTO-4_2022-07	POL-P2_PHYTO-5_2022-07	QUL-ZOO-1_PHYTO-1_2022-07	QUL-ZOO-1_PHYTO-2_2022-07
Date Sampled							26-Jul-22	25-Jul-22	25-Jul-22	25-Jul-22	25-Jul-22	25-Jul-22	27-Jul-22	27-Jul-22
Common Name	Phylum	Order	Family	Taxon	Grand Total		Total Density	Total Density	Total Density	Total Density	Total Density	Total Density	Total Density	Total Density
					Unique Taxa	Density (cells/L)	(cells/L)	(cells/L)	(cells/L)	(cells/L)	(cells/L)	(cells/L)	(cells/L)	(cells/L)
Diatoms	Bacillariophyta	Aulacoseirales	Aulacoseiraceae	Aulacoseira sp.	1	224,892	4,550							18,913
Diatoms	Bacillariophyta	Bacillariales	Bacillariaceae	Nitzschia sp.	1	68,146		5,359						
Diatoms	Bacillariophyta	Cocconeidales	Achnanthidiaceae	Achnanthidium sp.	1	18,143								
Diatoms	Bacillariophyta	Cocconeidales	Cocconeidaceae	Cocconeis placentula	1	1,340								
Diatoms	Bacillariophyta	Cymbellales	Cymbellaceae	Didymosphenia geminata	1	4,019								
Diatoms	Bacillariophyta	Cymbellales	Gomphonemataceae	Encyonema sp.	1	1,489								
Diatoms	Bacillariophyta	Cymbellales	Gomphonemataceae	Gomphonema sp.	1	0								
Diatoms	Bacillariophyta	Eunotiales	Eunotiaceae	Eunotia sp.	1	20,186								
Diatoms	Bacillariophyta	Fragilariales	Fragilariaceae	Fragilaria capucina	1	75,022			75,022					
Diatoms	Bacillariophyta	Fragilariales	Fragilariaceae	Fragilaria crotonensis	1	149,523								
Diatoms	Bacillariophyta	Fragilariales	Fragilariaceae	Fragilaria sp.		105,171		42,870	5,359	10,717		10,717		4,728
Diatoms	Bacillariophyta	Fragilariales	Staurosiraceae	Staurosira sp.	1	19,831								
Diatoms	Bacillariophyta	Fragilariales	Staurosiraceae	Staurosirella sp.	1	18,755								
Diatoms	Bacillariophyta	Licmophorales	Ulnariaceae	Ulnaria ulna	1	6,183								
Diatoms	Bacillariophyta	Naviculales	Sellaphoraceae	Sellaphora sp.	1	1,517	1,517							
Diatoms	Bacillariophyta	Rhabdonematales	Tabellariaceae	Asterionella formosa	1	682,648	1,517	155,402	37,511	123,250	6,183	64,304	18,549	66,196
Diatoms	Bacillariophyta	Rhabdonematales	Tabellariaceae	Diatoma sp.	1	2,344								
Diatoms	Bacillariophyta	Rhabdonematales	Tabellariaceae	Tabellaria fenestrata	1	168,933	3,033			5,359				
Diatoms	Bacillariophyta	Rhizosoleniales	Rhizosoleniaceae	Urosolenia eriensis	1	21,779								
Diatoms	Bacillariophyta	Rhopalodiales	Rhopalodiaceae	Epithemia sorex	1	2,679								
Diatoms	Bacillariophyta	Stephanodiscales	Stephanodiscaceae	Cyclotella sp.		623,465	6,066	32,152	21,435	48,228	30,916	37,511	24,732	23,641
Diatoms	Bacillariophyta	Stephanodiscales	Stephanodiscaceae	Cyclotella cf. atomus	1	357,092							61,831	14,185
Diatoms	Bacillariophyta	Stephanodiscales	Stephanodiscaceae	Lindavia sp.	1	6,606								
Diatoms	Bacillariophyta	Stephanodiscales	Stephanodiscaceae	Stephanodiscus sp.	1	16,811	1,517							
Diatoms	Bacillariophyta			Centric diatom		1,662,793	1,517	21,435	5,359	10,717	6,183	16,076	111,296	99,294
				Total Diatoms		**4,259,368**	**19,716**	**257,218**	**144,685**	**198,272**	**43,282**	**128,609**	**216,409**	**226,957**
Green Algae	Charophyta	Desmidiales	Desmidiaceae	Cosmarium sp.	1	9,532							6,183	
Green Algae	Charophyta	Desmidiales	Desmidiaceae	Staurastrum sp.	1	3,303								
Green Algae	Charophyta	Klebsormidiales	Elakatotrichaceae	Elakatothrix gelatinosa	1	34,468	6,066					5,359	12,366	
Green Algae	Charophyta	Klebsormidiales	Elakatotrichaceae	Elakatothrix sp.		85,448		10,717	5,359	5,359				
Green Algae	Charophyta	Klebsormidiales	Elakatotrichaceae	Elakatothrix viridis	1	53,848							12,366	18,913
Green Algae	Chlorophyta	Chlamydomonadales	Sphaerocystidaceae	Sphaerocystis sp.	1	1,941,671	15,166	294,728	316,163	348,315	408,086	187,554		4,728
Green Algae	Chlorophyta	Chlorellales	Oocystaceae	Nephrocytium sp.	1	168,331	1,517			42,870	24,732			9,457
Green Algae	Chlorophyta	Chlorellales	Oocystaceae	Oocystis sp.	1	713,404	65,214	21,435	53,587	32,152	80,380	107,174	12,366	4,728
Green Algae	Chlorophyta	Prasiolales	Prasiolaceae	Stichococcus sp.	1	65,036							18,549	4,728
Green Algae	Chlorophyta	Pyramimonadales	Pyramimonadaceae	Pyramimonas sp.	1	15,360								
Green Algae	Chlorophyta	Sphaeropleales	Characiaceae	Ankyra sp.	1	312,705	18,199	48,228	42,870	37,511	49,465	32,152		
Green Algae	Chlorophyta	Sphaeropleales	Hydrodictyaceae	Pseudopediastrum boryanum	1	7,583								
Green Algae	Chlorophyta	Sphaeropleales	Hydrodictyaceae	Tetraedron sp.	1	8,676								
Green Algae	Chlorophyta	Sphaeropleales	Scenedesmaceae	Coelastrum sp.	1	0								
Green Algae	Chlorophyta	Sphaeropleales	Scenedesmaceae	Desmodesmus sp.	1	16,076								
Green Algae	Chlorophyta	Sphaeropleales	Scenedesmaceae	Scenedesmus arcuatus	1	169,359	3,033				61,831			
Green Algae	Chlorophyta	Sphaeropleales	Scenedesmaceae	Scenedesmus sp.		72,683								
Green Algae	Chlorophyta	Sphaeropleales	Schizochlamydaceae	Planktosphaeria sp.	1	39,378			10,717					
Green Algae	Chlorophyta	Sphaeropleales	Selenastraceae	Monoraphidium contortum	1	195,318								
Green Algae	Chlorophyta	Sphaeropleales	Selenastraceae	Monoraphidium sp.		62,583			5,359	5,359				
Green Algae	Chlorophyta	Trebouxiales	Botryococcaceae	Botryococcus sp.	1	93,264								
Green Algae	Chlorophyta	Trebouxiophyceae ordo incertae sedis	Trebouxiophyceae incertae sedis	Crucigenia sp.	1	261,974	15,166							
Green Algae	Chlorophyta			Chlorophyte		49,742	7,583		5,359		12,366	16,076		
				Total Green Algae		**4,379,742**	**131,945**	**375,109**	**439,413**	**471,566**	**636,861**	**348,315**	**61,831**	**42,554**

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Total phytoplankton density (cells/L) for Minnow Environmental Mount Polley Phytoplankton, 2022

Biologica Sample ID							fp22-078-033	fp22-078-034	fp22-078-035	fp22-078-036	fp22-078-037	fp22-078-038	fp22-078-039	fp22-078-040
Client Sample ID							BOL-B2_PHYTO-5_2022-07	POL-P2_PHYTO-1_2022-07	POL-P2_PHYTO-2_2022-07	POL-P2_PHYTO-3_2022-07	POL-P2_PHYTO-4_2022-07	POL-P2_PHYTO-5_2022-07	QUL-ZOO-1_PHYTO-1_2022-07	QUL-ZOO-1_PHYTO-2_2022-07
Date Sampled							26-Jul-22	25-Jul-22	25-Jul-22	25-Jul-22	25-Jul-22	25-Jul-22	27-Jul-22	27-Jul-22
Common Name	Phylum	Order	Family	Taxon	Grand Total		Total Density	Total Density	Total Density	Total Density	Total Density	Total Density	Total Density	Total Density
					Unique Taxa	Density (cells/L)	(cells/L)	(cells/L)	(cells/L)	(cells/L)	(cells/L)	(cells/L)	(cells/L)	(cells/L)
Golden Algae	Haptophyta	Prymnesiales	Chrysochromulinaceae	Chrysochromulina sp.	1	271,359	13,650		5,359					9,457
Golden Algae	Ochrophyta	Chromulinales	Chromulinaceae	Chromulina sp.	1	14,210								
Golden Algae	Ochrophyta	Chromulinales	Chromulinaceae	Uroglena sp.	1	10,121,266	31,849		42,870	5,359	6,183	5,359	1,255,172	955,109
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Chrysolykos sp.	1	55,379								4,728
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Dinobryon borgei	1	49,426							6,183	
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Dinobryon crenulatum	1	226,800							12,366	23,641
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Dinobryon divergens	1	3,260,808		637,685	476,924	530,511	809,988	530,511	18,549	18,913
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Dinobryon sp.		1,124,947		96,457	155,402	64,304	352,438	128,609	24,732	23,641
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Epipyxis sp.	1	16,700	1,517							
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Kephyrion/Pseudokephyrion sp.	1	250,778							18,549	4,728
Golden Algae	Ochrophyta	Hibberdinales	Stylococcaceae	Bitrichia sp.	1	6,029								
Golden Algae	Ochrophyta	Pedinellales	Pedinellaceae	Pseudopedinella sp.	1	168,125	1,517						24,732	
Golden Algae	Ochrophyta	Phaeothamniales	Phaeothamniaceae	Stichogloea sp.	1	1,362,752	43,982	69,663	160,761	107,174	6,183	123,250	6,183	
Golden Algae	Ochrophyta	Synurales	Mallomonadaceae	Mallomonas akrokomos	1	8,762	3,033							
Golden Algae	Ochrophyta	Synurales	Mallomonadaceae	Mallomonas sp.		374,542	9,100						6,183	
Golden Algae	Ochrophyta	Synurales	Synuraceae	Spiniferomonas sp.	1	1,517	1,517							
Golden Algae	Ochrophyta	Synurales	Synuraceae	Synura sp.	1	153,207	1,517							
Golden Algae	Ochrophyta			Chrysophyte		139,201							43,282	
				Total Golden Algae		**17,605,807**	**107,680**	**803,805**	**841,316**	**707,348**	**1,174,792**	**787,729**	**1,415,933**	**1,040,218**
Cryptomonads	Cryptophyta	Cryptomonadales	Cryptomonadaceae	Cryptomonas sp.	1	523,654	16,683	21,435	26,793	16,076	18,549	42,870	49,465	18,913
Cryptomonads	Cryptophyta	Pyrenomonadales	Geminigeraceae	Plagioselmis nanoplanctica	1	4,338,590	134,979	230,424	176,837	230,424	148,395	246,500	247,325	170,218
Cryptomonads	Katablepharidophyta	Katablepharidales	Katablepharidaceae	Katablepharis ovalis	1	31,089								
				Total Cryptomonads		**4,893,333**	**151,661**	**251,859**	**203,631**	**246,500**	**166,944**	**289,370**	**296,790**	**189,131**
Euglenoids	Euglenozoa	Euglenida	Euglenidae	Trachelomonas sp.	1	2,010								
				Total Euglenoids		**2,010**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Blue-green Algae	Cyanophyta	Chroococcales	Aphanothecaceae	Aphanothece sp.	1	13,380,249	2,476,413			1,270,012	1,706,540	1,067,453		
Blue-green Algae	Cyanophyta	Chroococcales	Chroococcaceae	Chroococcus sp.	1	165,117			42,870					
Blue-green Algae	Cyanophyta	Chroococcales	Gomphosphaeriaceae	Gomphosphaeria sp.	1	310,835	131,945							
Blue-green Algae	Cyanophyta	Nostocales	Aphanizomenonaceae	Aphanizomenon sp.	1	522,780	71,281		96,457	166,120				
Blue-green Algae	Cyanophyta	Nostocales	Aphanizomenonaceae	Dolichospermum sp.	1	5,643,629	27,299	1,328,958	852,033	573,381	1,693,290	300,087	61,831	
Blue-green Algae	Cyanophyta	Synechococcales	Coelosphaeriaceae	Coelomoron sp.	1	11,139,030		1,018,153			1,187,158	2,250,654		
Blue-green Algae	Cyanophyta	Synechococcales	Coelosphaeriaceae	Coelosphaerium sp.	1	1,140,291			482,283	300,087				
Blue-green Algae	Cyanophyta	Synechococcales	Coelosphaeriaceae	Snowella sp.	1	50,908								
Blue-green Algae	Cyanophyta	Synechococcales	Coelosphaeriaceae	Woronichinia sp.	1	180,856								
Blue-green Algae	Cyanophyta	Synechococcales	Merismopediaceae	Aphanocapsa sp.	1	2,202,527	145,595		428,696					
Blue-green Algae	Cyanophyta	Synechococcales	Pseudanabaenaceae	Pseudanabaena sp.	1	77,869								
Blue-green Algae	Cyanophyta	Synechococcales	Synechococcaceae	Cyanodictyon sp.	1	2,918,502	545,981							
Blue-green Algae	Cyanophyta	Synechococcales	Synechococcaceae	Synechococcus sp.	1	101,608							6,183	
Blue-green Algae	Cyanophyta			Cyanophyte (colony)		28,983								
				Total Blue-green Algae		**37,863,183**	**3,398,514**	**2,347,111**	**1,902,338**	**2,309,600**	**4,586,988**	**3,618,194**	**68,014**	**0**
Dinoflagellates	Miozoa	Gonyaulacales	Ceratiaceae	Ceratium hirundinella	1	18,557						5,359		
Dinoflagellates	Miozoa	Gymnodiniales	Gymnodiniaceae	Gymnodinium fuscum	1	5,771								
Dinoflagellates	Miozoa	Gymnodiniales	Gymnodiniaceae	Gymnodinium sp.		82,818							6,183	
Dinoflagellates	Miozoa	Peridiniales	Peridiniaceae	Peridinium sp.	1	19,097								
				Total Dinoflagellates		**126,242**	**0**	**0**	**0**	**0**	**0**	**5,359**	**6,183**	**0**
				Total Phytoplankton		**69,129,685**	**3,809,516**	**4,035,101**	**3,531,383**	**3,933,286**	**6,608,867**	**5,177,576**	**2,065,161**	**1,498,860**
				Total Unique Taxa	**76**		**29**	**14**	**20**	**19**	**15**	**16**	**20**	**17**

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Total phytoplankton density (cells/L) for Minnow Environmental Mount Polley Phytoplankton, 2022

Biologica Sample ID							fp22-078-041	fp22-078-042	fp22-078-043	fp22-078-044	fp22-078-045	fp22-078-046	fp22-078-047	fp22-078-048
Client Sample ID							QUL-ZOO-1_PHYTO-3_2022-07	QUL-ZOO-1_PHYTO-4_2022-07	QUL-ZOO-1_PHYTO-5_2022-07	QUL-ZOO-7_PHYTO-1_2022-07	QUL-ZOO-7_PHYTO-2_2022-07	QUL-ZOO-7_PHYTO-3_2022-07	QUL-ZOO-7_PHYTO-4_2022-07	QUL-ZOO-7_PHYTO-5_2022-07
Date Sampled							28-Jul-22	28-Jul-22	28-Jul-22	27-Jul-22	27-Jul-22	27-Jul-22	27-Jul-22	27-Jul-22
Common Name	Phylum	Order	Family	Taxon	Grand Total		Total Density	Total Density	Total Density	Total Density	Total Density	Total Density	Total Density	Total Density
					Unique Taxa	Density (cells/L)	(cells/L)	(cells/L)	(cells/L)	(cells/L)	(cells/L)	(cells/L)	(cells/L)	(cells/L)
Diatoms	Bacillariophyta	Aulacoseirales	Aulacoseiraceae	Aulacoseira sp.	1	224,892			21,435		13,979	8,038		6,990
Diatoms	Bacillariophyta	Bacillariales	Bacillariaceae	Nitzschia sp.	1	68,146				4,019	3,495			3,495
Diatoms	Bacillariophyta	Cocconeidales	Achnanthidiaceae	Achnanthidium sp.	1	18,143					6,990			
Diatoms	Bacillariophyta	Cocconeidales	Cocconeidaceae	Cocconeis placentula	1	1,340								
Diatoms	Bacillariophyta	Cymbellales	Cymbellaceae	Didymosphenia geminata	1	4,019							4,019	
Diatoms	Bacillariophyta	Cymbellales	Gomphonemataceae	Encyonema sp.	1	1,489								
Diatoms	Bacillariophyta	Cymbellales	Gomphonemataceae	Gomphonema sp.	1	0								
Diatoms	Bacillariophyta	Eunotiales	Eunotiaceae	Eunotia sp.	1	20,186								
Diatoms	Bacillariophyta	Fragilariales	Fragilariaceae	Fragilaria capucina	1	75,022								
Diatoms	Bacillariophyta	Fragilariales	Fragilariaceae	Fragilaria crotonensis	1	149,523			5,359			4,019	8,038	
Diatoms	Bacillariophyta	Fragilariales	Fragilariaceae	Fragilaria sp.		105,171		6,183			6,990			
Diatoms	Bacillariophyta	Fragilariales	Staurosiraceae	Staurosira sp.	1	19,831								
Diatoms	Bacillariophyta	Fragilariales	Staurosiraceae	Staurosirella sp.	1	18,755								
Diatoms	Bacillariophyta	Licmophorales	Ulnariaceae	Ulnaria ulna	1	6,183								
Diatoms	Bacillariophyta	Naviculales	Sellaphoraceae	Sellaphora sp.	1	1,517								
Diatoms	Bacillariophyta	Rhabdonematales	Tabellariaceae	Asterionella formosa	1	682,648		12,366		12,057		8,038		
Diatoms	Bacillariophyta	Rhabdonematales	Tabellariaceae	Diatoma sp.	1	2,344								
Diatoms	Bacillariophyta	Rhabdonematales	Tabellariaceae	Tabellaria fenestrata	1	168,933				20,095	3,495		8,038	
Diatoms	Bacillariophyta	Rhizosoleniales	Rhizosoleniaceae	Urosolenia eriensis	1	21,779			5,359					6,990
Diatoms	Bacillariophyta	Rhopalodiales	Rhopalodiaceae	Epithemia sorex	1	2,679								
Diatoms	Bacillariophyta	Stephanodiscales	Stephanodiscaceae	Cyclotella sp.		623,465	24,732	37,099	26,793	8,038	27,958	28,133	52,247	48,927
Diatoms	Bacillariophyta	Stephanodiscales	Stephanodiscaceae	Cyclotella cf. atomus	1	357,092		18,549	26,793	16,076	24,464	12,057	20,095	10,484
Diatoms	Bacillariophyta	Stephanodiscales	Stephanodiscaceae	Lindavia sp.	1	6,606								
Diatoms	Bacillariophyta	Stephanodiscales	Stephanodiscaceae	Stephanodiscus sp.	1	16,811								
Diatoms	Bacillariophyta			Centric diatom		1,662,793	92,747	49,465	80,380	28,133	52,422	88,419	100,476	80,380
				Total Diatoms		**4,259,368**	**117,479**	**123,662**	**166,120**	**88,419**	**139,792**	**148,704**	**192,913**	**157,266**
Green Algae	Charophyta	Desmidiales	Desmidiaceae	Cosmarium sp.	1	9,532								
Green Algae	Charophyta	Desmidiales	Desmidiaceae	Staurastrum sp.	1	3,303								
Green Algae	Charophyta	Klebsormidiales	Elakatotrichaceae	Elakatothrix gelatinosa	1	34,468								
Green Algae	Charophyta	Klebsormidiales	Elakatotrichaceae	Elakatothrix sp.		85,448	6,183	6,183				16,076		3,495
Green Algae	Charophyta	Klebsormidiales	Elakatotrichaceae	Elakatothrix viridis	1	53,848	6,183			4,019				
Green Algae	Chlorophyta	Chlamydomonadales	Sphaerocystidaceae	Sphaerocystis sp.	1	1,941,671				4,019	6,990			3,495
Green Algae	Chlorophyta	Chlorellales	Oocystaceae	Nephrocytium sp.	1	168,331	6,183	12,366	10,717	24,114	6,990	12,057		13,979
Green Algae	Chlorophyta	Chlorellales	Oocystaceae	Oocystis sp.	1	713,404	24,732		5,359	12,057	6,990	24,114	8,038	38,443
Green Algae	Chlorophyta	Prasiolales	Prasiolaceae	Stichococcus sp.	1	65,036	12,366				3,495	4,019	12,057	3,495
Green Algae	Chlorophyta	Pyramimonadales	Pyramimonadaceae	Pyramimonas sp.	1	15,360							4,019	
Green Algae	Chlorophyta	Sphaeropleales	Characiaceae	Ankyra sp.	1	312,705						4,019		
Green Algae	Chlorophyta	Sphaeropleales	Hydrodictyaceae	Pseudopediastrum boryanum	1	7,583								
Green Algae	Chlorophyta	Sphaeropleales	Hydrodictyaceae	Tetraedron sp.	1	8,676		6,183						
Green Algae	Chlorophyta	Sphaeropleales	Scenedesmaceae	Coelastrum sp.	1	0								
Green Algae	Chlorophyta	Sphaeropleales	Scenedesmaceae	Desmodesmus sp.	1	16,076								
Green Algae	Chlorophyta	Sphaeropleales	Scenedesmaceae	Scenedesmus arcuatus	1	169,359								
Green Algae	Chlorophyta	Sphaeropleales	Scenedesmaceae	Scenedesmus sp.		72,683						8,038		
Green Algae	Chlorophyta	Sphaeropleales	Schizochlamydaceae	Planktosphaeria sp.	1	39,378	12,366						4,019	
Green Algae	Chlorophyta	Sphaeropleales	Selenastraceae	Monoraphidium contortum	1	195,318								
Green Algae	Chlorophyta	Sphaeropleales	Selenastraceae	Monoraphidium sp.		62,583					3,495		8,038	
Green Algae	Chlorophyta	Trebouxiales	Botryococcaceae	Botryococcus sp.	1	93,264								
Green Algae	Chlorophyta	Trebouxiophyceae ordo incertae sedis	Trebouxiophyceae incertae sedis	Crucigenia sp.	1	261,974		24,732		32,152	13,979		64,304	27,958
Green Algae	Chlorophyta			Chlorophyte		49,742								
				Total Green Algae		**4,379,742**	**68,014**	**49,465**	**16,076**	**76,361**	**41,938**	**68,323**	**100,476**	**90,865**

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Total phytoplankton density (cells/L) for Minnow Environmental Mount Polley Phytoplankton, 2022

Biologica Sample ID							fp22-078-041	fp22-078-042	fp22-078-043	fp22-078-044	fp22-078-045	fp22-078-046	fp22-078-047	fp22-078-048
Client Sample ID							QUL-ZOO-1_PHYTO-3_2022-07	QUL-ZOO-1_PHYTO-4_2022-07	QUL-ZOO-1_PHYTO-5_2022-07	QUL-ZOO-7_PHYTO-1_2022-07	QUL-ZOO-7_PHYTO-2_2022-07	QUL-ZOO-7_PHYTO-3_2022-07	QUL-ZOO-7_PHYTO-4_2022-07	QUL-ZOO-7_PHYTO-5_2022-07
Date Sampled							28-Jul-22	28-Jul-22	28-Jul-22	27-Jul-22	27-Jul-22	27-Jul-22	27-Jul-22	27-Jul-22
Common Name	Phylum	Order	Family	Taxon	Grand Total		Total Density	Total Density	Total Density	Total Density	Total Density	Total Density	Total Density	Total Density
					Unique Taxa	Density (cells/L)	(cells/L)	(cells/L)	(cells/L)	(cells/L)	(cells/L)	(cells/L)	(cells/L)	(cells/L)
Golden Algae	Haptophyta	Prymnesiales	Chrysochromulinaceae	Chrysochromulina sp.	1	271,359		12,366	32,152	4,019	38,443	12,057	8,038	20,969
Golden Algae	Ochrophyta	Chromulinales	Chromulinaceae	Chromulina sp.	1	14,210						4,019		
Golden Algae	Ochrophyta	Chromulinales	Chromulinaceae	Uroglena sp.	1	10,121,266	1,601,427	1,756,005	1,018,153	1,077,099	548,684	643,044	558,644	475,293
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Chrysolykos sp.	1	55,379	6,183	6,183	5,359	8,038	3,495	4,019		10,484
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Dinobryon borgei	1	49,426				4,019	3,495		4,019	6,990
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Dinobryon crenulatum	1	226,800	6,183	30,916	37,511	8,038	10,484	16,076	12,057	20,969
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Dinobryon divergens	1	3,260,808		24,732	21,435	24,114	17,474	36,171	44,209	27,958
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Dinobryon sp.		1,124,947	24,732	49,465	26,793	12,057	27,958	28,133	12,057	20,969
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Epipyxis sp.	1	16,700								
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Kephyrion/Pseudokephyrion sp.	1	250,778	43,282	30,916	26,793	16,076	27,958	4,019	20,095	17,474
Golden Algae	Ochrophyta	Hibberdinales	Stylococcaceae	Bitrichia sp.	1	6,029								
Golden Algae	Ochrophyta	Pedinellales	Pedinellaceae	Pseudopedinella sp.	1	168,125	6,183	18,549	32,152	16,076		8,038	12,057	3,495
Golden Algae	Ochrophyta	Phaeothamniales	Phaeothamniaceae	Stichogloea sp.	1	1,362,752					6,990		8,038	
Golden Algae	Ochrophyta	Synurales	Mallomonadaceae	Mallomonas akrokomos	1	8,762								
Golden Algae	Ochrophyta	Synurales	Mallomonadaceae	Mallomonas sp.		374,542			5,359		3,495	4,019	4,019	3,495
Golden Algae	Ochrophyta	Synurales	Synuraceae	Spiniferomonas sp.	1	1,517								
Golden Algae	Ochrophyta	Synurales	Synuraceae	Synura sp.	1	153,207				4,019				
Golden Algae	Ochrophyta			Chrysophyte		139,201					10,484	16,076	20,095	6,990
				Total Golden Algae		**17,605,807**	**1,687,990**	**1,929,132**	**1,205,707**	**1,173,555**	**698,961**	**775,672**	**703,329**	**615,086**
Cryptomonads	Cryptophyta	Cryptomonadales	Cryptomonadaceae	Cryptomonas sp.	1	523,654		18,549	10,717	4,019	6,990		28,133	20,969
Cryptomonads	Cryptophyta	Pyrenomonadales	Geminigeraceae	Plagioselmis nanoplanctica	1	4,338,590	74,197	105,113	198,272	136,647	206,193	217,027	237,122	171,245
Cryptomonads	Katablepharidophyta	Katablepharidales	Katablepharidaceae	Katablepharis ovalis	1	31,089						12,057		3,495
				Total Cryptomonads		**4,893,333**	**74,197**	**123,662**	**208,989**	**140,666**	**213,183**	**229,084**	**265,256**	**195,709**
Euglenoids	Euglenozoa	Euglenida	Euglenidae	Trachelomonas sp.	1	2,010								
				Total Euglenoids		**2,010**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Blue-green Algae	Cyanophyta	Chroococcales	Aphanothecaceae	Aphanothece sp.	1	13,380,249								
Blue-green Algae	Cyanophyta	Chroococcales	Chroococcaceae	Chroococcus sp.	1	165,117								
Blue-green Algae	Cyanophyta	Chroococcales	Gomphosphaeriaceae	Gomphosphaeria sp.	1	310,835								
Blue-green Algae	Cyanophyta	Nostocales	Aphanizomenonaceae	Aphanizomenon sp.	1	522,780								
Blue-green Algae	Cyanophyta	Nostocales	Aphanizomenonaceae	Dolichospermum sp.	1	5,643,629		18,549						
Blue-green Algae	Cyanophyta	Synechococcales	Coelosphaeriaceae	Coelomoron sp.	1	11,139,030								
Blue-green Algae	Cyanophyta	Synechococcales	Coelosphaeriaceae	Coelosphaerium sp.	1	1,140,291								
Blue-green Algae	Cyanophyta	Synechococcales	Coelosphaeriaceae	Snowella sp.	1	50,908								
Blue-green Algae	Cyanophyta	Synechococcales	Coelosphaeriaceae	Woronichinia sp.	1	180,856								
Blue-green Algae	Cyanophyta	Synechococcales	Merismopediaceae	Aphanocapsa sp.	1	2,202,527								
Blue-green Algae	Cyanophyta	Synechococcales	Pseudanabaenaceae	Pseudanabaena sp.	1	77,869				32,152				
Blue-green Algae	Cyanophyta	Synechococcales	Synechococcaceae	Cyanodictyon sp.	1	2,918,502								
Blue-green Algae	Cyanophyta	Synechococcales	Synechococcaceae	Synechococcus sp.	1	101,608					3,495	4,019		13,979
Blue-green Algae	Cyanophyta			Cyanophyte (colony)		28,983							16,076	
				Total Blue-green Algae		**37,863,183**	**0**	**18,549**	**0**	**32,152**	**3,495**	**4,019**	**16,076**	**13,979**
Dinoflagellates	Miozoa	Gonyaulacales	Ceratiaceae	Ceratium hirundinella	1	18,557								
Dinoflagellates	Miozoa	Gymnodiniales	Gymnodiniaceae	Gymnodinium fuscum	1	5,771								
Dinoflagellates	Miozoa	Gymnodiniales	Gymnodiniaceae	Gymnodinium sp.		82,818		6,183	10,717		3,495			3,495
Dinoflagellates	Miozoa	Peridiniales	Peridiniaceae	Peridinium sp.	1	19,097					6,990			3,495
				Total Dinoflagellates		**126,242**	**0**	**6,183**	**10,717**	**0**	**10,484**	**0**	**0**	**6,990**
				Total Phytoplankton		**69,129,685**	**1,947,681**	**2,250,654**	**1,607,610**	**1,511,153**	**1,107,853**	**1,225,803**	**1,278,050**	**1,079,895**
				Total Unique Taxa	**76**		**12**	**18**	**17**	**21**	**26**	**22**	**21**	**25**

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Total phytoplankton density (cells/L) for Minnow Environmental Mount Polley Phytoplankton, 2022

Biologica Sample ID							fp22-078-049	fp22-078-050	fp22-078-051	fp22-078-052	fp22-078-002-QA	fp22-078-038-QA	fp22-078-046-QA
Client Sample ID							POL-P2_PHYTO-1_2022-08	BOL-B2_PHYTO-1_2022-08	QUL-ZOO-1_PHYTO-1_2022-08	QUL-ZOO-7_PHYTO-1_2022-08	BOL-B2_PHYTO-1_2022-06-QA	POL-P2_PHYTO-5_2022-07-QA	QUL-ZOO-7_PHYTO-3_2022-07-QA
Date Sampled							25-Aug-22	28-Aug-22	28-Aug-22	28-Aug-22	21-Jun-22	25-Jul-22	27-Jul-22
Common Name	Phylum	Order	Family	Taxon	Grand Total		Total Density	Total Density	Total Density	Total Density	Total Density	Total Density	Total Density
					Unique Taxa	Density (cells/L)	(cells/L)	(cells/L)	(cells/L)	(cells/L)	(cells/L)	(cells/L)	(cells/L)
Diatoms	Bacillariophyta	Aulacoseirales	Aulacoseiraceae	Aulacoseira sp.	1	224,892	5,359	2,010		10,717	58,946		
Diatoms	Bacillariophyta	Bacillariales	Bacillariaceae	Nitzschia sp.	1	68,146		4,019	2,010	2,679	5,359		8,038
Diatoms	Bacillariophyta	Cocconeidales	Achnanthidiaceae	Achnanthidium sp.	1	18,143		6,029		1,340	5,359		
Diatoms	Bacillariophyta	Cocconeidales	Cocconeidaceae	Cocconeis placentula	1	1,340				1,340			
Diatoms	Bacillariophyta	Cymbellales	Cymbellaceae	Didymosphenia geminata	1	4,019							
Diatoms	Bacillariophyta	Cymbellales	Gomphonemataceae	Encyonema sp.	1	1,489							
Diatoms	Bacillariophyta	Cymbellales	Gomphonemataceae	Gomphonema sp.	1	0							4,019
Diatoms	Bacillariophyta	Eunotiales	Eunotiaceae	Eunotia sp.	1	20,186							
Diatoms	Bacillariophyta	Fragilariales	Fragilariaceae	Fragilaria capucina	1	75,022							
Diatoms	Bacillariophyta	Fragilariales	Fragilariaceae	Fragilaria crotonensis	1	149,523			78,371	52,247			
Diatoms	Bacillariophyta	Fragilariales	Fragilariaceae	Fragilaria sp.		105,171					10,717	5,359	
Diatoms	Bacillariophyta	Fragilariales	Staurosiraceae	Staurosira sp.	1	19,831	13,397	3,014					
Diatoms	Bacillariophyta	Fragilariales	Staurosiraceae	Staurosirella sp.	1	18,755					2,679		
Diatoms	Bacillariophyta	Licmophorales	Ulnariaceae	Ulnaria ulna	1	6,183							
Diatoms	Bacillariophyta	Naviculales	Sellaphoraceae	Sellaphora sp.	1	1,517							
Diatoms	Bacillariophyta	Rhabdonematales	Tabellariaceae	Asterionella formosa	1	682,648	8,038	8,038	16,076		42,870	42,870	
Diatoms	Bacillariophyta	Rhabdonematales	Tabellariaceae	Diatoma sp.	1	2,344		1,005		1,340			
Diatoms	Bacillariophyta	Rhabdonematales	Tabellariaceae	Tabellaria fenestrata	1	168,933		2,010	4,019	30,813	8,038		
Diatoms	Bacillariophyta	Rhizosoleniales	Rhizosoleniaceae	Urosolenia eriensis	1	21,779			2,010	1,340			
Diatoms	Bacillariophyta	Rhopalodiales	Rhopalodiaceae	Epithemia sorex	1	2,679	2,679						
Diatoms	Bacillariophyta	Stephanodiscales	Stephanodiscaceae	Cyclotella sp.		623,465	21,435		46,219	18,755	16,076	32,152	24,114
Diatoms	Bacillariophyta	Stephanodiscales	Stephanodiscaceae	Cyclotella cf. atomus	1	357,092			78,371	49,568	10,717		28,133
Diatoms	Bacillariophyta	Stephanodiscales	Stephanodiscaceae	Lindavia sp.	1	6,606							
Diatoms	Bacillariophyta	Stephanodiscales	Stephanodiscaceae	Stephanodiscus sp.	1	16,811		1,005			13,397		
Diatoms	Bacillariophyta			Centric diatom		1,662,793	2,679	8,038	156,742	60,285	18,755	32,152	44,209
				Total Diatoms		**4,259,368**	**53,587**	**35,166**	**383,817**	**230,424**	**192,913**	**112,533**	**108,514**
Green Algae	Charophyta	Desmidiales	Desmidiaceae	Cosmarium sp.	1	9,532			2,010	1,340			
Green Algae	Charophyta	Desmidiales	Desmidiaceae	Staurastrum sp.	1	3,303							
Green Algae	Charophyta	Klebsormidiales	Elakatotrichaceae	Elakatothrix gelatinosa	1	34,468		1,005		2,679			
Green Algae	Charophyta	Klebsormidiales	Elakatotrichaceae	Elakatothrix sp.		85,448				2,679	16,076		4,019
Green Algae	Charophyta	Klebsormidiales	Elakatotrichaceae	Elakatothrix viridis	1	53,848					21,435		
Green Algae	Chlorophyta	Chlamydomonadales	Sphaerocystidaceae	Sphaerocystis sp.	1	1,941,671	158,082	76,361		6,698	32,152	434,055	
Green Algae	Chlorophyta	Chlorellales	Oocystaceae	Nephrocytium sp.	1	168,331		2,010		1,340			4,019
Green Algae	Chlorophyta	Chlorellales	Oocystaceae	Oocystis sp.	1	713,404	10,717	16,076	10,048	2,679	10,717	21,435	8,038
Green Algae	Chlorophyta	Prasiolales	Prasiolaceae	Stichococcus sp.	1	65,036			2,010	1,340			
Green Algae	Chlorophyta	Pyramimonadales	Pyramimonadaceae	Pyramimonas sp.	1	15,360					2,679		
Green Algae	Chlorophyta	Sphaeropleales	Characiaceae	Ankyra sp.	1	312,705	8,038				8,038	48,228	
Green Algae	Chlorophyta	Sphaeropleales	Hydrodictyaceae	Pseudopediastrum boryanum	1	7,583							
Green Algae	Chlorophyta	Sphaeropleales	Hydrodictyaceae	Tetraedron sp.	1	8,676		1,005					4,019
Green Algae	Chlorophyta	Sphaeropleales	Scenedesmaceae	Coelastrum sp.	1	0					21,435		
Green Algae	Chlorophyta	Sphaeropleales	Scenedesmaceae	Desmodesmus sp.	1	16,076			16,076				
Green Algae	Chlorophyta	Sphaeropleales	Scenedesmaceae	Scenedesmus arcuatus	1	169,359	72,342	32,152					
Green Algae	Chlorophyta	Sphaeropleales	Scenedesmaceae	Scenedesmus sp.		72,683							
Green Algae	Chlorophyta	Sphaeropleales	Schizochlamydaceae	Planktosphaeria sp.	1	39,378					2,679		
Green Algae	Chlorophyta	Sphaeropleales	Selenastraceae	Monoraphidium contortum	1	195,318					5,359		
Green Algae	Chlorophyta	Sphaeropleales	Selenastraceae	Monoraphidium sp.		62,583	2,679	1,005	2,010		13,397	10,717	
Green Algae	Chlorophyta	Trebouxiales	Botryococcaceae	Botryococcus sp.	1	93,264							
Green Algae	Chlorophyta	Trebouxiophyceae ordo incertae sedis	Trebouxiophyceae incertae sedis	Crucigenia sp.	1	261,974			46,219	21,435			
Green Algae	Chlorophyta			Chlorophyte		49,742					2,679		
				Total Green Algae		**4,379,742**	**251,859**	**129,614**	**78,371**	**40,190**	**136,647**	**514,435**	**20,095**

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Total phytoplankton density (cells/L) for Minnow Environmental Mount Polley Phytoplankton, 2022

Biologica Sample ID							fp22-078-049	fp22-078-050	fp22-078-051	fp22-078-052	fp22-078-002-QA	fp22-078-038-QA	fp22-078-046-QA
Client Sample ID							POL-P2_PHYTO-1_2022-08	BOL-B2_PHYTO-1_2022-08	QUL-ZOO-1_PHYTO-1_2022-08	QUL-ZOO-7_PHYTO-1_2022-08	BOL-B2_PHYTO-1_2022-06-QA	POL-P2_PHYTO-5_2022-07-QA	QUL-ZOO-7_PHYTO-3_2022-07-QA
Date Sampled							25-Aug-22	28-Aug-22	28-Aug-22	28-Aug-22	21-Jun-22	25-Jul-22	27-Jul-22
Common Name	Phylum	Order	Family	Taxon	Grand Total		Total Density	Total Density	Total Density	Total Density	Total Density	Total Density	Total Density
					Unique Taxa	Density (cells/L)	(cells/L)	(cells/L)	(cells/L)	(cells/L)	(cells/L)	(cells/L)	(cells/L)
Golden Algae	Haptophyta	Prymnesiales	Chrysochromulinaceae	Chrysochromulina sp.	1	271,359				2,679	13,397	10,717	32,152
Golden Algae	Ochrophyta	Chromulinales	Chromulinaceae	Chromulina sp.	1	14,210		1,005					
Golden Algae	Ochrophyta	Chromulinales	Chromulinaceae	Uroglena sp.	1	10,121,266		13,062				5,359	590,797
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Chrysolykos sp.	1	55,379							8,038
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Dinobryon borgei	1	49,426			2,010				
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Dinobryon crenulatum	1	226,800			2,010	9,378			12,057
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Dinobryon divergens	1	3,260,808			6,029	2,679		455,489	60,285
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Dinobryon sp.		1,124,947	2,679	8,038	8,038	1,340		101,815	8,038
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Epipyxis sp.	1	16,700	13,397						
Golden Algae	Ochrophyta	Chromulinales	Dinobryaceae	Kephyrion/Pseudokephyrion sp.	1	250,778		7,033	4,019	6,698			12,057
Golden Algae	Ochrophyta	Hibberdinales	Stylococcaceae	Bitrichia sp.	1	6,029	2,679	2,010		1,340			
Golden Algae	Ochrophyta	Pedinellales	Pedinellaceae	Pseudopedinella sp.	1	168,125			6,029		10,717		4,019
Golden Algae	Ochrophyta	Phaeothamniales	Phaeothamniaceae	Stichogloea sp.	1	1,362,752	174,158		38,181	12,057	53,587	150,044	
Golden Algae	Ochrophyta	Synurales	Mallomonadaceae	Mallomonas akrokomos	1	8,762		4,019					
Golden Algae	Ochrophyta	Synurales	Mallomonadaceae	Mallomonas sp.		374,542		1,005	6,029	2,679	243,821		4,019
Golden Algae	Ochrophyta	Synurales	Synuraceae	Spiniferomonas sp.	1	1,517							
Golden Algae	Ochrophyta	Synurales	Synuraceae	Synura sp.	1	153,207							
Golden Algae	Ochrophyta			Chrysophyte		139,201				2,679			24,114
				Total Golden Algae		**17,605,807**	**192,913**	**36,171**	**72,342**	**41,530**	**321,522**	**723,424**	**755,577**
Cryptomonads	Cryptophyta	Cryptomonadales	Cryptomonadaceae	Cryptomonas sp.	1	523,654	10,717	10,048	26,124	21,435	34,832	26,793	8,038
Cryptomonads	Cryptophyta	Pyrenomonadales	Geminigeraceae	Plagioselmis nanoplanctica	1	4,338,590	144,685	35,166	32,152	75,022	198,272	203,631	261,237
Cryptomonads	Katablepharidophyta	Katablepharidales	Katablepharidaceae	Katablepharis ovalis	1	31,089					5,359		4,019
				Total Cryptomonads		**4,893,333**	**155,402**	**45,214**	**58,276**	**96,457**	**238,462**	**230,424**	**273,294**
Euglenoids	Euglenozoa	Euglenida	Euglenidae	Trachelomonas sp.	1	2,010		2,010					
				Total Euglenoids		**2,010**	**0**	**2,010**	**0**	**0**	**0**	**0**	**0**
Blue-green Algae	Cyanophyta	Chroococcales	Aphanothecaceae	Aphanothece sp.	1	13,380,249	1,028,870	823,900			187,555	2,625,763	
Blue-green Algae	Cyanophyta	Chroococcales	Chroococcaceae	Chroococcus sp.	1	165,117	26,794		32,152	20,095			
Blue-green Algae	Cyanophyta	Chroococcales	Gomphosphaeriaceae	Gomphosphaeria sp.	1	310,835	144,685						
Blue-green Algae	Cyanophyta	Nostocales	Aphanizomenonaceae	Aphanizomenon sp.	1	522,780	58,946						
Blue-green Algae	Cyanophyta	Nostocales	Aphanizomenonaceae	Dolichospermum sp.	1	5,643,629	321,522				8,038	235,783	68,323
Blue-green Algae	Cyanophyta	Synechococcales	Coelosphaeriaceae	Coelomoron sp.	1	11,139,030	6,683,064					1,607,610	
Blue-green Algae	Cyanophyta	Synechococcales	Coelosphaeriaceae	Coelosphaerium sp.	1	1,140,291	160,761						
Blue-green Algae	Cyanophyta	Synechococcales	Coelosphaeriaceae	Snowella sp.	1	50,908	50,908						
Blue-green Algae	Cyanophyta	Synechococcales	Coelosphaeriaceae	Woronichinia sp.	1	180,856		180,856					
Blue-green Algae	Cyanophyta	Synechococcales	Merismopediaceae	Aphanocapsa sp.	1	2,202,527	107,174	80,381			669,838		
Blue-green Algae	Cyanophyta	Synechococcales	Pseudanabaenaceae	Pseudanabaena sp.	1	77,869		45,716					
Blue-green Algae	Cyanophyta	Synechococcales	Synechococcaceae	Cyanodictyon sp.	1	2,918,502							
Blue-green Algae	Cyanophyta	Synechococcales	Synechococcaceae	Synechococcus sp.	1	101,608		7,033		5,359		10,717	
Blue-green Algae	Cyanophyta			Cyanophyte (colony)		28,983						21,435	
				Total Blue-green Algae		**37,863,183**	**8,582,724**	**1,137,886**	**32,152**	**25,454**	**865,430**	**4,501,308**	**68,323**
Dinoflagellates	Miozoa	Gonyaulacales	Ceratiaceae	Ceratium hirundinella	1	18,557	2,679	2,010					
Dinoflagellates	Miozoa	Gymnodiniales	Gymnodiniaceae	Gymnodinium fuscum	1	5,771							
Dinoflagellates	Miozoa	Gymnodiniales	Gymnodiniaceae	Gymnodinium sp.		82,818			8,038	1,340	2,679		
Dinoflagellates	Miozoa	Peridiniales	Peridiniaceae	Peridinium sp.	1	19,097				1,340			
				Total Dinoflagellates		**126,242**	**2,679**	**2,010**	**8,038**	**2,679**	**2,679**	**0**	**0**
				Total Phytoplankton		**69,129,685**	**9,239,164**	**1,388,071**	**632,996**	**436,734**	**1,757,654**	**6,082,124**	**1,225,803**
				Total Unique Taxa	**76**		**26**	**30**	**23**	**29**	**28**	**17**	**19**

PLANKTON COMMUNITY AND PRODUCTIVITY

Biologica Laboratory Reports fz22-078 Freshwater Zooplankton

(Finalized November 16, 2022)

Freshwater Zooplankton Enumeration and Identification Methods
Client: Minnow Environmental
Project: Mount Polley 2022

Sample Inventory

Sample arrival: 29-Jun-22; 15-Aug-22; 1-Sept-22
Number of samples: 28 (4, 20, 4)
Number of jars: 28
Screen size: 45 µm
Biologica project number: fz22-078

Upon arrival, the samples were examined and double-checked against the chain of custody to ensure that (1) all samples were accounted for, and (2) each sample had the appropriate number of jars as indicated on the COC. Any discrepancies were reported to the client and were resolved before further sample handling. Samples were transferred from formalin into 70% ethanol and assigned a unique identification number.

Sample Processing

Freshwater zooplankton samples were analyzed in 2-3 fractions as follows:

(1) A "URL" fraction (Unique, Large, and Rare) or "Whole" fraction comprised of unique, large, and rare organisms. These tend to have low abundance. The whole sample was scanned, and these organisms were removed for identification.

(2) A "Coarse" fraction comprised of cladocerans, adult copepods, and copepodids, in which a minimum count of 200 organisms was obtained, and

(3) A "Fine" or "Micro" fraction, in which only copepod nauplii and rotifers were identified and enumerated. Processing of the micro fraction was completed to either a 100-count or a minimum of three sub-samples. The Micro fraction was analyzed using a 1-mL Sedgewick-Rafter counting chamber.

The Coarse fraction was analyzed in a Bogorov tray through a stereo microscope at 10-40x magnification. All organisms were identified by taxonomic experts to the lowest taxonomic level using a compound microscope (100–400x magnification), appropriate dissection tools, and standard taxonomic references. For copepods, the stage of development was also recorded (copepodite stages I-V) as is the sex for mature individuals (copepod stage VI).

Sub-sampling for all fractions was performed using Hensen-Stempel pipettes. Generally sub-samples are 1/10 of total sample volume for the "Coarse" fraction and 1/100 for the "Micro" fraction.

Zooplankton were identified to species wherever possible, although immature copepods lack differentiating features required for identification beyond order (e.g., Calanoida, Cyclopoida, or

Harpacticoida). All identifications were performed using taxonomic references and collaborations with external experts, where necessary.

Table 1. Summary of zooplankton samples processed for Minnow Environmental Mount Polley, 2022.

Client Sample ID	Lake	Date Sampled	Biologica Sample ID	Fraction	Split	Specimens Counted
POL-P2_ZOO-1_2022-06	Polley	21-Jun-22	fz22-078-005	Coarse	2/220	240
				Fine	1/220	201
BOL-B2_ZOO-1_2022-06	Bootjack	21-Jun-22	fz22-078-006	Coarse	2/200	203
				Fine	1/200	497
QUL-ZOO-1_ZOO-1_2022-06	Quesnel	22-Jun-22	fz22-078-007	Coarse	10/220	322
				Fine	3/220	158
QUL-ZOO-7_ZOO-1_2022-06	Quesnel	22-Jun-22	fz22-078-008	Coarse	4/200	272
				Fine	2/200	218
BOL-B2_ZOO-1_2022-07	Bootjack	26-Jul-22	fz22-078-009	Coarse	4/180	228
				Fine	1/180	286
BOL-B2_ZOO-2_2022-07	Bootjack	26-Jul-22	fz22-078-010	Coarse	5/250	278
				Fine	1/250	316
BOL-B2_ZOO-3_2022-07	Bootjack	26-Jul-22	fz22-078-011	Coarse	8/200	249
				Fine	1/200	386
BOL-B2_ZOO-4_2022-07	Bootjack	26-Jul-22	fz22-078-012	Coarse	10/200	226
				Fine	1/200	250
				Whole	Whole	1
BOL-B2_ZOO-5_2022-07	Bootjack	26-Jul-22	fz22-078-013	Coarse	10/200	377
				Fine	1/200	353
POL-P2_ZOO-1_2022-07	Polley	25-Jul-22	fz22-078-014	Coarse	2/230	232
				Fine	1/230	337
				Whole	Whole	6
POL-P2_ZOO-2_2022-07	Polley	25-Jul-22	fz22-078-015	Coarse	6/250	228
				Fine	1/250	378
				Whole	Whole	9
POL-P2_ZOO-3_2022-07	Polley	25-Jul-22	fz22-078-016	Coarse	5/220	286
				Fine	1/220	662
				Whole	Whole	3
POL-P2_ZOO-4_2022-07	Polley	25-Jul-22	fz22-078-017	Coarse	4/230	233
				Fine	1/230	403
POL-P2_ZOO-5_2022-07	Polley	25-Jul-22	fz22-078-018	Coarse	4/200	259
				Fine	1/200	559
				Whole	Whole	16
QUL-ZOO-1_ZOO-1_2022-07	Quesnel	27-Jul-22	fz22-078-019	Coarse	10/200	282
				Fine	1/200	191
QUL-ZOO-1_ZOO-2_2022-07	Quesnel	27-Jul-22	fz22-078-020	Coarse	10/220	296
				Fine	1/220	199
QUL-ZOO-1_ZOO-3_2022-07*	Quesnel	28-Jul-22	fz22-078-021	Coarse	15/250	377
				Fine	1/250	278
QUL-ZOO-1_ZOO-4_2022-07	Quesnel	28-Jul-22	fz22-078-022	Coarse	10/200	236
				Fine	2/200	194
				Whole	Whole	1

Client Sample ID	Lake	Date Sampled	Biologica Sample ID	Fraction	Split	Specimens Counted
QUL-ZOO-1_ZOO-5_2022-07	Quesnel	28-Jul-22	fz22-078-023	Coarse	10/200	208
				Fine	1/200	130
QUL-ZOO-7_ZOO-1_2022-07	Quesnel	27-Jul-22	fz22-078-024	Coarse	10/200	254
				Fine	1/200	146
QUL-ZOO-7_ZOO-2_2022-07	Quesnel	27-Jul-22	fz22-078-025	Coarse	15/200	286
				Fine	1/200	368
QUL-ZOO-7_ZOO-3_2022-07	Quesnel	27-Jul-22	fz22-078-026	Coarse	20/240	226
				Fine	2/240	145
QUL-ZOO-7_ZOO-4_2022-07	Quesnel	27-Jul-22	fz22-078-027	Coarse	10/240	222
				Fine	2/240	173
QUL-ZOO-7_ZOO-5_2022-07	Quesnel	27-Jul-22	fz22-078-028	Coarse	12/240	221
				Fine	1/240	131
POL-P2_ZOO-1_2022-08	Polley	25-Aug-22	fz22-078-053	Coarse	4/200	257
				Fine	3/200	153
BOL-B2_ZOO-1_2022-08	Bootjack	28-Aug-22	fz22-078-054	Coarse	12/230	269
				Fine	2/230	161
				Whole	Whole	53
QUL-ZOO-1_ZOO-1_2022-08	Quesnel	28-Aug-22	fz22-078-055	Coarse	10/200	244
				Fine	2/200	188
				Whole	Whole	1
QUL-ZOO-7_ZOO-1_2022-08	Quesnel	28-Aug-22	fz22-078-056	Coarse	15/200	243
				Fine	3/200	176
				Whole	Whole	1

*QUL-ZOO-1_ZOO-3_2022-07 labelled as phytoplankton but preserved in lugols. Processed as zooplankton.

QA/QC

Ten percent (10%) of samples were reanalyzed to assess sub-sampling accuracy and taxonomic consistency. The sample(s) were chosen at random and processed at different times to reduce counting and identification bias. The percent agreement between QA samples is reported in Table 2.

Table 2. Summary of enumeration QA/QC results for Minnow Environmental Mount Polley, 2022.

Client Sample ID	Biologica Sample ID	Original Total Abundance	QA Total Abundance	Percent Agreement
BOL-B2_ZOO-3_2022-07	fz22-078-011	83,425	87,875	94.67
POL-P2_ZOO-5_2022-07	fz22-078-018	124,766	118,666	95.11
QUL-ZOO-7_ZOO-1_2022-08	fz22-078-056	14,974	14,534	97.06
			Average:	**95.61**

Percent Agreement:
100 – [(difference in abundance between samples/total abundance of original sample) x 100]

Data

Biomass calculations were also performed for the 7 dominant zooplankton taxa by measuring at least 5-10 specimens of each taxon and applying length/weight regression formulae (EPA, 2003).

Biomass estimates were presented as total per-sample wet-weight and dry-weight values derived from per-sample abundances.

Taxonomic data were recorded in Biologica's custom database. Results were provided to the Minnow Environmental project manager in Excel spreadsheets via email.

Methodological and Taxonomic References

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Zooplankton total abundance data matrix for Minnow Environmental Mount Polley, 2022

Biologica Sample ID							fz22-078-005	fz22-078-006	fz22-078-007	fz22-078-008	fz22-078-009
Lake							Polley	Bootjack	Quesnel	Quesnel	Bootjack
Client Sample ID							POL-P2_ZOO-1_2022-06	BOL-B2_ZOO-1_2022-06	QUL-ZOO-1_ZOO-1_2022-06	QUL-ZOO-7_ZOO-1_2022-06	BOL-B2_ZOO-1_2022-07
Date Sampled							21-Jun-22	21-Jun-22	22-Jun-22	22-Jun-22	26-Jul-22
					Grand Total		Total Abundance	Total Abundance	Total Abundance	Total Abundance	Total Abundance
Groupcode	Major Group	Family	Taxon	Stage	Unique Taxa	Total Abundance (#/sample)	(#/sample)	(#/sample)	(#/sample)	(#/sample)	(#/sample)
CRCL	Crustacea Cladocera	Bosminidae	Eubosmina sp.	F	1	4,953			154		
CRCL	Crustacea Cladocera	Daphniidae	Daphnia mendotae complex	F	1	39,638	1,760	2,300	44	50	540
CRCL	Crustacea Cladocera	Daphniidae	Daphnia mendotae complex	M		367					
CRCL	Crustacea Cladocera	Daphniidae	Daphnia pulicaria	F	1	6,411	110	3,700	22	50	270
CRCL	Crustacea Cladocera	Leptodoridae	Leptodora kindtii	F	1	36					
CRCL	Crustacea Cladocera	Polyphemidae	Polyphemus pediculus	F	1	45					45
			Total Cladocera			**51,450**	**1,870**	**6,000**	**220**	**100**	**855**
CRCO	Crustacea Copepoda Calanoida	Diaptomidae	Aglaodiaptomus leptopus	VIf	1	747					
CRCO	Crustacea Copepoda Calanoida	Diaptomidae	Aglaodiaptomus leptopus	VIm		299					
CRCO	Crustacea Copepoda Calanoida	Diaptomidae	Leptodiaptomus ashlandi	VIf	1	216					
CRCO	Crustacea Copepoda Calanoida	Diaptomidae	Leptodiaptomus ashlandi	VIm		59					
CRCO	Crustacea Copepoda Calanoida	Diaptomidae	Skistodiaptomus pallidus	VIf	1	0					
CRCO	Crustacea Copepoda Calanoida	Diaptomidae	Skistodiaptomus pallidus	VIm		0					
CRCO	Crustacea Copepoda Calanoida	Temoridae	Epischura sp.	VIf	1	20					
CRCO	Crustacea Copepoda Calanoida	Temoridae	Epischura sp.	VIm		12					
CRCO	Crustacea Copepoda Calanoida		Calanoida indet.	I-V		33,497	220	1,300	2,486	5,000	405
CRCO	Crustacea Copepoda Calanoida		Calanoida indet.	VIf		274	110	100			
			Total Calanoida			**35,124**	**330**	**1,400**	**2,486**	**5,000**	**405**
CRCO	Crustacea Copepoda Cyclopoida	Cyclopidae	Acanthocyclops sp.	VIm	1	20					
CRCO	Crustacea Copepoda Cyclopoida	Cyclopidae	Diacyclops thomasi	VIf	1	23,064	5,390	900	880	1,350	270
CRCO	Crustacea Copepoda Cyclopoida	Cyclopidae	Diacyclops thomasi	VIm		3,290	330	100	154	650	45
CRCO	Crustacea Copepoda Cyclopoida		Cyclopoida indet.	I-V		146,823	18,480	11,900	3,344	6,500	8,685
			Total Cyclopoida			**173,197**	**24,200**	**12,900**	**4,378**	**8,500**	**9,000**
CRCO	Crustacea Copepoda Calanoida		Calanoida indet.	Nauplius		7,083		1,600	1,393	1,500	
CRCO	Crustacea Copepoda Cyclopoida		Cyclopoida indet.	Nauplius		519,555	3,960	16,000	3,887	7,200	8,280
			Total Copepoda Nauplii			**526,638**	**3,960**	**17,600**	**5,280**	**8,700**	**8,280**
			Total Crustacean Zooplankton			**786,409**	**30,360**	**37,900**	**12,364**	**22,300**	**18,540**
INDI	Insecta Diptera	Chaoboridae	Chaoborus sp.	L	1	55					
			Total Diptera			**55**	**0**	**0**	**0**	**0**	**0**
ROTI	Rotifera	Asplanchnidae	Asplanchna sp.	----	1	5,365					900
ROTI	Rotifera	Brachionidae	Kellicottia sp.	----	1	607,010	37,840	78,400	2,053	5,600	38,160
ROTI	Rotifera	Brachionidae	Keratella sp. 1	----	1	193,283			3,593	6,700	2,520
ROTI	Rotifera	Brachionidae	Keratella sp. 2	----	1	9,110	1,320	2,200		100	
ROTI	Rotifera	Conochilidae	Conochilus sp.	Individual	1	18,355	440				
ROTI	Rotifera	Filiniidae	Filinia sp.	----	1	5,212		200			540
ROTI	Rotifera	Gastropodidae	Ascomorpha sp.	----	1	467					
ROTI	Rotifera	Gastropodidae	Gastropus sp.	----	1	5,600					
ROTI	Rotifera	Lecanidae	Monostyla sp.	----	1	200					
ROTI	Rotifera	Synchaetidae	Polyarthra sp.	----	1	83,800	660	1,000	660	700	1,080
ROTI	Rotifera	Synchaetidae	Synchaeta sp.	----	1	500					
ROTI	Rotifera	Trichocercidae	Trichocerca sp.	----	1	415					
			Total Rotifera			**929,317**	**40,260**	**81,800**	**6,307**	**13,100**	**43,200**
			Total Zooplankton			**1,715,781**	**70,620**	**119,700**	**18,671**	**35,400**	**61,740**
			Total Unique Taxa		**24**		**8**	**8**	**8**	**8**	**10**

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Zooplankton total abundance data matrix for Minnow Environmental Mount Polley, 2022

Biologica Sample ID							fz22-078-010	fz22-078-011	fz22-078-012	fz22-078-013	fz22-078-014
Lake							Bootjack	Bootjack	Bootjack	Bootjack	Polley
Client Sample ID							BOL-B2_ZOO-2_2022-07	BOL-B2_ZOO-3_2022-07	BOL-B2_ZOO-4_2022-07	BOL-B2_ZOO-5_2022-07	POL-P2_ZOO-1_2022-07
Date Sampled							26-Jul-22	26-Jul-22	26-Jul-22	26-Jul-22	25-Jul-22
					Grand Total		Total Abundance	Total Abundance	Total Abundance	Total Abundance	Total Abundance
Groupcode	Major Group	Family	Taxon	Stage	Unique Taxa	Total Abundance (#/sample)	(#/sample)	(#/sample)	(#/sample)	(#/sample)	(#/sample)
CRCL	Crustacea Cladocera	Bosminidae	Eubosmina sp.	F	1	4,953					
CRCL	Crustacea Cladocera	Daphniidae	Daphnia mendotae complex	F	1	39,638	1,100	575	700	1,720	7,360
CRCL	Crustacea Cladocera	Daphniidae	Daphnia mendotae complex	M		367					
CRCL	Crustacea Cladocera	Daphniidae	Daphnia pulicaria	F	1	6,411	300	250	120	540	230
CRCL	Crustacea Cladocera	Leptodoridae	Leptodora kindtii	F	1	36					6
CRCL	Crustacea Cladocera	Polyphemidae	Polyphemus pediculus	F	1	45					
			Total Cladocera			**51,450**	**1,400**	**825**	**820**	**2,260**	**7,596**
CRCO	Crustacea Copepoda Calanoida	Diaptomidae	Aglaodiaptomus leptopus	VIf	1	747	100	25	20	20	
CRCO	Crustacea Copepoda Calanoida	Diaptomidae	Aglaodiaptomus leptopus	VIm		299	50	25			
CRCO	Crustacea Copepoda Calanoida	Diaptomidae	Leptodiaptomus ashlandi	VIf	1	216					
CRCO	Crustacea Copepoda Calanoida	Diaptomidae	Leptodiaptomus ashlandi	VIm		59					
CRCO	Crustacea Copepoda Calanoida	Diaptomidae	Skistodiaptomus pallidus	VIf	1	0					
CRCO	Crustacea Copepoda Calanoida	Diaptomidae	Skistodiaptomus pallidus	VIm		0					
CRCO	Crustacea Copepoda Calanoida	Temoridae	Epischura sp.	VIf	1	20					
CRCO	Crustacea Copepoda Calanoida	Temoridae	Epischura sp.	VIm		12					
CRCO	Crustacea Copepoda Calanoida		Calanoida indet.	I-V		33,497	700	1,100	580	820	2,530
CRCO	Crustacea Copepoda Calanoida		Calanoida indet.	VIf		274					
			Total Calanoida			**35,124**	**850**	**1,150**	**600**	**840**	**2,530**
CRCO	Crustacea Copepoda Cyclopoida	Cyclopidae	Acanthocyclops sp.	VIm	1	20				20	
CRCO	Crustacea Copepoda Cyclopoida	Cyclopidae	Diacyclops thomasi	VIf	1	23,064	600	400	160	140	3,105
CRCO	Crustacea Copepoda Cyclopoida	Cyclopidae	Diacyclops thomasi	VIm		3,290		25		40	
CRCO	Crustacea Copepoda Cyclopoida		Cyclopoida indet.	I-V		146,823	11,050	3,825	2,940	4,240	13,455
			Total Cyclopoida			**173,197**	**11,650**	**4,250**	**3,100**	**4,440**	**16,560**
CRCO	Crustacea Copepoda Calanoida		Calanoida indet.	Nauplius		7,083	250				
CRCO	Crustacea Copepoda Cyclopoida		Cyclopoida indet.	Nauplius		519,555	14,000	6,800	11,400	9,000	39,100
			Total Copepoda Nauplii			**526,638**	**14,250**	**6,800**	**11,400**	**9,000**	**39,100**
			Total Crustacean Zooplankton			**786,409**	**28,150**	**13,025**	**15,920**	**16,540**	**65,786**
INDI	Insecta Diptera	Chaoboridae	Chaoborus sp.	L	1	55			1		
			Total Diptera			**55**	**0**	**0**	**1**	**0**	**0**
ROTI	Rotifera	Asplanchnidae	Asplanchna sp.	----	1	5,365	1,750	1,200	1,000	400	
ROTI	Rotifera	Brachionidae	Kellicottia sp.	----	1	607,010	55,500	64,200	33,800	53,200	32,200
ROTI	Rotifera	Brachionidae	Keratella sp. 1	----	1	193,283	5,000	4,800	2,600	6,000	690
ROTI	Rotifera	Brachionidae	Keratella sp. 2	----	1	9,110					920
ROTI	Rotifera	Conochilidae	Conochilus sp.	Individual	1	18,355	500		600	1,400	
ROTI	Rotifera	Filiniidae	Filinia sp.	----	1	5,212	250	200			1,610
ROTI	Rotifera	Gastropodidae	Ascomorpha sp.	----	1	467					
ROTI	Rotifera	Gastropodidae	Gastropus sp.	----	1	5,600					
ROTI	Rotifera	Lecanidae	Monostyla sp.	----	1	200					
ROTI	Rotifera	Synchaetidae	Polyarthra sp.	----	1	83,800	1,750		600	600	2,990
ROTI	Rotifera	Synchaetidae	Synchaeta sp.	----	1	500					
ROTI	Rotifera	Trichocercidae	Trichocerca sp.	----	1	415					
			Total Rotifera			**929,317**	**64,750**	**70,400**	**38,600**	**61,600**	**38,410**
			Total Zooplankton			**1,715,781**	**92,900**	**83,425**	**54,521**	**78,140**	**104,196**
			Total Unique Taxa		**24**		**10**	**8**	**10**	**10**	**10**

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Zooplankton total abundance data matrix for Minnow Environmental Mount Polley, 2022

Biologica Sample ID							fz22-078-015	fz22-078-016	fz22-078-017	fz22-078-018	fz22-078-019
Lake							Polley	Polley	Polley	Polley	Quesnel
Client Sample ID							POL-P2_ZOO-2_2022-07	POL-P2_ZOO-3_2022-07	POL-P2_ZOO-4_2022-07	POL-P2_ZOO-5_2022-07	QUL-ZOO-1_ZOO-1_2022-07
Date Sampled							25-Jul-22	25-Jul-22	25-Jul-22	25-Jul-22	27-Jul-22
					Grand Total		Total Abundance	Total Abundance	Total Abundance	Total Abundance	Total Abundance
Groupcode	Major Group	Family	Taxon	Stage	Unique Taxa	Total Abundance (#/sample)	(#/sample)	(#/sample)	(#/sample)	(#/sample)	(#/sample)
CRCL	Crustacea Cladocera	Bosminidae	Eubosmina sp.	F	1	4,953					620
CRCL	Crustacea Cladocera	Daphniidae	Daphnia mendotae complex	F	1	39,638	2,917	3,344	3,738	4,700	260
CRCL	Crustacea Cladocera	Daphniidae	Daphnia mendotae complex	M		367					
CRCL	Crustacea Cladocera	Daphniidae	Daphnia pulicaria	F	1	6,411	83	176	230	100	
CRCL	Crustacea Cladocera	Leptodoridae	Leptodora kindtii	F	1	36	9	3		16	
CRCL	Crustacea Cladocera	Polyphemidae	Polyphemus pediculus	F	1	45					
			Total Cladocera			**51,450**	**3,009**	**3,523**	**3,968**	**4,816**	**880**
CRCO	Crustacea Copepoda Calanoida	Diaptomidae	Aglaodiaptomus leptopus	VIf	1	747	83	88	58	100	
CRCO	Crustacea Copepoda Calanoida	Diaptomidae	Aglaodiaptomus leptopus	VIm		299	42	44			
CRCO	Crustacea Copepoda Calanoida	Diaptomidae	Leptodiaptomus ashlandi	VIf	1	216					
CRCO	Crustacea Copepoda Calanoida	Diaptomidae	Leptodiaptomus ashlandi	VIm		59					
CRCO	Crustacea Copepoda Calanoida	Diaptomidae	Skistodiaptomus pallidus	VIf	1	0					
CRCO	Crustacea Copepoda Calanoida	Diaptomidae	Skistodiaptomus pallidus	VIm		0					
CRCO	Crustacea Copepoda Calanoida	Temoridae	Epischura sp.	VIf	1	20					
CRCO	Crustacea Copepoda Calanoida	Temoridae	Epischura sp.	VIm		12					
CRCO	Crustacea Copepoda Calanoida		Calanoida indet.	I-V		33,497	1,542	1,672	2,645	2,850	860
CRCO	Crustacea Copepoda Calanoida		Calanoida indet.	VIf		274					
			Total Calanoida			**35,124**	**1,667**	**1,804**	**2,703**	**2,950**	**860**
CRCO	Crustacea Copepoda Cyclopoida	Cyclopidae	Acanthocyclops sp.	VIm	1	20					
CRCO	Crustacea Copepoda Cyclopoida	Cyclopidae	Diacyclops thomasi	VIf	1	23,064	667	880	978	600	660
CRCO	Crustacea Copepoda Cyclopoida	Cyclopidae	Diacyclops thomasi	VIm		3,290	42	44			80
CRCO	Crustacea Copepoda Cyclopoida		Cyclopoida indet.	I-V		146,823	4,125	6,336	5,750	4,600	3,160
			Total Cyclopoida			**173,197**	**4,833**	**7,260**	**6,728**	**5,200**	**3,900**
CRCO	Crustacea Copepoda Calanoida		Calanoida indet.	Nauplius		7,083	750		230	400	
CRCO	Crustacea Copepoda Cyclopoida		Cyclopoida indet.	Nauplius		519,555	66,500	114,620	60,950	70,400	9,000
			Total Copepoda Nauplii			**526,638**	**67,250**	**114,620**	**61,180**	**70,800**	**9,000**
			Total Crustacean Zooplankton			**786,409**	**76,759**	**127,207**	**74,578**	**83,766**	**14,640**
INDI	Insecta Diptera	Chaoboridae	Chaoborus sp.	L	1	55					
			Total Diptera			**55**	**0**	**0**	**0**	**0**	**0**
ROTI	Rotifera	Asplanchnidae	Asplanchna sp.	----	1	5,365					
ROTI	Rotifera	Brachionidae	Kellicottia sp.	----	1	607,010	20,250	22,440	24,380	27,800	10,400
ROTI	Rotifera	Brachionidae	Keratella sp. 1	----	1	193,283	250	880	1,150	400	11,200
ROTI	Rotifera	Brachionidae	Keratella sp. 2	----	1	9,110	500	220	920	1,400	
ROTI	Rotifera	Conochilidae	Conochilus sp.	Individual	1	18,355	250		690	2,000	2,400
ROTI	Rotifera	Filiniidae	Filinia sp.	----	1	5,212		440	230	800	
ROTI	Rotifera	Gastropodidae	Ascomorpha sp.	----	1	467					
ROTI	Rotifera	Gastropodidae	Gastropus sp.	----	1	5,600					
ROTI	Rotifera	Lecanidae	Monostyla sp.	----	1	200					
ROTI	Rotifera	Synchaetidae	Polyarthra sp.	----	1	83,800	6,000	7,040	4,140	8,600	5,200
ROTI	Rotifera	Synchaetidae	Synchaeta sp.	----	1	500					
ROTI	Rotifera	Trichocercidae	Trichocerca sp.	----	1	415					
			Total Rotifera			**929,317**	**27,250**	**31,020**	**31,510**	**41,000**	**29,200**
			Total Zooplankton			**1,715,781**	**104,009**	**158,227**	**106,088**	**124,766**	**43,840**
			Total Unique Taxa		**24**		**10**	**10**	**10**	**11**	**8**

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Zooplankton total abundance data matrix for Minnow Environmental Mount Polley, 2022

Biologica Sample ID							fz22-078-020	fz22-078-021	fz22-078-022	fz22-078-023
Lake							Quesnel	Quesnel	Quesnel	Quesnel
Client Sample ID							QUL-ZOO-1_ZOO-2_2022-07	QUL-ZOO-1_ZOO-3_2022-07	QUL-ZOO-1_ZOO-4_2022-07	QUL-ZOO-1_ZOO-5_2022-07
Date Sampled							27-Jul-22	28-Jul-22	28-Jul-22	28-Jul-22
					Grand Total		Total Abundance	Total Abundance	Total Abundance	Total Abundance
Groupcode	Major Group	Family	Taxon	Stage	Unique Taxa	Total Abundance (#/sample)	(#/sample)	(#/sample)	(#/sample)	(#/sample)
CRCL	Crustacea Cladocera	Bosminidae	Eubosmina sp.	F	1	4,953	572	383	480	300
CRCL	Crustacea Cladocera	Daphniidae	Daphnia mendotae complex	F	1	39,638	418	517	300	280
CRCL	Crustacea Cladocera	Daphniidae	Daphnia mendotae complex	M		367				
CRCL	Crustacea Cladocera	Daphniidae	Daphnia pulicaria	F	1	6,411				
CRCL	Crustacea Cladocera	Leptodoridae	Leptodora kindtii	F	1	36			1	
CRCL	Crustacea Cladocera	Polyphemidae	Polyphemus pediculus	F	1	45				
			Total Cladocera			**51,450**	**990**	**900**	**781**	**580**
CRCO	Crustacea Copepoda Calanoida	Diaptomidae	Aglaodiaptomus leptopus	VIf	1	747				
CRCO	Crustacea Copepoda Calanoida	Diaptomidae	Aglaodiaptomus leptopus	VIm		299				
CRCO	Crustacea Copepoda Calanoida	Diaptomidae	Leptodiaptomus ashlandi	VIf	1	216				
CRCO	Crustacea Copepoda Calanoida	Diaptomidae	Leptodiaptomus ashlandi	VIm		59				
CRCO	Crustacea Copepoda Calanoida	Diaptomidae	Skistodiaptomus pallidus	VIf	1	0				
CRCO	Crustacea Copepoda Calanoida	Diaptomidae	Skistodiaptomus pallidus	VIm		0				
CRCO	Crustacea Copepoda Calanoida	Temoridae	Epischura sp.	VIf	1	20				
CRCO	Crustacea Copepoda Calanoida	Temoridae	Epischura sp.	VIm		12				
CRCO	Crustacea Copepoda Calanoida		Calanoida indet.	I-V		33,497	1,012	900	620	600
CRCO	Crustacea Copepoda Calanoida		Calanoida indet.	VIf		274	44		20	
			Total Calanoida			**35,124**	**1,056**	**900**	**640**	**600**
CRCO	Crustacea Copepoda Cyclopoida	Cyclopidae	Acanthocyclops sp.	VIm	1	20				
CRCO	Crustacea Copepoda Cyclopoida	Cyclopidae	Diacyclops thomasi	VIf	1	23,064	880	833	500	380
CRCO	Crustacea Copepoda Cyclopoida	Cyclopidae	Diacyclops thomasi	VIm		3,290	264	267	100	240
CRCO	Crustacea Copepoda Cyclopoida		Cyclopoida indet.	I-V		146,823	3,322	3,383	2,700	2,360
			Total Cyclopoida			**173,197**	**4,466**	**4,483**	**3,300**	**2,980**
CRCO	Crustacea Copepoda Calanoida		Calanoida indet.	Nauplius		7,083	220	500		
CRCO	Crustacea Copepoda Cyclopoida		Cyclopoida indet.	Nauplius		519,555	13,200	9,500	4,100	5,800
			Total Copepoda Nauplii			**526,638**	**13,420**	**10,000**	**4,100**	**5,800**
			Total Crustacean Zooplankton			**786,409**	**19,932**	**16,283**	**8,821**	**9,960**
INDI	Insecta Diptera	Chaoboridae	Chaoborus sp.	L	1	55				
			Total Diptera			**55**	**0**	**0**	**0**	**0**
ROTI	Rotifera	Asplanchnidae	Asplanchna sp.	----	1	5,365				
ROTI	Rotifera	Brachionidae	Kellicottia sp.	----	1	607,010	9,460	17,750	5,800	6,800
ROTI	Rotifera	Brachionidae	Keratella sp. 1	----	1	193,283	12,760	27,750	5,000	7,800
ROTI	Rotifera	Brachionidae	Keratella sp. 2	----	1	9,110		250	200	200
ROTI	Rotifera	Conochilidae	Conochilus sp.	Individual	1	18,355	1,760	750	600	1,000
ROTI	Rotifera	Filiniidae	Filinia sp.	----	1	5,212				
ROTI	Rotifera	Gastropodidae	Ascomorpha sp.	----	1	467				
ROTI	Rotifera	Gastropodidae	Gastropus sp.	----	1	5,600		4,000		200
ROTI	Rotifera	Lecanidae	Monostyla sp.	----	1	200				200
ROTI	Rotifera	Synchaetidae	Polyarthra sp.	----	1	83,800	6,380	8,500	3,700	4,000
ROTI	Rotifera	Synchaetidae	Synchaeta sp.	----	1	500		500		
ROTI	Rotifera	Trichocercidae	Trichocerca sp.	----	1	415				
			Total Rotifera			**929,317**	**30,360**	**59,500**	**15,300**	**20,200**
			Total Zooplankton			**1,715,781**	**50,292**	**75,783**	**24,121**	**30,160**
			Total Unique Taxa		**24**		**8**	**9**	**11**	**10**

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Zooplankton total abundance data matrix for Minnow Environmental Mount Polley, 2022

Biologica Sample ID							fz22-078-024	fz22-078-025	fz22-078-026	fz22-078-027
Lake							Quesnel	Quesnel	Quesnel	Quesnel
Client Sample ID							QUL-ZOO-7_ZOO-1_2022-07	QUL-ZOO-7_ZOO-2_2022-07	QUL-ZOO-7_ZOO-3_2022-07	QUL-ZOO-7_ZOO-4_2022-07
Date Sampled							27-Jul-22	27-Jul-22	27-Jul-22	27-Jul-22
					Grand Total		Total Abundance	Total Abundance	Total Abundance	Total Abundance
Groupcode	Major Group	Family	Taxon	Stage	Unique Taxa	Total Abundance (#/sample)	(#/sample)	(#/sample)	(#/sample)	(#/sample)
CRCL	Crustacea Cladocera	Bosminidae	Eubosmina sp.	F	1	4,953	220	307	180	624
CRCL	Crustacea Cladocera	Daphniidae	Daphnia mendotae complex	F	1	39,638	300	187	168	432
CRCL	Crustacea Cladocera	Daphniidae	Daphnia mendotae complex	M		367				
CRCL	Crustacea Cladocera	Daphniidae	Daphnia pulicaria	F	1	6,411				
CRCL	Crustacea Cladocera	Leptodoridae	Leptodora kindtii	F	1	36				
CRCL	Crustacea Cladocera	Polyphemidae	Polyphemus pediculus	F	1	45				
			Total Cladocera			**51,450**	**520**	**493**	**348**	**1,056**
CRCO	Crustacea Copepoda Calanoida	Diaptomidae	Aglaodiaptomus leptopus	VIf	1	747				
CRCO	Crustacea Copepoda Calanoida	Diaptomidae	Aglaodiaptomus leptopus	VIm		299				
CRCO	Crustacea Copepoda Calanoida	Diaptomidae	Leptodiaptomus ashlandi	VIf	1	216	60	13	12	24
CRCO	Crustacea Copepoda Calanoida	Diaptomidae	Leptodiaptomus ashlandi	VIm		59	20	13	12	
CRCO	Crustacea Copepoda Calanoida	Diaptomidae	Skistodiaptomus pallidus	VIf	1	0				
CRCO	Crustacea Copepoda Calanoida	Diaptomidae	Skistodiaptomus pallidus	VIm		0				
CRCO	Crustacea Copepoda Calanoida	Temoridae	Epischura sp.	VIf	1	20				
CRCO	Crustacea Copepoda Calanoida	Temoridae	Epischura sp.	VIm		12			12	
CRCO	Crustacea Copepoda Calanoida		Calanoida indet.	I-V		33,497	920	480	456	1,032
CRCO	Crustacea Copepoda Calanoida		Calanoida indet.	VIf		274				
			Total Calanoida			**35,124**	**1,000**	**507**	**492**	**1,056**
CRCO	Crustacea Copepoda Cyclopoida	Cyclopidae	Acanthocyclops sp.	VIm	1	20				
CRCO	Crustacea Copepoda Cyclopoida	Cyclopidae	Diacyclops thomasi	VIf	1	23,064	600	387	324	432
CRCO	Crustacea Copepoda Cyclopoida	Cyclopidae	Diacyclops thomasi	VIm		3,290	160	93	72	192
CRCO	Crustacea Copepoda Cyclopoida		Cyclopoida indet.	I-V		146,823	2,800	2,333	1,476	2,592
			Total Cyclopoida			**173,197**	**3,560**	**2,813**	**1,872**	**3,216**
CRCO	Crustacea Copepoda Calanoida		Calanoida indet.	Nauplius		7,083				
CRCO	Crustacea Copepoda Cyclopoida		Cyclopoida indet.	Nauplius		519,555	9,200	4,200	3,720	4,680
			Total Copepoda Nauplii			**526,638**	**9,200**	**4,200**	**3,720**	**4,680**
			Total Crustacean Zooplankton			**786,409**	**14,280**	**8,013**	**6,432**	**10,008**
INDI	Insecta Diptera	Chaoboridae	Chaoborus sp.	L	1	55				
			Total Diptera			**55**	**0**	**0**	**0**	**0**
ROTI	Rotifera	Asplanchnidae	Asplanchna sp.	----	1	5,365				
ROTI	Rotifera	Brachionidae	Kellicottia sp.	----	1	607,010	8,400	9,800	4,320	7,440
ROTI	Rotifera	Brachionidae	Keratella sp. 1	----	1	193,283	7,800	54,600	8,640	4,440
ROTI	Rotifera	Brachionidae	Keratella sp. 2	----	1	9,110				240
ROTI	Rotifera	Conochilidae	Conochilus sp.	Individual	1	18,355	600	200	240	360
ROTI	Rotifera	Filiniidae	Filinia sp.	----	1	5,212	200			
ROTI	Rotifera	Gastropodidae	Ascomorpha sp.	----	1	467		200		
ROTI	Rotifera	Gastropodidae	Gastropus sp.	----	1	5,600	200	600		
ROTI	Rotifera	Lecanidae	Monostyla sp.	----	1	200				
ROTI	Rotifera	Synchaetidae	Polyarthra sp.	----	1	83,800	2,800	4,000	480	3,600
ROTI	Rotifera	Synchaetidae	Synchaeta sp.	----	1	500				
ROTI	Rotifera	Trichocercidae	Trichocerca sp.	----	1	415				
			Total Rotifera			**929,317**	**20,000**	**69,400**	**13,680**	**16,080**
			Total Zooplankton			**1,715,781**	**34,280**	**77,413**	**20,112**	**26,088**
			Total Unique Taxa		**24**		**11**	**10**	**10**	**9**

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Zooplankton total abundance data matrix for Minnow Environmental Mount Polley, 2022

Biologica Sample ID							fz22-078-028	fz22-078-053	fz22-078-054	fz22-078-055
Lake							Quesnel	Polley	Bootjack	Quesnel
Client Sample ID							QUL-ZOO-7_ZOO-5_2022-07	POL-P2_ZOO-1_2022-08	BOL-B2_ZOO-1_2022-08	QUL-ZOO-1_ZOO-1_2022-08
Date Sampled							27-Jul-22	25-Aug-22	28-Aug-22	28-Aug-22
					Grand Total		Total Abundance	Total Abundance	Total Abundance	Total Abundance
Groupcode	Major Group	Family	Taxon	Stage	Unique Taxa	Total Abundance (#/sample)	(#/sample)	(#/sample)	(#/sample)	(#/sample)
CRCL	Crustacea Cladocera	Bosminidae	Eubosmina sp.	F	1	4,953	660			240
CRCL	Crustacea Cladocera	Daphniidae	Daphnia mendotae complex	F	1	39,638	360	2,050	1,706	1,280
CRCL	Crustacea Cladocera	Daphniidae	Daphnia mendotae complex	M		367				180
CRCL	Crustacea Cladocera	Daphniidae	Daphnia pulicaria	F	1	6,411			230	
CRCL	Crustacea Cladocera	Leptodoridae	Leptodora kindtii	F	1	36				
CRCL	Crustacea Cladocera	Polyphemidae	Polyphemus pediculus	F	1	45				
			Total Cladocera			**51,450**	**1,020**	**2,050**	**1,936**	**1,700**
CRCO	Crustacea Copepoda Calanoida	Diaptomidae	Aglaodiaptomus leptopus	VIf	1	747		100	153	
CRCO	Crustacea Copepoda Calanoida	Diaptomidae	Aglaodiaptomus leptopus	VIm		299		100	38	
CRCO	Crustacea Copepoda Calanoida	Diaptomidae	Leptodiaptomus ashlandi	VIf	1	216	60			20
CRCO	Crustacea Copepoda Calanoida	Diaptomidae	Leptodiaptomus ashlandi	VIm		59				
CRCO	Crustacea Copepoda Calanoida	Diaptomidae	Skistodiaptomus pallidus	VIf	1	0				
CRCO	Crustacea Copepoda Calanoida	Diaptomidae	Skistodiaptomus pallidus	VIm		0				
CRCO	Crustacea Copepoda Calanoida	Temoridae	Epischura sp.	VIf	1	20				20
CRCO	Crustacea Copepoda Calanoida	Temoridae	Epischura sp.	VIm		12				
CRCO	Crustacea Copepoda Calanoida		Calanoida indet.	I-V		33,497	600	650	671	500
CRCO	Crustacea Copepoda Calanoida		Calanoida indet.	VIf		274				
			Total Calanoida			**35,124**	**660**	**850**	**863**	**540**
CRCO	Crustacea Copepoda Cyclopoida	Cyclopidae	Acanthocyclops sp.	VIm	1	20				
CRCO	Crustacea Copepoda Cyclopoida	Cyclopidae	Diacyclops thomasi	VIf	1	23,064	480	150	38	640
CRCO	Crustacea Copepoda Cyclopoida	Cyclopidae	Diacyclops thomasi	VIm		3,290	180		19	140
CRCO	Crustacea Copepoda Cyclopoida		Cyclopoida indet.	I-V		146,823	2,080	9,800	2,300	1,860
			Total Cyclopoida			**173,197**	**2,740**	**9,950**	**2,358**	**2,640**
CRCO	Crustacea Copepoda Calanoida		Calanoida indet.	Nauplius		7,083	240			
CRCO	Crustacea Copepoda Cyclopoida		Cyclopoida indet.	Nauplius		519,555	4,560	7,400	3,565	5,000
			Total Copepoda Nauplii			**526,638**	**4,800**	**7,400**	**3,565**	**5,000**
			Total Crustacean Zooplankton			**786,409**	**9,220**	**20,250**	**8,721**	**9,880**
INDI	Insecta Diptera	Chaoboridae	Chaoborus sp.	L	1	55			53	1
			Total Diptera			**55**	**0**	**0**	**53**	**1**
ROTI	Rotifera	Asplanchnidae	Asplanchna sp.	----	1	5,365			115	
ROTI	Rotifera	Brachionidae	Kellicottia sp.	----	1	607,010	7,680	1,267	8,970	8,100
ROTI	Rotifera	Brachionidae	Keratella sp. 1	----	1	193,283	13,200	1,000	1,610	1,100
ROTI	Rotifera	Brachionidae	Keratella sp. 2	----	1	9,110	240	267		
ROTI	Rotifera	Conochilidae	Conochilus sp.	Individual	1	18,355	960	67	3,105	300
ROTI	Rotifera	Filiniidae	Filinia sp.	----	1	5,212		67	575	100
ROTI	Rotifera	Gastropodidae	Ascomorpha sp.	----	1	467				
ROTI	Rotifera	Gastropodidae	Gastropus sp.	----	1	5,600				600
ROTI	Rotifera	Lecanidae	Monostyla sp.	----	1	200				
ROTI	Rotifera	Synchaetidae	Polyarthra sp.	----	1	83,800	4,560	133	460	3,300
ROTI	Rotifera	Synchaetidae	Synchaeta sp.	----	1	500				
ROTI	Rotifera	Trichocercidae	Trichocerca sp.	----	1	415			115	300
			Total Rotifera			**929,317**	**26,640**	**2,800**	**14,950**	**13,800**
			Total Zooplankton			**1,715,781**	**35,860**	**23,050**	**23,724**	**23,681**
			Total Unique Taxa		**24**		**9**	**9**	**12**	**13**

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Zooplankton total abundance data matrix for Minnow Environmental Mount Polley, 2022

Biologica Sample ID							fz22-078-056	fz22-078-011_QA	fz22-078-018_QA	fz22-078-056_QA
Lake							Quesnel	Bootjack	Polley	Quesnel
Client Sample ID							QUL-ZOO-7_ZOO-1_2022-08	BOL-B2_ZOO-3_2022-07_QA	POL-P2_ZOO-5_2022-07_QA	QUL-ZOO-7_ZOO-1_2022-08_QA
Date Sampled							28-Aug-22	26-Jul-22	25-Jul-22	28-Aug-22
					Grand Total		Total Abundance	Total Abundance	Total Abundance	Total Abundance
Groupcode	Major Group	Family	Taxon	Stage	Unique Taxa	Total Abundance (#/sample)	(#/sample)	(#/sample)	(#/sample)	(#/sample)
CRCL	Crustacea Cladocera	Bosminidae	Eubosmina sp.	F	1	4,953	213			213
CRCL	Crustacea Cladocera	Daphniidae	Daphnia mendotae complex	F	1	39,638	533	675	4,950	693
CRCL	Crustacea Cladocera	Daphniidae	Daphnia mendotae complex	M		367	187			120
CRCL	Crustacea Cladocera	Daphniidae	Daphnia pulicaria	F	1	6,411		275	100	
CRCL	Crustacea Cladocera	Leptodoridae	Leptodora kindtii	F	1	36	1		16	1
CRCL	Crustacea Cladocera	Polyphemidae	Polyphemus pediculus	F	1	45				
			Total Cladocera			**51,450**	**934**	**950**	**5,066**	**1,028**
CRCO	Crustacea Copepoda Calanoida	Diaptomidae	Aglaodiaptomus leptopus	VIf	1	747			50	
CRCO	Crustacea Copepoda Calanoida	Diaptomidae	Aglaodiaptomus leptopus	VIm		299				
CRCO	Crustacea Copepoda Calanoida	Diaptomidae	Leptodiaptomus ashlandi	VIf	1	216	27			27
CRCO	Crustacea Copepoda Calanoida	Diaptomidae	Leptodiaptomus ashlandi	VIm		59	13			13
CRCO	Crustacea Copepoda Calanoida	Diaptomidae	Skistodiaptomus pallidus	VIf	1	0		25		
CRCO	Crustacea Copepoda Calanoida	Diaptomidae	Skistodiaptomus pallidus	VIm		0		25		
CRCO	Crustacea Copepoda Calanoida	Temoridae	Epischura sp.	VIf	1	20				
CRCO	Crustacea Copepoda Calanoida	Temoridae	Epischura sp.	VIm		12				
CRCO	Crustacea Copepoda Calanoida		Calanoida indet.	I-V		33,497	347	1,300	3,100	427
CRCO	Crustacea Copepoda Calanoida		Calanoida indet.	VIf		274				
			Total Calanoida			**35,124**	**387**	**1,350**	**3,150**	**467**
CRCO	Crustacea Copepoda Cyclopoida	Cyclopidae	Acanthocyclops sp.	VIm	1	20				
CRCO	Crustacea Copepoda Cyclopoida	Cyclopidae	Diacyclops thomasi	VIf	1	23,064	440	275	800	480
CRCO	Crustacea Copepoda Cyclopoida	Cyclopidae	Diacyclops thomasi	VIm		3,290	53	25		80
CRCO	Crustacea Copepoda Cyclopoida		Cyclopoida indet.	I-V		146,823	1,427	3,675	4,250	1,480
			Total Cyclopoida			**173,197**	**1,920**	**3,975**	**5,050**	**2,040**
CRCO	Crustacea Copepoda Calanoida		Calanoida indet.	Nauplius		7,083			200	
CRCO	Crustacea Copepoda Cyclopoida		Cyclopoida indet.	Nauplius		519,555	3,533	5,800	64,400	2,600
			Total Copepoda Nauplii			**526,638**	**3,533**	**5,800**	**64,600**	**2,600**
			Total Crustacean Zooplankton			**786,409**	**6,774**	**12,075**	**77,866**	**6,134**
INDI	Insecta Diptera	Chaoboridae	Chaoborus sp.	L	1	55				
			Total Diptera			**55**	**0**	**0**	**0**	**0**
ROTI	Rotifera	Asplanchnidae	Asplanchna sp.	----	1	5,365		1,800		
ROTI	Rotifera	Brachionidae	Kellicottia sp.	----	1	607,010	5,000	69,800	26,600	4,467
ROTI	Rotifera	Brachionidae	Keratella sp. 1	----	1	193,283	1,800	3,800	800	2,333
ROTI	Rotifera	Brachionidae	Keratella sp. 2	----	1	9,110	133		1,000	200
ROTI	Rotifera	Conochilidae	Conochilus sp.	Individual	1	18,355	133		1,600	133
ROTI	Rotifera	Filiniidae	Filinia sp.	----	1	5,212		400	1,000	
ROTI	Rotifera	Gastropodidae	Ascomorpha sp.	----	1	467	267			333
ROTI	Rotifera	Gastropodidae	Gastropus sp.	----	1	5,600				
ROTI	Rotifera	Lecanidae	Monostyla sp.	----	1	200				
ROTI	Rotifera	Synchaetidae	Polyarthra sp.	----	1	83,800	867		9,800	933
ROTI	Rotifera	Synchaetidae	Synchaeta sp.	----	1	500				
ROTI	Rotifera	Trichocercidae	Trichocerca sp.	----	1	415				
			Total Rotifera			**929,317**	**8,200**	**75,800**	**40,800**	**8,400**
			Total Zooplankton			**1,715,781**	**14,974**	**87,875**	**118,666**	**14,534**
			Total Unique Taxa		**24**		**11**	**8**	**11**	**11**

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Zooplankton total wet (WW) and dry (DW) weight biomass data matrix for Minnow Environmental Mount Polley, 2022

Biologica Sample ID							fz22-078-005		fz22-078-006		fz22-078-007		fz22-078-008		fz22-078-009		fz22-078-010		fz22-078-011	
Lake							Polley		Bootjack		Quesnel		Quesnel		Bootjack		Bootjack		Bootjack	
Client Sample ID							POL-P2_ZOO-1_2022-06		BOL-B2_ZOO-1_2022-06		QUL-ZOO-1_ZOO-1_2022-06		QUL-ZOO-7_ZOO-1_2022-06		BOL-B2_ZOO-1_2022-07		BOL-B2_ZOO-2_2022-07		BOL-B2_ZOO-3_2022-07	
Date Sampled							21-Jun-22		21-Jun-22		22-Jun-22		22-Jun-22		26-Jul-22		26-Jul-22		26-Jul-22	
Groupcode	Major Group	Family	Taxon	Stage	Total Biomass (mg/sample)		Total Biomass (mg/sample)		Total Biomass (mg/sample)		Total Biomass (mg/sample)		Total Biomass (mg/sample)		Total Biomass (mg/sample)		Total Biomass (mg/sample)		Total Biomass (mg/sample)	
					DW	WW	DW	WW	DW	WW	DW	WW	DW	WW	DW	WW	DW	WW	DW	WW
CRCL	Crustacea Cladocera	Daphniidae	Daphnia mendotae complex	F	350	1,749	15.5	77.6	20.3	101	0.388	1.94	0.441	2.21	4.76	23.8	9.71	48.5	5.07	25.4
			Total Cladocera		**350**	**1,749**	**15.5**	**77.6**	**20.3**	**101**	**0.388**	**1.94**	**0.441**	**2.21**	**4.76**	**23.8**	**9.71**	**48.5**	**5.07**	**25.4**
CRCO	Crustacea Copepoda Calanoida		Calanoida indet.	I-V	141	707	0.928	4.64	5.48	27.4	10.5	52.4	21.1	105	1.71	8.54	2.95	14.8	4.64	23.2
			Total Calanoida		**141**	**707**	**0.928**	**4.64**	**5.48**	**27.4**	**10.5**	**52.4**	**21.1**	**105**	**1.71**	**8.54**	**2.95**	**14.8**	**4.64**	**23.2**
CRCO	Crustacea Copepoda Cyclopoida		Cyclopoida indet.	I-V	906	4,532	114	570	73.5	367	20.6	103	40.1	201	53.6	268	68.2	341	23.6	118
			Total Cyclopoida		**906**	**4,532**	**114**	**570**	**73.5**	**367**	**20.6**	**103**	**40.1**	**201**	**53.6**	**268**	**68.2**	**341**	**23.6**	**118**
CRCO	Crustacea Copepoda Cyclopoida		Cyclopoida indet.	Nauplius	58.5	293	0.446	2.23	1.80	9.02	0.438	2.19	0.811	4.06	0.933	4.67	1.58	7.89	0.766	3.83
			Total Copepoda Nauplii		**58.5**	**293**	**0.446**	**2.23**	**1.80**	**9.02**	**0.438**	**2.19**	**0.811**	**4.06**	**0.933**	**4.67**	**1.58**	**7.89**	**0.766**	**3.83**
			Total Crustacean Zooplankton		**1,456**	**7,280**	**131**	**655**	**101**	**505**	**32.0**	**160**	**62.5**	**312**	**61.0**	**305**	**82.5**	**412**	**34.1**	**170**
ROTI	Rotifera	Brachionidae	Kellicottia sp.	----	8.63	86.3	0.538	5.38	1.11	11.1	0.0292	0.292	0.0796	0.796	0.542	5.42	0.789	7.89	0.912	9.12
ROTI	Rotifera	Brachionidae	Keratella sp. 1	----	48.5	485					0.902	9.02	1.68	16.8	0.633	6.33	1.26	12.6	1.21	12.1
ROTI	Rotifera	Synchaetidae	Polyarthra sp.	----	3.98	39.8	0.0313	0.313	0.0474	0.474	0.0313	0.313	0.0332	0.332	0.0512	0.512	0.0830	0.830		
			Total Rotifera		**61.1**	**611**	**0.569**	**5.69**	**1.16**	**11.6**	**0.963**	**9.63**	**1.80**	**18.0**	**1.23**	**12.3**	**2.13**	**21.3**	**2.12**	**21.2**
			Total Zooplankton		**1,517**	**7,891**	**132**	**661**	**102**	**517**	**32.9**	**169**	**64.3**	**330**	**62.2**	**317**	**84.6**	**434**	**36.2**	**192**

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Zooplankton total wet (WW) and dry (DW) weight biomass data matrix for Minnow Environmental Mount Polley, 2022

Biologica Sample ID					fz22-078-012		fz22-078-013		fz22-078-014		fz22-078-015		fz22-078-016		fz22-078-017		fz22-078-018	
Lake					Bootjack		Bootjack		Polley		Polley		Polley		Polley		Polley	
Client Sample ID					BOL-B2_ZOO-4_2022-07		BOL-B2_ZOO-5_2022-07		POL-P2_ZOO-1_2022-07		POL-P2_ZOO-2_2022-07		POL-P2_ZOO-3_2022-07		POL-P2_ZOO-4_2022-07		POL-P2_ZOO-5_2022-07	
Date Sampled					26-Jul-22		26-Jul-22		25-Jul-22		25-Jul-22		25-Jul-22		25-Jul-22		25-Jul-22	
Groupcode	Major Group	Family	Taxon	Stage	Total Biomass (mg/sample)		Total Biomass (mg/sample)		Total Biomass (mg/sample)		Total Biomass (mg/sample)		Total Biomass (mg/sample)		Total Biomass (mg/sample)		Total Biomass (mg/sample)	
					DW	WW	DW	WW	DW	WW	DW	WW	DW	WW	DW	WW	DW	WW	DW	WW
CRCL	Crustacea Cladocera	Daphniidae	Daphnia mendotae complex	F	350	1,749	6.18	30.9	15.2	75.9	64.9	325	25.7	129	29.5	148	33.0	165	41.5	207
			Total Cladocera		**350**	**1,749**	**6.18**	**30.9**	**15.2**	**75.9**	**64.9**	**325**	**25.7**	**129**	**29.5**	**148**	**33.0**	**165**	**41.5**	**207**
CRCO	Crustacea Copepoda Calanoida		Calanoida indet.	I-V	141	707	2.45	12.2	3.46	17.3	10.7	53.4	6.50	32.5	7.05	35.3	11.2	55.8	12.0	60.1
			Total Calanoida		**141**	**707**	**2.45**	**12.2**	**3.46**	**17.3**	**10.7**	**53.4**	**6.50**	**32.5**	**7.05**	**35.3**	**11.2**	**55.8**	**12.0**	**60.1**
CRCO	Crustacea Copepoda Cyclopoida		Cyclopoida indet.	I-V	906	4,532	18.1	90.7	26.2	131	83.1	415	25.5	127	39.1	196	35.5	177	28.4	142
			Total Cyclopoida		**906**	**4,532**	**18.1**	**90.7**	**26.2**	**131**	**83.1**	**415**	**25.5**	**127**	**39.1**	**196**	**35.5**	**177**	**28.4**	**142**
CRCO	Crustacea Copepoda Cyclopoida		Cyclopoida indet.	Nauplius	58.5	293	1.28	6.42	1.01	5.07	4.41	22.0	7.49	37.5	12.9	64.6	6.87	34.3	7.93	39.7
			Total Copepoda Nauplii		**58.5**	**293**	**1.28**	**6.42**	**1.01**	**5.07**	**4.41**	**22.0**	**7.49**	**37.5**	**12.9**	**64.6**	**6.87**	**34.3**	**7.93**	**39.7**
			Total Crustacean Zooplankton		**1,456**	**7,280**	**28.1**	**140**	**45.8**	**229**	**163**	**815**	**65.2**	**326**	**88.6**	**443**	**86.5**	**433**	**89.8**	**449**
ROTI	Rotifera	Brachionidae	Kellicottia sp.	----	8.63	86.3	0.480	4.80	0.756	7.56	0.458	4.58	0.288	2.88	0.319	3.19	0.346	3.46	0.395	3.95
ROTI	Rotifera	Brachionidae	Keratella sp. 1	----	48.5	485	0.653	6.53	1.51	15.1	0.173	1.73	0.0628	0.628	0.221	2.21	0.289	2.89	0.100	1.00
ROTI	Rotifera	Synchaetidae	Polyarthra sp.	----	3.98	39.8	0.0285	0.285	0.0285	0.285	0.142	1.42	0.285	2.85	0.334	3.34	0.196	1.96	0.408	4.08
			Total Rotifera		**61.1**	**611**	**1.16**	**11.6**	**2.29**	**22.9**	**0.773**	**7.73**	**0.635**	**6.35**	**0.874**	**8.74**	**0.832**	**8.32**	**0.904**	**9.04**
			Total Zooplankton		**1,517**	**7,891**	**29.2**	**152**	**48.1**	**252**	**164**	**823**	**65.8**	**332**	**89.5**	**452**	**87.3**	**441**	**90.7**	**458**

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Zooplankton total wet (WW) and dry (DW) weight biomass data matrix for Minnow Environmental Mount Polley, 2022

Biologica Sample ID					fz22-078-019		fz22-078-020		fz22-078-021		fz22-078-022		fz22-078-023		fz22-078-024		fz22-078-025	
Lake					Quesnel		Quesnel		Quesnel		Quesnel		Quesnel		Quesnel		Quesnel	
Client Sample ID					QUL-ZOO-1_ZOO-1_2022-07		QUL-ZOO-1_ZOO-2_2022-07		QUL-ZOO-1_ZOO-3_2022-07		QUL-ZOO-1_ZOO-4_2022-07		QUL-ZOO-1_ZOO-5_2022-07		QUL-ZOO-7_ZOO-1_2022-07		QUL-ZOO-7_ZOO-2_2022-07	
Date Sampled					27-Jul-22		27-Jul-22		28-Jul-22		28-Jul-22		28-Jul-22		27-Jul-22		27-Jul-22	
Groupcode	Major Group	Family	Taxon	Stage	Total Biomass (mg/sample)		Total Biomass (mg/sample)		Total Biomass (mg/sample)		Total Biomass (mg/sample)		Total Biomass (mg/sample)		Total Biomass (mg/sample)		Total Biomass (mg/sample)	
					DW	WW	DW	WW	DW	WW	DW	WW	DW	WW	DW	WW	DW	WW	DW	WW
CRCL	Crustacea Cladocera	Daphniidae	Daphnia mendotae complex	F	350	1,749	2.29	11.5	3.69	18.4	4.56	22.8	2.65	13.2	2.47	12.4	2.65	13.2	1.65	8.24
			Total Cladocera		**350**	**1,749**	**2.29**	**11.5**	**3.69**	**18.4**	**4.56**	**22.8**	**2.65**	**13.2**	**2.47**	**12.4**	**2.65**	**13.2**	**1.65**	**8.24**
CRCO	Crustacea Copepoda Calanoida		Calanoida indet.	I-V	141	707	3.63	18.1	4.27	21.3	3.80	19.0	2.62	13.1	2.53	12.7	3.88	19.4	2.03	10.1
			Total Calanoida		**141**	**707**	**3.63**	**18.1**	**4.27**	**21.3**	**3.80**	**19.0**	**2.62**	**13.1**	**2.53**	**12.7**	**3.88**	**19.4**	**2.03**	**10.1**
CRCO	Crustacea Copepoda Cyclopoida		Cyclopoida indet.	I-V	906	4,532	19.5	97.5	20.5	103	20.9	104	16.7	83.3	14.6	72.8	17.3	86.4	14.4	72.0
			Total Cyclopoida		**906**	**4,532**	**19.5**	**97.5**	**20.5**	**103**	**20.9**	**104**	**16.7**	**83.3**	**14.6**	**72.8**	**17.3**	**86.4**	**14.4**	**72.0**
CRCO	Crustacea Copepoda Cyclopoida		Cyclopoida indet.	Nauplius	58.5	293	1.01	5.07	1.49	7.44	1.07	5.35	0.462	2.31	0.654	3.27	1.04	5.18	0.473	2.37
			Total Copepoda Nauplii		**58.5**	**293**	**1.01**	**5.07**	**1.49**	**7.44**	**1.07**	**5.35**	**0.462**	**2.31**	**0.654**	**3.27**	**1.04**	**5.18**	**0.473**	**2.37**
			Total Crustacean Zooplankton		**1,456**	**7,280**	**26.4**	**132**	**30.0**	**150**	**30.3**	**152**	**22.4**	**112**	**20.2**	**101**	**24.9**	**124**	**18.5**	**92.7**
ROTI	Rotifera	Brachionidae	Kellicottia sp.	----	8.63	86.3	0.148	1.48	0.134	1.34	0.252	2.52	0.0824	0.824	0.097	0.966	0.119	1.19	0.139	1.39
ROTI	Rotifera	Brachionidae	Keratella sp. 1	----	48.5	485	2.81	28.1	3.20	32.0	6.97	69.7	1.26	12.6	1.96	19.6	1.96	19.6	13.7	137
ROTI	Rotifera	Synchaetidae	Polyarthra sp.	----	3.98	39.8	0.247	2.47	0.303	3.03	0.216	2.16	0.403	4.03	0.176	1.76	0.190	1.90	0.133	1.33
			Total Rotifera		**61.1**	**611**	**3.21**	**32.1**	**3.64**	**36.4**	**7.44**	**74.4**	**1.74**	**17.4**	**2.23**	**22.3**	**2.27**	**22.7**	**14.0**	**140**
			Total Zooplankton		**1,517**	**7,891**	**29.7**	**164**	**33.6**	**186**	**37.8**	**226**	**24.1**	**129**	**22.5**	**123**	**27.1**	**147**	**32.5**	**233**

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Zooplankton total wet (WW) and dry (DW) weight biomass data matrix for Minnow Environmental Mount Polley, 2022

Biologica Sample ID					fz22-078-026		fz22-078-027		fz22-078-028		fz22-078-053		fz22-078-054		fz22-078-055		fz22-078-056	
Lake					Quesnel		Quesnel		Quesnel		Polley		Bootjack		Quesnel		Quesnel	
Client Sample ID					QUL-ZOO-7_ZOO-3_2022-07		QUL-ZOO-7_ZOO-4_2022-07		QUL-ZOO-7_ZOO-5_2022-07		POL-P2_ZOO-1_2022-08		BOL-B2_ZOO-1_2022-08		QUL-ZOO-1_ZOO-1_2022-08		QUL-ZOO-7_ZOO-1_2022-08	
Date Sampled					27-Jul-22		27-Jul-22		27-Jul-22		25-Aug-22		28-Aug-22		28-Aug-22		28-Aug-22	
Groupcode	Major Group	Family	Taxon	Stage	Total Biomass (mg/sample)		Total Biomass (mg/sample)		Total Biomass (mg/sample)		Total Biomass (mg/sample)		Total Biomass (mg/sample)		Total Biomass (mg/sample)		Total Biomass (mg/sample)	
					DW	WW	DW	WW	DW	WW	DW	WW	DW	WW	DW	WW	DW	WW
CRCL	Crustacea Cladocera	Daphniidae	Daphnia mendotae complex	F	350	1,749	1.48	7.41	3.81	19.1	3.18	15.9	18.1	90.4	15.1	75.3	11.3	56.5	4.71	23.5
			Total Cladocera		**350**	**1,749**	**1.48**	**7.41**	**3.81**	**19.1**	**3.18**	**15.9**	**18.1**	**90.4**	**15.1**	**75.3**	**11.3**	**56.5**	**4.71**	**23.5**
CRCO	Crustacea Copepoda Calanoida		Calanoida indet.	I-V	141	707	1.92	9.62	4.35	21.8	2.53	12.7	2.74	13.7	2.83	14.2	2.11	10.5	1.46	7.31
			Total Calanoida		**141**	**707**	**1.92**	**9.62**	**4.35**	**21.8**	**2.53**	**12.7**	**2.74**	**13.7**	**2.83**	**14.2**	**2.11**	**10.5**	**1.46**	**7.31**
CRCO	Crustacea Copepoda Cyclopoida		Cyclopoida indet.	I-V	906	4,532	9.11	45.6	16.0	80.0	12.8	64.2	60.5	302	14.2	71.0	11.5	57.4	8.81	44.0
			Total Cyclopoida		**906**	**4,532**	**9.11**	**45.6**	**16.0**	**80.0**	**12.8**	**64.2**	**60.5**	**302**	**14.2**	**71.0**	**11.5**	**57.4**	**8.81**	**44.0**
CRCO	Crustacea Copepoda Cyclopoida		Cyclopoida indet.	Nauplius	58.5	293	0.419	2.10	0.527	2.64	0.514	2.57	0.834	4.17	0.402	2.01	0.563	2.82	0.398	1.99
			Total Copepoda Nauplii		**58.5**	**293**	**0.419**	**2.10**	**0.527**	**2.64**	**0.514**	**2.57**	**0.834**	**4.17**	**0.402**	**2.01**	**0.563**	**2.82**	**0.398**	**1.99**
			Total Crustacean Zooplankton		**1,456**	**7,280**	**12.9**	**64.7**	**24.7**	**123**	**19.1**	**95.3**	**82.2**	**411**	**32.5**	**162**	**25.4**	**127**	**15.4**	**76.9**
ROTI	Rotifera	Brachionidae	Kellicottia sp.	----	8.63	86.3	0.0614	0.614	0.106	1.06	0.109	1.09	0.0180	0.180	0.127	1.27	0.115	1.15	0.0710	0.710
ROTI	Rotifera	Brachionidae	Keratella sp. 1	----	48.5	485	2.17	21.7	1.12	11.2	3.32	33.2	0.251	2.51	0.404	4.04	0.276	2.76	0.452	4.52
ROTI	Rotifera	Synchaetidae	Polyarthra sp.	----	3.98	39.8	0.190	1.90	0.0228	0.228	0.171	1.71	0.0063	0.0633	0.0218	0.218	0.157	1.57	0.0411	0.411
			Total Rotifera		**61.1**	**611**	**2.42**	**24.2**	**1.24**	**12.4**	**3.60**	**36.0**	**0.275**	**2.75**	**0.554**	**5.54**	**0.548**	**5.48**	**0.564**	**5.64**
			Total Zooplankton		**1,517**	**7,891**	**15.4**	**88.9**	**25.9**	**136**	**22.7**	**131**	**82.4**	**414**	**33.0**	**168**	**26.0**	**133**	**15.9**	**82.5**

biologica

Zooplankton total wet (WW) and dry (DW) weight biomass data matrix for Minnow Environmental Mount Polley, 2022

Biologica Sample ID							fz22-078-011_QA		fz22-078-018_QA		fz22-078-056_QA	
Lake							Bootjack		Polley		Quesnel	
Client Sample ID							BOL-B2_ZOO-3_2022-07_QA		POL-P2_ZOO-5_2022-07_QA		QUL-ZOO-7_ZOO-1_2022-08_QA	
Date Sampled							26-Jul-22		25-Jul-22		28-Aug-22	
Groupcode	Major Group	Family	Taxon	Stage	Total Biomass (mg/sample)		Total Biomass (mg/sample)		Total Biomass (mg/sample)		Total Biomass (mg/sample)	
					DW	WW	DW	WW	DW	WW	DW	WW
CRCL	Crustacea Cladocera	Daphniidae	Daphnia mendotae complex	F	350	1,749	5.96	29.8	43.7	218	6.12	30.6
			Total Cladocera		**350**	**1,749**	**5.96**	**29.8**	**43.7**	**218**	**6.12**	**30.6**
CRCO	Crustacea Copepoda Calanoida		Calanoida indet.	I-V	141	707	5.48	27.4	13.1	65.4	1.80	9.00
			Total Calanoida		**141**	**707**	**5.48**	**27.4**	**13.1**	**65.4**	**1.80**	**9.00**
CRCO	Crustacea Copepoda Cyclopoida		Cyclopoida indet.	I-V	906	4,532	22.7	113	26.2	131	9.14	45.7
			Total Cyclopoida		**906**	**4,532**	**22.7**	**113**	**26.2**	**131**	**9.14**	**45.7**
CRCO	Crustacea Copepoda Cyclopoida		Cyclopoida indet.	Nauplius	58.5	293	0.654	3.27	7.26	36.3	0.293	1.46
			Total Copepoda Nauplii		**58.5**	**293**	**0.654**	**3.27**	**7.26**	**36.3**	**0.293**	**1.46**
			Total Crustacean Zooplankton		**1,456**	**7,280**	**34.8**	**174**	**90.2**	**451**	**17.3**	**86.7**
ROTI	Rotifera	Brachionidae	Kellicottia sp.	----	8.63	86.3	0.992	9.92	0.378	3.78	0.0635	0.635
ROTI	Rotifera	Brachionidae	Keratella sp. 1	----	48.5	485	0.954	9.54	0.201	2.01	0.586	5.86
ROTI	Rotifera	Synchaetidae	Polyarthra sp.	----	3.98	39.8			0.465	4.65	0.0443	0.443
			Total Rotifera		**61.1**	**611**	**1.95**	**19.5**	**1.04**	**10.4**	**0.694**	**6.94**
			Total Zooplankton		**1,517**	**7,891**	**36.7**	**193**	**91.3**	**462**	**18.0**	**93.7**

PLANKTON COMMUNITY AND PRODUCTIVITY

ALS Laboratory Report VA22B4431
(Finalized July 7, 2022)

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **VA22B4431**	Page	: 1 of 2
Client	: **Mount Polley Mining Corporation**	Laboratory	: Vancouver - Environmental
Contact	: Kala Ivens	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: 250-790-2215 Ext 2112	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 24-Jun-2022 11:20
PO	: 5590008044 Q2 2022	Date Analysis Commenced	: 28-Jun-2022
C-O-C number	: ----	Issue Date	: 07-Jul-2022 14:43
Sampler	: Latimer, Schnurr		
Site	: ----		
Quote number	: VA2021-MPMC100-004-Minnow Water Quality		
No. of samples received	: 5		
No. of samples analysed	: 5		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Janice Pearson	Account Manager Assistant	Administration, Burnaby, British Columbia
Lindsay Gung	Supervisor - Water Chemistry	Inorganics, Burnaby, British Columbia

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

Unit	*Description*
µg/L	micrograms per litre
µg/sample	micrograms per sample
L	litres

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	*CAS Number*	*Method*	*LOR*	*Unit*	*Client sample ID*	**POL-P2_CHLA-1_2022-06**	**BOL-B2_CHLA-1_2022-06**	**QUL-ZOO-7_CHLA-1_2022-06**	**QUL-ZOO-1_CHLA-1_2022-06**	**QUL-ZOO-1_CHLA-1X_2022-06**
					Client sampling date / time	21-Jun-2022 12:05	21-Jun-2022 14:25	22-Jun-2022 09:55	22-Jun-2022 11:00	22-Jun-2022 11:00
						VA22B4431-001	**VA22B4431-002**	**VA22B4431-003**	**VA22B4431-004**	**VA22B4431-005**
						Result	Result	Result	Result	Result
Field Tests										
sampling volume, field	----	EF003	0.010	L		0.250	0.250	0.250	0.240	0.245
Plant Pigments										
chlorophyll a	479-61-8	EC870A	0.010	µg/L		2.60	6.28	2.02	1.58	1.63
chlorophyll a	479-61-8	E870A	0.0020	µg/sample		0.651	1.57	0.506	0.380	0.400

Please refer to the General Comments section for an explanation of any qualifiers detected.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA22B4431**	Page	: 1 of 5
Client	: **Mount Polley Mining Corporation**	Laboratory	: Vancouver - Environmental
Contact	: Kala Ivens	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: 250-790-2215 Ext 2112	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 24-Jun-2022 11:20
PO	: 5590008044 Q2 2022	Issue Date	: 07-Jul-2022 14:42
C-O-C number	: ----		
Sampler	: Latimer, Schnurr		
Site	: ----		
Quote number	: VA2021-MPMC100-004-Minnow Water Quality		
No. of samples received	: 5		
No. of samples analysed	: 5		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Field Tests : Field Volume (L)										
Opaque HDPE tube										
BOL-B2_CHLA-1_2022-06	EF003	21-Jun-2022	----	----	----		29-Jun-2022	----	----	
Field Tests : Field Volume (L)										
Opaque HDPE tube										
POL-P2_CHLA-1_2022-06	EF003	21-Jun-2022	----	----	----		29-Jun-2022	----	----	
Field Tests : Field Volume (L)										
Opaque HDPE tube										
QUL-ZOO-1_CHLA-1_2022-06	EF003	22-Jun-2022	----	----	----		29-Jun-2022	----	----	
Field Tests : Field Volume (L)										
Opaque HDPE tube										
QUL-ZOO-1_CHLA-1X_2022-06	EF003	22-Jun-2022	----	----	----		29-Jun-2022	----	----	
Field Tests : Field Volume (L)										
Opaque HDPE tube										
QUL-ZOO-7_CHLA-1_2022-06	EF003	22-Jun-2022	----	----	----		29-Jun-2022	----	----	
Plant Pigments : Chlorophyll-a by Fluorometry (Field Filtered µg)										
Opaque HDPE tube										
QUL-ZOO-1_CHLA-1_2022-06	E870A	22-Jun-2022	28-Jun-2022	28 days	6 days	✓	28-Jun-2022	28 days	0 days	✓
Plant Pigments : Chlorophyll-a by Fluorometry (Field Filtered µg)										
Opaque HDPE tube										
QUL-ZOO-1_CHLA-1X_2022-06	E870A	22-Jun-2022	28-Jun-2022	28 days	6 days	✓	28-Jun-2022	28 days	0 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Plant Pigments : Chlorophyll-a by Fluorometry (Field Filtered µg)										
Opaque HDPE tube QUL-ZOO-7_CHLA-1_2022-06	E870A	22-Jun-2022	28-Jun-2022	28 days	6 days	✓	28-Jun-2022	28 days	0 days	✓
Plant Pigments : Chlorophyll-a by Fluorometry (Field Filtered µg)										
Opaque HDPE tube BOL-B2_CHLA-1_2022-06	E870A	21-Jun-2022	28-Jun-2022	28 days	7 days	✓	28-Jun-2022	28 days	0 days	✓
Plant Pigments : Chlorophyll-a by Fluorometry (Field Filtered µg)										
Opaque HDPE tube POL-P2_CHLA-1_2022-06	E870A	21-Jun-2022	28-Jun-2022	28 days	7 days	✓	28-Jun-2022	28 days	0 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Control Samples (LCS)							
Chlorophyll-a by Fluorometry (Field Filtered µg)	E870A	541174	1	16	6.2	5.0	✓
Method Blanks (MB)							
Chlorophyll-a by Fluorometry (Field Filtered µg)	E870A	541174	1	16	6.2	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Chlorophyll-a by Fluorometry (Field Filtered µg)	E870A Vancouver - Environmental	Water	EPA 445.0 (mod)	Chlorophyll-a is determined by solvent extraction followed with analysis by fluorometry using the non-acidification procedure. Sampling volume not provided by client.
Chlorophyll-a by Fluorometry (Field Filtered µg/L)	EC870A Vancouver - Environmental	Water	CALC	Convert results to sample concentration based on field information.
Field Volume (L)	EF003 Vancouver - Environmental	Water		Field measurement of sampling volume provided by client and recorded on ALS report may affect the validity of results.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Chlorophyll-a Extraction (Field Filtered)	EP870A Vancouver - Environmental	Water	EPA 445.0 (mod)	Chlorophyll-a solvent extraction.

QUALITY CONTROL REPORT

Work Order	: **VA22B4431**	Page	: 1 of 3
Client	: Mount Polley Mining Corporation	Laboratory	: Vancouver - Environmental
Contact	: Kala Ivens	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: 250-790-2215 Ext 2112	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 24-Jun-2022 11:20
PO	: 5590008044 Q2 2022	Date Analysis Commenced	: 28-Jun-2022
C-O-C number	: ----	Issue Date	: 07-Jul-2022 14:43
Sampler	: Latimer, Schnurr		
Site	: ----		
Quote number	: VA2021-MPMC100-004-Minnow Water Quality		
No. of samples received	: 5		
No. of samples analysed	: 5		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Janice Pearson	Account Manager Assistant	Vancouver Administration, Burnaby, British Columbia
Lindsay Gung	Supervisor - Water Chemistry	Vancouver Inorganics, Burnaby, British Columbia

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Plant Pigments (QCLot: 541174)						
chlorophyll a	479-61-8	E870A	0.002	µg/sample	<0.0020	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Plant Pigments (QCLot: 541174)									
chlorophyll a	479-61-8	E870A	0.002	µg/sample	1 µg/sample	92.2	80.0	120	----

ALS Environmental

www.alsglobal.com

Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878

Affix ALS barcode label here
(lab use only)

COC Number: 15 -

Page 1 of 1

Report To	Contact and company name below will appear on the final report
Company:	Mount Polley Mining Corporation
Contact:	Gabriel Holmes
Phone:	236-317-4939
	Company address below will appear on the final report
Street:	PO Box 12
City/Province:	Likely, BC
Postal Code:	V0L 1N0
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☐ NO
Company:	
Contact:	

Report Format / Distribution

Select Report Format: ☑ ☑ EXCEL ☐ EDD (DIGITAL)
Quality Control (QC) Report with Report ☑ ☐ NO
☑ Compare Results to Criteria on Report - provide details below if box
Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax: gabriel.holmes@mountpolley.com
Email 2: kala.ivens@mountpolley.com, pschnurr@minnow.ca
Email 3: pstecko@minnow.ca; kbatchelar@minnow.ca

Invoice Distribution

Select Invoice Distribution: ☑ EMAIL ☑ MAIL ☐ FAX
Email 1 or Fax: gabriel.holmes@mountpolley.com
Email 2:

Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply

Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days)		EMERGENCY	
4 day [P4]	☐	1 Business day [E1]	☐
3 day [P3]	☐	Same Day, Weekend or Statutory holiday [E0]	☐
2 day [P2]	☐		

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm

For tests that can not be performed according to the service level selected, you will be contacted.

Project Information

ALS Account # / Quote #:	VA2021-MPMC100-004
Job #:	
PO / AFE:	
LSD:	

Oil and Gas Required Fields (client use)

AFE/Cost Center:	PO#
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Lab Work Order # (lab use only)

ALS Contact: Can Dang **Sampler:**

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Chlorophyll-a by Fluorometry (E870A)	Number of Containers
	POL-P2_CHLA-1_2022-06	21-JUN-22	12:05	Tissue	R	1
	BOL-B2_CHLA-1_2022-06	21-JUN-22	14:25	Tissue	R	1
	QUL-ZOO-7_CHLA-1_2022-06	22-JUN-22	09:55	Tissue	R	1
	QUL-ZOO-1_CHLA-1_2022-06	22-JUN-22	11:00	Tissue	R	1
	QUL-ZOO-1_CHLA-1X_2022-06	22-JUN-22	11:00	Tissue	R	1

Environmental Division
Vancouver
Work Order Reference
VA22B4431

Telephone : +1 604 253 4188

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ ☐

Are samples for human drinking water use? ☐ ☐

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐
Ice Packs ☑ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐
Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C		FINAL COOLER TEMPERATURES °C	
		6°	5°

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by:	Date:	Time:	Received by:	Date:	Time:	Received by:	Date:	Time:
							June 24/22	11:20

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

OCTOBER 2019 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

PLANKTON COMMUNITY AND PRODUCTIVITY

ALS Laboratory Report VA22B7705
(Finalized August 18, 2022)

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **VA22B7705**	Page	: 1 of 5
Amendment	: **1**		
Client	: **Mount Polley Mining Corporation**	Laboratory	: Vancouver - Environmental
Contact	: Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: ----	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 02-Aug-2022 11:40
PO	: 5590008044 Q2 2022	Date Analysis Commenced	: 04-Aug-2022
C-O-C number	: ----	Issue Date	: 18-Aug-2022 16:23
Sampler	: SLA/NZI		
Site	: ----		
Quote number	: VA2021-MPMC100-004-Minnow Water Quality		
No. of samples received	: 21		
No. of samples analysed	: 21		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Janice Pearson	Account Manager Assistant	Administration, Burnaby, British Columbia
Tracy Harley	Supervisor - Water Quality Instrumentation	Inorganics, Burnaby, British Columbia

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

Unit	*Description*
µg/L	micrograms per litre
µg/sample	micrograms per sample
L	litres

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Workorder Comments

Amendment (18/08/2022): This report has been amended as a result of a request to change sample identification numbers (IDs). The id for the sample ALS identify as VA22B7705-021 has been modified. All analysis results are as per the previous report.

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	POL-P2_CHLA-1_2022-07	POL-P2_CHLA-2_2022-07	POL-P2_CHLA-3_2022-07	POL-P2_CHLA-4_2022-07	POL-P2_CHLA-5_2022-07
					Client sampling date / time	25-Jul-2022 11:56	25-Jul-2022 13:30	25-Jul-2022 14:25	25-Jul-2022 15:00	25-Jul-2022 15:45
						VA22B7705-001	VA22B7705-002	VA22B7705-003	VA22B7705-004	VA22B7705-005
						Result	Result	Result	Result	Result
Field Tests										
sampling volume, field	----	EF003	0.010	L		0.225	0.250	0.250	0.250	0.250
Plant Pigments										
chlorophyll a	479-61-8	EC870A	0.010	µg/L		2.57	2.46	2.55	3.78	2.73
chlorophyll a	479-61-8	E870A	0.0020	µg/sample		0.579	0.616	0.638	0.946	0.682

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BOL-B2_CHLA-1_2022-07	BOL-B2_CHLA-2_2022-07	BOL-B2_CHLA-3_2022-07	BOL-B2_CHLA-4_2022-07	BOL-B2_CHLA-5_2022-07
					Client sampling date / time	26-Jul-2022 08:45	26-Jul-2022 10:50	26-Jul-2022 11:45	26-Jul-2022 13:40	26-Jul-2022 14:15
						VA22B7705-006	VA22B7705-007	VA22B7705-008	VA22B7705-009	VA22B7705-010
						Result	Result	Result	Result	Result
Field Tests										
sampling volume, field	----	EF003	0.010	L		0.225	0.225	0.225	0.225	0.225
Plant Pigments										
chlorophyll a	479-61-8	EC870A	0.010	µg/L		1.82	2.07	1.94	2.50	2.09
chlorophyll a	479-61-8	E870A	0.0020	µg/sample		0.409	0.465	0.436	0.562	0.470

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	QUL-ZOO-7_CHLA-1_2022-07	QUL-ZOO-7_CHLA-2_2022-07	QUL-ZOO-7_CHLA-3_2022-07	QUL-ZOO-7_CHLA-4_2022-07	QUL-ZOO-7_CHLA-5_2022-07
					Client sampling date / time	27-Jul-2022 09:00	27-Jul-2022 10:30	27-Jul-2022 11:15	27-Jul-2022 11:50	27-Jul-2022 12:40
						VA22B7705-011	VA22B7705-012	VA22B7705-013	VA22B7705-014	VA22B7705-015
						Result	Result	Result	Result	Result
Field Tests										
sampling volume, field	----	EF003	0.010	L		0.250	0.225	0.225	0.250	0.225
Plant Pigments										
chlorophyll a	479-61-8	EC870A	0.010	µg/L		3.97	2.26	2.48	4.24	3.15
chlorophyll a	479-61-8	E870A	0.0020	µg/sample		0.992	0.508	0.557	1.06	0.708

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	QUL-ZOO-1_CHLA-1_2022-07	QUL-ZOO-1_CHLA-2_2022-07	QUL-ZOO-1_CHLA-3_2022-07	QUL-ZOO-1_CHLA-4_2022-07	QUL-ZOO-1_CHLA-5_2022-07
					Client sampling date / time	27-Jul-2022 13:40	27-Jul-2022 14:50	28-Jul-2022 07:30	28-Jul-2022 08:10	28-Jul-2022 08:50
						VA22B7705-016	VA22B7705-017	VA22B7705-018	VA22B7705-019	VA22B7705-020
						Result	Result	Result	Result	Result
Field Tests										
sampling volume, field	----	EF003	0.010	L		0.250	0.250	0.250	0.250	0.250
Plant Pigments										
chlorophyll a	479-61-8	EC870A	0.010	µg/L		2.76	2.50	3.13	5.48	2.59
chlorophyll a	479-61-8	E870A	0.0020	µg/sample		0.690	0.626	0.782	1.37	0.647

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Water** (Matrix: **Water**)				Client sample ID	POL-P2_CHLA-1X_2022-07	----	----	----	----
				Client sampling date / time	25-Jul-2022 11:56	----	----	----	----
Analyte	*CAS Number*	*Method*	*LOR*	*Unit*	**VA22B7705-021**	--------	--------	--------	--------
					Result	----	----	----	----
Field Tests									
sampling volume, field	----	EF003	0.010	L	0.188	----	----	----	----
Plant Pigments									
chlorophyll a	479-61-8	EC870A	0.010	µg/L	2.56	----	----	----	----
chlorophyll a	479-61-8	E870A	0.0020	µg/sample	0.482	----	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA22B7705**	Page	: 1 of 9
Amendment	: 1		
Client	: **Mount Polley Mining Corporation**	Laboratory	: Vancouver - Environmental
Contact	: Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: ----	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 02-Aug-2022 11:40
PO	: 5590008044 Q2 2022	Issue Date	: 18-Aug-2022 16:23
C-O-C number	: ----		
Sampler	: SLA/NZI		
Site	: ----		
Quote number	: VA2021-MPMC100-004-Minnow Water Quality		
No. of samples received	: 21		
No. of samples analysed	: 21		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Field Tests : Field Volume (L)										
Opaque HDPE tube										
BOL-B2_CHLA-1_2022-07	EF003	26-Jul-2022	----	----	----		04-Aug-2022	----	----	
Field Tests : Field Volume (L)										
Opaque HDPE tube										
BOL-B2_CHLA-2_2022-07	EF003	26-Jul-2022	----	----	----		04-Aug-2022	----	----	
Field Tests : Field Volume (L)										
Opaque HDPE tube										
BOL-B2_CHLA-3_2022-07	EF003	26-Jul-2022	----	----	----		04-Aug-2022	----	----	
Field Tests : Field Volume (L)										
Opaque HDPE tube										
BOL-B2_CHLA-4_2022-07	EF003	26-Jul-2022	----	----	----		04-Aug-2022	----	----	
Field Tests : Field Volume (L)										
Opaque HDPE tube										
BOL-B2_CHLA-5_2022-07	EF003	26-Jul-2022	----	----	----		04-Aug-2022	----	----	
Field Tests : Field Volume (L)										
Opaque HDPE tube										
POL-P2_CHLA-1_2022-07	EF003	25-Jul-2022	----	----	----		04-Aug-2022	----	----	
Field Tests : Field Volume (L)										
Opaque HDPE tube										
POL-P2_CHLA-1X_2022-07	EF003	25-Jul-2022	----	----	----		04-Aug-2022	----	----	

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Field Tests : Field Volume (L)										
Opaque HDPE tube POL-P2_CHLA-2_2022-07	EF003	25-Jul-2022	----	----	----		04-Aug-2022	----	----	
Field Tests : Field Volume (L)										
Opaque HDPE tube POL-P2_CHLA-3_2022-07	EF003	25-Jul-2022	----	----	----		04-Aug-2022	----	----	
Field Tests : Field Volume (L)										
Opaque HDPE tube POL-P2_CHLA-4_2022-07	EF003	25-Jul-2022	----	----	----		04-Aug-2022	----	----	
Field Tests : Field Volume (L)										
Opaque HDPE tube POL-P2_CHLA-5_2022-07	EF003	25-Jul-2022	----	----	----		04-Aug-2022	----	----	
Field Tests : Field Volume (L)										
Opaque HDPE tube QUL-ZOO-1_CHLA-1_2022-07	EF003	27-Jul-2022	----	----	----		04-Aug-2022	----	----	
Field Tests : Field Volume (L)										
Opaque HDPE tube QUL-ZOO-1_CHLA-2_2022-07	EF003	27-Jul-2022	----	----	----		04-Aug-2022	----	----	
Field Tests : Field Volume (L)										
Opaque HDPE tube QUL-ZOO-1_CHLA-3_2022-07	EF003	28-Jul-2022	----	----	----		04-Aug-2022	----	----	
Field Tests : Field Volume (L)										
Opaque HDPE tube QUL-ZOO-1_CHLA-4_2022-07	EF003	28-Jul-2022	----	----	----		04-Aug-2022	----	----	
Field Tests : Field Volume (L)										
Opaque HDPE tube QUL-ZOO-1_CHLA-5_2022-07	EF003	28-Jul-2022	----	----	----		04-Aug-2022	----	----	

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Field Tests : Field Volume (L)										
Opaque HDPE tube QUL-ZOO-7_CHLA-1_2022-07	EF003	27-Jul-2022	----	----	----		04-Aug-2022	----	----	
Field Tests : Field Volume (L)										
Opaque HDPE tube QUL-ZOO-7_CHLA-2_2022-07	EF003	27-Jul-2022	----	----	----		04-Aug-2022	----	----	
Field Tests : Field Volume (L)										
Opaque HDPE tube QUL-ZOO-7_CHLA-3_2022-07	EF003	27-Jul-2022	----	----	----		04-Aug-2022	----	----	
Field Tests : Field Volume (L)										
Opaque HDPE tube QUL-ZOO-7_CHLA-4_2022-07	EF003	27-Jul-2022	----	----	----		04-Aug-2022	----	----	
Field Tests : Field Volume (L)										
Opaque HDPE tube QUL-ZOO-7_CHLA-5_2022-07	EF003	27-Jul-2022	----	----	----		04-Aug-2022	----	----	
Plant Pigments : Chlorophyll-a by Fluorometry (Field Filtered µg)										
Opaque HDPE tube QUL-ZOO-1_CHLA-3_2022-07	E870A	28-Jul-2022	09-Aug-2022	28 days	12 days	✓	09-Aug-2022	28 days	0 days	✓
Plant Pigments : Chlorophyll-a by Fluorometry (Field Filtered µg)										
Opaque HDPE tube QUL-ZOO-1_CHLA-4_2022-07	E870A	28-Jul-2022	09-Aug-2022	28 days	12 days	✓	09-Aug-2022	28 days	0 days	✓
Plant Pigments : Chlorophyll-a by Fluorometry (Field Filtered µg)										
Opaque HDPE tube QUL-ZOO-1_CHLA-5_2022-07	E870A	28-Jul-2022	09-Aug-2022	28 days	12 days	✓	09-Aug-2022	28 days	0 days	✓
Plant Pigments : Chlorophyll-a by Fluorometry (Field Filtered µg)										
Opaque HDPE tube QUL-ZOO-1_CHLA-1_2022-07	E870A	27-Jul-2022	09-Aug-2022	28 days	13 days	✓	09-Aug-2022	28 days	0 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Plant Pigments : Chlorophyll-a by Fluorometry (Field Filtered µg)										
Opaque HDPE tube QUL-ZOO-1_CHLA-2_2022-07	E870A	27-Jul-2022	09-Aug-2022	28 days	13 days	✓	09-Aug-2022	28 days	0 days	✓
Plant Pigments : Chlorophyll-a by Fluorometry (Field Filtered µg)										
Opaque HDPE tube QUL-ZOO-7_CHLA-1_2022-07	E870A	27-Jul-2022	09-Aug-2022	28 days	13 days	✓	09-Aug-2022	28 days	0 days	✓
Plant Pigments : Chlorophyll-a by Fluorometry (Field Filtered µg)										
Opaque HDPE tube QUL-ZOO-7_CHLA-2_2022-07	E870A	27-Jul-2022	09-Aug-2022	28 days	13 days	✓	09-Aug-2022	28 days	0 days	✓
Plant Pigments : Chlorophyll-a by Fluorometry (Field Filtered µg)										
Opaque HDPE tube QUL-ZOO-7_CHLA-3_2022-07	E870A	27-Jul-2022	09-Aug-2022	28 days	13 days	✓	09-Aug-2022	28 days	0 days	✓
Plant Pigments : Chlorophyll-a by Fluorometry (Field Filtered µg)										
Opaque HDPE tube QUL-ZOO-7_CHLA-4_2022-07	E870A	27-Jul-2022	09-Aug-2022	28 days	13 days	✓	09-Aug-2022	28 days	0 days	✓
Plant Pigments : Chlorophyll-a by Fluorometry (Field Filtered µg)										
Opaque HDPE tube QUL-ZOO-7_CHLA-5_2022-07	E870A	27-Jul-2022	09-Aug-2022	28 days	13 days	✓	09-Aug-2022	28 days	0 days	✓
Plant Pigments : Chlorophyll-a by Fluorometry (Field Filtered µg)										
Opaque HDPE tube BOL-B2_CHLA-1_2022-07	E870A	26-Jul-2022	09-Aug-2022	28 days	14 days	✓	09-Aug-2022	28 days	0 days	✓
Plant Pigments : Chlorophyll-a by Fluorometry (Field Filtered µg)										
Opaque HDPE tube BOL-B2_CHLA-2_2022-07	E870A	26-Jul-2022	09-Aug-2022	28 days	14 days	✓	09-Aug-2022	28 days	0 days	✓
Plant Pigments : Chlorophyll-a by Fluorometry (Field Filtered µg)										
Opaque HDPE tube BOL-B2_CHLA-3_2022-07	E870A	26-Jul-2022	09-Aug-2022	28 days	14 days	✓	09-Aug-2022	28 days	0 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Plant Pigments : Chlorophyll-a by Fluorometry (Field Filtered µg)										
Opaque HDPE tube BOL-B2_CHLA-4_2022-07	E870A	26-Jul-2022	09-Aug-2022	28 days	14 days	✓	09-Aug-2022	28 days	0 days	✓
Plant Pigments : Chlorophyll-a by Fluorometry (Field Filtered µg)										
Opaque HDPE tube BOL-B2_CHLA-5_2022-07	E870A	26-Jul-2022	09-Aug-2022	28 days	14 days	✓	09-Aug-2022	28 days	0 days	✓
Plant Pigments : Chlorophyll-a by Fluorometry (Field Filtered µg)										
Opaque HDPE tube POL-P2_CHLA-1_2022-07	E870A	25-Jul-2022	09-Aug-2022	28 days	15 days	✓	09-Aug-2022	28 days	0 days	✓
Plant Pigments : Chlorophyll-a by Fluorometry (Field Filtered µg)										
Opaque HDPE tube POL-P2_CHLA-1X_2022-07	E870A	25-Jul-2022	09-Aug-2022	28 days	15 days	✓	09-Aug-2022	28 days	0 days	✓
Plant Pigments : Chlorophyll-a by Fluorometry (Field Filtered µg)										
Opaque HDPE tube POL-P2_CHLA-2_2022-07	E870A	25-Jul-2022	09-Aug-2022	28 days	15 days	✓	09-Aug-2022	28 days	0 days	✓
Plant Pigments : Chlorophyll-a by Fluorometry (Field Filtered µg)										
Opaque HDPE tube POL-P2_CHLA-3_2022-07	E870A	25-Jul-2022	09-Aug-2022	28 days	15 days	✓	09-Aug-2022	28 days	0 days	✓
Plant Pigments : Chlorophyll-a by Fluorometry (Field Filtered µg)										
Opaque HDPE tube POL-P2_CHLA-4_2022-07	E870A	25-Jul-2022	09-Aug-2022	28 days	15 days	✓	09-Aug-2022	28 days	0 days	✓
Plant Pigments : Chlorophyll-a by Fluorometry (Field Filtered µg)										
Opaque HDPE tube POL-P2_CHLA-5_2022-07	E870A	25-Jul-2022	09-Aug-2022	28 days	15 days	✓	09-Aug-2022	28 days	0 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Control Samples (LCS)							
Chlorophyll-a by Fluorometry (Field Filtered µg)	E870A	594074	2	21	9.5	5.0	✓
Method Blanks (MB)							
Chlorophyll-a by Fluorometry (Field Filtered µg)	E870A	594074	2	21	9.5	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Chlorophyll-a by Fluorometry (Field Filtered µg)	E870A Vancouver - Environmental	Water	EPA 445.0 (mod)	Chlorophyll-a is determined by solvent extraction followed with analysis by fluorometry using the non-acidification procedure. Sampling volume not provided by client.
Chlorophyll-a by Fluorometry (Field Filtered µg/L)	EC870A Vancouver - Environmental	Water	CALC	Convert results to sample concentration based on field information.
Field Volume (L)	EF003 Vancouver - Environmental	Water		Field measurement of sampling volume provided by client and recorded on ALS report may affect the validity of results.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Chlorophyll-a Extraction (Field Filtered)	EP870A Vancouver - Environmental	Water	EPA 445.0 (mod)	Chlorophyll-a solvent extraction.

QUALITY CONTROL REPORT

Work Order	: **VA22B7705**	Page	: 1 of 3
Amendment	: **1**		
Client	: Mount Polley Mining Corporation	Laboratory	: Vancouver - Environmental
Contact	: Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: ----	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 02-Aug-2022 11:40
PO	: 5590008044 Q2 2022	Date Analysis Commenced	: 04-Aug-2022
C-O-C number	: ----	Issue Date	: 18-Aug-2022 16:23
Sampler	: SLA/NZI		
Site	: ----		
Quote number	: VA2021-MPMC100-004-Minnow Water Quality		
No. of samples received	: 21		
No. of samples analysed	: 21		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Janice Pearson	Account Manager Assistant	Vancouver Administration, Burnaby, British Columbia
Tracy Harley	Supervisor - Water Quality Instrumentation	Vancouver Inorganics, Burnaby, British Columbia

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Plant Pigments (QCLot: 594074)						
chlorophyll a	479-61-8	E870A	0.002	µg/sample	<0.0020	----
Plant Pigments (QCLot: 594075)						
chlorophyll a	479-61-8	E870A	0.002	µg/sample	<0.0020	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Plant Pigments (QCLot: 594074)									
chlorophyll a	479-61-8	E870A	0.002	µg/sample	1 µg/sample	96.9	80.0	120	----
Plant Pigments (QCLot: 594075)									
chlorophyll a	479-61-8	E870A	0.002	µg/sample	1 µg/sample	93.7	80.0	120	----

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Affix ALS barcode label here (lab use only)

COC Num

Environmental Division Vancouver
Work Order Reference
VA22B7705

Telephone : +1 604 253 4188

Report To	Contact and company name below will appear on the final report
Company:	Mount Polley Mining Corporation
Contact:	Gabriel Holmes
Phone:	236-317-4939
	Company address below will appear on the final report
Street:	PO Box 12
City/Province:	Likely, BC
Postal Code:	V0L 1N0
Invoice To	Same as Report To |✓| YES | | NO
	Copy of Invoice with Report | | YES | | NO
Company:	
Contact:	

Report Format / Distribution	
Select Report Format:	|✓| PDF |✓| EXCEL | | EDD (DIGITAL)
Quality Control (QC) Report with Report	|✓| | | NO
☑ Compare Results to Criteria on Report - provide details below if box checked	
Select Distribution:	|✓| EMAIL | | MAIL | | FAX
Email 1 or Fax	gabriel.holmes@mountpolley.com
Email 2	kala.ivens@mountpolley.com; pschnurr@minnow.ca
Email 3	pstecko@minnow.ca; kbatchelar@minnow.ca

Invoice Distribution	
Select Invoice Distribution:	☑ EMAIL ☑ MAIL ☐ FAX
Email 1 or Fax	gabriel.holmes@mountpolley.com
Email 2	

Select Service Level Below - Please confirm all E&P TATs with

Regular [R] ☑ Standard TAT if received by

PRIORITY (Business Days): 4 day [P4] ☐ | 3 day [P3] ☐ | 2 day [P2] ☐

EMERGENCY: 1

Date and Time Required for all E&P TATs:

For tests that can not be performed according to the service le

Project Information		Oil and Gas Required Fields (client use)	
ALS Account # / Quote #:	VA2021-MPMC100-004	AFE/Cost Center:	PO#
Job #:		Major/Minor Code:	Routing Code:
PO / AFE:		Requisitioner:	
LSD:		Location:	

ALS Lab Work Order # (lab use only): B7705

ALS Contact: Can Dang

Sampler: SLA/NZI

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)		Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Chlorophyll-a by Fluorometry (E870A)	Number of Containers
1	POL-P2_CHLA-1_2022-07	225 mL	25-JUL-22	11:56	Tissue	R	1
2	POL-P2_CHLA-2_2022-07	250 mL	25-JUL-22	13:30	Tissue	R	1
3	POL-P2_CHLA-3_2022-07	250 mL	25-JUL-22	14:25	Tissue	R	1
4	POL-P2_CHLA-4_2022-07	250 mL	25-JUL-22	15:00	Tissue	R	1
5	POL-P2_CHLA-5_2022-07	250 mL	25-JUL-22	15:45	Tissue	R	1
6	BOL-B2_CHLA-1_2022-07	225 mL	26-JUL-22	08:45	Tissue	R	1
7	BOL-B2_CHLA-2_2022-07	225 mL	26-JUL-22	10:50	Tissue	R	1
8	BOL-B2_CHLA-3_2022-07	225 mL	26-JUL-22	11:45	Tissue	R	1
9	BOL-B2_CHLA-4_2022-07	225 mL	26-JUL-22	13:40	Tissue	R	1
10	BOL-B2_CHLA-5_2022-07	225mL	26-JUL-22	14:15	Tissue	R	1
11	QUL-ZOO-7_CHLA-1_2022-07	250 mL	27-JUL-22	09:00	Tissue	R	1
12	QUL-ZOO-7_CHLA-2_2022-07	225mL	27-JUL-22	10:30	Tissue	R	1

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ ☐

Are samples for human drinking water use? \| \| \| \|

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

Volume filtered indicated beside Sample ID is

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice Packs ☑ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
			2.3		

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: S. Lajoie	Date: 28-JUL-2022	Time: 1241	Received by:	Date:	Time:	Received by: IT	Date: Aug 2/22	Time: 1124

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

OCTOBER 2015 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

ALS Environmental

www.alsglobal.com

Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878

Affix ALS barcode label here (lab use only)

COC Number: 15 -

Report To	Contact and company name below will appear on the final report
Company:	Mount Polley Mining Corporation
Contact:	Gabriel Holmes
Phone:	236-317-4939
	Company address below will appear on the final report
Street:	PO Box 12
City/Province:	Likely, BC
Postal Code:	V0L 1N0
Invoice To	Same as Report To |✓| YES | | NO
	Copy of Invoice with Report | | YES | | NO
Company:	
Contact:	

Report Format / Distribution	
Select Report Format:	|✓| PDF ☑ EXCEL | | EDD (DIGITAL)
Quality Control (QC) Report with Report	|✓| | | NO
☑ Compare Results to Criteria on Report - provide details below if box checked	
Select Distribution:	|✓| EMAIL | MAIL | | FAX
Email 1 or Fax	gabriel.holmes@mountpolley.com
Email 2	kala.ivens@mountpolley.com; pschnurr@minnow.ca
Email 3	pstecko@minnow.ca; kbatchelar@minnow.ca

Invoice Distribution	
Select Invoice Distribution:	☑ EMAIL ☑ MAIL ☐ FAX
Email 1 or Fax	gabriel.holmes@mountpolley.com
Email 2	

Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply

Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days)		EMERGENCY	
	4 day [P4]		1 Business day [E1]
	3 day [P3] ☐		Same Day, Weekend or Statutory holiday [E0] ☐
	2 day [P2]		

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm

For tests that can not be performed according to the service level selected, you will be contacted.

Project Information		Oil and Gas Required Fields (client use)	
ALS Account # / Quote #:	VA2021-MPMC100-004	AFE/Cost Center:	PO#
Job #:		Major/Minor Code:	Routing Code:
PO / AFE:		Requisitioner:	
LSD:		Location:	
ALS Lab Work Order # (lab use only)		ALS Contact: Can Dang	Sampler: SLA/NZi

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	F	Chlorophyll-a by Fluorometry (E870A)	Number of Containers
13	QUL-ZOO-7_CHLA-3_2022-07 225mL	27-JUL-22	11:15	Tissue	R		1
14	QUL-ZOO-7_CHLA-4_2022-07 250mL	27-JUL-22	11:50	Tissue	R		1
15	QUL-ZOO-7_CHLA-5_2022-07 225mL	27-JUL-22	12:40	Tissue	R		1
16	QUL-ZOO-1_CHLA-1_2022-07 250mL	27-JUL-22	13:40	Tissue	R		1
17	QUL-ZOO-1_CHLA-2_2022-07 250mL	27-JUL-22	14:50	Tissue	R		1
18	QUL-ZOO-1_CHLA-3_2022-07 250mL	28-JUL-22	07:30	Tissue	R		1
19	QUL-ZOO-1_CHLA-4_2022-07 250mL	28-JUL-22	08:10	Tissue	R		1
20	QUL-ZOO-1_CHLA-5_2022-07 250mL	28-JUL-22	08:50	Tissue	R		1
21	QUL-ZOO-1_CHLA-1X_2022-07 187.5	25-JUL-22	11:56	Tissue	R		1

Drinking Water (DW) Samples[1] (client use)	Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)
Are samples taken from a Regulated DW System? ☐ ☐	Volume filtered is indicated beside the Sample ID.
Are samples for human drinking water use? | | | |	

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice Packs ☑ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
			23		

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: S. Latimer	Date: 28-July-2022	Time: 1241	Received by:	Date:	Time:	Received by: BIT	Date: Aug 2/22	Time: 11:40 am

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

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1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Affix ALS barcode label here
(lab use only)

COC Num

Environmental Division
Vancouver
Work Order Reference
VA22B7705

Telephone : +1 604 253 4188

Report To	Contact and company name below will appear on the final report
Company:	Mount Polley Mining Corporation
Contact:	Gabriel Holmes
Phone:	236-317-4939
	Company address below will appear on the final report
Street:	PO Box 12
City/Province:	Likely, BC
Postal Code:	V0L 1N0
Invoice To	Same as Report To |✓| YES | | NO
	Copy of Invoice with Report | | YES | | NO
Company:	
Contact:	

Report Format / Distribution	
Select Report Format:	|✓| PDF |✓| EXCEL | | EDD (DIGITAL)
Quality Control (QC) Report with Report	|✓| | | NO
☑ Compare Results to Criteria on Report - provide details below if box checked	
Select Distribution:	|✓| EMAIL | | MAIL | | FAX
Email 1 or Fax	gabriel.holmes@mountpolley.com
Email 2	kala.ivens@mountpolley.com; pschnurr@minnow.ca
Email 3	pstecko@minnow.ca; kbatchelar@minnow.ca

Invoice Distribution	
Select Invoice Distribution:	☑ EMAIL ☑ MAIL ☐ FAX
Email 1 or Fax	gabriel.holmes@mountpolley.com
Email 2	

Select Service Level Below - Please confirm all E&P TATs with

Regular [R] ☑ Standard TAT if received by

PRIORITY (Business Days): 4 day [P4] ☐ | 3 day [P3] ☐ | 2 day [P2] ☐

EMERGENCY: 1

Date and Time Required for all E&P TATs:

For tests that can not be performed according to the service le

Project Information	
ALS Account # / Quote #:	VA2021-MPMC100-004
Job #:	
PO / AFE:	
LSD:	

Oil and Gas Required Fields (client use)	
AFE/Cost Center:	PO#
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Lab Work Order #. (lab use only): B7705

ALS Contact: Can Dang

Sampler: SLA/NZI

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	F	Chlorophyll-a by Fluorometry (E870A)	Number of Containers
1	POL-P2_CHLA-1_2022-07 225 mL	25 -JUL-22	11:56	Tissue	R		1
2	POL-P2_CHLA-2_2022-07 250 mL	25 -JUL-22	13:30	Tissue	R		1
3	POL-P2_CHLA-3_2022-07 250 mL	25 -JUL-22	14:25	Tissue	R		1
4	POL-P2_CHLA-4_2022-07 250 mL	25 -JUL-22	15:00	Tissue	R		1
5	POL-P2_CHLA-5_2022-07 250 mL	25 -JUL-22	15:45	Tissue	R		1
6	BOL-B2_CHLA-1_2022-07 225 mL	26 -JUL-22	08:45	Tissue	R		1
7	BOL-B2_CHLA-2_2022-07 225 mL	26 -JUL-22	10:50	Tissue	R		1
8	BOL-B2_CHLA-3_2022-07 225 mL	26 -JUL-22	11:45	Tissue	R		1
9	BOL-B2_CHLA-4_2022-07 225 mL	26 -JUL-22	13:40	Tissue	R		1
10	BOL-B2_CHLA-5_2022-07 225mL	26 -JUL-22	14:15	Tissue	R		1
11	QUL-ZOO-7_CHLA-1_2022-07 250mL	27 -JUL-22	09:00	Tissue	R		1
12	QUL-ZOO-7_CHLA-2_2022-07 225mL	27 -JUL-22	10:30	Tissue	R		1

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ ☐

Are samples for human drinking water use? \| \| \| \|

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

Volume filtered indicated beside Sample ID is

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ | SIF Observations Yes ☐ No ☐

Ice Packs ☑ Ice Cubes ☐ | Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
			2.3	0	

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: S. Latimer	Date: 28-JUL-2022	Time: 1241	Received by:	Date:	Time:	Received by: IT	Date: Aug 2 '22	Time: 1124

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

OCTOBER 2015 FRONT

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1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Affix ALS barcode label here (lab use only)

COC Number: 15 -

Report To	Contact and company name below will appear on the final report
Company:	Mount Polley Mining Corporation
Contact:	Gabriel Holmes
Phone:	236-317-4939
	Company address below will appear on the final report
Street:	PO Box 12
City/Province:	Likely, BC
Postal Code:	V0L 1N0
Invoice To	Same as Report To |✓| YES | | NO
	Copy of Invoice with Report | | YES | | NO
Company:	
Contact:	

Report Format / Distribution

Select Report Format: |✓| PDF [✓] EXCEL | | EDD (DIGITAL)

Quality Control (QC) Report with Report |✓| | | NO

[✓] Compare Results to Criteria on Report - provide details below if box checked

Select Distribution: |✓| EMAIL | | MAIL | | FAX

Email 1 or Fax: gabriel.holmes@mountpolley.com

Email 2: kela.ivens@mountpolley.com; pschnurr@minnow.ca

Email 3: pstecko@minnow.ca; kbatchelar@minnow.ca

Invoice Distribution

Select Invoice Distribution: [✓] EMAIL [✓] MAIL [ ] FAX

Email 1 or Fax: gabriel.holmes@mountpolley.com

Email 2:

Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply

Regular [R] [✓] Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days): 4 day [P4] | 3 day [P3] [ ] | 2 day [P2]

EMERGENCY: 1 Business day [E1] | Same Day, Weekend or Statutory holiday [E0] [ ]

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm

For tests that can not be performed according to the service level selected, you will be contacted.

Project Information

ALS Account # / Quote #:	VA2021-MPMC100-004
Job #:	
PO / AFE:	
LSD:	

Oil and Gas Required Fields (client use)

AFE/Cost Center:	PO#
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Lab Work Order # (lab use only):

ALS Contact: Can Dang

Sampler: SLA/NZi

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	F	Chlorophyll-a by Fluorometry (E870A)	Number of Containers
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14	QUL-ZOO-7_CHLA-4_2022-07 250mL	27-JUL-22	11:50	Tissue	R		1
15	QUL-ZOO-7_CHLA-5_2022-07 225mL	27-JUL-22	12:40	Tissue	R		1
16	QUL-ZOO-1_CHLA-1_2022-07 250mL	27-JUL-22	13:40	Tissue	R		1
17	QUL-ZOO-1_CHLA-2_2022-07 250mL	27-JUL-22	14:50	Tissue	R		1
18	QUL-ZOO-1_CHLA-3_2022-07 250mL	28-JUL-22	07:30	Tissue	R		1
19	QUL-ZOO-1_CHLA-4_2022-07 250mL	28-JUL-22	08:10	Tissue	R		1
20	QUL-ZOO-1_CHLA-5_2022-07 250mL	28-JUL-22	08:50	Tissue	R		1
21	POL-P2_CHLA-1X_2022-07 187.5	25-JUL-22	11:56	Tissue	R		1

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? [ ] [ ]

Are samples for human drinking water use? | | | |

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

Volume filtered is indicated beside the Sample ID.

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen [ ] SIF Observations Yes [ ] No [ ]

Ice Packs [✓] Ice Cubes [ ] Custody seal intact Yes [ ] No [ ]

Cooling Initiated [ ]

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
			23°		

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: S. Latimer	Date: 28-July-2022	Time: 1241	Received by:	Date:	Time:	Received by: EIT	Date: Aug 2/22	Time: 11:40 am

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

OCTOBER 2015 FRONT

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1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form**.

ZOOPLANKTON TISSUE CHEMISTRY

ALS Laboratory Report VA22B4432

(Finalized August 25, 2022)

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **VA22B4432**	Page	: 1 of 4
Client	: **Mount Polley Mining Corporation**	Laboratory	: Vancouver - Environmental
Contact	: Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: ----	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 24-Jun-2022 16:40
PO	: 550008044 Q2 2022	Date Analysis Commenced	: 29-Jul-2022
C-O-C number	: ----	Issue Date	: 25-Aug-2022 09:56
Sampler	: Latimer, Schnurr		
Site	: ----		
Quote number	: VA22-MPMC100-002		
No. of samples received	: 5		
No. of samples analysed	: 5		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Angela Ren	Team Leader - Metals	Metals, Burnaby, British Columbia
Owen Cheng		Metals, Burnaby, British Columbia
Ragini Saini	Lab Assistant	Metals, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Metals, Burnaby, British Columbia

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

Unit	*Description*
%	percent
mg/kg	milligrams per kilogram
mg/kg wwt	milligrams per kilogram wet weight

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	POL-P2_ZOOT-1_2022-06	BOL-B2_ZOOT-1_2022-06	QUL-ZOO-7_ZOOT-1_2022-06	QUL-ZOO-1_ZOOT-1_2022-06	QUL-ZOO-1_ZOOT-1X_2022-06
					Client sampling date / time	21-Jun-2022 12:05	21-Jun-2022 14:25	22-Jun-2022 09:55	22-Jun-2022 11:00	22-Jun-2022 11:00
						VA22B4432-001	VA22B4432-002	VA22B4432-003	VA22B4432-004	VA22B4432-005
						Result	Result	Result	Result	Result
Physical Tests										
moisture	----	E144A	2.0	%		94.8	99.1	94.0	94.6	94.7
Metals										
aluminum	7429-90-5	E475	5.0	mg/kg		895	5240	2290	1220	1210
antimony	7440-36-0	E475	0.020	mg/kg		0.167	0.603	0.049	0.079	0.171
arsenic	7440-38-2	E475	0.050	mg/kg		23.0	26.3	3.50	2.62	2.63
barium	7440-39-3	E475	0.050	mg/kg		15.7	132	15.1	20.0	19.6
beryllium	7440-41-7	E475	0.010	mg/kg		0.036	0.202	0.162	0.056	0.058
bismuth	7440-69-9	E475	0.010	mg/kg		0.011	0.041	<0.010	<0.010	<0.010
boron	7440-42-8	E475	1.0	mg/kg		3.4	12.9	<1.0	1.2	<1.0
cadmium	7440-43-9	E475	0.010	mg/kg		0.404	0.450	0.927	0.940	0.926
calcium	7440-70-2	E475	20	mg/kg		6430	26300	3650	3360	3440
cesium	7440-46-2	E475	0.0050	mg/kg		0.0982	0.579	0.0870	0.103	0.0927
chromium	7440-47-3	E475	0.20	mg/kg		27.9	49.9	4.11	2.69	3.37
cobalt	7440-48-4	E475	0.020	mg/kg		0.836	3.80	0.912	0.983	0.983
copper	7440-50-8	E475	0.20	mg/kg		71.2	182	24.3	16.5	18.1
iron	7439-89-6	E475	5.0	mg/kg		1380	10200	1410	1180	1190
lead	7439-92-1	E475	0.050	mg/kg		1.44	4.27	0.580	0.464	0.514
lithium	7439-93-2	E475	0.50	mg/kg		0.76	3.54	0.72	0.90	0.92
magnesium	7439-95-4	E475	2.0	mg/kg		1340	2960	1470	1300	1330
manganese	7439-96-5	E475	0.050	mg/kg		210	1180	84.9	97.7	97.3
mercury	7439-97-6	E512	0.010	mg/kg		0.027	0.090	0.035	0.037	0.036
mercury	7439-97-6	E512A	0.0020	mg/kg wwt		<0.0020	<0.0020	0.0021	<0.0020	<0.0020
molybdenum	7439-98-7	E475	0.040	mg/kg		0.827	1.82	0.566	0.308	0.318
nickel	7440-02-0	E475	0.20	mg/kg		3.21	11.8	2.70	2.50	2.81
phosphorus	7723-14-0	E475	20	mg/kg		8820	8300	9130	11300	11500
potassium	7440-09-7	E475	20	mg/kg		6660	6570	7590	9280	9500
rubidium	7440-17-7	E475	0.050	mg/kg		6.77	8.70	12.1	15.4	15.9
selenium	7782-49-2	E475	0.10	mg/kg		2.68	2.35	2.33	2.88	2.87
silver	7440-22-4	E475.Ag	0.0050	mg/kg		0.0429	0.121	0.0472	0.0547	0.0506
sodium	7440-23-5	E475	20	mg/kg		3020	3380	2420	3300	3350

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	POL-P2_ZOOT-1_2022-06	BOL-B2_ZOOT-1_2022-06	QUL-ZOO-7_ZOOT-1_2022-06	QUL-ZOO-1_ZOOT-1_2022-06	QUL-ZOO-1_ZOOT-1X_2022-06
					Client sampling date / time	21-Jun-2022 12:05	21-Jun-2022 14:25	22-Jun-2022 09:55	22-Jun-2022 11:00	22-Jun-2022 11:00
						VA22B4432-001	VA22B4432-002	VA22B4432-003	VA22B4432-004	VA22B4432-005
						Result	Result	Result	Result	Result
Metals										
strontium	7440-24-6	E475	0.10	mg/kg		30.2	186	22.2	20.4	20.8
tellurium	13494-80-9	E475	0.020	mg/kg		<0.020	0.023	<0.020	<0.020	<0.020
thallium	7440-28-0	E475	0.0020	mg/kg		0.0069	0.0283	0.0269	0.0307	0.0304
tin	7440-31-5	E475	0.10	mg/kg		0.71	1.92	0.24	0.30	0.22
titanium	7440-32-6	E475.Ti	0.50	mg/kg		56.8	317	41.1	35.1	36.3
uranium	7440-61-1	E475	0.0020	mg/kg		0.0622	0.427	0.150	0.0901	0.0883
vanadium	7440-62-2	E475	0.10	mg/kg		4.80	30.6	3.11	2.48	2.56
zinc	7440-66-6	E475	1.0	mg/kg		85.6	79.5	79.8	84.6	81.5
zirconium	7440-67-7	E475	0.20	mg/kg		0.97	2.74	0.77	0.61	0.57

Please refer to the General Comments section for an explanation of any qualifiers detected.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA22B4432**	Page	: 1 of 9
Client	: **Mount Polley Mining Corporation**	Laboratory	: Vancouver - Environmental
Contact	: Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: ----	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 24-Jun-2022 16:40
PO	: 550008044 Q2 2022	Issue Date	: 25-Aug-2022 09:56
C-O-C number	: ----		
Sampler	: Latimer, Schnurr		
Site	: ----		
Quote number	: VA22-MPMC100-002		
No. of samples received	: 5		
No. of samples analysed	: 5		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- Reference Material (RM) Sample outliers occur - please see the following pages for full details.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Matrix: **Biota**

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment
Reference Material (RM) Sample								
Metals	QC-MRG4-594928003	----	lead	7439-92-1	E475	133 % MES	70.0-130%	Recovery greater than upper control limit

Result Qualifiers

Qualifier	*Description*
MES	*Data Quality Objective was marginally exceeded (by < 10% absolute) for < 10% of analytes in a Multi-Element Scan / Multi-Parameter Scan (considered acceptable as per OMOE & CCME).*

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Biota by CVAAS (DRY units, Biopsy)										
LDPE bag QUL-ZOO-1_ZOOT-1_2022-06	E512	22-Jun-2022	09-Aug-2022	----	----		10-Aug-2022	365 days	48 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Biopsy)										
LDPE bag QUL-ZOO-1_ZOOT-1X_2022-06	E512	22-Jun-2022	09-Aug-2022	----	----		10-Aug-2022	365 days	48 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Biopsy)										
LDPE bag QUL-ZOO-7_ZOOT-1_2022-06	E512	22-Jun-2022	09-Aug-2022	----	----		10-Aug-2022	365 days	48 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Biopsy)										
LDPE bag BOL-B2_ZOOT-1_2022-06	E512	21-Jun-2022	09-Aug-2022	----	----		10-Aug-2022	365 days	49 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Biopsy)										
LDPE bag POL-P2_ZOOT-1_2022-06	E512	21-Jun-2022	09-Aug-2022	----	----		10-Aug-2022	365 days	49 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Biopsy)										
LDPE bag QUL-ZOO-1_ZOOT-1_2022-06	E512A	22-Jun-2022	09-Aug-2022	----	----		10-Aug-2022	365 days	48 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Biopsy)										
LDPE bag QUL-ZOO-1_ZOOT-1X_2022-06	E512A	22-Jun-2022	09-Aug-2022	----	----		10-Aug-2022	365 days	48 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Biota by CVAAS (WET units, Biopsy)										
LDPE bag QUL-ZOO-7_ZOOT-1_2022-06	E512A	22-Jun-2022	09-Aug-2022	----	----		10-Aug-2022	365 days	48 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Biopsy)										
LDPE bag BOL-B2_ZOOT-1_2022-06	E512A	21-Jun-2022	09-Aug-2022	----	----		10-Aug-2022	365 days	49 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Biopsy)										
LDPE bag POL-P2_ZOOT-1_2022-06	E512A	21-Jun-2022	09-Aug-2022	----	----		10-Aug-2022	365 days	49 days	✓
Metals : Metals by CRC ICPMS (DRY units, Biopsy)										
LDPE bag QUL-ZOO-1_ZOOT-1_2022-06	E475	22-Jun-2022	09-Aug-2022	----	----		09-Aug-2022	730 days	48 days	✓
Metals : Metals by CRC ICPMS (DRY units, Biopsy)										
LDPE bag QUL-ZOO-1_ZOOT-1X_2022-06	E475	22-Jun-2022	09-Aug-2022	----	----		09-Aug-2022	730 days	48 days	✓
Metals : Metals by CRC ICPMS (DRY units, Biopsy)										
LDPE bag QUL-ZOO-7_ZOOT-1_2022-06	E475	22-Jun-2022	09-Aug-2022	----	----		09-Aug-2022	730 days	48 days	✓
Metals : Metals by CRC ICPMS (DRY units, Biopsy)										
LDPE bag BOL-B2_ZOOT-1_2022-06	E475	21-Jun-2022	09-Aug-2022	----	----		09-Aug-2022	730 days	49 days	✓
Metals : Metals by CRC ICPMS (DRY units, Biopsy)										
LDPE bag POL-P2_ZOOT-1_2022-06	E475	21-Jun-2022	09-Aug-2022	----	----		09-Aug-2022	730 days	49 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag QUL-ZOO-1_ZOOT-1_2022-06	E475.Ag	22-Jun-2022	19-Aug-2022	----	----		19-Aug-2022	730 days	58 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Silver in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag QUL-ZOO-1_ZOOT-1X_2022-06	E475.Ag	22-Jun-2022	19-Aug-2022	----	----		19-Aug-2022	730 days	58 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag QUL-ZOO-7_ZOOT-1_2022-06	E475.Ag	22-Jun-2022	19-Aug-2022	----	----		19-Aug-2022	730 days	58 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag BOL-B2_ZOOT-1_2022-06	E475.Ag	21-Jun-2022	19-Aug-2022	----	----		19-Aug-2022	730 days	59 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag POL-P2_ZOOT-1_2022-06	E475.Ag	21-Jun-2022	19-Aug-2022	----	----		19-Aug-2022	730 days	59 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag QUL-ZOO-1_ZOOT-1_2022-06	E475.Ti	22-Jun-2022	09-Aug-2022	----	----		09-Aug-2022	730 days	48 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag QUL-ZOO-1_ZOOT-1X_2022-06	E475.Ti	22-Jun-2022	09-Aug-2022	----	----		09-Aug-2022	730 days	48 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag QUL-ZOO-7_ZOOT-1_2022-06	E475.Ti	22-Jun-2022	09-Aug-2022	----	----		09-Aug-2022	730 days	48 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag BOL-B2_ZOOT-1_2022-06	E475.Ti	21-Jun-2022	09-Aug-2022	----	----		09-Aug-2022	730 days	49 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag POL-P2_ZOOT-1_2022-06	E475.Ti	21-Jun-2022	09-Aug-2022	----	----		09-Aug-2022	730 days	49 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Moisture Content by Gravimetry (Biopsy)										
LDPE bag										
BOL-B2_ZOOT-1_2022-06	E144A	21-Jun-2022	----	----	----		09-Aug-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Biopsy)										
LDPE bag										
POL-P2_ZOOT-1_2022-06	E144A	21-Jun-2022	----	----	----		09-Aug-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Biopsy)										
LDPE bag										
QUL-ZOO-1_ZOOT-1_2022-06	E144A	22-Jun-2022	----	----	----		09-Aug-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Biopsy)										
LDPE bag										
QUL-ZOO-1_ZOOT-1X_2022-06	E144A	22-Jun-2022	----	----	----		09-Aug-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Biopsy)										
LDPE bag										
QUL-ZOO-7_ZOOT-1_2022-06	E144A	22-Jun-2022	----	----	----		09-Aug-2022	----	----	

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Biota**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Control Samples (LCS)							
Mercury in Biota by CVAAS (DRY units, Biopsy)	E512	594929	2	5	40.0	10.0	✓
Mercury in Biota by CVAAS (WET units, Biopsy)	E512A	594930	2	5	40.0	10.0	✓
Metals by CRC ICPMS (DRY units, Biopsy)	E475	594931	2	5	40.0	10.0	✓
Moisture Content by Gravimetry (Biopsy)	E144A	595007	1	5	20.0	5.0	✓
Silver in Biota by CRC ICPMS (DRY units, Biopsy)	E475.Ag	610686	2	5	40.0	10.0	✓
Titanium in Biota by CRC ICPMS (DRY units, Biopsy)	E475.Ti	594928	2	5	40.0	10.0	✓
Method Blanks (MB)							
Mercury in Biota by CVAAS (DRY units, Biopsy)	E512	594929	1	5	20.0	5.0	✓
Mercury in Biota by CVAAS (WET units, Biopsy)	E512A	594930	1	5	20.0	5.0	✓
Metals by CRC ICPMS (DRY units, Biopsy)	E475	594931	1	5	20.0	5.0	✓
Moisture Content by Gravimetry (Biopsy)	E144A	595007	1	5	20.0	5.0	✓
Silver in Biota by CRC ICPMS (DRY units, Biopsy)	E475.Ag	610686	1	5	20.0	5.0	✓
Titanium in Biota by CRC ICPMS (DRY units, Biopsy)	E475.Ti	594928	1	5	20.0	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Moisture Content by Gravimetry (Biopsy)	E144A Vancouver - Environmental	Biota	Puget Sound Water Quality Authority/CCME PHC in Soil - Tier 1	This analysis is carried out gravimetrically by drying the sample at < 60 deg. C for a minimum of three days.
Metals by CRC ICPMS (DRY units, Biopsy)	E475 Vancouver - Environmental	Biota	EPA 200.3/6020B (mod)	Samples are digested with nitric acid, hydrochloric acid, and hydrogen peroxide. Analysis is by Collision/Reaction Cell ICPMS: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.
Silver in Biota by CRC ICPMS (DRY units, Biopsy)	E475.Ag Vancouver - Environmental	Biota	EPA 200.3/6020B (mod)	Samples are digested with nitric acid, hydrochloric acid, and hydrogen peroxide. Analysis is by Collision/Reaction Cell ICPMS. Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.
Titanium in Biota by CRC ICPMS (DRY units, Biopsy)	E475.Ti Vancouver - Environmental	Biota	EPA 200.3/6020B (mod)	Samples are digested with nitric acid, hydrochloric acid, and hydrogen peroxide. Analysis is by Collision/Reaction Cell ICPMS. Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.
Mercury in Biota by CVAAS (DRY units, Biopsy)	E512 Vancouver - Environmental	Biota	EPA 200.3/1631E (mod)	Samples are digested with nitric acid, hydrochloric acid, and hydrogen peroxide. Analysis is by CVAAS.
Mercury in Biota by CVAAS (WET units, Biopsy)	E512A Vancouver - Environmental	Biota	EPA 200.3/1631E (mod)	Samples are homogenized digested with nitric acid, hydrochloric acid, and hydrogen peroxide. Analysis is by CVAAS.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Metals and Mercury Biota Digestion (Micro)	EP472 Vancouver - Environmental	Biota	EPA 200.3	This method, designed for small sample amounts, uses a heated strong acid digestion with HNO3, HCl, and H2O2 and is intended to provide a conservative estimate of bio-available metals.
Metals and Mercury Biota Digestion (Biopsy)	EP475 Vancouver - Environmental	Biota	EPA 200.3/200.8 (mod)	Samples are digested with nitric acid, hydrochloric acid, and hydrogen peroxide. Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.

QUALITY CONTROL REPORT

Work Order	: **VA22B4432**	Page	: 1 of 8
Client	: Mount Polley Mining Corporation	Laboratory	: Vancouver - Environmental
Contact	: Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: ----	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 24-Jun-2022 16:40
PO	: 550008044 Q2 2022	Date Analysis Commenced	: 29-Jul-2022
C-O-C number	: ----	Issue Date	: 25-Aug-2022 09:56
Sampler	: Latimer, Schnurr		
Site	: ----		
Quote number	: VA22-MPMC100-002		
No. of samples received	: 5		
No. of samples analysed	: 5		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Reference Material (RM) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Angela Ren	Team Leader - Metals	Vancouver Metals, Burnaby, British Columbia
Owen Cheng		Vancouver Metals, Burnaby, British Columbia
Ragini Saini	Lab Assistant	Vancouver Metals, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Vancouver Metals, Burnaby, British Columbia

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Biota**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 595007)						
moisture	----	E144A	2	%	<2.0	----
Metals (QCLot: 594928)						
titanium	7440-32-6	E475.Ti	0.5	mg/kg	<0.50	----
Metals (QCLot: 594929)						
mercury	7439-97-6	E512	0.01	mg/kg	<0.010	----
Metals (QCLot: 594930)						
mercury	7439-97-6	E512A	0.002	mg/kg wwt	<0.0020	----
Metals (QCLot: 594931)						
aluminum	7429-90-5	E475	5	mg/kg	<5.0	----
antimony	7440-36-0	E475	0.02	mg/kg	<0.020	----
arsenic	7440-38-2	E475	0.05	mg/kg	<0.050	----
barium	7440-39-3	E475	0.05	mg/kg	<0.050	----
beryllium	7440-41-7	E475	0.01	mg/kg	<0.010	----
bismuth	7440-69-9	E475	0.01	mg/kg	<0.010	----
boron	7440-42-8	E475	1	mg/kg	<1.0	----
cadmium	7440-43-9	E475	0.01	mg/kg	<0.010	----
calcium	7440-70-2	E475	20	mg/kg	<20	----
cesium	7440-46-2	E475	0.005	mg/kg	<0.0050	----
chromium	7440-47-3	E475	0.2	mg/kg	<0.20	----
cobalt	7440-48-4	E475	0.02	mg/kg	<0.020	----
copper	7440-50-8	E475	0.2	mg/kg	<0.20	----
iron	7439-89-6	E475	5	mg/kg	<5.0	----
lead	7439-92-1	E475	0.05	mg/kg	<0.050	----
lithium	7439-93-2	E475	0.5	mg/kg	<0.50	----
magnesium	7439-95-4	E475	2	mg/kg	<2.0	----
manganese	7439-96-5	E475	0.05	mg/kg	<0.050	----
molybdenum	7439-98-7	E475	0.04	mg/kg	<0.040	----
nickel	7440-02-0	E475	0.2	mg/kg	<0.20	----
phosphorus	7723-14-0	E475	20	mg/kg	<20	----
potassium	7440-09-7	E475	20	mg/kg	<20	----
rubidium	7440-17-7	E475	0.05	mg/kg	<0.050	----
selenium	7782-49-2	E475	0.1	mg/kg	<0.10	----
sodium	7440-23-5	E475	20	mg/kg	<20	----

Sub-Matrix: **Biota**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 594931) - continued						
strontium	7440-24-6	E475	0.1	mg/kg	<0.10	----
tellurium	13494-80-9	E475	0.02	mg/kg	<0.020	----
thallium	7440-28-0	E475	0.002	mg/kg	<0.0020	----
tin	7440-31-5	E475	0.1	mg/kg	<0.10	----
uranium	7440-61-1	E475	0.002	mg/kg	<0.0020	----
vanadium	7440-62-2	E475	0.1	mg/kg	<0.10	----
zinc	7440-66-6	E475	1	mg/kg	<1.0	----
zirconium	7440-67-7	E475	0.2	mg/kg	<0.20	----
Metals (QCLot: 610686)						
silver	7440-22-4	E475.Ag	0.005	mg/kg	<0.0050	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Biota**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 595007)									
moisture	----	E144A	2	%	100 %	100	90.0	110	----
Metals (QCLot: 594928)									
titanium	7440-32-6	E475.Ti	0.5	mg/kg	6.25 mg/kg	102	80.0	120	----
Metals (QCLot: 594929)									
mercury	7439-97-6	E512	0.01	mg/kg	0.05 mg/kg	95.4	80.0	120	----
Metals (QCLot: 594930)									
mercury	7439-97-6	E512A	0.002	mg/kg wwt	0.05 mg/kg wwt	95.4	80.0	120	----
Metals (QCLot: 594931)									
aluminum	7429-90-5	E475	5	mg/kg	50 mg/kg	105	80.0	120	----
antimony	7440-36-0	E475	0.02	mg/kg	25 mg/kg	106	80.0	120	----
arsenic	7440-38-2	E475	0.05	mg/kg	25 mg/kg	101	80.0	120	----
barium	7440-39-3	E475	0.05	mg/kg	6.25 mg/kg	103	80.0	120	----
beryllium	7440-41-7	E475	0.01	mg/kg	2.5 mg/kg	101	80.0	120	----
bismuth	7440-69-9	E475	0.01	mg/kg	25 mg/kg	99.1	80.0	120	----
boron	7440-42-8	E475	1	mg/kg	25 mg/kg	92.8	80.0	120	----
cadmium	7440-43-9	E475	0.01	mg/kg	2.5 mg/kg	100	80.0	120	----
calcium	7440-70-2	E475	20	mg/kg	1250 mg/kg	104	80.0	120	----
cesium	7440-46-2	E475	0.005	mg/kg	1.25 mg/kg	103	80.0	120	----
chromium	7440-47-3	E475	0.2	mg/kg	6.25 mg/kg	103	80.0	120	----
cobalt	7440-48-4	E475	0.02	mg/kg	6.25 mg/kg	100	80.0	120	----
copper	7440-50-8	E475	0.2	mg/kg	6.25 mg/kg	99.3	80.0	120	----
iron	7439-89-6	E475	5	mg/kg	25 mg/kg	100	80.0	120	----
lead	7439-92-1	E475	0.05	mg/kg	12.5 mg/kg	101	80.0	120	----
lithium	7439-93-2	E475	0.5	mg/kg	6.25 mg/kg	103	80.0	120	----
magnesium	7439-95-4	E475	2	mg/kg	1250 mg/kg	98.6	80.0	120	----
manganese	7439-96-5	E475	0.05	mg/kg	6.25 mg/kg	102	80.0	120	----
molybdenum	7439-98-7	E475	0.04	mg/kg	6.25 mg/kg	109	80.0	120	----
nickel	7440-02-0	E475	0.2	mg/kg	12.5 mg/kg	100	80.0	120	----
phosphorus	7723-14-0	E475	20	mg/kg	250 mg/kg	105	80.0	120	----
potassium	7440-09-7	E475	20	mg/kg	1250 mg/kg	102	80.0	120	----
rubidium	7440-17-7	E475	0.05	mg/kg	2.5 mg/kg	105	80.0	120	----
selenium	7782-49-2	E475	0.1	mg/kg	25 mg/kg	101	80.0	120	----
sodium	7440-23-5	E475	20	mg/kg	1250 mg/kg	102	80.0	120	----

Sub-Matrix: **Biota**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Metals (QCLot: 594931) - continued									
strontium	7440-24-6	E475	0.1	mg/kg	6.25 mg/kg	108	80.0	120	----
tellurium	13494-80-9	E475	0.02	mg/kg	2.5 mg/kg	101	80.0	120	----
thallium	7440-28-0	E475	0.002	mg/kg	25 mg/kg	101	80.0	120	----
tin	7440-31-5	E475	0.1	mg/kg	12.5 mg/kg	104	80.0	120	----
uranium	7440-61-1	E475	0.002	mg/kg	0.125 mg/kg	105	80.0	120	----
vanadium	7440-62-2	E475	0.1	mg/kg	12.5 mg/kg	106	80.0	120	----
zinc	7440-66-6	E475	1	mg/kg	12.5 mg/kg	97.5	80.0	120	----
zirconium	7440-67-7	E475	0.2	mg/kg	2.5 mg/kg	106	80.0	120	----
Metals (QCLot: 610686)									
silver	7440-22-4	E475.Ag	0.005	mg/kg	2.5 mg/kg	86.7	80.0	120	----

Reference Material (RM) Report

A Reference Material (RM) is a homogenous material with known and well-established analyte concentrations. RMs are processed in an identical manner to test samples, and are used to monitor and control the accuracy and precision of a test method for a typical sample matrix. RM results are expressed as percent recovery of the target analyte concentration. RM targets may be certified target concentrations provided by the RM supplier, or may be ALS long-term mean values (for empirical test methods).

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Metals (QCLot: 594928)									
	RM	titanium	7440-32-6	E475.Ti	1.05 mg/kg	86.2	70.0	130	----
Metals (QCLot: 594929)									
	RM	mercury	7439-97-6	E512	0.331 mg/kg	109	70.0	130	----
Metals (QCLot: 594930)									
	RM	mercury	7439-97-6	E512A	0.331 mg/kg wwt	109	70.0	130	----
Metals (QCLot: 594931)									
	RM	aluminum	7429-90-5	E475	11.2 mg/kg	95.7	70.0	130	----
	RM	arsenic	7440-38-2	E475	34.6 mg/kg	102	70.0	130	----
	RM	bismuth	7440-69-9	E475	0.0247 mg/kg	94.3	60.0	140	----
	RM	cadmium	7440-43-9	E475	14.5 mg/kg	95.7	70.0	130	----
	RM	calcium	7440-70-2	E475	550 mg/kg	100	70.0	130	----
	RM	cesium	7440-46-2	E475	0.0712 mg/kg	97.4	70.0	130	----
	RM	chromium	7440-47-3	E475	1.96 mg/kg	107	70.0	130	----
	RM	cobalt	7440-48-4	E475	0.267 mg/kg	94.6	70.0	130	----
	RM	copper	7440-50-8	E475	35 mg/kg	99.4	70.0	130	----
	RM	iron	7439-89-6	E475	1070 mg/kg	99.9	70.0	130	----
	RM	lead	7439-92-1	E475	0.162 mg/kg	# 133	70.0	130	MES
	RM	magnesium	7439-95-4	E475	940 mg/kg	99.2	70.0	130	----
	RM	manganese	7439-96-5	E475	8.91 mg/kg	99.5	70.0	130	----
	RM	molybdenum	7439-98-7	E475	1.41 mg/kg	101	70.0	130	----
	RM	nickel	7440-02-0	E475	1.57 mg/kg	94.0	70.0	130	----
	RM	phosphorus	7723-14-0	E475	11500 mg/kg	103	70.0	130	----
	RM	potassium	7440-09-7	E475	14400 mg/kg	104	70.0	130	----
	RM	rubidium	7440-17-7	E475	5.11 mg/kg	98.9	70.0	130	----
	RM	selenium	7782-49-2	E475	8 mg/kg	106	70.0	130	----
	RM	sodium	7440-23-5	E475	10673 mg/kg	98.2	70.0	130	----
	RM	strontium	7440-24-6	E475	3.92 mg/kg	96.7	70.0	130	----
	RM	thallium	7440-28-0	E475	0.013 mg/kg	93.6	70.0	130	----
	RM	uranium	7440-61-1	E475	0.0786 mg/kg	99.9	70.0	130	----

Sub-Matrix:

Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Reference Material (RM) Report: RM Target Concentration	Recovery (%): RM	Recovery Limits (%): Low	Recovery Limits (%): High	Qualifier
Metals (QCLot: 594931) - continued									
	RM	vanadium	7440-62-2	E475	0.51 mg/kg	99.8	70.0	130	----
	RM	zinc	7440-66-6	E475	105.3 mg/kg	99.4	70.0	130	----
Metals (QCLot: 610686)									
	RM	silver	7440-22-4	E475.Ag	2.05 mg/kg	88.3	70.0	130	----

Qualifiers

Qualifier	Description
MES	*Data Quality Objective was marginally exceeded (by < 10% absolute) for < 10% of analytes in a Multi-Element Scan / Multi-Parameter Scan (considered acceptable as per OMOE & CCME).*

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

Affix ALS barcode label here (lab use only)

COC Number:

Page 1 of 1

Report To	Contact and company name below will appear on the final report	Report Format / Distribution	Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply
Company:	Mount Polley Mining Corporation	Select Report Format: ☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)	Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply
Contact:	Gabriel Holmes	Quality Control (QC) Report with Report ☑ YES ☐ NO	PRIORITY (Business Days): 4 day [P4] ☐ / 3 day [P3] ☐ / 2 day [P2] ☐ — EMERGENCY: 1 Business day [E1] ☐ / Same Day, Weekend or Statutory holiday [E0] ☐
Phone:	236-317-4939	☑ Compare Results to Criteria on Report - provide details below if box checked	
	Company address below will appear on the final report	Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX	Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm
Street:	PO Box 12	Email 1 or Fax: gabriel.holmes@mountpolley.com	For tests that can not be performed according to the service level selected, you will be contacted.
City/Province:	Likely, BC	Email 2: kala.ivens@mountpolley.com, pschnurr@minnow.ca	
Postal Code:	V0L 1N0	Email 3: pstecko@minnow.ca, kbatchelar@minnow.ca	
Invoice To	Same as Report To ☑ YES ☐ NO	Invoice Distribution	
	Copy of Invoice with Report ☐ YES ☐ NO	Select Invoice Distribution: ☑ EMAIL ☑ MAIL ☐ FAX	
Company:		Email 1 or Fax: gabriel.holmes@mountpolley.com	
Contact:		Email 2:	

Project Information		Oil and Gas Required Fields (client use)	
ALS Account # / Quote #:	VA22-MPMC100-002	AFE/Cost Center:	PO#:
Job #:		Major/Minor Code:	Routing Code:
PO / AFE:		Requisitioner:	
LSD:		Location:	
ALS Lab Work Order # (lab use only)		ALS Contact: Can Dang	Sampler: SCHNURR/ LATIMER

Environmental Division Vancouver
Work Order Reference
VA22B4432

Telephone : +1 604 253 4188

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Moisture Content by Gravimetry (E144)	Mercury in Biota by CVAAS (DRY units, Routine) (E510)	Mercury in Biota by CVAAS (WET units, Routine) (E510A)	Metals in Biota by CRC ICPMS (DRY units, Routine) (E440)	Silver in Biota by CRC ICPMS (DRY units, Routine) (E440.Ag)	Titanium in Biota by CRC ICPMS (DRY units, Routine) (E440.Ti)							
	POL-P2_ZOOT-1_2022-06	21-June-22	12:05	Tissue	R	R	R	R	R	R							1
	BOL-B2_ZOOT-1_2022-06	21-June-22	14:25	Tissue	R	R	R	R	R	R							1
	QUL-ZOO-7_ZOOT-1_2022-06	22-June-22	09:55	Tissue	R	R	R	R	R	R							1
	QUL-ZOO-1_ZOOT-1_2022-06	22-June-22	11:00	Tissue	R	R	R	R	R	R							1
	QUL-ZOO1_ZOOT- X_2022-06	22-June-22	11:00	Tissue	R	R	R	R	R	R							1

Drinking Water (DW) Samples[1] (client use)	Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)
Are samples taken from a Regulated DW System? ☐ YES ☑ NO	
Are samples for human drinking water use? ☐ YES ☑ NO	If sample is insufficient for regular digestion and analysis, contact kbatchelar@minnow.ca to discuss analysis options (e.g., use of microdigestion and HR-ICPMS)

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice Packs ☑ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
			6°	3°	

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by:	Date:	Time:	Received by:	Date:	Time:	Received by:	Date:	Time:
							June 24/22	11:20

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION WHITE - LABORATORY COPY YELLOW - CLIENT COPY

OCTOBER 2015 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

ZOOPLANKTON TISSUE CHEMISTRY

ALS Laboratory Report VA22B7702

(Finalized November 7, 2022)

ALS Canada Ltd.

right solutions. right partner.

CERTIFICATE OF ANALYSIS

Work Order	: **VA22B7702**	Page	: 1 of 13
Amendment	: **1**		
Client	: **Mount Polley Mining Corporation**	Laboratory	: Vancouver - Environmental
Contact	: Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: ----	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 02-Aug-2022 14:15
PO	: 5590008044 Q2 2022	Date Analysis Commenced	: 07-Sep-2022
C-O-C number	: ----	Issue Date	: 07-Nov-2022 16:16
Sampler	: Sarah Latimer		
Site	: ----		
Quote number	: VA22-MPMC100-002		
No. of samples received	: 21		
No. of samples analysed	: 21		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Qammar Almas	Lab Assistant	Metals, Burnaby, British Columbia
Salimah Khimani	Lab Assistant	Metals, Burnaby, British Columbia

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.
Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

Unit	*Description*
%	percent
mg/kg	milligrams per kilogram
mg/kg wwt	milligrams per kilogram wet weight

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Workorder Comments

Amendment (07/11/2022): This report has been amended and re-released to remove extra wet weight basis analysis data as requested.

Qualifiers

Qualifier	*Description*
DLA	*Detection Limit adjusted for required dilution.*
DLHM	*Detection Limit Adjusted: Sample has high moisture content.*
DLIS	*Detection Limit Adjusted due to insufficient sample.*

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	POL-P2_ZOOT-1_2022-07	POL-P2_ZOOT-2_2022-07	POL-P2_ZOOT-3_2022-07	POL-P2_ZOOT-4_2022-07	POL-P2_ZOOT-5_2022-07
					Client sampling date / time	25-Jul-2022	25-Jul-2022	25-Jul-2022	25-Jul-2022	25-Jul-2022
						VA22B7702-001	VA22B7702-002	VA22B7702-003	VA22B7702-004	VA22B7702-005
						Result	Result	Result	Result	Result
Physical Tests										
moisture	----	E144A	2.0	%		97.6	97.9	98.2	98.0	98.4
Metals										
aluminum	7429-90-5	E475	5.0	mg/kg		1150	1450	948	1200	888
antimony	7440-36-0	E475	0.020	mg/kg		0.108	0.074	0.065	0.033	0.078
arsenic	7440-38-2	E475	0.050	mg/kg		6.70	5.46	10.7	6.12	6.20
barium	7440-39-3	E475	0.050	mg/kg		22.3	37.2	23.5	23.1	20.8
beryllium	7440-41-7	E475	0.010	mg/kg		0.049	0.071	0.049	0.054	0.044
bismuth	7440-69-9	E475	0.010	mg/kg		0.017	<0.012 DLIS	<0.011 DLIS	<0.010	<0.012 DLIS
boron	7440-42-8	E475	1.0	mg/kg		5.5	5.6	5.2	4.8	5.1
cadmium	7440-43-9	E475	0.010	mg/kg		0.349	0.362	0.349	0.292	0.306
calcium	7440-70-2	E475	20	mg/kg		17500	24900	23600	17900	23000
cesium	7440-46-2	E475	0.0050	mg/kg		0.119	0.128	0.0962	0.124	0.0880
chromium	7440-47-3	E475	0.20	mg/kg		7.21	3.23	9.71	3.54	3.96
cobalt	7440-48-4	E475	0.020	mg/kg		0.989	1.12	0.740	0.919	0.703
copper	7440-50-8	E475	0.20	mg/kg		59.5	70.2	48.8	44.1	42.1
iron	7439-89-6	E475	5.0	mg/kg		1760	2290	1390	1720	1320
lead	7439-92-1	E475	0.050	mg/kg		1.18	0.982	0.981	2.72	0.820
lithium	7439-93-2	E475	0.50	mg/kg		0.92	1.13	0.75	0.97	0.70
magnesium	7439-95-4	E475	2.0	mg/kg		1560	1870	1570	1630	1560
manganese	7439-96-5	E475	0.050	mg/kg		285	252	257	232	222
mercury	7439-97-6	E512	0.010	mg/kg		<0.055 DLA	0.050	<0.037 DLA	0.036	0.054
mercury	7439-97-6	E512A	0.0020	mg/kg wwt		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
molybdenum	7439-98-7	E475	0.040	mg/kg		1.00	1.04	0.878	0.757	0.924
nickel	7440-02-0	E475	0.20	mg/kg		4.22	2.90	2.46	2.50	2.35
phosphorus	7723-14-0	E475	20	mg/kg		8120	8730	9120	8040	8560
potassium	7440-09-7	E475	20	mg/kg		6220	6860	6360	7060	6640
rubidium	7440-17-7	E475	0.050	mg/kg		5.86	6.34	6.07	7.30	6.36
selenium	7782-49-2	E475	0.10	mg/kg		2.50	3.34	2.27	2.14	2.77
silver	7440-22-4	E475.Ag	0.0050	mg/kg		0.0648	0.0478	0.0409	0.0333	0.0291
sodium	7440-23-5	E475	20	mg/kg		4800	5600	5460	5650	5460

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	POL-P2_ZOOT-1_2022-07	POL-P2_ZOOT-2_2022-07	POL-P2_ZOOT-3_2022-07	POL-P2_ZOOT-4_2022-07	POL-P2_ZOOT-5_2022-07
					Client sampling date / time	25-Jul-2022	25-Jul-2022	25-Jul-2022	25-Jul-2022	25-Jul-2022
						VA22B7702-001	VA22B7702-002	VA22B7702-003	VA22B7702-004	VA22B7702-005
						Result	Result	Result	Result	Result
Metals										
strontium	7440-24-6	E475	0.10	mg/kg		79.8	108	101	80.1	107
tellurium	13494-80-9	E475	0.020	mg/kg		<0.033 DLIS	<0.024 DLIS	<0.022 DLIS	<0.020	<0.024 DLIS
thallium	7440-28-0	E475	0.0020	mg/kg		0.0078	0.0076	0.0059	0.0064	0.0074
tin	7440-31-5	E475	0.10	mg/kg		0.59	0.40	0.32	0.21	0.50
titanium	7440-32-6	E475.Ti	0.50	mg/kg		73.3	94.6	54.6	64.4	50.7
uranium	7440-61-1	E475	0.0020	mg/kg		0.0789	0.0761	0.0661	0.0773	0.0638
vanadium	7440-62-2	E475	0.10	mg/kg		8.18	11.6	7.47	8.73	6.90
zinc	7440-66-6	E475	1.0	mg/kg		68.6	66.0	67.5	55.9	62.4
zirconium	7440-67-7	E475	0.20	mg/kg		1.70	1.41	1.24	1.15	0.98

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BOL-B2_ZOOT-1_2022-07	BOL-B2_ZOOT-2_2022-07	BOL-B2_ZOOT-3_2022-07	BOL-B2_ZOOT-4_2022-07	BOL-B2_ZOOT-5_2022-07
					Client sampling date / time	26-Jul-2022	26-Jul-2022	26-Jul-2022	26-Jul-2022	26-Jul-2022
						VA22B7702-006	VA22B7702-007	VA22B7702-008	VA22B7702-009	VA22B7702-010
						Result	Result	Result	Result	Result
Physical Tests										
moisture	----	E144A	2.0	%		95.9	97.7	97.4	97.7	97.8
Metals										
aluminum	7429-90-5	E475	5.0	mg/kg		7530	2100	5430	1920	1520
antimony	7440-36-0	E475	0.020	mg/kg		0.194	0.176	0.237	0.162	0.180
arsenic	7440-38-2	E475	0.050	mg/kg		5.74	19.6	38.3	28.1	19.0
barium	7440-39-3	E475	0.050	mg/kg		177	93.6	109	65.5	68.6
beryllium	7440-41-7	E475	0.010	mg/kg		0.293	0.080	0.196	0.074	0.064
bismuth	7440-69-9	E475	0.010	mg/kg		0.050	0.017	0.037	0.016	0.013
boron	7440-42-8	E475	1.0	mg/kg		11.0	6.9	10.2	6.9	6.1
cadmium	7440-43-9	E475	0.010	mg/kg		0.371	0.349	0.384	0.322	0.279
calcium	7440-70-2	E475	20	mg/kg		20200	28300	25900	33700	26800
cesium	7440-46-2	E475	0.0050	mg/kg		0.904	0.280	0.664	0.257	0.199
chromium	7440-47-3	E475	0.20	mg/kg		23.6	23.8	52.8	35.8	21.7
cobalt	7440-48-4	E475	0.020	mg/kg		4.68	1.66	3.64	1.47	1.33
copper	7440-50-8	E475	0.20	mg/kg		144	76.1	174	67.3	58.5
iron	7439-89-6	E475	5.0	mg/kg		12200	3960	9390	3550	3160
lead	7439-92-1	E475	0.050	mg/kg		4.33	3.13	4.45	2.44	2.19
lithium	7439-93-2	E475	0.50	mg/kg		4.97	1.40	3.68	1.36	1.08
magnesium	7439-95-4	E475	2.0	mg/kg		2960	2240	2920	2150	1870
manganese	7439-96-5	E475	0.050	mg/kg		2410	1580	1210	939	1170
mercury	7439-97-6	E512	0.010	mg/kg		0.153	0.080	0.131	0.079	0.117
mercury	7439-97-6	E512A	0.0020	mg/kg wwt		0.0062	<0.0020	0.0034	<0.0020	0.0025
molybdenum	7439-98-7	E475	0.040	mg/kg		2.34	1.41	1.55	1.07	1.15
nickel	7440-02-0	E475	0.20	mg/kg		14.4	4.56	8.89	3.95	3.80
phosphorus	7723-14-0	E475	20	mg/kg		9900	13100	10200	12200	11000
potassium	7440-09-7	E475	20	mg/kg		6360	9410	6860	8090	7430
rubidium	7440-17-7	E475	0.050	mg/kg		10.0	10.8	10.0	9.23	8.15
selenium	7782-49-2	E475	0.10	mg/kg		2.62	3.24	2.99	2.88	2.17
silver	7440-22-4	E475.Ag	0.0050	mg/kg		0.185	0.0960	0.170	0.0898	0.0858
sodium	7440-23-5	E475	20	mg/kg		3730	6370	3870	5470	4940

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BOL-B2_ZOOT-1_2022-07	BOL-B2_ZOOT-2_2022-07	BOL-B2_ZOOT-3_2022-07	BOL-B2_ZOOT-4_2022-07	BOL-B2_ZOOT-5_2022-07
					Client sampling date / time	26-Jul-2022	26-Jul-2022	26-Jul-2022	26-Jul-2022	26-Jul-2022
						VA22B7702-006	VA22B7702-007	VA22B7702-008	VA22B7702-009	VA22B7702-010
						Result	Result	Result	Result	Result
Metals										
strontium	7440-24-6	E475	0.10	mg/kg		149	188	173	207	172
tellurium	13494-80-9	E475	0.020	mg/kg		<0.023 DLIS	<0.020	<0.020	<0.020	<0.020
thallium	7440-28-0	E475	0.0020	mg/kg		0.0726	0.0328	0.0641	0.0352	0.0275
tin	7440-31-5	E475	0.10	mg/kg		0.49	0.66	0.73	0.72	0.76
titanium	7440-32-6	E475.Ti	0.50	mg/kg		258	95.2	232	90.9	75.4
uranium	7440-61-1	E475	0.0020	mg/kg		0.938	0.322	0.701	0.297	0.272
vanadium	7440-62-2	E475	0.10	mg/kg		29.8	11.1	21.8	10.5	9.36
zinc	7440-66-6	E475	1.0	mg/kg		125	125	133	110	100
zirconium	7440-67-7	E475	0.20	mg/kg		5.71	2.58	4.98	2.38	2.09

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	QUL-ZOO-7_ZOOT-1_2022-07	QUL-ZOO-7_ZOOT-2_2022-07	QUL-ZOO-7_ZOOT-3_2022-07	QUL-ZOO-7_ZOOT-4_2022-07	QUL-ZOO-7_ZOOT-5_2022-07
					Client sampling date / time	27-Jul-2022	27-Jul-2022	27-Jul-2022	27-Jul-2022	27-Jul-2022
						VA22B7702-011	VA22B7702-012	VA22B7702-013	VA22B7702-014	VA22B7702-015
						Result	Result	Result	Result	Result
Physical Tests										
moisture	----	E144A	2.0	%		----	97.8	98.3	98.7	95.6
moisture	----	E144-H	2.0	%		97.1	----	----	----	----
Metals										
aluminum	7429-90-5	E475	5.0	mg/kg		----	1250	911	671	584
aluminum	7429-90-5	E472	5.0	mg/kg		618	----	----	----	----
antimony	7440-36-0	E472	0.010	mg/kg		0.023	----	----	----	----
antimony	7440-36-0	E475	0.020	mg/kg		----	0.043	0.054	0.043	0.046
arsenic	7440-38-2	E472	0.030	mg/kg		2.40	----	----	----	----
arsenic	7440-38-2	E475	0.050	mg/kg		----	3.09	2.69	2.25	2.07
barium	7440-39-3	E475	0.050	mg/kg		----	16.4	14.9	15.1	10.9
barium	7440-39-3	E472	0.050	mg/kg		9.50	----	----	----	----
beryllium	7440-41-7	E475	0.010	mg/kg		----	0.053	0.036	0.033	0.023
beryllium	7440-41-7	E472	0.010	mg/kg		0.033	----	----	----	----
bismuth	7440-69-9	E475	0.010	mg/kg		----	0.013	0.012	0.013	0.014
bismuth	7440-69-9	E472	0.010	mg/kg		<0.013 DLHM	----	----	----	----
boron	7440-42-8	E475	1.0	mg/kg		----	1.9	1.4	1.1	<1.8 DLIS
boron	7440-42-8	E472	1.0	mg/kg		<1.3 DLHM	----	----	----	----
cadmium	7440-43-9	E475	0.010	mg/kg		----	1.88	2.43	2.81	2.06
cadmium	7440-43-9	E472	0.010	mg/kg		1.66	----	----	----	----
calcium	7440-70-2	E475	20	mg/kg		----	13400	8160	11000	14200
calcium	7440-70-2	E472	20	mg/kg		11000	----	----	----	----
cesium	7440-46-2	E475	0.0050	mg/kg		----	0.141	0.114	0.0929	0.0971
cesium	7440-46-2	E472	0.0050	mg/kg		0.0789	----	----	----	----
chromium	7440-47-3	E475	0.20	mg/kg		----	5.26	2.60	2.02	4.39
chromium	7440-47-3	E472	0.20	mg/kg		2.08	----	----	----	----
cobalt	7440-48-4	E475	0.020	mg/kg		----	1.22	1.10	1.00	0.893
cobalt	7440-48-4	E472	0.020	mg/kg		0.685	----	----	----	----
copper	7440-50-8	E475	0.20	mg/kg		----	39.3	28.0	19.4	16.8
copper	7440-50-8	E472	0.20	mg/kg		17.3	----	----	----	----
iron	7439-89-6	E475	5.0	mg/kg		----	2250	1770	1540	1380

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	QUL-ZOO-7_ZOOT-1_2022-07	QUL-ZOO-7_ZOOT-2_2022-07	QUL-ZOO-7_ZOOT-3_2022-07	QUL-ZOO-7_ZOOT-4_2022-07	QUL-ZOO-7_ZOOT-5_2022-07
					Client sampling date / time	27-Jul-2022	27-Jul-2022	27-Jul-2022	27-Jul-2022	27-Jul-2022
						VA22B7702-011	VA22B7702-012	VA22B7702-013	VA22B7702-014	VA22B7702-015
						Result	Result	Result	Result	Result
Metals										
iron	7439-89-6	E472	5.0	mg/kg		1100	----	----	----	----
lead	7439-92-1	E475	0.050	mg/kg		----	0.846	0.928	0.945	0.579
lead	7439-92-1	E472	0.050	mg/kg		0.635	----	----	----	----
lithium	7439-93-2	E475	0.50	mg/kg		----	0.97	0.80	0.70	<0.68 DLIS
lithium	7439-93-2	E472	0.50	mg/kg		<0.65 DLHM	----	----	----	----
magnesium	7439-95-4	E475	2.0	mg/kg		----	1650	1420	1330	1210
magnesium	7439-95-4	E472	2.0	mg/kg		1130	----	----	----	----
manganese	7439-96-5	E475	0.050	mg/kg		----	128	126	141	109
manganese	7439-96-5	E472	0.050	mg/kg		78.8	----	----	----	----
mercury	7439-97-6	E511	0.0050	mg/kg		0.0366	----	----	----	----
mercury	7439-97-6	E512	0.010	mg/kg		----	0.041	0.045	0.059	0.046
mercury	7439-97-6	E511A	0.0010	mg/kg wwt		0.0011	----	----	----	----
mercury	7439-97-6	E512A	0.0020	mg/kg wwt		----	<0.0020	<0.0020	<0.0020	<0.0020
molybdenum	7439-98-7	E475	0.040	mg/kg		----	0.604	0.431	0.392	0.494
molybdenum	7439-98-7	E472	0.040	mg/kg		0.364	----	----	----	----
nickel	7440-02-0	E475	0.20	mg/kg		----	4.48	3.66	4.12	3.60
nickel	7440-02-0	E472	0.20	mg/kg		2.54	----	----	----	----
phosphorus	7723-14-0	E472	10	mg/kg		10500	----	----	----	----
phosphorus	7723-14-0	E475	20	mg/kg		----	12400	10200	10000	11800
potassium	7440-09-7	E475	20	mg/kg		----	8360	6970	7340	7350
potassium	7440-09-7	E472	20	mg/kg		7150	----	----	----	----
rubidium	7440-17-7	E475	0.050	mg/kg		----	13.0	11.6	11.9	11.5
rubidium	7440-17-7	E472	0.050	mg/kg		11.8	----	----	----	----
selenium	7782-49-2	E475	0.10	mg/kg		----	2.42	2.46	2.69	2.56
selenium	7782-49-2	E472	0.10	mg/kg		2.10	----	----	----	----
silver	7440-22-4	E475.Ag	0.0050	mg/kg		----	0.0779	0.0754	0.0843	0.0607
silver	7440-22-4	E472.Ag	0.0050	mg/kg		0.0547	----	----	----	----
sodium	7440-23-5	E475	20	mg/kg		----	4370	3180	3810	4310
sodium	7440-23-5	E472	20	mg/kg		3570	----	----	----	----
strontium	7440-24-6	E475	0.10	mg/kg		----	66.9	46.7	57.2	72.6

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	QUL-ZOO-7_ZOOT-1_2022-07	QUL-ZOO-7_ZOOT-2_2022-07	QUL-ZOO-7_ZOOT-3_2022-07	QUL-ZOO-7_ZOOT-4_2022-07	QUL-ZOO-7_ZOOT-5_2022-07
					Client sampling date / time	27-Jul-2022	27-Jul-2022	27-Jul-2022	27-Jul-2022	27-Jul-2022
						VA22B7702-011	VA22B7702-012	VA22B7702-013	VA22B7702-014	VA22B7702-015
						Result	Result	Result	Result	Result
Metals										
strontium	7440-24-6	E472	0.10	mg/kg		54.1	----	----	----	----
tellurium	13494-80-9	E475	0.020	mg/kg		----	<0.020	<0.020	<0.020	<0.027 DLIS
tellurium	13494-80-9	E472	0.020	mg/kg		<0.026 DLHM	----	----	----	----
thallium	7440-28-0	E475	0.0020	mg/kg		----	0.0308	0.0221	0.0263	0.0252
thallium	7440-28-0	E472	0.0020	mg/kg		0.0288	----	----	----	----
tin	7440-31-5	E475	0.10	mg/kg		----	0.32	0.25	0.33	0.18
tin	7440-31-5	E472	0.10	mg/kg		0.13	----	----	----	----
titanium	7440-32-6	E475.Ti	0.50	mg/kg		----	64.2	51.1	36.5	30.9
titanium	7440-32-6	E472.Ti	0.50	mg/kg		24.5	----	----	----	----
uranium	7440-61-1	E475	0.0020	mg/kg		----	0.118	0.106	0.0820	0.0761
uranium	7440-61-1	E472	0.0020	mg/kg		0.0766	----	----	----	----
vanadium	7440-62-2	E475	0.10	mg/kg		----	7.04	4.94	3.51	2.81
vanadium	7440-62-2	E472	0.10	mg/kg		2.98	----	----	----	----
zinc	7440-66-6	E475	1.0	mg/kg		----	100	114	88.1	99.9
zinc	7440-66-6	E472	1.0	mg/kg		79.2	----	----	----	----
zirconium	7440-67-7	E475	0.20	mg/kg		----	1.07	0.95	0.75	0.60
zirconium	7440-67-7	E472	0.20	mg/kg		0.54	----	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	QUL-ZOO-1_ZOOT-1_2022-07	QUL-ZOO-1_ZOOT-2_2022-07	QUL-ZOO-1_ZOOT-3_2022-07	QUL-ZOO-1_ZOOT-4_2022-07	QUL-ZOO-1_ZOOT-5_2022-07
					Client sampling date / time	27-Jul-2022	27-Jul-2022	28-Jul-2022	28-Jul-2022	28-Jul-2022
						VA22B7702-016	VA22B7702-017	VA22B7702-018	VA22B7702-019	VA22B7702-020
						Result	Result	Result	Result	Result
Physical Tests										
moisture	----	E144A	2.0	%		99.2	98.3	98.5	98.6	98.9
Metals										
aluminum	7429-90-5	E475	5.0	mg/kg		604	530	512	602	631
antimony	7440-36-0	E475	0.020	mg/kg		0.060	0.048	0.436	0.037	0.044
arsenic	7440-38-2	E475	0.050	mg/kg		2.37	2.49	2.58	2.30	2.44
barium	7440-39-3	E475	0.050	mg/kg		10.8	9.44	7.93	8.40	9.33
beryllium	7440-41-7	E475	0.010	mg/kg		0.026	0.024	0.026	0.032	0.033
bismuth	7440-69-9	E475	0.010	mg/kg		0.012	<0.010	<0.010	<0.010	<0.010
boron	7440-42-8	E475	1.0	mg/kg		1.4	1.2	<1.0	1.2	1.2
cadmium	7440-43-9	E475	0.010	mg/kg		4.90	2.60	2.77	2.92	3.32
calcium	7440-70-2	E475	20	mg/kg		8760	8000	9200	8420	9180
cesium	7440-46-2	E475	0.0050	mg/kg		0.0808	0.0788	0.0631	0.0656	0.0703
chromium	7440-47-3	E475	0.20	mg/kg		2.67	2.02	1.84	1.68	1.31
cobalt	7440-48-4	E475	0.020	mg/kg		1.13	0.701	0.652	0.715	0.806
copper	7440-50-8	E475	0.20	mg/kg		29.2	18.1	16.0	23.9	27.5
iron	7439-89-6	E475	5.0	mg/kg		1720	1060	1030	1130	1220
lead	7439-92-1	E475	0.050	mg/kg		0.966	0.662	0.559	0.545	0.612
lithium	7439-93-2	E475	0.50	mg/kg		0.66	0.59	<0.50	0.55	0.55
magnesium	7439-95-4	E475	2.0	mg/kg		1530	1270	1220	1260	1350
manganese	7439-96-5	E475	0.050	mg/kg		184	77.2	98.2	112	117
mercury	7439-97-6	E512	0.010	mg/kg		0.065	0.045	0.044	0.043	0.045
mercury	7439-97-6	E512A	0.0020	mg/kg wwt		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
molybdenum	7439-98-7	E475	0.040	mg/kg		0.512	0.405	0.334	1.86	0.426
nickel	7440-02-0	E475	0.20	mg/kg		6.59	3.17	3.21	3.45	3.80
phosphorus	7723-14-0	E475	20	mg/kg		9350	10700	10200	9710	10300
potassium	7440-09-7	E475	20	mg/kg		7760	7770	7410	7420	7850
rubidium	7440-17-7	E475	0.050	mg/kg		13.4	13.1	12.4	12.7	13.4
selenium	7782-49-2	E475	0.10	mg/kg		3.68	2.63	2.64	2.64	2.84
silver	7440-22-4	E475.Ag	0.0050	mg/kg		0.131	0.0723	0.0720	0.0813	0.0900
sodium	7440-23-5	E475	20	mg/kg		3320	3680	3480	3560	3700

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	QUL-ZOO-1_ZOOT-1_2022-07	QUL-ZOO-1_ZOOT-2_2022-07	QUL-ZOO-1_ZOOT-3_2022-07	QUL-ZOO-1_ZOOT-4_2022-07	QUL-ZOO-1_ZOOT-5_2022-07
					Client sampling date / time	27-Jul-2022	27-Jul-2022	28-Jul-2022	28-Jul-2022	28-Jul-2022
						VA22B7702-016	VA22B7702-017	VA22B7702-018	VA22B7702-019	VA22B7702-020
						Result	Result	Result	Result	Result
Metals										
strontium	7440-24-6	E475	0.10	mg/kg		53.2	46.8	50.9	47.0	50.9
tellurium	13494-80-9	E475	0.020	mg/kg		<0.020	<0.020	<0.020	<0.020	<0.020
thallium	7440-28-0	E475	0.0020	mg/kg		0.0198	0.0192	0.0229	0.0204	0.0195
tin	7440-31-5	E475	0.10	mg/kg		0.27	0.27	0.16	0.16	0.18
titanium	7440-32-6	E475.Ti	0.50	mg/kg		32.3	25.7	18.2	22.0	21.2
uranium	7440-61-1	E475	0.0020	mg/kg		0.0824	0.0708	0.0600	0.0706	0.0788
vanadium	7440-62-2	E475	0.10	mg/kg		3.79	3.15	2.93	3.19	3.10
zinc	7440-66-6	E475	1.0	mg/kg		108	96.0	87.3	89.5	100
zirconium	7440-67-7	E475	0.20	mg/kg		0.63	0.86	0.38	0.55	0.72

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BOL-B2_ZOOT-3X_2022-07	----	----	----	----
					Client sampling date / time	26-Jul-2022	----	----	----	----
						VA22B7702-021	--------	--------	--------	--------
						Result	----	----	----	----
Physical Tests										
moisture	----	E144A	2.0	%		96.9	----	----	----	----
Metals										
aluminum	7429-90-5	E475	5.0	mg/kg		5590	----	----	----	----
antimony	7440-36-0	E475	0.020	mg/kg		0.493	----	----	----	----
arsenic	7440-38-2	E475	0.050	mg/kg		63.1	----	----	----	----
barium	7440-39-3	E475	0.050	mg/kg		108	----	----	----	----
beryllium	7440-41-7	E475	0.010	mg/kg		0.218	----	----	----	----
bismuth	7440-69-9	E475	0.010	mg/kg		0.042	----	----	----	----
boron	7440-42-8	E475	1.0	mg/kg		10.3	----	----	----	----
cadmium	7440-43-9	E475	0.010	mg/kg		0.393	----	----	----	----
calcium	7440-70-2	E475	20	mg/kg		27000	----	----	----	----
cesium	7440-46-2	E475	0.0050	mg/kg		0.717	----	----	----	----
chromium	7440-47-3	E475	0.20	mg/kg		98.5	----	----	----	----
cobalt	7440-48-4	E475	0.020	mg/kg		3.81	----	----	----	----
copper	7440-50-8	E475	0.20	mg/kg		178	----	----	----	----
iron	7439-89-6	E475	5.0	mg/kg		9760	----	----	----	----
lead	7439-92-1	E475	0.050	mg/kg		6.65	----	----	----	----
lithium	7439-93-2	E475	0.50	mg/kg		4.09	----	----	----	----
magnesium	7439-95-4	E475	2.0	mg/kg		2800	----	----	----	----
manganese	7439-96-5	E475	0.050	mg/kg		1210	----	----	----	----
mercury	7439-97-6	E512	0.010	mg/kg		0.133	----	----	----	----
mercury	7439-97-6	E512A	0.0020	mg/kg wwt		0.0041	----	----	----	----
molybdenum	7439-98-7	E475	0.040	mg/kg		2.03	----	----	----	----
nickel	7440-02-0	E475	0.20	mg/kg		14.3	----	----	----	----
phosphorus	7723-14-0	E475	20	mg/kg		10100	----	----	----	----
potassium	7440-09-7	E475	20	mg/kg		5640	----	----	----	----
rubidium	7440-17-7	E475	0.050	mg/kg		8.92	----	----	----	----
selenium	7782-49-2	E475	0.10	mg/kg		2.70	----	----	----	----
silver	7440-22-4	E475.Ag	0.0050	mg/kg		0.174	----	----	----	----
sodium	7440-23-5	E475	20	mg/kg		3230	----	----	----	----

Analytical Results

Sub-Matrix: Tissue (Matrix: Biota)					Client sample ID	BOL-B2_ZOOT-3X_2022-07	----	----	----	----
					Client sampling date / time	26-Jul-2022	----	----	----	----
Analyte	CAS Number	Method	LOR	Unit		VA22B7702-021	--------	--------	--------	--------
						Result	----	----	----	----
Metals										
strontium	7440-24-6	E475	0.10	mg/kg		183	----	----	----	----
tellurium	13494-80-9	E475	0.020	mg/kg		<0.029 DLIS	----	----	----	----
thallium	7440-28-0	E475	0.0020	mg/kg		0.0727	----	----	----	----
tin	7440-31-5	E475	0.10	mg/kg		0.88	----	----	----	----
titanium	7440-32-6	E475.Ti	0.50	mg/kg		235	----	----	----	----
uranium	7440-61-1	E475	0.0020	mg/kg		0.770	----	----	----	----
vanadium	7440-62-2	E475	0.10	mg/kg		21.8	----	----	----	----
zinc	7440-66-6	E475	1.0	mg/kg		142	----	----	----	----
zirconium	7440-67-7	E475	0.20	mg/kg		5.43	----	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

ALS Canada Ltd.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA22B7702**	Page	: 1 of 21
Amendment	: **1**		
Client	: **Mount Polley Mining Corporation**	Laboratory	: Vancouver - Environmental
Contact	: Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: ----	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 02-Aug-2022 14:15
PO	: 5590008044 Q2 2022	Issue Date	: 07-Nov-2022 16:16
C-O-C number	: ----		
Sampler	: Sarah Latimer		
Site	: ----		
Quote number	: VA22-MPMC100-002		
No. of samples received	: 21		
No. of samples analysed	: 21		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- Laboratory Control Sample (LCS) outliers occur - please see following pages for full details.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- Quality Control Sample Frequency Outliers occur - please see following pages for full details.

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **Biota**

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment
Laboratory Control Sample (LCS) Recoveries								
Metals	QC-MRG8-635554002	----	silver	7440-22-4	E472.Ag	79.0 % MES	80.0-120%	Recovery less than lower control limit
Metals	QC-MRG8-648756002	----	silver	7440-22-4	E475.Ag	79.0 % MES	80.0-120%	Recovery less than lower control limit

Result Qualifiers

Qualifier	*Description*
MES	*Data Quality Objective was marginally exceeded (by < 10% absolute) for < 10% of analytes in a Multi-Element Scan / Multi-Parameter Scan (considered acceptable as per OMOE & CCME).*

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Biota by CVAAS (DRY units, Biopsy)										
LDPE bag QUL-ZOO-1_ZOOT-3_2022-07	E512	28-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	365 days	50 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Biopsy)										
LDPE bag QUL-ZOO-1_ZOOT-4_2022-07	E512	28-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	365 days	50 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Biopsy)										
LDPE bag QUL-ZOO-1_ZOOT-5_2022-07	E512	28-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	365 days	50 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Biopsy)										
LDPE bag QUL-ZOO-1_ZOOT-1_2022-07	E512	27-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	365 days	51 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Biopsy)										
LDPE bag QUL-ZOO-1_ZOOT-2_2022-07	E512	27-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	365 days	51 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Biopsy)										
LDPE bag QUL-ZOO-7_ZOOT-2_2022-07	E512	27-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	365 days	51 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Biopsy)										
LDPE bag QUL-ZOO-7_ZOOT-3_2022-07	E512	27-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	365 days	51 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Biota by CVAAS (DRY units, Biopsy)										
LDPE bag QUL-ZOO-7_ZOOT-4_2022-07	E512	27-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	365 days	51 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Biopsy)										
LDPE bag QUL-ZOO-7_ZOOT-5_2022-07	E512	27-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	365 days	51 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Biopsy)										
LDPE bag BOL-B2_ZOOT-1_2022-07	E512	26-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	365 days	52 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Biopsy)										
LDPE bag BOL-B2_ZOOT-2_2022-07	E512	26-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	365 days	52 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Biopsy)										
LDPE bag BOL-B2_ZOOT-3_2022-07	E512	26-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	365 days	52 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Biopsy)										
LDPE bag BOL-B2_ZOOT-3X_2022-07	E512	26-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	365 days	52 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Biopsy)										
LDPE bag BOL-B2_ZOOT-4_2022-07	E512	26-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	365 days	52 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Biopsy)										
LDPE bag BOL-B2_ZOOT-5_2022-07	E512	26-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	365 days	52 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Biopsy)										
LDPE bag POL-P2_ZOOT-1_2022-07	E512	25-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	365 days	53 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Biota by CVAAS (DRY units, Biopsy)										
LDPE bag POL-P2_ZOOT-2_2022-07	E512	25-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Biopsy)										
LDPE bag POL-P2_ZOOT-3_2022-07	E512	25-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Biopsy)										
LDPE bag POL-P2_ZOOT-4_2022-07	E512	25-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Biopsy)										
LDPE bag POL-P2_ZOOT-5_2022-07	E512	25-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag QUL-ZOO-7_ZOOT-1_2022-07	E511	27-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	365 days	51 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Biopsy)										
LDPE bag QUL-ZOO-1_ZOOT-3_2022-07	E512A	28-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	365 days	50 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Biopsy)										
LDPE bag QUL-ZOO-1_ZOOT-4_2022-07	E512A	28-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	365 days	50 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Biopsy)										
LDPE bag QUL-ZOO-1_ZOOT-5_2022-07	E512A	28-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	365 days	50 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Biopsy)										
LDPE bag QUL-ZOO-1_ZOOT-1_2022-07	E512A	27-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	365 days	51 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Biota by CVAAS (WET units, Biopsy)										
LDPE bag QUL-ZOO-1_ZOOT-2_2022-07	E512A	27-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	365 days	51 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Biopsy)										
LDPE bag QUL-ZOO-7_ZOOT-2_2022-07	E512A	27-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	365 days	51 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Biopsy)										
LDPE bag QUL-ZOO-7_ZOOT-3_2022-07	E512A	27-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	365 days	51 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Biopsy)										
LDPE bag QUL-ZOO-7_ZOOT-4_2022-07	E512A	27-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	365 days	51 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Biopsy)										
LDPE bag QUL-ZOO-7_ZOOT-5_2022-07	E512A	27-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	365 days	51 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Biopsy)										
LDPE bag BOL-B2_ZOOT-1_2022-07	E512A	26-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	365 days	52 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Biopsy)										
LDPE bag BOL-B2_ZOOT-2_2022-07	E512A	26-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	365 days	52 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Biopsy)										
LDPE bag BOL-B2_ZOOT-3_2022-07	E512A	26-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	365 days	52 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Biopsy)										
LDPE bag BOL-B2_ZOOT-3X_2022-07	E512A	26-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	365 days	52 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Biota by CVAAS (WET units, Biopsy)										
LDPE bag BOL-B2_ZOOT-4_2022-07	E512A	26-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	365 days	52 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Biopsy)										
LDPE bag BOL-B2_ZOOT-5_2022-07	E512A	26-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	365 days	52 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Biopsy)										
LDPE bag POL-P2_ZOOT-1_2022-07	E512A	25-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Biopsy)										
LDPE bag POL-P2_ZOOT-2_2022-07	E512A	25-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Biopsy)										
LDPE bag POL-P2_ZOOT-3_2022-07	E512A	25-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Biopsy)										
LDPE bag POL-P2_ZOOT-4_2022-07	E512A	25-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Biopsy)										
LDPE bag POL-P2_ZOOT-5_2022-07	E512A	25-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Micro)										
LDPE bag QUL-ZOO-7_ZOOT-1_2022-07	E511A	27-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	365 days	51 days	✓
Metals : Metals by CRC ICPMS (DRY units, Biopsy)										
LDPE bag QUL-ZOO-1_ZOOT-3_2022-07	E475	28-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	730 days	50 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Metals by CRC ICPMS (DRY units, Biopsy)										
LDPE bag QUL-ZOO-1_ZOOT-4_2022-07	E475	28-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	730 days	50 days	✓
Metals : Metals by CRC ICPMS (DRY units, Biopsy)										
LDPE bag QUL-ZOO-1_ZOOT-5_2022-07	E475	28-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	730 days	50 days	✓
Metals : Metals by CRC ICPMS (DRY units, Biopsy)										
LDPE bag QUL-ZOO-1_ZOOT-1_2022-07	E475	27-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	730 days	51 days	✓
Metals : Metals by CRC ICPMS (DRY units, Biopsy)										
LDPE bag QUL-ZOO-1_ZOOT-2_2022-07	E475	27-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	730 days	51 days	✓
Metals : Metals by CRC ICPMS (DRY units, Biopsy)										
LDPE bag QUL-ZOO-7_ZOOT-2_2022-07	E475	27-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	730 days	51 days	✓
Metals : Metals by CRC ICPMS (DRY units, Biopsy)										
LDPE bag QUL-ZOO-7_ZOOT-3_2022-07	E475	27-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	730 days	51 days	✓
Metals : Metals by CRC ICPMS (DRY units, Biopsy)										
LDPE bag QUL-ZOO-7_ZOOT-4_2022-07	E475	27-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	730 days	51 days	✓
Metals : Metals by CRC ICPMS (DRY units, Biopsy)										
LDPE bag QUL-ZOO-7_ZOOT-5_2022-07	E475	27-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	730 days	51 days	✓
Metals : Metals by CRC ICPMS (DRY units, Biopsy)										
LDPE bag BOL-B2_ZOOT-1_2022-07	E475	26-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	730 days	52 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Metals by CRC ICPMS (DRY units, Biopsy)										
LDPE bag BOL-B2_ZOOT-2_2022-07	E475	26-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	730 days	52 days	✓
Metals : Metals by CRC ICPMS (DRY units, Biopsy)										
LDPE bag BOL-B2_ZOOT-3_2022-07	E475	26-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	730 days	52 days	✓
Metals : Metals by CRC ICPMS (DRY units, Biopsy)										
LDPE bag BOL-B2_ZOOT-3X_2022-07	E475	26-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	730 days	52 days	✓
Metals : Metals by CRC ICPMS (DRY units, Biopsy)										
LDPE bag BOL-B2_ZOOT-4_2022-07	E475	26-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	730 days	52 days	✓
Metals : Metals by CRC ICPMS (DRY units, Biopsy)										
LDPE bag BOL-B2_ZOOT-5_2022-07	E475	26-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	730 days	52 days	✓
Metals : Metals by CRC ICPMS (DRY units, Biopsy)										
LDPE bag POL-P2_ZOOT-1_2022-07	E475	25-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	730 days	53 days	✓
Metals : Metals by CRC ICPMS (DRY units, Biopsy)										
LDPE bag POL-P2_ZOOT-2_2022-07	E475	25-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	730 days	53 days	✓
Metals : Metals by CRC ICPMS (DRY units, Biopsy)										
LDPE bag POL-P2_ZOOT-3_2022-07	E475	25-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	730 days	53 days	✓
Metals : Metals by CRC ICPMS (DRY units, Biopsy)										
LDPE bag POL-P2_ZOOT-4_2022-07	E475	25-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	730 days	53 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Metals by CRC ICPMS (DRY units, Biopsy)										
LDPE bag POL-P2_ZOOT-5_2022-07	E475	25-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	730 days	53 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag QUL-ZOO-7_ZOOT-1_2022-07	E472	27-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	730 days	51 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag QUL-ZOO-1_ZOOT-3_2022-07	E475.Ag	28-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	730 days	50 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag QUL-ZOO-1_ZOOT-4_2022-07	E475.Ag	28-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	730 days	50 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag QUL-ZOO-1_ZOOT-5_2022-07	E475.Ag	28-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	730 days	50 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag QUL-ZOO-1_ZOOT-1_2022-07	E475.Ag	27-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	730 days	51 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag QUL-ZOO-1_ZOOT-2_2022-07	E475.Ag	27-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	730 days	51 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag QUL-ZOO-7_ZOOT-2_2022-07	E475.Ag	27-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	730 days	51 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag QUL-ZOO-7_ZOOT-3_2022-07	E475.Ag	27-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	730 days	51 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Silver in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag QUL-ZOO-7_ZOOT-4_2022-07	E475.Ag	27-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	730 days	51 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag QUL-ZOO-7_ZOOT-5_2022-07	E475.Ag	27-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	730 days	51 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag BOL-B2_ZOOT-1_2022-07	E475.Ag	26-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	730 days	52 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag BOL-B2_ZOOT-2_2022-07	E475.Ag	26-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	730 days	52 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag BOL-B2_ZOOT-3_2022-07	E475.Ag	26-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	730 days	52 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag BOL-B2_ZOOT-3X_2022-07	E475.Ag	26-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	730 days	52 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag BOL-B2_ZOOT-4_2022-07	E475.Ag	26-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	730 days	52 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag BOL-B2_ZOOT-5_2022-07	E475.Ag	26-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	730 days	52 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag POL-P2_ZOOT-1_2022-07	E475.Ag	25-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	730 days	53 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Silver in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag POL-P2_ZOOT-2_2022-07	E475.Ag	25-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	730 days	53 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag POL-P2_ZOOT-3_2022-07	E475.Ag	25-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	730 days	53 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag POL-P2_ZOOT-4_2022-07	E475.Ag	25-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	730 days	53 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag POL-P2_ZOOT-5_2022-07	E475.Ag	25-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	730 days	53 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag QUL-ZOO-7_ZOOT-1_2022-07	E472.Ag	27-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	730 days	51 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag QUL-ZOO-1_ZOOT-3_2022-07	E475.Ti	28-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	730 days	50 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag QUL-ZOO-1_ZOOT-4_2022-07	E475.Ti	28-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	730 days	50 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag QUL-ZOO-1_ZOOT-5_2022-07	E475.Ti	28-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	730 days	50 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag QUL-ZOO-1_ZOOT-1_2022-07	E475.Ti	27-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	730 days	51 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Titanium in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag QUL-ZOO-1_ZOOT-2_2022-07	E475.Ti	27-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	730 days	51 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag QUL-ZOO-7_ZOOT-2_2022-07	E475.Ti	27-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	730 days	51 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag QUL-ZOO-7_ZOOT-3_2022-07	E475.Ti	27-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	730 days	51 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag QUL-ZOO-7_ZOOT-4_2022-07	E475.Ti	27-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	730 days	51 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag QUL-ZOO-7_ZOOT-5_2022-07	E475.Ti	27-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	730 days	51 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag BOL-B2_ZOOT-1_2022-07	E475.Ti	26-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	730 days	52 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag BOL-B2_ZOOT-2_2022-07	E475.Ti	26-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	730 days	52 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag BOL-B2_ZOOT-3_2022-07	E475.Ti	26-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	730 days	52 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag BOL-B2_ZOOT-3X_2022-07	E475.Ti	26-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	730 days	52 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Titanium in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag BOL-B2_ZOOT-4_2022-07	E475.Ti	26-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	730 days	52 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag BOL-B2_ZOOT-5_2022-07	E475.Ti	26-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	730 days	52 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag POL-P2_ZOOT-1_2022-07	E475.Ti	25-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	730 days	53 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag POL-P2_ZOOT-2_2022-07	E475.Ti	25-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	730 days	53 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag POL-P2_ZOOT-3_2022-07	E475.Ti	25-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	730 days	53 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag POL-P2_ZOOT-4_2022-07	E475.Ti	25-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	730 days	53 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag POL-P2_ZOOT-5_2022-07	E475.Ti	25-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	730 days	53 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag QUL-ZOO-7_ZOOT-1_2022-07	E472.Ti	27-Jul-2022	16-Sep-2022	----	----		16-Sep-2022	730 days	51 days	✓
Physical Tests : Moisture Content by Gravimetry (Biopsy)										
LDPE bag BOL-B2_ZOOT-1_2022-07	E144A	26-Jul-2022	----	----	----		15-Sep-2022	----	----	

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Moisture Content by Gravimetry (Biopsy)										
LDPE bag BOL-B2_ZOOT-2_2022-07	E144A	26-Jul-2022	----	----	----		15-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Biopsy)										
LDPE bag BOL-B2_ZOOT-3_2022-07	E144A	26-Jul-2022	----	----	----		15-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Biopsy)										
LDPE bag BOL-B2_ZOOT-3X_2022-07	E144A	26-Jul-2022	----	----	----		15-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Biopsy)										
LDPE bag BOL-B2_ZOOT-4_2022-07	E144A	26-Jul-2022	----	----	----		15-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Biopsy)										
LDPE bag BOL-B2_ZOOT-5_2022-07	E144A	26-Jul-2022	----	----	----		15-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Biopsy)										
LDPE bag POL-P2_ZOOT-1_2022-07	E144A	25-Jul-2022	----	----	----		15-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Biopsy)										
LDPE bag POL-P2_ZOOT-2_2022-07	E144A	25-Jul-2022	----	----	----		15-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Biopsy)										
LDPE bag POL-P2_ZOOT-3_2022-07	E144A	25-Jul-2022	----	----	----		15-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Biopsy)										
LDPE bag POL-P2_ZOOT-4_2022-07	E144A	25-Jul-2022	----	----	----		15-Sep-2022	----	----	

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Moisture Content by Gravimetry (Biopsy)										
LDPE bag POL-P2_ZOOT-5_2022-07	E144A	25-Jul-2022	----	----	----		15-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Biopsy)										
LDPE bag QUL-ZOO-1_ZOOT-1_2022-07	E144A	27-Jul-2022	----	----	----		15-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Biopsy)										
LDPE bag QUL-ZOO-1_ZOOT-2_2022-07	E144A	27-Jul-2022	----	----	----		15-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Biopsy)										
LDPE bag QUL-ZOO-1_ZOOT-3_2022-07	E144A	28-Jul-2022	----	----	----		15-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Biopsy)										
LDPE bag QUL-ZOO-1_ZOOT-4_2022-07	E144A	28-Jul-2022	----	----	----		15-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Biopsy)										
LDPE bag QUL-ZOO-1_ZOOT-5_2022-07	E144A	28-Jul-2022	----	----	----		15-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Biopsy)										
LDPE bag QUL-ZOO-7_ZOOT-2_2022-07	E144A	27-Jul-2022	----	----	----		15-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Biopsy)										
LDPE bag QUL-ZOO-7_ZOOT-3_2022-07	E144A	27-Jul-2022	----	----	----		15-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Biopsy)										
LDPE bag QUL-ZOO-7_ZOOT-4_2022-07	E144A	27-Jul-2022	----	----	----		15-Sep-2022	----	----	

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Moisture Content by Gravimetry (Biopsy)										
LDPE bag QUL-ZOO-7_ZOOT-5_2022-07	E144A	27-Jul-2022	----	----	----		15-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag QUL-ZOO-7_ZOOT-1_2022-07	E144-H	27-Jul-2022	----	----	----		07-Sep-2022	----	----	

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Biota**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Mercury in Biota by CVAAS (DRY units, Micro)	E511	635559	0	1	0.0	5.0	×
Mercury in Biota by CVAAS (WET units, Micro)	E511A	635560	0	1	0.0	5.0	×
Metals in Biota by CRC ICPMS (DRY units, Micro)	E472	635561	0	1	0.0	5.0	×
Moisture Content by Gravimetry (Micro)	E144-H	635498	1	1	100.0	5.0	✓
Silver in Biota by CRC ICPMS (DRY units, Micro)	E472.Ag	635557	0	1	0.0	5.0	×
Titanium in Biota by CRC ICPMS (DRY units, Micro)	E472.Ti	635558	0	1	0.0	5.0	×
Laboratory Control Samples (LCS)							
Mercury in Biota by CVAAS (DRY units, Biopsy)	E512	648734	4	20	20.0	10.0	✓
Mercury in Biota by CVAAS (DRY units, Micro)	E511	635559	2	1	200.0	10.0	✓
Mercury in Biota by CVAAS (WET units, Biopsy)	E512A	648735	4	20	20.0	10.0	✓
Mercury in Biota by CVAAS (WET units, Micro)	E511A	635560	2	1	200.0	10.0	✓
Metals by CRC ICPMS (DRY units, Biopsy)	E475	648741	4	20	20.0	10.0	✓
Metals in Biota by CRC ICPMS (DRY units, Micro)	E472	635561	2	1	200.0	10.0	✓
Moisture Content by Gravimetry (Biopsy)	E144A	648732	2	20	10.0	5.0	✓
Moisture Content by Gravimetry (Micro)	E144-H	635498	1	1	100.0	5.0	✓
Silver in Biota by CRC ICPMS (DRY units, Biopsy)	E475.Ag	648736	4	20	20.0	10.0	✓
Silver in Biota by CRC ICPMS (DRY units, Micro)	E472.Ag	635557	2	1	200.0	10.0	✓
Titanium in Biota by CRC ICPMS (DRY units, Biopsy)	E475.Ti	648737	2	20	10.0	10.0	✓
Titanium in Biota by CRC ICPMS (DRY units, Micro)	E472.Ti	635558	1	1	100.0	10.0	✓
Method Blanks (MB)							
Mercury in Biota by CVAAS (DRY units, Biopsy)	E512	648734	2	20	10.0	5.0	✓
Mercury in Biota by CVAAS (DRY units, Micro)	E511	635559	1	1	100.0	5.0	✓
Mercury in Biota by CVAAS (WET units, Biopsy)	E512A	648735	2	20	10.0	5.0	✓
Mercury in Biota by CVAAS (WET units, Micro)	E511A	635560	1	1	100.0	5.0	✓
Metals by CRC ICPMS (DRY units, Biopsy)	E475	648741	2	20	10.0	5.0	✓
Metals in Biota by CRC ICPMS (DRY units, Micro)	E472	635561	1	1	100.0	5.0	✓
Moisture Content by Gravimetry (Biopsy)	E144A	648732	2	20	10.0	5.0	✓
Moisture Content by Gravimetry (Micro)	E144-H	635498	1	1	100.0	5.0	✓
Silver in Biota by CRC ICPMS (DRY units, Biopsy)	E475.Ag	648736	2	20	10.0	5.0	✓
Silver in Biota by CRC ICPMS (DRY units, Micro)	E472.Ag	635557	1	1	100.0	5.0	✓
Titanium in Biota by CRC ICPMS (DRY units, Biopsy)	E475.Ti	648737	2	20	10.0	5.0	✓
Titanium in Biota by CRC ICPMS (DRY units, Micro)	E472.Ti	635558	1	1	100.0	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Moisture Content by Gravimetry (Biopsy)	E144A Vancouver - Environmental	Biota	Puget Sound Water Quality Authority/CCME PHC in Soil - Tier 1	This analysis is carried out gravimetrically by drying the sample at < 60 deg. C for a minimum of three days.
Moisture Content by Gravimetry (Micro)	E144-H Vancouver - Environmental	Biota	Puget Sound Water Quality Authority/BC MOE Lab Manual	Moisture is measured gravimetrically by drying the sample at < 60°C for a minimum of 3 days to constant weight. Moisture content is calculated as the weight loss (due to water) divided by the wet weight of soil, expressed as a percentage.
Metals in Biota by CRC ICPMS (DRY units, Micro)	E472 Vancouver - Environmental	Biota	EPA 200.3/6020B (mod)	Tissue samples are homogenized and sub-sampled prior to hotblock digestion with HNO3, HCl, and H2O2. Analysis is by Collision/Reaction Cell ICPMS. Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.
Silver in Biota by CRC ICPMS (DRY units, Micro)	E472.Ag Vancouver - Environmental	Biota	EPA 200.3/6020B (mod)	Tissue samples are homogenized and sub-sampled prior to hotblock digestion with HNO3, HCl, and H2O2. Analysis is by Collision/Reaction Cell ICPMS. Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.
Titanium in Biota by CRC ICPMS (DRY units, Micro)	E472.Ti Vancouver - Environmental	Biota	EPA 200.3/6020B (mod)	Tissue samples are homogenized and sub-sampled prior to hotblock digestion with HNO3, HCl, and H2O2. Analysis is by Collision/Reaction Cell ICPMS. Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.
Metals by CRC ICPMS (DRY units, Biopsy)	E475 Vancouver - Environmental	Biota	EPA 200.3/6020B (mod)	Samples are digested with nitric acid, hydrochloric acid, and hydrogen peroxide. Analysis is by Collision/Reaction Cell ICPMS: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Silver in Biota by CRC ICPMS (DRY units, Biopsy)	E475.Ag Vancouver - Environmental	Biota	EPA 200.3/6020B (mod)	Samples are digested with nitric acid, hydrochloric acid, and hydrogen peroxide. Analysis is by Collision/Reaction Cell ICPMS. Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.
Titanium in Biota by CRC ICPMS (DRY units, Biopsy)	E475.Ti Vancouver - Environmental	Biota	EPA 200.3/6020B (mod)	Samples are digested with nitric acid, hydrochloric acid, and hydrogen peroxide. Analysis is by Collision/Reaction Cell ICPMS. Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.
Mercury in Biota by CVAAS (DRY units, Micro)	E511 Vancouver - Environmental	Biota	EPA 200.3/1631E (mod)	Samples are homogenized and sub-sampled prior to hotblock digestion with nitric acid, hydrochloric acid, and hydrogen peroxide. Analysis is by CVAAS.
Mercury in Biota by CVAAS (WET units, Micro)	E511A Vancouver - Environmental	Biota	EPA 200.3/1631E (mod)	Samples are homogenized and sub-sampled prior to hotblock digestion with nitric acid, hydrochloric acid, and hydrogen peroxide. Analysis is by CVAAS.
Mercury in Biota by CVAAS (DRY units, Biopsy)	E512 Vancouver - Environmental	Biota	EPA 200.3/1631E (mod)	Samples are digested with nitric acid, hydrochloric acid, and hydrogen peroxide. Analysis is by CVAAS.
Mercury in Biota by CVAAS (WET units, Biopsy)	E512A Vancouver - Environmental	Biota	EPA 200.3/1631E (mod)	Samples are homogenized digested with nitric acid, hydrochloric acid, and hydrogen peroxide. Analysis is by CVAAS.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Metals and Mercury Biota Digestion (Micro)	EP472 Vancouver - Environmental	Biota	EPA 200.3	This method, designed for small sample amounts, uses a heated strong acid digestion with HNO3, HCl, and H2O2 and is intended to provide a conservative estimate of bio-available metals.
Metals and Mercury Biota Digestion (Biopsy)	EP475 Vancouver - Environmental	Biota	EPA 200.3/200.8 (mod)	Samples are digested with nitric acid, hydrochloric acid, and hydrogen peroxide. Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.

ALS Canada Ltd.

QUALITY CONTROL REPORT

Work Order	: **VA22B7702**	Page	: 1 of 15
Amendment	: **1**		
Client	: Mount Polley Mining Corporation	Laboratory	: Vancouver - Environmental
Contact	: Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 02-Aug-2022 14:15
PO	: 5590008044 Q2 2022	Date Analysis Commenced	: 07-Sep-2022
C-O-C number	: ----	Issue Date	: 07-Nov-2022 16:16
Sampler	: Sarah Latimer		
Site	: ----		
Quote number	: VA22-MPMC100-002		
No. of samples received	: 21		
No. of samples analysed	: 21		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Reference Material (RM) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Vancouver Metals, Burnaby, British Columbia
Qammar Almas	Lab Assistant	Vancouver Metals, Burnaby, British Columbia
Salimah Khimani	Lab Assistant	Vancouver Metals, Burnaby, British Columbia

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Biota**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 635498)											
VA22B7702-015	QUL-ZOO-7_ZOOT-5_2022-07	moisture	----	E144-H	2.0	%	95.6	95.7	0.0885%	20%	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Biota**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 635498)						
moisture	----	E144-H	2	%	<2.0	----
Physical Tests (QCLot: 648732)						
moisture	----	E144A	2	%	<2.0	----
Physical Tests (QCLot: 648743)						
moisture	----	E144A	2	%	<2.0	----
Metals (QCLot: 635557)						
silver	7440-22-4	E472.Ag	0.005	mg/kg	<0.0050	----
Metals (QCLot: 635558)						
titanium	7440-32-6	E472.Ti	0.5	mg/kg	<0.50	----
Metals (QCLot: 635559)						
mercury	7439-97-6	E511	0.005	mg/kg	<0.0050	----
Metals (QCLot: 635560)						
mercury	7439-97-6	E511A	0.001	mg/kg wwt	<0.0010	----
Metals (QCLot: 635561)						
aluminum	7429-90-5	E472	5	mg/kg	<5.0	----
antimony	7440-36-0	E472	0.01	mg/kg	<0.010	----
arsenic	7440-38-2	E472	0.03	mg/kg	<0.030	----
barium	7440-39-3	E472	0.05	mg/kg	<0.050	----
beryllium	7440-41-7	E472	0.01	mg/kg	<0.010	----
bismuth	7440-69-9	E472	0.01	mg/kg	<0.010	----
boron	7440-42-8	E472	1	mg/kg	<1.0	----
cadmium	7440-43-9	E472	0.01	mg/kg	<0.010	----
calcium	7440-70-2	E472	20	mg/kg	<20	----
cesium	7440-46-2	E472	0.005	mg/kg	<0.0050	----
chromium	7440-47-3	E472	0.2	mg/kg	<0.20	----
cobalt	7440-48-4	E472	0.02	mg/kg	<0.020	----
copper	7440-50-8	E472	0.2	mg/kg	<0.20	----
iron	7439-89-6	E472	5	mg/kg	<5.0	----
lead	7439-92-1	E472	0.05	mg/kg	<0.050	----
lithium	7439-93-2	E472	0.5	mg/kg	<0.50	----
magnesium	7439-95-4	E472	2	mg/kg	<2.0	----
manganese	7439-96-5	E472	0.05	mg/kg	<0.050	----

Sub-Matrix: **Biota**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 635561) - continued						
molybdenum	7439-98-7	E472	0.04	mg/kg	<0.040	----
nickel	7440-02-0	E472	0.2	mg/kg	<0.20	----
phosphorus	7723-14-0	E472	10	mg/kg	<10	----
potassium	7440-09-7	E472	20	mg/kg	<20	----
rubidium	7440-17-7	E472	0.05	mg/kg	<0.050	----
selenium	7782-49-2	E472	0.1	mg/kg	<0.10	----
sodium	7440-23-5	E472	20	mg/kg	<20	----
strontium	7440-24-6	E472	0.1	mg/kg	<0.10	----
tellurium	13494-80-9	E472	0.02	mg/kg	<0.020	----
thallium	7440-28-0	E472	0.002	mg/kg	<0.0020	----
tin	7440-31-5	E472	0.1	mg/kg	<0.10	----
uranium	7440-61-1	E472	0.002	mg/kg	<0.0020	----
vanadium	7440-62-2	E472	0.1	mg/kg	<0.10	----
zinc	7440-66-6	E472	1	mg/kg	<1.0	----
zirconium	7440-67-7	E472	0.2	mg/kg	<0.20	----
Metals (QCLot: 648734)						
mercury	7439-97-6	E512	0.01	mg/kg	<0.010	----
Metals (QCLot: 648735)						
mercury	7439-97-6	E512A	0.002	mg/kg wwt	<0.0020	----
Metals (QCLot: 648736)						
silver	7440-22-4	E475.Ag	0.005	mg/kg	<0.0050	----
Metals (QCLot: 648737)						
titanium	7440-32-6	E475.Ti	0.5	mg/kg	<0.50	----
Metals (QCLot: 648741)						
aluminum	7429-90-5	E475	5	mg/kg	<5.0	----
antimony	7440-36-0	E475	0.02	mg/kg	<0.020	----
arsenic	7440-38-2	E475	0.05	mg/kg	<0.050	----
barium	7440-39-3	E475	0.05	mg/kg	<0.050	----
beryllium	7440-41-7	E475	0.01	mg/kg	<0.010	----
bismuth	7440-69-9	E475	0.01	mg/kg	<0.010	----
boron	7440-42-8	E475	1	mg/kg	<1.0	----
cadmium	7440-43-9	E475	0.01	mg/kg	<0.010	----
calcium	7440-70-2	E475	20	mg/kg	<20	----
cesium	7440-46-2	E475	0.005	mg/kg	<0.0050	----
chromium	7440-47-3	E475	0.2	mg/kg	<0.20	----

Sub-Matrix: **Biota**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 648741) - continued						
cobalt	7440-48-4	E475	0.02	mg/kg	<0.020	----
copper	7440-50-8	E475	0.2	mg/kg	<0.20	----
iron	7439-89-6	E475	5	mg/kg	<5.0	----
lead	7439-92-1	E475	0.05	mg/kg	<0.050	----
lithium	7439-93-2	E475	0.5	mg/kg	<0.50	----
magnesium	7439-95-4	E475	2	mg/kg	<2.0	----
manganese	7439-96-5	E475	0.05	mg/kg	<0.050	----
molybdenum	7439-98-7	E475	0.04	mg/kg	<0.040	----
nickel	7440-02-0	E475	0.2	mg/kg	<0.20	----
phosphorus	7723-14-0	E475	20	mg/kg	<20	----
potassium	7440-09-7	E475	20	mg/kg	<20	----
rubidium	7440-17-7	E475	0.05	mg/kg	<0.050	----
selenium	7782-49-2	E475	0.1	mg/kg	<0.10	----
sodium	7440-23-5	E475	20	mg/kg	<20	----
strontium	7440-24-6	E475	0.1	mg/kg	<0.10	----
tellurium	13494-80-9	E475	0.02	mg/kg	<0.020	----
thallium	7440-28-0	E475	0.002	mg/kg	<0.0020	----
tin	7440-31-5	E475	0.1	mg/kg	<0.10	----
uranium	7440-61-1	E475	0.002	mg/kg	<0.0020	----
vanadium	7440-62-2	E475	0.1	mg/kg	<0.10	----
zinc	7440-66-6	E475	1	mg/kg	<1.0	----
zirconium	7440-67-7	E475	0.2	mg/kg	<0.20	----
Metals (QCLot: 648756)						
mercury	7439-97-6	E512	0.01	mg/kg	<0.010	----
Metals (QCLot: 648757)						
mercury	7439-97-6	E512A	0.002	mg/kg wwt	<0.0020	----
Metals (QCLot: 648758)						
silver	7440-22-4	E475.Ag	0.005	mg/kg	<0.0050	----
Metals (QCLot: 648759)						
titanium	7440-32-6	E475.Ti	0.5	mg/kg	<0.50	----
Metals (QCLot: 648763)						
aluminum	7429-90-5	E475	5	mg/kg	<5.0	----
antimony	7440-36-0	E475	0.02	mg/kg	<0.020	----
arsenic	7440-38-2	E475	0.05	mg/kg	<0.050	----
barium	7440-39-3	E475	0.05	mg/kg	<0.050	----

Sub-Matrix: **Biota**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 648763) - continued						
beryllium	7440-41-7	E475	0.01	mg/kg	<0.010	----
bismuth	7440-69-9	E475	0.01	mg/kg	<0.010	----
boron	7440-42-8	E475	1	mg/kg	<1.0	----
cadmium	7440-43-9	E475	0.01	mg/kg	<0.010	----
calcium	7440-70-2	E475	20	mg/kg	<20	----
cesium	7440-46-2	E475	0.005	mg/kg	<0.0050	----
chromium	7440-47-3	E475	0.2	mg/kg	<0.20	----
cobalt	7440-48-4	E475	0.02	mg/kg	<0.020	----
copper	7440-50-8	E475	0.2	mg/kg	<0.20	----
iron	7439-89-6	E475	5	mg/kg	<5.0	----
lead	7439-92-1	E475	0.05	mg/kg	<0.050	----
lithium	7439-93-2	E475	0.5	mg/kg	<0.50	----
magnesium	7439-95-4	E475	2	mg/kg	<2.0	----
manganese	7439-96-5	E475	0.05	mg/kg	<0.050	----
molybdenum	7439-98-7	E475	0.04	mg/kg	<0.040	----
nickel	7440-02-0	E475	0.2	mg/kg	<0.20	----
phosphorus	7723-14-0	E475	20	mg/kg	<20	----
potassium	7440-09-7	E475	20	mg/kg	<20	----
rubidium	7440-17-7	E475	0.05	mg/kg	<0.050	----
selenium	7782-49-2	E475	0.1	mg/kg	<0.10	----
sodium	7440-23-5	E475	20	mg/kg	<20	----
strontium	7440-24-6	E475	0.1	mg/kg	<0.10	----
tellurium	13494-80-9	E475	0.02	mg/kg	<0.020	----
thallium	7440-28-0	E475	0.002	mg/kg	<0.0020	----
tin	7440-31-5	E475	0.1	mg/kg	<0.10	----
uranium	7440-61-1	E475	0.002	mg/kg	<0.0020	----
vanadium	7440-62-2	E475	0.1	mg/kg	<0.10	----
zinc	7440-66-6	E475	1	mg/kg	<1.0	----
zirconium	7440-67-7	E475	0.2	mg/kg	<0.20	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Biota**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 635498)									
moisture	----	E144-H	2	%	100 %	100	90.0	110	----
Physical Tests (QCLot: 648732)									
moisture	----	E144A	2	%	100 %	100	90.0	110	----
Physical Tests (QCLot: 648743)									
moisture	----	E144A	2	%	100 %	100	90.0	110	----
Metals (QCLot: 635557)									
silver	7440-22-4	E472.Ag	0.005	mg/kg	1 mg/kg	# 79.0	80.0	120	MES
Metals (QCLot: 635558)									
titanium	7440-32-6	E472.Ti	0.5	mg/kg	2.5 mg/kg	87.0	80.0	120	----
Metals (QCLot: 635559)									
mercury	7439-97-6	E511	0.005	mg/kg	0.02 mg/kg	88.8	80.0	120	----
Metals (QCLot: 635560)									
mercury	7439-97-6	E511A	0.001	mg/kg wwt	0.02 mg/kg wwt	88.8	80.0	120	----
Metals (QCLot: 635561)									
aluminum	7429-90-5	E472	5	mg/kg	20 mg/kg	89.3	80.0	120	----
antimony	7440-36-0	E472	0.01	mg/kg	10 mg/kg	89.8	80.0	120	----
arsenic	7440-38-2	E472	0.03	mg/kg	10 mg/kg	91.0	80.0	120	----
barium	7440-39-3	E472	0.05	mg/kg	2.5 mg/kg	86.6	80.0	120	----
beryllium	7440-41-7	E472	0.01	mg/kg	1 mg/kg	89.0	80.0	120	----
bismuth	7440-69-9	E472	0.01	mg/kg	10 mg/kg	87.6	80.0	120	----
boron	7440-42-8	E472	1	mg/kg	10 mg/kg	89.0	80.0	120	----
cadmium	7440-43-9	E472	0.01	mg/kg	1 mg/kg	86.0	80.0	120	----
calcium	7440-70-2	E472	20	mg/kg	500 mg/kg	86.4	80.0	120	----
cesium	7440-46-2	E472	0.005	mg/kg	0.5 mg/kg	91.6	80.0	120	----
chromium	7440-47-3	E472	0.2	mg/kg	2.5 mg/kg	87.4	80.0	120	----
cobalt	7440-48-4	E472	0.02	mg/kg	2.5 mg/kg	86.1	80.0	120	----
copper	7440-50-8	E472	0.2	mg/kg	2.5 mg/kg	84.0	80.0	120	----
iron	7439-89-6	E472	5	mg/kg	10 mg/kg	89.6	80.0	120	----
lead	7439-92-1	E472	0.05	mg/kg	5 mg/kg	89.4	80.0	120	----
lithium	7439-93-2	E472	0.5	mg/kg	2.5 mg/kg	91.9	80.0	120	----
magnesium	7439-95-4	E472	2	mg/kg	500 mg/kg	86.9	80.0	120	----

Sub-Matrix: **Biota**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Metals (QCLot: 635561) - continued									
manganese	7439-96-5	E472	0.05	mg/kg	2.5 mg/kg	88.5	80.0	120	----
molybdenum	7439-98-7	E472	0.04	mg/kg	2.5 mg/kg	93.0	80.0	120	----
nickel	7440-02-0	E472	0.2	mg/kg	5 mg/kg	84.0	80.0	120	----
phosphorus	7723-14-0	E472	10	mg/kg	100 mg/kg	90.0	80.0	120	----
potassium	7440-09-7	E472	20	mg/kg	500 mg/kg	86.6	80.0	120	----
rubidium	7440-17-7	E472	0.05	mg/kg	1 mg/kg	90.8	80.0	120	----
selenium	7782-49-2	E472	0.1	mg/kg	10 mg/kg	86.9	80.0	120	----
sodium	7440-23-5	E472	20	mg/kg	500 mg/kg	92.3	80.0	120	----
strontium	7440-24-6	E472	0.1	mg/kg	2.5 mg/kg	91.3	80.0	120	----
tellurium	13494-80-9	E472	0.02	mg/kg	1 mg/kg	86.0	80.0	120	----
thallium	7440-28-0	E472	0.002	mg/kg	10 mg/kg	87.3	80.0	120	----
tin	7440-31-5	E472	0.1	mg/kg	5 mg/kg	87.3	80.0	120	----
uranium	7440-61-1	E472	0.002	mg/kg	0.05 mg/kg	91.9	80.0	120	----
vanadium	7440-62-2	E472	0.1	mg/kg	5 mg/kg	90.2	80.0	120	----
zinc	7440-66-6	E472	1	mg/kg	5 mg/kg	83.6	80.0	120	----
zirconium	7440-67-7	E472	0.2	mg/kg	1 mg/kg	90.1	80.0	120	----
Metals (QCLot: 648734)									
mercury	7439-97-6	E512	0.01	mg/kg	0.05 mg/kg	91.0	80.0	120	----
Metals (QCLot: 648735)									
mercury	7439-97-6	E512A	0.002	mg/kg wwt	0.05 mg/kg wwt	91.0	80.0	120	----
Metals (QCLot: 648736)									
silver	7440-22-4	E475.Ag	0.005	mg/kg	2.5 mg/kg	83.4	80.0	120	----
Metals (QCLot: 648737)									
titanium	7440-32-6	E475.Ti	0.5	mg/kg	6.25 mg/kg	91.4	80.0	120	----
Metals (QCLot: 648741)									
aluminum	7429-90-5	E475	5	mg/kg	50 mg/kg	94.0	80.0	120	----
antimony	7440-36-0	E475	0.02	mg/kg	25 mg/kg	93.6	80.0	120	----
arsenic	7440-38-2	E475	0.05	mg/kg	25 mg/kg	93.7	80.0	120	----
barium	7440-39-3	E475	0.05	mg/kg	6.25 mg/kg	86.9	80.0	120	----
beryllium	7440-41-7	E475	0.01	mg/kg	2.5 mg/kg	95.4	80.0	120	----
bismuth	7440-69-9	E475	0.01	mg/kg	25 mg/kg	90.2	80.0	120	----
boron	7440-42-8	E475	1	mg/kg	25 mg/kg	97.5	80.0	120	----
cadmium	7440-43-9	E475	0.01	mg/kg	2.5 mg/kg	88.3	80.0	120	----
calcium	7440-70-2	E475	20	mg/kg	1250 mg/kg	91.7	80.0	120	----
cesium	7440-46-2	E475	0.005	mg/kg	1.25 mg/kg	96.9	80.0	120	----
chromium	7440-47-3	E475	0.2	mg/kg	6.25 mg/kg	90.6	80.0	120	----

Sub-Matrix: **Biota**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Metals (QCLot: 648741) - continued									
cobalt	7440-48-4	E475	0.02	mg/kg	6.25 mg/kg	88.5	80.0	120	----
copper	7440-50-8	E475	0.2	mg/kg	6.25 mg/kg	86.8	80.0	120	----
iron	7439-89-6	E475	5	mg/kg	25 mg/kg	93.5	80.0	120	----
lead	7439-92-1	E475	0.05	mg/kg	12.5 mg/kg	92.8	80.0	120	----
lithium	7439-93-2	E475	0.5	mg/kg	6.25 mg/kg	98.4	80.0	120	----
magnesium	7439-95-4	E475	2	mg/kg	1250 mg/kg	89.8	80.0	120	----
manganese	7439-96-5	E475	0.05	mg/kg	6.25 mg/kg	91.5	80.0	120	----
molybdenum	7439-98-7	E475	0.04	mg/kg	6.25 mg/kg	99.4	80.0	120	----
nickel	7440-02-0	E475	0.2	mg/kg	12.5 mg/kg	87.1	80.0	120	----
phosphorus	7723-14-0	E475	20	mg/kg	250 mg/kg	94.6	80.0	120	----
potassium	7440-09-7	E475	20	mg/kg	1250 mg/kg	90.0	80.0	120	----
rubidium	7440-17-7	E475	0.05	mg/kg	2.5 mg/kg	94.3	80.0	120	----
selenium	7782-49-2	E475	0.1	mg/kg	25 mg/kg	88.3	80.0	120	----
sodium	7440-23-5	E475	20	mg/kg	1250 mg/kg	94.9	80.0	120	----
strontium	7440-24-6	E475	0.1	mg/kg	6.25 mg/kg	96.9	80.0	120	----
tellurium	13494-80-9	E475	0.02	mg/kg	2.5 mg/kg	91.7	80.0	120	----
thallium	7440-28-0	E475	0.002	mg/kg	25 mg/kg	89.2	80.0	120	----
tin	7440-31-5	E475	0.1	mg/kg	12.5 mg/kg	90.6	80.0	120	----
uranium	7440-61-1	E475	0.002	mg/kg	0.125 mg/kg	94.9	80.0	120	----
vanadium	7440-62-2	E475	0.1	mg/kg	12.5 mg/kg	93.8	80.0	120	----
zinc	7440-66-6	E475	1	mg/kg	12.5 mg/kg	87.3	80.0	120	----
zirconium	7440-67-7	E475	0.2	mg/kg	2.5 mg/kg	97.1	80.0	120	----
Metals (QCLot: 648756)									
mercury	7439-97-6	E512	0.01	mg/kg	0.05 mg/kg	86.8	80.0	120	----
Metals (QCLot: 648757)									
mercury	7439-97-6	E512A	0.002	mg/kg wwt	0.05 mg/kg wwt	86.8	80.0	120	----
Metals (QCLot: 648758)									
silver	7440-22-4	E475.Ag	0.005	mg/kg	2.5 mg/kg	# 79.0	80.0	120	MES
Metals (QCLot: 648759)									
titanium	7440-32-6	E475.Ti	0.5	mg/kg	6.25 mg/kg	87.0	80.0	120	----
Metals (QCLot: 648763)									
aluminum	7429-90-5	E475	5	mg/kg	50 mg/kg	89.3	80.0	120	----
antimony	7440-36-0	E475	0.02	mg/kg	25 mg/kg	89.8	80.0	120	----
arsenic	7440-38-2	E475	0.05	mg/kg	25 mg/kg	91.0	80.0	120	----
barium	7440-39-3	E475	0.05	mg/kg	6.25 mg/kg	86.6	80.0	120	----
beryllium	7440-41-7	E475	0.01	mg/kg	2.5 mg/kg	89.0	80.0	120	----

Sub-Matrix: **Biota**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Metals (QCLot: 648763) - continued									
bismuth	7440-69-9	E475	0.01	mg/kg	25 mg/kg	87.6	80.0	120	----
boron	7440-42-8	E475	1	mg/kg	25 mg/kg	89.0	80.0	120	----
cadmium	7440-43-9	E475	0.01	mg/kg	2.5 mg/kg	86.0	80.0	120	----
calcium	7440-70-2	E475	20	mg/kg	1250 mg/kg	86.4	80.0	120	----
cesium	7440-46-2	E475	0.005	mg/kg	1.25 mg/kg	91.6	80.0	120	----
chromium	7440-47-3	E475	0.2	mg/kg	6.25 mg/kg	87.4	80.0	120	----
cobalt	7440-48-4	E475	0.02	mg/kg	6.25 mg/kg	86.1	80.0	120	----
copper	7440-50-8	E475	0.2	mg/kg	6.25 mg/kg	84.0	80.0	120	----
iron	7439-89-6	E475	5	mg/kg	25 mg/kg	89.6	80.0	120	----
lead	7439-92-1	E475	0.05	mg/kg	12.5 mg/kg	89.4	80.0	120	----
lithium	7439-93-2	E475	0.5	mg/kg	6.25 mg/kg	91.9	80.0	120	----
magnesium	7439-95-4	E475	2	mg/kg	1250 mg/kg	86.9	80.0	120	----
manganese	7439-96-5	E475	0.05	mg/kg	6.25 mg/kg	88.5	80.0	120	----
molybdenum	7439-98-7	E475	0.04	mg/kg	6.25 mg/kg	93.0	80.0	120	----
nickel	7440-02-0	E475	0.2	mg/kg	12.5 mg/kg	84.0	80.0	120	----
phosphorus	7723-14-0	E475	20	mg/kg	250 mg/kg	90.0	80.0	120	----
potassium	7440-09-7	E475	20	mg/kg	1250 mg/kg	86.6	80.0	120	----
rubidium	7440-17-7	E475	0.05	mg/kg	2.5 mg/kg	90.8	80.0	120	----
selenium	7782-49-2	E475	0.1	mg/kg	25 mg/kg	86.9	80.0	120	----
sodium	7440-23-5	E475	20	mg/kg	1250 mg/kg	92.3	80.0	120	----
strontium	7440-24-6	E475	0.1	mg/kg	6.25 mg/kg	91.3	80.0	120	----
tellurium	13494-80-9	E475	0.02	mg/kg	2.5 mg/kg	86.0	80.0	120	----
thallium	7440-28-0	E475	0.002	mg/kg	25 mg/kg	87.3	80.0	120	----
tin	7440-31-5	E475	0.1	mg/kg	12.5 mg/kg	87.3	80.0	120	----
uranium	7440-61-1	E475	0.002	mg/kg	0.125 mg/kg	91.9	80.0	120	----
vanadium	7440-62-2	E475	0.1	mg/kg	12.5 mg/kg	90.2	80.0	120	----
zinc	7440-66-6	E475	1	mg/kg	12.5 mg/kg	83.6	80.0	120	----
zirconium	7440-67-7	E475	0.2	mg/kg	2.5 mg/kg	90.1	80.0	120	----

Qualifiers

Qualifier	Description
MES	*Data Quality Objective was marginally exceeded (by < 10% absolute) for < 10% of analytes in a Multi-Element Scan / Multi-Parameter Scan (considered acceptable as per OMOE & CCME).*

Reference Material (RM) Report

A Reference Material (RM) is a homogenous material with known and well-established analyte concentrations. RMs are processed in an identical manner to test samples, and are used to monitor and control the accuracy and precision of a test method for a typical sample matrix. RM results are expressed as percent recovery of the target analyte concentration. RM targets may be certified target concentrations provided by the RM supplier, or may be ALS long-term mean values (for empirical test methods).

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Metals (QCLot: 635557)									
	RM	silver	7440-22-4	E472.Ag	2.05 mg/kg	83.5	70.0	130	----
Metals (QCLot: 635559)									
	RM	mercury	7439-97-6	E511	0.331 mg/kg	97.6	70.0	130	----
Metals (QCLot: 635560)									
	RM	mercury	7439-97-6	E511A	0.331 mg/kg wwt	97.6	70.0	130	----
Metals (QCLot: 635561)									
	RM	aluminum	7429-90-5	E472	11.2 mg/kg	84.0	70.0	130	----
	RM	arsenic	7440-38-2	E472	34.6 mg/kg	87.8	70.0	130	----
	RM	cadmium	7440-43-9	E472	14.5 mg/kg	81.9	70.0	130	----
	RM	calcium	7440-70-2	E472	550 mg/kg	87.9	70.0	130	----
	RM	cesium	7440-46-2	E472	0.0712 mg/kg	91.5	70.0	130	----
	RM	chromium	7440-47-3	E472	1.96 mg/kg	91.4	70.0	130	----
	RM	cobalt	7440-48-4	E472	0.267 mg/kg	80.8	70.0	130	----
	RM	copper	7440-50-8	E472	35 mg/kg	83.4	70.0	130	----
	RM	iron	7439-89-6	E472	1070 mg/kg	85.0	70.0	130	----
	RM	lead	7439-92-1	E472	0.162 mg/kg	86.6	70.0	130	----
	RM	magnesium	7439-95-4	E472	940 mg/kg	83.3	70.0	130	----
	RM	manganese	7439-96-5	E472	8.91 mg/kg	86.0	70.0	130	----
	RM	molybdenum	7439-98-7	E472	1.41 mg/kg	93.0	70.0	130	----
	RM	nickel	7440-02-0	E472	1.57 mg/kg	116	70.0	130	----
	RM	phosphorus	7723-14-0	E472	11500 mg/kg	88.0	70.0	130	----
	RM	potassium	7440-09-7	E472	14400 mg/kg	87.2	70.0	130	----
	RM	rubidium	7440-17-7	E472	5.11 mg/kg	84.4	70.0	130	----
	RM	selenium	7782-49-2	E472	8 mg/kg	94.0	70.0	130	----
	RM	sodium	7440-23-5	E472	10673 mg/kg	90.0	70.0	130	----
	RM	strontium	7440-24-6	E472	3.92 mg/kg	87.9	70.0	130	----
	RM	thallium	7440-28-0	E472	0.013 mg/kg	87.4	70.0	130	----
	RM	uranium	7440-61-1	E472	0.0786 mg/kg	90.2	70.0	130	----

Sub-Matrix:

Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Reference Material (RM) Report: RM Target Concentration	Recovery (%): RM	Recovery Limits (%): Low	Recovery Limits (%): High	Qualifier
Metals (QCLot: 635561) - continued									
	RM	vanadium	7440-62-2	E472	0.51 mg/kg	83.9	70.0	130	----
	RM	zinc	7440-66-6	E472	105.3 mg/kg	88.0	70.0	130	----
Metals (QCLot: 648734)									
	RM	mercury	7439-97-6	E512	0.331 mg/kg	99.8	70.0	130	----
Metals (QCLot: 648735)									
	RM	mercury	7439-97-6	E512A	0.331 mg/kg wwt	99.8	70.0	130	----
Metals (QCLot: 648736)									
	RM	silver	7440-22-4	E475.Ag	2.05 mg/kg	84.2	70.0	130	----
Metals (QCLot: 648741)									
	RM	aluminum	7429-90-5	E475	11.2 mg/kg	92.0	70.0	130	----
	RM	arsenic	7440-38-2	E475	34.6 mg/kg	89.0	70.0	130	----
	RM	bismuth	7440-69-9	E475	0.0247 mg/kg	73.7	60.0	140	----
	RM	cadmium	7440-43-9	E475	14.5 mg/kg	83.5	70.0	130	----
	RM	calcium	7440-70-2	E475	550 mg/kg	90.5	70.0	130	----
	RM	cesium	7440-46-2	E475	0.0712 mg/kg	92.6	70.0	130	----
	RM	chromium	7440-47-3	E475	1.96 mg/kg	106	70.0	130	----
	RM	cobalt	7440-48-4	E475	0.267 mg/kg	81.8	70.0	130	----
	RM	copper	7440-50-8	E475	35 mg/kg	84.5	70.0	130	----
	RM	iron	7439-89-6	E475	1070 mg/kg	87.9	70.0	130	----
	RM	lead	7439-92-1	E475	0.162 mg/kg	109	70.0	130	----
	RM	magnesium	7439-95-4	E475	940 mg/kg	85.8	70.0	130	----
	RM	manganese	7439-96-5	E475	8.91 mg/kg	87.5	70.0	130	----
	RM	molybdenum	7439-98-7	E475	1.41 mg/kg	92.1	70.0	130	----
	RM	nickel	7440-02-0	E475	1.57 mg/kg	83.3	70.0	130	----
	RM	phosphorus	7723-14-0	E475	11500 mg/kg	91.8	70.0	130	----
	RM	potassium	7440-09-7	E475	14400 mg/kg	90.6	70.0	130	----
	RM	rubidium	7440-17-7	E475	5.11 mg/kg	86.7	70.0	130	----
	RM	selenium	7782-49-2	E475	8 mg/kg	92.4	70.0	130	----
	RM	sodium	7440-23-5	E475	10673 mg/kg	91.7	70.0	130	----
	RM	strontium	7440-24-6	E475	3.92 mg/kg	89.9	70.0	130	----
	RM	thallium	7440-28-0	E475	0.013 mg/kg	86.5	70.0	130	----

Sub-Matrix:

Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Reference Material (RM) Report: RM Target Concentration	Recovery (%): RM	Recovery Limits (%): Low	Recovery Limits (%): High	Qualifier
Metals (QCLot: 648741) - continued									
	RM	uranium	7440-61-1	E475	0.0786 mg/kg	95.4	70.0	130	----
	RM	vanadium	7440-62-2	E475	0.51 mg/kg	87.9	70.0	130	----
	RM	zinc	7440-66-6	E475	105.3 mg/kg	86.9	70.0	130	----
Metals (QCLot: 648756)									
	RM	mercury	7439-97-6	E512	0.331 mg/kg	94.9	70.0	130	----
Metals (QCLot: 648757)									
	RM	mercury	7439-97-6	E512A	0.331 mg/kg wwt	94.9	70.0	130	----
Metals (QCLot: 648758)									
	RM	silver	7440-22-4	E475.Ag	2.05 mg/kg	83.5	70.0	130	----
Metals (QCLot: 648763)									
	RM	aluminum	7429-90-5	E475	11.2 mg/kg	84.0	70.0	130	----
	RM	arsenic	7440-38-2	E475	34.6 mg/kg	87.8	70.0	130	----
	RM	cadmium	7440-43-9	E475	14.5 mg/kg	81.9	70.0	130	----
	RM	calcium	7440-70-2	E475	550 mg/kg	87.9	70.0	130	----
	RM	cesium	7440-46-2	E475	0.0712 mg/kg	91.5	70.0	130	----
	RM	chromium	7440-47-3	E475	1.96 mg/kg	91.4	70.0	130	----
	RM	cobalt	7440-48-4	E475	0.267 mg/kg	80.8	70.0	130	----
	RM	copper	7440-50-8	E475	35 mg/kg	83.4	70.0	130	----
	RM	iron	7439-89-6	E475	1070 mg/kg	85.0	70.0	130	----
	RM	lead	7439-92-1	E475	0.162 mg/kg	86.6	70.0	130	----
	RM	magnesium	7439-95-4	E475	940 mg/kg	83.3	70.0	130	----
	RM	manganese	7439-96-5	E475	8.91 mg/kg	86.0	70.0	130	----
	RM	molybdenum	7439-98-7	E475	1.41 mg/kg	93.0	70.0	130	----
	RM	nickel	7440-02-0	E475	1.57 mg/kg	116	70.0	130	----
	RM	phosphorus	7723-14-0	E475	11500 mg/kg	88.0	70.0	130	----
	RM	potassium	7440-09-7	E475	14400 mg/kg	87.2	70.0	130	----
	RM	rubidium	7440-17-7	E475	5.11 mg/kg	84.4	70.0	130	----
	RM	selenium	7782-49-2	E475	8 mg/kg	94.0	70.0	130	----
	RM	sodium	7440-23-5	E475	10673 mg/kg	90.0	70.0	130	----
	RM	strontium	7440-24-6	E475	3.92 mg/kg	87.9	70.0	130	----
	RM	thallium	7440-28-0	E475	0.013 mg/kg	87.4	70.0	130	----

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Metals (QCLot: 648763) - continued									
	RM	uranium	7440-61-1	E475	0.0786 mg/kg	90.2	70.0	130	----
	RM	vanadium	7440-62-2	E475	0.51 mg/kg	83.9	70.0	130	----
	RM	zinc	7440-66-6	E475	105.3 mg/kg	88.0	70.0	130	----

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

Affix ALS barcode label here
(lab use only)

COC Nu

Environmental Division
Vancouver
Work Order Reference
VA22B7702

Telephone : +1 604 253 4188

Report To	Contact and company name below will appear on the final report	Report Format / Distribution	Select Service Level Below - Please confirm all E&P TATs with
Company:	Mount Polley Mining Corporation	Select Report Format: ☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)	Regular [R] ☑ Standard TAT if receive
Contact:	Gabriel Holmes	Quality Control (QC) Report with Report ☑ YES ☐ NO	PRIORITY (Business Days): 4 day [P4] ☐ / 3 day [P3] ☐ / 2 day [P2] ☐ — EMERGENCY 1
Phone:	236-317-4939	☑ Compare Results to Criteria on Report - provide details below if box checked	
	Company address below will appear on the final report	Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX	Date and Time Required for all E&P TATs:
Street:	PO Box 12	Email 1 or Fax gabriel.holmes@mountpolley.com	
City/Province:	Likely, BC	Email 2 kala.ivens@mountpolley.com, pschnurr@minnow.ca	For tests that can not be performed according to the service le
Postal Code:	V0L 1N0	Email 3 pstecko@minnow.ca, kbatchelar@minnow.ca	
Invoice To	Same as Report To ☑ YES ☐ NO	**Invoice Distribution**	
	Copy of Invoice with Report ☐ YES ☐ NO	Select Invoice Distribution: ☑ EMAIL ☑ MAIL ☐ FAX	
Company:		Email 1 or Fax gabriel.holmes@mountpolley.com	
Contact:		Email 2	

Project Information		Oil and Gas Required Fields (client use)	
ALS Account # / Quote #:	VA22-MPMC100-002	AFE/Cost Center:	PO#
Job #:		Major/Minor Code:	Routing Code:
PO / AFE:		Requisitioner:	
LSD:		Location:	

ALS Lab Work Order # (lab use only)	B7702	ALS Contact: Can Dang	Sampler: ~~SCHNURR~~ LATIMER

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Moisture Content by Gravimetry (E144)	Mercury in Biota by CVAAS (DRY units, Routine) (E510)	Mercury in Biota by CVAAS (WET units, Routine) (E510A)	Metals in Biota by CRC ICPMS (DRY units, Routine) (E440)	Silver in Biota by CRC ICPMS (DRY units, Routine) (E440 Ag)	Titanium in Biota by CRC ICPMS (DRY units, Routine) (E440 Ti)	Number of Containers
1	POL-P2_ZOOT-1_2022-07	25-July-22	—	Tissue	R	R	R	R	R	R	1
2	POL-P2_ZOOT-2_2022-07	25-July-22	—	Tissue	R	R	R	R	R	R	1
3	POL-P2_ZOOT-3_2022-07	25-July-22	—	Tissue	R	R	R	R	R	R	1
4	POL-P2_ZOOT-4_2022-07	25-July-22	—	Tissue	R	R	R	R	R	R	1
5	POL-P2_ZOOT-5_2022-07	25-July-22	—	Tissue	R	R	R	R	R	R	1
6	BOL-B2_ZOOT-1_2022-07	26-July-22	—	Tissue	R	R	R	R	R	R	1
7	BOL-B2_ZOOT-2_2022-07	26-July-22	—	Tissue	R	R	R	R	R	R	1
8	BOL-B2_ZOOT-3_2022-07	26-July-22	—	Tissue	R	R	R	R	R	R	1
9	BOL-B2_ZOOT-4_2022-07	26-July-22	—	Tissue	R	R	R	R	R	R	1
10	BOL-B2_ZOOT-5_2022-07	26-July-22	—	Tissue	R	R	R	R	R	R	1
~~11~~											
~~12~~											

Drinking Water (DW) Samples[1] (client use)	Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)
Are samples taken from a Regulated DW System? ☐ YES ☑ NO	
Are samples for human drinking water use? ☐ YES ☑ NO	If sample is insufficient for regular digestion and analysis, contact kbatchelar@minnow.ca to discuss analysis options (e.g., use of microdigestion and HR-ICPMS)

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐
Ice Packs ☑ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐
Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
			7.8°		

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: S. Latimer	Date: 28-Jul-2022	Time: 1241	Received by:	Date:	Time:	Received by: IT	Date: Aug 2/22	Time: 11:40 AM

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

OCTOBER 2015 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form**.

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Affix ALS barcode label here (lab use only)

COC Number:

Report To	Contact and company name below will appear on the final report
Company:	Mount Polley Mining Corporation
Contact:	Gabriel Holmes
Phone:	236-317-4939
	Company address below will appear on the final report
Street:	PO Box 12
City/Province:	Likely, BC
Postal Code:	V0L 1N0
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☐ NO
Company:	
Contact:	

Report Format / Distribution

Select Report Format: ☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)
Quality Control (QC) Report with Report ☑ YES ☐ NO
☑ Compare Results to Criteria on Report - provide details below if box checked
Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax: gabriel.holmes@mountpolley.com
Email 2: kala.ivens@mountpolley.com, pschnurr@minnow.ca
Email 3: pstecko@minnow.ca, kbatchelar@minnow.ca

Invoice Distribution

Select Invoice Distribution: ☐ EMAIL ☑ MAIL ☐ FAX
Email 1 or Fax: gabriel.holmes@mountpolley.com
Email 2:

Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply

Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days): 4 day [P4] ☐ | 3 day [P3] ☐ | 2 day [P2] ☐

EMERGENCY: 1 Business day [E1] ☐ | Same Day, Weekend or Statutory holiday [E0] ☐

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm

For tests that can not be performed according to the service level selected, you will be contacted.

Project Information

ALS Account # / Quote #: VA22-MPMC100-002
Job #:
PO / AFE:
LSD:

Oil and Gas Required Fields (client use)

AFE/Cost Center: | PO#
Major/Minor Code: | Routing Code:
Requisitioner:
Location:

ALS Lab Work Order # (lab use only):

ALS Contact: Can Dang | Sampler: ~~SCHURR~~ LATIMER

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Moisture Content by Gravimetry (E144)	Mercury in Biota by CVAAS (DRY units, Routine) (E510)	Mercury in Biota by CVAAS (WET units, Routine) (E510A)	Metals in Biota by CRC ICPMS (DRY units, Routine) (E440)	Silver in Biota by CRC ICPMS (DRY units, Routine) (E440.Ag)	Titanium in Biota by CRC ICPMS (DRY units, Routine) (E440.Ti)	Number of Containers
11	QUL-ZOO-7_ZOOT-1_2022-07	27-July-22	—	Tissue	R	R	R	R	R	R	1
12	QUL-ZOO-7_ZOOT-2_2022-07	27-July-22	—	Tissue	R	R	R	R	R	R	1
13	QUL-ZOO-7_ZOOT-3_2022-07	27-July-22	—	Tissue	R	R	R	R	R	R	1
14	QUL-ZOO-7_ZOOT-4_2022-07	27-July-22	—	Tissue	R	R	R	R	R	R	1
15	QUL-ZOO-7_ZOOT-5_2022-07	27-July-22	—	Tissue	R	R	R	R	R	R	1
16	QUL-ZOO-1_ZOOT-1_2022-07	27-July-22	—	Tissue	R	R	R	R	R	R	1
17	QUL-ZOO-1_ZOOT-2_2022-07	27-July-22	—	Tissue	R	R	R	R	R	R	1
18	QUL-ZOO-1_ZOOT-3_2022-07	28-July-22	—	Tissue	R	R	R	R	R	R	1
19	QUL-ZOO-1_ZOOT-4_2022-07	28-July-22	—	Tissue	R	R	R	R	R	R	1
20	QUL-ZOO-1_ZOOT-5_2022-07	28-July-22	—	Tissue	R	R	R	R	R	R	1
21	BBOL-B2_ZOOT-3 X_2022-07	26-July-22	—	Tissue	R	R	R	R	R	R	1
22											

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☑ NO

Are samples for human drinking water use? ☐ YES ☑ NO

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

If sample is insufficient for regular digestion and analysis, contact kbatchelar@minnow.ca to discuss analysis options (e.g., use of microdigestion and HR-ICPMS)

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ | SIF Observations Yes ☐ No ☐
Ice Packs ☑ Ice Cubes ☐ | Custody seal intact Yes ☐ No ☐
Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
			23°		

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: S. Latimer	Date: 28-Jul-2022	Time: 1241	Received by:	Date:	Time:	Received by: IT	Date: Aug 2 2	Time: 11:40

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

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1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

Affix ALS barcode label here
(lab use only)

COC Nu

Environmental Division
Vancouver
Work Order Reference
VA22B7702

Telephone : +1 604 253 4188

Report To	Contact and company name below will appear on the final report	Report Format / Distribution	Select Service Level Below - Please confirm all E&P TATs with
Company:	Mount Polley Mining Corporation	Select Report Format: ☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)	Regular [R] ☑ Standard TAT if receive
Contact:	Gabriel Holmes	Quality Control (QC) Report with Report ☑ YES ☐ NO	PRIORITY (Business Days) 4 day [P4] ☐ EMERGENCY 1
Phone:	236-317-4939	☑ Compare Results to Criteria on Report - provide details below if box checked	3 day [P3] ☐
	Company address below will appear on the final report	Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX	2 day [P2] ☐
Street:	PO Box 12	Email 1 or Fax gabriel.holmes@mountpolley.com	Date and Time Required for all E&P TATs:
City/Province:	Likely, BC	Email 2 kala.ivens@mountpolley.com, pschnurr@minnow.ca	For tests that can not be performed according to the service le
Postal Code:	V0L 1N0	Email 3 pstecko@minnow.ca, kbatchelar@minnow.ca	
Invoice To	Same as Report To ☑ YES ☐ NO	Invoice Distribution	
	Copy of Invoice with Report ☐ YES ☐ NO	Select Invoice Distribution: ☑ EMAIL ☑ MAIL ☐ FAX	
Company:		Email 1 or Fax gabriel.holmes@mountpolley.com	
Contact:		Email 2	

Project Information		Oil and Gas Required Fields (client use)	
ALS Account # / Quote #:	VA22-MPMC100-002	AFE/Cost Center:	PO#
Job #:		Major/Minor Code:	Routing Code:
PO / AFE:		Requisitioner:	
LSD:		Location:	
ALS Lab Work Order # (lab use only)	B7702	ALS Contact: Can Dang	Sampler: ~~SCHNURR~~ LATIMER

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Moisture Content by Gravimetry (E144)	Mercury in Biota by CVAAS (DRY units, Routine) (E510)	Mercury in Biota by CVAAS (WET units, Routine) (E510A)	Metals in Biota by CRC ICPMS (DRY units, Routine) (E440)	Silver in Biota by CRC ICPMS (DRY units, Routine) (E440.Ag)	Titanium in Biota by CRC ICPMS (DRY units, Routine) (E440.Ti)	Number of Containers
1	POL-P2_ZOOT-1_2022-07	25-July-22	—	Tissue	R	R	R	R	R	R	1
2	POL-P2_ZOOT-2_2022-07	25-July-22	—	Tissue	R	R	R	R	R	R	1
3	POL-P2_ZOOT-3_2022-07	25-July-22	—	Tissue	R	R	R	R	R	R	1
4	POL-P2_ZOOT-4_2022-07	25-July-22	—	Tissue	R	R	R	R	R	R	1
5	POL-P2_ZOOT-5_2022-07	25-July-22	—	Tissue	R	R	R	R	R	R	1
6	BOL-B2_ZOOT-1_2022-07	26-July-22	—	Tissue	R	R	R	R	R	R	1
7	BOL-B2_ZOOT-2_2022-07	26-July-22	—	Tissue	R	R	R	R	R	R	1
8	BOL-B2_ZOOT-3_2022-07	26-July-22	—	Tissue	R	R	R	R	R	R	1
9	BOL-B2_ZOOT-4_2022-07	26-July-22	—	Tissue	R	R	R	R	R	R	1
10	BOL-B2_ZOOT-5_2022-07	26-July-22	—	Tissue	R	R	R	R	R	R	1
~~11~~											
~~12~~											

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☑ NO

Are samples for human drinking water use? ☐ YES ☑ NO

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

If sample is insufficient for regular digestion and analysis, contact kbatchelar@minnow.ca to discuss analysis options (e.g., use of microdigestion and HR-ICPMS)

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice Packs ☑ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
			28°		

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: S. Latimer	Date: 28-Jul-2022	Time: 1241	Received by:	Date:	Time:	Received by: JT	Date: Aug 2 22	Time: 11:40

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

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1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

Affix ALS barcode label here (lab use only)

COC Number:

Report To	Contact and company name below will appear on the final report
Company:	Mount Polley Mining Corporation
Contact:	Gabriel Holmes
Phone:	236-317-4939
	Company address below will appear on the final report
Street:	PO Box 12
City/Province:	Likely, BC
Postal Code:	V0L 1N0
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☐ NO
Company:	
Contact:	

Report Format / Distribution	
Select Report Format:	☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)
Quality Control (QC) Report with Report	☑ YES ☐ NO
☑ Compare Results to Criteria on Report - provide details below if box checked	
Select Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	gabriel.holmes@mountpolley.com
Email 2	kala.ivens@mountpolley.com, pschnurr@minnow.ca
Email 3	pstecko@minnow.ca, kbatchelar@minnow.ca
Invoice Distribution	
Select Invoice Distribution:	☐ EMAIL ☑ MAIL ☐ FAX
Email 1 or Fax	gabriel.holmes@mountpolley.com
Email 2	

Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply

Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days)		EMERGENCY	
4 day [P4]	☐	1 Business day [E1]	☐
3 day [P3]	☐	Same Day, Weekend or Statutory holiday [E0]	☐
2 day [P2]	☐		

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm

For tests that can not be performed according to the service level selected, you will be contacted.

Project Information		Oil and Gas Required Fields (client use)	
ALS Account # / Quote #:	VA22-MPMC100-002	AFE/Cost Center:	PO#
Job #:		Major/Minor Code:	Routing Code:
PO / AFE:		Requisitioner:	
LSD:		Location:	

ALS Lab Work Order # (lab use only):

ALS Contact: Can Dang **Sampler:** ~~SCHNURR~~ LATIMER

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Moisture Content by Gravimetry (E144)	Mercury in Biota by CVAAS (DRY units, Routine) (E510)	Mercury in Biota by CVAAS (WET units, Routine) (E510A)	Metals in Biota by CRC ICPMS (DRY units, Routine) (E440)	Silver in Biota by CRC ICPMS (DRY units, Routine) (E440.Ag)	Titanium in Biota by CRC ICPMS (DRY units, Routine) (E440.Ti)	Number of Containers
11 ~~13~~	QUL-ZOO-7_ZOOT-1_2022-07	27-July-22	—	Tissue	R	R	R	R	R	R	1
12 ~~14~~	QUL-ZOO-7_ZOOT-2_2022-07	27-July-22	—	Tissue	R	R	R	R	R	R	1
13 ~~15~~	QUL-ZOO-7_ZOOT-3_2022-07	27-July-22	—	Tissue	R	R	R	R	R	R	1
14 ~~16~~	QUL-ZOO-7_ZOOT-4_2022-07	27-July-22	—	Tissue	R	R	R	R	R	R	1
15 ~~17~~	QUL-ZOO-7_ZOOT-5_2022-07	27-July-22	—	Tissue	R	R	R	R	R	R	1
16 ~~18~~	QUL-ZOO-1_ZOOT-1_2022-07	27-July-22	—	Tissue	R	R	R	R	R	R	1
17 ~~19~~	QUL-ZOO-1_ZOOT-2_2022-07	27-July-22	—	Tissue	R	R	R	R	R	R	1
18 ~~20~~	QUL-ZOO-1_ZOOT-3_2022-07	28-July-22	—	Tissue	R	R	R	R	R	R	1
19 ~~21~~	QUL-ZOO-1_ZOOT-4_2022-07	28-July-22	—	Tissue	R	R	R	R	R	R	1
20 ~~22~~	QUL-ZOO-1_ZOOT-5_2022-07	28-July-22	—	Tissue	R	R	R	R	R	R	1
21 ~~23~~	BBOL-B2 _ZOOT-3 X_2022-07	26-July-22	—	Tissue	R	R	R	R	R	R	1
~~24~~											

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☑ NO

Are samples for human drinking water use? ☐ YES ☑ NO

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

If sample is insufficient for regular digestion and analysis, contact kbatchelar@minnow.ca to discuss analysis options (e.g., use of microdigestion and HR-ICPMS)

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice Packs ☑ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
			23°		

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: S. Latimer	Date: 28-Jul-2022	Time: 1241	Received by:	Date:	Time:	Received by: IT	Date: Aug 2 22	Time: 11:40

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

OCTOBER 2015 FRONT

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1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

ZOOPLANKTON TISSUE CHEMISTRY

ALS Laboratory Report VA22C0442

(Finalized October 19, 2022)

ALS Canada Ltd.

right solutions. right partner.

CERTIFICATE OF ANALYSIS

Work Order	: **VA22C0442**	Page	: 1 of 4
Client	: **Mount Polley Mining Corporation**	Laboratory	: Vancouver - Environmental
Contact	: Kala Ivens	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: 250-790-2215 Ext 2112	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 30-Aug-2022 10:50
PO	: 5590008044 Q2 2022	Date Analysis Commenced	: 17-Oct-2022
C-O-C number	: ----	Issue Date	: 19-Oct-2022 12:38
Sampler	: ----		
Site	: ----		
Quote number	: VA22-MPMC100-002		
No. of samples received	: 5		
No. of samples analysed	: 5		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Alex Thornton	Analyst	Metals, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Metals, Burnaby, British Columbia
Salimah Khimani	Lab Assistant	Metals, Burnaby, British Columbia

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances

LOR: Limit of Reporting (detection limit).

Unit	*Description*
%	percent
mg/kg	milligrams per kilogram
mg/kg wwt	milligrams per kilogram wet weight

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Qualifiers

Qualifier	*Description*
DLA	*Detection Limit adjusted for required dilution.*

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	POL-P2_ZOOT-1_2022-08	BOL-B2_ZOOT-1_2022-08	QUL-ZOO-7_ZOOT-1_2022-08	QUL-ZOO-1_ZOOT-1_2022-08	QUL-ZOO-1_ZOOT-1X_2022-08
					Client sampling date / time	25-Aug-2022	28-Aug-2022	28-Aug-2022	28-Aug-2022	28-Aug-2022
						VA22C0442-001	VA22C0442-002	VA22C0442-003	VA22C0442-004	VA22C0442-005
						Result	Result	Result	Result	Result
Physical Tests										
moisture	----	E144A	2.0	%		96.5	98.4	97.8	97.9	98.0
Metals										
aluminum	7429-90-5	E475	5.0	mg/kg		576	1150	1190	1450	1240
antimony	7440-36-0	E475	0.020	mg/kg		0.086	0.249	0.053	0.170	0.071
arsenic	7440-38-2	E475	0.050	mg/kg		7.85	8.24	3.48	4.24	3.70
barium	7440-39-3	E475	0.050	mg/kg		14.2	86.0	19.4	26.0	25.0
beryllium	7440-41-7	E475	0.010	mg/kg		0.019	0.044	0.044	0.052	0.045
bismuth	7440-69-9	E475	0.010	mg/kg		<0.014 DLA	0.010	0.020	0.014	0.012
boron	7440-42-8	E475	1.0	mg/kg		4.5	9.5	4.6	3.3	3.8
cadmium	7440-43-9	E475	0.010	mg/kg		0.303	0.368	1.49	1.50	1.51
calcium	7440-70-2	E475	20	mg/kg		11700	25600	37100	34500	36900
cesium	7440-46-2	E475	0.0050	mg/kg		0.0789	0.149	0.147	0.177	0.166
chromium	7440-47-3	E475	0.20	mg/kg		19.0	16.2	7.31	21.3	12.8
cobalt	7440-48-4	E475	0.020	mg/kg		0.725	1.29	1.55	1.97	1.59
copper	7440-50-8	E475	0.20	mg/kg		53.3	57.0	41.3	36.3	31.6
iron	7439-89-6	E475	5.0	mg/kg		964	3000	2130	3110	2090
lead	7439-92-1	E475	0.050	mg/kg		0.649	5.72	0.892	0.933	0.750
lithium	7439-93-2	E475	0.50	mg/kg		<0.71 DLA	0.84	1.17	1.63	1.13
magnesium	7439-95-4	E475	2.0	mg/kg		1160	2090	1770	2330	1770
manganese	7439-96-5	E475	0.050	mg/kg		187	3060	132	164	145
mercury	7439-97-6	E512	0.010	mg/kg		0.030	0.058	0.068	0.082	0.075
mercury	7439-97-6	E512A	0.0020	mg/kg wwt		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
molybdenum	7439-98-7	E475	0.040	mg/kg		0.867	2.26	0.554	0.744	0.552
nickel	7440-02-0	E475	0.20	mg/kg		7.71	8.16	5.52	10.0	6.01
phosphorus	7723-14-0	E475	20	mg/kg		8000	11400	11600	11200	11500
potassium	7440-09-7	E475	20	mg/kg		6360	9800	8690	8840	9130
rubidium	7440-17-7	E475	0.050	mg/kg		5.67	9.11	13.5	13.7	13.4
selenium	7782-49-2	E475	0.10	mg/kg		2.83	3.01	2.75	2.65	2.67
silver	7440-22-4	E475.Ag	0.0050	mg/kg		0.0255	0.0664	0.0622	0.0587	0.0560
sodium	7440-23-5	E475	20	mg/kg		4730	9580	6970	7070	7490

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	POL-P2_ZOOT-1_2022-08	BOL-B2_ZOOT-1_2022-08	QUL-ZOO-7_ZOOT-1_2022-08	QUL-ZOO-1_ZOOT-1_2022-08	QUL-ZOO-1_ZOOT-1X_2022-08
					Client sampling date / time	25-Aug-2022	28-Aug-2022	28-Aug-2022	28-Aug-2022	28-Aug-2022
						VA22C0442-001	VA22C0442-002	VA22C0442-003	VA22C0442-004	VA22C0442-005
						Result	Result	Result	Result	Result
Metals										
strontium	7440-24-6	E475	0.10	mg/kg		53.4	153	177	167	186
tellurium	13494-80-9	E475	0.020	mg/kg		<0.028 DLA	<0.020	<0.020	<0.020	<0.020
thallium	7440-28-0	E475	0.0020	mg/kg		0.0075	0.0475	0.0209	0.0192	0.0189
tin	7440-31-5	E475	0.10	mg/kg		0.21	0.29	0.43	0.21	0.22
titanium	7440-32-6	E475.Ti	0.50	mg/kg		36.9	65.5	66.2	85.7	59.7
uranium	7440-61-1	E475	0.0020	mg/kg		0.0827	0.209	0.126	0.143	0.131
vanadium	7440-62-2	E475	0.10	mg/kg		3.42	7.22	6.83	10.4	6.85
zinc	7440-66-6	E475	1.0	mg/kg		77.3	89.1	77.2	71.0	74.7
zirconium	7440-67-7	E475	0.20	mg/kg		1.04	1.92	1.43	1.50	1.13

Please refer to the General Comments section for an explanation of any qualifiers detected.

ALS Canada Ltd.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA22C0442**	Page	: 1 of 9
Client	: **Mount Polley Mining Corporation**	Laboratory	: Vancouver - Environmental
Contact	: Kala Ivens	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: 250-790-2215 Ext 2112	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 30-Aug-2022 10:50
PO	: 5590008044 Q2 2022	Issue Date	: 19-Oct-2022 12:36
C-O-C number	: ----		
Sampler	: ----		
Site	: ----		
Quote number	: VA22-MPMC100-002		
No. of samples received	: 5		
No. of samples analysed	: 5		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- Laboratory Control Sample (LCS) outliers occur - please see following pages for full details.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **Biota**

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment
Laboratory Control Sample (LCS) Recoveries								
Metals	QC-MRG6-699714002	----	silver	7440-22-4	E475.Ag	78.4 % MES	80.0-120%	Recovery less than lower control limit

Result Qualifiers

Qualifier	Description
MES	*Data Quality Objective was marginally exceeded (by < 10% absolute) for < 10% of analytes in a Multi-Element Scan / Multi-Parameter Scan (considered acceptable as per OMOE & CCME).*

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Biota by CVAAS (DRY units, Biopsy)										
LDPE bag BOL-B2_ZOOT-1_2022-08	E512	28-Aug-2022	17-Oct-2022	----	----		18-Oct-2022	365 days	52 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Biopsy)										
LDPE bag QUL-ZOO-1_ZOOT-1_2022-08	E512	28-Aug-2022	17-Oct-2022	----	----		18-Oct-2022	365 days	52 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Biopsy)										
LDPE bag QUL-ZOO-1_ZOOT-1X_2022-08	E512	28-Aug-2022	17-Oct-2022	----	----		18-Oct-2022	365 days	52 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Biopsy)										
LDPE bag QUL-ZOO-7_ZOOT-1_2022-08	E512	28-Aug-2022	17-Oct-2022	----	----		18-Oct-2022	365 days	52 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Biopsy)										
LDPE bag POL-P2_ZOOT-1_2022-08	E512	25-Aug-2022	17-Oct-2022	----	----		18-Oct-2022	365 days	55 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Biopsy)										
LDPE bag BOL-B2_ZOOT-1_2022-08	E512A	28-Aug-2022	17-Oct-2022	----	----		18-Oct-2022	365 days	52 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Biopsy)										
LDPE bag QUL-ZOO-1_ZOOT-1_2022-08	E512A	28-Aug-2022	17-Oct-2022	----	----		18-Oct-2022	365 days	52 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Biota by CVAAS (WET units, Biopsy)										
LDPE bag QUL-ZOO-1_ZOOT-1X_2022-08	E512A	28-Aug-2022	17-Oct-2022	----	----		18-Oct-2022	365 days	52 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Biopsy)										
LDPE bag QUL-ZOO-7_ZOOT-1_2022-08	E512A	28-Aug-2022	17-Oct-2022	----	----		18-Oct-2022	365 days	52 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Biopsy)										
LDPE bag POL-P2_ZOOT-1_2022-08	E512A	25-Aug-2022	17-Oct-2022	----	----		18-Oct-2022	365 days	55 days	✓
Metals : Metals by CRC ICPMS (DRY units, Biopsy)										
LDPE bag BOL-B2_ZOOT-1_2022-08	E475	28-Aug-2022	17-Oct-2022	----	----		18-Oct-2022	730 days	52 days	✓
Metals : Metals by CRC ICPMS (DRY units, Biopsy)										
LDPE bag QUL-ZOO-1_ZOOT-1_2022-08	E475	28-Aug-2022	17-Oct-2022	----	----		18-Oct-2022	730 days	52 days	✓
Metals : Metals by CRC ICPMS (DRY units, Biopsy)										
LDPE bag QUL-ZOO-1_ZOOT-1X_2022-08	E475	28-Aug-2022	17-Oct-2022	----	----		18-Oct-2022	730 days	52 days	✓
Metals : Metals by CRC ICPMS (DRY units, Biopsy)										
LDPE bag QUL-ZOO-7_ZOOT-1_2022-08	E475	28-Aug-2022	17-Oct-2022	----	----		18-Oct-2022	730 days	52 days	✓
Metals : Metals by CRC ICPMS (DRY units, Biopsy)										
LDPE bag POL-P2_ZOOT-1_2022-08	E475	25-Aug-2022	17-Oct-2022	----	----		18-Oct-2022	730 days	55 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag BOL-B2_ZOOT-1_2022-08	E475.Ag	28-Aug-2022	17-Oct-2022	----	----		18-Oct-2022	730 days	52 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Silver in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag QUL-ZOO-1_ZOOT-1_2022-08	E475.Ag	28-Aug-2022	17-Oct-2022	----	----		18-Oct-2022	730 days	52 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag QUL-ZOO-1_ZOOT-1X_2022-08	E475.Ag	28-Aug-2022	17-Oct-2022	----	----		18-Oct-2022	730 days	52 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag QUL-ZOO-7_ZOOT-1_2022-08	E475.Ag	28-Aug-2022	17-Oct-2022	----	----		18-Oct-2022	730 days	52 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag POL-P2_ZOOT-1_2022-08	E475.Ag	25-Aug-2022	17-Oct-2022	----	----		18-Oct-2022	730 days	55 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag BOL-B2_ZOOT-1_2022-08	E475.Ti	28-Aug-2022	17-Oct-2022	----	----		18-Oct-2022	730 days	52 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag QUL-ZOO-1_ZOOT-1_2022-08	E475.Ti	28-Aug-2022	17-Oct-2022	----	----		18-Oct-2022	730 days	52 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag QUL-ZOO-1_ZOOT-1X_2022-08	E475.Ti	28-Aug-2022	17-Oct-2022	----	----		18-Oct-2022	730 days	52 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag QUL-ZOO-7_ZOOT-1_2022-08	E475.Ti	28-Aug-2022	17-Oct-2022	----	----		18-Oct-2022	730 days	52 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag POL-P2_ZOOT-1_2022-08	E475.Ti	25-Aug-2022	17-Oct-2022	----	----		18-Oct-2022	730 days	55 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Moisture Content by Gravimetry (Biopsy)										
LDPE bag										
BOL-B2_ZOOT-1_2022-08	E144A	28-Aug-2022	----	----	----		17-Oct-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Biopsy)										
LDPE bag										
POL-P2_ZOOT-1_2022-08	E144A	25-Aug-2022	----	----	----		17-Oct-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Biopsy)										
LDPE bag										
QUL-ZOO-1_ZOOT-1_2022-08	E144A	28-Aug-2022	----	----	----		17-Oct-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Biopsy)										
LDPE bag										
QUL-ZOO-1_ZOOT-1X_2022-08	E144A	28-Aug-2022	----	----	----		17-Oct-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Biopsy)										
LDPE bag										
QUL-ZOO-7_ZOOT-1_2022-08	E144A	28-Aug-2022	----	----	----		17-Oct-2022	----	----	

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Biota**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Control Samples (LCS)							
Mercury in Biota by CVAAS (DRY units, Biopsy)	E512	699714	2	6	33.3	10.0	✓
Mercury in Biota by CVAAS (WET units, Biopsy)	E512A	699715	2	6	33.3	10.0	✓
Metals by CRC ICPMS (DRY units, Biopsy)	E475	699717	2	6	33.3	10.0	✓
Moisture Content by Gravimetry (Biopsy)	E144A	699722	1	6	16.6	5.0	✓
Silver in Biota by CRC ICPMS (DRY units, Biopsy)	E475.Ag	699718	2	5	40.0	10.0	✓
Titanium in Biota by CRC ICPMS (DRY units, Biopsy)	E475.Ti	699719	1	5	20.0	10.0	✓
Method Blanks (MB)							
Mercury in Biota by CVAAS (DRY units, Biopsy)	E512	699714	1	6	16.6	5.0	✓
Mercury in Biota by CVAAS (WET units, Biopsy)	E512A	699715	1	6	16.6	5.0	✓
Metals by CRC ICPMS (DRY units, Biopsy)	E475	699717	1	6	16.6	5.0	✓
Moisture Content by Gravimetry (Biopsy)	E144A	699722	1	6	16.6	5.0	✓
Silver in Biota by CRC ICPMS (DRY units, Biopsy)	E475.Ag	699718	1	5	20.0	5.0	✓
Titanium in Biota by CRC ICPMS (DRY units, Biopsy)	E475.Ti	699719	1	5	20.0	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Moisture Content by Gravimetry (Biopsy)	E144A Vancouver - Environmental	Biota	Puget Sound Water Quality Authority/CCME PHC in Soil - Tier 1	This analysis is carried out gravimetrically by drying the sample at < 60 deg. C for a minimum of three days.
Metals by CRC ICPMS (DRY units, Biopsy)	E475 Vancouver - Environmental	Biota	EPA 200.3/6020B (mod)	Samples are digested with nitric acid, hydrochloric acid, and hydrogen peroxide. Analysis is by Collision/Reaction Cell ICPMS: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.
Silver in Biota by CRC ICPMS (DRY units, Biopsy)	E475.Ag Vancouver - Environmental	Biota	EPA 200.3/6020B (mod)	Samples are digested with nitric acid, hydrochloric acid, and hydrogen peroxide. Analysis is by Collision/Reaction Cell ICPMS. Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.
Titanium in Biota by CRC ICPMS (DRY units, Biopsy)	E475.Ti Vancouver - Environmental	Biota	EPA 200.3/6020B (mod)	Samples are digested with nitric acid, hydrochloric acid, and hydrogen peroxide. Analysis is by Collision/Reaction Cell ICPMS. Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.
Mercury in Biota by CVAAS (DRY units, Biopsy)	E512 Vancouver - Environmental	Biota	EPA 200.3/1631E (mod)	Samples are digested with nitric acid, hydrochloric acid, and hydrogen peroxide. Analysis is by CVAAS.
Mercury in Biota by CVAAS (WET units, Biopsy)	E512A Vancouver - Environmental	Biota	EPA 200.3/1631E (mod)	Samples are homogenized digested with nitric acid, hydrochloric acid, and hydrogen peroxide. Analysis is by CVAAS.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Metals and Mercury Biota Digestion (Biopsy)	EP475 Vancouver - Environmental	Biota	EPA 200.3/200.8 (mod)	Samples are digested with nitric acid, hydrochloric acid, and hydrogen peroxide. Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.

QUALITY CONTROL REPORT

Work Order	: **VA22C0442**	Page	: 1 of 8
Client	: Mount Polley Mining Corporation	Laboratory	: Vancouver - Environmental
Contact	: Kala Ivens	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 30-Aug-2022 10:50
PO	: 5590008044 Q2 2022	Date Analysis Commenced	: 17-Oct-2022
C-O-C number	: ----	Issue Date	: 19-Oct-2022 12:36
Sampler	: ---- 250-790-2215 Ext 2112		
Site	: ----		
Quote number	: VA22-MPMC100-002		
No. of samples received	: 5		
No. of samples analysed	: 5		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Reference Material (RM) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Alex Thornton	Analyst	Vancouver Metals, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Vancouver Metals, Burnaby, British Columbia
Salimah Khimani	Lab Assistant	Vancouver Metals, Burnaby, British Columbia

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Biota**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 699722)						
moisture	----	E144A	2	%	<2.0	----
Metals (QCLot: 699714)						
mercury	7439-97-6	E512	0.01	mg/kg	<0.010	----
Metals (QCLot: 699715)						
mercury	7439-97-6	E512A	0.002	mg/kg wwt	<0.0020	----
Metals (QCLot: 699717)						
aluminum	7429-90-5	E475	5	mg/kg	<5.0	----
antimony	7440-36-0	E475	0.02	mg/kg	<0.020	----
arsenic	7440-38-2	E475	0.05	mg/kg	<0.050	----
barium	7440-39-3	E475	0.05	mg/kg	<0.050	----
beryllium	7440-41-7	E475	0.01	mg/kg	<0.010	----
bismuth	7440-69-9	E475	0.01	mg/kg	<0.010	----
boron	7440-42-8	E475	1	mg/kg	<1.0	----
cadmium	7440-43-9	E475	0.01	mg/kg	<0.010	----
calcium	7440-70-2	E475	20	mg/kg	<20	----
cesium	7440-46-2	E475	0.005	mg/kg	<0.0050	----
chromium	7440-47-3	E475	0.2	mg/kg	<0.20	----
cobalt	7440-48-4	E475	0.02	mg/kg	<0.020	----
copper	7440-50-8	E475	0.2	mg/kg	<0.20	----
iron	7439-89-6	E475	5	mg/kg	<5.0	----
lead	7439-92-1	E475	0.05	mg/kg	<0.050	----
lithium	7439-93-2	E475	0.5	mg/kg	<0.50	----
magnesium	7439-95-4	E475	2	mg/kg	<2.0	----
manganese	7439-96-5	E475	0.05	mg/kg	<0.050	----
molybdenum	7439-98-7	E475	0.04	mg/kg	<0.040	----
nickel	7440-02-0	E475	0.2	mg/kg	<0.20	----
phosphorus	7723-14-0	E475	20	mg/kg	<20	----
potassium	7440-09-7	E475	20	mg/kg	<20	----
rubidium	7440-17-7	E475	0.05	mg/kg	<0.050	----
selenium	7782-49-2	E475	0.1	mg/kg	<0.10	----
sodium	7440-23-5	E475	20	mg/kg	<20	----
strontium	7440-24-6	E475	0.1	mg/kg	<0.10	----

Sub-Matrix: **Biota**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 699717) - continued						
tellurium	13494-80-9	E475	0.02	mg/kg	<0.020	----
thallium	7440-28-0	E475	0.002	mg/kg	<0.0020	----
tin	7440-31-5	E475	0.1	mg/kg	<0.10	----
uranium	7440-61-1	E475	0.002	mg/kg	<0.0020	----
vanadium	7440-62-2	E475	0.1	mg/kg	<0.10	----
zinc	7440-66-6	E475	1	mg/kg	<1.0	----
zirconium	7440-67-7	E475	0.2	mg/kg	<0.20	----
Metals (QCLot: 699718)						
silver	7440-22-4	E475.Ag	0.005	mg/kg	<0.0050	----
Metals (QCLot: 699719)						
titanium	7440-32-6	E475.Ti	0.5	mg/kg	<0.50	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Biota**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 699722)									
moisture	----	E144A	2	%	100 %	99.9	90.0	110	----
Metals (QCLot: 699714)									
mercury	7439-97-6	E512	0.01	mg/kg	0.05 mg/kg	95.8	80.0	120	----
Metals (QCLot: 699715)									
mercury	7439-97-6	E512A	0.002	mg/kg wwt	0.05 mg/kg wwt	95.8	80.0	120	----
Metals (QCLot: 699717)									
aluminum	7429-90-5	E475	5	mg/kg	50 mg/kg	95.5	80.0	120	----
antimony	7440-36-0	E475	0.02	mg/kg	25 mg/kg	95.4	80.0	120	----
arsenic	7440-38-2	E475	0.05	mg/kg	25 mg/kg	99.5	80.0	120	----
barium	7440-39-3	E475	0.05	mg/kg	6.25 mg/kg	95.7	80.0	120	----
beryllium	7440-41-7	E475	0.01	mg/kg	2.5 mg/kg	85.9	80.0	120	----
bismuth	7440-69-9	E475	0.01	mg/kg	25 mg/kg	92.3	80.0	120	----
boron	7440-42-8	E475	1	mg/kg	25 mg/kg	85.0	80.0	120	----
cadmium	7440-43-9	E475	0.01	mg/kg	2.5 mg/kg	91.3	80.0	120	----
calcium	7440-70-2	E475	20	mg/kg	1250 mg/kg	89.2	80.0	120	----
cesium	7440-46-2	E475	0.005	mg/kg	1.25 mg/kg	100	80.0	120	----
chromium	7440-47-3	E475	0.2	mg/kg	6.25 mg/kg	96.0	80.0	120	----
cobalt	7440-48-4	E475	0.02	mg/kg	6.25 mg/kg	97.6	80.0	120	----
copper	7440-50-8	E475	0.2	mg/kg	6.25 mg/kg	94.0	80.0	120	----
iron	7439-89-6	E475	5	mg/kg	25 mg/kg	95.1	80.0	120	----
lead	7439-92-1	E475	0.05	mg/kg	12.5 mg/kg	93.5	80.0	120	----
lithium	7439-93-2	E475	0.5	mg/kg	6.25 mg/kg	88.1	80.0	120	----
magnesium	7439-95-4	E475	2	mg/kg	1250 mg/kg	93.0	80.0	120	----
manganese	7439-96-5	E475	0.05	mg/kg	6.25 mg/kg	95.4	80.0	120	----
molybdenum	7439-98-7	E475	0.04	mg/kg	6.25 mg/kg	104	80.0	120	----
nickel	7440-02-0	E475	0.2	mg/kg	12.5 mg/kg	93.6	80.0	120	----
phosphorus	7723-14-0	E475	20	mg/kg	250 mg/kg	95.1	80.0	120	----
potassium	7440-09-7	E475	20	mg/kg	1250 mg/kg	93.7	80.0	120	----
rubidium	7440-17-7	E475	0.05	mg/kg	2.5 mg/kg	99.3	80.0	120	----
selenium	7782-49-2	E475	0.1	mg/kg	25 mg/kg	92.4	80.0	120	----
sodium	7440-23-5	E475	20	mg/kg	1250 mg/kg	93.5	80.0	120	----
strontium	7440-24-6	E475	0.1	mg/kg	6.25 mg/kg	98.1	80.0	120	----

Sub-Matrix: **Biota**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Metals (QCLot: 699717) - continued									
tellurium	13494-80-9	E475	0.02	mg/kg	2.5 mg/kg	93.9	80.0	120	----
thallium	7440-28-0	E475	0.002	mg/kg	25 mg/kg	94.9	80.0	120	----
tin	7440-31-5	E475	0.1	mg/kg	12.5 mg/kg	95.7	80.0	120	----
uranium	7440-61-1	E475	0.002	mg/kg	0.125 mg/kg	94.5	80.0	120	----
vanadium	7440-62-2	E475	0.1	mg/kg	12.5 mg/kg	99.7	80.0	120	----
zinc	7440-66-6	E475	1	mg/kg	12.5 mg/kg	90.8	80.0	120	----
zirconium	7440-67-7	E475	0.2	mg/kg	2.5 mg/kg	101	80.0	120	----
Metals (QCLot: 699718)									
silver	7440-22-4	E475.Ag	0.005	mg/kg	2.5 mg/kg	# 78.4	80.0	120	MES
Metals (QCLot: 699719)									
titanium	7440-32-6	E475.Ti	0.5	mg/kg	6.25 mg/kg	94.2	80.0	120	----

Qualifiers

Qualifier	Description
MES	*Data Quality Objective was marginally exceeded (by < 10% absolute) for < 10% of analytes in a Multi-Element Scan / Multi-Parameter Scan (considered acceptable as per OMOE & CCME).*

Reference Material (RM) Report

A Reference Material (RM) is a homogenous material with known and well-established analyte concentrations. RMs are processed in an identical manner to test samples, and are used to monitor and control the accuracy and precision of a test method for a typical sample matrix. RM results are expressed as percent recovery of the target analyte concentration. RM targets may be certified target concentrations provided by the RM supplier, or may be ALS long-term mean values (for empirical test methods).

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Metals (QCLot: 699714)									
	RM	mercury	7439-97-6	E512	0.331 mg/kg	99.4	70.0	130	----
Metals (QCLot: 699715)									
	RM	mercury	7439-97-6	E512A	0.331 mg/kg wwt	99.4	70.0	130	----
Metals (QCLot: 699717)									
	RM	aluminum	7429-90-5	E475	11.2 mg/kg	85.4	70.0	130	----
	RM	arsenic	7440-38-2	E475	34.6 mg/kg	93.6	70.0	130	----
	RM	bismuth	7440-69-9	E475	0.0247 mg/kg	110	60.0	140	----
	RM	cadmium	7440-43-9	E475	14.5 mg/kg	85.1	70.0	130	----
	RM	calcium	7440-70-2	E475	550 mg/kg	88.8	70.0	130	----
	RM	cesium	7440-46-2	E475	0.0712 mg/kg	89.1	70.0	130	----
	RM	chromium	7440-47-3	E475	1.96 mg/kg	92.1	70.0	130	----
	RM	cobalt	7440-48-4	E475	0.267 mg/kg	88.3	70.0	130	----
	RM	copper	7440-50-8	E475	35 mg/kg	91.8	70.0	130	----
	RM	iron	7439-89-6	E475	1070 mg/kg	91.6	70.0	130	----
	RM	lead	7439-92-1	E475	0.162 mg/kg	83.4	70.0	130	----
	RM	magnesium	7439-95-4	E475	940 mg/kg	93.5	70.0	130	----
	RM	manganese	7439-96-5	E475	8.91 mg/kg	92.2	70.0	130	----
	RM	molybdenum	7439-98-7	E475	1.41 mg/kg	91.1	70.0	130	----
	RM	nickel	7440-02-0	E475	1.57 mg/kg	106	70.0	130	----
	RM	phosphorus	7723-14-0	E475	11500 mg/kg	94.7	70.0	130	----
	RM	potassium	7440-09-7	E475	14400 mg/kg	99.4	70.0	130	----
	RM	rubidium	7440-17-7	E475	5.11 mg/kg	93.6	70.0	130	----
	RM	selenium	7782-49-2	E475	8 mg/kg	93.8	70.0	130	----
	RM	sodium	7440-23-5	E475	10673 mg/kg	91.1	70.0	130	----
	RM	strontium	7440-24-6	E475	3.92 mg/kg	90.6	70.0	130	----
	RM	thallium	7440-28-0	E475	0.013 mg/kg	88.1	70.0	130	----
	RM	uranium	7440-61-1	E475	0.0786 mg/kg	96.0	70.0	130	----
	RM	vanadium	7440-62-2	E475	0.51 mg/kg	91.9	70.0	130	----

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Metals (QCLot: 699717) - continued									
	RM	zinc	7440-66-6	E475	105.3 mg/kg	90.4	70.0	130	----
Metals (QCLot: 699718)									
	RM	silver	7440-22-4	E475.Ag	2.05 mg/kg	83.0	70.0	130	----

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Affix ALS barcode label here (lab use only)

COC Number:

Page 1 of 1

Report To	Contact and company name below will appear on the final report
Company:	Mount Polley Mining Corporation
Contact:	Gabriel Holmes
Phone:	236-317-4939
Company address below will appear on the final report	
Street:	PO Box 12
City/Province:	Likely, BC
Postal Code:	V0L 1N0
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☐ NO
Company:	
Contact:	

Report Format / Distribution	
Select Report Format:	☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)
Quality Control (QC) Report with Report	☑ YES ☐ NO
☑ Compare Results to Criteria on Report - provide details below if box checked	
Select Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	gabriel.holmes@mountpolley.com
Email 2	kala.ivens@mountpolley.com, pschnurr@minnow.ca
Email 3	pstecko@minnow.ca, kbatchelar@minnow.ca

Invoice Distribution	
Select Invoice Distribution:	☑ EMAIL ☑ MAIL ☐ FAX
Email 1 or Fax	gabriel.holmes@mountpolley.com
Email 2	

Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply

Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days)		EMERGENCY	
	4 day [P4] ☐		1 Business day [E1] ☐
	3 day [P3] ☐		Same Day, Weekend or Statutory holiday [E0] ☐
	2 day [P2] ☐		

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm

For tests that can not be performed according to the service level selected, you will be contacted.

Project Information		Oil and Gas Required Fields (client use)	
ALS Account # / Quote #:	VA22-MPMC100-002	AFE/Cost Center:	PO#:
Job #:		Major/Minor Code:	Routing Code:
PO / AFE:		Requisitioner:	
LSD:		Location:	
ALS Lab Work Order # (lab use only)	VA22C0442	ALS Contact: Can Dang	Sampler: SCHNURR/ LATIMER

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Moisture Content by Gravimetry (E144)	Mercury in Biota by CVAAS (DRY units, Routine) (E510)	Mercury in Biota by CVAAS (WET units, Routine) (E510A)	Metals in Biota by CRC ICPMS (DRY units, Routine) (E440)	Silver in Biota by CRC ICPMS (DRY units, Routine) (E440.Ag)	Titanium in Biota by CRC ICPMS (DRY units, Routine) (E440.Ti)	Number of Containers
	POL-P2_ZOOT-1_2022-08	25-Aug-22		Tissue	R	R	R	R	R	R	1
	BOL-B2_ZOOT-1_2022-08	28-Aug-22		Tissue	R	R	R	R	R	R	1
	QUL-ZOO-7_ZOOT-1_2022-08	29-Aug-22		Tissue	R	R	R	R	R	R	1
	QUL-ZOO-1_ZOOT-1_2022-08	28-Aug-22		Tissue	R	R	R	R	R	R	1
	QUL-ZOO-1_ZOOT-1X_2022-08	28-Aug-22		Tissue	R	R	R	R	R	R	1

Environmental Division Vancouver

Work Order Reference VA22C0442

Telephone : +1 604 253 4188

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☑ NO

Are samples for human drinking water use? ☐ YES ☑ NO

dd on report by clicking on the drop-down list below (ronic COC only)

If sample is insufficient for regular digestion and analysis, contact kbatchelar@minnow.ca to discuss analysis options (e.g., use of microdigestion and HR-ICPMS)

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice Packs ☐ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
				9	

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: S. Lehmer	Date: 29 Aug 22	Time: 0915	Received by:	Date:	Time:	Received by: JC	Date: AUG 30 2022	Time: 1050 AM

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

OCTOBER 2015 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form.**

PERIPHYTON COMMUNITY AND PRODUCTIVITY

Biologica Laboratory Reports pp22-078
Freshwater Periphyton

(Finalized November 1, 2022)

Freshwater Periphyton Enumeration and Identification Methods
Client: Minnow Environmental
Project: Mount Polley 2022

Sample Inventory

Sample arrival: 15-Aug-2022
Number of samples: 15
Number of jars: 15
Biologica project number: pp22-078

Upon arrival, samples were examined, and Lugols preservative was added to ensure adequate preservation of samples. An inventory form was created and verified with the chain of custody (COC) to ensure all samples were accounted for. Any discrepancies were reported to the client and were resolved before further sample handling.

Sample Processing

Distilled water was added to the samples as needed to make their volumes uniform (27.8 mL). Samples were sonicated for seven minutes using a CO-Z Digital Ultrasonic Cleaner (40 kHz), and sub-samples (0.1 – 0.2 mL) were dispensed into Utermohl settling chambers and allowed to settle for 24 hours. Sub-samples were then systematically scanned using a Zeiss Axio Vert A.1 inverted phase-contrast microscope at 400x magnification. All algal cells were counted in a series of randomly located fields of view (FOV) until a minimum of 300 algal units were enumerated or until 80 FOV were scanned. Algal units represent single cells of all algal groups, as well as colonies or filaments of blue-green algae. Given that blue-green algal colonies/filaments may contain hundreds of cells, enumerating units rather than individual cells allows for a more equal representation of algal groups. The mean number of cells per unit (= 1 for single cells, >1 for all other algal forms) was estimated for all taxa and used to calculate total densities. Only “viable” cells (those that appeared to be alive at the time of collection) were identified and enumerated. Chrysophyte loricas were also counted (EPA, 2003).

Algae were identified to genus, where possible, following the most up-to-date taxonomic references and collaborations with international and local algal taxonomic experts. Species-level identifications were only given to identifiable taxa for which there are reliable taxonomic references available that encompass the species-level morphological diversity in North America. This approach ensures long-term consistency of data sets and is in accordance with the trend in algal taxonomic practice to be more conservative with the delineation of species. Species-level identifications for some taxa are problematic due to widespread phenotypic plasticity that can artificially inflate species richness (Wehr *et al.* 2015). When applicable, terms “cf.” (*confertim*, possibly for species) and “sp.1” (a single undetermined species) were employed to distinguish between different species in the same genus.

Table 1. Summary of phytoplankton samples processed for Minnow Environmental Mount Polley Periphyton, 2022.

Client Sample ID	Rep	Date Sampled	Biologica Sample ID	Sub-sample Volume (mL)	Fields of View Scanned	Total Units Counted*
EDC-U_PERI-1_2022-08	1	10-Aug-22	pp22-078-049	0.1	37	304
EDC-U_PERI-2_2022-08	2	10-Aug-22	pp22-078-050	0.1	15	324
EDC-U_PERI-3_2022-08	3	10-Aug-22	pp22-078-051	0.1	13	310
EDC-U_PERI-4_2022-08	4	10-Aug-22	pp22-078-052	0.1	33	312
EDC-U_PERI-5_2022-08	5	10-Aug-22	pp22-078-053	0.1	17	307
HAC-R1_PERI-1_2022-08	1	10-Aug-22	pp22-078-054	0.1	23	319
HAC-R1_PERI-2_2022-08	2	10-Aug-22	pp22-078-055	0.1	35	318
HAC-R1_PERI-3_2022-08	3	10-Aug-22	pp22-078-056	0.1	23	357
HAC-R1_PERI-4_2022-08	4	10-Aug-22	pp22-078-057	0.1	23	312
HAC-R1_PERI-5_2022-08	5	10-Aug-22	pp22-078-058	0.1	17	341
HAC-U_PERI-1_2022-08	1	10-Aug-22	pp22-078-059	0.2	23	325
HAC-U_PERI-2_2022-08	2	10-Aug-22	pp22-078-060	0.2	15	314
HAC-U_PERI-3_2022-08	3	10-Aug-22	pp22-078-061	0.1	17	306
HAC-U_PERI-4_2022-08	4	10-Aug-22	pp22-078-062	0.1	21	311
HAC-U_PERI-5_2022-08	5	10-Aug-22	pp22-078-063	0.1	25	321

*Algal units represent single cells, colonies, coenobia or filaments.

Data

A calculation involving the sub-sample volume, number of FOV assessed, number of units counted, and number of cells per unit enabled cell densities, expressed as the number of cells per centimetre squared (cells/cm^2), to be determined.

QA/QC

Two samples were re-analyzed to assess the precision of enumeration (Table 2). Replicate samples are chosen at random and processed at different times to reduce counting and identification bias.

Table 2. Summary of enumeration QA/QC results for Minnow Environmental Mount Polley Periphyton, 2022.

Client Sample ID	Rep	Biologica Sample ID	Original Density (cells/cm^2)	QA Density (cells/cm^2)	Percent Agreement (%)
EDC-U_PERI-2_2022-08	2	pp22-078-050	3,685,304	3,174,032	**86.13**
HAC-R1_PERI-4_2022-08	4	pp22-078-057	2,239,208	1,876,189	**83.79**
				Average:	**84.96**

* Percent Agreement: [100- (difference in abundance between samples) / total abundance of the original sample)] %

Results were provided to the Minnow Environmental project manager in Excel spreadsheets via email.

Methodological and Taxonomic References

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John, D. M., Whitton, B. A., & Brook, A. J. 2002. The freshwater algal flora of the British Isles: an identification guide to freshwater and terrestrial Algae (Vol. 1). Cambridge University Press.

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Total Periphyton Density (cells/cm²) for Minnow Environmental Mount Polley, 2022

						Biologica Sample ID	pp22-078-049	pp22-078-050	pp22-078-051	pp22-078-052	pp22-078-053
						Client Sample ID	EDC-U_PERI-1_2022-08	EDC-U_PERI-2_2022-08	EDC-U_PERI-3_2022-08	EDC-U_PERI-4_2022-08	EDC-U_PERI-5_2022-08
						Date Sampled	10-Aug-22	10-Aug-22	10-Aug-22	10-Aug-22	10-Aug-22
Common Name	Phylum	Order	Family	Taxon	Grand Total		Total Density	Total Density	Total Density	Total Density	Total Density
					Unique Taxa	Density (cells/cm²)	(cells/cm²)	(cells/cm²)	(cells/cm²)	(cells/cm²)	(cells/cm²)
Diatoms	Bacillariophyta	Aulacoseirales	Aulacoseiraceae	Aulacoseira sp.	1	2,429					
Diatoms	Bacillariophyta	Bacillariales	Bacillariaceae	Nitzschia sp.	1	466,390		94,970	158,999	30,472	42,720
Diatoms	Bacillariophyta	Cocconeidales	Achnanthidiaceae	Achnanthidium minutissimum	1	202,711	1,510	42,829	53,716	846	8,215
Diatoms	Bacillariophyta	Cocconeidales	Achnanthidiaceae	Achnanthidium sp.		316,591	3,020	44,692	75,202	6,771	21,360
Diatoms	Bacillariophyta	Cocconeidales	Cocconeidaceae	Cocconeis placentula	1	58,136	755	5,586	2,149	2,539	3,286
Diatoms	Bacillariophyta	Cymbellales	Cymbellaceae	Cymbella sp.	1	139,172				1,693	
Diatoms	Bacillariophyta	Cymbellales	Cymbellaceae	Cymbella sp. (< 55 µm in length)		1,643					
Diatoms	Bacillariophyta	Cymbellales	Gomphonemataceae	Encyonema sp.	1	65,148		3,724			
Diatoms	Bacillariophyta	Cymbellales	Gomphonemataceae	Encyonopsis cf. microcephala	1	10,561					
Diatoms	Bacillariophyta	Cymbellales	Gomphonemataceae	Gomphonema sp.	1	295,836	9,814	35,381	42,973	22,007	27,932
Diatoms	Bacillariophyta	Cymbellales	Gomphonemataceae	Reimeria sp.	1	7,866		1,862		2,539	
Diatoms	Bacillariophyta	Cymbellales	Rhoicospheniaceae	Rhoicosphenia sp.	1	6,482	755				1,643
Diatoms	Bacillariophyta	Fragilariales	Fragilariaceae	Fragilaria crotonensis	1	7,287					
Diatoms	Bacillariophyta	Fragilariales	Fragilariaceae	Fragilaria sp.		84,416		16,759	32,229	16,082	9,858
Diatoms	Bacillariophyta	Fragilariales	Staurosiraceae	Staurosira sp.	1	358,870				1,693	4,929
Diatoms	Bacillariophyta	Fragilariales	Staurosiraceae	Staurosirella sp.	1	141,260					
Diatoms	Bacillariophyta	Licmophorales	Ulnariaceae	Ulnaria sp.	1	16,354			6,446	1,693	4,929
Diatoms	Bacillariophyta	Mastogloiales	Achnanthaceae	Platessa sp.	1	2,760					
Diatoms	Bacillariophyta	Melosirales	Melosiraceae	Melosira sp.	1	33,949		9,311			
Diatoms	Bacillariophyta	Naviculales	Amphipleuraceae	Amphipleura pellucida	1	30,967		11,173	10,743	1,693	1,643
Diatoms	Bacillariophyta	Naviculales	Amphipleuraceae	Frustulia sp.	1	2,149			2,149		
Diatoms	Bacillariophyta	Naviculales	Naviculaceae	Navicula cf. cryptocephala	1	45,219					
Diatoms	Bacillariophyta	Naviculales	Naviculaceae	Navicula cf. radiosa	1	11,095					1,643
Diatoms	Bacillariophyta	Naviculales	Naviculaceae	Navicula sp.		286,631		20,484	36,527	2,539	4,929
Diatoms	Bacillariophyta	Rhabdonematales	Tabellariaceae	Diatoma sp.	1	12,404					1,643
Diatoms	Bacillariophyta	Rhabdonematales	Tabellariaceae	Meridion circulare	1	2,995			2,149	846	
Diatoms	Bacillariophyta	Rhopalodiales	Rhopalodiaceae	Epithemia adnata	1	2,429					
Diatoms	Bacillariophyta	Rhopalodiales	Rhopalodiaceae	Epithemia sp.		13,054					
Diatoms	Bacillariophyta	Rhopalodiales	Rhopalodiaceae	Epithemia turgida	1	5,286					
Diatoms	Bacillariophyta	Rhopalodiales	Rhopalodiaceae	Epithemia sorex	1	180,632					
Diatoms	Bacillariophyta	Rhopalodiales	Rhopalodiaceae	Rhopalodia gibba	1	24,386					
Diatoms	Bacillariophyta	Stephanodiscales	Stephanodiscaceae	Cyclotella sp.	1	1,643					
Diatoms	Bacillariophyta	Surirellales	Surirellaceae	Surirella sp.	1	1,862		1,862			
Diatoms	Bacillariophyta	Thalassiophysales	Catenulaceae	Amphora sp.	1	1,117					
Diatoms	Bacillariophyta			Pennate diatom		110,963		33,519	21,486	4,232	
				Total Diatoms		**2,950,694**	**15,853**	**322,152**	**444,767**	**95,647**	**134,732**
Green Algae	Charophyta	Desmidiales	Closteriaceae	Closterium sp.	1	1,862		1,862			
Green Algae	Chlorophyta	Chaetophorales	Chaetophoraceae	Chaetophora sp.	1	76,861					
Green Algae	Chlorophyta	Chlorellales	Oocystaceae	Oocystis sp.	1	4,858					
Green Algae	Chlorophyta	Sphaeropleales	Hydrodictyaceae	Stauridium tetras	1	7,287					
Green Algae	Chlorophyta	Sphaeropleales	Scenedesmaceae	Desmodesmus sp.	1	11,430					
Green Algae	Chlorophyta	Sphaeropleales	Scenedesmaceae	Scenedesmus sp.	1	41,051			8,595		
Green Algae	Chlorophyta	Sphaeropleales	Selenastraceae	Monoraphidium sp.	1	13,621		3,724	4,297		
Green Algae	Chlorophyta			Chlorophyte		202,648	75,492	11,173	10,743	5,925	23,003
				Total Green Algae		**359,617**	**75,492**	**16,759**	**23,635**	**5,925**	**23,003**
Blue-green Algae	Cyanophyta	Chroococcales	Chroococcaceae	Chroococcus sp.	1	2,429					
Blue-green Algae	Cyanophyta	Chroococcales	Stichosiphonaceae	Stichosiphon sp.	1	11,279	5,284	1,862		846	3,286
Blue-green Algae	Cyanophyta	Nostocales	Nostocaceae	Anabaena sp.	1	30,373					
Blue-green Algae	Cyanophyta	Nostocales	Rivulariaceae	Calothrix sp.	1	7,933,883					29,575
Blue-green Algae	Cyanophyta	Oscillatoriales	Oscillatoriaceae	Phormidium sp.	1	4,514,213	36,236	2,041,535	655,333	686,117	756,319
Blue-green Algae	Cyanophyta	Synechococcales	Chamaesiphonaceae	Chamaesiphon sp. (colony)	1	2,341,633	415,406	426,855	573,346	227,521	449,928
Blue-green Algae	Cyanophyta	Synechococcales	Chamaesiphonaceae	Chamaesiphon sp. (single cell)		108,356	8,304	18,621	25,784	17,775	36,148
Blue-green Algae	Cyanophyta	Synechococcales	Heteroleibleiniaceae	Heteroleibeinia sp.	1	6,182,261	556,612	685,271	914,458	858,958	1,046,637
Blue-green Algae	Cyanophyta	Synechococcales	Leptolyngbyaceae	Leptolyngbya sp.	1	825,740		75,417	292,214	110,036	213,599
Blue-green Algae	Cyanophyta	Synechococcales	Leptolyngbyaceae	Tapinothrix sp.	1	224,457					123,230
Blue-green Algae	Cyanophyta	Synechococcales	Merismopediaceae	Merismopedia sp.	1	56,736					
Blue-green Algae	Cyanophyta	Synechococcales	Pseudanabaenaceae	Pseudanabaena sp.	1	526,364		65,175	127,076	33,011	42,720
Blue-green Algae	Cyanophyta			Cyanophyte (colony)		175,559	67,943	20,484		20,314	63,094
Blue-green Algae	Cyanophyta			Cyanophyte (filament)		139,661			139,661		
				Total Blue-green Algae		**23,072,947**	**1,089,786**	**3,335,220**	**2,727,872**	**1,954,579**	**2,764,536**
Red Algae	Rhodophyta	Acrochaetiales	Acrochaetiaceae	Audouinella sp.	1	119,107	36,236	11,173		7,618	64,080
				Total Red Algae		**119,107**	**36,236**	**11,173**	**0**	**7,618**	**64,080**
Brown Algae	Ochrophyta	Sphacelariales	Lithodermataceae	Bodanella sp.	1	972,927					
				Total Brown Algae		**972,927**	**0**	**0**	**0**	**0**	**0**
				Total Periphyton		**27,475,292**	**1,217,368**	**3,685,304**	**3,196,274**	**2,063,768**	**2,986,351**
				Total Unique Taxa	**49**		**10**	**20**	**2**	**20**	**21**

Total Periphyton Density (cells/cm²) for Minnow Environmental Mount Polley, 2022

						Biologica Sample ID	pp22-078-054	pp22-078-055	pp22-078-056	pp22-078-057	pp22-078-058
						Client Sample ID	HAC-R1_PERI-1_2022-08	HAC-R1_PERI-2_2022-08	HAC-R1_PERI-3_2022-08	HAC-R1_PERI-4_2022-08	HAC-R1_PERI-5_2022-08
						Date Sampled	10-Aug-22	10-Aug-22	10-Aug-22	10-Aug-22	10-Aug-22
Common Name	Phylum	Order	Family	Taxon	Grand Total		Total Density	Total Density	Total Density	Total Density	Total Density
					Unique Taxa	Density (cells/cm²)	(cells/cm²)	(cells/cm²)	(cells/cm²)	(cells/cm²)	(cells/cm²)
Diatoms	Bacillariophyta	Aulacoseirales	Aulacoseiraceae	Aulacoseira sp.	1	2,429	2,429				
Diatoms	Bacillariophyta	Bacillariales	Bacillariaceae	Nitzschia sp.	1	466,390	7,287	5,586	1,214	7,287	19,717
Diatoms	Bacillariophyta	Cocconeidales	Achnanthidiaceae	Achnanthidium minutissimum	1	202,711			3,643		3,286
Diatoms	Bacillariophyta	Cocconeidales	Achnanthidiaceae	Achnanthidium sp.		316,591	7,287	2,394	4,858	9,716	11,502
Diatoms	Bacillariophyta	Cocconeidales	Cocconeidaceae	Cocconeis placentula	1	58,136	1,214	798	2,429	1,214	6,572
Diatoms	Bacillariophyta	Cymbellales	Cymbellaceae	Cymbella sp.	1	139,172	19,431	3,192	2,429	8,501	19,717
Diatoms	Bacillariophyta	Cymbellales	Cymbellaceae	Cymbella sp. (< 55 µm in length)		1,643					1,643
Diatoms	Bacillariophyta	Cymbellales	Gomphonemataceae	Encyonema sp.	1	65,148	13,359	20,750		3,643	9,858
Diatoms	Bacillariophyta	Cymbellales	Gomphonemataceae	Encyonopsis cf. microcephala	1	10,561				1,214	
Diatoms	Bacillariophyta	Cymbellales	Gomphonemataceae	Gomphonema sp.	1	295,836		3,990	4,858	3,643	
Diatoms	Bacillariophyta	Cymbellales	Gomphonemataceae	Reimeria sp.	1	7,866	1,214				
Diatoms	Bacillariophyta	Cymbellales	Rhoicospheniaceae	Rhoicosphenia sp.	1	6,482		798			
Diatoms	Bacillariophyta	Fragilariales	Fragilariaceae	Fragilaria crotonensis	1	7,287	4,858				
Diatoms	Bacillariophyta	Fragilariales	Fragilariaceae	Fragilaria sp.		84,416		798			4,929
Diatoms	Bacillariophyta	Fragilariales	Staurosiraceae	Staurosira sp.	1	358,870	34,004	26,336	3,643	17,002	126,517
Diatoms	Bacillariophyta	Fragilariales	Staurosiraceae	Staurosirella sp.	1	141,260	8,501	12,769	10,930	20,646	27,932
Diatoms	Bacillariophyta	Licmophorales	Ulnariaceae	Ulnaria sp.	1	16,354					3,286
Diatoms	Bacillariophyta	Mastogloiales	Achnanthaceae	Platessa sp.	1	2,760					
Diatoms	Bacillariophyta	Melosirales	Melosiraceae	Melosira sp.	1	33,949	1,214	1,596			3,286
Diatoms	Bacillariophyta	Naviculales	Amphipleuraceae	Amphipleura pellucida	1	30,967	2,429				1,643
Diatoms	Bacillariophyta	Naviculales	Amphipleuraceae	Frustulia sp.	1	2,149					
Diatoms	Bacillariophyta	Naviculales	Naviculaceae	Navicula cf. cryptocephala	1	45,219		3,990	3,643	4,858	8,215
Diatoms	Bacillariophyta	Naviculales	Naviculaceae	Navicula cf. radiosa	1	11,095	2,429	798		1,214	1,643
Diatoms	Bacillariophyta	Naviculales	Naviculaceae	Navicula sp.		286,631	29,147	21,548	8,501	17,002	19,717
Diatoms	Bacillariophyta	Rhabdonematales	Tabellariaceae	Diatoma sp.	1	12,404					
Diatoms	Bacillariophyta	Rhabdonematales	Tabellariaceae	Meridion circulare	1	2,995					
Diatoms	Bacillariophyta	Rhopalodiales	Rhopalodiaceae	Epithemia adnata	1	2,429	2,429				
Diatoms	Bacillariophyta	Rhopalodiales	Rhopalodiaceae	Epithemia sp.		13,054	1,214	798		3,643	3,286
Diatoms	Bacillariophyta	Rhopalodiales	Rhopalodiaceae	Epithemia turgida	1	5,286	1,214		1,214	1,214	1,643
Diatoms	Bacillariophyta	Rhopalodiales	Rhopalodiaceae	Epithemia sorex	1	180,632	25,503	11,173	8,501	19,431	80,511
Diatoms	Bacillariophyta	Rhopalodiales	Rhopalodiaceae	Rhopalodia gibba	1	24,386	8,501	3,192	1,214	1,214	4,929
Diatoms	Bacillariophyta	Stephanodiscales	Stephanodiscaceae	Cyclotella sp.	1	1,643					
Diatoms	Bacillariophyta	Surirellales	Surirellaceae	Surirella sp.	1	1,862					
Diatoms	Bacillariophyta	Thalassiophysales	Catenulaceae	Amphora sp.	1	1,117					
Diatoms	Bacillariophyta			Pennate diatom		110,963	2,429	4,788	4,858	6,072	11,502
				Total Diatoms		**2,950,694**	**176,094**	**125,296**	**61,937**	**127,517**	**371,334**
Green Algae	Charophyta	Desmidiales	Closteriaceae	Closterium sp.	1	1,862					
Green Algae	Chlorophyta	Chaetophorales	Chaetophoraceae	Chaetophora sp.	1	76,861					
Green Algae	Chlorophyta	Chlorellales	Oocystaceae	Oocystis sp.	1	4,858	4,858				
Green Algae	Chlorophyta	Sphaeropleales	Hydrodictyaceae	Stauridium tetras	1	7,287			7,287		
Green Algae	Chlorophyta	Sphaeropleales	Scenedesmaceae	Desmodesmus sp.	1	11,430				4,858	
Green Algae	Chlorophyta	Sphaeropleales	Scenedesmaceae	Scenedesmus sp.	1	41,051	10,930		4,858		
Green Algae	Chlorophyta	Sphaeropleales	Selenastraceae	Monoraphidium sp.	1	13,621					
Green Algae	Chlorophyta			Chlorophyte		202,648	9,716		10,930	1,214	6,572
				Total Green Algae		**359,617**	**25,503**	**0**	**23,074**	**6,072**	**6,572**
Blue-green Algae	Cyanophyta	Chroococcales	Chroococcaceae	Chroococcus sp.	1	2,429	2,429				
Blue-green Algae	Cyanophyta	Chroococcales	Stichosiphonaceae	Stichosiphon sp.	1	11,279					
Blue-green Algae	Cyanophyta	Nostocales	Nostocaceae	Anabaena sp.	1	30,373		798			
Blue-green Algae	Cyanophyta	Nostocales	Rivulariaceae	Calothrix sp.	1	7,933,883	669,159	242,611	3,604,543	1,948,956	478,838
Blue-green Algae	Cyanophyta	Oscillatoriales	Oscillatoriaceae	Phormidium sp.	1	4,514,213	18,217	249,634	9,716		
Blue-green Algae	Cyanophyta	Synechococcales	Chamaesiphonaceae	Chamaesiphon sp. (colony)	1	2,341,633		47,884	8,501		
Blue-green Algae	Cyanophyta	Synechococcales	Chamaesiphonaceae	Chamaesiphon sp. (single cell)		108,356					
Blue-green Algae	Cyanophyta	Synechococcales	Heteroleibleiniaceae	Heteroleibeinia sp.	1	6,182,261	85,821	132,279	47,363		
Blue-green Algae	Cyanophyta	Synechococcales	Leptolyngbyaceae	Leptolyngbya sp.	1	825,740		25,538	1,214		
Blue-green Algae	Cyanophyta	Synechococcales	Leptolyngbyaceae	Tapinothrix sp.	1	224,457		20,750	65,580		
Blue-green Algae	Cyanophyta	Synechococcales	Merismopediaceae	Merismopedia sp.	1	56,736	31,576		9,716		9,858
Blue-green Algae	Cyanophyta	Synechococcales	Pseudanabaenaceae	Pseudanabaena sp.	1	526,364	32,790	26,602	8,501	13,359	104,499
Blue-green Algae	Cyanophyta			Cyanophyte (colony)		175,559					
Blue-green Algae	Cyanophyta			Cyanophyte (filament)		139,661					
				Total Blue-green Algae		**23,072,947**	**839,991**	**746,096**	**3,755,134**	**1,962,315**	**593,196**
Red Algae	Rhodophyta	Acrochaetiales	Acrochaetiaceae	Audouinella sp.	1	119,107					
				Total Red Algae		**119,107**	**0**	**0**	**0**	**0**	**0**
Brown Algae	Ochrophyta	Sphacelariales	Lithodermataceae	Bodanella sp.	1	972,927	137,232	60,653	180,952	143,304	138,018
				Total Brown Algae		**972,927**	**137,232**	**60,653**	**180,952**	**143,304**	**138,018**
				Total Periphyton		**27,475,292**	**1,178,821**	**932,045**	**4,021,097**	**2,239,208**	**1,109,121**
				Total Unique Taxa	**49**		**26**	**24**	**22**	**18**	**21**

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Total Periphyton Density (cells/cm²) for Minnow Environmental Mount Polley, 2022

						Biologica Sample ID	pp22-078-059	pp22-078-060	pp22-078-061	pp22-078-062	pp22-078-063
						Client Sample ID	HAC-U_PERI-1_2022-08	HAC-U_PERI-2_2022-08	HAC-U_PERI-3_2022-08	HAC-U_PERI-4_2022-08	HAC-U_PERI-5_2022-08
						Date Sampled	10-Aug-22	10-Aug-22	10-Aug-22	10-Aug-22	10-Aug-22
Common Name	Phylum	Order	Family	Taxon	Grand Total		Total Density	Total Density	Total Density	Total Density	Total Density
					Unique Taxa	Density (cells/cm²)	(cells/cm²)	(cells/cm²)	(cells/cm²)	(cells/cm²)	(cells/cm²)
Diatoms	Bacillariophyta	Aulacoseirales	Aulacoseiraceae	Aulacoseira sp.	1	2,429					
Diatoms	Bacillariophyta	Bacillariales	Bacillariaceae	Nitzschia sp.	1	466,390	24,896	3,724	4,929	54,534	10,056
Diatoms	Bacillariophyta	Cocconeidales	Achnanthidiaceae	Achnanthidium minutissimum	1	202,711	10,323	13,035	49,292	9,311	6,704
Diatoms	Bacillariophyta	Cocconeidales	Achnanthidiaceae	Achnanthidium sp.		316,591	13,966	25,139	49,292	21,282	20,111
Diatoms	Bacillariophyta	Cocconeidales	Cocconeidaceae	Cocconeis placentula	1	58,136	4,251	10,242	8,215	6,651	2,235
Diatoms	Bacillariophyta	Cymbellales	Cymbellaceae	Cymbella sp.	1	139,172	4,251	12,104	50,935	7,981	8,938
Diatoms	Bacillariophyta	Cymbellales	Cymbellaceae	Cymbella sp. (< 55 µm in length)		1,643					
Diatoms	Bacillariophyta	Cymbellales	Gomphonemataceae	Encyonema sp.	1	65,148	3,643	2,793	4,929	1,330	1,117
Diatoms	Bacillariophyta	Cymbellales	Gomphonemataceae	Encyonopsis cf. microcephala	1	10,561	607	2,793	3,286	2,660	
Diatoms	Bacillariophyta	Cymbellales	Gomphonemataceae	Gomphonema sp.	1	295,836	5,465	15,828	47,649	43,893	32,401
Diatoms	Bacillariophyta	Cymbellales	Gomphonemataceae	Reimeria sp.	1	7,866	607		1,643		
Diatoms	Bacillariophyta	Cymbellales	Rhoicospheniaceae	Rhoicosphenia sp.	1	6,482			3,286		
Diatoms	Bacillariophyta	Fragilariales	Fragilariaceae	Fragilaria crotonensis	1	7,287	2,429				
Diatoms	Bacillariophyta	Fragilariales	Fragilariaceae	Fragilaria sp.		84,416	2,429			1,330	
Diatoms	Bacillariophyta	Fragilariales	Staurosiraceae	Staurosira sp.	1	358,870	12,144	35,381	37,791	57,195	2,235
Diatoms	Bacillariophyta	Fragilariales	Staurosiraceae	Staurosirella sp.	1	141,260	14,573	7,449	29,575	6,651	2,235
Diatoms	Bacillariophyta	Licmophorales	Ulnariaceae	Ulnaria sp.	1	16,354					
Diatoms	Bacillariophyta	Mastogloiales	Achnanthaceae	Platessa sp.	1	2,760			1,643		1,117
Diatoms	Bacillariophyta	Melosirales	Melosiraceae	Melosira sp.	1	33,949	1,822	2,793	3,286	10,641	
Diatoms	Bacillariophyta	Naviculales	Amphipleuraceae	Amphipleura pellucida	1	30,967			1,643		
Diatoms	Bacillariophyta	Naviculales	Amphipleuraceae	Frustulia sp.	1	2,149					
Diatoms	Bacillariophyta	Naviculales	Naviculaceae	Navicula cf. cryptocephala	1	45,219	4,858	1,862	8,215	3,990	5,586
Diatoms	Bacillariophyta	Naviculales	Naviculaceae	Navicula cf. radiosa	1	11,095	607		1,643		1,117
Diatoms	Bacillariophyta	Naviculales	Naviculaceae	Navicula sp.		286,631	12,144	15,828	70,652	11,971	15,642
Diatoms	Bacillariophyta	Rhabdonematales	Tabellariaceae	Diatoma sp.	1	12,404		2,793	3,286	1,330	3,352
Diatoms	Bacillariophyta	Rhabdonematales	Tabellariaceae	Meridion circulare	1	2,995					
Diatoms	Bacillariophyta	Rhopalodiales	Rhopalodiaceae	Epithemia adnata	1	2,429					
Diatoms	Bacillariophyta	Rhopalodiales	Rhopalodiaceae	Epithemia sp.		13,054	607	1,862	1,643		
Diatoms	Bacillariophyta	Rhopalodiales	Rhopalodiaceae	Epithemia turgida	1	5,286					
Diatoms	Bacillariophyta	Rhopalodiales	Rhopalodiaceae	Epithemia sorex	1	180,632	2,429	3,724	16,431	3,990	8,938
Diatoms	Bacillariophyta	Rhopalodiales	Rhopalodiaceae	Rhopalodia gibba	1	24,386		931	3,286		1,117
Diatoms	Bacillariophyta	Stephanodiscales	Stephanodiscaceae	Cyclotella sp.	1	1,643			1,643		
Diatoms	Bacillariophyta	Surirellales	Surirellaceae	Surirella sp.	1	1,862					
Diatoms	Bacillariophyta	Thalassiophysales	Catenulaceae	Amphora sp.	1	1,117					1,117
Diatoms	Bacillariophyta			Pennate diatom		110,963	2,429		9,858	5,320	4,469
				Total Diatoms		**2,950,694**	**124,481**	**158,283**	**414,054**	**250,060**	**128,488**
Green Algae	Charophyta	Desmidiales	Closteriaceae	Closterium sp.	1	1,862					
Green Algae	Chlorophyta	Chaetophorales	Chaetophoraceae	Chaetophora sp.	1	76,861			4,929	30,592	41,340
Green Algae	Chlorophyta	Chlorellales	Oocystaceae	Oocystis sp.	1	4,858					
Green Algae	Chlorophyta	Sphaeropleales	Hydrodictyaceae	Stauridium tetras	1	7,287					
Green Algae	Chlorophyta	Sphaeropleales	Scenedesmaceae	Desmodesmus sp.	1	11,430			6,572		
Green Algae	Chlorophyta	Sphaeropleales	Scenedesmaceae	Scenedesmus sp.	1	41,051	2,429	9,311	4,929		
Green Algae	Chlorophyta	Sphaeropleales	Selenastraceae	Monoraphidium sp.	1	13,621	1,822			2,660	1,117
Green Algae	Chlorophyta			Chlorophyte		202,648	9,716		9,858	9,311	18,994
				Total Green Algae		**359,617**	**13,966**	**9,311**	**26,289**	**42,563**	**61,451**
Blue-green Algae	Cyanophyta	Chroococcales	Chroococcaceae	Chroococcus sp.	1	2,429					
Blue-green Algae	Cyanophyta	Chroococcales	Stichosiphonaceae	Stichosiphon sp.	1	11,279					
Blue-green Algae	Cyanophyta	Nostocales	Nostocaceae	Anabaena sp.	1	30,373			29,575		
Blue-green Algae	Cyanophyta	Nostocales	Rivulariaceae	Calothrix sp.	1	7,933,883	23,074			726,238	210,888
Blue-green Algae	Cyanophyta	Oscillatoriales	Oscillatoriaceae	Phormidium sp.	1	4,514,213			34,505	26,602	
Blue-green Algae	Cyanophyta	Synechococcales	Chamaesiphonaceae	Chamaesiphon sp. (colony)	1	2,341,633	72,138	67,968		25,272	26,815
Blue-green Algae	Cyanophyta	Synechococcales	Chamaesiphonaceae	Chamaesiphon sp. (single cell)		108,356	607				1,117
Blue-green Algae	Cyanophyta	Synechococcales	Heteroleibleiniaceae	Heteroleibeinia sp.	1	6,182,261	371,165	60,520	21,360	421,496	980,322
Blue-green Algae	Cyanophyta	Synechococcales	Leptolyngbyaceae	Leptolyngbya sp.	1	825,740	40,684	67,037			
Blue-green Algae	Cyanophyta	Synechococcales	Leptolyngbyaceae	Tapinothrix sp.	1	224,457		14,897			
Blue-green Algae	Cyanophyta	Synechococcales	Merismopediaceae	Merismopedia sp.	1	56,736		5,586			
Blue-green Algae	Cyanophyta	Synechococcales	Pseudanabaenaceae	Pseudanabaena sp.	1	526,364	61,937			3,990	6,704
Blue-green Algae	Cyanophyta			Cyanophyte (colony)		175,559		3,724			
Blue-green Algae	Cyanophyta			Cyanophyte (filament)		139,661					
				Total Blue-green Algae		**23,072,947**	**569,605**	**219,733**	**85,440**	**1,203,598**	**1,225,847**
Red Algae	Rhodophyta	Acrochaetiales	Acrochaetiaceae	Audouinella sp.	1	119,107					
				Total Red Algae		**119,107**	**0**	**0**	**0**	**0**	**0**
Brown Algae	Ochrophyta	Sphacelariales	Lithodermataceae	Bodanella sp.	1	972,927	15,788	113,591	57,508	46,554	79,328
				Total Brown Algae		**972,927**	**15,788**	**113,591**	**57,508**	**46,554**	**79,328**
				Total Periphyton		**27,475,292**	**723,839**	**500,918**	**583,291**	**1,542,775**	**1,495,113**
				Total Unique Taxa	**49**		**23**	**21**	**27**	**22**	**22**

biologica

Total Periphyton Density (cells/cm²) for Minnow Environmental Mount Polley, 2022

							Biologica Sample ID	pp22-078-050_QA	pp22-078-057_QA
							Client Sample ID	EDC-U_PERI-2_2022-08-QA	HAC-R1_PERI-4_2022-08-QA
							Date Sampled	10-Aug-22	10-Aug-22
Common Name	Phylum	Order	Family	Taxon	Grand Total		Total Density	Total Density	
					Unique Taxa	Density (cells/cm²)	(cells/cm²)	(cells/cm²)	
Diatoms	Bacillariophyta	Aulacoseirales	Aulacoseiraceae	Aulacoseira sp.	1	2,429			
Diatoms	Bacillariophyta	Bacillariales	Bacillariaceae	Nitzschia sp.	1	466,390	121,040	4,858	
Diatoms	Bacillariophyta	Cocconeidales	Achnanthidiaceae	Achnanthidium minutissimum	1	202,711	13,035		
Diatoms	Bacillariophyta	Cocconeidales	Achnanthidiaceae	Achnanthidium sp.		316,591	44,692	4,858	
Diatoms	Bacillariophyta	Cocconeidales	Cocconeidaceae	Cocconeis placentula	1	58,136	11,173	1,214	
Diatoms	Bacillariophyta	Cymbellales	Cymbellaceae	Cymbella sp.	1	139,172	3,724	1,214	
Diatoms	Bacillariophyta	Cymbellales	Cymbellaceae	Cymbella sp. (< 55 µm in length)		1,643			
Diatoms	Bacillariophyta	Cymbellales	Gomphonemataceae	Encyonema sp.	1	65,148	1,862	1,214	
Diatoms	Bacillariophyta	Cymbellales	Gomphonemataceae	Encyonopsis cf. microcephala	1	10,561			
Diatoms	Bacillariophyta	Cymbellales	Gomphonemataceae	Gomphonema sp.	1	295,836	7,449	2,429	
Diatoms	Bacillariophyta	Cymbellales	Gomphonemataceae	Reimeria sp.	1	7,866	5,586		
Diatoms	Bacillariophyta	Cymbellales	Rhoicospheniaceae	Rhoicosphenia sp.	1	6,482			
Diatoms	Bacillariophyta	Fragilariales	Fragilariaceae	Fragilaria crotonensis	1	7,287			
Diatoms	Bacillariophyta	Fragilariales	Fragilariaceae	Fragilaria sp.		84,416	18,621	2,429	
Diatoms	Bacillariophyta	Fragilariales	Staurosiraceae	Staurosira sp.	1	358,870	5,586	23,074	
Diatoms	Bacillariophyta	Fragilariales	Staurosiraceae	Staurosirella sp.	1	141,260		29,147	
Diatoms	Bacillariophyta	Licmophorales	Ulnariaceae	Ulnaria sp.	1	16,354			
Diatoms	Bacillariophyta	Mastogloiales	Achnanthaceae	Platessa sp.	1	2,760			
Diatoms	Bacillariophyta	Melosirales	Melosiraceae	Melosira sp.	1	33,949	3,724		
Diatoms	Bacillariophyta	Naviculales	Amphipleuraceae	Amphipleura pellucida	1	30,967	11,173		
Diatoms	Bacillariophyta	Naviculales	Amphipleuraceae	Frustulia sp.	1	2,149	1,862		
Diatoms	Bacillariophyta	Naviculales	Naviculaceae	Navicula cf. cryptocephala	1	45,219		4,858	
Diatoms	Bacillariophyta	Naviculales	Naviculaceae	Navicula cf. radiosa	1	11,095			
Diatoms	Bacillariophyta	Naviculales	Naviculaceae	Navicula sp.		286,631	29,794	7,287	
Diatoms	Bacillariophyta	Rhabdonematales	Tabellariaceae	Diatoma sp.	1	12,404			
Diatoms	Bacillariophyta	Rhabdonematales	Tabellariaceae	Meridion circulare	1	2,995			
Diatoms	Bacillariophyta	Rhopalodiales	Rhopalodiaceae	Epithemia adnata	1	2,429		1,214	
Diatoms	Bacillariophyta	Rhopalodiales	Rhopalodiaceae	Epithemia sp.		13,054		2,429	
Diatoms	Bacillariophyta	Rhopalodiales	Rhopalodiaceae	Epithemia turgida	1	5,286			
Diatoms	Bacillariophyta	Rhopalodiales	Rhopalodiaceae	Epithemia sorex	1	180,632		14,573	
Diatoms	Bacillariophyta	Rhopalodiales	Rhopalodiaceae	Rhopalodia gibba	1	24,386			
Diatoms	Bacillariophyta	Stephanodiscales	Stephanodiscaceae	Cyclotella sp.	1	1,643			
Diatoms	Bacillariophyta	Surirellales	Surirellaceae	Surirella sp.	1	1,862	1,862		
Diatoms	Bacillariophyta	Thalassiophysales	Catenulaceae	Amphora sp.	1	1,117			
Diatoms	Bacillariophyta			Pennate diatom		110,963	20,484	1,214	
				Total Diatoms		**2,950,694**	**301,668**	**102,013**	
Green Algae	Charophyta	Desmidiales	Closteriaceae	Closterium sp.	1	1,862	1,862		
Green Algae	Chlorophyta	Chaetophorales	Chaetophoraceae	Chaetophora sp.	1	76,861			
Green Algae	Chlorophyta	Chlorellales	Oocystaceae	Oocystis sp.	1	4,858			
Green Algae	Chlorophyta	Sphaeropleales	Hydrodictyaceae	Stauridium tetras	1	7,287			
Green Algae	Chlorophyta	Sphaeropleales	Scenedesmaceae	Desmodesmus sp.	1	11,430			
Green Algae	Chlorophyta	Sphaeropleales	Scenedesmaceae	Scenedesmus sp.	1	41,051		3,643	
Green Algae	Chlorophyta	Sphaeropleales	Selenastraceae	Monoraphidium sp.	1	13,621	1,862		
Green Algae	Chlorophyta			Chlorophyte		202,648	14,897		
				Total Green Algae		**359,617**	**18,621**	**3,643**	
Blue-green Algae	Cyanophyta	Chroococcales	Chroococcaceae	Chroococcus sp.	1	2,429			
Blue-green Algae	Cyanophyta	Chroococcales	Stichosiphonaceae	Stichosiphon sp.	1	11,279			
Blue-green Algae	Cyanophyta	Nostocales	Nostocaceae	Anabaena sp.	1	30,373			
Blue-green Algae	Cyanophyta	Nostocales	Rivulariaceae	Calothrix sp.	1	7,933,883		1,600,510	
Blue-green Algae	Cyanophyta	Oscillatoriales	Oscillatoriaceae	Phormidium sp.	1	4,514,213	1,612,620	4,858	
Blue-green Algae	Cyanophyta	Synechococcales	Chamaesiphonaceae	Chamaesiphon sp. (colony)	1	2,341,633	655,476		
Blue-green Algae	Cyanophyta	Synechococcales	Chamaesiphonaceae	Chamaesiphon sp. (single cell)		108,356	7,449		
Blue-green Algae	Cyanophyta	Synechococcales	Heteroleibleiniaceae	Heteroleibeinia sp.	1	6,182,261	414,328		
Blue-green Algae	Cyanophyta	Synechococcales	Leptolyngbyaceae	Leptolyngbya sp.	1	825,740	42,829		
Blue-green Algae	Cyanophyta	Synechococcales	Leptolyngbyaceae	Tapinothrix sp.	1	224,457			
Blue-green Algae	Cyanophyta	Synechococcales	Merismopediaceae	Merismopedia sp.	1	56,736			
Blue-green Algae	Cyanophyta	Synechococcales	Pseudanabaenaceae	Pseudanabaena sp.	1	526,364	46,554		
Blue-green Algae	Cyanophyta			Cyanophyte (colony)		175,559			
Blue-green Algae	Cyanophyta			Cyanophyte (filament)		139,661			
				Total Blue-green Algae		**23,072,947**	**2,779,256**	**1,605,368**	
Red Algae	Rhodophyta	Acrochaetiales	Acrochaetiaceae	Audouinella sp.	1	119,107	74,486		
				Total Red Algae		**119,107**	**74,486**	**0**	
Brown Algae	Ochrophyta	Sphacelariales	Lithodermataceae	Bodanella sp.	1	972,927		165,164	
				Total Brown Algae		**972,927**	**0**	**165,164**	
				Total Periphyton		**27,475,292**	**3,174,032**	**1,876,189**	
				Total Unique Taxa	**49**		**21**	**16**	

PERIPHYTON COMMUNITY AND PRODUCTIVITY

ALS Laboratory Report VA22B8786

(Finalized August 24, 2022)

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **VA22B8786**	Page	: 1 of 6
Client	: **Mount Polley Mining Corporation**	Laboratory	: Vancouver - Environmental
Contact	: Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: ----	Telephone	: +1 604 253 4188
Project	: Mount Polley Periphyton Quality Analysis	Date Samples Received	: 12-Aug-2022 12:00
PO	: 5500052166	Date Analysis Commenced	: 16-Aug-2022
C-O-C number	: ----	Issue Date	: 24-Aug-2022 15:41
Sampler	: ----		
Site	: ----		
Quote number	: VA22-MPMC100-004-Minnow Environmental-Periphyton Analysis		
No. of samples received	: 50		
No. of samples analysed	: 50		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Lindsay Gung	Supervisor - Water Chemistry	Inorganics, Burnaby, British Columbia

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

Unit	*Description*
µg	micrograms
g/sample	grams per sample

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical Results

Sub-Matrix: **Biota**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	FPC-R3_CHLA-1_2022-08	FPC-R3_CHLA-2_2022-08	FPC-R3_CHLA-3_2022-08	FPC-R3_CHLA-4_2022-08	FPC-R3_CHLA-5_2022-08
					Client sampling date / time	09-Aug-2022	09-Aug-2022	09-Aug-2022	09-Aug-2022	09-Aug-2022
						VA22B8786-001	VA22B8786-002	VA22B8786-003	VA22B8786-004	VA22B8786-005
						Result	Result	Result	Result	Result
Plant Pigments										
chlorophyll a	479-61-8	E870	0.010	µg		42.7	223	93.5	102	30.4

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Biota**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	HAC-R1_CHLA-1_2022-08	HAC-R1_CHLA-2_2022-08	HAC-R1_CHLA-3_2022-08	HAC-R1_CHLA-4_2022-08	HAC-R1_CHLA-5_2022-08
					Client sampling date / time	10-Aug-2022	10-Aug-2022	10-Aug-2022	10-Aug-2022	10-Aug-2022
						VA22B8786-006	VA22B8786-007	VA22B8786-008	VA22B8786-009	VA22B8786-010
						Result	Result	Result	Result	Result
Plant Pigments										
chlorophyll a	479-61-8	E870	0.010	µg		107	143	212	287	125

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Biota**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	HAC-U_CHLA-1_2022-08	HAC-U_CHLA-2_2022-08	HAC-U_CHLA-3_2022-08	HAC-U_CHLA-4_2022-08	HAC-U_CHLA-5_2022-08
					Client sampling date / time	06-Aug-2022	06-Aug-2022	06-Aug-2022	06-Aug-2022	06-Aug-2022
						VA22B8786-011	VA22B8786-012	VA22B8786-013	VA22B8786-014	VA22B8786-015
						Result	Result	Result	Result	Result
Plant Pigments										
chlorophyll a	479-61-8	E870	0.010	µg		64.8	28.9	62.5	56.3	55.3

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Biota**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	EDC-U_CHLA-1_2022-08	EDC-U_CHLA-2_2022-08	EDC-U_CHLA-3_2022-08	EDC-U_CHLA-4_2022-08	EDC-U_CHLA-5_2022-08
					Client sampling date / time	08-Aug-2022	07-Aug-2022	07-Aug-2022	07-Aug-2022	07-Aug-2022
						VA22B8786-016	VA22B8786-017	VA22B8786-018	VA22B8786-019	VA22B8786-020
						Result	Result	Result	Result	Result
Plant Pigments										
chlorophyll a	479-61-8	E870	0.010	µg		36.7	52.7	127	110	68.6

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Biota**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	HAC-R3_CHLA-1_2022-08	HAC-R3_CHLA-2_2022-08	HAC-R3_CHLA-3_2022-08	HAC-R3_CHLA-4_2022-08	HAC-R3_CHLA-5_2022-08
					Client sampling date / time	10-Aug-2022	10-Aug-2022	10-Aug-2022	10-Aug-2022	10-Aug-2022
						VA22B8786-021	VA22B8786-022	VA22B8786-023	VA22B8786-024	VA22B8786-025
						Result	Result	Result	Result	Result
Plant Pigments										
chlorophyll a	479-61-8	E870	0.010	µg		7.07	24.4	4.86	1.48	1.86

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Biota**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	FPC-R3_AFDM-1_2022-08	FPC-R3_AFDM-2_2022-08	FPC-R3_AFDM-3_2022-08	FPC-R3_AFDM-4_2022-08	FPC-R3_AFDM-5_2022-08
					Client sampling date / time	09-Aug-2022	09-Aug-2022	09-Aug-2022	09-Aug-2022	09-Aug-2022
						VA22B8786-026	VA22B8786-027	VA22B8786-028	VA22B8786-029	VA22B8786-030
						Result	Result	Result	Result	Result
Physical Tests										
ash free dry weight	----	E137	0.0010	g/sample		0.0080	0.0224	0.0088	0.0163	0.0132
ash weight	----	E137	0.0010	g/sample		0.0703	0.121	0.0290	0.0605	0.182
weight, dry	----	E137	0.0010	g/sample		0.0783	0.143	0.0378	0.0768	0.195

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Biota**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	HAC-R1_AFDM-1_2022-08	HAC-R1_AFDM-2_2022-08	HAC-R1_AFDM-3_2022-08	HAC-R1_AFDM-4_2022-08	HAC-R1_AFDM-5_2022-08
					Client sampling date / time	10-Aug-2022	10-Aug-2022	10-Aug-2022	10-Aug-2022	10-Aug-2022
						VA22B8786-031	VA22B8786-032	VA22B8786-033	VA22B8786-034	VA22B8786-035
						Result	Result	Result	Result	Result
Physical Tests										
ash free dry weight	----	E137	0.0010	g/sample		0.171	0.0997	0.278	0.258	0.160
ash weight	----	E137	0.0010	g/sample		0.259	0.213	0.527	0.432	0.256
weight, dry	----	E137	0.0010	g/sample		0.430	0.312	0.805	0.689	0.415

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Biota**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	HAC-U_AFDM-1_2022-08	HAC-U_AFDM-2_2022-08	HAC-U_AFDM-3_2022-08	HAC-U_AFDM-4_2022-08	HAC-U_AFDM-5_2022-08
					Client sampling date / time	06-Aug-2022	06-Aug-2022	06-Aug-2022	06-Aug-2022	06-Aug-2022
						VA22B8786-036	VA22B8786-037	VA22B8786-038	VA22B8786-039	VA22B8786-040
						Result	Result	Result	Result	Result
Physical Tests										
ash free dry weight	----	E137	0.0010	g/sample		0.0656	0.0775	0.149	0.0251	0.0605
ash weight	----	E137	0.0010	g/sample		0.138	0.133	0.226	0.0441	0.0989
weight, dry	----	E137	0.0010	g/sample		0.203	0.211	0.375	0.0692	0.159

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Biota**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	EDC-U_AFDM-1_2022-08	EDC-U_AFDM-2_2022-08	EDC-U_AFDM-3_2022-08	EDC-U_AFDM-4_2022-08	EDC-U_AFDM-5_2022-08
					Client sampling date / time	08-Aug-2022	07-Aug-2022	07-Aug-2022	07-Aug-2022	07-Aug-2022
						VA22B8786-041	VA22B8786-042	VA22B8786-043	VA22B8786-044	VA22B8786-045
						Result	Result	Result	Result	Result
Physical Tests										
ash free dry weight	----	E137	0.0010	g/sample		0.0281	0.0130	0.0243	0.0337	0.0071
ash weight	----	E137	0.0010	g/sample		0.0050	0.0170	0.0150	0.0172	0.0101
weight, dry	----	E137	0.0010	g/sample		0.0332	0.0301	0.0393	0.0509	0.0172

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Biota**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	HAC-R3_AFDM-1_2022-08	HAC-R3_AFDM-2_2022-08	HAC-R3_AFDM-3_2022-08	HAC-R3_AFDM-4_2022-08	HAC-R3_AFDM-5_2022-08
					Client sampling date / time	10-Aug-2022	10-Aug-2022	08-Aug-2022	08-Aug-2022	08-Aug-2022
						VA22B8786-046	VA22B8786-047	VA22B8786-048	VA22B8786-049	VA22B8786-050
						Result	Result	Result	Result	Result
Physical Tests										
ash free dry weight	----	E137	0.0010	g/sample		0.0038	0.0069	0.0011	0.0074	<0.0010
ash weight	----	E137	0.0010	g/sample		0.0138	0.0262	0.0066	0.0830	0.0017
weight, dry	----	E137	0.0010	g/sample		0.0176	0.0331	0.0076	0.0904	0.0021

Please refer to the General Comments section for an explanation of any qualifiers detected.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA22B8786**	Page	: 1 of 9
Client	: **Mount Polley Mining Corporation**	Laboratory	: Vancouver - Environmental
Contact	: Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: ----	Telephone	: +1 604 253 4188
Project	: Mount Polley Periphyton Quality Analysis	Date Samples Received	: 12-Aug-2022 12:00
PO	: 5500052166	Issue Date	: 24-Aug-2022 15:41
C-O-C number	: ----		
Sampler	: ----		
Site	: ----		
Quote number	: VA22-MPMC100-004-Minnow Environmental-Periphyton Analysis		
No. of samples received	: 50		
No. of samples analysed	: 50		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Ash-free Dry Weight by Gravimetry										
Tube EDC-U_AFDM-1_2022-08	E137	08-Aug-2022	----	----	----		18-Aug-2022	180 days	10 days	✓
Physical Tests : Ash-free Dry Weight by Gravimetry										
Tube HAC-R3_AFDM-3_2022-08	E137	08-Aug-2022	----	----	----		18-Aug-2022	180 days	10 days	✓
Physical Tests : Ash-free Dry Weight by Gravimetry										
Tube HAC-R3_AFDM-4_2022-08	E137	08-Aug-2022	----	----	----		18-Aug-2022	180 days	10 days	✓
Physical Tests : Ash-free Dry Weight by Gravimetry										
Tube HAC-R3_AFDM-5_2022-08	E137	08-Aug-2022	----	----	----		18-Aug-2022	180 days	10 days	✓
Physical Tests : Ash-free Dry Weight by Gravimetry										
Tube EDC-U_AFDM-2_2022-08	E137	07-Aug-2022	----	----	----		18-Aug-2022	180 days	11 days	✓
Physical Tests : Ash-free Dry Weight by Gravimetry										
Tube EDC-U_AFDM-3_2022-08	E137	07-Aug-2022	----	----	----		18-Aug-2022	180 days	11 days	✓
Physical Tests : Ash-free Dry Weight by Gravimetry										
Tube EDC-U_AFDM-4_2022-08	E137	07-Aug-2022	----	----	----		18-Aug-2022	180 days	11 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Ash-free Dry Weight by Gravimetry										
Tube EDC-U_AFDM-5_2022-08	E137	07-Aug-2022	----	----	----		18-Aug-2022	180 days	11 days	✓
Physical Tests : Ash-free Dry Weight by Gravimetry										
Tube HAC-U_AFDM-1_2022-08	E137	06-Aug-2022	----	----	----		18-Aug-2022	180 days	12 days	✓
Physical Tests : Ash-free Dry Weight by Gravimetry										
Tube HAC-U_AFDM-2_2022-08	E137	06-Aug-2022	----	----	----		18-Aug-2022	180 days	12 days	✓
Physical Tests : Ash-free Dry Weight by Gravimetry										
Tube HAC-U_AFDM-3_2022-08	E137	06-Aug-2022	----	----	----		18-Aug-2022	180 days	12 days	✓
Physical Tests : Ash-free Dry Weight by Gravimetry										
Tube HAC-U_AFDM-4_2022-08	E137	06-Aug-2022	----	----	----		18-Aug-2022	180 days	12 days	✓
Physical Tests : Ash-free Dry Weight by Gravimetry										
Tube HAC-U_AFDM-5_2022-08	E137	06-Aug-2022	----	----	----		18-Aug-2022	180 days	12 days	✓
Physical Tests : Ash-free Dry Weight by Gravimetry										
Tube HAC-R1_AFDM-1_2022-08	E137	10-Aug-2022	----	----	----		18-Aug-2022	180 days	8 days	✓
Physical Tests : Ash-free Dry Weight by Gravimetry										
Tube HAC-R1_AFDM-2_2022-08	E137	10-Aug-2022	----	----	----		18-Aug-2022	180 days	8 days	✓
Physical Tests : Ash-free Dry Weight by Gravimetry										
Tube HAC-R1_AFDM-3_2022-08	E137	10-Aug-2022	----	----	----		18-Aug-2022	180 days	8 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Ash-free Dry Weight by Gravimetry										
Tube HAC-R1_AFDM-4_2022-08	E137	10-Aug-2022	----	----	----		18-Aug-2022	180 days	8 days	✓
Physical Tests : Ash-free Dry Weight by Gravimetry										
Tube HAC-R1_AFDM-5_2022-08	E137	10-Aug-2022	----	----	----		18-Aug-2022	180 days	8 days	✓
Physical Tests : Ash-free Dry Weight by Gravimetry										
Tube HAC-R3_AFDM-1_2022-08	E137	10-Aug-2022	----	----	----		18-Aug-2022	180 days	8 days	✓
Physical Tests : Ash-free Dry Weight by Gravimetry										
Tube HAC-R3_AFDM-2_2022-08	E137	10-Aug-2022	----	----	----		18-Aug-2022	180 days	8 days	✓
Physical Tests : Ash-free Dry Weight by Gravimetry										
Tube FPC-R3_AFDM-1_2022-08	E137	09-Aug-2022	----	----	----		18-Aug-2022	180 days	9 days	✓
Physical Tests : Ash-free Dry Weight by Gravimetry										
Tube FPC-R3_AFDM-2_2022-08	E137	09-Aug-2022	----	----	----		18-Aug-2022	180 days	9 days	✓
Physical Tests : Ash-free Dry Weight by Gravimetry										
Tube FPC-R3_AFDM-3_2022-08	E137	09-Aug-2022	----	----	----		18-Aug-2022	180 days	9 days	✓
Physical Tests : Ash-free Dry Weight by Gravimetry										
Tube FPC-R3_AFDM-4_2022-08	E137	09-Aug-2022	----	----	----		18-Aug-2022	180 days	9 days	✓
Physical Tests : Ash-free Dry Weight by Gravimetry										
Tube FPC-R3_AFDM-5_2022-08	E137	09-Aug-2022	----	----	----		18-Aug-2022	180 days	9 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Plant Pigments : Chlorophyll-a by Fluorometry										
Opaque HDPE tube HAC-U_CHLA-1_2022-08	E870	06-Aug-2022	16-Aug-2022	28 days	10 days	✓	16-Aug-2022	28 days	0 days	✓
Plant Pigments : Chlorophyll-a by Fluorometry										
Opaque HDPE tube HAC-U_CHLA-2_2022-08	E870	06-Aug-2022	16-Aug-2022	28 days	10 days	✓	16-Aug-2022	28 days	0 days	✓
Plant Pigments : Chlorophyll-a by Fluorometry										
Opaque HDPE tube HAC-U_CHLA-3_2022-08	E870	06-Aug-2022	16-Aug-2022	28 days	10 days	✓	16-Aug-2022	28 days	0 days	✓
Plant Pigments : Chlorophyll-a by Fluorometry										
Opaque HDPE tube HAC-U_CHLA-4_2022-08	E870	06-Aug-2022	16-Aug-2022	28 days	10 days	✓	16-Aug-2022	28 days	0 days	✓
Plant Pigments : Chlorophyll-a by Fluorometry										
Opaque HDPE tube HAC-U_CHLA-5_2022-08	E870	06-Aug-2022	16-Aug-2022	28 days	10 days	✓	16-Aug-2022	28 days	0 days	✓
Plant Pigments : Chlorophyll-a by Fluorometry										
Opaque HDPE tube HAC-R1_CHLA-1_2022-08	E870	10-Aug-2022	16-Aug-2022	28 days	6 days	✓	16-Aug-2022	28 days	0 days	✓
Plant Pigments : Chlorophyll-a by Fluorometry										
Opaque HDPE tube HAC-R1_CHLA-2_2022-08	E870	10-Aug-2022	16-Aug-2022	28 days	6 days	✓	16-Aug-2022	28 days	0 days	✓
Plant Pigments : Chlorophyll-a by Fluorometry										
Opaque HDPE tube HAC-R1_CHLA-3_2022-08	E870	10-Aug-2022	16-Aug-2022	28 days	6 days	✓	16-Aug-2022	28 days	0 days	✓
Plant Pigments : Chlorophyll-a by Fluorometry										
Opaque HDPE tube HAC-R1_CHLA-4_2022-08	E870	10-Aug-2022	16-Aug-2022	28 days	6 days	✓	16-Aug-2022	28 days	0 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Plant Pigments : Chlorophyll-a by Fluorometry										
Opaque HDPE tube HAC-R1_CHLA-5_2022-08	E870	10-Aug-2022	16-Aug-2022	28 days	6 days	✓	16-Aug-2022	28 days	0 days	✓
Plant Pigments : Chlorophyll-a by Fluorometry										
Opaque HDPE tube HAC-R3_CHLA-1_2022-08	E870	10-Aug-2022	16-Aug-2022	28 days	6 days	✓	16-Aug-2022	28 days	0 days	✓
Plant Pigments : Chlorophyll-a by Fluorometry										
Opaque HDPE tube HAC-R3_CHLA-2_2022-08	E870	10-Aug-2022	16-Aug-2022	28 days	6 days	✓	16-Aug-2022	28 days	0 days	✓
Plant Pigments : Chlorophyll-a by Fluorometry										
Opaque HDPE tube HAC-R3_CHLA-3_2022-08	E870	10-Aug-2022	16-Aug-2022	28 days	6 days	✓	16-Aug-2022	28 days	0 days	✓
Plant Pigments : Chlorophyll-a by Fluorometry										
Opaque HDPE tube HAC-R3_CHLA-4_2022-08	E870	10-Aug-2022	16-Aug-2022	28 days	6 days	✓	16-Aug-2022	28 days	0 days	✓
Plant Pigments : Chlorophyll-a by Fluorometry										
Opaque HDPE tube HAC-R3_CHLA-5_2022-08	E870	10-Aug-2022	16-Aug-2022	28 days	6 days	✓	16-Aug-2022	28 days	0 days	✓
Plant Pigments : Chlorophyll-a by Fluorometry										
Opaque HDPE tube FPC-R3_CHLA-1_2022-08	E870	09-Aug-2022	16-Aug-2022	28 days	7 days	✓	16-Aug-2022	28 days	0 days	✓
Plant Pigments : Chlorophyll-a by Fluorometry										
Opaque HDPE tube FPC-R3_CHLA-2_2022-08	E870	09-Aug-2022	16-Aug-2022	28 days	7 days	✓	16-Aug-2022	28 days	0 days	✓
Plant Pigments : Chlorophyll-a by Fluorometry										
Opaque HDPE tube FPC-R3_CHLA-3_2022-08	E870	09-Aug-2022	16-Aug-2022	28 days	7 days	✓	16-Aug-2022	28 days	0 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Plant Pigments : Chlorophyll-a by Fluorometry										
Opaque HDPE tube FPC-R3_CHLA-4_2022-08	E870	09-Aug-2022	16-Aug-2022	28 days	7 days	✓	16-Aug-2022	28 days	0 days	✓
Plant Pigments : Chlorophyll-a by Fluorometry										
Opaque HDPE tube FPC-R3_CHLA-5_2022-08	E870	09-Aug-2022	16-Aug-2022	28 days	7 days	✓	16-Aug-2022	28 days	0 days	✓
Plant Pigments : Chlorophyll-a by Fluorometry										
Opaque HDPE tube EDC-U_CHLA-1_2022-08	E870	08-Aug-2022	16-Aug-2022	28 days	8 days	✓	16-Aug-2022	28 days	0 days	✓
Plant Pigments : Chlorophyll-a by Fluorometry										
Opaque HDPE tube EDC-U_CHLA-2_2022-08	E870	07-Aug-2022	16-Aug-2022	28 days	9 days	✓	16-Aug-2022	28 days	0 days	✓
Plant Pigments : Chlorophyll-a by Fluorometry										
Opaque HDPE tube EDC-U_CHLA-3_2022-08	E870	07-Aug-2022	16-Aug-2022	28 days	9 days	✓	16-Aug-2022	28 days	0 days	✓
Plant Pigments : Chlorophyll-a by Fluorometry										
Opaque HDPE tube EDC-U_CHLA-4_2022-08	E870	07-Aug-2022	16-Aug-2022	28 days	9 days	✓	16-Aug-2022	28 days	0 days	✓
Plant Pigments : Chlorophyll-a by Fluorometry										
Opaque HDPE tube EDC-U_CHLA-5_2022-08	E870	07-Aug-2022	16-Aug-2022	28 days	9 days	✓	16-Aug-2022	28 days	0 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Biota**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Control Samples (LCS)							
Ash-free Dry Weight by Gravimetry	E137	608144	2	25	8.0	5.0	✓
Chlorophyll-a by Fluorometry	E870	604651	2	25	8.0	5.0	✓
Method Blanks (MB)							
Ash-free Dry Weight by Gravimetry	E137	608144	2	25	8.0	5.0	✓
Chlorophyll-a by Fluorometry	E870	604651	2	25	8.0	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Ash-free Dry Weight by Gravimetry	E137 Vancouver - Environmental	Biota	APHA 10200 I (mod)	"Ash-free dry weight is determined gravimetrically after drying the submitted sample at 105°C. The residue is then ignited at 500°C and the ash rewetted to restore water of hydration to clays and other minerals. The ash weight is determined gravimetrically after bringing the rewetted ash to constant weight at 104°. The ash-free dry weight is the difference between the dry weight and the ash weight.
Chlorophyll-a by Fluorometry	E870 Vancouver - Environmental	Biota	EPA 445.0 (mod)	Chlorophyll-a is determined by solvent extraction followed with analysis by fluorometry using the non-acidification procedure.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Chlorophyll-a Extraction	EP870 Vancouver - Environmental	Biota	EPA 445.0 (mod)	Chlorophyll-a solvent extraction.

QUALITY CONTROL REPORT

Work Order	: **VA22B8786**	Page	: 1 of 3
Client	: Mount Polley Mining Corporation	Laboratory	: Vancouver - Environmental
Contact	: Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: ----	Telephone	: +1 604 253 4188
Project	: Mount Polley Periphyton Quality Analysis	Date Samples Received	: 12-Aug-2022 12:00
PO	: 5500052166	Date Analysis Commenced	: 16-Aug-2022
C-O-C number	: ----	Issue Date	: 24-Aug-2022 15:41
Sampler	: ----		
Site	: ----		
Quote number	: VA22-MPMC100-004-Minnow Environmental-Periphyton Analysis		
No. of samples received	: 50		
No. of samples analysed	: 50		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Lindsay Gung	Supervisor - Water Chemistry	Vancouver Inorganics, Burnaby, British Columbia

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Biota**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 608144)						
ash free dry weight	----	E137	0.001	g/sample	<0.0010	----
ash weight	----	E137	0.001	g/sample	<0.0010	----
weight, dry	----	E137	0.001	g/sample	<0.0010	----
Physical Tests (QCLot: 608145)						
ash free dry weight	----	E137	0.001	g/sample	<0.0010	----
ash weight	----	E137	0.001	g/sample	<0.0010	----
weight, dry	----	E137	0.001	g/sample	<0.0010	----
Plant Pigments (QCLot: 604651)						
chlorophyll a	479-61-8	E870	0.01	µg	<0.010	----
Plant Pigments (QCLot: 604652)						
chlorophyll a	479-61-8	E870	0.01	µg	<0.010	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Biota**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 608144)									
ash free dry weight	----	E137	0.001	g/sample	0.0405 g/sample	85.2	70.0	130	----
ash weight	----	E137	0.001	g/sample	0.0745 g/sample	104	70.0	130	----
weight, dry	----	E137	0.001	g/sample	0.115 g/sample	97.4	70.0	130	----
Physical Tests (QCLot: 608145)									
ash free dry weight	----	E137	0.001	g/sample	0.0405 g/sample	91.8	70.0	130	----
ash weight	----	E137	0.001	g/sample	0.0745 g/sample	102	70.0	130	----
weight, dry	----	E137	0.001	g/sample	0.115 g/sample	98.6	70.0	130	----
Plant Pigments (QCLot: 604651)									
chlorophyll a	479-61-8	E870	0.01	µg	1 µg	88.1	80.0	120	----
Plant Pigments (QCLot: 604652)									
chlorophyll a	479-61-8	E870	0.01	µg	1 µg	88.9	80.0	120	----

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Affix ALS barcode label here (lab use only)

COC Number: 15 -

Environmental Division Vancouver
Work Order Reference
VA22B8786

Telephone : +1 604 253 4188

Report To	Contact and company name below will appear on the final report
Company:	Mount Polley Mining Corporation
Contact:	Gabriel Holmes
Phone:	236-317-4939
	Company address below will appear on the final report
Street:	PO Box 12
City/Province:	Likely, BC
Postal Code:	V0L 1N0
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☐ NO
Company:	
Contact:	

Report Format / Distribution	
Select Report Format:	☑ EXCEL ☐ EDD (DIGITAL)
Quality Control (QC) Report with Report	☑ ☐ NO
☑ Compare Results to Criteria on Report - provide details below if box	
Select Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	kala.ivens@mountpolley.com
Email 2	gabriel.holmes@mountpolley.com
Email 3	pstecko@minnow.ca; kbatchelar@minnow.ca
Invoice Distribution	
Select Invoice Distribution:	☑ EMAIL ☑ MAIL ☐ FAX
Email 1 or Fax	gabriel.holmes@mountpolley.com
Email 2	

Select Service Level Below - Please confirm all E&P TATs with your

Regular [R] ☑ Standard TAT if received by 3 pr

PRIORITY (Business Days): 4 day [P4] ☐ | 3 day [P3] ☐ | 2 day [P2] ☐

EMERGENCY: 1 Bu | San | Sta

Date and Time Required for all E&P TATs:

For tests that can not be performed according to the service level sel

Analysis Requ

Indicate Filtered (F), Preserved (P) or Filtered and Pr

Project Information		Oil and Gas Required Fields (client use)	
ALS Account # / Quote #:	VA22-MPMC100-004	AFE/Cost Center:	PO#
Job #:		Major/Minor Code:	Routing Code:
PO / AFE:		Requisitioner:	
LSD:		Location:	
ALS Lab Work Order # (lab use only)		ALS Contact: Can Dang	Sampler: KBa

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Chlorophyll-a by Fluorometry (E870)	Ash-free Dry Weight by Gravimetry (E137)	Number of Containers
1	FPC-R3_CHLA-1_2022-08	09-Aug-22		Tissue	R		1
2	FPC-R3_CHLA-2_2022-08	09-Aug-22		Tissue	R		1
3	FPC-R3_CHLA-3_2022-08	09-Aug-22		Tissue	R		1
4	FPC-R3_CHLA-4_2022-08	09-Aug-22		Tissue	R		1
5	FPC-R3_CHLA-5_2022-08	09-Aug-22		Tissue	R		1
6	HAC-R1_CHLA-1_2022-08	10-Aug-22		Tissue	R		1
7	HAC-R1_CHLA-2_2022-08	10-Aug-22		Tissue	R		1
8	HAC-R1_CHLA-3_2022-08	10-Aug-22		Tissue	R		1
9	HAC-R1_CHLA-4_2022-08	10-Aug-22		Tissue	R		1
10	HAC-R1_CHLA-5_2022-08	10-Aug-22		Tissue	R		1
11	HAC-U_CHLA-1_2022-08	06-Aug-22		Tissue	R		1
12	HAC-U_CHLA-2_2022-08	06-Aug-22		Tissue	R		1

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ ☐

Are samples for human drinking water use? | | | |

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice Packs ☐ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
			2,4	6,6	10

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Kathrina Batchelar	Date: 11-Aug-22	Time: 12:00	Received by:	Date:	Time:	Received by: JC	Date: AUG 12 2022	Time: 12pm

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

OCTOBER 2015 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form.**

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Affix ALS barcode label here (lab use only)

COC Number: 15 -

Report To	Contact and company name below will appear on the final report
Company:	Mount Polley Mining Corporation
Contact:	Gabriel Holmes
Phone:	236-317-4939
	Company address below will appear on the final report
Street:	PO Box 12
City/Province:	Likely, BC
Postal Code:	V0L 1N0
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☐ NO
Company:	
Contact:	

Report Format / Distribution	
Select Report Format:	☑ EXCEL ☐ EDD (DIGITAL)
Quality Control (QC) Report with Report	☑ ☐ NO
☐ Compare Results to Criteria on Report - provide details below if box	
Select Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	kala.ivens@mountpolley.com
Email 2	gabriel.holmes@mountpolley.com
Email 3	pstecko@minnow.ca; kbatchelar@minnow.ca

Invoice Distribution	
Select Invoice Distribution:	☑ EMAIL ☑ MAIL ☐ FAX
Email 1 or Fax	gabriel.holmes@mountpolley.com
Email 2	

Project Information	
ALS Account # / Quote #:	VA22-MPMC100-004
Job #:	
PO / AFE:	
LSD:	

Oil and Gas Required Fields (client use)	
AFE/Cost Center:	PO#
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Lab Work Order # (lab use only):

ALS Contact: Can Dang **Sampler:** KB

Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply

Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days)		EMERGENCY	
	4 day [P4] ☐		1 Business day [E1] ☐
	3 day [P3] ☐		Same Day, Weekend or Statutory holiday [E0] ☐
	2 day [P2] ☐		

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm

For tests that can not be performed according to the service level selected, you will be contacted.

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Chlorophyll-a by Fluorometry (E870)	Ash-free Dry Weight by Gravimetry (E137)	Number of Containers
13	HAC-U_CHLA-3_2022-08	06-Aug-22		Tissue	R		1
14	HAC-U_CHLA-4_2022-08	06-Aug-22		Tissue	R		1
15	HAC-U_CHLA-5_2022-08	06-Aug-22		Tissue	R		1
16	EDC-U_CHLA-1_2022-08	08-Aug-22		Tissue	R		1
17	EDC-U_CHLA-2_2022-08	07-Aug-22		Tissue	R		1
18	EDC-U_CHLA-3_2022-08	07-Aug-22		Tissue	R		1
19	EDC-U_CHLA-4_2022-08	07-Aug-22		Tissue	R		1
20	EDC-U_CHLA-5_2022-08	07-Aug-22		Tissue	R		1
21	HAC-R3_CHLA-1_2022-08	10-Aug-22		Tissue	R		1
22	HAC-R3_CHLA-2_2022-08	10-Aug-22		Tissue	R		1
23	HAC-R3_CHLA-3_2022-08	10-Aug-22		Tissue	R		1
24	HAC-R3_CHLA-4_2022-08	10-Aug-22		Tissue	R		1

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ ☐

Are samples for human drinking water use? | | | |

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice Packs ☑ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
			2,4	6,6	10

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by:	Date:	Time:	Received by:	Date:	Time:	Received by:	Date:	Time:
Katharina Batchelar	11-Aug-22	12:00				JC	AUG 12 2022	12pm

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form**.

ALS Environmental

www.alsglobal.com

Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878

Affix ALS barcode label here (lab use only)

COC Number: 15 -

Report To	Contact and company name below will appear on the final report
Company:	Mount Polley Mining Corporation
Contact:	Gabriel Holmes
Phone:	236-317-4939
	Company address below will appear on the final report
Street:	PO Box 12
City/Province:	Likely, BC
Postal Code:	V0L 1N0
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☐ NO
Company:	
Contact:	

Report Format / Distribution	
Select Report Format:	☑ EXCEL ☐ EDD (DIGITAL)
Quality Control (QC) Report with Report	☑ ☐ NO
☐ Compare Results to Criteria on Report - provide details below if box	
Select Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	kala.ivens@mountpolley.com
Email 2	gabriel.holmes@mountpolley.com
Email 3	pstecko@minnow.ca; kbatchelar@minnow.ca

Invoice Distribution	
Select Invoice Distribution:	☑ EMAIL ☑ MAIL ☐ FAX
Email 1 or Fax	gabriel.holmes@mountpolley.com
Email 2	

Project Information	
ALS Account # / Quote #:	VA22-MPMC100-004
Job #:	
PO / AFE:	
LSD:	

Oil and Gas Required Fields (client use)	
AFE/Cost Center:	PO#
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Lab Work Order # (lab use only):

ALS Contact: Can Dang

Sampler: KBa

Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply

Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days): 4 day [P4] ☐ | 3 day [P3] ☐ | 2 day [P2] ☐

EMERGENCY: 1 Business day [E1] ☐ | Same Day, Weekend or Statutory holiday [E0] ☐

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm

For tests that can not be performed according to the service level selected, you will be contacted.

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Chlorophyll-a by Fluorometry (E870)	Ash-free Dry Weight by Gravimetry (E137)	Number of Containers
25	HAC-R3_CHLA-5_2022-08	10-Aug-22		Tissue	R		1
26	FPC-R3_AFDM-1_2022-08	09-Aug-22		Tissue		R	1
27	FPC-R3_AFDM-2_2022-08	09-Aug-22		Tissue		R	1
28	FPC-R3_AFDM-3_2022-08	09-Aug-22		Tissue		R	1
29	FPC-R3_AFDM-4_2022-08	09-Aug-22		Tissue		R	1
30	FPC-R3_AFDM-5_2022-08	09-Aug-22		Tissue		R	1
31	HAC-R1_AFDM-1_2022-08 ✓	10-Aug-22		Tissue		R	1
32	HAC-R1_AFDM-2_2022-08 ✓	10-Aug-22		Tissue		R	1
33	HAC-R1_AFDM-3_2022-08 ✓	10-Aug-22		Tissue		R	1
34	HAC-R1_AFDM-4_2022-08 ✓	10-Aug-22		Tissue		R	1
35	HAC-R1_AFDM-5_2022-08 ✓	10-Aug-22		Tissue		R	1
36	HAC-U_AFDM-1_2022-08	06-Aug-22		Tissue		R	1

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ ☐

Are samples for human drinking water use? | | | |

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ | SIF Observations Yes ☐ No ☐

Ice Packs ☑ Ice Cubes ☐ | Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
			2, 4	6, 6	10 -

SHIPMENT RELEASE (client use)		
Released by: Katharina Batchelar	Date: 11-Aug-22	Time: 12:00

INITIAL SHIPMENT RECEPTION (lab use only)		
Received by:	Date:	Time:

FINAL SHIPMENT RECEPTION (lab use only)		
Received by: JC	Date: AUG 12 2022	Time: 12pm

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

OCTOBER 2015 FRONT

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1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form**.

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Affix ALS barcode label here (lab use only)

COC Number: 15 -

Report To	Contact and company name below will appear on the final report
Company:	Mount Polley Mining Corporation
Contact:	Gabriel Holmes
Phone:	236-317-4939
	Company address below will appear on the final report
Street:	PO Box 12
City/Province:	Likely, BC
Postal Code:	V0L 1N0
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☐ NO
Company:	
Contact:	

Report Format / Distribution	
Select Report Format:	☑ EXCEL ☐ EDD (DIGITAL)
Quality Control (QC) Report with Report	☑ ☐ NO
☐ Compare Results to Criteria on Report - provide details below if box	
Select Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	kala.ivens@mountpolley.com
Email 2	gabriel.holmes@mountpolley.com
Email 3	pstecko@minnow.ca; kbatchelar@minnow.ca

Invoice Distribution	
Select Invoice Distribution:	☑ EMAIL ☑ MAIL ☐ FAX
Email 1 or Fax	gabriel.holmes@mountpolley.com
Email 2	

Project Information	
ALS Account # / Quote #:	VA22-MPMC100-004
Job #:	
PO / AFE:	
LSD:	

Oil and Gas Required Fields (client use)	
AFE/Cost Center:	PO#
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Lab Work Order # (lab use only):

ALS Contact: Can Dang

Sampler: KBa

Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply

Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days): 4 day [P4] ☐ | 3 day [P3] ☐ | 2 day [P2] ☐

EMERGENCY: 1 Business day [E1] ☐ | Same Day, Weekend or Statutory holiday [E0] ☐

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm

For tests that can not be performed according to the service level selected, you will be contacted.

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Chlorophyll-a by Fluorometry (E870)	Ash-free Dry Weight by Gravimetry (E137)	Number of Containers
37	HAC-U_AFDM-2_2022-08	06-Aug-22		Tissue		R	1
38	HAC-U_AFDM-3_2022-08	06-Aug-22		Tissue		R	1
39	HAC-U_AFDM-4_2022-08	06-Aug-22		Tissue		R	1
40	HAC-U_AFDM-5_2022-08	06-Aug-22		Tissue		R	1
41	EDC-U_AFDM-1_2022-08	08-Aug-22		Tissue		R	1
42	EDC-U_AFDM-2_2022-08	07-Aug-22		Tissue		R	1
43	EDC-U_AFDM-3_2022-08	07-Aug-22		Tissue		R	1
44	EDC-U_AFDM-4_2022-08	07-Aug-22		Tissue		R	1
45	EDC-U_AFDM-5_2022-08	07-Aug-22		Tissue		R	1
46	HAC-R3_AFDM-1_2022-08	10-Aug-22		Tissue		R	1
47	HAC-R3_AFDM-2_2022-08	10-Aug-22		Tissue		R	1
48	HAC-R3_AFDM-3_2022-08	08-Aug-22		Tissue		R	1

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ ☐

Are samples for human drinking water use? | | | |

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ | SIF Observations Yes ☐ No ☐

Ice Packs ☑ Ice Cubes ☐ | Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
			2.4	6.6	10

SHIPMENT RELEASE (client use)		
Released by: Katharina Batchelar	Date: 11-Aug-22	Time: 12:00

INITIAL SHIPMENT RECEPTION (lab use only)		
Received by:	Date:	Time:

FINAL SHIPMENT RECEPTION (lab use only)		
Received by: JC	Date: AUG 12 2022	Time: 12pm

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1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Affix ALS barcode label here (lab use only)

COC Number: 15 -

Report To	Contact and company name below will appear on the final report
Company:	Mount Polley Mining Corporation
Contact:	Gabriel Holmes
Phone:	236-317-4939
	Company address below will appear on the final report
Street:	PO Box 12
City/Province:	Likely, BC
Postal Code:	V0L 1N0
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☐ NO
Company:	
Contact:	

Report Format / Distribution

Select Report Format: ☑ ☑ EXCEL ☐ EDD (DIGITAL)

Quality Control (QC) Report with Report ☑ ☐ NO

☐ Compare Results to Criteria on Report - provide details below if box

Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax	kala.ivens@mountpolley.com
Email 2	gabriel.holmes@mountpolley.com
Email 3	pstecko@minnow.ca; kbatchelar@minnow.ca

Invoice Distribution

Select Invoice Distribution: ☑ EMAIL ☑ MAIL ☐ FAX

Email 1 or Fax	gabriel.holmes@mountpolley.com
Email 2	

Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply

Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days)		EMERGENCY	
	4 day [P4] ☐		1 Business day [E1] ☐
	3 day [P3] ☐		Same Day, Weekend or Statutory holiday [E0] ☐
	2 day [P2] ☐		

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm

For tests that can not be performed according to the service level selected, you will be contacted.

Project Information

ALS Account # / Quote #:	VA22-MPMC100-004
Job #:	
PO / AFE:	
LSD:	

Oil and Gas Required Fields (client use)

AFE/Cost Center:	PO#
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Lab Work Order # (lab use only):

ALS Contact: Can Dang

Sampler: KBa

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Chlorophyll-a by Fluorometry (EB70)	Ash-free Dry Weight by Gravimetry (E137)	Number of Containers
49	HAC-R3_AFDM-4_2022-08	08-Aug-22		Tissue		R	1
50	HAC-R3_AFDM-5_2022-08	08-Aug-22		Tissue		R	1

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ ☐

Are samples for human drinking water use? | | | |

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☑ SIF Observations Yes ☐ No ☐

Ice Packs ☑ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
			2,4	6,6	10

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by:	Date:	Time:	Received by:	Date:	Time:	Received by:	Date:	Time:
Katharina Batchelar	11-Aug-22	12:00				JC	AUG 12 2022	12pm

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1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form**.

BENTHIC INVERTEBRATE COMMUNITY

Cordillera Methods, QC Report, and Results 22-29-1

(Finalized October 7, 2022)

Methods and QC Report 2022

Project ID: MPMC Hazeltine (22-29)

Client: Minnow Environmental

Prepared by:
Cordillera Consulting Inc.
Summerland, BC
© 2022

Unit 1, 13216 Henry Ave B1202
Summerland, BC, V0H 1Z0
www.cordilleraconsulting.ca

P: 250.494.7553
F: 250.494.7562

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Sample Reception

On August 15, 2022, Cordillera Consulting received 10 benthic samples from Minnow Environmental. When samples arrived to Cordillera Consulting, exterior packaging was initially inspected for damage or wet spots that would have indicated damage to the interior containers.

Samples were logged into a proprietary software database (INSTAR1) where the clients assigned sample name was recorded along with a Cordillera Consulting (CC) number for cross-reference. Each sample was checked to ensure that all sites and replicates recorded on field sheets or packing lists were delivered intact and with adequate preservative. Any missing, mislabelled or extra samples were reported to the client immediately to confirm the total numbers and correct names on the sample jars. The client representative was notified of the arrival of the shipment and provided a sample inventory once intake was completed.
See table below for sample inventory:

Table 1: Summary of sample information including Cordillera Consulting (CC) number

Sample	CC#	Date	Size	# of Jars
FPC-R3_BIC-1_2022-08	CC230204	8/9/2022	250µM	1
FPC-R3_BIC-2_2022-08	CC230205	8/9/2022	250µM	1
FPC-R3_BIC-3_2022-08	CC230206	8/9/2022	250µM	1
FPC-R3_BIC-4_2022-08	CC230207	8/9/2022	250µM	1
FPC-R3_BIC-5_2022-08	CC230208	8/9/2022	250µM	1
HAC-R3_BIC-1_2022-08	CC230209	8/10/2022	250µM	1
HAC-R3_BIC-2_2022-08	CC230210	8/10/2022	250µM	1
HAC-R3_BIC-3_2022-08	CC230211	8/8/2022	250µM	1
HAC-R3_BIC-4_2022-08	CC230212	8/8/2022	250µM	1
HAC-R3_BIC-5_2022-08	CC230213	8/8/2022	250µM	1

Sample Sorting

- Using a gridded Petri dish, fine forceps and a low power stereo-microscope (Olympus, Nikon, Leica) the sorting technicians removed the invertebrates and sorted them into family/orders.
- The sorting technician kept a running tally of total numbers excluding organisms from Porifera, Nemata, Platyhelminthes, Ostracoda, Copepoda, Cladocera and terrestrial drop-ins such as aphids. These organisms were marked for their presence (given a value of 1) only and left in the sample. They were not included towards the 300-organism subsample count.
- Where specimens are broken or damaged, only heads were counted.
- Subsampling was conducted with the use of a Marchant Box.

- When using the Marchant box, cells were extracted at the same time in the order indicated by a random number table. If the 300th organism was found part way into sorting a cell then the balance of that cell was sorted. If the organism count had not reached 300 by the 50th cell then the entire sample was sorted.
- The total number of cells sorted and the number of organisms removed were recorded manually on a bench sheet and then recorded into INSTAR1
- Organisms were stored in vials containing 80% ethanol and an interior label indicating the site names, date of sampling, site code numbers and portion subsampled. This information was also recorded on the laboratory bench sheet and on INSTAR1.
- The sorted portion of the debris was preserved and labeled separately from the unsorted portion and was tested for sorting efficiency (Sorting Quality Control – Sorting Efficiency). The unsorted portion was also labeled and preserved in separate jars.

Percent sub-sampled and total countable invertebrates pulled from the samples were summarized in the table below.

Table 2: Percent sub-sample and invertebrate count for each sample

Sample	Date	CC#	250 micron fraction	
			% Sampled	# Invertebrates
FPC-R3_BIC-1_2022-08	09-Aug-22	CC230204	7%	377
FPC-R3_BIC-2_2022-08	09-Aug-22	CC230205	5%	371
FPC-R3_BIC-3_2022-08	09-Aug-22	CC230206	10%	403
FPC-R3_BIC-4_2022-08	09-Aug-22	CC230207	6%	308
FPC-R3_BIC-5_2022-08	09-Aug-22	CC230208	9%	411
HAC-R3_BIC-1_2022-08	10-Aug-22	CC230209	6%	329
HAC-R3_BIC-2_2022-08	10-Aug-22	CC230210	6%	333
HAC-R3_BIC-3_2022-08	08-Aug-22	CC230211	5%	342
HAC-R3_BIC-4_2022-08	08-Aug-22	CC230212	6%	376
HAC-R3_BIC-5_2022-08	08-Aug-22	CC230213	10%	328

Sorting Quality Control - Sorting Efficiency

As a part of Cordillera's laboratory policy, all projects undergo sorting efficiency checks.

- As sorting progresses, 10% of samples were randomly chosen by senior members of the sorting team for resorting.
- All sorters working on a project had at least 1 sample resorted by another sorter.
- An efficiency of 90 % was expected (95% for CABIN samples).
- If 90/95% efficiency was not met, samples from that sorter were resorted.
- To calculated sorting efficiency the following formula was used:

$$\frac{\#OrganismsMissed}{TotalOrganismsFound} * 100 = \%OM$$

Table 3 Summary of sorting efficiency

			Total from Sample	Percent Efficiency
Site - QC, Sample - QC 1, CC# - CC230211, Percent sampled = 5%, Sieve size = 250				
Coleoptera		1		
Trichoptera		5		
	Total:	**6**	**342**	**98%**

Sorting Quality Control - Sub-Sampling QC

Certain Provincial and Mining projects require additional sorting checks in the form of sub-sampling QC, (Environmental Effects Monitoring (EEM) protocol). This ensured that any fraction of the total sample that was examined was actually an accurate representation of the number of total organisms. Organisms from the additional sub-samples were not identified; rather total organism count only was compared.

Sub-Sampling efficiency was measured on 10% of the number of sub-sampled samples in the project. Ex. In a project where 50 of 100 total samples were processed through subsampling using a Marchant box, then 10% of 50; or 5 samples were used for sub sampling efficiency.

Sub-Sampling efficiency was performed by fractioning the entire sample into sub-sample percentages. On each sub-sampled portion, a total organism count was recorded and compared to the rest of the sub-samples. In order to pass, all fractions were required to be within 20% of total organism count.

Example: If 300 organisms are found in 10% of the sample, the sorter will continue to sample in 10% fractions until the entire sample is separated. They will then count the total number of organisms in each of the 10 fractions of 10% and compare the organism count.

When divergence is >20% the sorting manager examines for the source of the problem and takes steps to correct it. With the Marchant box, the problem typically rested with how the box is flipped back to the upright position. For this reason, subsampling was performed by experienced employees only. Another common source of error would be the type of debris in the sample. Samples with algae or heavy with periphyton have a higher incident of failure due to clumping than clear samples.

Table 4 Summary of Sub Sample efficiency

Station ID		Organisms in Subsample																			Sorter		Actual Total	Precision		Accuracy	
CC#	Sample Name	1	2	3	4	5	6	7	8	9	10										By	Time		Percent Range		Min	Max
230213	HAC-R3_BIC-5_2022-08	328	335	401	403	382	404	333	392	350	332										MP	625	3660	0.25	18.81	4.37	10.38

Taxonomic Effort

The next procedure was the identification to genus-species level where possible of all the organisms in the sample.

- Identifications were made at the genus/species level for all insect organisms found including Chironomidae (Based on CABIN protocol).
- Non-insect organisms (except those not included in CABIN count) were identified to genus/species where possible and to a minimum of family level with intact and mature specimens.
- The Standard Taxonomic Effort lists compiled by the CABIN manual[1], SAFIT[2] , and PNAMP[3] were used as a guide line for what level of identification to achieve where the condition and maturity of the organism enabled.
- Organisms from the same families/order were kept in separate vials with 80% ethanol and an interior label of printed laser paper.
- Chironomidae was identified to genus/species level where possible and was aided by slide mounts. CMC-10 was used to clear and mount the slide.
- Oligochaetes was identified to family/genus level with the aid of slide mounts. CMC-10 was used to clear and mount the slide.
- Other Annelida (leeches, polychaetes) were identified to the family/genus/species level with undamaged, mature specimens.
- Mollusca was identified to family and genus/species where possible
- Decapoda, Amphipoda and Isopoda were identified at family/genus/species level where possible.
- Bryozoans and Nemata remained at the phylum level
- Hydrachnidae and Cnidaria were identified at the family/genus level where possible.
- When requested, reference collections were made containing at least one individual from each taxa listed. Organisms represented will have been identified to the lowest practical level.
- Reference collection specimens were stored in 55 mm glass vials with screw-cap lids with polyseal inserts (museum quality). They were labeled with taxa name, site code, date identified and taxonomist name. The same information was applied to labels on the slide mounts.

Taxonomists

The taxonomists for this project were certified by the Society of Freshwater Science (SFS) Taxonomic Certification Program at level 2 which is the required certification for CABIN projects:

Scott Finlayson: Group 1 General Arthropods (East/West); Group 2 EPT (East/West); Group 3 Chironomidae (East/West); Group 4 Oligochaeta

Adam Bliss: Group 1 General Arthropods (East/West); Group 2 EPT (East/West); Group 3 Chironomidae
Rita Avery: Group 1 General Arthropods (East/West); Group 2 EPT (East/West)

Taxonomic QC

Taxonomic QC was performed in house by someone other than the original taxonomist.

- Quality control protocol involved complete, blind re-identification and re-enumeration of at least 10% of samples by a second SFS-certified taxonomist.
- Samples for taxonomic quality control were randomly selected and quality control procedures were conducted as the project progresses through the laboratories.

- The second (QC) taxonomist will calculate and record four types of errors:
    1. Misidentification error
    2. Enumeration error
    3. Questionable taxonomic resolution error
    4. Insufficient taxonomic resolution error

The QC coordinator then calculates the following estimates of taxonomic precision.

1. The percent total identification error rate is calculated as:

$$\frac{Sum\ of\ incorrect\ identifications}{total\ organisms\ counted\ in\ audit} * (100)$$

The average total identification error rate of audited samples did not exceed 5%. All samples that exceed a 5% error rate were re-evaluated to determine whether repeated errors or patterns in error contributed.

2. The percent difference in enumeration (PDE) to quantify the consistency of specimen counts.

$$PDE = \frac{|n_1 - n_2|}{n_1 + n_2} x100$$

3. The percent taxonomic disagreement (PTD) to quantify the shared precision between two sets of identifications.

$$PTD = \left(1 - \left[\frac{a}{N}\right]\right) x100$$

4. Bray Curtis dissimilarity Index to quantify the differences in identifications.

$$BC_{ij} = 1 - \frac{2C_{ij}}{S_j + S_i}$$

Error Summary

All samples report errors within the acceptable limits for CABIN Laboratory methods (less than 5% error).

Table 5 Summary of taxonomic error following QC

Site	Taxa Identified	% Error	PDE	PTD	Bray - Curtis Dissimilarity index
Site - FPC-R3, Sample - FPC-R3_BIC-4_2022-08, CC# - CC230207, Percent sampled = 6%, Sieve size = 250	312	0.00	0.64516129	1.6025641	0.00967742

There will always be disagreements between taxonomists regarding the degree of taxonomic resolution in immature specimens and when laboratories make use of different keys for certain groups (Mollusks is an especially disputed group). It is always possible that some taxa found by the original taxonomist were overlooked in QC.

All of the Taxonomic QC samples that were observed passed testing according to the CABIN misidentification protocols. See the tables below for results from taxonomic QC audit.

Error Rationale

Site - FPC-R3, Sample - FPC-R3_BIC-4_2022-08, CC# - CC230207, Percent sampled = 6%, Sieve size = 250	Laboratory Count	QC Audit Count	Agreement	Misidentification	Questionable Taxonomic Resolution	Enumeration	Insufficient Taxonomic Resolution	Comments
Atractides	1	1						
Aturus	2	2						
Baetidae	28	27	No			X		
Baetis	1	2	No			X		
Bezzia/ Palpomyia	1	1						
Capniidae	33	33						
Chloroperlidae	11	11						

Collembola	9	9						
Elmidae	3	3						
Enchytraeus	2	2						
Eukiefferiella	7	7						
Heptageniidae	87	88	No			X		
Heterlimnius	1	1						
Hygrobates	2	5	No			X		
Leptophlebiidae	41	41						
Leuctridae	1	1						
Micropsectra	3	3						
Mideopsis	1	1						
Nemouridae	5	5						
Oribatida	1	1						
Orthocladiinae	2	2						
Orthocladius lignicola	1	1						
Perlodidae	8	8						
Pisidiidae	5	5						
Plecoptera	1	1						
Polypedilum	3	3						
Rheocricotopus	6	6						
Rhyacophila	1	1						
Sminthuridae	1	1						
Sweltsa	13	13						
Tanypodinae	2	2						
Tanytarsini	10	10						
Trichoptera	7	7						
Tubificinae with hair chaetae	1	1						
Tvetenia	3	3						
Wormaldia	4	4						
Total:	**308**	**312**						
					0	**4**	**0**	
% Total Misidentification Rate =	misidentifications / total number	x100 =	0.00	**Pass**				

References

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[2] Southwest Association of Freshwater Invertebrate Taxonomists. (2015). www.safit.org

[3] Pacific Northwest Aquatic Monitoring Partnership (Accessed 2015). www.pnamp.org

Taxonomic Keys

Below is a reference list of taxonomic keys utilized by taxonomists at Cordillera Consulting. Cordillera taxonomists routinely seek out new literature to ensure the most accurate identification keys are being utilized. This is not reflective of the exhaustive list of resources that we use for identification. A more complete list of taxonomic resources can be found at Southwest Association of Freshwater Invertebrate Taxonomists. (2015).
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Raw Benthic Invertebrate Density Results (# individuals/sample), Mount Polley Mine

Project: 22-29-1 (MPMC Hazeltine)
Minnow Environmental (BC)
Taxonomist: Scott Finlayson
scottfinlayson@cordilleraconsulting.ca
250-494-7553

Site:	FPC-R3	FPC-R3	FPC-R3	FPC-R3	FPC-R3	HAC-R3	HAC-R3	HAC-R3	HAC-R3	HAC-R3
Sample:	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
Sample Collection Date:	09-Aug-22	09-Aug-22	09-Aug-22	09-Aug-22	09-Aug-22	10-Aug-22	10-Aug-22	08-Aug-22	08-Aug-22	08-Aug-22
CC#:	CC230204	CC230205	CC230206	CC230207	CC230208	CC230209	CC230210	CC230211	CC230212	CC230213
Phylum: Arthropoda	0	0	0	0	0	0	0	0	0	0
| Order: Collembola	14	0	0	150	78	0	0	0	0	0
| Family: Sminthuridae	0	0	0	17	0	0	0	0	0	0
Subphylum: Hexapoda	0	0	0	0	0	0	0	0	0	0
| Class: Insecta	0	0	0	0	0	0	0	0	0	0
| Order: Ephemeroptera	0	0	0	0	0	0	0	0	0	0
| Family: Ameletidae	0	0	0	0	0	0	0	0	0	0
Ameletus	0	0	0	0	0	0	0	80	33	50
| Family: Baetidae	29	500	270	467	356	1,033	817	240	317	90
Baetis	0	20	50	17	33	350	1,767	260	367	20
Fallceon	0	0	0	0	0	283	0	320	250	50
| Family: Ephemerellidae	0	0	0	0	22	300	0	0	0	0
Drunella	0	20	0	0	0	0	0	0	0	0
Drunella spinifera	0	0	0	0	0	0	0	0	0	10
Ephemerella excrucians complex	0	0	0	0	22	0	0	0	0	0
| Family: Heptageniidae	57	640	1,210	1,450	556	683	117	360	517	160
Epeorus	0	0	0	0	0	0	0	0	33	0
| Family: Leptophlebiidae	2,043	3,440	910	683	600	633	0	220	117	180
Neoleptophlebia	0	0	10	0	0	0	0	0	0	0
Paraleptophlebia	0	0	0	0	0	83	0	60	17	10
| Order: Plecoptera	29	0	40	17	22	0	0	0	0	0
| Family: Capniidae	343	600	460	550	778	0	0	0	0	0
| Family: Chloroperlidae	0	60	70	183	67	0	0	0	0	0
Sweltsa	0	40	180	217	478	0	0	0	0	0
| Family: Leuctridae	0	0	10	17	0	0	0	0	0	0
| Family: Nemouridae	14	40	50	83	56	0	0	0	0	0
Malenka	29	40	0	0	0	0	0	0	0	0
Zapada cinctipes	0	0	0	0	0	33	83	40	0	0

Note: A value of zero reported at a less specific level of taxonomy does not indicate an absence of organisms at a more specific level of taxonomy.

Raw Benthic Invertebrate Density Results (# individuals/sample), Mount Polley Mine

Project: 22-29-1 (MPMC Hazeltine)
Minnow Environmental (BC)
Taxonomist: Scott Finlayson
scottfinlayson@cordilleraconsulting.ca
250-494-7553

Site:	FPC-R3	FPC-R3	FPC-R3	FPC-R3	FPC-R3	HAC-R3	HAC-R3	HAC-R3	HAC-R3	HAC-R3
Sample:	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
Sample Collection Date:	09-Aug-22	09-Aug-22	09-Aug-22	09-Aug-22	09-Aug-22	10-Aug-22	10-Aug-22	08-Aug-22	08-Aug-22	08-Aug-22
CC#:	CC230204	CC230205	CC230206	CC230207	CC230208	CC230209	CC230210	CC230211	CC230212	CC230213
| **Family: Perlodidae**	0	660	130	133	233	0	17	0	0	10
Isoperla	71	100	10	0	11	0	0	0	0	0
| **Order: Trichoptera**	29	180	70	117	56	183	233	2,100	1,017	870
| **Family: Apataniidae**	0	0	0	0	0	0	0	0	0	0
Apatania	0	20	0	0	0	0	0	0	0	0
| **Family: Hydropsychidae**	0	120	0	0	0	133	983	480	817	230
Cheumatopsyche	0	0	0	0	0	33	50	160	150	110
Hydropsyche	0	0	0	0	0	0	167	80	50	0
| **Family: Lepidostomatidae**	0	0	0	0	0	0	0	0	0	0
Lepidostoma	0	0	0	0	0	433	367	2,260	2,350	1,300
| **Family: Limnephilidae**	0	0	0	0	0	33	0	0	0	0
Dicosmoecus	0	0	10	0	11	0	0	0	0	0
| **Family: Philopotamidae**	0	0	0	0	0	0	0	0	0	0
Chimarra	0	0	10	0	0	0	0	0	0	0
Wormaldia	0	20	10	67	33	0	0	0	0	0
| **Family: Polycentropodidae**	0	0	20	0	0	0	0	0	0	0
| **Family: Rhyacophilidae**	0	0	0	0	0	0	0	0	0	0
Rhyacophila	0	0	20	17	33	0	0	0	0	0
Rhyacophila brunnea/vemna group	0	0	0	0	11	0	0	0	0	0
Rhyacophila arnaudi	0	0	0	0	0	0	33	0	0	0
| **Order: Coleoptera**	14	0	0	0	0	0	0	0	0	0
| **Family: Dytiscidae**	29	0	0	0	0	0	0	0	0	0
| **Family: Elmidae**	0	80	50	50	78	233	233	0	0	60
Heterlimnius	0	0	40	17	44	0	0	0	0	0
Optioservus	0	0	0	0	0	84	17	0	0	0
| **Family: Staphylinidae**	0	0	0	0	11	0	0	0	0	0
| **Order: Diptera**	0	0	0	0	0	0	0	0	0	0
| **Family: Ceratopogonidae**	0	0	0	0	0	0	0	20	0	0
Bezzia/ Palpomyia	0	0	20	17	11	0	0	0	0	0

Note: A value of zero reported at a less specific level of taxonomy does not indicate an absence of organisms at a more specific level of taxonomy.

Raw Benthic Invertebrate Density Results (# individuals/sample), Mount Polley Mine

Project: 22-29-1 (MPMC Hazeltine)
Minnow Environmental (BC)
Taxonomist: Scott Finlayson
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250-494-7553

Site:	FPC-R3	FPC-R3	FPC-R3	FPC-R3	FPC-R3	HAC-R3	HAC-R3	HAC-R3	HAC-R3	HAC-R3
Sample:	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
Sample Collection Date:	09-Aug-22	09-Aug-22	09-Aug-22	09-Aug-22	09-Aug-22	10-Aug-22	10-Aug-22	08-Aug-22	08-Aug-22	08-Aug-22
CC#:	CC230204	CC230205	CC230206	CC230207	CC230208	CC230209	CC230210	CC230211	CC230212	CC230213
Culicoides	0	0	0	0	11	0	0	0	0	0
Forcipomyia	0	0	0	0	11	0	0	0	0	0
| Family: Chironomidae	0	0	0	0	22	0	0	0	0	0
| Subfamily: Chironominae	0	0	10	0	0	0	0	0	0	0
| Tribe: Chironomini	0	0	0	0	0	0	0	0	0	0
Polypedilum	43	0	10	50	11	17	50	0	50	0
| Tribe: Tanytarsini	57	20	10	167	111	33	67	20	0	0
Micropsectra	14	20	30	50	178	150	150	0	17	10
Rheotanytarsus	0	0	0	0	11	50	50	0	0	0
Stempellinella	14	0	0	0	0	0	0	0	0	0
Tanytarsus	14	0	0	0	11	17	0	0	17	10
| Subfamily: Diamesinae	0	0	0	0	0	0	0	0	0	0
| Tribe: Diamesini	0	0	0	0	0	0	0	0	0	0
Pagastia	0	0	0	0	11	17	50	20	0	0
| Subfamily: Orthocladiinae	86	20	0	33	0	0	17	0	0	0
Brillia	0	20	0	0	0	0	0	0	0	0
Corynoneura	14	20	10	0	22	0	0	0	0	0
Eukiefferiella	43	20	0	117	44	33	50	20	0	0
Heterotrissocladius	0	0	0	0	0	17	0	0	0	0
Limnophyes	14	0	0	0	0	0	0	0	0	0
Orthocladius complex	114	80	0	0	0	0	0	0	0	0
Orthocladius lignicola	0	0	0	17	0	0	0	0	0	0
Parakiefferiella	0	0	10	0	0	0	0	0	0	0
Parametriocnemus	29	20	0	0	11	17	0	0	0	0
Rheocricotopus	0	0	20	100	111	17	17	0	0	0
Synorthocladius	43	60	0	0	0	0	0	0	0	0
Thienemanniella	0	0	0	0	0	0	0	0	17	0
Tvetenia	14	100	20	50	44	0	0	20	17	0

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Raw Benthic Invertebrate Density Results (# individuals/sample), Mount Polley Mine

Project: 22-29-1 (MPMC Hazeltine)
Minnow Environmental (BC)
Taxonomist: Scott Finlayson
scottfinlayson@cordilleraconsulting.ca
250-494-7553

Site:	FPC-R3	FPC-R3	FPC-R3	FPC-R3	FPC-R3	HAC-R3	HAC-R3	HAC-R3	HAC-R3	HAC-R3
Sample:	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
Sample Collection Date:	09-Aug-22	09-Aug-22	09-Aug-22	09-Aug-22	09-Aug-22	10-Aug-22	10-Aug-22	08-Aug-22	08-Aug-22	08-Aug-22
CC#:	CC230204	CC230205	CC230206	CC230207	CC230208	CC230209	CC230210	CC230211	CC230212	CC230213
| **Subfamily: Prodiamesinae**	0	0	0	0	0	0	0	0	0	0
Monodiamesa	0	0	10	0	0	0	0	0	0	0
| **Subfamily: Tanypodinae**	14	0	0	33	0	0	0	0	0	0
Ablabesmyia	0	0	0	0	0	17	17	0	0	0
| **Tribe: Natarsiini**	0	0	0	0	0	0	0	0	0	0
Natarsia	57	0	0	0	0	0	0	0	0	0
| **Tribe: Pentaneurini**	0	0	0	0	0	0	0	0	0	0
Pentaneura	0	0	0	0	0	83	100	40	33	30
Thienemannimyia group	186	0	0	0	0	150	33	20	50	50
| **Family: Empididae**	57	0	0	0	0	0	0	0	0	0
| **Family: Simuliidae**	0	20	0	0	33	0	0	20	0	10
Simulium	0	0	10	0	33	0	17	0	0	0
| **Family: Tipulidae**	0	0	0	0	0	0	0	0	0	10
Antocha	0	0	0	0	0	117	17	0	0	0
Dicranota	0	0	0	0	11	0	0	0	0	0
| **Order: Lepidoptera**	14	0	20	0	0	0	0	0	0	0
| **Order: Megaloptera**	0	20	0	0	0	0	0	0	0	0
| **Family: Sialidae**	0	0	0	0	0	0	0	0	0	0
Sialis	0	0	10	0	0	0	0	0	0	0
| **Order: Thysanoptera**	14	0	0	0	0	0	17	0	0	0
Subphylum: Chelicerata	0	0	0	0	0	0	0	0	0	0
| Class: Arachnida	0	0	0	0	0	0	0	0	0	0
| **Order: Trombidiformes**	0	0	0	0	0	0	0	0	0	0
| **Family: Aturidae**	0	0	0	0	0	0	0	0	0	0
Aturus	0	0	30	33	67	0	0	0	0	0
| **Family: Halacaridae**	14	0	0	0	0	0	0	0	0	0
| **Family: Hydryphantidae**	0	0	0	0	0	0	0	0	0	0
Albertathyas	14	0	0	0	0	0	0	0	0	0

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Raw Benthic Invertebrate Density Results (# individuals/sample), Mount Polley Mine

Project: 22-29-1 (MPMC Hazeltine)
Minnow Environmental (BC)
Taxonomist: Scott Finlayson
scottfinlayson@cordilleraconsulting.ca
250-494-7553

Site:	FPC-R3	FPC-R3	FPC-R3	FPC-R3	FPC-R3	HAC-R3	HAC-R3	HAC-R3	HAC-R3	HAC-R3
Sample:	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
Sample Collection Date:	09-Aug-22	09-Aug-22	09-Aug-22	09-Aug-22	09-Aug-22	10-Aug-22	10-Aug-22	08-Aug-22	08-Aug-22	08-Aug-22
CC#:	CC230204	CC230205	CC230206	CC230207	CC230208	CC230209	CC230210	CC230211	CC230212	CC230213
| **Family: Hygrobatidae**	29	40	0	0	0	0	0	0	0	0
Atractides	0	40	30	17	22	0	0	0	0	0
Hygrobates	0	0	10	33	0	0	0	0	0	10
| **Family: Lebertiidae**	0	0	0	0	0	0	0	0	0	0
Lebertia	14	0	0	0	0	0	0	0	0	0
| **Family: Limnesiidae**	0	20	0	0	0	0	0	0	0	0
| **Family: Mideopsidae**	0	0	0	0	0	0	0	0	0	0
Mideopsis	0	0	10	17	0	0	0	0	0	0
| **Family: Sperchontidae**	0	0	0	0	0	0	0	0	0	0
Sperchon	43	120	0	0	0	0	0	0	0	0
| **Order: Sarcoptiformes**	0	0	0	0	0	0	0	0	0	0
| **Order: Oribatida**	0	0	30	17	0	0	0	0	0	0
| **Family: Hydrozetidae**	0	0	10	0	11	0	0	0	0	0
| Class: Malacostraca	0	0	0	0	0	0	0	0	0	0
| **Order: Amphipoda**	14	0	0	0	0	0	0	0	0	0
Phylum: Mollusca	0	0	0	0	0	0	0	0	0	0
| Class: Bivalvia	0	0	0	0	0	0	0	0	0	0
| **Order: Veneroida**	0	0	0	0	0	0	0	0	0	0
| **Family: Pisidiidae**	1,457	160	40	83	111	0	0	0	0	0
Pisidium	86	0	0	0	0	0	0	0	0	0
| Class: Gastropoda	29	0	0	0	0	100	0	0	0	0
| **Order: Basommatophora**	0	0	0	0	0	0	0	0	0	0
| **Family: Lymnaeidae**	0	0	0	0	0	0	0	0	0	0
Fossaria	0	0	0	0	0	50	0	0	0	0
| **Family: Physidae**	0	0	0	0	0	0	0	0	0	0
Physa	0	0	0	0	0	17	0	0	0	0
Phylum: Annelida	0	0	0	0	0	0	0	0	0	0
Subphylum: Clitellata	0	0	0	0	0	0	0	0	0	0
| Class: Oligochaeta	0	0	0	0	0	0	0	0	0	0
| **Order: Lumbriculida**	0	0	0	0	0	0	0	0	0	0

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Project: 22-29-1 (MPMC Hazeltine)
Minnow Environmental (BC)
Taxonomist: Scott Finlayson
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Site:	FPC-R3	FPC-R3	FPC-R3	FPC-R3	FPC-R3	HAC-R3	HAC-R3	HAC-R3	HAC-R3	HAC-R3
Sample:	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
Sample Collection Date:	09-Aug-22	09-Aug-22	09-Aug-22	09-Aug-22	09-Aug-22	10-Aug-22	10-Aug-22	08-Aug-22	08-Aug-22	08-Aug-22
CC#:	CC230204	CC230205	CC230206	CC230207	CC230208	CC230209	CC230210	CC230211	CC230212	CC230213
| Family: Lumbriculidae	0	0	0	0	11	17	0	0	0	0
| Order: Tubificida	0	0	0	0	0	0	0	0	0	0
| Family: Enchytraeidae	0	0	0	0	0	0	0	0	0	0
Enchytraeus	29	0	0	33	56	0	0	0	0	0
| Family: Naididae	114	0	50	0	0	0	0	0	17	0
Nais	0	40	0	0	0	33	0	0	0	0
Pristina	0	0	0	0	0	0	17	0	17	0
| Subfamily: Tubificinae with hair chaetae	0	0	0	17	0	0	0	0	0	0
Totals:	**5,385**	**7,420**	**4,030**	**5,136**	**4,564**	**5,482**	**5,553**	**6,840**	**6,270**	**3,280**
Taxa present but not included:										
Phylum: Arthropoda	0	0	0	0	0	0	0	0	0	0
Subphylum: Crustacea	0	0	0	0	0	0	0	0	0	0
| Class: Ostracoda	14	20	10	17	11	17	17	20	17	10
| Class: Branchiopoda	0	0	0	0	0	0	0	0	0	0
| Order: Cladocera	14	20	10	17	11	0	17	20	0	10
| Class: Maxillipoda	0	0	0	0	0	0	0	0	0	0
| Class: Copepoda	14	20	0	17	11	0	0	20	0	0
Phylum: Annelida	0	0	0	0	0	0	0	0	0	0
Subphylum: Clitellata	0	0	0	0	0	0	0	0	0	0
| Class: Oligochaeta	0	0	0	0	0	0	0	0	0	0
| Order: Tubificida	0	0	0	0	0	0	0	0	0	0
| Family: Lumbricidae	14	0	60	17	11	0	0	0	0	0
Phylum: Nemata	14	0	10	0	11	0	0	0	0	10
Totals:	**70**	**60**	**90**	**68**	**55**	**17**	**34**	**60**	**17**	**30**

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Area-Based Benthic Invertebrate Density Results (# individuals/m^2), Mount Polley Mine

Project: 22-29-1 (MPMC Hazeltine)
Minnow Environmental (BC)
Taxonomist: Scott Finlayson
scottfinlayson@cordilleraconsulting.ca
250-494-7553

Site:	FPC-R3	FPC-R3	FPC-R3	FPC-R3	FPC-R3	HAC-R3	HAC-R3	HAC-R3	HAC-R3	HAC-R3
Sample:	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
Sample Collection Date:	09-Aug-22	09-Aug-22	09-Aug-22	09-Aug-22	09-Aug-22	10-Aug-22	10-Aug-22	08-Aug-22	08-Aug-22	08-Aug-22
CC#:	CC230204	CC230205	CC230206	CC230207	CC230208	CC230209	CC230210	CC230211	CC230212	CC230213
Phylum: Arthropoda	0	0	0	0	0	0	0	0	0	0
| Order: Collembola	3.91	0	0	41.9	21.8	0	0	0	0	0
| Family: Sminthuridae	0	0	0	4.74	0	0	0	0	0	0
Subphylum: Hexapoda	0	0	0	0	0	0	0	0	0	0
| Class: Insecta	0	0	0	0	0	0	0	0	0	0
| Order: Ephemeroptera	0	0	0	0	0	0	0	0	0	0
| Family: Ameletidae	0	0	0	0	0	0	0	0	0	0
Ameletus	0	0	0	0	0	0	0	24.0	9.90	15.0
| Family: Baetidae	8.09	140	75.3	130	99.3	310	245	72.0	95.1	27.0
Baetis	0	5.58	14.0	4.74	9.21	105	530	78.0	110	6.00
Fallceon	0	0	0	0	0	84.9	0	96.0	75.0	15.0
| Family: Ephemerellidae	0	0	0	0	6.14	90.0	0	0	0	0
Drunella	0	5.58	0	0	0	0	0	0	0	0
Drunella spinifera	0	0	0	0	0	0	0	0	0	3.00
Ephemerella excrucians complex	0	0	0	0	6.14	0	0	0	0	0
| Family: Heptageniidae	15.9	179	338	405	155	205	35.1	108	155	48.0
Epeorus	0	0	0	0	0	0	0	0	9.90	0
| Family: Leptophlebiidae	570	960	254	191	167	190	0	66.0	35.1	54.0
Neoleptophlebia	0	0	2.79	0	0	0	0	0	0	0
Paraleptophlebia	0	0	0	0	0	24.9	0	18.0	5.10	3.00
| Order: Plecoptera	8.09	0	11.2	4.74	6.14	0	0	0	0	0
| Family: Capniidae	95.7	167	128	153	217	0	0	0	0	0
| Family: Chloroperlidae	0	16.7	19.5	51.1	18.7	0	0	0	0	0
Sweltsa	0	11.2	50.2	60.5	133	0	0	0	0	0
| Family: Leuctridae	0	0	2.79	4.74	0	0	0	0	0	0
| Family: Nemouridae	3.91	11.2	14.0	23.2	15.6	0	0	0	0	0
Malenka	8.09	11.2	0	0	0	0	0	0	0	0
Zapada cinctipes	0	0	0	0	0	9.90	24.9	12.0	0	0
| Family: Perlodidae	0	184	36.3	37.1	65.0	0	5.10	0	0	3.00
Isoperla	19.8	27.9	2.79	0	3.07	0	0	0	0	0

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Area-Based Benthic Invertebrate Density Results (# individuals/m^2), Mount Polley Mine

Project: 22-29-1 (MPMC Hazeltine)
Minnow Environmental (BC)
Taxonomist: Scott Finlayson
scottfinlayson@cordilleraconsulting.ca
250-494-7553

Site:	FPC-R3	FPC-R3	FPC-R3	FPC-R3	FPC-R3	HAC-R3	HAC-R3	HAC-R3	HAC-R3	HAC-R3
Sample:	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
Sample Collection Date:	09-Aug-22	09-Aug-22	09-Aug-22	09-Aug-22	09-Aug-22	10-Aug-22	10-Aug-22	08-Aug-22	08-Aug-22	08-Aug-22
CC#:	CC230204	CC230205	CC230206	CC230207	CC230208	CC230209	CC230210	CC230211	CC230212	CC230213
| Order: Trichoptera	8.09	50.2	19.5	32.6	15.6	54.9	69.9	630	305	261
| Family: Apataniidae	0	0	0	0	0	0	0	0	0	0
Apatania	0	5.58	0	0	0	0	0	0	0	0
| Family: Hydropsychidae	0	33.5	0	0	0	39.9	295	144	245	69.0
Cheumatopsyche	0	0	0	0	0	9.90	15.0	48.0	45.0	33.0
Hydropsyche	0	0	0	0	0	0	50.1	24.0	15.0	0
| Family: Lepidostomatidae	0	0	0	0	0	0	0	0	0	0
Lepidostoma	0	0	0	0	0	130	110	678	705	390
| Family: Limnephilidae	0	0	0	0	0	9.90	0	0	0	0
Dicosmoecus	0	0	2.79	0	3.07	0	0	0	0	0
| Family: Philopotamidae	0	0	0	0	0	0	0	0	0	0
Chimarra	0	0	2.79	0	0	0	0	0	0	0
Wormaldia	0	5.58	2.79	18.7	9.21	0	0	0	0	0
| Family: Polycentropodidae	0	0	5.58	0	0	0	0	0	0	0
| Family: Rhyacophilidae	0	0	0	0	0	0	0	0	0	0
Rhyacophila	0	0	5.58	4.74	9.21	0	0	0	0	0
Rhyacophila brunnea/vemna group	0	0	0	0	3.07	0	0	0	0	0
Rhyacophila arnaudi	0	0	0	0	0	0	9.90	0	0	0
| Order: Coleoptera	3.91	0	0	0	0	0	0	0	0	0
| Family: Dytiscidae	8.09	0	0	0	0	0	0	0	0	0
| Family: Elmidae	0	22.3	14.0	14.0	21.8	69.9	69.9	0	0	18.0
Heterlimnius	0	0	11.2	4.74	12.3	0	0	0	0	0
Optioservus	0	0	0	0	0	25.2	5.10	0	0	0
| Family: Staphylinidae	0	0	0	0	3.07	0	0	0	0	0
| Order: Diptera	0	0	0	0	0	0	0	0	0	0
| Family: Ceratopogonidae	0	0	0	0	0	0	0	6.00	0	0
Bezzia/ Palpomyia	0	0	5.58	4.74	3.07	0	0	0	0	0
Culicoides	0	0	0	0	3.07	0	0	0	0	0
Forcipomyia	0	0	0	0	3.07	0	0	0	0	0
| Family: Chironomidae	0	0	0	0	6.14	0	0	0	0	0

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Area-Based Benthic Invertebrate Density Results (# individuals/m^2), Mount Polley Mine

Project: 22-29-1 (MPMC Hazeltine)
Minnow Environmental (BC)
Taxonomist: Scott Finlayson
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250-494-7553

Site:	FPC-R3	FPC-R3	FPC-R3	FPC-R3	FPC-R3	HAC-R3	HAC-R3	HAC-R3	HAC-R3	HAC-R3
Sample:	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
Sample Collection Date:	09-Aug-22	09-Aug-22	09-Aug-22	09-Aug-22	09-Aug-22	10-Aug-22	10-Aug-22	08-Aug-22	08-Aug-22	08-Aug-22
CC#:	CC230204	CC230205	CC230206	CC230207	CC230208	CC230209	CC230210	CC230211	CC230212	CC230213
| Subfamily: Chironominae	0	0	2.79	0	0	0	0	0	0	0
| Tribe: Chironomini	0	0	0	0	0	0	0	0	0	0
Polypedilum	12.0	0	2.79	14.0	3.07	5.10	15.0	0	15.0	0
| Tribe: Tanytarsini	15.9	5.58	2.79	46.6	31.0	9.90	20.1	6.00	0	0
Micropsectra	3.91	5.58	8.37	14.0	49.7	45.0	45.0	0	5.10	3.00
Rheotanytarsus	0	0	0	0	3.07	15.0	15.0	0	0	0
Stempellinella	3.91	0	0	0	0	0	0	0	0	0
Tanytarsus	3.91	0	0	0	3.07	5.10	0	0	5.10	3.00
| Subfamily: Diamesinae	0	0	0	0	0	0	0	0	0	0
| Tribe: Diamesini	0	0	0	0	0	0	0	0	0	0
Pagastia	0	0	0	0	3.07	5.10	15.0	6.00	0	0
| Subfamily: Orthocladiinae	24.0	5.58	0	9.21	0	0	5.10	0	0	0
Brillia	0	5.58	0	0	0	0	0	0	0	0
Corynoneura	3.91	5.58	2.79	0	6.14	0	0	0	0	0
Eukiefferiella	12.0	5.58	0	32.6	12.3	9.90	15.0	6.00	0	0
Heterotrissocladius	0	0	0	0	0	5.10	0	0	0	0
Limnophyes	3.91	0	0	0	0	0	0	0	0	0
Orthocladius complex	31.8	22.3	0	0	0	0	0	0	0	0
Orthocladius lignicola	0	0	0	4.74	0	0	0	0	0	0
Parakiefferiella	0	0	2.79	0	0	0	0	0	0	0
Parametriocnemus	8.09	5.58	0	0	3.07	5.10	0	0	0	0
Rheocricotopus	0	0	5.58	27.9	31.0	5.10	5.10	0	0	0
Synorthocladius	12.0	16.7	0	0	0	0	0	0	0	0
Thienemanniella	0	0	0	0	0	0	0	0	5.10	0
Tvetenia	3.91	27.9	5.58	14.0	12.3	0	0	6.00	5.10	0
| Subfamily: Prodiamesinae	0	0	0	0	0	0	0	0	0	0
Monodiamesa	0	0	2.79	0	0	0	0	0	0	0
| Subfamily: Tanypodinae	3.91	0	0	9.21	0	0	0	0	0	0
Ablabesmyia	0	0	0	0	0	5.10	5.10	0	0	0

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Area-Based Benthic Invertebrate Density Results (# individuals/m^2), Mount Polley Mine

Project: 22-29-1 (MPMC Hazeltine)
Minnow Environmental (BC)
Taxonomist: Scott Finlayson
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250-494-7553

Site:	FPC-R3	FPC-R3	FPC-R3	FPC-R3	FPC-R3	HAC-R3	HAC-R3	HAC-R3	HAC-R3	HAC-R3
Sample:	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
Sample Collection Date:	09-Aug-22	09-Aug-22	09-Aug-22	09-Aug-22	09-Aug-22	10-Aug-22	10-Aug-22	08-Aug-22	08-Aug-22	08-Aug-22
CC#:	CC230204	CC230205	CC230206	CC230207	CC230208	CC230209	CC230210	CC230211	CC230212	CC230213
| **Tribe: Natarsiini**	0	0	0	0	0	0	0	0	0	0
Natarsia	15.9	0	0	0	0	0	0	0	0	0
| **Tribe: Pentaneurini**	0	0	0	0	0	0	0	0	0	0
Pentaneura	0	0	0	0	0	24.9	30.0	12.0	9.90	9.00
Thienemannimyia group	51.9	0	0	0	0	45.0	9.90	6.00	15.0	15.0
| **Family: Empididae**	15.9	0	0	0	0	0	0	0	0	0
| **Family: Simuliidae**	0	5.58	0	0	9.21	0	0	6.00	0	3.00
Simulium	0	0	2.79	0	9.21	0	5.10	0	0	0
| **Family: Tipulidae**	0	0	0	0	0	0	0	0	0	3.00
Antocha	0	0	0	0	0	35.1	5.10	0	0	0
Dicranota	0	0	0	0	3.07	0	0	0	0	0
| **Order: Lepidoptera**	3.91	0	5.58	0	0	0	0	0	0	0
| **Order: Megaloptera**	0	5.58	0	0	0	0	0	0	0	0
| **Family: Sialidae**	0	0	0	0	0	0	0	0	0	0
Sialis	0	0	2.79	0	0	0	0	0	0	0
| **Order: Thysanoptera**	3.91	0	0	0	0	0	5.10	0	0	0
Subphylum: Chelicerata	0	0	0	0	0	0	0	0	0	0
| **Class: Arachnida**	0	0	0	0	0	0	0	0	0	0
| **Order: Trombidiformes**	0	0	0	0	0	0	0	0	0	0
| **Family: Aturidae**	0	0	0	0	0	0	0	0	0	0
Aturus	0	0	8.37	9.21	18.7	0	0	0	0	0
| **Family: Halacaridae**	3.91	0	0	0	0	0	0	0	0	0
| **Family: Hydryphantidae**	0	0	0	0	0	0	0	0	0	0
Albertathyas	3.91	0	0	0	0	0	0	0	0	0
| **Family: Hygrobatidae**	8.09	11.2	0	0	0	0	0	0	0	0
Atractides	0	11.2	8.37	4.74	6.14	0	0	0	0	0
Hygrobates	0	0	2.79	9.21	0	0	0	0	0	3.00
| **Family: Lebertiidae**	0	0	0	0	0	0	0	0	0	0
Lebertia	3.91	0	0	0	0	0	0	0	0	0

Notes: All results displayed are area-based densities (#/m^2). A value of zero reported at a less specific level of taxonomy does not indicate an absence of organisms at a more specific level of taxonomy.

Area-Based Benthic Invertebrate Density Results (# individuals/m^2), Mount Polley Mine

Project: 22-29-1 (MPMC Hazeltine)
Minnow Environmental (BC)
Taxonomist: Scott Finlayson
scottfinlayson@cordilleraconsulting.ca
250-494-7553

Site:	FPC-R3	FPC-R3	FPC-R3	FPC-R3	FPC-R3	HAC-R3	HAC-R3	HAC-R3	HAC-R3	HAC-R3
Sample:	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
Sample Collection Date:	09-Aug-22	09-Aug-22	09-Aug-22	09-Aug-22	09-Aug-22	10-Aug-22	10-Aug-22	08-Aug-22	08-Aug-22	08-Aug-22
CC#:	CC230204	CC230205	CC230206	CC230207	CC230208	CC230209	CC230210	CC230211	CC230212	CC230213
| **Family: Limnesiidae**	0	5.58	0	0	0	0	0	0	0	0
| **Family: Mideopsidae**	0	0	0	0	0	0	0	0	0	0
Mideopsis	0	0	2.79	4.74	0	0	0	0	0	0
| **Family: Sperchontidae**	0	0	0	0	0	0	0	0	0	0
Sperchon	12.0	33.5	0	0	0	0	0	0	0	0
| **Order: Sarcoptiformes**	0	0	0	0	0	0	0	0	0	0
| **Order: Oribatida**	0	0	8.37	4.74	0	0	0	0	0	0
| **Family: Hydrozetidae**	0	0	2.79	0	3.07	0	0	0	0	0
| **Class: Malacostraca**	0	0	0	0	0	0	0	0	0	0
| **Order: Amphipoda**	3.91	0	0	0	0	0	0	0	0	0
Phylum: Mollusca	0	0	0	0	0	0	0	0	0	0
| **Class: Bivalvia**	0	0	0	0	0	0	0	0	0	0
| **Order: Veneroida**	0	0	0	0	0	0	0	0	0	0
| **Family: Pisidiidae**	407	44.6	11.2	23.2	31.0	0	0	0	0	0
Pisidium	24.0	0	0	0	0	0	0	0	0	0
| **Class: Gastropoda**	8.09	0	0	0	0	30.0	0	0	0	0
| **Order: Basommatophora**	0	0	0	0	0	0	0	0	0	0
| **Family: Lymnaeidae**	0	0	0	0	0	0	0	0	0	0
Fossaria	0	0	0	0	0	15.0	0	0	0	0
| **Family: Physidae**	0	0	0	0	0	0	0	0	0	0
Physa	0	0	0	0	0	5.10	0	0	0	0
Phylum: Annelida	0	0	0	0	0	0	0	0	0	0
Subphylum: Clitellata	0	0	0	0	0	0	0	0	0	0
| **Class: Oligochaeta**	0	0	0	0	0	0	0	0	0	0
| **Order: Lumbriculida**	0	0	0	0	0	0	0	0	0	0
| **Family: Lumbriculidae**	0	0	0	0	3.07	5.10	0	0	0	0
| **Order: Tubificida**	0	0	0	0	0	0	0	0	0	0
| **Family: Enchytraeidae**	0	0	0	0	0	0	0	0	0	0
Enchytraeus	8.09	0	0	9.21	15.6	0	0	0	0	0

Notes: All results displayed are area-based densities (#/m^2). A value of zero reported at a less specific level of taxonomy does not indicate an absence of organisms at a more specific level of taxonomy.

Area-Based Benthic Invertebrate Density Results (# individuals/m^2), Mount Polley Mine

Project: 22-29-1 (MPMC Hazeltine)
Minnow Environmental (BC)
Taxonomist: Scott Finlayson
scottfinlayson@cordilleraconsulting.ca
250-494-7553

Site:	FPC-R3	FPC-R3	FPC-R3	FPC-R3	FPC-R3	HAC-R3	HAC-R3	HAC-R3	HAC-R3	HAC-R3
Sample:	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
Sample Collection Date:	09-Aug-22	09-Aug-22	09-Aug-22	09-Aug-22	09-Aug-22	10-Aug-22	10-Aug-22	08-Aug-22	08-Aug-22	08-Aug-22
CC#:	CC230204	CC230205	CC230206	CC230207	CC230208	CC230209	CC230210	CC230211	CC230212	CC230213
| Family: Naididae	31.8	0	14.0	0	0	0	0	0	5.10	0
Nais	0	11.2	0	0	0	9.90	0	0	0	0
Pristina	0	0	0	0	0	0	5.10	0	5.10	0
| Subfamily: Tubificinae with hair chaetae	0	0	0	4.74	0	0	0	0	0	0
Totals:	**1,502**	**2,070**	**1,124**	**1,433**	**1,273**	**1,645**	**1,666**	**2,052**	**1,881**	**984**
Taxa present but not included:										
Phylum: Arthropoda	0	0	0	0	0	0	0	0	0	0
Subphylum: Crustacea	0	0	0	0	0	0	0	0	0	0
| Class: Ostracoda	3.91	5.58	2.79	4.74	3.07	5.10	5.10	6.00	5.10	3.00
| Class: Branchiopoda	0	0	0	0	0	0	0	0	0	0
| Order: Cladocera	3.91	5.58	2.79	4.74	3.07	0	5.10	6.00	0	3.00
| Class: Maxillipoda	0	0	0	0	0	0	0	0	0	0
| Class: Copepoda	3.91	5.58	0	4.74	3.07	0	0	6.00	0	0
Phylum: Annelida	0	0	0	0	0	0	0	0	0	0
Subphylum: Clitellata	0	0	0	0	0	0	0	0	0	0
| Class: Oligochaeta	0	0	0	0	0	0	0	0	0	0
| Order: Tubificida	0	0	0	0	0	0	0	0	0	0
| Family: Lumbricidae	3.91	0	16.7	4.74	3.07	0	0	0	0	0
Phylum: Nemata	3.91	0	2.79	0	3.07	0	0	0	0	3.00
Totals:	**19.5**	**16.7**	**25.1**	**19.0**	**15.3**	**5.10**	**10.2**	**18.0**	**5.10**	**9.00**

Notes: All results displayed are area-based densities (#/m^2). A value of zero reported at a less specific level of taxonomy does not indicate an absence of organisms at a more specific level of taxonomy.

BENTHIC COMMUNITY

Cordillera Biomass Creek Data 22-29-1

(Finalized October 7, 2022)

Raw Benthic Invertebrate Biomass Results (g), Mount Polley Mine

Project: Mt. Polley 2022
Minnow Environmental (BC)
Taxonomist: Scott Finlayson
scottfinlayson@cordilleraconsulting.ca
250-494-7553

Site:	FPC-R3	FPC-R3	FPC-R3	FPC-R3	FPC-R3	HAC-R3	HAC-R3	HAC-R3	HAC-R3	HAC-R3
Sample:	BIC_2022-08	BIC-2_2022-08	BIC-3_2-22-08	BIC-4_2022-08	BIC-5_2022-08	BIC-1_2022-08	BIC-2_2022-08	BIC-3_2022-08	BIC-4_2022-08	BIC-5_2022-08
Sample Collection Date:	9-Aug-22	9-Aug-23	9-Aug-22	9-Aug-22	9-Aug-22	10-Aug-22	10-Aug-22	8-Aug-22	8-Aug-22	8-Aug-22
CC#:	CC230204	CC230205	CC230206	CC230207	CC230208	CC230209	CC230210	CC230211	CC230212	CC230213
Mesh	250	250	250	250	250	250	250	250	250	250
Sub-sample %	7	5	10	6	9	6	6	5	6	10
Dry Biomass analysis (g)										
Sample Total Dry Weight										
All organisms	1.4929	0.1780	1.1750	0.4683	0.7356	0.8083	0.4033	0.5120	0.4600	0.1400
Raw Dry Weight										
All organisms	0.1045	0.0089	0.1175	0.0281	0.0662	0.0485	0.0242	0.0256	0.0276	0.0140
Measured Weight										
All organisms	0.2388	0.144	0.2521	0.1618	0.1996	0.1826	0.1585	0.1588	0.1613	0.1473
Mesh Weight	0									
All organisms	0.1343	0.1351	0.1346	0.1337	0.1334	0.1341	0.1343	0.1332	0.1337	0.1333
Wet Biomass Analysis (g)										
Sample Total Wet Weight (g)										
All organisms	0.4804	0.0615	0.5496	0.1721	0.3870	0.1866	0.1480	0.1096	0.1111	0.0462
Mesh Weight	0.4586	0.4586	0.4586	0.46	0.46	0.4621	0.4621	0.4532	0.4532	0.4532
Corrected Wet Weight										
All organisms	6.8629	1.2300	5.4960	2.8683	4.3000	3.1100	2.4667	2.1920	1.8517	0.4620
Raw Wet Weight										
All organisms	0.939	0.5201	1.0082	0.6321	0.847	0.6487	0.6101	0.5628	0.5643	0.4994

BENTHIC COMMUNITY

Cordillera Methods, QC Report, and Results 22-29-6

(Finalized October 19, 2022)

Methods and QC Report 2022

Project ID: 22-29-6 (MPMC Creek CEMP)

Client: Minnow Environmental

Prepared by:
Cordillera Consulting Inc.
Summerland, BC
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Sample Reception

On August 16, 2022, Cordillera Consulting received 15 benthic samples from Minnow Environmental. When samples arrived to Cordillera Consulting, exterior packaging was initially inspected for damage or wet spots that would have indicated damage to the interior containers.

Samples were logged into a proprietary software database (INSTAR1) where the clients assigned sample name was recorded along with a Cordillera Consulting (CC) number for cross-reference. Each sample was checked to ensure that all sites and replicates recorded on field sheets or packing lists were delivered intact and with adequate preservative. Any missing, mislabelled or extra samples were reported to the client immediately to confirm the total numbers and correct names on the sample jars. The client representative was notified of the arrival of the shipment and provided a sample inventory once intake was completed.
See table below for sample inventory:

Table 1: Summary of sample information including Cordillera Consulting (CC) number

Sample	CC#	Date	Size	# of Jars
HAC-R1_BIC-1_2022-08	CC230214	8/10/2022	250µM	1
HAC-R1_BIC-2_2022-08	CC230215	8/10/2022	250µM	1
HAC-R1_BIC-3_2022-08	CC230216	8/10/2022	250µM	1
HAC-R1_BIC-4_2022-08	CC230217	8/10/2022	250µM	1
HAC-R1_BIC-5_2022-08	CC230218	8/10/2022	250µM	1
HAC-U_BIC-1_2022-08	CC230219	8/6/2022	250µM	1
HAC-U_BIC-2_2022-08	CC230220	8/6/2022	250µM	1
HAC-U_BIC-3_2022-08	CC230221	8/6/2022	250µM	1
HAC-U_BIC-4_2022-08	CC230222	8/6/2022	250µM	1
HAC-U_BIC-5_2022-08	CC230223	8/6/2022	250µM	1
EDC-U_BIC-1_2022-08	CC230224	8/8/2022	250µM	1
EDC-U_BIC-2_2022-08	CC230225	8/7/2022	250µM	1
EDC-U_BIC-3_2022-08	CC230226	8/7/2022	250µM	1
EDC-U_BIC-4_2022-08	CC230227	8/7/2022	250µM	1
EDC-U_BIC-5_2022-08	CC230228	8/7/2022	250µM	1

Sample Sorting

- Using a gridded Petri dish, fine forceps and a low power stereo-microscope (Olympus, Nikon, Leica) the sorting technicians removed the invertebrates and sorted them into family/orders.
- The sorting technician kept a running tally of total numbers excluding organisms from Porifera, Nemata, Platyhelminthes, Ostracoda, Copepoda, Cladocera and terrestrial drop-ins such as aphids. These organisms were marked for their presence

(given a value of 1) only and left in the sample. They were not included towards the 300-organism subsample count.

- Where specimens are broken or damaged, only heads were counted.
- Subsampling was conducted with the use of a Marchant Box.
- When using the Marchant box, cells were extracted at the same time in the order indicated by a random number table. If the 300th organism was found part way into sorting a cell then the balance of that cell was sorted. If the organism count had not reached 300 by the 50th cell then the entire sample was sorted.
- The total number of cells sorted and the number of organisms removed were recorded manually on a bench sheet and then recorded into INSTAR1
- Organisms were stored in vials containing 80% ethanol and an interior label indicating the site names, date of sampling, site code numbers and portion subsampled. This information was also recorded on the laboratory bench sheet and on INSTAR1.
- The sorted portion of the debris was preserved and labeled separately from the unsorted portion and was tested for sorting efficiency (Sorting Quality Control – Sorting Efficiency). The unsorted portion was also labeled and preserved in separate jars.

Percent sub-sampled and total countable invertebrates pulled from the samples were summarized in the table below.

Table 2: Percent sub-sample and invertebrate count for each sample

Sample	Date	CC#	250 micron fraction	
			% Sampled	# Invertebrates
HAC-R1_BIC-1_2022-08	10-Aug-22	CC230214	5%	781
HAC-R1_BIC-2_2022-08	10-Aug-22	CC230215	5%	782
HAC-R1_BIC-3_2022-08	10-Aug-22	CC230216	5%	914
HAC-R1_BIC-4_2022-08	10-Aug-22	CC230217	5%	424
HAC-R1_BIC-5_2022-08	10-Aug-22	CC230218	5%	434
HAC-U_BIC-1_2022-08	06-Aug-22	CC230219	5%	545
HAC-U_BIC-2_2022-08	06-Aug-22	CC230220	5%	424
HAC-U_BIC-3_2022-08	06-Aug-22	CC230221	5%	561
HAC-U_BIC-4_2022-08	06-Aug-22	CC230222	5%	588
HAC-U_BIC-5_2022-08	06-Aug-22	CC230223	5%	413
EDC-U_BIC-1_2022-08	08-Aug-22	CC230224	5%	388
EDC-U_BIC-2_2022-08	07-Aug-22	CC230225	5%	391
EDC-U_BIC-3_2022-08	07-Aug-22	CC230226	5%	547
EDC-U_BIC-4_2022-08	07-Aug-22	CC230227	20%	504
EDC-U_BIC-5_2022-08	07-Aug-22	CC230228	14%	307

Sorting Quality Control - Sorting Efficiency

As a part of Cordillera's laboratory policy, all projects undergo sorting efficiency checks.

- As sorting progresses, 10% of samples were randomly chosen by senior members of the sorting team for resorting.
- All sorters working on a project had at least 1 sample resorted by another sorter.
- An efficiency of 90 % was expected (95% for CABIN samples).
- If 90/95% efficiency was not met, samples from that sorter were resorted.
- To calculated sorting efficiency the following formula was used:

$$\frac{\#OrganismsMissed}{TotalOrganismsFound} * 100 = \%OM$$

Table 3 Summary of sorting efficiency

		Total from Sample	Percent Efficiency
Site - QC, Sample - QC 1, CC# - CC230214, Percent sampled = 5%, Sieve size = 250			
Chironomidae	3		
Trichoptera	2		
Total:	**5**	**781**	**99%**
Site - QC, Sample - QC 2, CC# - CC230224, Percent sampled = 5%, Sieve size = 250			
Oligochaeta	2		
Chironomidae	1		
Plecoptera	2		
Total:	**5**	**388**	**99%**

Sorting Quality Control - Sub-Sampling QC

Certain Provincial and Mining projects require additional sorting checks in the form of sub-sampling QC, (Environmental Effects Monitoring (EEM) protocol). This ensured that any fraction of the total sample that was examined was actually an accurate

representation of the number of total organisms. Organisms from the additional sub-samples were not identified; rather total organism count only was compared.

Sub-Sampling efficiency was measured on 10% of the number of sub-sampled samples in the project. Ex. In a project where 50 of 100 total samples were processed through subsampling using a Marchant box, then 10% of 50; or 5 samples were used for sub sampling efficiency.

Sub-Sampling efficiency was performed by fractioning the entire sample into sub-sample percentages. On each sub-sampled portion, a total organism count was recorded and compared to the rest of the sub-samples. In order to pass, all fractions were required to be within 20% of total organism count.

Example: If 300 organisms are found in 10% of the sample, the sorter will continue to sample in 10% fractions until the entire sample is separated. They will then count the total number of organisms in each of the 10 fractions of 10% and compare the organism count.

When divergence is >20% the sorting manager examines for the source of the problem and takes steps to correct it. With the Marchant box, the problem typically rested with how the box is flipped back to the upright position. For this reason, subsampling was performed by experienced employees only. Another common source of error would be the type of debris in the sample. Samples with algae or heavy with periphyton have a higher incident of failure due to clumping than clear samples.

Table 4 Summary of Sub Sample efficiency

Station ID		Organisms in Subsample																				Sorter		Actual Total	Precision		Accuracy	
CC#	Sample Name	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	By	Time		Percent Range		Min	Max
230227	EDC-U_BIC-4_2022-08	532	491	525	564	488																MP	540	2600	0.61	13.48	0.96	8.46
230223	HAC-U_BIC-5_2022-08	413	402	385	420	348																AR	315	1968	1.67	17.14	2.13	11.59

Taxonomic Effort

The next procedure was the identification to genus-species level where possible of all the organisms in the sample.

- Identifications were made at the genus/species level for all insect organisms found including Chironomidae (Based on CABIN protocol).
- Non-insect organisms (except those not included in CABIN count) were identified to genus/species where possible and to a minimum of family level with intact and mature specimens.
- The Standard Taxonomic Effort lists compiled by the CABIN manual[1], SAFIT[2] , and PNAMP[3] were used as a guide line for what level of identification to achieve where the condition and maturity of the organism enabled.
- Organisms from the same families/order were kept in separate vials with 80% ethanol and an interior label of printed laser paper.
- Chironomidae was identified to genus/species level where possible and was aided by slide mounts. CMC-10 was used to clear and mount the slide.
- Oligochaetes was identified to family/genus level with the aid of slide mounts. CMC-10 was used to clear and mount the slide.
- Other Annelida (leeches, polychaetes) were identified to the family/genus/species level with undamaged, mature specimens.
- Mollusca was identified to family and genus/species where possible
- Decapoda, Amphipoda and Isopoda were identified at family/genus/species level where possible.
- Bryozoans and Nemata remained at the phylum level
- Hydrachnidae and Cnidaria were identified at the family/genus level where possible.
- When requested, reference collections were made containing at least one individual from each taxa listed. Organisms represented will have been identified to the lowest practical level.
- Reference collection specimens were stored in 55 mm glass vials with screw-cap lids with polyseal inserts (museum quality). They were labeled with taxa name, site code, date identified and taxonomist name. The same information was applied to labels on the slide mounts.

Taxonomists

The taxonomists for this project were certified by the Society of Freshwater Science (SFS) Taxonomic Certification Program at level 2 which is the required certification for CABIN projects:

Scott Finlayson: Group 1 General Arthropods (East/West); Group 2 EPT (East/West); Group 3 Chironomidae (East/West); Group 4 Oligochaeta

Adam Bliss: Group 1 General Arthropods (East/West); Group 2 EPT (East/West); Group 3 Chironomidae
Rita Avery: Group 1 General Arthropods (East/West); Group 2 EPT (East/West)

Taxonomic QC

Taxonomic QC was performed in house by someone other than the original taxonomist.

- Quality control protocol involved complete, blind re-identification and re-enumeration of at least 10% of samples by a second SFS-certified taxonomist.
- Samples for taxonomic quality control were randomly selected and quality control procedures were conducted as the project progresses through the laboratories.

- The second (QC) taxonomist will calculate and record four types of errors:
    1. Misidentification error
    2. Enumeration error
    3. Questionable taxonomic resolution error
    4. Insufficient taxonomic resolution error

The QC coordinator then calculates the following estimates of taxonomic precision.

1. The percent total identification error rate is calculated as:

$$\frac{Sum\ of\ incorrect\ identifications}{total\ organisms\ counted\ in\ audit} * (100)$$

The average total identification error rate of audited samples did not exceed 5%. All samples that exceed a 5% error rate were re-evaluated to determine whether repeated errors or patterns in error contributed.

2. The percent difference in enumeration (PDE) to quantify the consistency of specimen counts.

$$PDE = \frac{|n_1 - n_2|}{n_1 + n_2} x100$$

3. The percent taxonomic disagreement (PTD) to quantify the shared precision between two sets of identifications.

$$PTD = \left(1 - \left[\frac{a}{N}\right]\right) x100$$

4. Bray Curtis dissimilarity Index to quantify the differences in identifications.

$$BC_{ij} = 1 - \frac{2C_{ij}}{S_j + S_i}$$

Error Summary

All samples report errors within the acceptable limits for CABIN Laboratory methods (less than 5% error).

Table 5 Summary of taxonomic error following QC

Site	Taxa Identified	% Error	PDE	PTD	Bray - Curtis Dissimilarity index
Site - HAC-R1, Sample - HAC-R1_BIC-1_2022-08, CC# - CC230214, Percent sampled = 5%, Sieve size = 250	780	0.00	0.0640615	0.51216389	0.0044843
Site - HAC-U, Sample - HAC-U_BIC-4_2022-08, CC# - CC230222, Percent sampled = 5%, Sieve size = 250	588	0.00	0	0.68027211	0.00680272

There will always be disagreements between taxonomists regarding the degree of taxonomic resolution in immature specimens and when laboratories make use of different keys for certain groups (Mollusks is an especially disputed group). It is always possible that some taxa found by the original taxonomist were overlooked in QC.

All of the Taxonomic QC samples that were observed passed testing according to the CABIN misidentification protocols. See the tables below for results from taxonomic QC audit.

Error Rationale

Site - HAC-R1, Sample - HAC-R1_BIC-1_2022-08, CC# - CC230214, Percent sampled = 5%, Sieve size = 250	Laboratory Count	QC Audit Count	Agreement	Misidentification	Questionable Taxonomic Resolution	Enumeration	Insufficient Taxonomic Resolution	Comments
Antocha	1	1						
Atractides	2	2						
Baetidae	7	7						
Cardiocladius	1	1						
Cheumatopsyche	32	33	No			X		
Chironomidae	13	13						

Diphetor hageni	1	1						
Elmidae	2	2						
Eukiefferiella	2	2						
Gastropoda	20	20						
Gyraulus	3	3						
Hyalella	3	3						
Hydropsyche	1	2	No			X		
Hydropsychidae	86	84	No			X		
Hydrozetidae	7	7						
Lepidostoma	1	1						
Leptoceridae	3	3						
Leptophlebiidae	38	38						
Micropsectra	9	9						
Nais	7	7						
Oribatida	30	30						
Orthocladius complex	61	61						
Paraleptophlebia	1	1						
Parametriocnemus	9	9						
Pentaneura	10	10						
Rheotanytarsus	251	249	No			X		
Simuliidae	9	9						
Simulium	8	8						
Sperchon	2	2						
Synorthocladius	98	98						
Tanypodinae	6	6						
Thienemannimyia group	11	11						
Tipula	2	2						
Trichoptera	28	29	No			X		
Tvetenia	16	16						
Total:	**781**	**780**						
					0	5	0	
% Total Misidentification Rate =	misidentifications / total number	x100 =	0.00	**Pass**				
Site - HAC-U, Sample - HAC-U_BIC-4_2022-08, CC# - CC230222, Percent sampled = 5%, Sieve size = 250	**Laboratory Count**	**QC Audit Count**	**Agreement**	**Misidentification**	**Questionable Taxonomic Resolution**	**Enumeration**	**Insufficient Taxonomic Resolution**	**Comments**

Ablabesmyia	2	2						
Antocha	8	8						
Atractides	3	3						
Aturus	1	1						
Baetidae	22	24	No			X		
Baetis	12	10	No			X		
Cheumatopsyche	26	26						
Chironomidae	3	3						
Cryptochironomus	3	3						
Diphetor hageni	10	10						
Diptera	1	1						
Drunella	2	2						
Drunella spinifera	1	1						
Elmidae	23	23						
Ephemerellidae	1	1						
Eukiefferiella	2	2						
Fossaria	14	14						
Gastropoda	2	2						
Gyraulus	1	1						
Heterotrissocladius	1	1						
Hydropsyche	14	16	No			X		
Hydropsychidae	144	142	No			X		
Hydrozetidae	2	2						
Hygrobatidae	2	2						
Lepidostoma	13	13						
Leptophlebiidae	26	26						
Lymnaeidae	1	1						
Micropsectra	60	60						
Microtendipes	1	1						
Nais	1	1						
Optioservus	2	2						
Optioservus	4	4						
Oribatida	2	2						
Orthocladius complex	8	8						
Parametriocnemus	3	3						
Pentaneura	16	16						
Planorbidae	2	2						
Polypedilum	1	1						
Rheotanytarsus	54	54						
Rhyacophila arnaudi	3	3						
Simulium	13	13						

Synorthocladius	21	21						
Tanytarsini	34	34						
Thienemannimyia group	16	16						
Tipula	1	1						
Trichoptera	2	2						
Trombidiformes	1	1						
Tvetenia	3	3						
Total:	**588**	**588**						
					0	**4**	**0**	
% Total Misidentification Rate =	misidentifications / total number	x100 =	0.00	**Pass**				

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[3] Pacific Northwest Aquatic Monitoring Partnership (Accessed 2015). www.pnamp.org

Taxonomic Keys

Below is a reference list of taxonomic keys utilized by taxonomists at Cordillera Consulting. Cordillera taxonomists routinely seek out new literature to ensure the most accurate identification keys are being utilized. This is not reflective of the exhaustive list of resources that we use for identification. A more complete list of taxonomic resources can be found at Southwest Association of Freshwater Invertebrate Taxonomists. (2015).
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Raw Benthic Invertebrate Density Results (# individuals/sample), Mount Polley Mine

Project: 22-29-6 (MPMC Creek CEMP)
Minnow Environmental (BC)
Taxonomist: Scott Finlayson
scottfinlayson@cordilleraconsulting.ca
250-494-7553

Site:	HAC-R1	HAC-R1	HAC-R1	HAC-R1	HAC-R1	HAC-U	HAC-U
Sample:	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 1	Rep 2
Sample Collection Date:	10-Aug-22	10-Aug-22	10-Aug-22	10-Aug-22	10-Aug-22	06-Aug-22	06-Aug-22
CC#:	CC230214	CC230215	CC230216	CC230217	CC230218	CC230219	CC230220
Phylum: Arthropoda	0	0	0	0	0	0	0
| Order: Collembola	0	0	0	0	0	0	0
Subphylum: Hexapoda	0	0	0	0	0	0	0
| Class: Insecta	0	0	0	0	0	0	0
| Order: Ephemeroptera	0	0	0	0	0	0	0
| Family: Ameletidae	0	0	0	0	0	0	0
Ameletus	0	0	0	0	0	0	0
| Family: Baetidae	140	120	60	60	80	260	60
Baetis	0	0	0	0	0	100	80
Diphetor hageni	20	40	140	40	20	140	20
| Family: Caenidae	0	0	0	0	0	0	0
Caenis	0	0	20	0	0	0	0
| Family: Ephemerellidae	0	0	0	0	0	0	0
Drunella	0	0	0	0	0	0	0
Drunella doddsii	0	0	0	0	0	0	0
Drunella spinifera	0	0	0	0	0	20	20
Ephemerella	0	0	0	0	0	0	0
| Family: Heptageniidae	0	0	0	0	0	0	0
Rhithrogena	0	0	0	0	0	0	0
| Family: Leptophlebiidae	760	600	680	580	320	980	900
Neoleptophlebia	0	0	0	0	0	0	0
Paraleptophlebia	20	140	100	120	40	40	100
| Order: Plecoptera	0	0	0	0	0	0	0
| Family: Capniidae	0	0	0	0	0	0	0

Note: A value of zero reported at a less specific level of taxonomy does not indicate an absence of organisms at a more specific level of taxonomy.

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250-494-7553

Site:	HAC-R1	HAC-R1	HAC-R1	HAC-R1	HAC-R1	HAC-U	HAC-U
Sample:	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 1	Rep 2
Sample Collection Date:	10-Aug-22	10-Aug-22	10-Aug-22	10-Aug-22	10-Aug-22	06-Aug-22	06-Aug-22
CC#:	CC230214	CC230215	CC230216	CC230217	CC230218	CC230219	CC230220
| Family: Chloroperlidae	0	0	0	0	0	0	0
Sweltsa	0	0	0	0	0	0	0
| Family: Nemouridae	0	0	0	0	0	0	0
Zapada cinctipes	0	0	0	0	0	0	0
| Family: Perlodidae	0	0	0	0	0	0	20
Isoperla	0	0	0	0	0	0	0
Skwala	0	0	0	0	0	0	0
| Order: Trichoptera	560	60	800	260	340	440	380
| Family: Hydropsychidae	1,720	2,860	880	780	700	2,320	1,380
Cheumatopsyche	640	1,080	380	260	180	100	120
Hydropsyche	20	100	40	20	20	100	80
| Family: Hydroptilidae	0	0	0	0	0	0	0
Hydroptila	0	0	120	60	20	0	40
| Family: Lepidostomatidae	0	0	0	0	0	0	0
Lepidostoma	20	0	60	20	20	260	120
| Family: Leptoceridae	60	80	40	140	0	0	0
| Family: Limnephilidae	0	0	0	20	20	0	0
| Family: Rhyacophilidae	0	0	0	0	0	0	0
Rhyacophila arnaudi	0	0	0	0	0	0	0
| Order: Coleoptera	0	0	0	0	0	0	0
| Family: Elmidae	40	0	140	80	40	300	400
Heterlimnius	0	0	0	0	0	0	0
Narpus	0	0	0	0	0	0	0
Optioservus	0	0	40	40	0	40	20

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250-494-7553

Site:	HAC-R1	HAC-R1	HAC-R1	HAC-R1	HAC-R1	HAC-U	HAC-U
Sample:	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 1	Rep 2
Sample Collection Date:	10-Aug-22	10-Aug-22	10-Aug-22	10-Aug-22	10-Aug-22	06-Aug-22	06-Aug-22
CC#:	CC230214	CC230215	CC230216	CC230217	CC230218	CC230219	CC230220
| Family: Staphylinidae	0	0	0	0	0	0	0
| Order: Diptera	0	0	0	0	0	0	0
| Family: Ceratopogonidae	0	0	0	0	0	0	0
Bezzia/ Palpomyia	0	0	0	0	0	0	0
Mallochohelea	0	0	0	0	0	0	0
| Family: Chironomidae	260	560	520	220	100	140	80
| Subfamily: Chironominae	0	0	0	0	0	0	0
| Tribe: Chironomini	0	0	0	0	0	0	0
Cryptochironomus	0	0	0	0	0	20	20
Microtendipes	0	0	0	0	0	0	0
Paralauterborniella nigrohalterale	0	0	0	20	20	0	0
Paratendipes	0	0	20	0	0	0	0
Phaenopsectra	0	40	0	0	0	0	0
Polypedilum	0	0	40	0	0	40	40
| Tribe: Tanytarsini	0	0	0	0	0	0	160
Micropsectra	180	380	380	780	1,080	1,560	900
Rheotanytarsus	5,020	5,720	5,160	1,420	1,500	680	400
Stempellinella	0	0	0	0	0	0	0
| Subfamily: Diamesinae	0	0	0	0	0	0	0
| Tribe: Diamesini	0	0	0	0	0	0	0
Pagastia	0	40	0	0	0	60	60
| Subfamily: Orthocladiinae	0	0	0	0	0	180	0
Brillia	0	0	0	0	0	0	0
Cardiocladius	20	0	20	0	0	0	0

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250-494-7553

Site:	HAC-R1	HAC-R1	HAC-R1	HAC-R1	HAC-R1	HAC-U	HAC-U
Sample:	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 1	Rep 2
Sample Collection Date:	10-Aug-22	10-Aug-22	10-Aug-22	10-Aug-22	10-Aug-22	06-Aug-22	06-Aug-22
CC#:	CC230214	CC230215	CC230216	CC230217	CC230218	CC230219	CC230220
Corynoneura	0	0	0	0	0	20	0
Eukiefferiella	40	20	60	0	0	0	0
Heterotrissocladius	0	0	0	40	0	20	0
Metriocnemus	0	0	20	0	0	0	0
Nanocladius	0	0	20	0	0	20	0
Orthocladius complex	1,220	320	1,400	600	820	100	480
Parametriocnemus	180	60	80	0	140	80	40
Pseudosmittia	0	0	0	0	0	0	0
Rheocricotopus	0	0	0	0	0	20	0
Synorthocladius	1,960	1,400	2,800	980	1,340	320	340
Thienemanniella	0	0	0	0	0	0	0
Tvetenia	320	240	340	120	60	60	60
| Subfamily: Tanypodinae	120	160	260	80	540	340	40
Ablabesmyia	0	0	20	40	40	40	80
Guttipelopia	0	0	0	20	20	0	0
| Tribe: Pentaneurini	0	0	0	0	0	0	0
Pentaneura	200	200	280	240	40	660	240
Thienemannimyia group	220	220	220	220	260	160	220
| Family: Dixidae	0	0	20	0	0	0	20
| Family: Simuliidae	180	120	60	0	0	20	0
Simulium	160	240	260	60	60	40	0
| Family: Tabanidae	0	0	20	0	0	0	0
| Family: Tipulidae	0	0	0	0	0	0	0
Antocha	20	120	20	20	60	100	40
Dicranota	0	0	0	0	0	20	0
Tipula	40	0	0	0	0	0	0

Note: A value of zero reported at a less specific level of taxonomy does not indicate an absence of organisms at a more specific level of taxonomy.

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Project: 22-29-6 (MPMC Creek CEMP)
Minnow Environmental (BC)
Taxonomist: Scott Finlayson
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250-494-7553

Site:	HAC-R1	HAC-R1	HAC-R1	HAC-R1	HAC-R1	HAC-U	HAC-U
Sample:	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 1	Rep 2
Sample Collection Date:	10-Aug-22	10-Aug-22	10-Aug-22	10-Aug-22	10-Aug-22	06-Aug-22	06-Aug-22
CC#:	CC230214	CC230215	CC230216	CC230217	CC230218	CC230219	CC230220
| Order: Lepidoptera	0	0	0	0	0	0	0
| Order: Odonata	0	0	0	0	0	0	0
| Family: Aeshnidae	0	0	0	0	0	0	0
Boyeria	0	0	0	0	0	0	0
Subphylum: Chelicerata	0	0	0	0	0	0	0
| Class: Arachnida	0	0	0	0	0	0	0
| Order: Trombidiformes	0	0	0	20	0	20	0
| Family: Aturidae	0	0	0	0	0	0	0
Aturus	0	0	0	0	0	0	0
| Family: Halacaridae	0	0	20	0	0	0	0
| Family: Hygrobatidae	0	0	0	0	0	0	0
Atractides	40	60	60	0	0	0	20
| Family: Lebertiidae	0	0	0	0	0	0	0
Lebertia	0	0	0	0	0	0	0
| Family: Mideopsidae	0	0	0	0	0	0	0
Mideopsis	0	0	0	0	0	0	0
| Family: Pionidae	0	0	0	0	0	0	0
Piona	0	0	0	0	0	20	0
| Family: Sperchontidae	0	0	0	0	0	0	0
Sperchon	40	60	20	0	0	0	0
| Family: Torrenticolidae	0	0	0	0	0	0	0
Testudacarus	0	0	0	0	0	0	0
| Order: Sarcoptiformes	0	0	0	0	0	0	0
| Order: Oribatida	600	140	1,460	220	120	100	320
| Family: Hydrozetidae	140	80	340	100	160	0	220
| Class: Malacostraca	0	0	0	0	0	0	0

Note: A value of zero reported at a less specific level of taxonomy does not indicate an absence of organisms at a more specific level of taxonomy.

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250-494-7553

Site:	HAC-R1	HAC-R1	HAC-R1	HAC-R1	HAC-R1	HAC-U	HAC-U
Sample:	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 1	Rep 2
Sample Collection Date:	10-Aug-22	10-Aug-22	10-Aug-22	10-Aug-22	10-Aug-22	06-Aug-22	06-Aug-22
CC#:	CC230214	CC230215	CC230216	CC230217	CC230218	CC230219	CC230220
| Order: Amphipoda	0	20	240	180	0	0	0
| Family: Hyalellidae	0	0	0	0	0	0	0
Hyalella	60	80	100	140	0	0	0
Phylum: Mollusca	0	0	0	0	0	0	0
| Class: Gastropoda	400	80	260	260	240	200	440
| Order: Basommatophora	0	0	0	0	0	0	0
| Family: Lymnaeidae	0	0	0	0	0	0	80
Fossaria	0	20	0	0	40	480	220
| Family: Planorbidae	0	0	0	0	0	0	100
Gyraulus	60	140	80	80	120	220	80
Phylum: Annelida	0	0	0	0	0	0	0
Subphylum: Clitellata	0	0	0	0	0	0	0
| Order: Hirudinida	0	0	0	0	0	0	0
| Order: Arhynchobdellida	0	0	0	0	0	0	0
| Family: Erpobdellidae	0	0	0	0	0	0	0
Erpobdella	0	0	0	0	0	0	0
| Class: Oligochaeta	0	0	0	0	20	0	0
| Order: Tubificida	0	0	0	0	0	0	0
| Family: Enchytraeidae	0	0	0	0	0	0	0
Enchytraeus	0	0	0	0	0	20	0
| Family: Naididae	0	0	0	0	0	0	0
Nais	140	0	60	40	60	0	40
Pristina	0	0	0	0	0	0	0
| Subfamily: Tubificinae without hair chaetae	0	0	20	80	20	0	0
Phylum: Cnidaria	0	0	0	0	0	0	0
| Class: Hydrozoa	0	0	0	0	0	0	0

Note: A value of zero reported at a less specific level of taxonomy does not indicate an absence of organisms at a more specific level of taxonomy.

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Taxonomist: Scott Finlayson
scottfinlayson@cordilleraconsulting.ca
250-494-7553

Site:	HAC-R1	HAC-R1	HAC-R1	HAC-R1	HAC-R1	HAC-U	HAC-U
Sample:	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 1	Rep 2
Sample Collection Date:	10-Aug-22	10-Aug-22	10-Aug-22	10-Aug-22	10-Aug-22	06-Aug-22	06-Aug-22
CC#:	CC230214	CC230215	CC230216	CC230217	CC230218	CC230219	CC230220
| Order: Anthoathecatae	0	0	0	0	0	0	0
| Family: Hydridae	0	0	0	0	0	0	0
Hydra	0	40	100	20	20	40	0
Totals:	**15,620**	**15,640**	**18,280**	**8,480**	**8,680**	**10,900**	**8,480**
Taxa present but not included:							
Phylum: Arthropoda	0	0	0	0	0	0	0
Subphylum: Hexapoda	0	0	0	0	0	0	0
| Class: Insecta	0	0	0	0	0	0	0
| Order: Diptera	0	0	0	0	0	0	0
| Family: Cecidomyiidae	20	0	0	0	0	0	0
Subphylum: Crustacea	0	0	0	0	0	0	0
| Class: Ostracoda	20	20	20	20	20	20	20
| Class: Branchiopoda	0	0	0	0	0	0	0
| Order: Cladocera	20	20	20	20	20	20	20
| Class: Maxillipoda	0	0	0	0	0	0	0
| Class: Copepoda	0	0	20	0	20	20	20
Phylum: Annelida	0	0	0	0	0	0	0
Subphylum: Clitellata	0	0	0	0	0	0	0
| Class: Oligochaeta	0	0	0	0	0	0	0
| Order: Tubificida	0	0	0	0	0	0	0
| Family: Lumbricidae	0	0	0	0	0	0	0
Phylum: Nemata	0	0	0	0	0	0	0
Totals:	**60**	**40**	**60**	**40**	**60**	**60**	**60**

Note: A value of zero reported at a less specific level of taxonomy does not indicate an absence of organisms at a more specific level of taxonomy.

Raw Benthic Invertebrate Density Results (# individuals/sample), Mount Polley Mine

Project: 22-29-6 (MPMC Creek CEMP)
Minnow Environmental (BC)
Taxonomist: Scott Finlayson
scottfinlayson@cordilleraconsulting.ca
250-494-7553

Site:	HAC-U	HAC-U	HAC-U	EDC-U	EDC-U	EDC-U	EDC-U	EDC-U
Sample:	Rep 3	Rep 4	Rep 5	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
Sample Collection Date:	06-Aug-22	06-Aug-22	06-Aug-22	08-Aug-22	07-Aug-22	07-Aug-22	07-Aug-22	07-Aug-22
CC#:	CC230221	CC230222	CC230223	CC230224	CC230225	CC230226	CC230227	CC230228
Phylum: Arthropoda	0	0	0	0	0	0	0	0
| Order: Collembola	0	0	60	20	3200	20	20	214
Subphylum: Hexapoda	0	0	0	0	0	0	0	0
| Class: Insecta	0	0	0	0	0	0	0	0
| Order: Ephemeroptera	0	0	0	0	0	0	0	0
| Family: Ameletidae	0	0	0	0	0	0	0	0
Ameletus	0	0	0	0	0	20	5	0
| Family: Baetidae	660	440	280	20	20	100	20	0
Baetis	260	240	0	20	0	40	30	14
Diphetor hageni	120	200	180	20	0	0	0	7
| Family: Caenidae	0	0	0	0	0	0	0	0
Caenis	0	0	0	0	0	0	0	0
| Family: Ephemerellidae	20	20	0	0	40	60	20	0
Drunella	0	40	0	20	0	20	30	14
Drunella doddsii	0	0	0	20	60	120	30	14
Drunella spinifera	20	20	0	280	140	140	105	36
Ephemerella	0	0	0	0	0	20	0	0
| Family: Heptageniidae	0	0	0	460	600	940	365	93
Rhithrogena	0	0	0	0	60	0	0	7
| Family: Leptophlebiidae	380	520	720	280	600	1,020	355	200
Neoleptophlebia	0	0	0	0	0	20	0	0
Paraleptophlebia	20	0	60	20	120	0	0	0
| Order: Plecoptera	0	0	0	40	40	0	5	0
| Family: Capniidae	0	0	0	160	20	180	165	86

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Raw Benthic Invertebrate Density Results (# individuals/sample), Mount Polley Mine

Project: 22-29-6 (MPMC Creek CEMP)
Minnow Environmental (BC)
Taxonomist: Scott Finlayson
scottfinlayson@cordilleraconsulting.ca
250-494-7553

Site:	HAC-U	HAC-U	HAC-U	EDC-U	EDC-U	EDC-U	EDC-U	EDC-U
Sample:	Rep 3	Rep 4	Rep 5	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
Sample Collection Date:	06-Aug-22	06-Aug-22	06-Aug-22	08-Aug-22	07-Aug-22	07-Aug-22	07-Aug-22	07-Aug-22
CC#:	CC230221	CC230222	CC230223	CC230224	CC230225	CC230226	CC230227	CC230228
| Family: Chloroperlidae	0	0	0	240	40	0	70	7
Sweltsa	0	0	0	360	20	100	100	71
| Family: Nemouridae	0	0	0	0	0	0	0	0
Zapada cinctipes	0	0	0	20	20	0	0	7
| Family: Perlodidae	0	0	0	60	100	0	50	36
Isoperla	0	0	0	0	20	20	15	14
Skwala	0	0	0	80	60	100	20	0
| Order: Trichoptera	400	40	140	40	0	2,940	220	314
| Family: Hydropsychidae	3,240	2,880	1,040	0	0	0	0	0
Cheumatopsyche	240	520	160	0	0	0	0	0
Hydropsyche	160	280	120	0	0	0	0	0
| Family: Hydroptilidae	0	0	0	0	0	0	0	0
Hydroptila	0	0	20	0	0	0	0	0
| Family: Lepidostomatidae	0	0	0	0	0	0	0	0
Lepidostoma	120	260	100	0	0	0	0	0
| Family: Leptoceridae	0	0	0	60	0	0	0	0
| Family: Limnephilidae	0	0	0	0	0	0	5	0
| Family: Rhyacophilidae	0	0	0	0	0	0	0	0
Rhyacophila arnaudi	0	60	0	0	0	0	0	0
| Order: Coleoptera	0	0	0	0	0	260	0	0
| Family: Elmidae	280	460	360	20	120	160	45	57
Heterlimnius	0	0	0	0	0	0	15	0
Narpus	0	0	0	20	0	0	10	0
Optioservus	160	120	280	100	0	100	30	0

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Raw Benthic Invertebrate Density Results (# individuals/sample), Mount Polley Mine

Project: 22-29-6 (MPMC Creek CEMP)
Minnow Environmental (BC)
Taxonomist: Scott Finlayson
scottfinlayson@cordilleraconsulting.ca
250-494-7553

Site:	HAC-U	HAC-U	HAC-U	EDC-U	EDC-U	EDC-U	EDC-U	EDC-U
Sample:	Rep 3	Rep 4	Rep 5	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
Sample Collection Date:	06-Aug-22	06-Aug-22	06-Aug-22	08-Aug-22	07-Aug-22	07-Aug-22	07-Aug-22	07-Aug-22
CC#:	CC230221	CC230222	CC230223	CC230224	CC230225	CC230226	CC230227	CC230228
| Family: Staphylinidae	0	0	20	0	0	0	5	0
| Order: Diptera	0	20	0	0	0	0	0	0
| Family: Ceratopogonidae	0	0	0	0	0	0	0	0
Bezzia/ Palpomyia	0	0	0	40	0	0	0	0
Mallochohelea	0	0	0	0	20	0	0	0
| Family: Chironomidae	120	60	40	0	40	40	15	0
| Subfamily: Chironominae	0	0	0	0	0	0	0	0
| Tribe: Chironomini	0	0	0	0	0	0	0	0
Cryptochironomus	0	60	20	0	0	0	0	0
Microtendipes	0	20	20	0	0	0	0	0
Paralauterborniella nigrohalterale	0	0	0	0	0	0	0	0
Paratendipes	0	0	0	0	0	0	0	0
Phaenopsectra	0	0	0	0	0	0	0	0
Polypedilum	40	20	60	0	40	0	0	0
| Tribe: Tanytarsini	0	680	0	340	180	480	0	50
Micropsectra	1,360	1,200	1,040	220	300	500	75	93
Rheotanytarsus	540	1,080	200	0	0	20	0	7
Stempellinella	0	0	0	0	0	20	0	7
| Subfamily: Diamesinae	0	0	0	0	0	0	0	0
| Tribe: Diamesini	0	0	0	0	0	0	0	0
Pagastia	60	0	40	60	0	80	10	0
| Subfamily: Orthocladiinae	80	0	340	480	260	440	55	43
Brillia	0	0	0	0	120	0	20	50
Cardiocladius	0	0	0	0	0	0	0	0

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Raw Benthic Invertebrate Density Results (# individuals/sample), Mount Polley Mine

Project: 22-29-6 (MPMC Creek CEMP)
Minnow Environmental (BC)
Taxonomist: Scott Finlayson
scottfinlayson@cordilleraconsulting.ca
250-494-7553

Site:	HAC-U	HAC-U	HAC-U	EDC-U	EDC-U	EDC-U	EDC-U	EDC-U
Sample:	Rep 3	Rep 4	Rep 5	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
Sample Collection Date:	06-Aug-22	06-Aug-22	06-Aug-22	08-Aug-22	07-Aug-22	07-Aug-22	07-Aug-22	07-Aug-22
CC#:	CC230221	CC230222	CC230223	CC230224	CC230225	CC230226	CC230227	CC230228
Corynoneura	0	0	0	60	40	80	10	7
Eukiefferiella	20	40	0	0	20	40	10	0
Heterotrissocladius	80	20	20	0	0	0	25	0
Metriocnemus	0	0	0	0	0	0	0	0
Nanocladius	0	0	0	0	0	0	0	0
Orthocladius complex	60	160	120	100	20	400	30	7
Parametriocnemus	20	60	220	0	0	0	0	0
Pseudosmittia	0	0	0	0	0	0	5	0
Rheocricotopus	0	0	0	60	100	260	5	79
Synorthocladius	340	420	160	0	0	0	0	0
Thienemanniella	0	0	0	0	0	20	0	0
Tvetenia	140	60	80	40	120	240	35	179
| Subfamily: Tanypodinae	0	0	20	0	0	40	0	0
Ablabesmyia	100	40	80	0	0	0	0	0
Guttipelopia	0	0	0	0	0	0	0	0
| Tribe: Pentaneurini	0	0	0	0	0	0	0	0
Pentaneura	260	320	120	0	0	20	0	7
Thienemannimyia group	260	320	180	0	120	40	15	7
| Family: Dixidae	0	0	20	0	0	0	0	7
| Family: Simuliidae	40	0	0	0	0	0	0	14
Simulium	40	260	120	0	0	0	5	7
| Family: Tabanidae	0	0	20	0	0	0	0	0
| Family: Tipulidae	0	0	0	0	0	0	5	0
Antocha	120	160	0	0	0	0	0	0
Dicranota	20	0	0	0	0	0	0	0
Tipula	0	20	0	0	0	0	0	0

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Raw Benthic Invertebrate Density Results (# individuals/sample), Mount Polley Mine

Project: 22-29-6 (MPMC Creek CEMP)
Minnow Environmental (BC)
Taxonomist: Scott Finlayson
scottfinlayson@cordilleraconsulting.ca
250-494-7553

Site:	HAC-U	HAC-U	HAC-U	EDC-U	EDC-U	EDC-U	EDC-U	EDC-U
Sample:	Rep 3	Rep 4	Rep 5	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
Sample Collection Date:	06-Aug-22	06-Aug-22	06-Aug-22	08-Aug-22	07-Aug-22	07-Aug-22	07-Aug-22	07-Aug-22
CC#:	CC230221	CC230222	CC230223	CC230224	CC230225	CC230226	CC230227	CC230228
| Order: Lepidoptera	0	0	0	0	0	0	5	7
| Order: Odonata	0	0	0	0	0	0	0	0
| Family: Aeshnidae	0	0	0	0	0	0	0	0
Boyeria	20	0	0	0	0	0	0	0
Subphylum: Chelicerata	0	0	0	0	0	0	0	0
| Class: Arachnida	0	0	0	0	0	0	0	0
| Order: Trombidiformes	40	20	0	20	40	40	10	29
| Family: Aturidae	0	0	0	0	0	0	0	0
Aturus	0	20	0	60	60	80	25	64
| Family: Halacaridae	0	0	0	100	0	20	0	0
| Family: Hygrobatidae	0	40	0	0	0	0	0	0
Atractides	40	60	0	0	0	0	0	0
| Family: Lebertiidae	0	0	0	0	0	0	0	0
Lebertia	0	0	0	0	0	0	10	7
| Family: Mideopsidae	0	0	0	0	0	0	0	0
Mideopsis	0	0	0	20	20	80	15	14
| Family: Pionidae	0	0	0	0	0	0	0	0
Piona	0	0	20	0	0	0	0	0
| Family: Sperchontidae	0	0	0	0	0	0	0	0
Sperchon	0	0	20	0	0	100	5	0
| Family: Torrenticolidae	0	0	0	0	0	0	0	0
Testudacarus	0	0	0	0	0	0	0	7
| Order: Sarcoptiformes	0	0	0	0	0	0	0	0
| Order: Oribatida	100	40	200	3,380	980	1,280	300	250
| Family: Hydrozetidae	120	40	120	20	0	20	5	7
| Class: Malacostraca	0	0	0	0	0	0	0	0

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Raw Benthic Invertebrate Density Results (# individuals/sample), Mount Polley Mine

Project: 22-29-6 (MPMC Creek CEMP)
Minnow Environmental (BC)
Taxonomist: Scott Finlayson
scottfinlayson@cordilleraconsulting.ca
250-494-7553

Site:	HAC-U	HAC-U	HAC-U	EDC-U	EDC-U	EDC-U	EDC-U	EDC-U
Sample:	Rep 3	Rep 4	Rep 5	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
Sample Collection Date:	06-Aug-22	06-Aug-22	06-Aug-22	08-Aug-22	07-Aug-22	07-Aug-22	07-Aug-22	07-Aug-22
CC#:	CC230221	CC230222	CC230223	CC230224	CC230225	CC230226	CC230227	CC230228
| Order: Amphipoda	160	0	40	0	0	0	5	0
| Family: Hyalellidae	0	0	0	0	0	0	0	0
Hyalella	100	0	20	0	0	0	0	0
Phylum: Mollusca	0	0	0	0	0	0	0	0
| Class: Gastropoda	200	40	380	0	0	40	0	0
| Order: Basommatophora	0	0	0	0	0	0	0	0
| Family: Lymnaeidae	20	20	0	0	0	0	0	0
Fossaria	400	280	680	0	0	0	0	0
| Family: Planorbidae	100	40	60	0	0	0	0	0
Gyraulus	100	20	200	0	0	0	0	0
Phylum: Annelida	0	0	0	0	0	0	0	0
Subphylum: Clitellata	0	0	0	0	0	0	0	0
| Order: Hirudinida	0	0	0	0	0	0	0	0
| Order: Arhynchobdellida	0	0	0	0	0	0	0	0
| Family: Erpobdellidae	0	0	0	0	0	0	0	0
Erpobdella	0	0	0	20	0	0	0	0
| Class: Oligochaeta	0	0	0	0	0	20	5	0
| Order: Tubificida	0	0	0	0	0	0	0	0
| Family: Enchytraeidae	0	0	0	0	0	0	0	0
Enchytraeus	0	0	0	0	0	0	0	0
| Family: Naididae	20	0	0	120	40	20	10	21
Nais	20	20	60	180	0	20	5	21
Pristina	0	0	0	80	20	120	65	0
| Subfamily: Tubificinae without hair chaetae	0	0	0	0	0	0	0	7
Phylum: Cnidaria	0	0	0	0	0	0	0	0
| Class: Hydrozoa	0	0	0	0	0	0	0	0

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Raw Benthic Invertebrate Density Results (# individuals/sample), Mount Polley Mine

Project: 22-29-6 (MPMC Creek CEMP)
Minnow Environmental (BC)
Taxonomist: Scott Finlayson
scottfinlayson@cordilleraconsulting.ca
250-494-7553

Site:	HAC-U	HAC-U	HAC-U	EDC-U	EDC-U	EDC-U	EDC-U	EDC-U
Sample:	Rep 3	Rep 4	Rep 5	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
Sample Collection Date:	06-Aug-22	06-Aug-22	06-Aug-22	08-Aug-22	07-Aug-22	07-Aug-22	07-Aug-22	07-Aug-22
CC#:	CC230221	CC230222	CC230223	CC230224	CC230225	CC230226	CC230227	CC230228
| Order: Anthoathecatae	0	0	0	0	0	0	0	0
| Family: Hydridae	0	0	0	0	0	0	0	0
Hydra	0	0	0	0	0	0	0	0
Totals:	**11,220**	**11,760**	**8,260**	**7,760**	**7,820**	**10,940**	**2,520**	**2,189**
Taxa present but not included:								
Phylum: Arthropoda	0	0	0	0	0	0	0	0
Subphylum: Hexapoda	0	0	0	0	0	0	0	0
| Class: Insecta	0	0	0	0	0	0	0	0
| Order: Diptera	0	0	0	0	0	0	0	0
| Family: Cecidomyiidae	0	0	0	0	0	0	5	0
Subphylum: Crustacea	0	0	0	0	0	0	0	0
| Class: Ostracoda	20	20	20	20	20	20	5	0
| Class: Branchiopoda	0	0	0	0	0	0	0	0
| Order: Cladocera	20	20	20	0	20	0	0	0
| Class: Maxillipoda	0	0	0	0	0	0	0	0
| Class: Copepoda	20	0	20	0	0	20	0	0
Phylum: Annelida	0	0	0	0	0	0	0	0
Subphylum: Clitellata	0	0	0	0	0	0	0	0
| Class: Oligochaeta	0	0	0	0	0	0	0	0
| Order: Tubificida	0	0	0	0	0	0	0	0
| Family: Lumbricidae	0	0	20	0	0	0	0	0
Phylum: Nemata	0	0	20	20	20	20	5	0
Totals:	**60**	**40**	**100**	**40**	**60**	**60**	**15**	**0**

Note: A value of zero reported at a less specific level of taxonomy does not indicate an absence of organisms at a more specific level of taxonomy.

Area-Based Benthic Invertebrate Density Results (# individuals/m^2), Mount Polley Mine

Project: 22-29-6 (MPMC Creek CEMP)
Minnow Environmental (BC)
Taxonomist: Scott Finlayson
scottfinlayson@cordilleraconsulting.ca
250-494-7553

Site:	HAC-R1	HAC-R1	HAC-R1	HAC-R1	HAC-R1	HAC-U	HAC-U
Sample:	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 1	Rep 2
Sample Collection Date:	10-Aug-22	10-Aug-22	10-Aug-22	10-Aug-22	10-Aug-22	06-Aug-22	06-Aug-22
CC#:	CC230214	CC230215	CC230216	CC230217	CC230218	CC230219	CC230220
Phylum: Arthropoda	0	0	0	0	0	0	0
| Order: Collembola	0	0	0	0	0	0	0
Subphylum: Hexapoda	0	0	0	0	0	0	0
| Class: Insecta	0	0	0	0	0	0	0
| Order: Ephemeroptera	0	0	0	0	0	0	0
| Family: Ameletidae	0	0	0	0	0	0	0
Ameletus	0	0	0	0	0	0	0
| Family: Baetidae	42.0	36.0	18.0	18.0	24.0	78.0	18.0
Baetis	0	0	0	0	0	30.0	24.0
Diphetor hageni	6.00	12.0	42.0	12.0	6.00	42.0	6.00
| Family: Caenidae	0	0	0	0	0	0	0
Caenis	0	0	6.00	0	0	0	0
| Family: Ephemerellidae	0	0	0	0	0	0	0
Drunella	0	0	0	0	0	0	0
Drunella doddsii	0	0	0	0	0	0	0
Drunella spinifera	0	0	0	0	0	6.00	6.00
Ephemerella	0	0	0	0	0	0	0
| Family: Heptageniidae	0	0	0	0	0	0	0
Rhithrogena	0	0	0	0	0	0	0
| Family: Leptophlebiidae	228	180	204	174	96.0	294	270
Neoleptophlebia	0	0	0	0	0	0	0
Paraleptophlebia	6.00	42.0	30.0	36.0	12.0	12.0	30.0
| Order: Plecoptera	0	0	0	0	0	0	0
| Family: Capniidae	0	0	0	0	0	0	0

Notes: All results displayed are area-based densities (#/m^2). A value of zero reported at a less specific level of taxonomy does not indicate an absence of organisms at a more specific level of taxonomy.

Area-Based Benthic Invertebrate Density Results (# individuals/m^2), Mount Polley Mine

Project: 22-29-6 (MPMC Creek CEMP)
Minnow Environmental (BC)
Taxonomist: Scott Finlayson
scottfinlayson@cordilleraconsulting.ca
250-494-7553

Site:	HAC-R1	HAC-R1	HAC-R1	HAC-R1	HAC-R1	HAC-U	HAC-U
Sample:	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 1	Rep 2
Sample Collection Date:	10-Aug-22	10-Aug-22	10-Aug-22	10-Aug-22	10-Aug-22	06-Aug-22	06-Aug-22
CC#:	CC230214	CC230215	CC230216	CC230217	CC230218	CC230219	CC230220
| Family: Chloroperlidae	0	0	0	0	0	0	0
Sweltsa	0	0	0	0	0	0	0
| Family: Nemouridae	0	0	0	0	0	0	0
Zapada cinctipes	0	0	0	0	0	0	0
| Family: Perlodidae	0	0	0	0	0	0	6.00
Isoperla	0	0	0	0	0	0	0
Skwala	0	0	0	0	0	0	0
| Order: Trichoptera	168	18.0	240	78.0	102	132	114
| Family: Hydropsychidae	516	858	264	234	210	696	414
Cheumatopsyche	192	324	114	78.0	54.0	30.0	36.0
Hydropsyche	6.00	30.0	12.0	6.00	6.00	30.0	24.0
| Family: Hydroptilidae	0	0	0	0	0	0	0
Hydroptila	0	0	36.0	18.0	6.00	0	12.0
| Family: Lepidostomatidae	0	0	0	0	0	0	0
Lepidostoma	6.00	0	18.0	6.00	6.00	78.0	36.0
| Family: Leptoceridae	18.0	24.0	12.0	42.0	0	0	0
| Family: Limnephilidae	0	0	0	6.00	6.00	0	0
| Family: Rhyacophilidae	0	0	0	0	0	0	0
Rhyacophila arnaudi	0	0	0	0	0	0	0
| Order: Coleoptera	0	0	0	0	0	0	0
| Family: Elmidae	12.0	0	42.0	24.0	12.0	90.0	120
Heterlimnius	0	0	0	0	0	0	0
Narpus	0	0	0	0	0	0	0
Optioservus	0	0	12.0	12.0	0	12.0	6.00

Notes: All results displayed are area-based densities (#/m^2). A value of zero reported at a less specific level of taxonomy does not indicate an absence of organisms at a more specific level of taxonomy.

Area-Based Benthic Invertebrate Density Results (# individuals/m^2), Mount Polley Mine

Project: 22-29-6 (MPMC Creek CEMP)
Minnow Environmental (BC)
Taxonomist: Scott Finlayson
scottfinlayson@cordilleraconsulting.ca
250-494-7553

Site:	HAC-R1	HAC-R1	HAC-R1	HAC-R1	HAC-R1	HAC-U	HAC-U
Sample:	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 1	Rep 2
Sample Collection Date:	10-Aug-22	10-Aug-22	10-Aug-22	10-Aug-22	10-Aug-22	06-Aug-22	06-Aug-22
CC#:	CC230214	CC230215	CC230216	CC230217	CC230218	CC230219	CC230220
| Family: Staphylinidae	0	0	0	0	0	0	0
| Order: Diptera	0	0	0	0	0	0	0
| Family: Ceratopogonidae	0	0	0	0	0	0	0
Bezzia/ Palpomyia	0	0	0	0	0	0	0
Mallochohelea	0	0	0	0	0	0	0
| Family: Chironomidae	78.0	168	156	66.0	30.0	42.0	24.0
| Subfamily: Chironominae	0	0	0	0	0	0	0
| Tribe: Chironomini	0	0	0	0	0	0	0
Cryptochironomus	0	0	0	0	0	6.00	6.00
Microtendipes	0	0	0	0	0	0	0
Paralauterborniella nigrohalterale	0	0	0	6.00	6.00	0	0
Paratendipes	0	0	6.00	0	0	0	0
Phaenopsectra	0	12.0	0	0	0	0	0
Polypedilum	0	0	12.0	0	0	12.0	12.0
| Tribe: Tanytarsini	0	0	0	0	0	0	48.0
Micropsectra	54.0	114	114	234	324	468	270
Rheotanytarsus	1,506	1,716	1,548	426	450	204	120
Stempellinella	0	0	0	0	0	0	0
| Subfamily: Diamesinae	0	0	0	0	0	0	0
| Tribe: Diamesini	0	0	0	0	0	0	0
Pagastia	0	12.0	0	0	0	18.0	18.0
| Subfamily: Orthocladiinae	0	0	0	0	0	54.0	0
Brillia	0	0	0	0	0	0	0
Cardiocladius	6.00	0	6.00	0	0	0	0

Notes: All results displayed are area-based densities (#/m^2). A value of zero reported at a less specific level of taxonomy does not indicate an absence of organisms at a more specific level of taxonomy.

Area-Based Benthic Invertebrate Density Results (# individuals/m^2), Mount Polley Mine

Project: 22-29-6 (MPMC Creek CEMP)
Minnow Environmental (BC)
Taxonomist: Scott Finlayson
scottfinlayson@cordilleraconsulting.ca
250-494-7553

Site:	HAC-R1	HAC-R1	HAC-R1	HAC-R1	HAC-R1	HAC-U	HAC-U
Sample:	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 1	Rep 2
Sample Collection Date:	10-Aug-22	10-Aug-22	10-Aug-22	10-Aug-22	10-Aug-22	06-Aug-22	06-Aug-22
CC#:	CC230214	CC230215	CC230216	CC230217	CC230218	CC230219	CC230220
Corynoneura	0	0	0	0	0	6.00	0
Eukiefferiella	12.0	6.00	18.0	0	0	0	0
Heterotrissocladius	0	0	0	12.0	0	6.00	0
Metriocnemus	0	0	6.00	0	0	0	0
Nanocladius	0	0	6.00	0	0	6.00	0
Orthocladius complex	366	96.0	420	180	246	30.0	144
Parametriocnemus	54.0	18.0	24.0	0	42.0	24.0	12.0
Pseudosmittia	0	0	0	0	0	0	0
Rheocricotopus	0	0	0	0	0	6.00	0
Synorthocladius	588	420	840	294	402	96.0	102
Thienemanniella	0	0	0	0	0	0	0
Tvetenia	96.0	72.0	102	36.0	18.0	18.0	18.0
| Subfamily: Tanypodinae	36.0	48.0	78.0	24.0	162	102	12.0
Ablabesmyia	0	0	6.00	12.0	12.0	12.0	24.0
Guttipelopia	0	0	0	6.00	6.00	0	0
| Tribe: Pentaneurini	0	0	0	0	0	0	0
Pentaneura	60.0	60.0	84.0	72.0	12.0	198	72.0
Thienemannimyia group	66.0	66.0	66.0	66.0	78.0	48.0	66.0
| Family: Dixidae	0	0	6.00	0	0	0	6.00
| Family: Simuliidae	54.0	36.0	18.0	0	0	6.00	0
Simulium	48.0	72.0	78.0	18.0	18.0	12.0	0
| Family: Tabanidae	0	0	6.00	0	0	0	0
| Family: Tipulidae	0	0	0	0	0	0	0
Antocha	6.00	36.0	6.00	6.00	18.0	30.0	12.0
Dicranota	0	0	0	0	0	6.00	0
Tipula	12.0	0	0	0	0	0	0

Notes: All results displayed are area-based densities (#/m^2). A value of zero reported at a less specific level of taxonomy does not indicate an absence of organisms at a more specific level of taxonomy.

Area-Based Benthic Invertebrate Density Results (# individuals/m^2), Mount Polley Mine

Project: 22-29-6 (MPMC Creek CEMP)
Minnow Environmental (BC)
Taxonomist: Scott Finlayson
scottfinlayson@cordilleraconsulting.ca
250-494-7553

Site:	HAC-R1	HAC-R1	HAC-R1	HAC-R1	HAC-R1	HAC-U	HAC-U
Sample:	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 1	Rep 2
Sample Collection Date:	10-Aug-22	10-Aug-22	10-Aug-22	10-Aug-22	10-Aug-22	06-Aug-22	06-Aug-22
CC#:	CC230214	CC230215	CC230216	CC230217	CC230218	CC230219	CC230220
| Order: Lepidoptera	0	0	0	0	0	0	0
| Order: Odonata	0	0	0	0	0	0	0
| Family: Aeshnidae	0	0	0	0	0	0	0
Boyeria	0	0	0	0	0	0	0
Subphylum: Chelicerata	0	0	0	0	0	0	0
| Class: Arachnida	0	0	0	0	0	0	0
| Order: Trombidiformes	0	0	0	6.00	0	6.00	0
| Family: Aturidae	0	0	0	0	0	0	0
Aturus	0	0	0	0	0	0	0
| Family: Halacaridae	0	0	6.00	0	0	0	0
| Family: Hygrobatidae	0	0	0	0	0	0	0
Atractides	12.0	18.0	18.0	0	0	0	6.00
| Family: Lebertiidae	0	0	0	0	0	0	0
Lebertia	0	0	0	0	0	0	0
| Family: Mideopsidae	0	0	0	0	0	0	0
Mideopsis	0	0	0	0	0	0	0
| Family: Pionidae	0	0	0	0	0	0	0
Piona	0	0	0	0	0	6.00	0
| Family: Sperchontidae	0	0	0	0	0	0	0
Sperchon	12.0	18.0	6.00	0	0	0	0
| Family: Torrenticolidae	0	0	0	0	0	0	0
Testudacarus	0	0	0	0	0	0	0
| Order: Sarcoptiformes	0	0	0	0	0	0	0
| Order: Oribatida	180	42.0	438	66.0	36.0	30.0	96.0
| Family: Hydrozetidae	42.0	24.0	102	30.0	48.0	0	66.0
| Class: Malacostraca	0	0	0	0	0	0	0

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Area-Based Benthic Invertebrate Density Results (# individuals/m^2), Mount Polley Mine

Project: 22-29-6 (MPMC Creek CEMP)
Minnow Environmental (BC)
Taxonomist: Scott Finlayson
scottfinlayson@cordilleraconsulting.ca
250-494-7553

Site:	HAC-R1	HAC-R1	HAC-R1	HAC-R1	HAC-R1	HAC-U	HAC-U
Sample:	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 1	Rep 2
Sample Collection Date:	10-Aug-22	10-Aug-22	10-Aug-22	10-Aug-22	10-Aug-22	06-Aug-22	06-Aug-22
CC#:	CC230214	CC230215	CC230216	CC230217	CC230218	CC230219	CC230220
| Order: Amphipoda	0	6.00	72.0	54.0	0	0	0
| Family: Hyalellidae	0	0	0	0	0	0	0
Hyalella	18.0	24.0	30.0	42.0	0	0	0
Phylum: Mollusca	0	0	0	0	0	0	0
| Class: Gastropoda	120	24.0	78.0	78.0	72.0	60.0	132
| Order: Basommatophora	0	0	0	0	0	0	0
| Family: Lymnaeidae	0	0	0	0	0	0	24.0
Fossaria	0	6.00	0	0	12.0	144	66.0
| Family: Planorbidae	0	0	0	0	0	0	30.0
Gyraulus	18.0	42.0	24.0	24.0	36.0	66.0	24.0
Phylum: Annelida	0	0	0	0	0	0	0
Subphylum: Clitellata	0	0	0	0	0	0	0
| Order: Hirudinida	0	0	0	0	0	0	0
| Order: Arhynchobdellida	0	0	0	0	0	0	0
| Family: Erpobdellidae	0	0	0	0	0	0	0
Erpobdella	0	0	0	0	0	0	0
| Class: Oligochaeta	0	0	0	0	6.00	0	0
| Order: Tubificida	0	0	0	0	0	0	0
| Family: Enchytraeidae	0	0	0	0	0	0	0
Enchytraeus	0	0	0	0	0	6.00	0
| Family: Naididae	0	0	0	0	0	0	0
Nais	42.0	0	18.0	12.0	18.0	0	12.0
Pristina	0	0	0	0	0	0	0
| Subfamily: Tubificinae without hair chaetae	0	0	6.00	24.0	6.00	0	0
Phylum: Cnidaria	0	0	0	0	0	0	0
| Class: Hydrozoa	0	0	0	0	0	0	0

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Area-Based Benthic Invertebrate Density Results (# individuals/m^2), Mount Polley Mine

Project: 22-29-6 (MPMC Creek CEMP)
Minnow Environmental (BC)
Taxonomist: Scott Finlayson
scottfinlayson@cordilleraconsulting.ca
250-494-7553

Site:	HAC-R1	HAC-R1	HAC-R1	HAC-R1	HAC-R1	HAC-U	HAC-U
Sample:	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 1	Rep 2
Sample Collection Date:	10-Aug-22	10-Aug-22	10-Aug-22	10-Aug-22	10-Aug-22	06-Aug-22	06-Aug-22
CC#:	CC230214	CC230215	CC230216	CC230217	CC230218	CC230219	CC230220
| Order: Anthoathecatae	0	0	0	0	0	0	0
| Family: Hydridae	0	0	0	0	0	0	0
Hydra	0	12.0	30.0	6.00	6.00	12.0	0
Totals:	**4,686**	**4,692**	**5,484**	**2,544**	**2,604**	**3,270**	**2,544**
Taxa present but not included:	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Phylum: Arthropoda	0	0	0	0	0	0	0
Subphylum: Hexapoda	0	0	0	0	0	0	0
| Class: Insecta	0	0	0	0	0	0	0
| Order: Diptera	0	0	0	0	0	0	0
| Family: Cecidomyiidae	6.00	0	0	0	0	0	0
Subphylum: Crustacea	0	0	0	0	0	0	0
| Class: Ostracoda	6.00	6.00	6.00	6.00	6.00	6.00	6.00
| Class: Branchiopoda	0	0	0	0	0	0	0
| Order: Cladocera	6.00	6.00	6.00	6.00	6.00	6.00	6.00
| Class: Maxillipoda	0	0	0	0	0	0	0
| Class: Copepoda	0	0	6.00	0	6.00	6.00	6.00
Phylum: Annelida	0	0	0	0	0	0	0
Subphylum: Clitellata	0	0	0	0	0	0	0
| Class: Oligochaeta	0	0	0	0	0	0	0
| Order: Tubificida	0	0	0	0	0	0	0
| Family: Lumbricidae	0	0	0	0	0	0	0
Phylum: Nemata	0	0	0	0	0	0	0
Totals:	**18.0**	**12.0**	**18.0**	**12.0**	**18.0**	**18.0**	**18.0**

Notes: All results displayed are area-based densities (#/m^2). A value of zero reported at a less specific level of taxonomy does not indicate an absence of organisms at a more specific level of taxonomy.

Area-Based Benthic Invertebrate Density Results (# individuals/m^2), Mount Polley Mine

Project: 22-29-6 (MPMC Creek CEMP)
Minnow Environmental (BC)
Taxonomist: Scott Finlayson
scottfinlayson@cordilleraconsulting.ca
250-494-7553

Site:	HAC-U	HAC-U	HAC-U	EDC-U	EDC-U	EDC-U	EDC-U	EDC-U
Sample:	Rep 3	Rep 4	Rep 5	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
Sample Collection Date:	06-Aug-22	06-Aug-22	06-Aug-22	08-Aug-22	07-Aug-22	07-Aug-22	07-Aug-22	07-Aug-22
CC#:	CC230221	CC230222	CC230223	CC230224	CC230225	CC230226	CC230227	CC230228
Phylum: Arthropoda	0	0	0	0	0	0	0	0
| Order: Collembola	0	0	18.0	5.57	892	5.57	5.57	59.6
Subphylum: Hexapoda	0	0	0	0	0	0	0	0
| Class: Insecta	0	0	0	0	0	0	0	0
| Order: Ephemeroptera	0	0	0	0	0	0	0	0
| Family: Ameletidae	0	0	0	0	0	0	0	0
Ameletus	0	0	0	0	0	5.57	1.39	0
| Family: Baetidae	198	132	84.0	5.57	5.57	27.9	5.57	0
Baetis	78.0	72.0	0	5.57	0	11.1	8.36	3.90
Diphetor hageni	36.0	60.0	54.0	5.57	0	0	0	1.95
| Family: Caenidae	0	0	0	0	0	0	0	0
Caenis	0	0	0	0	0	0	0	0
| Family: Ephemerellidae	6.00	6.00	0	0	11.1	16.7	5.57	0
Drunella	0	12.0	0	5.57	0	5.57	8.36	3.90
Drunella doddsii	0	0	0	5.57	16.7	33.4	8.36	3.90
Drunella spinifera	6.00	6.00	0	78.0	39.0	39.0	29.3	10.0
Ephemerella	0	0	0	0	0	5.57	0	0
| Family: Heptageniidae	0	0	0	128	167	262	102	25.9
Rhithrogena	0	0	0	0	16.7	0	0	1.95
| Family: Leptophlebiidae	114	156	216	78.0	167	284	98.9	55.7
Neoleptophlebia	0	0	0	0	0	5.57	0	0
Paraleptophlebia	6.00	0	18.0	5.57	33.4	0	0	0
| Order: Plecoptera	0	0	0	11.1	11.1	0	1.39	0
| Family: Capniidae	0	0	0	44.6	5.57	50.2	46.0	24.0

Notes: All results displayed are area-based densities (#/m^2). A value of zero reported at a less specific level of taxonomy does not indicate an absence of organisms at a more specific level of taxonomy.

Area-Based Benthic Invertebrate Density Results (# individuals/m^2), Mount Polley Mine

Project: 22-29-6 (MPMC Creek CEMP)
Minnow Environmental (BC)
Taxonomist: Scott Finlayson
scottfinlayson@cordilleraconsulting.ca
250-494-7553

Site:	HAC-U	HAC-U	HAC-U	EDC-U	EDC-U	EDC-U	EDC-U	EDC-U
Sample:	Rep 3	Rep 4	Rep 5	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
Sample Collection Date:	06-Aug-22	06-Aug-22	06-Aug-22	08-Aug-22	07-Aug-22	07-Aug-22	07-Aug-22	07-Aug-22
CC#:	CC230221	CC230222	CC230223	CC230224	CC230225	CC230226	CC230227	CC230228
| Family: Chloroperlidae	0	0	0	66.9	11.1	0	19.5	1.95
Sweltsa	0	0	0	100	5.57	27.9	27.9	19.8
| Family: Nemouridae	0	0	0	0	0	0	0	0
Zapada cinctipes	0	0	0	5.57	5.57	0	0	1.95
| Family: Perlodidae	0	0	0	16.7	27.9	0	13.9	10.0
Isoperla	0	0	0	0	5.57	5.57	4.18	3.90
Skwala	0	0	0	22.3	16.7	27.9	5.57	0
| Order: Trichoptera	120	12.0	42.0	11.1	0	819	61.3	87.5
| Family: Hydropsychidae	972	864	312	0	0	0	0	0
Cheumatopsyche	72.0	156	48.0	0	0	0	0	0
Hydropsyche	48.0	84.0	36.0	0	0	0	0	0
| Family: Hydroptilidae	0	0	0	0	0	0	0	0
Hydroptila	0	0	6.00	0	0	0	0	0
| Family: Lepidostomatidae	0	0	0	0	0	0	0	0
Lepidostoma	36.0	78.0	30.0	0	0	0	0	0
| Family: Leptoceridae	0	0	0	16.7	0	0	0	0
| Family: Limnephilidae	0	0	0	0	0	0	1.39	0
| Family: Rhyacophilidae	0	0	0	0	0	0	0	0
Rhyacophila arnaudi	0	18.0	0	0	0	0	0	0
| Order: Coleoptera	0	0	0	0	0	72.5	0	0
| Family: Elmidae	84.0	138	108	5.57	33.4	44.6	12.5	15.9
Heterlimnius	0	0	0	0	0	0	4.18	0
Narpus	0	0	0	5.57	0	0	2.79	0
Optioservus	48.0	36.0	84.0	27.9	0	27.9	8.36	0

Notes: All results displayed are area-based densities (#/m^2). A value of zero reported at a less specific level of taxonomy does not indicate an absence of organisms at a more specific level of taxonomy.

Area-Based Benthic Invertebrate Density Results (# individuals/m^2), Mount Polley Mine

Project: 22-29-6 (MPMC Creek CEMP)
Minnow Environmental (BC)
Taxonomist: Scott Finlayson
scottfinlayson@cordilleraconsulting.ca
250-494-7553

Site:	HAC-U	HAC-U	HAC-U	EDC-U	EDC-U	EDC-U	EDC-U	EDC-U
Sample:	Rep 3	Rep 4	Rep 5	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
Sample Collection Date:	06-Aug-22	06-Aug-22	06-Aug-22	08-Aug-22	07-Aug-22	07-Aug-22	07-Aug-22	07-Aug-22
CC#:	CC230221	CC230222	CC230223	CC230224	CC230225	CC230226	CC230227	CC230228
| Family: Staphylinidae	0	0	6.00	0	0	0	1.39	0
| Order: Diptera	0	6.00	0	0	0	0	0	0
| Family: Ceratopogonidae	0	0	0	0	0	0	0	0
Bezzia/ Palpomyia	0	0	0	11.1	0	0	0	0
Mallochohelea	0	0	0	0	5.57	0	0	0
| Family: Chironomidae	36.0	18.0	12.0	0	11.1	11.1	4.18	0
| Subfamily: Chironominae	0	0	0	0	0	0	0	0
| Tribe: Chironomini	0	0	0	0	0	0	0	0
Cryptochironomus	0	18.0	6.00	0	0	0	0	0
Microtendipes	0	6.00	6.00	0	0	0	0	0
Paralauterborniella nigrohalterale	0	0	0	0	0	0	0	0
Paratendipes	0	0	0	0	0	0	0	0
Phaenopsectra	0	0	0	0	0	0	0	0
Polypedilum	12.0	6.00	18.0	0	11.1	0	0	0
| Tribe: Tanytarsini	0	204	0	94.8	50.2	134	0	13.9
Micropsectra	408	360	312	61.3	83.6	139	20.9	25.9
Rheotanytarsus	162	324	60.0	0	0	5.57	0	1.95
Stempellinella	0	0	0	0	0	5.57	0	1.95
| Subfamily: Diamesinae	0	0	0	0	0	0	0	0
| Tribe: Diamesini	0	0	0	0	0	0	0	0
Pagastia	18.0	0	12.0	16.7	0	22.3	2.79	0
| Subfamily: Orthocladiinae	24.0	0	102	134	72.5	123	15.3	12.0
Brillia	0	0	0	0	33.4	0	5.57	13.9
Cardiocladius	0	0	0	0	0	0	0	0

Notes: All results displayed are area-based densities (#/m^2). A value of zero reported at a less specific level of taxonomy does not indicate an absence of organisms at a more specific level of taxonomy.

Area-Based Benthic Invertebrate Density Results (# individuals/m^2), Mount Polley Mine

Project: 22-29-6 (MPMC Creek CEMP)
Minnow Environmental (BC)
Taxonomist: Scott Finlayson
scottfinlayson@cordilleraconsulting.ca
250-494-7553

Site:	HAC-U	HAC-U	HAC-U	EDC-U	EDC-U	EDC-U	EDC-U	EDC-U
Sample:	Rep 3	Rep 4	Rep 5	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
Sample Collection Date:	06-Aug-22	06-Aug-22	06-Aug-22	08-Aug-22	07-Aug-22	07-Aug-22	07-Aug-22	07-Aug-22
CC#:	CC230221	CC230222	CC230223	CC230224	CC230225	CC230226	CC230227	CC230228
Corynoneura	0	0	0	16.7	11.1	22.3	2.79	1.95
Eukiefferiella	6.00	12.0	0	0	5.57	11.1	2.79	0
Heterotrissocladius	24.0	6.00	6.00	0	0	0	6.97	0
Metriocnemus	0	0	0	0	0	0	0	0
Nanocladius	0	0	0	0	0	0	0	0
Orthocladius complex	18.0	48.0	36.0	27.9	5.57	111	8.36	1.95
Parametriocnemus	6.00	18.0	66.0	0	0	0	0	0
Pseudosmittia	0	0	0	0	0	0	1.39	0
Rheocricotopus	0	0	0	16.7	27.9	72.5	1.39	22.0
Synorthocladius	102	126	48.0	0	0	0	0	0
Thienemanniella	0	0	0	0	0	5.57	0	0
Tvetenia	42.0	18.0	24.0	11.1	33.4	66.9	9.75	49.9
| Subfamily: Tanypodinae	0	0	6.00	0	0	11.1	0	0
Ablabesmyia	30.0	12.0	24.0	0	0	0	0	0
Guttipelopia	0	0	0	0	0	0	0	0
| Tribe: Pentaneurini	0	0	0	0	0	0	0	0
Pentaneura	78.0	96.0	36.0	0	0	5.57	0	1.95
Thienemannimyia group	78.0	96.0	54.0	0	33.4	11.1	4.18	1.95
| Family: Dixidae	0	0	6.00	0	0	0	0	1.95
| Family: Simuliidae	12.0	0	0	0	0	0	0	3.90
Simulium	12.0	78.0	36.0	0	0	0	1.39	1.95
| Family: Tabanidae	0	0	6.00	0	0	0	0	0
| Family: Tipulidae	0	0	0	0	0	0	1.39	0
Antocha	36.0	48.0	0	0	0	0	0	0
Dicranota	6.00	0	0	0	0	0	0	0
Tipula	0	6.00	0	0	0	0	0	0

Notes: All results displayed are area-based densities (#/m^2). A value of zero reported at a less specific level of taxonomy does not indicate an absence of organisms at a more specific level of taxonomy.

Area-Based Benthic Invertebrate Density Results (# individuals/m^2), Mount Polley Mine

Project: 22-29-6 (MPMC Creek CEMP)
Minnow Environmental (BC)
Taxonomist: Scott Finlayson
scottfinlayson@cordilleraconsulting.ca
250-494-7553

Site:	HAC-U	HAC-U	HAC-U	EDC-U	EDC-U	EDC-U	EDC-U	EDC-U
Sample:	Rep 3	Rep 4	Rep 5	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
Sample Collection Date:	06-Aug-22	06-Aug-22	06-Aug-22	08-Aug-22	07-Aug-22	07-Aug-22	07-Aug-22	07-Aug-22
CC#:	CC230221	CC230222	CC230223	CC230224	CC230225	CC230226	CC230227	CC230228
| Order: Lepidoptera	0	0	0	0	0	0	1.39	1.95
| Order: Odonata	0	0	0	0	0	0	0	0
| Family: Aeshnidae	0	0	0	0	0	0	0	0
Boyeria	6.00	0	0	0	0	0	0	0
Subphylum: Chelicerata	0	0	0	0	0	0	0	0
| Class: Arachnida	0	0	0	0	0	0	0	0
| Order: Trombidiformes	12.0	6.00	0	5.57	11.1	11.1	2.79	8.08
| Family: Aturidae	0	0	0	0	0	0	0	0
Aturus	0	6.00	0	16.7	16.7	22.3	6.97	17.8
| Family: Halacaridae	0	0	0	27.9	0	5.57	0	0
| Family: Hygrobatidae	0	12.0	0	0	0	0	0	0
Atractides	12.0	18.0	0	0	0	0	0	0
| Family: Lebertiidae	0	0	0	0	0	0	0	0
Lebertia	0	0	0	0	0	0	2.79	1.95
| Family: Mideopsidae	0	0	0	0	0	0	0	0
Mideopsis	0	0	0	5.57	5.57	22.3	4.18	3.90
| Family: Pionidae	0	0	0	0	0	0	0	0
Piona	0	0	6.00	0	0	0	0	0
| Family: Sperchontidae	0	0	0	0	0	0	0	0
Sperchon	0	0	6.00	0	0	27.9	1.39	0
| Family: Torrenticolidae	0	0	0	0	0	0	0	0
Testudacarus	0	0	0	0	0	0	0	1.95
| Order: Sarcoptiformes	0	0	0	0	0	0	0	0
| Order: Oribatida	30.0	12.0	60.0	942	273	357	83.6	69.7
| Family: Hydrozetidae	36.0	12.0	36.0	5.57	0	5.57	1.39	1.95
| Class: Malacostraca	0	0	0	0	0	0	0	0

Notes: All results displayed are area-based densities (#/m^2). A value of zero reported at a less specific level of taxonomy does not indicate an absence of organisms at a more specific level of taxonomy.

Area-Based Benthic Invertebrate Density Results (# individuals/m^2), Mount Polley Mine

Project: 22-29-6 (MPMC Creek CEMP)
Minnow Environmental (BC)
Taxonomist: Scott Finlayson
scottfinlayson@cordilleraconsulting.ca
250-494-7553

Site:	HAC-U	HAC-U	HAC-U	EDC-U	EDC-U	EDC-U	EDC-U	EDC-U
Sample:	Rep 3	Rep 4	Rep 5	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
Sample Collection Date:	06-Aug-22	06-Aug-22	06-Aug-22	08-Aug-22	07-Aug-22	07-Aug-22	07-Aug-22	07-Aug-22
CC#:	CC230221	CC230222	CC230223	CC230224	CC230225	CC230226	CC230227	CC230228
| Order: Amphipoda	48.0	0	12.0	0	0	0	1.39	0
| Family: Hyalellidae	0	0	0	0	0	0	0	0
Hyalella	30.0	0	6.00	0	0	0	0	0
Phylum: Mollusca	0	0	0	0	0	0	0	0
| Class: Gastropoda	60.0	12.0	114	0	0	11.1	0	0
| Order: Basommatophora	0	0	0	0	0	0	0	0
| Family: Lymnaeidae	6.00	6.00	0	0	0	0	0	0
Fossaria	120	84.0	204	0	0	0	0	0
| Family: Planorbidae	30.0	12.0	18.0	0	0	0	0	0
Gyraulus	30.0	6.00	60.0	0	0	0	0	0
Phylum: Annelida	0	0	0	0	0	0	0	0
Subphylum: Clitellata	0	0	0	0	0	0	0	0
| Order: Hirudinida	0	0	0	0	0	0	0	0
| Order: Arhynchobdellida	0	0	0	0	0	0	0	0
| Family: Erpobdellidae	0	0	0	0	0	0	0	0
Erpobdella	0	0	0	5.57	0	0	0	0
| Class: Oligochaeta	0	0	0	0	0	5.57	1.39	0
| Order: Tubificida	0	0	0	0	0	0	0	0
| Family: Enchytraeidae	0	0	0	0	0	0	0	0
Enchytraeus	0	0	0	0	0	0	0	0
| Family: Naididae	6.00	0	0	33.4	11.1	5.57	2.79	5.85
Nais	6.00	6.00	18.0	50.2	0	5.57	1.39	5.85
Pristina	0	0	0	22.3	5.57	33.4	18.1	0
| Subfamily: Tubificinae without hair chaetae	0	0	0	0	0	0	0	1.95
Phylum: Cnidaria	0	0	0	0	0	0	0	0
| Class: Hydrozoa	0	0	0	0	0	0	0	0

Notes: All results displayed are area-based densities (#/m^2). A value of zero reported at a less specific level of taxonomy does not indicate an absence of organisms at a more specific level of taxonomy.

Area-Based Benthic Invertebrate Density Results (# individuals/m^2), Mount Polley Mine

Project: 22-29-6 (MPMC Creek CEMP)
Minnow Environmental (BC)
Taxonomist: Scott Finlayson
scottfinlayson@cordilleraconsulting.ca
250-494-7553

Site:	HAC-U	HAC-U	HAC-U	EDC-U	EDC-U	EDC-U	EDC-U	EDC-U
Sample:	Rep 3	Rep 4	Rep 5	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
Sample Collection Date:	06-Aug-22	06-Aug-22	06-Aug-22	08-Aug-22	07-Aug-22	07-Aug-22	07-Aug-22	07-Aug-22
CC#:	CC230221	CC230222	CC230223	CC230224	CC230225	CC230226	CC230227	CC230228
| Order: Anthoathecatae	0	0	0	0	0	0	0	0
| Family: Hydridae	0	0	0	0	0	0	0	0
Hydra	0	0	0	0	0	0	0	0
Totals:	**3,366**	**3,528**	**2,478**	**2,163**	**2,180**	**3,049**	**702**	**610**
Taxa present but not included:	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Phylum: Arthropoda	0	0	0	0	0	0	0	0
Subphylum: Hexapoda	0	0	0	0	0	0	0	0
| Class: Insecta	0	0	0	0	0	0	0	0
| Order: Diptera	0	0	0	0	0	0	0	0
| Family: Cecidomyiidae	0	0	0	0	0	0	1.39	0
Subphylum: Crustacea	0	0	0	0	0	0	0	0
| Class: Ostracoda	6.00	6.00	6.00	5.57	5.57	5.57	1.39	0
| Class: Branchiopoda	0	0	0	0	0	0	0	0
| Order: Cladocera	6.00	6.00	6.00	0	5.57	0	0	0
| Class: Maxillipoda	0	0	0	0	0	0	0	0
| Class: Copepoda	6.00	0	6.00	0	0	5.57	0	0
Phylum: Annelida	0	0	0	0	0	0	0	0
Subphylum: Clitellata	0	0	0	0	0	0	0	0
| Class: Oligochaeta	0	0	0	0	0	0	0	0
| Order: Tubificida	0	0	0	0	0	0	0	0
| Family: Lumbricidae	0	0	6.00	0	0	0	0	0
Phylum: Nemata	0	0	6.00	5.57	5.57	5.57	1.39	0
Totals:	**18.0**	**12.0**	**30.0**	**11.1**	**16.7**	**16.7**	**4.18**	**0**

Notes: All results displayed are area-based densities (#/m^2). A value of zero reported at a less specific level of taxonomy does not indicate an absence of organisms at a more specific level of taxonomy.

BENTHIC COMMUNITY

Cordillera Biomass Creek Data 22-29-6

(Finalized October 18, 2022)

Raw Benthic Invertebrate Biomass Results (g), Mount Polley Mine

Project: Mt. Polley 2022 (MPMC Creek CEMP)
Minnow Environmental (BC)
Taxonomist: Scott Finlayson
scottfinlayson@cordilleraconsulting.ca
250-494-7553

Site:	HAC-R1	HAC-R1	HAC-R1	HAC-R1	HAC-R1	HAC-U	HAC-U	HAC-U	HAC-U	HAC-U	EDC-U	EDC-U	EDC-U	EDC-U	EDC-U
Sample Collection Date:	10-Aug-22	10-Aug-22	10-Aug-22	10-Aug-22	10-Aug-22	6-Aug-22	6-Aug-22	6-Aug-22	6-Aug-22	6-Aug-22	8-Aug-22	7-Aug-22	7-Aug-22	7-Aug-22	7-Aug-22
CC#:	CC230214	CC230215	CC230216	CC230217	CC230218	CC230219	CC230220	CC230221	CC230222	CC230223	CC230224	CC230225	CC230226	CC230227	CC230228
Mesh	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250
Sub-sample %	5	5	5	5	5	5	5	5	5	5	5	5	5	20	14
Dry Biomass analysis (g)															
Sample Total Dry Weight															
All organisms	0.740	0.914	0.468	0.730	0.350	1.912	0.826	1.056	0.936	2.118	6.066	0.312	0.432	0.223	0.074
Raw Dry Weight															
All organisms	0.037	0.046	0.023	0.037	0.018	0.096	0.041	0.053	0.047	0.106	0.303	0.016	0.022	0.045	0.010
Measured Weight															
All organisms	0.1693	0.1783	0.1579	0.1711	0.1536	0.2309	0.1775	0.1877	0.1817	0.2401	0.4397	0.1499	0.1556	0.1789	0.1444
Mesh Weight															
All organisms	0.1323	0.1326	0.1345	0.1346	0.1361	0.1353	0.1362	0.1349	0.1349	0.1342	0.1364	0.1343	0.134	0.1344	0.1341
Wet Biomass Analysis (g)															
Sample Total Wet Weight (g)															
All organisms	0.2093	0.2546	0.1231	0.1666	0.0984	0.3153	0.1555	0.2295	0.2369	0.4328	1.0770	0.0668	0.1002	0.2204	0.0526
Mesh Weight	0.4494	0.4494	0.4513	0.4513	0.4517	0.4527	0.4525	0.4526	0.4511	0.4507	0.4542	0.4527	0.4522	0.4528	0.4538
Corrected Wet Weight															
All organisms	4.1860	5.0920	2.4620	3.3320	1.9680	6.3060	3.1100	4.5900	4.7380	8.6560	21.5400	1.3360	2.0040	1.1020	0.3757
Raw Wet Weight															
All organisms	0.6587	0.704	0.5744	0.6179	0.5501	0.768	0.608	0.6821	0.688	0.8835	1.5312	0.5195	0.5524	0.6732	0.5064

BENTHIC COMMUNITY

Cordillera Methods, QC Report, and Results 22-29-7

(Finalized October 19, 2022)

Methods and QC Report 2022

Project ID: 22-29-7 (MPMC CEMP Lake Sediment and BIC)

Client: Minnow Environmental

Prepared by:
Cordillera Consulting Inc.
Summerland, BC
© 2022

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Sample Reception

On September 1, 2022, Cordillera Consulting received 5 benthic samples from Minnow Environmental. When samples arrived to Cordillera Consulting, exterior packaging was initially inspected for damage or wet spots that would have indicated damage to the interior containers.

Samples were logged into a proprietary software database (INSTAR1) where the clients assigned sample name was recorded along with a Cordillera Consulting (CC) number for cross-reference. Each sample was checked to ensure that all sites and replicates recorded on field sheets or packing lists were delivered intact and with adequate preservative. Any missing, mislabelled or extra samples were reported to the client immediately to confirm the total numbers and correct names on the sample jars. The client representative was notified of the arrival of the shipment and provided a sample inventory once intake was completed.
See table below for sample inventory:

Table 1: Summary of sample information including Cordillera Consulting (CC) number

Sample	CC#	Date	Size	# of Jars
QUL-PNF_BIC-1_2022-08	CC230336	8/26/2022	250µM	1
QUL-PNF_BIC-2_2022-08	CC230337	8/27/2022	250µM	1
QUL-PNF_BIC-3_2022-08	CC230338	8/27/2022	250µM	1
QUL-PNF_BIC-4_2022-08	CC230339	8/27/2022	250µM	1
QUL-PNF_BIC-5_2022-08	CC230340	8/27/2022	250µM	1

Sample Sorting

- Using a gridded Petri dish, fine forceps and a low power stereo-microscope (Olympus, Nikon, Leica) the sorting technicians removed the invertebrates and sorted them into family/orders.
- The sorting technician kept a running tally of total numbers excluding organisms from Porifera, Nemata, Platyhelminthes, Ostracoda, Copepoda, Cladocera and terrestrial drop-ins such as aphids. These organisms were marked for their presence (given a value of 1) only and left in the sample. They were not included towards the 300-organism subsample count.
- Where specimens are broken or damaged, only heads were counted.
- Subsampling was conducted with the use of a Marchant Box.
- When using the Marchant box, cells were extracted at the same time in the order indicated by a random number table. If the 300th organism was found part way into sorting a cell then the balance of that cell was sorted. If the organism count had not reached 300 by the 50th cell then the entire sample was sorted.

- The total number of cells sorted and the number of organisms removed were recorded manually on a bench sheet and then recorded into INSTAR1
- Organisms were stored in vials containing 80% ethanol and an interior label indicating the site names, date of sampling, site code numbers and portion subsampled. This information was also recorded on the laboratory bench sheet and on INSTAR1.
- The sorted portion of the debris was preserved and labeled separately from the unsorted portion and was tested for sorting efficiency (Sorting Quality Control – Sorting Efficiency). The unsorted portion was also labeled and preserved in separate jars.

Percent sub-sampled and total countable invertebrates pulled from the samples were summarized in the table below.

Table 2: Percent sub-sample and invertebrate count for each sample

Sample	Date	CC#	250 micron fraction	
			% Sampled	# Invertebrates
QUL-PNF_BIC-1_2022-08	26-Aug-22	CC230336	100%	95
QUL-PNF_BIC-2_2022-08	27-Aug-22	CC230337	100%	70
QUL-PNF_BIC-3_2022-08	27-Aug-22	CC230338	100%	118
QUL-PNF_BIC-4_2022-08	27-Aug-22	CC230339	100%	137
QUL-PNF_BIC-5_2022-08	27-Aug-22	CC230340	100%	158

Sorting Quality Control - Sorting Efficiency

As a part of Cordillera's laboratory policy, all projects undergo sorting efficiency checks.

- As sorting progresses, 10% of samples were randomly chosen by senior members of the sorting team for resorting.
- All sorters working on a project had at least 1 sample resorted by another sorter.
- An efficiency of 90 % was expected (95% for CABIN samples).
- If 90/95% efficiency was not met, samples from that sorter were resorted.
- To calculated sorting efficiency the following formula was used:

$$\frac{\#OrganismsMissed}{TotalOrganismsFound} * 100 = \%OM$$

Table 3 Summary of sorting efficiency

		Total from Sample	Percent Efficiency
Site - QC, Sample - QC 1, CC# - CC230336, Percent sampled = 100%, Sieve size = 250			
No Invertebrates Found	0		
Total:	**0**	**95**	**100%**

Sorting Quality Control - Sub-Sampling QC

Certain Provincial and Mining projects require additional sorting checks in the form of sub-sampling QC, (Environmental Effects Monitoring (EEM) protocol). This ensured that any fraction of the total sample that was examined was actually an accurate representation of the number of total organisms. Organisms from the additional sub-samples were not identified; rather total organism count only was compared.

Sub-Sampling efficiency was measured on 10% of the number of sub-sampled samples in the project. Ex. In a project where 50 of 100 total samples were processed through subsampling using a Marchant box, then 10% of 50; or 5 samples were used for sub sampling efficiency.

Sub-Sampling efficiency was performed by fractioning the entire sample into sub-sample percentages. On each sub-sampled portion, a total organism count was recorded and compared to the rest of the sub-samples. In order to pass, all fractions were required to be within 20% of total organism count.

Example: If 300 organisms are found in 10% of the sample, the sorter will continue to sample in 10% fractions until the entire sample is separated. They will then count the total number of organisms in each of the 10 fractions of 10% and compare the organism count.

When divergence is >20% the sorting manager examines for the source of the problem and takes steps to correct it. With the Marchant box, the problem typically rested with how the box is flipped back to the upright position. For this reason, subsampling was performed by experienced employees only. Another common source of error would be the type of debris in the sample. Samples with algae or heavy with periphyton have a higher incident of failure due to clumping than clear samples.

Table 4 Summary of Sub Sample efficiency

All samples fully processed.

Taxonomic Effort

The next procedure was the identification to genus-species level where possible of all the organisms in the sample.

- Identifications were made at the genus/species level for all insect organisms found including Chironomidae (Based on CABIN protocol).
- Non-insect organisms (except those not included in CABIN count) were identified to genus/species where possible and to a minimum of family level with intact and mature specimens.
- The Standard Taxonomic Effort lists compiled by the CABIN manual[1], SAFIT[2] , and PNAMP[3] were used as a guide line for what level of identification to achieve where the condition and maturity of the organism enabled.
- Organisms from the same families/order were kept in separate vials with 80% ethanol and an interior label of printed laser paper.
- Chironomidae was identified to genus/species level where possible and was aided by slide mounts. CMC-10 was used to clear and mount the slide.
- Oligochaetes was identified to family/genus level with the aid of slide mounts. CMC-10 was used to clear and mount the slide.
- Other Annelida (leeches, polychaetes) were identified to the family/genus/species level with undamaged, mature specimens.
- Mollusca was identified to family and genus/species where possible
- Decapoda, Amphipoda and Isopoda were identified at family/genus/species level where possible.
- Bryozoans and Nemata remained at the phylum level
- Hydrachnidae and Cnidaria were identified at the family/genus level where possible.
- When requested, reference collections were made containing at least one individual from each taxa listed. Organisms represented will have been identified to the lowest practical level.
- Reference collection specimens were stored in 55 mm glass vials with screw-cap lids with polyseal inserts (museum quality). They were labeled with taxa name, site code, date identified and taxonomist name. The same information was applied to labels on the slide mounts.

Taxonomists

The taxonomists for this project were certified by the Society of Freshwater Science (SFS) Taxonomic Certification Program at level 2 which is the required certification for CABIN projects:

Scott Finlayson: Group 1 General Arthropods (East/West); Group 2 EPT (East/West); Group 3 Chironomidae (East/West); Group 4 Oligochaeta

Adam Bliss: Group 1 General Arthropods (East/West); Group 2 EPT (East/West); Group 3 Chironomidae
Rita Avery: Group 1 General Arthropods (East/West); Group 2 EPT (East/West)

Taxonomic QC

Taxonomic QC was performed in house by someone other than the original taxonomist.

- Quality control protocol involved complete, blind re-identification and re-enumeration of at least 10% of samples by a second SFS-certified taxonomist.
- Samples for taxonomic quality control were randomly selected and quality control procedures were conducted as the project progresses through the laboratories.

- The second (QC) taxonomist will calculate and record four types of errors:
    1. Misidentification error
    2. Enumeration error
    3. Questionable taxonomic resolution error
    4. Insufficient taxonomic resolution error

The QC coordinator then calculates the following estimates of taxonomic precision.

1. The percent total identification error rate is calculated as:

$$\frac{Sum\ of\ incorrect\ identifications}{total\ organisms\ counted\ in\ audit} * (100)$$

The average total identification error rate of audited samples did not exceed 5%. All samples that exceed a 5% error rate were re-evaluated to determine whether repeated errors or patterns in error contributed.

2. The percent difference in enumeration (PDE) to quantify the consistency of specimen counts.

$$PDE = \frac{|n_1 - n_2|}{n_1 + n_2} x100$$

3. The percent taxonomic disagreement (PTD) to quantify the shared precision between two sets of identifications.

$$PTD = \left(1 - \left[\frac{a}{N}\right]\right) x100$$

4. Bray Curtis dissimilarity Index to quantify the differences in identifications.

$$BC_{ij} = 1 - \frac{2C_{ij}}{S_j + S_i}$$

Error Summary

All samples report errors within the acceptable limits for CABIN Laboratory methods (less than 5% error).

Table 5 Summary of taxonomic error following QC

Site	Taxa Identified	% Error	PDE	PTD	Bray - Curtis Dissimilarity index
Site - 2022, Sample - QUL-PNF_BIC-2_2022-08, CC# - CC230337, Percent sampled = 100%, Sieve size = 250	70	0.00	0	0	0

There will always be disagreements between taxonomists regarding the degree of taxonomic resolution in immature specimens and when laboratories make use of different keys for certain groups (Mollusks is an especially disputed group). It is always possible that some taxa found by the original taxonomist were overlooked in QC.

All of the Taxonomic QC samples that were observed passed testing according to the CABIN misidentification protocols. See the tables below for results from taxonomic QC audit.

Error Rationale

Site - 2022, Sample - QUL-PNF_BIC-2_2022-08, CC# - CC230337, Percent sampled = 100%, Sieve size = 250	Laboratory Count	QC Audit Count	Agreement	Misidentification	Questionable Taxonomic Resolution	Enumeration	Insufficient Taxonomic Resolution	Comments
Aturidae	1	1						
Chironomidae	5	5						
Heterotrissocladius	33	33						
Hydrozetidae	9	9						
Micropsectra	1	1						
Naididae	5	5						
Phaenopsectra	1	1						
Pristina	1	1						

Procladius	12	12						
Protanypus	1	1						
Tubificinae with hair chaetae	1	1						
Total:	**70**	**70**						
					0	**0**	**0**	
% Total Misidentification Rate =	misidentifications / total number	x100 =	0.00	**Pass**				

References

[1] McDermott, H., Paull, T., Strachan, S. (May 2014). Laboratory Methods: Processing, Taxonomy, and Quality Control of Benthic Macroinvertebrate Samples, Environment Canada. ISBN: 978-1-100-25417-3

[2] Southwest Association of Freshwater Invertebrate Taxonomists. (2015). www.safit.org

[3] Pacific Northwest Aquatic Monitoring Partnership (Accessed 2015). www.pnamp.org

Taxonomic Keys

Below is a reference list of taxonomic keys utilized by taxonomists at Cordillera Consulting. Cordillera taxonomists routinely seek out new literature to ensure the most accurate identification keys are being utilized. This is not reflective of the exhaustive list of resources that we use for identification. A more complete list of taxonomic resources can be found at Southwest Association of Freshwater Invertebrate Taxonomists. (2015).
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Raw Benthic Invertebrate Density Results (# individuals/sample), Mount Polley Mine

Project: 22-29-7 (MPMC CEMP Lake Sediment and BIC)
Minnow Environmental (BC)
Taxonomist: Scott Finlayson
scottfinlayson@cordilleraconsulting.ca
250-494-7553

Site:	QUL-PNF	QUL-PNF	QUL-PNF	QUL-PNF	QUL-PNF
Sample:	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
Sample Collection Date:	26-Aug-22	27-Aug-22	27-Aug-22	27-Aug-22	27-Aug-22
CC#:	CC230336	CC230337	CC230338	CC230339	CC230340
Phylum: Arthropoda	0	0	0	0	0
Subphylum: Hexapoda	0	0	0	0	0
| Class: Insecta	0	0	0	0	0
| Order: Ephemeroptera	0	0	0	0	0
| Family: Baetidae	0	0	0	0	0
Baetis	0	0	0	1	0
| Order: Diptera	0	0	0	0	0
| Family: Ceratopogonidae	0	0	0	0	0
Sphaeromias	2	0	0	0	0
| Family: Chironomidae	33	5	60	62	58
| Subfamily: Chironominae	0	0	0	0	0
| Tribe: Chironomini	0	0	0	0	0
Dicrotendipes	0	0	1	0	0
Phaenopsectra	0	1	0	1	0
| Tribe: Tanytarsini	0	0	0	0	0
Micropsectra	0	1	0	0	0
| Subfamily: Diamesinae	0	0	0	0	0
Protanypus	0	1	1	0	1
| Subfamily: Orthocladiinae	0	0	0	0	0
Heterotrissocladius	39	33	40	53	72
| Subfamily: Tanypodinae	0	0	0	0	0
| Tribe: Procladiini	0	0	0	0	0
Procladius	15	12	14	13	18
Subphylum: Chelicerata	0	0	0	0	0
| Class: Arachnida	0	0	0	0	0
| Order: Trombidiformes	0	0	0	0	0
| Family: Aturidae	4	1	0	0	5
| Family: Lebertiidae	0	0	0	0	0
Lebertia	0	0	0	0	3

Note: A value of zero reported at a less specific level of taxonomy does not indicate an absence of organisms at a more specific level of taxonomy.

Raw Benthic Invertebrate Density Results (# individuals/sample), Mount Polley Mine

Project: 22-29-7 (MPMC CEMP Lake Sediment and BIC)
Minnow Environmental (BC)
Taxonomist: Scott Finlayson
scottfinlayson@cordilleraconsulting.ca
250-494-7553

Site:	QUL-PNF	QUL-PNF	QUL-PNF	QUL-PNF	QUL-PNF
Sample:	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
Sample Collection Date:	26-Aug-22	27-Aug-22	27-Aug-22	27-Aug-22	27-Aug-22
CC#:	CC230336	CC230337	CC230338	CC230339	CC230340
| Order: Sarcoptiformes	0	0	0	0	0
| Family: Hydrozetidae	0	9	0	0	0
Phylum: Annelida	0	0	0	0	0
Subphylum: Clitellata	0	0	0	0	0
| Class: Oligochaeta	0	0	0	0	0
| Order: Tubificida	0	0	0	0	0
| Family: Enchytraeidae	0	0	0	0	0
Enchytraeus	0	0	0	2	1
| Family: Naididae	1	5	0	2	0
Nais	1	0	0	0	0
Pristina	0	1	2	3	0
| Subfamily: Tubificinae with hair chaetae	0	1	0	0	0
Totals:	**95**	**70**	**118**	**137**	**158**
Taxa present but not included:					
Phylum: Arthropoda	0	0	0	0	0
Subphylum: Crustacea	0	0	0	0	0
| Class: Ostracoda	0	1	1	0	0
| Class: Branchiopoda	0	0	0	0	0
| Order: Cladocera	0	1	1	1	1
| Class: Maxillipoda	0	0	0	0	0
| Class: Copepoda	1	1	0	1	1
Phylum: Nemata	1	1	1	0	1
Phylum: Platyhelminthes	0	0	0	0	0
| Class: Turbellaria	0	1	0	0	0
Totals:	**2**	**5**	**3**	**2**	**3**

Note: A value of zero reported at a less specific level of taxonomy does not indicate an absence of organisms at a more specific level of taxonomy.

Area-Based Benthic Invertebrate Density Results (# individuals/m^2), Mount Polley Mine

Project: 22-29-7 (MPMC CEMP Lake Sediment and BIC)
Minnow Environmental (BC)
Taxonomist: Scott Finlayson
scottfinlayson@cordilleraconsulting.ca
250-494-7553

Site:	QUL-PNF	QUL-PNF	QUL-PNF	QUL-PNF	QUL-PNF
Sample:	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
Sample Collection Date:	26-Aug-22	27-Aug-22	27-Aug-22	27-Aug-22	27-Aug-22
CC#:	CC230336	CC230337	CC230338	CC230339	CC230340
Phylum: Arthropoda	0	0	0	0	0
Subphylum: Hexapoda	0	0	0	0	0
| Class: Insecta	0	0	0	0	0
| Order: Ephemeroptera	0	0	0	0	0
| Family: Baetidae	0	0	0	0	0
Baetis	0	0	0	0.116	0
| Order: Diptera	0	0	0	0	0
| Family: Ceratopogonidae	0	0	0	0	0
Sphaeromias	0.232	0	0	0	0
| Family: Chironomidae	3.83	0.581	6.97	7.20	6.74
| Subfamily: Chironominae	0	0	0	0	0
| Tribe: Chironomini	0	0	0	0	0
Dicrotendipes	0	0	0.116	0	0
Phaenopsectra	0	0.116	0	0.116	0
| Tribe: Tanytarsini	0	0	0	0	0
Micropsectra	0	0.116	0	0	0
| Subfamily: Diamesinae	0	0	0	0	0
Protanypus	0	0.116	0.116	0	0.116
| Subfamily: Orthocladiinae	0	0	0	0	0
Heterotrissocladius	4.53	3.83	4.65	6.15	8.36
| Subfamily: Tanypodinae	0	0	0	0	0
| Tribe: Procladiini	0	0	0	0	0
Procladius	1.74	1.39	1.63	1.51	2.09
Subphylum: Chelicerata	0	0	0	0	0
| Class: Arachnida	0	0	0	0	0
| Order: Trombidiformes	0	0	0	0	0
| Family: Aturidae	0.465	0.116	0	0	0.581

Notes: All results displayed are area-based densities (#/m^2). A value of zero reported at a less specific level of taxonomy does not indicate an absence of organisms at a more specific level of taxonomy.

Area-Based Benthic Invertebrate Density Results (# individuals/m^2), Mount Polley Mine

Project: 22-29-7 (MPMC CEMP Lake Sediment and BIC)
Minnow Environmental (BC)
Taxonomist: Scott Finlayson
scottfinlayson@cordilleraconsulting.ca
250-494-7553

Site:	QUL-PNF	QUL-PNF	QUL-PNF	QUL-PNF	QUL-PNF
Sample:	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
Sample Collection Date:	26-Aug-22	27-Aug-22	27-Aug-22	27-Aug-22	27-Aug-22
CC#:	CC230336	CC230337	CC230338	CC230339	CC230340
| Family: Lebertiidae	0	0	0	0	0
Lebertia	0	0	0	0	0.348
| Order: Sarcoptiformes	0	0	0	0	0
| Family: Hydrozetidae	0	1.05	0	0	0
Phylum: Annelida	0	0	0	0	0
Subphylum: Clitellata	0	0	0	0	0
| Class: Oligochaeta	0	0	0	0	0
| Order: Tubificida	0	0	0	0	0
| Family: Enchytraeidae	0	0	0	0	0
Enchytraeus	0	0	0	0.232	0.116
| Family: Naididae	0.116	0.581	0	0.232	0
Nais	0.116	0	0	0	0
Pristina	0	0.116	0.232	0.348	0
| Subfamily: Tubificinae with hair chaetae	0	0.116	0	0	0
Totals:	**11.0**	**8.13**	**13.7**	**15.9**	**18.3**
Taxa present but not included:					
Phylum: Arthropoda	0	0	0	0	0
Subphylum: Crustacea	0	0	0	0	0
| Class: Ostracoda	0	0.116	0.116	0	0
| Class: Branchiopoda	0	0	0	0	0
| Order: Cladocera	0	0.116	0.116	0.116	0.116
| Class: Maxillipoda	0	0	0	0	0
| Class: Copepoda	0.116	0.116	0	0.116	0.116
Phylum: Nemata	0.116	0.116	0.116	0	0.116
Phylum: Platyhelminthes	0	0	0	0	0
| Class: Turbellaria	0	0.116	0	0	0
Totals:	**0.232**	**0.581**	**0.348**	**0.232**	**0.348**

Notes: All results displayed are area-based densities (#/m^2). A value of zero reported at a less specific level of taxonomy does not indicate an absence of organisms at a more specific level of taxonomy.

BENTHIC & PERIPHYTON TISSUE

ALS Laboratory Report VA22B8779

(Finalized November 7, 2022)

ALS Canada Ltd.

right solutions. right partner.

CERTIFICATE OF ANALYSIS

Work Order	: **VA22B8779**	Page	: 1 of 70
Client	: **Mount Polley Mining Corporation**	Laboratory	: Vancouver - Environmental
Contact	: Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: ----	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 12-Aug-2022 12:25
PO	: 5590008044 Q2 2022	Date Analysis Commenced	: 16-Sep-2022
C-O-C number	: ----	Issue Date	: 07-Nov-2022 09:07
Sampler	: KBa		
Site	: ----		
Quote number	: VA22-MPMC100-002		
No. of samples received	: 159		
No. of samples analysed	: 159		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Benjamin Oke	Lab Assistant	Metals, Burnaby, British Columbia
Hamideh Moradi	Analyst	Metals, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Owen Cheng		Metals, Burnaby, British Columbia
Qammar Almas	Lab Assistant	Metals, Burnaby, British Columbia
Salimah Khimani	Lab Assistant	Metals, Burnaby, British Columbia

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances

LOR: Limit of Reporting (detection limit).

Unit	*Description*
%	percent
mg/kg	milligrams per kilogram

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Qualifiers

Qualifier	*Description*
DLA	*Detection Limit adjusted for required dilution.*
DLM	*Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).*

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	HAC-R1_PERT-1_2022-08	HAC-R1_PERT-2_2022-08	HAC-R1_PERT-3_2022-08	HAC-R1_PERT-4_2022-08	HAC-R1_PERT-5_2022-08
					Client sampling date / time	10-Aug-2022	10-Aug-2022	10-Aug-2022	10-Aug-2022	10-Aug-2022
						VA22B8779-001	VA22B8779-002	VA22B8779-003	VA22B8779-004	VA22B8779-005
						Result	Result	Result	Result	Result
Physical Tests										
moisture	----	E144-H	2.0	%		65.7	67.7	64.7	61.0	72.3
Metals										
aluminum	7429-90-5	E472	5.0	mg/kg		2010	1750	868	920	1400
antimony	7440-36-0	E472	0.010	mg/kg		0.080	0.068	0.064	0.085	0.068
arsenic	7440-38-2	E472	0.030	mg/kg		2.30	2.24	1.78	1.87	2.11
barium	7440-39-3	E472	0.050	mg/kg		133	99.3	68.3	125	84.5
beryllium	7440-41-7	E472	0.010	mg/kg		0.057	0.062	0.033	0.036	0.050
bismuth	7440-69-9	E472	0.010	mg/kg		<0.012 DLA	<0.010	<0.012 DLA	<0.015 DLA	<0.010
boron	7440-42-8	E472	1.0	mg/kg		363	288	289	295	325
cadmium	7440-43-9	E472	0.010	mg/kg		0.148	0.169	0.148	0.152	0.182
calcium	7440-70-2	E472	20	mg/kg		224000	246000	236000	250000	223000
cesium	7440-46-2	E472	0.0050	mg/kg		0.216	0.172	0.116	0.146	0.175
chromium	7440-47-3	E472	0.20	mg/kg		2.64	3.23	2.34	1.88	2.90
cobalt	7440-48-4	E472	0.020	mg/kg		2.00	1.96	1.20	1.48	1.70
copper	7440-50-8	E472	0.20	mg/kg		42.1	116	36.4	42.6	60.4
iron	7439-89-6	E472	5.0	mg/kg		2840	3100	1630	1830	2520
lead	7439-92-1	E472	0.050	mg/kg		0.644	0.498	0.298	0.315	0.484
lithium	7439-93-2	E472	0.50	mg/kg		1.59	1.49	0.91	0.99	1.39
magnesium	7439-95-4	E472	2.0	mg/kg		3090	2840	2570	2750	2840
manganese	7439-96-5	E472	0.050	mg/kg		1240	1150	774	1580	1360
mercury	7439-97-6	E511	0.0050	mg/kg		0.0096	0.0091	0.0091	0.0064	0.0088
molybdenum	7439-98-7	E472	0.040	mg/kg		1.50	1.35	1.17	1.31	1.71
nickel	7440-02-0	E472	0.20	mg/kg		3.13	3.77	3.10	3.12	3.30
phosphorus	7723-14-0	E472	10	mg/kg		866	886	731	681	787
potassium	7440-09-7	E472	20	mg/kg		4980	3870	3720	3790	4480
rubidium	7440-17-7	E472	0.050	mg/kg		5.14	3.90	3.54	3.65	4.42
selenium	7782-49-2	E472	0.10	mg/kg		2.22	1.88	2.28	2.57	1.95
silver	7440-22-4	E472.Ag	0.0050	mg/kg		0.0138	0.0246	0.0115	0.0150	0.0189
sodium	7440-23-5	E472	20	mg/kg		326	358	249	270	313
strontium	7440-24-6	E472	0.10	mg/kg		513	535	509	544	512

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	HAC-R1_PERT-1_2022-08	HAC-R1_PERT-2_2022-08	HAC-R1_PERT-3_2022-08	HAC-R1_PERT-4_2022-08	HAC-R1_PERT-5_2022-08
					Client sampling date / time	10-Aug-2022	10-Aug-2022	10-Aug-2022	10-Aug-2022	10-Aug-2022
						VA22B8779-001	VA22B8779-002	VA22B8779-003	VA22B8779-004	VA22B8779-005
						Result	Result	Result	Result	Result
Metals										
tellurium	13494-80-9	E472	0.020	mg/kg		<0.025 DLA	0.025	0.031	0.032	0.025
thallium	7440-28-0	E472	0.0020	mg/kg		0.0070	0.0061	0.0048	0.0063	0.0064
tin	7440-31-5	E472	0.10	mg/kg		<0.12 DLA	<0.10	<0.12 DLA	<0.15 DLA	<0.10
titanium	7440-32-6	E472.Ti	0.50	mg/kg		132	124	72.3	80.9	112
uranium	7440-61-1	E472	0.0020	mg/kg		0.156	0.150	0.117	0.122	0.138
vanadium	7440-62-2	E472	0.10	mg/kg		10.7	12.3	6.18	7.06	10.1
zinc	7440-66-6	E472	1.0	mg/kg		19.2	20.7	16.9	16.4	21.4
zirconium	7440-67-7	E472	0.20	mg/kg		1.42	1.26	0.96	0.91	1.23

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	HAC-R1_PERT-6_2022-08	HAC-R1_PERT-7_2022-08	HAC-R1_PERT-8_2022-08	HAC-U_PERT-1_2022-08	HAC-U_PERT-2_2022-08
					Client sampling date / time	10-Aug-2022	10-Aug-2022	10-Aug-2022	06-Aug-2022	06-Aug-2022
						VA22B8779-006	VA22B8779-007	VA22B8779-008	VA22B8779-009	VA22B8779-010
						Result	Result	Result	Result	Result
Physical Tests										
moisture	----	E144-H	2.0	%		67.4	69.8	71.3	59.8	57.2
Metals										
aluminum	7429-90-5	E472	5.0	mg/kg		857	4720	4470	1370	3010
antimony	7440-36-0	E472	0.010	mg/kg		0.057	0.072	0.078	0.082	0.083
arsenic	7440-38-2	E472	0.030	mg/kg		2.17	3.41	3.97	2.31	2.97
barium	7440-39-3	E472	0.050	mg/kg		71.6	246	165	113	238
beryllium	7440-41-7	E472	0.010	mg/kg		0.037	0.171	0.138	0.048	0.162
bismuth	7440-69-9	E472	0.010	mg/kg		<0.012 DLA	<0.012 DLA	0.016	<0.010	0.014
boron	7440-42-8	E472	1.0	mg/kg		117	232	150	239	228
cadmium	7440-43-9	E472	0.010	mg/kg		0.190	0.180	0.238	0.242	0.234
calcium	7440-70-2	E472	20	mg/kg		280000	247000	210000	212000	176000
cesium	7440-46-2	E472	0.0050	mg/kg		0.0775	0.258	0.267	0.243	0.365
chromium	7440-47-3	E472	0.20	mg/kg		5.79	19.3	88.5	2.28	4.74
cobalt	7440-48-4	E472	0.020	mg/kg		1.23	3.01	3.47	1.75	3.20
copper	7440-50-8	E472	0.20	mg/kg		41.0	57.5	160	50.5	86.8
iron	7439-89-6	E472	5.0	mg/kg		1510	4450	7680	2320	4680
lead	7439-92-1	E472	0.050	mg/kg		0.280	0.747	1.17	0.541	1.43
lithium	7439-93-2	E472	0.50	mg/kg		0.96	2.56	2.80	1.27	2.51
magnesium	7439-95-4	E472	2.0	mg/kg		2610	3260	3660	3020	4110
manganese	7439-96-5	E472	0.050	mg/kg		852	1780	2100	3500	3200
mercury	7439-97-6	E511	0.0050	mg/kg		0.0060	0.0160	0.0243	0.0153	0.0195
molybdenum	7439-98-7	E472	0.040	mg/kg		1.01	1.23	2.29	1.37	1.49
nickel	7440-02-0	E472	0.20	mg/kg		3.98	4.68	11.1	3.11	6.97
phosphorus	7723-14-0	E472	10	mg/kg		780	880	1340	1050	1360
potassium	7440-09-7	E472	20	mg/kg		1610	3410	3370	6350	7010
rubidium	7440-17-7	E472	0.050	mg/kg		1.64	4.05	4.55	6.78	8.68
selenium	7782-49-2	E472	0.10	mg/kg		1.50	1.51	1.92	5.00	3.83
silver	7440-22-4	E472.Ag	0.0050	mg/kg		0.0093	0.0259	0.0295	0.0162	0.0616
sodium	7440-23-5	E472	20	mg/kg		225	333	370	317	375
strontium	7440-24-6	E472	0.10	mg/kg		543	571	439	518	488

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	HAC-R1_PERT-6_2022-08	HAC-R1_PERT-7_2022-08	HAC-R1_PERT-8_2022-08	HAC-U_PERT-1_2022-08	HAC-U_PERT-2_2022-08
					Client sampling date / time	10-Aug-2022	10-Aug-2022	10-Aug-2022	06-Aug-2022	06-Aug-2022
						VA22B8779-006	VA22B8779-007	VA22B8779-008	VA22B8779-009	VA22B8779-010
						Result	Result	Result	Result	Result
Metals										
tellurium	13494-80-9	E472	0.020	mg/kg		0.035	0.027	0.021	<0.020	<0.020
thallium	7440-28-0	E472	0.0020	mg/kg		0.0036	0.0068	0.0087	0.0097	0.0168
tin	7440-31-5	E472	0.10	mg/kg		<0.12 DLA	<0.12 DLA	0.22	<0.10	<0.10
titanium	7440-32-6	E472.Ti	0.50	mg/kg		69.3	228	365	98.0	304
uranium	7440-61-1	E472	0.0020	mg/kg		0.0956	0.215	0.195	0.186	0.189
vanadium	7440-62-2	E472	0.10	mg/kg		5.61	18.2	25.7	9.34	17.0
zinc	7440-66-6	E472	1.0	mg/kg		11.6	27.4	59.8	43.1	31.7
zirconium	7440-67-7	E472	0.20	mg/kg		0.71	2.10	2.38	0.89	2.15

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	HAC-U_PERT-3_2022-08	HAC-U_PERT-4_2022-08	HAC-U_PERT-5_2022-08	HAC-U_PERT-6_2022-08	HAC-U_PERT-7_2022-08
					Client sampling date / time	06-Aug-2022	06-Aug-2022	05-Aug-2022	05-Aug-2022	06-Aug-2022
						VA22B8779-011	VA22B8779-012	VA22B8779-013	VA22B8779-014	VA22B8779-015
						Result	Result	Result	Result	Result
Physical Tests										
moisture	----	E144-H	2.0	%		70.5	74.3	76.4	71.7	87.3
Metals										
aluminum	7429-90-5	E472	5.0	mg/kg		1170	3900	2610	595	3730
antimony	7440-36-0	E472	0.010	mg/kg		0.060	0.072	0.054	0.053	0.061
arsenic	7440-38-2	E472	0.030	mg/kg		1.95	2.92	3.12	1.93	4.70
barium	7440-39-3	E472	0.050	mg/kg		96.1	272	136	84.0	114
beryllium	7440-41-7	E472	0.010	mg/kg		0.040	0.131	0.064	0.023	0.094
bismuth	7440-69-9	E472	0.010	mg/kg		<0.010	<0.010	<0.010	<0.011 DLA	0.011
boron	7440-42-8	E472	1.0	mg/kg		323	197	114	201	115
cadmium	7440-43-9	E472	0.010	mg/kg		0.197	0.237	0.152	0.162	0.209
calcium	7440-70-2	E472	20	mg/kg		203000	196000	188000	238000	145000
cesium	7440-46-2	E472	0.0050	mg/kg		0.192	0.202	0.249	0.134	0.189
chromium	7440-47-3	E472	0.20	mg/kg		2.66	1.96	7.92	1.28	17.5
cobalt	7440-48-4	E472	0.020	mg/kg		1.29	2.50	2.23	0.800	2.89
copper	7440-50-8	E472	0.20	mg/kg		35.1	510	52.2	21.2	71.5
iron	7439-89-6	E472	5.0	mg/kg		1610	3940	3420	950	5860
lead	7439-92-1	E472	0.050	mg/kg		0.385	0.885	0.729	0.226	2.53
lithium	7439-93-2	E472	0.50	mg/kg		0.92	1.53	1.76	0.60	2.31
magnesium	7439-95-4	E472	2.0	mg/kg		2740	3420	3270	2650	3780
manganese	7439-96-5	E472	0.050	mg/kg		2820	4260	2620	2120	2220
mercury	7439-97-6	E511	0.0050	mg/kg		0.0097	0.0129	0.0148	0.0064	0.0362
molybdenum	7439-98-7	E472	0.040	mg/kg		1.35	1.56	1.20	0.900	1.96
nickel	7440-02-0	E472	0.20	mg/kg		2.66	2.59	3.20	1.79	5.49
phosphorus	7723-14-0	E472	10	mg/kg		861	1280	1670	896	4480
potassium	7440-09-7	E472	20	mg/kg		6070	5410	6100	4930	6820
rubidium	7440-17-7	E472	0.050	mg/kg		6.17	6.20	7.95	5.15	7.94
selenium	7782-49-2	E472	0.10	mg/kg		4.05	12.2	1.97	1.94	2.30
silver	7440-22-4	E472.Ag	0.0050	mg/kg		0.0101	0.0631	0.0171	<0.0057 DLA	0.0477
sodium	7440-23-5	E472	20	mg/kg		307	345	420	246	269
strontium	7440-24-6	E472	0.10	mg/kg		479	494	474	550	366

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	HAC-U_PERT-3_2022-08	HAC-U_PERT-4_2022-08	HAC-U_PERT-5_2022-08	HAC-U_PERT-6_2022-08	HAC-U_PERT-7_2022-08
					Client sampling date / time	06-Aug-2022	06-Aug-2022	05-Aug-2022	05-Aug-2022	06-Aug-2022
						VA22B8779-011	VA22B8779-012	VA22B8779-013	VA22B8779-014	VA22B8779-015
						Result	Result	Result	Result	Result
Metals										
tellurium	13494-80-9	E472	0.020	mg/kg		<0.020	0.027	<0.020	<0.023 DLA	0.021
thallium	7440-28-0	E472	0.0020	mg/kg		0.0088	0.0134	0.0123	0.0078	0.0064
tin	7440-31-5	E472	0.10	mg/kg		<0.10	<0.10	<0.10	<0.11 DLA	0.10
titanium	7440-32-6	E472.Ti	0.50	mg/kg		73.2	188	207	39.6	296
uranium	7440-61-1	E472	0.0020	mg/kg		0.144	0.163	0.165	0.123	0.130
vanadium	7440-62-2	E472	0.10	mg/kg		7.29	20.8	13.2	4.24	18.1
zinc	7440-66-6	E472	1.0	mg/kg		14.5	13.2	12.4	6.4	19.7
zirconium	7440-67-7	E472	0.20	mg/kg		0.80	1.30	1.14	0.60	1.13

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	HAC-U_PERT-8_2022-08	HAC-D_PERT-1_2022-08	HAC-D_PERT-2_2022-08	HAC-D_PERT-3_2022-08	HAC-D_PERT-4_2022-08
					Client sampling date / time	05-Aug-2022	05-Aug-2022	05-Aug-2022	05-Aug-2022	05-Aug-2022
						VA22B8779-016	VA22B8779-017	VA22B8779-018	VA22B8779-019	VA22B8779-020
						Result	Result	Result	Result	Result
Physical Tests										
moisture	----	E144A	2.0	%		----	93.5	----	----	----
moisture	----	E144-H	2.0	%		71.0	----	73.3	63.4	64.5
Metals										
aluminum	7429-90-5	E475	5.0	mg/kg		----	53800	----	----	----
aluminum	7429-90-5	E472	5.0	mg/kg		11600	----	4190	2400	1900
antimony	7440-36-0	E472	0.010	mg/kg		0.071	----	0.061	0.055	0.050
antimony	7440-36-0	E475	0.020	mg/kg		----	0.341	----	----	----
arsenic	7440-38-2	E472	0.030	mg/kg		5.27	----	6.96	5.32	5.19
arsenic	7440-38-2	E475	0.050	mg/kg		----	63.0	----	----	----
barium	7440-39-3	E475	0.050	mg/kg		----	987	----	----	----
barium	7440-39-3	E472	0.050	mg/kg		823	----	127	177	130
beryllium	7440-41-7	E475	0.010	mg/kg		----	1.85	----	----	----
beryllium	7440-41-7	E472	0.010	mg/kg		0.180	----	0.155	0.076	0.072
bismuth	7440-69-9	E475	0.010	mg/kg		----	0.376	----	----	----
bismuth	7440-69-9	E472	0.010	mg/kg		<0.010	----	0.034	0.016	0.014
boron	7440-42-8	E475	1.0	mg/kg		----	181	----	----	----
boron	7440-42-8	E472	1.0	mg/kg		90.4	----	36.8	43.0	41.5
cadmium	7440-43-9	E475	0.010	mg/kg		----	1.73	----	----	----
cadmium	7440-43-9	E472	0.010	mg/kg		0.127	----	0.249	0.285	0.311
calcium	7440-70-2	E475	20	mg/kg		----	827000	----	----	----
calcium	7440-70-2	E472	20	mg/kg		185000	----	174000	252000	271000
cesium	7440-46-2	E475	0.0050	mg/kg		----	5.30	----	----	----
cesium	7440-46-2	E472	0.0050	mg/kg		0.225	----	0.570	0.301	0.271
chromium	7440-47-3	E475	0.20	mg/kg		----	258	----	----	----
chromium	7440-47-3	E472	0.20	mg/kg		7.08	----	11.7	5.88	5.81
cobalt	7440-48-4	E475	0.020	mg/kg		----	43.9	----	----	----
cobalt	7440-48-4	E472	0.020	mg/kg		3.09	----	3.74	2.16	1.84
copper	7440-50-8	E475	0.20	mg/kg		----	1130	----	----	----
copper	7440-50-8	E472	0.20	mg/kg		104	----	93.4	59.1	118
iron	7439-89-6	E475	5.0	mg/kg		----	117000	----	----	----

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	HAC-U_PERT-8_2022-08	HAC-D_PERT-1_2022-08	HAC-D_PERT-2_2022-08	HAC-D_PERT-3_2022-08	HAC-D_PERT-4_2022-08
					Client sampling date / time	05-Aug-2022	05-Aug-2022	05-Aug-2022	05-Aug-2022	05-Aug-2022
						VA22B8779-016	VA22B8779-017	VA22B8779-018	VA22B8779-019	VA22B8779-020
						Result	Result	Result	Result	Result
Metals										
iron	7439-89-6	E472	5.0	mg/kg		5070	----	9110	4460	3830
lead	7439-92-1	E475	0.050	mg/kg		----	24.2	----	----	----
lead	7439-92-1	E472	0.050	mg/kg		1.12	----	2.10	1.25	0.894
lithium	7439-93-2	E475	0.50	mg/kg		----	48.5	----	----	----
lithium	7439-93-2	E472	0.50	mg/kg		2.72	----	4.52	2.37	2.08
magnesium	7439-95-4	E475	2.0	mg/kg		----	34100	----	----	----
magnesium	7439-95-4	E472	2.0	mg/kg		4460	----	4000	3480	3540
manganese	7439-96-5	E475	0.050	mg/kg		----	4970	----	----	----
manganese	7439-96-5	E472	0.050	mg/kg		2200	----	779	921	1890
mercury	7439-97-6	E511	0.0050	mg/kg		0.0202	----	0.0364	0.0189	0.0161
mercury	7439-97-6	E512	0.010	mg/kg		----	0.225	----	----	----
molybdenum	7439-98-7	E475	0.040	mg/kg		----	11.1	----	----	----
molybdenum	7439-98-7	E472	0.040	mg/kg		0.745	----	0.620	0.490	0.755
nickel	7440-02-0	E475	0.20	mg/kg		----	105	----	----	----
nickel	7440-02-0	E472	0.20	mg/kg		2.97	----	8.23	4.41	4.38
phosphorus	7723-14-0	E472	10	mg/kg		1650	----	2530	1820	1850
phosphorus	7723-14-0	E475	20	mg/kg		----	13300	----	----	----
potassium	7440-09-7	E475	20	mg/kg		----	19300	----	----	----
potassium	7440-09-7	E472	20	mg/kg		5490	----	3750	3550	3640
rubidium	7440-17-7	E475	0.050	mg/kg		----	49.3	----	----	----
rubidium	7440-17-7	E472	0.050	mg/kg		8.08	----	7.70	6.43	5.89
selenium	7782-49-2	E475	0.10	mg/kg		----	9.13	----	----	----
selenium	7782-49-2	E472	0.10	mg/kg		1.62	----	2.11	1.59	1.98
silver	7440-22-4	E475.Ag	0.0050	mg/kg		----	0.470	----	----	----
silver	7440-22-4	E472.Ag	0.0050	mg/kg		0.0214	----	0.0398	0.0188	0.0216
sodium	7440-23-5	E475	20	mg/kg		----	2740	----	----	----
sodium	7440-23-5	E472	20	mg/kg		306	----	351	311	350
strontium	7440-24-6	E475	0.10	mg/kg		----	2510	----	----	----
strontium	7440-24-6	E472	0.10	mg/kg		589	----	478	596	659
tellurium	13494-80-9	E475	0.020	mg/kg		----	0.185	----	----	----

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	HAC-U_PERT-8_2022-08	HAC-D_PERT-1_2022-08	HAC-D_PERT-2_2022-08	HAC-D_PERT-3_2022-08	HAC-D_PERT-4_2022-08
					Client sampling date / time	05-Aug-2022	05-Aug-2022	05-Aug-2022	05-Aug-2022	05-Aug-2022
						VA22B8779-016	VA22B8779-017	VA22B8779-018	VA22B8779-019	VA22B8779-020
						Result	Result	Result	Result	Result
Metals										
tellurium	13494-80-9	E472	0.020	mg/kg		0.023	----	0.031	0.031	0.028
thallium	7440-28-0	E475	0.0020	mg/kg		----	0.390	----	----	----
thallium	7440-28-0	E472	0.0020	mg/kg		0.0086	----	0.0457	0.0239	0.0255
tin	7440-31-5	E475	0.10	mg/kg		----	1.66	----	----	----
tin	7440-31-5	E472	0.10	mg/kg		<0.10	----	0.14	<0.10	<0.12 DLA
titanium	7440-32-6	E475.Ti	0.50	mg/kg		----	3120	----	----	----
titanium	7440-32-6	E472.Ti	0.50	mg/kg		255	----	244	141	111
uranium	7440-61-1	E475	0.0020	mg/kg		----	3.68	----	----	----
uranium	7440-61-1	E472	0.0020	mg/kg		0.174	----	0.354	0.229	0.206
vanadium	7440-62-2	E475	0.10	mg/kg		----	380	----	----	----
vanadium	7440-62-2	E472	0.10	mg/kg		22.1	----	26.2	13.8	10.9
zinc	7440-66-6	E475	1.0	mg/kg		----	231	----	----	----
zinc	7440-66-6	E472	1.0	mg/kg		15.3	----	27.4	18.0	17.1
zirconium	7440-67-7	E475	0.20	mg/kg		----	33.5	----	----	----
zirconium	7440-67-7	E472	0.20	mg/kg		1.90	----	2.75	1.30	1.06

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	HAC-D_PERT-5_2022-08	HAC-D_PERT-6_2022-08	HAC-D_PERT-7_2022-08	HAC-D_PERT-8_2022-08	EDC-U_PERT-1_2022-08
					Client sampling date / time	05-Aug-2022	05-Aug-2022	05-Aug-2022	05-Aug-2022	08-Aug-2022
						VA22B8779-021	VA22B8779-022	VA22B8779-023	VA22B8779-024	VA22B8779-025
						Result	Result	Result	Result	Result
Physical Tests										
moisture	----	E144-H	2.0	%		64.0	62.0	61.9	65.7	73.8
Metals										
aluminum	7429-90-5	E472	5.0	mg/kg		2580	2130	2320	1760	1960
antimony	7440-36-0	E472	0.010	mg/kg		0.060	0.058	0.082	0.082	0.094
arsenic	7440-38-2	E472	0.030	mg/kg		5.89	6.33	6.29	7.60	6.75
barium	7440-39-3	E472	0.050	mg/kg		164	232	222	304	232
beryllium	7440-41-7	E472	0.010	mg/kg		0.104	0.089	0.105	0.075	0.206
bismuth	7440-69-9	E472	0.010	mg/kg		0.017	0.015	<0.024 DLA	<0.014 DLA	0.014
boron	7440-42-8	E472	1.0	mg/kg		38.0	25.5	88.8	71.3	18.6
cadmium	7440-43-9	E472	0.010	mg/kg		0.318	0.320	0.597	0.853	1.03
calcium	7440-70-2	E472	20	mg/kg		230000	246000	260000	236000	7430
cesium	7440-46-2	E472	0.0050	mg/kg		0.325	0.255	0.315	0.265	0.0886
chromium	7440-47-3	E472	0.20	mg/kg		9.29	9.25	7.85	6.83	23.9
cobalt	7440-48-4	E472	0.020	mg/kg		2.82	2.56	3.93	6.07	14.4
copper	7440-50-8	E472	0.20	mg/kg		75.2	71.2	194	96.3	24.7
iron	7439-89-6	E472	5.0	mg/kg		5200	4380	4740	4080	4460
lead	7439-92-1	E472	0.050	mg/kg		1.25	1.04	1.12	0.863	0.742
lithium	7439-93-2	E472	0.50	mg/kg		2.80	2.47	2.65	1.82	1.39
magnesium	7439-95-4	E472	2.0	mg/kg		3740	3510	4170	3280	1910
manganese	7439-96-5	E472	0.050	mg/kg		3280	3540	7210	12000	6970
mercury	7439-97-6	E511	0.0050	mg/kg		0.0266	0.0222	0.0212	0.0200	0.0486
molybdenum	7439-98-7	E472	0.040	mg/kg		0.703	0.626	0.998	1.33	2.38
nickel	7440-02-0	E472	0.20	mg/kg		5.67	6.38	6.17	8.18	25.2
phosphorus	7723-14-0	E472	10	mg/kg		1690	1890	1910	1700	2760
potassium	7440-09-7	E472	20	mg/kg		3610	2980	3480	3370	6070
rubidium	7440-17-7	E472	0.050	mg/kg		6.69	5.67	5.26	5.03	7.02
selenium	7782-49-2	E472	0.10	mg/kg		1.67	1.65	2.53	1.94	0.39
silver	7440-22-4	E472.Ag	0.0050	mg/kg		0.0226	0.0298	0.0265	0.0191	0.0337
sodium	7440-23-5	E472	20	mg/kg		306	292	341	312	159
strontium	7440-24-6	E472	0.10	mg/kg		604	617	618	574	65.4

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	HAC-D_PERT-5_2022-08	HAC-D_PERT-6_2022-08	HAC-D_PERT-7_2022-08	HAC-D_PERT-8_2022-08	EDC-U_PERT-1_2022-08
					Client sampling date / time	05-Aug-2022	05-Aug-2022	05-Aug-2022	05-Aug-2022	08-Aug-2022
						VA22B8779-021	VA22B8779-022	VA22B8779-023	VA22B8779-024	VA22B8779-025
						Result	Result	Result	Result	Result
Metals										
tellurium	13494-80-9	E472	0.020	mg/kg		0.033	0.026	<0.048 DLA	0.036	<0.026 DLA
thallium	7440-28-0	E472	0.0020	mg/kg		0.0256	0.0255	0.0344	0.0422	0.0419
tin	7440-31-5	E472	0.10	mg/kg		<0.10	<0.10	<0.24 DLA	<0.14 DLA	<0.13 DLA
titanium	7440-32-6	E472.Ti	0.50	mg/kg		178	135	142	99.1	116
uranium	7440-61-1	E472	0.0020	mg/kg		0.219	0.192	0.210	0.172	0.388
vanadium	7440-62-2	E472	0.10	mg/kg		17.1	13.2	16.9	14.2	16.2
zinc	7440-66-6	E472	1.0	mg/kg		17.8	18.5	28.6	34.3	154
zirconium	7440-67-7	E472	0.20	mg/kg		1.75	1.24	1.22	1.06	1.56

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	EDC-U_PERT-2_2022-08	EDC-U_PERT-3_2022-08	EDC-U_PERT-4_2022-08	EDC-U_PERT-5_2022-08	EDC-U_PERT-6_2022-08
					Client sampling date / time	07-Aug-2022	07-Aug-2022	07-Aug-2022	07-Aug-2022	07-Aug-2022
						VA22B8779-026	VA22B8779-027	VA22B8779-028	VA22B8779-029	VA22B8779-030
						Result	Result	Result	Result	Result
Physical Tests										
moisture	----	E144A	2.0	%		----	89.5	----	----	----
moisture	----	E144-H	2.0	%		89.1	----	77.9	87.2	86.8
Metals										
aluminum	7429-90-5	E475	5.0	mg/kg		----	10600	----	----	----
aluminum	7429-90-5	E472	5.0	mg/kg		13300	----	6490	14700	10900
antimony	7440-36-0	E472	0.010	mg/kg		0.086	----	0.093	0.071	0.067
antimony	7440-36-0	E475	0.020	mg/kg		----	0.086	----	----	----
arsenic	7440-38-2	E472	0.030	mg/kg		12.8	----	37.9	41.0	10.8
arsenic	7440-38-2	E475	0.050	mg/kg		----	14.4	----	----	----
barium	7440-39-3	E475	0.050	mg/kg		----	319	----	----	----
barium	7440-39-3	E472	0.050	mg/kg		229	----	824	480	225
beryllium	7440-41-7	E475	0.010	mg/kg		----	0.374	----	----	----
beryllium	7440-41-7	E472	0.010	mg/kg		0.447	----	0.392	0.629	0.339
bismuth	7440-69-9	E475	0.010	mg/kg		----	0.084	----	----	----
bismuth	7440-69-9	E472	0.010	mg/kg		0.111	----	0.056	0.123	0.078
boron	7440-42-8	E475	1.0	mg/kg		----	8.8	----	----	----
boron	7440-42-8	E472	1.0	mg/kg		7.8	----	11.9	7.4	15.1
cadmium	7440-43-9	E475	0.010	mg/kg		----	1.07	----	----	----
cadmium	7440-43-9	E472	0.010	mg/kg		0.949	----	2.83	1.82	0.991
calcium	7440-70-2	E475	20	mg/kg		----	11000	----	----	----
calcium	7440-70-2	E472	20	mg/kg		11700	----	10100	13100	9420
cesium	7440-46-2	E475	0.0050	mg/kg		----	0.783	----	----	----
cesium	7440-46-2	E472	0.0050	mg/kg		1.01	----	0.306	1.02	0.848
chromium	7440-47-3	E475	0.20	mg/kg		----	79.1	----	----	----
chromium	7440-47-3	E472	0.20	mg/kg		127	----	119	68.6	145
cobalt	7440-48-4	E475	0.020	mg/kg		----	22.8	----	----	----
cobalt	7440-48-4	E472	0.020	mg/kg		21.9	----	47.6	35.9	20.6
copper	7440-50-8	E475	0.20	mg/kg		----	39.1	----	----	----
copper	7440-50-8	E472	0.20	mg/kg		44.1	----	34.8	43.0	35.3
iron	7439-89-6	E475	5.0	mg/kg		----	22600	----	----	----

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	EDC-U_PERT-2_2022-08	EDC-U_PERT-3_2022-08	EDC-U_PERT-4_2022-08	EDC-U_PERT-5_2022-08	EDC-U_PERT-6_2022-08
					Client sampling date / time	07-Aug-2022	07-Aug-2022	07-Aug-2022	07-Aug-2022	07-Aug-2022
						VA22B8779-026	VA22B8779-027	VA22B8779-028	VA22B8779-029	VA22B8779-030
						Result	Result	Result	Result	Result
Metals										
iron	7439-89-6	E472	5.0	mg/kg		26400	----	22700	45500	21800
lead	7439-92-1	E475	0.050	mg/kg		----	3.99	----	----	----
lead	7439-92-1	E472	0.050	mg/kg		5.27	----	2.96	6.26	3.94
lithium	7439-93-2	E475	0.50	mg/kg		----	9.04	----	----	----
lithium	7439-93-2	E472	0.50	mg/kg		12.2	----	4.18	12.0	9.95
magnesium	7439-95-4	E475	2.0	mg/kg		----	5340	----	----	----
magnesium	7439-95-4	E472	2.0	mg/kg		6170	----	3540	6250	5040
manganese	7439-96-5	E475	0.050	mg/kg		----	11300	----	----	----
manganese	7439-96-5	E472	0.050	mg/kg		8460	----	26900	18300	8900
mercury	7439-97-6	E511	0.0050	mg/kg		0.157	----	0.0972	0.176	0.122
mercury	7439-97-6	E512	0.010	mg/kg		----	0.188	----	----	----
molybdenum	7439-98-7	E475	0.040	mg/kg		----	2.42	----	----	----
molybdenum	7439-98-7	E472	0.040	mg/kg		2.24	----	2.87	2.74	2.17
nickel	7440-02-0	E475	0.20	mg/kg		----	45.3	----	----	----
nickel	7440-02-0	E472	0.20	mg/kg		45.0	----	66.3	56.0	48.1
phosphorus	7723-14-0	E472	10	mg/kg		3290	----	3030	3600	2630
phosphorus	7723-14-0	E475	20	mg/kg		----	3900	----	----	----
potassium	7440-09-7	E475	20	mg/kg		----	5880	----	----	----
potassium	7440-09-7	E472	20	mg/kg		4780	----	4850	4140	3080
rubidium	7440-17-7	E475	0.050	mg/kg		----	15.1	----	----	----
rubidium	7440-17-7	E472	0.050	mg/kg		16.7	----	8.09	14.7	11.5
selenium	7782-49-2	E475	0.10	mg/kg		----	0.82	----	----	----
selenium	7782-49-2	E472	0.10	mg/kg		0.98	----	0.70	1.13	0.77
silver	7440-22-4	E475.Ag	0.0050	mg/kg		----	0.164	----	----	----
silver	7440-22-4	E472.Ag	0.0050	mg/kg		0.200	----	0.0811	0.193	0.129
sodium	7440-23-5	E475	20	mg/kg		----	289	----	----	----
sodium	7440-23-5	E472	20	mg/kg		291	----	147	291	214
strontium	7440-24-6	E475	0.10	mg/kg		----	94.0	----	----	----
strontium	7440-24-6	E472	0.10	mg/kg		98.2	----	114	125	94.2
tellurium	13494-80-9	E475	0.020	mg/kg		----	<0.025 DLA	----	----	----

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	EDC-U_PERT-2_ 2022-08	EDC-U_PERT-3_ 2022-08	EDC-U_PERT-4_ 2022-08	EDC-U_PERT-5_ 2022-08	EDC-U_PERT-6_ 2022-08
					Client sampling date / time	07-Aug-2022	07-Aug-2022	07-Aug-2022	07-Aug-2022	07-Aug-2022
						VA22B8779-026	VA22B8779-027	VA22B8779-028	VA22B8779-029	VA22B8779-030
						Result	Result	Result	Result	Result
Metals										
tellurium	13494-80-9	E472	0.020	mg/kg		<0.038 DLA	----	0.034	<0.060 DLA	<0.062 DLA
thallium	7440-28-0	E475	0.0020	mg/kg		----	0.116	----	----	----
thallium	7440-28-0	E472	0.0020	mg/kg		0.116	----	0.200	0.152	0.105
tin	7440-31-5	E475	0.10	mg/kg		----	0.19	----	----	----
tin	7440-31-5	E472	0.10	mg/kg		0.27	----	<0.15 DLA	<0.30 DLA	<0.31 DLA
titanium	7440-32-6	E475.Ti	0.50	mg/kg		----	353	----	----	----
titanium	7440-32-6	E472.Ti	0.50	mg/kg		458	----	200	487	385
uranium	7440-61-1	E475	0.0020	mg/kg		----	0.658	----	----	----
uranium	7440-61-1	E472	0.0020	mg/kg		0.809	----	0.612	1.00	0.704
vanadium	7440-62-2	E475	0.10	mg/kg		----	45.0	----	----	----
vanadium	7440-62-2	E472	0.10	mg/kg		54.4	----	55.4	98.8	45.7
zinc	7440-66-6	E475	1.0	mg/kg		----	143	----	----	----
zinc	7440-66-6	E472	1.0	mg/kg		152	----	241	202	135
zirconium	7440-67-7	E475	0.20	mg/kg		----	5.87	----	----	----
zirconium	7440-67-7	E472	0.20	mg/kg		7.61	----	4.70	8.94	6.12

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	EDC-U_PERT-7_ 2022-08	EDC-U_PERT-8_ 2022-08	EDC-D_PERT-1_ 2022-08	EDC-D_PERT-2_ 2022-08	EDC-D_PERT-3_ 2022-08
					Client sampling date / time	07-Aug-2022	07-Aug-2022	04-Aug-2022	04-Aug-2022	03-Aug-2022
						VA22B8779-031	VA22B8779-032	VA22B8779-033	VA22B8779-034	VA22B8779-035
						Result	Result	Result	Result	Result
Physical Tests										
moisture	----	E144-H	2.0	%		88.9	84.3	66.6	83.8	82.2
Metals										
aluminum	7429-90-5	E472	5.0	mg/kg		8020	8050	10500	9850	11400
antimony	7440-36-0	E472	0.010	mg/kg		0.085	0.110	0.040	0.064	0.053
arsenic	7440-38-2	E472	0.030	mg/kg		24.5	34.0	12.7	14.2	12.9
barium	7440-39-3	E472	0.050	mg/kg		242	1140	130	138	149
beryllium	7440-41-7	E472	0.010	mg/kg		0.336	0.422	0.323	0.292	0.310
bismuth	7440-69-9	E472	0.010	mg/kg		0.053	0.056	0.069	0.075	0.083
boron	7440-42-8	E472	1.0	mg/kg		8.4	9.9	6.6	10.5	9.4
cadmium	7440-43-9	E472	0.010	mg/kg		1.13	4.69	0.338	0.294	0.328
calcium	7440-70-2	E472	20	mg/kg		8310	12000	7550	9440	9330
cesium	7440-46-2	E472	0.0050	mg/kg		0.440	0.419	1.27	1.21	1.24
chromium	7440-47-3	E472	0.20	mg/kg		233	46.6	50.3	41.6	54.4
cobalt	7440-48-4	E472	0.020	mg/kg		22.0	65.9	10.8	10.0	11.3
copper	7440-50-8	E472	0.20	mg/kg		36.4	39.7	27.3	25.2	26.3
iron	7439-89-6	E472	5.0	mg/kg		26000	19800	21600	19700	21600
lead	7439-92-1	E472	0.050	mg/kg		3.71	3.33	4.57	4.44	4.39
lithium	7439-93-2	E472	0.50	mg/kg		6.82	5.51	10.8	10.3	11.2
magnesium	7439-95-4	E472	2.0	mg/kg		4330	3640	6370	5710	5980
manganese	7439-96-5	E472	0.050	mg/kg		9480	38600	2020	2300	2540
mercury	7439-97-6	E511	0.0050	mg/kg		0.0730	0.0777	0.0435	0.0516	0.0494
molybdenum	7439-98-7	E472	0.040	mg/kg		3.78	4.41	1.05	1.70	1.26
nickel	7440-02-0	E472	0.20	mg/kg		51.1	95.6	33.6	29.8	36.0
phosphorus	7723-14-0	E472	10	mg/kg		2630	2670	1370	1960	1680
potassium	7440-09-7	E472	20	mg/kg		4260	3810	2540	4380	2990
rubidium	7440-17-7	E472	0.050	mg/kg		9.40	8.27	8.97	11.5	10.3
selenium	7782-49-2	E472	0.10	mg/kg		0.60	0.77	0.88	1.08	0.88
silver	7440-22-4	E472.Ag	0.0050	mg/kg		0.0847	0.100	0.0897	0.0744	0.0760
sodium	7440-23-5	E472	20	mg/kg		224	151	266	316	289
strontium	7440-24-6	E472	0.10	mg/kg		74.0	140	73.7	91.3	79.9

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	EDC-U_PERT-7_ 2022-08	EDC-U_PERT-8_ 2022-08	EDC-D_PERT-1_ 2022-08	EDC-D_PERT-2_ 2022-08	EDC-D_PERT-3_ 2022-08
					Client sampling date / time	07-Aug-2022	07-Aug-2022	04-Aug-2022	04-Aug-2022	03-Aug-2022
						VA22B8779-031	VA22B8779-032	VA22B8779-033	VA22B8779-034	VA22B8779-035
						Result	Result	Result	Result	Result
Metals										
tellurium	13494-80-9	E472	0.020	mg/kg		<0.050 DLA	<0.068 DLA	<0.033 DLA	<0.054 DLA	<0.053 DLA
thallium	7440-28-0	E472	0.0020	mg/kg		0.0929	0.404	0.0812	0.0726	0.0752
tin	7440-31-5	E472	0.10	mg/kg		<0.25 DLA	<0.34 DLA	<0.16 DLA	<0.27 DLA	<0.27 DLA
titanium	7440-32-6	E472.Ti	0.50	mg/kg		417	289	432	485	566
uranium	7440-61-1	E472	0.0020	mg/kg		0.660	0.851	0.546	0.645	0.559
vanadium	7440-62-2	E472	0.10	mg/kg		58.8	53.0	46.3	40.0	46.2
zinc	7440-66-6	E472	1.0	mg/kg		113	337	55.8	59.2	58.2
zirconium	7440-67-7	E472	0.20	mg/kg		6.87	5.40	6.12	6.44	6.96

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	EDC-D_PERT-4_ 2022-08	EDC-D_PERT-5_ 2022-08	EDC-D_PERT-6_ 2022-08	EDC-D_PERT-7_ 2022-08	EDC-D_PERT-8_ 2022-08
					Client sampling date / time	03-Aug-2022	03-Aug-2022	03-Aug-2022	03-Aug-2022	03-Aug-2022
						VA22B8779-036	VA22B8779-037	VA22B8779-038	VA22B8779-039	VA22B8779-040
						Result	Result	Result	Result	Result
Physical Tests										
moisture	----	E144A	2.0	%		----	88.3	71.0	----	----
moisture	----	E144-H	2.0	%		79.0	----	----	80.1	83.1
Metals										
aluminum	7429-90-5	E475	5.0	mg/kg		----	6060	13300	----	----
aluminum	7429-90-5	E472	5.0	mg/kg		7600	----	----	9740	11700
antimony	7440-36-0	E472	0.010	mg/kg		0.051	----	----	0.071	0.095
antimony	7440-36-0	E475	0.020	mg/kg		----	0.080	0.219	----	----
arsenic	7440-38-2	E472	0.030	mg/kg		9.58	----	----	12.6	15.3
arsenic	7440-38-2	E475	0.050	mg/kg		----	13.9	32.9	----	----
barium	7440-39-3	E475	0.050	mg/kg		----	174	205	----	----
barium	7440-39-3	E472	0.050	mg/kg		114	----	----	119	154
beryllium	7440-41-7	E475	0.010	mg/kg		----	0.212	0.500	----	----
beryllium	7440-41-7	E472	0.010	mg/kg		0.260	----	----	0.318	0.326
bismuth	7440-69-9	E475	0.010	mg/kg		----	0.062	0.068	----	----
bismuth	7440-69-9	E472	0.010	mg/kg		0.081	----	----	0.057	0.110
boron	7440-42-8	E475	1.0	mg/kg		----	17.8	27.9	----	----
boron	7440-42-8	E472	1.0	mg/kg		5.3	----	----	10.1	10.0
cadmium	7440-43-9	E475	0.010	mg/kg		----	0.461	2.12	----	----
cadmium	7440-43-9	E472	0.010	mg/kg		0.197	----	----	0.311	0.328
calcium	7440-70-2	E475	20	mg/kg		----	12100	23300	----	----
calcium	7440-70-2	E472	20	mg/kg		5720	----	----	9580	9410
cesium	7440-46-2	E475	0.0050	mg/kg		----	0.815	1.55	----	----
cesium	7440-46-2	E472	0.0050	mg/kg		1.29	----	----	1.22	1.53
chromium	7440-47-3	E475	0.20	mg/kg		----	27.1	54.4	----	----
chromium	7440-47-3	E472	0.20	mg/kg		25.8	----	----	37.7	50.1
cobalt	7440-48-4	E475	0.020	mg/kg		----	7.94	21.0	----	----
cobalt	7440-48-4	E472	0.020	mg/kg		6.99	----	----	9.15	12.0
copper	7440-50-8	E475	0.20	mg/kg		----	24.1	27.1	----	----
copper	7440-50-8	E472	0.20	mg/kg		17.9	----	----	28.5	30.4
iron	7439-89-6	E475	5.0	mg/kg		----	12600	42400	----	----

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	EDC-D_PERT-4_ 2022-08	EDC-D_PERT-5_ 2022-08	EDC-D_PERT-6_ 2022-08	EDC-D_PERT-7_ 2022-08	EDC-D_PERT-8_ 2022-08
					Client sampling date / time	03-Aug-2022	03-Aug-2022	03-Aug-2022	03-Aug-2022	03-Aug-2022
						VA22B8779-036	VA22B8779-037	VA22B8779-038	VA22B8779-039	VA22B8779-040
						Result	Result	Result	Result	Result
Metals										
iron	7439-89-6	E472	5.0	mg/kg		15500	----	----	19200	25400
lead	7439-92-1	E475	0.050	mg/kg		----	2.84	9.34	----	----
lead	7439-92-1	E472	0.050	mg/kg		3.68	----	----	3.66	5.33
lithium	7439-93-2	E475	0.50	mg/kg		----	6.56	10.1	----	----
lithium	7439-93-2	E472	0.50	mg/kg		9.34	----	----	15.8	12.3
magnesium	7439-95-4	E475	2.0	mg/kg		----	4250	8000	----	----
magnesium	7439-95-4	E472	2.0	mg/kg		4300	----	----	5670	6000
manganese	7439-96-5	E475	0.050	mg/kg		----	2960	5970	----	----
manganese	7439-96-5	E472	0.050	mg/kg		1640	----	----	1710	2280
mercury	7439-97-6	E511	0.0050	mg/kg		0.0666	----	----	0.0433	0.0452
mercury	7439-97-6	E512	0.010	mg/kg		----	0.055	0.063	----	----
molybdenum	7439-98-7	E475	0.040	mg/kg		----	2.86	1.94	----	----
molybdenum	7439-98-7	E472	0.040	mg/kg		0.776	----	----	1.43	1.06
nickel	7440-02-0	E475	0.20	mg/kg		----	25.2	43.1	----	----
nickel	7440-02-0	E472	0.20	mg/kg		22.0	----	----	29.3	33.2
phosphorus	7723-14-0	E472	10	mg/kg		1030	----	----	1870	1400
phosphorus	7723-14-0	E475	20	mg/kg		----	2560	1950	----	----
potassium	7440-09-7	E475	20	mg/kg		----	5480	2720	----	----
potassium	7440-09-7	E472	20	mg/kg		2300	----	----	3650	2910
rubidium	7440-17-7	E475	0.050	mg/kg		----	10.9	11.7	----	----
rubidium	7440-17-7	E472	0.050	mg/kg		8.24	----	----	10.3	11.6
selenium	7782-49-2	E475	0.10	mg/kg		----	1.56	1.73	----	----
selenium	7782-49-2	E472	0.10	mg/kg		0.86	----	----	0.93	0.86
silver	7440-22-4	E475.Ag	0.0050	mg/kg		----	0.0504	0.0870	----	----
silver	7440-22-4	E472.Ag	0.0050	mg/kg		0.263	----	----	0.105	0.0824
sodium	7440-23-5	E475	20	mg/kg		----	274	403	----	----
sodium	7440-23-5	E472	20	mg/kg		240	----	----	381	505
strontium	7440-24-6	E475	0.10	mg/kg		----	111	189	----	----
strontium	7440-24-6	E472	0.10	mg/kg		50.9	----	----	70.4	77.7
tellurium	13494-80-9	E475	0.020	mg/kg		----	<0.032 DLA	<0.054 DLA	----	----

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	EDC-D_PERT-4_2022-08	EDC-D_PERT-5_2022-08	EDC-D_PERT-6_2022-08	EDC-D_PERT-7_2022-08	EDC-D_PERT-8_2022-08
					Client sampling date / time	03-Aug-2022	03-Aug-2022	03-Aug-2022	03-Aug-2022	03-Aug-2022
						VA22B8779-036	VA22B8779-037	VA22B8779-038	VA22B8779-039	VA22B8779-040
						Result	Result	Result	Result	Result
Metals										
tellurium	13494-80-9	E472	0.020	mg/kg		<0.035 DLA	----	----	<0.070 DLA	<0.052 DLA
thallium	7440-28-0	E475	0.0020	mg/kg		----	0.0626	0.109	----	----
thallium	7440-28-0	E472	0.0020	mg/kg		0.0596	----	----	0.100	0.108
tin	7440-31-5	E475	0.10	mg/kg		----	<0.16 DLA	0.32	----	----
tin	7440-31-5	E472	0.10	mg/kg		<0.18 DLA	----	----	<0.35 DLA	<0.26 DLA
titanium	7440-32-6	E475.Ti	0.50	mg/kg		----	252	1020	----	----
titanium	7440-32-6	E472.Ti	0.50	mg/kg		301	----	----	529	580
uranium	7440-61-1	E475	0.0020	mg/kg		----	0.382	0.860	----	----
uranium	7440-61-1	E472	0.0020	mg/kg		0.377	----	----	0.477	0.494
vanadium	7440-62-2	E475	0.10	mg/kg		----	23.9	91.5	----	----
vanadium	7440-62-2	E472	0.10	mg/kg		26.1	----	----	45.8	49.6
zinc	7440-66-6	E475	1.0	mg/kg		----	76.9	89.1	----	----
zinc	7440-66-6	E472	1.0	mg/kg		40.7	----	----	62.3	58.5
zirconium	7440-67-7	E475	0.20	mg/kg		----	2.00	16.2	----	----
zirconium	7440-67-7	E472	0.20	mg/kg		4.27	----	----	6.41	7.08

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	E1_PERT-1_2022-08	E1_PERT-2_2022-08	E1_PERT-3_2022-08	E1_PERT-4_2022-08	E1_PERT-5_2022-08
					Client sampling date / time	05-Aug-2022	05-Aug-2022	05-Aug-2022	04-Aug-2022	04-Aug-2022
						VA22B8779-041	VA22B8779-042	VA22B8779-043	VA22B8779-044	VA22B8779-045
						Result	Result	Result	Result	Result
Physical Tests										
moisture	----	E144A	2.0	%		92.1	89.8	----	93.6	----
moisture	----	E144-H	2.0	%		----	----	83.7	----	78.4
Metals										
aluminum	7429-90-5	E475	5.0	mg/kg		2860	2210	----	4160	----
aluminum	7429-90-5	E472	5.0	mg/kg		----	----	11100	----	12300
antimony	7440-36-0	E472	0.010	mg/kg		----	----	0.056	----	0.049
antimony	7440-36-0	E475	0.020	mg/kg		0.022	0.023	----	0.026	----
arsenic	7440-38-2	E472	0.030	mg/kg		----	----	12.8	----	11.4
arsenic	7440-38-2	E475	0.050	mg/kg		2.79	2.78	----	3.01	----
barium	7440-39-3	E475	0.050	mg/kg		31.3	24.1	----	190	----
barium	7440-39-3	E472	0.050	mg/kg		----	----	112	----	157
beryllium	7440-41-7	E475	0.010	mg/kg		0.078	0.065	----	0.162	----
beryllium	7440-41-7	E472	0.010	mg/kg		----	----	0.529	----	0.411
bismuth	7440-69-9	E475	0.010	mg/kg		0.023	0.017	----	0.015	----
bismuth	7440-69-9	E472	0.010	mg/kg		----	----	0.054	----	0.089
boron	7440-42-8	E475	1.0	mg/kg		5.8	6.6	----	6.9	----
boron	7440-42-8	E472	1.0	mg/kg		----	----	19.4	----	11.9
cadmium	7440-43-9	E475	0.010	mg/kg		0.073	0.098	----	0.081	----
cadmium	7440-43-9	E472	0.010	mg/kg		----	----	0.473	----	0.275
calcium	7440-70-2	E475	20	mg/kg		2110	1960	----	3910	----
calcium	7440-70-2	E472	20	mg/kg		----	----	13400	----	9300
cesium	7440-46-2	E475	0.0050	mg/kg		0.346	0.247	----	0.369	----
cesium	7440-46-2	E472	0.0050	mg/kg		----	----	1.16	----	1.36
chromium	7440-47-3	E475	0.20	mg/kg		30.9	40.1	----	9.94	----
chromium	7440-47-3	E472	0.20	mg/kg		----	----	416	----	32.0
cobalt	7440-48-4	E475	0.020	mg/kg		2.54	2.19	----	3.26	----
cobalt	7440-48-4	E472	0.020	mg/kg		----	----	12.2	----	11.7
copper	7440-50-8	E475	0.20	mg/kg		17.6	17.0	----	102	----
copper	7440-50-8	E472	0.20	mg/kg		----	----	49.6	----	214
iron	7439-89-6	E475	5.0	mg/kg		5880	4790	----	6840	----

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	E1_PERT-1_2022-08	E1_PERT-2_2022-08	E1_PERT-3_2022-08	E1_PERT-4_2022-08	E1_PERT-5_2022-08
					Client sampling date / time	05-Aug-2022	05-Aug-2022	05-Aug-2022	04-Aug-2022	04-Aug-2022
						VA22B8779-041	VA22B8779-042	VA22B8779-043	VA22B8779-044	VA22B8779-045
						Result	Result	Result	Result	Result
Metals										
iron	7439-89-6	E472	5.0	mg/kg		----	----	30300	----	25000
lead	7439-92-1	E475	0.050	mg/kg		1.33	1.01	----	1.41	----
lead	7439-92-1	E472	0.050	mg/kg		----	----	3.58	----	5.97
lithium	7439-93-2	E475	0.50	mg/kg		3.40	2.47	----	3.14	----
lithium	7439-93-2	E472	0.50	mg/kg		----	----	5.95	----	13.4
magnesium	7439-95-4	E475	2.0	mg/kg		1530	1280	----	2840	----
magnesium	7439-95-4	E472	2.0	mg/kg		----	----	4600	----	7020
manganese	7439-96-5	E475	0.050	mg/kg		284	296	----	264	----
manganese	7439-96-5	E472	0.050	mg/kg		----	----	1190	----	1200
mercury	7439-97-6	E511	0.0050	mg/kg		----	----	0.0377	----	0.0637
mercury	7439-97-6	E512	0.010	mg/kg		0.045	0.035	----	0.053	----
molybdenum	7439-98-7	E475	0.040	mg/kg		0.478	0.659	----	0.379	----
molybdenum	7439-98-7	E472	0.040	mg/kg		----	----	3.54	----	1.44
nickel	7440-02-0	E475	0.20	mg/kg		10.0	9.82	----	10.2	----
nickel	7440-02-0	E472	0.20	mg/kg		----	----	47.7	----	25.4
phosphorus	7723-14-0	E472	10	mg/kg		----	----	1770	----	1860
phosphorus	7723-14-0	E475	20	mg/kg		696	860	----	716	----
potassium	7440-09-7	E475	20	mg/kg		1300	1520	----	1200	----
potassium	7440-09-7	E472	20	mg/kg		----	----	3470	----	2420
rubidium	7440-17-7	E475	0.050	mg/kg		3.42	2.98	----	3.12	----
rubidium	7440-17-7	E472	0.050	mg/kg		----	----	8.10	----	10.4
selenium	7782-49-2	E475	0.10	mg/kg		0.27	0.41	----	0.30	----
selenium	7782-49-2	E472	0.10	mg/kg		----	----	1.08	----	0.94
silver	7440-22-4	E475.Ag	0.0050	mg/kg		0.0224	0.0193	----	0.0267	----
silver	7440-22-4	E472.Ag	0.0050	mg/kg		----	----	0.133	----	0.129
sodium	7440-23-5	E475	20	mg/kg		206	194	----	249	----
sodium	7440-23-5	E472	20	mg/kg		----	----	293	----	447
strontium	7440-24-6	E475	0.10	mg/kg		17.5	14.8	----	67.3	----
strontium	7440-24-6	E472	0.10	mg/kg		----	----	83.1	----	87.1
tellurium	13494-80-9	E475	0.020	mg/kg		<0.020	<0.020	----	<0.020	----

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	E1_PERT-1_2022-08	E1_PERT-2_2022-08	E1_PERT-3_2022-08	E1_PERT-4_2022-08	E1_PERT-5_2022-08
					Client sampling date / time	05-Aug-2022	05-Aug-2022	05-Aug-2022	04-Aug-2022	04-Aug-2022
						VA22B8779-041	VA22B8779-042	VA22B8779-043	VA22B8779-044	VA22B8779-045
						Result	Result	Result	Result	Result
Metals										
tellurium	13494-80-9	E472	0.020	mg/kg		----	----	0.021	----	0.032
thallium	7440-28-0	E475	0.0020	mg/kg		0.0265	0.0217	----	0.0191	----
thallium	7440-28-0	E472	0.0020	mg/kg		----	----	0.0737	----	0.0766
tin	7440-31-5	E475	0.10	mg/kg		<0.10	<0.10	----	0.12	----
tin	7440-31-5	E472	0.10	mg/kg		----	----	0.23	----	0.28
titanium	7440-32-6	E475.Ti	0.50	mg/kg		147	112	----	405	----
titanium	7440-32-6	E472.Ti	0.50	mg/kg		----	----	266	----	647
uranium	7440-61-1	E475	0.0020	mg/kg		0.134	0.120	----	0.130	----
uranium	7440-61-1	E472	0.0020	mg/kg		----	----	2.73	----	0.544
vanadium	7440-62-2	E475	0.10	mg/kg		12.0	11.1	----	20.9	----
vanadium	7440-62-2	E472	0.10	mg/kg		----	----	62.4	----	59.5
zinc	7440-66-6	E475	1.0	mg/kg		15.3	15.3	----	15.1	----
zinc	7440-66-6	E472	1.0	mg/kg		----	----	88.9	----	61.8
zirconium	7440-67-7	E475	0.20	mg/kg		1.64	1.36	----	3.25	----
zirconium	7440-67-7	E472	0.20	mg/kg		----	----	7.22	----	7.58

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	E1_PERT-6_2022-08	E1_PERT-7_2022-08	E1_PERT-8_2022-08	HAC-R1_INV-1_2022-08	HAC-R1_INV-2_2022-08
					Client sampling date / time	12-Aug-2022	12-Aug-2022	12-Aug-2022	10-Aug-2022	10-Aug-2022
						VA22B8779-046	VA22B8779-047	VA22B8779-048	VA22B8779-049	VA22B8779-050
						Result	Result	Result	Result	Result
Physical Tests										
moisture	----	E144-H	2.0	%		76.4	87.3	70.4	74.6	82.7
Metals										
aluminum	7429-90-5	E472	5.0	mg/kg		11600	6810	14000	1210	2160
antimony	7440-36-0	E472	0.010	mg/kg		0.096	0.085	0.096	0.038	0.055
arsenic	7440-38-2	E472	0.030	mg/kg		12.7	9.48	8.94	1.47	2.08
barium	7440-39-3	E472	0.050	mg/kg		291	103	725	24.5	36.2
beryllium	7440-41-7	E472	0.010	mg/kg		0.434	0.224	0.450	0.043	0.072
bismuth	7440-69-9	E472	0.010	mg/kg		0.084	0.051	0.085	<0.010	<0.010
boron	7440-42-8	E472	1.0	mg/kg		12.3	56.2	46.7	4.4	4.6
cadmium	7440-43-9	E472	0.010	mg/kg		0.284	0.248	0.363	0.225	0.278
calcium	7440-70-2	E472	20	mg/kg		11800	16800	16900	8370	9280
cesium	7440-46-2	E472	0.0050	mg/kg		1.12	0.808	0.957	0.121	0.174
chromium	7440-47-3	E472	0.20	mg/kg		34.3	23.2	20.4	2.54	3.76
cobalt	7440-48-4	E472	0.020	mg/kg		10.3	6.87	11.9	1.80	2.43
copper	7440-50-8	E472	0.20	mg/kg		293	147	823	89.4	102
iron	7439-89-6	E472	5.0	mg/kg		22800	15000	18200	2430	3520
lead	7439-92-1	E472	0.050	mg/kg		6.19	3.28	6.13	0.522	0.718
lithium	7439-93-2	E472	0.50	mg/kg		11.6	7.19	8.29	1.11	1.69
magnesium	7439-95-4	E472	2.0	mg/kg		6100	4800	6450	1450	2040
manganese	7439-96-5	E472	0.050	mg/kg		1150	1490	2500	842	875
mercury	7439-97-6	E511	0.0050	mg/kg		0.0580	0.0450	0.0578	0.0550	0.0540
molybdenum	7439-98-7	E472	0.040	mg/kg		1.30	1.72	1.88	3.36	4.05
nickel	7440-02-0	E472	0.20	mg/kg		24.2	16.8	16.6	3.10	4.39
phosphorus	7723-14-0	E472	10	mg/kg		1670	2930	2020	8380	8840
potassium	7440-09-7	E472	20	mg/kg		2430	6040	3690	9100	9400
rubidium	7440-17-7	E472	0.050	mg/kg		8.75	11.4	8.97	1.94	2.56
selenium	7782-49-2	E472	0.10	mg/kg		1.16	0.83	1.98	4.21	4.66
silver	7440-22-4	E472.Ag	0.0050	mg/kg		0.115	0.0709	0.149	0.0279	0.0336
sodium	7440-23-5	E472	20	mg/kg		372	351	430	4200	5420
strontium	7440-24-6	E472	0.10	mg/kg		200	87.7	292	24.5	41.2

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	E1_PERT-6_2022-08	E1_PERT-7_2022-08	E1_PERT-8_2022-08	HAC-R1_INV-1_2022-08	HAC-R1_INV-2_2022-08
					Client sampling date / time	12-Aug-2022	12-Aug-2022	12-Aug-2022	10-Aug-2022	10-Aug-2022
						VA22B8779-046	VA22B8779-047	VA22B8779-048	VA22B8779-049	VA22B8779-050
						Result	Result	Result	Result	Result
Metals										
tellurium	13494-80-9	E472	0.020	mg/kg		0.031	<0.020	0.033	<0.020	<0.020
thallium	7440-28-0	E472	0.0020	mg/kg		0.0692	0.0649	0.0554	0.0058	0.0091
tin	7440-31-5	E472	0.10	mg/kg		0.33	0.22	0.42	<0.10	<0.10
titanium	7440-32-6	E472.Ti	0.50	mg/kg		662	386	554	73.4	119
uranium	7440-61-1	E472	0.0020	mg/kg		0.552	0.386	0.449	0.109	0.188
vanadium	7440-62-2	E472	0.10	mg/kg		60.2	34.7	49.7	8.14	13.0
zinc	7440-66-6	E472	1.0	mg/kg		50.9	39.6	53.5	103	116
zirconium	7440-67-7	E472	0.20	mg/kg		7.31	4.68	6.10	0.92	1.37

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	HAC-R1_INV-3_ 2022-08	HAC-R1_INV-4_ 2022-08	HAC-R1_INV-5_ 2022-08	HAC-R1_INV-6_ 2022-08	HAC-R1_INV-7_ 2022-08
					Client sampling date / time	10-Aug-2022	10-Aug-2022	10-Aug-2022	10-Aug-2022	10-Aug-2022
						VA22B8779-051	VA22B8779-052	VA22B8779-053	VA22B8779-054	VA22B8779-055
						Result	Result	Result	Result	Result
Physical Tests										
moisture	----	E144-H	2.0	%		75.8	83.2	78.2	72.5	81.8
Metals										
aluminum	7429-90-5	E472	5.0	mg/kg		1060	1580	5370	4200	2360
antimony	7440-36-0	E472	0.010	mg/kg		0.059	0.052	0.057	0.064	0.047
arsenic	7440-38-2	E472	0.030	mg/kg		1.20	1.75	3.24	2.72	1.75
barium	7440-39-3	E472	0.050	mg/kg		28.3	32.8	31.0	58.3	103
beryllium	7440-41-7	E472	0.010	mg/kg		0.037	0.055	0.144	0.129	0.058
bismuth	7440-69-9	E472	0.010	mg/kg		<0.010	<0.010	<0.010	0.017	<0.010
boron	7440-42-8	E472	1.0	mg/kg		3.1	3.9	7.0	5.1	3.4
cadmium	7440-43-9	E472	0.010	mg/kg		0.381	0.460	0.362	0.411	0.935
calcium	7440-70-2	E472	20	mg/kg		4210	3450	15900	10700	4080
cesium	7440-46-2	E472	0.0050	mg/kg		0.0980	0.146	0.163	0.244	0.152
chromium	7440-47-3	E472	0.20	mg/kg		2.74	2.60	1.84	5.15	2.67
cobalt	7440-48-4	E472	0.020	mg/kg		1.55	2.13	2.88	3.77	2.09
copper	7440-50-8	E472	0.20	mg/kg		91.0	149	95.2	152	134
iron	7439-89-6	E472	5.0	mg/kg		2070	2970	4320	6240	3020
lead	7439-92-1	E472	0.050	mg/kg		0.434	0.606	0.564	0.933	0.693
lithium	7439-93-2	E472	0.50	mg/kg		0.97	1.42	2.43	3.26	1.31
magnesium	7439-95-4	E472	2.0	mg/kg		1700	1900	1890	3250	1800
manganese	7439-96-5	E472	0.050	mg/kg		603	938	890	1430	981
mercury	7439-97-6	E511	0.0050	mg/kg		0.0368	0.0703	0.0618	0.0701	0.0761
molybdenum	7439-98-7	E472	0.040	mg/kg		4.86	4.09	3.49	3.31	3.60
nickel	7440-02-0	E472	0.20	mg/kg		3.58	3.42	2.67	5.73	3.24
phosphorus	7723-14-0	E472	10	mg/kg		7200	7750	7070	7610	7980
potassium	7440-09-7	E472	20	mg/kg		7350	9400	7400	9000	8380
rubidium	7440-17-7	E472	0.050	mg/kg		2.23	2.45	2.36	3.14	3.09
selenium	7782-49-2	E472	0.10	mg/kg		7.30	5.14	4.25	4.12	4.91
silver	7440-22-4	E472.Ag	0.0050	mg/kg		0.0252	0.0392	0.0284	0.0443	0.0356
sodium	7440-23-5	E472	20	mg/kg		3010	5150	3120	4130	3420
strontium	7440-24-6	E472	0.10	mg/kg		18.9	20.6	39.0	36.6	39.7

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	HAC-R1_INV-3_ 2022-08	HAC-R1_INV-4_ 2022-08	HAC-R1_INV-5_ 2022-08	HAC-R1_INV-6_ 2022-08	HAC-R1_INV-7_ 2022-08
					Client sampling date / time	10-Aug-2022	10-Aug-2022	10-Aug-2022	10-Aug-2022	10-Aug-2022
						VA22B8779-051	VA22B8779-052	VA22B8779-053	VA22B8779-054	VA22B8779-055
						Result	Result	Result	Result	Result
Metals										
tellurium	13494-80-9	E472	0.020	mg/kg		<0.020	<0.020	<0.020	<0.020	<0.020
thallium	7440-28-0	E472	0.0020	mg/kg		0.0054	0.0109	0.0058	0.0088	0.0070
tin	7440-31-5	E472	0.10	mg/kg		<0.10	<0.10	0.11	0.12	<0.10
titanium	7440-32-6	E472.Ti	0.50	mg/kg		71.9	116	118	229	102
uranium	7440-61-1	E472	0.0020	mg/kg		0.102	0.154	0.171	0.193	0.128
vanadium	7440-62-2	E472	0.10	mg/kg		7.17	10.3	10.2	23.9	9.99
zinc	7440-66-6	E472	1.0	mg/kg		110	119	111	102	119
zirconium	7440-67-7	E472	0.20	mg/kg		0.76	1.13	1.70	1.91	1.11

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	HAC-R1_INV-8_2022-08	HAC-U_INV-1_2022-08	HAC-U_INV-2_2022-08	HAC-U_INV-3_2022-08	HAC-U_INV-4_2022-08
					Client sampling date / time	10-Aug-2022	06-Aug-2022	06-Aug-2022	06-Aug-2022	06-Aug-2022
						VA22B8779-056	VA22B8779-057	VA22B8779-058	VA22B8779-059	VA22B8779-060
						Result	Result	Result	Result	Result
Physical Tests										
moisture	----	E144-H	2.0	%		82.6	79.9	80.2	84.4	80.4
Metals										
aluminum	7429-90-5	E472	5.0	mg/kg		898	2180	496	1300	303
antimony	7440-36-0	E472	0.010	mg/kg		0.036	0.049	0.020	0.038	0.023
arsenic	7440-38-2	E472	0.030	mg/kg		2.08	3.75	3.12	3.68	2.05
barium	7440-39-3	E472	0.050	mg/kg		25.0	56.0	24.7	59.6	24.3
beryllium	7440-41-7	E472	0.010	mg/kg		0.029	0.086	0.017	0.050	0.011
bismuth	7440-69-9	E472	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	<0.010
boron	7440-42-8	E472	1.0	mg/kg		2.3	3.7	1.0	9.2	1.9
cadmium	7440-43-9	E472	0.010	mg/kg		1.97	0.458	0.995	0.594	0.305
calcium	7440-70-2	E472	20	mg/kg		6620	37400	51500	28300	11800
cesium	7440-46-2	E472	0.0050	mg/kg		0.0978	0.180	0.0701	0.137	0.0491
chromium	7440-47-3	E472	0.20	mg/kg		1.88	3.46	0.96	2.12	0.64
cobalt	7440-48-4	E472	0.020	mg/kg		1.68	2.16	1.32	2.34	0.593
copper	7440-50-8	E472	0.20	mg/kg		138	442	1180	926	133
iron	7439-89-6	E472	5.0	mg/kg		1820	3710	907	2300	710
lead	7439-92-1	E472	0.050	mg/kg		0.386	0.611	0.199	0.467	0.142
lithium	7439-93-2	E472	0.50	mg/kg		0.81	1.68	0.52	1.00	<0.50
magnesium	7439-95-4	E472	2.0	mg/kg		1740	2750	3050	2940	2800
manganese	7439-96-5	E472	0.050	mg/kg		828	1070	443	1310	801
mercury	7439-97-6	E511	0.0050	mg/kg		0.0844	0.0803	0.102	0.101	0.0854
molybdenum	7439-98-7	E472	0.040	mg/kg		2.52	2.54	1.35	1.83	4.03
nickel	7440-02-0	E472	0.20	mg/kg		2.52	3.74	2.63	4.53	0.93
phosphorus	7723-14-0	E472	10	mg/kg		10600	8890	10600	10200	8800
potassium	7440-09-7	E472	20	mg/kg		8350	4950	5080	4930	5710
rubidium	7440-17-7	E472	0.050	mg/kg		3.95	4.13	4.40	4.08	3.58
selenium	7782-49-2	E472	0.10	mg/kg		5.16	5.54	5.86	6.68	6.17
silver	7440-22-4	E472.Ag	0.0050	mg/kg		0.0332	0.159	0.379	0.471	0.0361
sodium	7440-23-5	E472	20	mg/kg		3620	2580	2950	2470	3880
strontium	7440-24-6	E472	0.10	mg/kg		25.8	90.9	104	93.7	49.1

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	HAC-R1_INV-8_2022-08	HAC-U_INV-1_2022-08	HAC-U_INV-2_2022-08	HAC-U_INV-3_2022-08	HAC-U_INV-4_2022-08
					Client sampling date / time	10-Aug-2022	06-Aug-2022	06-Aug-2022	06-Aug-2022	06-Aug-2022
						VA22B8779-056	VA22B8779-057	VA22B8779-058	VA22B8779-059	VA22B8779-060
						Result	Result	Result	Result	Result
Metals										
tellurium	13494-80-9	E472	0.020	mg/kg		<0.020	<0.020	<0.020	<0.020	<0.020
thallium	7440-28-0	E472	0.0020	mg/kg		0.0067	0.0148	0.0251	0.0230	0.0056
tin	7440-31-5	E472	0.10	mg/kg		<0.10	<0.10	<0.10	<0.10	<0.10
titanium	7440-32-6	E472.Ti	0.50	mg/kg		57.4	108	16.5	58.0	17.3
uranium	7440-61-1	E472	0.0020	mg/kg		0.0896	0.255	0.201	0.208	0.0407
vanadium	7440-62-2	E472	0.10	mg/kg		5.75	13.5	2.83	7.98	2.00
zinc	7440-66-6	E472	1.0	mg/kg		131	79.9	88.3	96.8	103
zirconium	7440-67-7	E472	0.20	mg/kg		0.62	0.24	<0.20	<0.20	0.23

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	HAC-U_INV-5_2022-08	HAC-U_INV-6_2022-08	HAC-U_INV-7_2022-08	HAC-U_INV-8_2022-08	HAC-D_INV-1_2022-08
					Client sampling date / time	05-Aug-2022	05-Aug-2022	06-Aug-2022	05-Aug-2022	05-Aug-2022
						VA22B8779-061	VA22B8779-062	VA22B8779-063	VA22B8779-064	VA22B8779-065
						Result	Result	Result	Result	Result
Physical Tests										
moisture	----	E144-H	2.0	%		85.5	76.9	79.4	85.3	69.9
Metals										
aluminum	7429-90-5	E472	5.0	mg/kg		373	700	2360	94.1	3070
antimony	7440-36-0	E472	0.010	mg/kg		0.022	0.026	0.048	0.032	0.082
arsenic	7440-38-2	E472	0.030	mg/kg		3.12	1.93	4.30	2.52	7.19
barium	7440-39-3	E472	0.050	mg/kg		35.7	19.0	75.1	40.4	43.8
beryllium	7440-41-7	E472	0.010	mg/kg		0.012	0.024	0.096	<0.010	0.124
bismuth	7440-69-9	E472	0.010	mg/kg		<0.010	<0.010	0.010	<0.010	0.023
boron	7440-42-8	E472	1.0	mg/kg		2.9	1.6	4.1	<1.0	3.3
cadmium	7440-43-9	E472	0.010	mg/kg		0.720	0.540	0.366	0.667	1.31
calcium	7440-70-2	E472	20	mg/kg		20400	7290	20100	28800	7350
cesium	7440-46-2	E472	0.0050	mg/kg		0.0713	0.0797	0.289	0.0337	0.362
chromium	7440-47-3	E472	0.20	mg/kg		1.06	1.19	3.81	0.35	6.21
cobalt	7440-48-4	E472	0.020	mg/kg		1.25	1.01	2.54	0.735	3.51
copper	7440-50-8	E472	0.20	mg/kg		403	394	393	127	104
iron	7439-89-6	E472	5.0	mg/kg		962	1400	4250	440	6910
lead	7439-92-1	E472	0.050	mg/kg		0.187	0.248	0.676	0.094	1.57
lithium	7439-93-2	E472	0.50	mg/kg		<0.50	0.56	1.85	<0.50	2.64
magnesium	7439-95-4	E472	2.0	mg/kg		3320	1570	3420	2590	2580
manganese	7439-96-5	E472	0.050	mg/kg		851	574	1230	1620	702
mercury	7439-97-6	E511	0.0050	mg/kg		0.107	0.0897	0.104	0.0755	0.0906
molybdenum	7439-98-7	E472	0.040	mg/kg		1.76	6.58	2.20	1.68	1.44
nickel	7440-02-0	E472	0.20	mg/kg		3.31	2.32	4.14	0.98	6.27
phosphorus	7723-14-0	E472	10	mg/kg		11500	6440	11800	11100	7010
potassium	7440-09-7	E472	20	mg/kg		6750	4990	7320	8770	6770
rubidium	7440-17-7	E472	0.050	mg/kg		4.97	3.14	4.59	4.53	4.08
selenium	7782-49-2	E472	0.10	mg/kg		6.06	9.03	6.78	8.01	6.69
silver	7440-22-4	E472.Ag	0.0050	mg/kg		0.0880	0.0674	0.248	0.0633	0.108
sodium	7440-23-5	E472	20	mg/kg		3770	2220	3210	4090	2440
strontium	7440-24-6	E472	0.10	mg/kg		80.5	27.1	83.7	73.6	47.8

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	HAC-U_INV-5_2022-08	HAC-U_INV-6_2022-08	HAC-U_INV-7_2022-08	HAC-U_INV-8_2022-08	HAC-D_INV-1_2022-08
					Client sampling date / time	05-Aug-2022	05-Aug-2022	06-Aug-2022	05-Aug-2022	05-Aug-2022
						VA22B8779-061	VA22B8779-062	VA22B8779-063	VA22B8779-064	VA22B8779-065
						Result	Result	Result	Result	Result
Metals										
tellurium	13494-80-9	E472	0.020	mg/kg		<0.020	<0.020	<0.020	<0.020	<0.020
thallium	7440-28-0	E472	0.0020	mg/kg		0.0070	0.0106	0.0142	0.0078	0.0507
tin	7440-31-5	E472	0.10	mg/kg		<0.10	<0.10	<0.10	<0.10	<0.10
titanium	7440-32-6	E472.Ti	0.50	mg/kg		20.4	44.1	114	4.43	135
uranium	7440-61-1	E472	0.0020	mg/kg		0.114	0.0843	0.200	0.0315	0.228
vanadium	7440-62-2	E472	0.10	mg/kg		2.50	4.74	14.7	1.33	19.2
zinc	7440-66-6	E472	1.0	mg/kg		99.8	101	84.8	68.7	152
zirconium	7440-67-7	E472	0.20	mg/kg		0.27	0.36	<0.20	<0.20	1.86

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	HAC-D_INV-2_2022-08	HAC-D_INV-3_2022-08	HAC-D_INV-4_2022-08	HAC-D_INV-5_2022-08	HAC-D_INV-6_2022-08
					Client sampling date / time	05-Aug-2022	05-Aug-2022	05-Aug-2022	05-Aug-2022	05-Aug-2022
						VA22B8779-066	VA22B8779-067	VA22B8779-068	VA22B8779-069	VA22B8779-070
						Result	Result	Result	Result	Result
Physical Tests										
moisture	----	E144-H	2.0	%		68.8	75.4	75.9	73.4	73.0
Metals										
aluminum	7429-90-5	E472	5.0	mg/kg		132	870	540	1240	286
antimony	7440-36-0	E472	0.010	mg/kg		0.023	0.029	0.028	0.035	0.018
arsenic	7440-38-2	E472	0.030	mg/kg		0.999	2.11	1.31	2.26	1.02
barium	7440-39-3	E472	0.050	mg/kg		20.2	22.6	25.3	53.4	19.7
beryllium	7440-41-7	E472	0.010	mg/kg		<0.010	0.029	0.022	0.064	0.011
bismuth	7440-69-9	E472	0.010	mg/kg		<0.010	0.011	<0.010	<0.010	<0.010
boron	7440-42-8	E472	1.0	mg/kg		<1.0	1.4	2.6	1.8	<1.0
cadmium	7440-43-9	E472	0.010	mg/kg		0.548	0.958	1.01	1.53	0.772
calcium	7440-70-2	E472	20	mg/kg		920	2360	2980	3570	1700
cesium	7440-46-2	E472	0.0050	mg/kg		0.0250	0.111	0.0879	0.121	0.0601
chromium	7440-47-3	E472	0.20	mg/kg		0.48	11.0	1.65	1.58	0.95
cobalt	7440-48-4	E472	0.020	mg/kg		1.24	1.70	1.14	1.65	0.809
copper	7440-50-8	E472	0.20	mg/kg		34.4	77.2	74.8	81.6	55.0
iron	7439-89-6	E472	5.0	mg/kg		283	1770	1110	1580	677
lead	7439-92-1	E472	0.050	mg/kg		0.141	0.611	0.332	1.49	0.196
lithium	7439-93-2	E472	0.50	mg/kg		<0.50	0.92	0.54	0.74	<0.50
magnesium	7439-95-4	E472	2.0	mg/kg		952	1590	1310	1540	1100
manganese	7439-96-5	E472	0.050	mg/kg		538	454	836	1230	820
mercury	7439-97-6	E511	0.0050	mg/kg		0.0664	0.0633	0.0829	0.0810	0.0646
molybdenum	7439-98-7	E472	0.040	mg/kg		4.22	1.66	1.41	1.66	2.23
nickel	7440-02-0	E472	0.20	mg/kg		0.93	87.8	1.75	6.03	1.51
phosphorus	7723-14-0	E472	10	mg/kg		6460	8470	8240	8630	7370
potassium	7440-09-7	E472	20	mg/kg		4500	6390	7050	7440	6130
rubidium	7440-17-7	E472	0.050	mg/kg		1.07	2.92	2.78	3.49	2.24
selenium	7782-49-2	E472	0.10	mg/kg		5.42	4.87	4.85	4.43	4.72
silver	7440-22-4	E472.Ag	0.0050	mg/kg		0.0091	0.0338	0.0271	0.0238	0.0230
sodium	7440-23-5	E472	20	mg/kg		2350	2930	3220	2940	3600
strontium	7440-24-6	E472	0.10	mg/kg		6.12	14.5	14.1	22.1	11.6

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	HAC-D_INV-2_2022-08	HAC-D_INV-3_2022-08	HAC-D_INV-4_2022-08	HAC-D_INV-5_2022-08	HAC-D_INV-6_2022-08
					Client sampling date / time	05-Aug-2022	05-Aug-2022	05-Aug-2022	05-Aug-2022	05-Aug-2022
						VA22B8779-066	VA22B8779-067	VA22B8779-068	VA22B8779-069	VA22B8779-070
						Result	Result	Result	Result	Result
Metals										
tellurium	13494-80-9	E472	0.020	mg/kg		<0.020	<0.020	<0.020	<0.020	<0.020
thallium	7440-28-0	E472	0.0020	mg/kg		0.0036	0.0115	0.0096	0.0122	0.0075
tin	7440-31-5	E472	0.10	mg/kg		<0.10	<0.10	<0.10	<0.10	<0.10
titanium	7440-32-6	E472.Ti	0.50	mg/kg		6.62	47.4	26.2	35.5	20.3
uranium	7440-61-1	E472	0.0020	mg/kg		0.0348	0.0808	0.0621	0.0838	0.0438
vanadium	7440-62-2	E472	0.10	mg/kg		0.77	5.40	2.77	4.70	2.14
zinc	7440-66-6	E472	1.0	mg/kg		177	125	126	135	106
zirconium	7440-67-7	E472	0.20	mg/kg		<0.20	0.51	0.46	0.40	0.25

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	HAC-D_INV-7_2022-08	HAC-D_INV-8_2022-08	EDC-U_INV-1_2022-08	EDC-U_INV-2_2022-08	EDC-U_INV-3_2022-08
					Client sampling date / time	05-Aug-2022	05-Aug-2022	08-Aug-2022	07-Aug-2022	07-Aug-2022
						VA22B8779-071	VA22B8779-072	VA22B8779-073	VA22B8779-074	VA22B8779-075
						Result	Result	Result	Result	Result
Physical Tests										
moisture	----	E144-H	2.0	%		79.6	79.7	82.1	82.2	81.7
Metals										
aluminum	7429-90-5	E472	5.0	mg/kg		541	1010	527	439	783
antimony	7440-36-0	E472	0.010	mg/kg		0.030	0.039	0.022	0.016	0.023
arsenic	7440-38-2	E472	0.030	mg/kg		2.10	1.82	1.08	0.704	1.51
barium	7440-39-3	E472	0.050	mg/kg		31.7	45.1	7.95	8.44	10.8
beryllium	7440-41-7	E472	0.010	mg/kg		0.021	0.036	0.015	0.012	0.026
bismuth	7440-69-9	E472	0.010	mg/kg		<0.010	0.010	<0.010	<0.010	<0.010
boron	7440-42-8	E472	1.0	mg/kg		4.0	2.4	<1.0	<1.0	<1.0
cadmium	7440-43-9	E472	0.010	mg/kg		2.31	0.744	1.16	0.811	1.70
calcium	7440-70-2	E472	20	mg/kg		4840	3380	1240	1440	1840
cesium	7440-46-2	E472	0.0050	mg/kg		0.0860	0.122	0.0404	0.0318	0.0518
chromium	7440-47-3	E472	0.20	mg/kg		2.29	1.90	2.80	2.22	2.71
cobalt	7440-48-4	E472	0.020	mg/kg		1.61	1.73	1.87	1.57	2.64
copper	7440-50-8	E472	0.20	mg/kg		81.5	75.2	24.3	22.1	25.4
iron	7439-89-6	E472	5.0	mg/kg		1270	2370	997	855	1820
lead	7439-92-1	E472	0.050	mg/kg		0.350	0.498	0.226	0.164	0.343
lithium	7439-93-2	E472	0.50	mg/kg		0.56	1.05	<0.50	<0.50	0.66
magnesium	7439-95-4	E472	2.0	mg/kg		1500	1610	1380	1210	1340
manganese	7439-96-5	E472	0.050	mg/kg		1390	1140	378	377	580
mercury	7439-97-6	E511	0.0050	mg/kg		0.0842	0.0739	0.0700	0.0559	0.102
molybdenum	7439-98-7	E472	0.040	mg/kg		1.79	2.24	25.6	5.22	3.16
nickel	7440-02-0	E472	0.20	mg/kg		2.23	2.92	1.92	1.50	2.55
phosphorus	7723-14-0	E472	10	mg/kg		9300	7150	8400	8670	7840
potassium	7440-09-7	E472	20	mg/kg		8210	6450	6790	7270	7200
rubidium	7440-17-7	E472	0.050	mg/kg		3.35	2.04	5.42	4.68	5.48
selenium	7782-49-2	E472	0.10	mg/kg		4.23	4.30	1.19	0.87	0.86
silver	7440-22-4	E472.Ag	0.0050	mg/kg		0.0296	0.0341	0.158	0.190	0.254
sodium	7440-23-5	E472	20	mg/kg		8240	5490	2850	3300	3200
strontium	7440-24-6	E472	0.10	mg/kg		19.2	18.4	7.40	8.53	10.6

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	HAC-D_INV-7_2022-08	HAC-D_INV-8_2022-08	EDC-U_INV-1_2022-08	EDC-U_INV-2_2022-08	EDC-U_INV-3_2022-08
					Client sampling date / time	05-Aug-2022	05-Aug-2022	08-Aug-2022	07-Aug-2022	07-Aug-2022
						VA22B8779-071	VA22B8779-072	VA22B8779-073	VA22B8779-074	VA22B8779-075
						Result	Result	Result	Result	Result
Metals										
tellurium	13494-80-9	E472	0.020	mg/kg		<0.020	<0.020	<0.020	<0.020	<0.020
thallium	7440-28-0	E472	0.0020	mg/kg		0.0120	0.0123	0.0104	0.0096	0.0118
tin	7440-31-5	E472	0.10	mg/kg		<0.10	<0.10	<0.10	<0.10	<0.10
titanium	7440-32-6	E472.Ti	0.50	mg/kg		34.4	65.7	30.5	22.6	34.3
uranium	7440-61-1	E472	0.0020	mg/kg		0.0721	0.0894	0.0558	0.0612	0.101
vanadium	7440-62-2	E472	0.10	mg/kg		3.94	7.38	2.37	1.96	4.24
zinc	7440-66-6	E472	1.0	mg/kg		142	124	190	158	166
zirconium	7440-67-7	E472	0.20	mg/kg		0.42	0.68	0.42	0.38	0.55

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	EDC-U_INV-4_2022-08	EDC-U_INV-5_2022-08	EDC-U_INV-6_2022-08	EDC-U_INV-7_2022-08	EDC-U_INV-8_2022-08
					Client sampling date / time	07-Aug-2022	07-Aug-2022	07-Aug-2022	07-Aug-2022	07-Aug-2022
						VA22B8779-076	VA22B8779-077	VA22B8779-078	VA22B8779-079	VA22B8779-080
						Result	Result	Result	Result	Result
Physical Tests										
moisture	----	E144-H	2.0	%		82.6	81.0	86.3	83.0	77.4
Metals										
aluminum	7429-90-5	E472	5.0	mg/kg		416	470	886	647	324
antimony	7440-36-0	E472	0.010	mg/kg		0.010	0.017	0.022	0.021	0.013
arsenic	7440-38-2	E472	0.030	mg/kg		0.873	0.888	1.22	1.23	0.619
barium	7440-39-3	E472	0.050	mg/kg		8.06	7.75	15.4	20.3	6.73
beryllium	7440-41-7	E472	0.010	mg/kg		0.012	0.013	0.027	0.031	<0.010
bismuth	7440-69-9	E472	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	<0.010
boron	7440-42-8	E472	1.0	mg/kg		<1.0	<1.0	<1.0	2.3	<1.0
cadmium	7440-43-9	E472	0.010	mg/kg		1.22	1.05	1.07	1.29	0.424
calcium	7440-70-2	E472	20	mg/kg		1420	1280	2030	1540	1010
cesium	7440-46-2	E472	0.0050	mg/kg		0.0303	0.0347	0.0636	0.0462	0.0254
chromium	7440-47-3	E472	0.20	mg/kg		1.48	1.80	3.15	2.64	1.45
cobalt	7440-48-4	E472	0.020	mg/kg		1.76	1.56	3.85	3.15	1.58
copper	7440-50-8	E472	0.20	mg/kg		23.5	21.3	30.1	24.0	17.6
iron	7439-89-6	E472	5.0	mg/kg		879	925	1860	1980	780
lead	7439-92-1	E472	0.050	mg/kg		0.160	0.178	0.352	0.401	0.166
lithium	7439-93-2	E472	0.50	mg/kg		<0.50	<0.50	0.68	0.50	<0.50
magnesium	7439-95-4	E472	2.0	mg/kg		1120	1380	1380	1390	1220
manganese	7439-96-5	E472	0.050	mg/kg		485	455	1580	1320	672
mercury	7439-97-6	E511	0.0050	mg/kg		0.0908	0.0665	0.127	0.0784	0.0593
molybdenum	7439-98-7	E472	0.040	mg/kg		2.26	4.37	0.624	0.874	4.51
nickel	7440-02-0	E472	0.20	mg/kg		1.52	1.44	2.94	2.47	1.15
phosphorus	7723-14-0	E472	10	mg/kg		8200	8140	8880	7910	8080
potassium	7440-09-7	E472	20	mg/kg		6910	6960	8500	8940	6110
rubidium	7440-17-7	E472	0.050	mg/kg		4.06	3.49	5.43	5.36	3.39
selenium	7782-49-2	E472	0.10	mg/kg		0.90	0.95	1.02	1.01	1.02
silver	7440-22-4	E472.Ag	0.0050	mg/kg		0.274	0.123	0.321	0.188	0.104
sodium	7440-23-5	E472	20	mg/kg		2930	3770	3690	3670	2740
strontium	7440-24-6	E472	0.10	mg/kg		7.78	8.05	12.0	11.2	8.72

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	EDC-U_INV-4_2022-08	EDC-U_INV-5_2022-08	EDC-U_INV-6_2022-08	EDC-U_INV-7_2022-08	EDC-U_INV-8_2022-08
					Client sampling date / time	07-Aug-2022	07-Aug-2022	07-Aug-2022	07-Aug-2022	07-Aug-2022
						VA22B8779-076	VA22B8779-077	VA22B8779-078	VA22B8779-079	VA22B8779-080
						Result	Result	Result	Result	Result
Metals										
tellurium	13494-80-9	E472	0.020	mg/kg		<0.020	<0.020	<0.020	<0.020	<0.020
thallium	7440-28-0	E472	0.0020	mg/kg		0.0095	0.0082	0.0157	0.0133	0.0068
tin	7440-31-5	E472	0.10	mg/kg		<0.10	<0.10	<0.10	<0.10	<0.10
titanium	7440-32-6	E472.Ti	0.50	mg/kg		18.8	19.9	37.6	52.0	15.2
uranium	7440-61-1	E472	0.0020	mg/kg		0.0619	0.0535	0.143	0.0897	0.0561
vanadium	7440-62-2	E472	0.10	mg/kg		1.85	1.90	3.67	4.61	1.71
zinc	7440-66-6	E472	1.0	mg/kg		176	153	240	219	131
zirconium	7440-67-7	E472	0.20	mg/kg		0.36	0.38	0.75	0.66	0.27

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	EDC-D_INV-1_2022-08	EDC-D_INV-2_2022-08	EDC-D_INV-3_2022-08	EDC-D_INV-4_2022-08	EDC-D_INV-5_2022-08
					Client sampling date / time	04-Aug-2022	04-Aug-2022	03-Aug-2022	03-Aug-2022	03-Aug-2022
						VA22B8779-081	VA22B8779-082	VA22B8779-083	VA22B8779-084	VA22B8779-085
						Result	Result	Result	Result	Result
Physical Tests										
moisture	----	E144-H	2.0	%		73.2	78.5	80.1	73.8	80.3
Metals										
aluminum	7429-90-5	E472	5.0	mg/kg		424	274	1180	221	658
antimony	7440-36-0	E472	0.010	mg/kg		0.020	0.018	0.039	0.011	0.021
arsenic	7440-38-2	E472	0.030	mg/kg		1.96	1.24	3.23	1.30	1.90
barium	7440-39-3	E472	0.050	mg/kg		8.50	9.84	25.9	5.28	24.3
beryllium	7440-41-7	E472	0.010	mg/kg		0.014	<0.010	0.037	<0.010	0.024
bismuth	7440-69-9	E472	0.010	mg/kg		<0.010	<0.010	0.015	<0.010	<0.010
boron	7440-42-8	E472	1.0	mg/kg		<1.0	<1.0	1.2	<1.0	<1.0
cadmium	7440-43-9	E472	0.010	mg/kg		0.946	0.878	2.69	0.595	1.06
calcium	7440-70-2	E472	20	mg/kg		1800	1480	2390	2570	1430
cesium	7440-46-2	E472	0.0050	mg/kg		0.0625	0.0439	0.170	0.0379	0.0892
chromium	7440-47-3	E472	0.20	mg/kg		2.02	1.60	3.77	1.04	2.36
cobalt	7440-48-4	E472	0.020	mg/kg		0.896	0.666	1.85	0.626	1.02
copper	7440-50-8	E472	0.20	mg/kg		38.0	29.6	39.4	38.8	30.8
iron	7439-89-6	E472	5.0	mg/kg		848	591	2260	460	1340
lead	7439-92-1	E472	0.050	mg/kg		0.198	0.170	0.596	0.106	0.341
lithium	7439-93-2	E472	0.50	mg/kg		<0.50	<0.50	1.16	<0.50	0.64
magnesium	7439-95-4	E472	2.0	mg/kg		1300	1640	1540	1900	1610
manganese	7439-96-5	E472	0.050	mg/kg		238	179	504	188	345
mercury	7439-97-6	E511	0.0050	mg/kg		0.120	0.103	0.110	0.0730	0.121
molybdenum	7439-98-7	E472	0.040	mg/kg		0.670	0.659	0.811	0.583	0.950
nickel	7440-02-0	E472	0.20	mg/kg		2.47	3.44	4.41	5.32	2.13
phosphorus	7723-14-0	E472	10	mg/kg		7140	8510	7770	9310	8800
potassium	7440-09-7	E472	20	mg/kg		7040	8000	6720	7080	8830
rubidium	7440-17-7	E472	0.050	mg/kg		2.88	3.49	5.23	2.74	3.49
selenium	7782-49-2	E472	0.10	mg/kg		1.76	1.80	1.98	1.65	2.03
silver	7440-22-4	E472.Ag	0.0050	mg/kg		0.164	0.122	0.173	0.184	0.142
sodium	7440-23-5	E472	20	mg/kg		3190	4000	3090	3470	3670
strontium	7440-24-6	E472	0.10	mg/kg		9.63	8.80	14.0	10.3	7.69

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	EDC-D_INV-1_2022-08	EDC-D_INV-2_2022-08	EDC-D_INV-3_2022-08	EDC-D_INV-4_2022-08	EDC-D_INV-5_2022-08
					Client sampling date / time	04-Aug-2022	04-Aug-2022	03-Aug-2022	03-Aug-2022	03-Aug-2022
						VA22B8779-081	VA22B8779-082	VA22B8779-083	VA22B8779-084	VA22B8779-085
						Result	Result	Result	Result	Result
Metals										
tellurium	13494-80-9	E472	0.020	mg/kg		<0.020	<0.020	<0.020	<0.020	<0.020
thallium	7440-28-0	E472	0.0020	mg/kg		0.0143	0.0096	0.0260	0.0072	0.0155
tin	7440-31-5	E472	0.10	mg/kg		<0.10	<0.10	<0.10	<0.10	<0.10
titanium	7440-32-6	E472.Ti	0.50	mg/kg		18.2	11.2	50.6	9.28	27.7
uranium	7440-61-1	E472	0.0020	mg/kg		0.0448	0.0296	0.0908	0.0264	0.0598
vanadium	7440-62-2	E472	0.10	mg/kg		1.52	1.04	4.32	0.92	2.61
zinc	7440-66-6	E472	1.0	mg/kg		119	291	172	129	149
zirconium	7440-67-7	E472	0.20	mg/kg		0.64	0.21	0.79	<0.20	0.46

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	EDC-D_INV-6_2022-08	EDC-D_INV-7_2022-08	EDC-D_INV-8_2022-08	E1_INV-1_2022-08	E2_INV-2_2022-08
					Client sampling date / time	03-Aug-2022	03-Aug-2022	03-Aug-2022	05-Aug-2022	05-Aug-2022
						VA22B8779-086	VA22B8779-087	VA22B8779-088	VA22B8779-089	VA22B8779-090
						Result	Result	Result	Result	Result
Physical Tests										
moisture	----	E144-H	2.0	%		79.0	80.1	80.9	79.5	84.4
Metals										
aluminum	7429-90-5	E472	5.0	mg/kg		2140	880	396	1000	1360
antimony	7440-36-0	E472	0.010	mg/kg		0.033	0.029	0.021	0.023	0.039
arsenic	7440-38-2	E472	0.030	mg/kg		2.32	2.44	1.29	2.34	2.02
barium	7440-39-3	E472	0.050	mg/kg		25.6	29.1	13.6	10.9	15.8
beryllium	7440-41-7	E472	0.010	mg/kg		0.045	0.029	0.012	0.026	0.044
bismuth	7440-69-9	E472	0.010	mg/kg		0.010	<0.010	0.076	<0.010	0.011
boron	7440-42-8	E472	1.0	mg/kg		2.0	1.8	<1.0	1.6	1.0
cadmium	7440-43-9	E472	0.010	mg/kg		0.522	1.16	0.717	1.08	2.35
calcium	7440-70-2	E472	20	mg/kg		3130	1500	1440	2040	2170
cesium	7440-46-2	E472	0.0050	mg/kg		0.0911	0.116	0.0520	0.0966	0.141
chromium	7440-47-3	E472	0.20	mg/kg		2.26	2.89	1.76	3.84	3.51
cobalt	7440-48-4	E472	0.020	mg/kg		1.32	1.41	0.732	1.69	2.17
copper	7440-50-8	E472	0.20	mg/kg		33.8	32.1	26.6	35.0	27.6
iron	7439-89-6	E472	5.0	mg/kg		2830	1720	896	1760	2860
lead	7439-92-1	E472	0.050	mg/kg		0.666	0.443	0.312	0.373	0.709
lithium	7439-93-2	E472	0.50	mg/kg		0.98	0.83	<0.50	0.93	1.45
magnesium	7439-95-4	E472	2.0	mg/kg		1820	1500	1340	1830	2170
manganese	7439-96-5	E472	0.050	mg/kg		370	421	210	378	209
mercury	7439-97-6	E511	0.0050	mg/kg		0.121	0.121	0.114	0.0537	0.0758
molybdenum	7439-98-7	E472	0.040	mg/kg		0.791	1.02	0.613	0.491	0.606
nickel	7440-02-0	E472	0.20	mg/kg		3.85	2.59	6.67	6.21	10.5
phosphorus	7723-14-0	E472	10	mg/kg		8010	8880	8960	9460	9510
potassium	7440-09-7	E472	20	mg/kg		8910	9750	8600	9130	8540
rubidium	7440-17-7	E472	0.050	mg/kg		1.90	3.93	2.44	5.41	4.92
selenium	7782-49-2	E472	0.10	mg/kg		1.71	2.12	1.52	1.20	1.98
silver	7440-22-4	E472.Ag	0.0050	mg/kg		0.151	0.153	0.134	0.104	0.158
sodium	7440-23-5	E472	20	mg/kg		3930	4110	4050	5690	12900
strontium	7440-24-6	E472	0.10	mg/kg		16.5	9.36	12.0	12.6	11.8

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	EDC-D_INV-6_2022-08	EDC-D_INV-7_2022-08	EDC-D_INV-8_2022-08	E1_INV-1_2022-08	E2_INV-2_2022-08
					Client sampling date / time	03-Aug-2022	03-Aug-2022	03-Aug-2022	05-Aug-2022	05-Aug-2022
						VA22B8779-086	VA22B8779-087	VA22B8779-088	VA22B8779-089	VA22B8779-090
						Result	Result	Result	Result	Result
Metals										
tellurium	13494-80-9	E472	0.020	mg/kg		<0.020	<0.020	<0.020	<0.020	<0.020
thallium	7440-28-0	E472	0.0020	mg/kg		0.0135	0.0166	0.0097	0.0176	0.0247
tin	7440-31-5	E472	0.10	mg/kg		<0.10	<0.10	<0.10	<0.10	<0.10
titanium	7440-32-6	E472.Ti	0.50	mg/kg		27.7	36.0	15.2	45.8	59.4
uranium	7440-61-1	E472	0.0020	mg/kg		0.0846	0.0856	0.0389	0.0601	0.114
vanadium	7440-62-2	E472	0.10	mg/kg		8.64	3.44	1.47	4.04	7.49
zinc	7440-66-6	E472	1.0	mg/kg		148	129	155	112	137
zirconium	7440-67-7	E472	0.20	mg/kg		0.76	0.61	0.28	0.60	0.80

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	E3_INV-3_2022-08	E4_INV-4_2022-08	E5_INV-5_2022-08	E6_INV-6_2022-08	E7_INV-7_2022-08
					Client sampling date / time	05-Aug-2022	04-Aug-2022	04-Aug-2022	04-Aug-2022	04-Aug-2022
						VA22B8779-091	VA22B8779-092	VA22B8779-093	VA22B8779-094	VA22B8779-095
						Result	Result	Result	Result	Result
Physical Tests										
moisture	----	E144-H	2.0	%		84.8	75.0	84.3	82.4	77.4
Metals										
aluminum	7429-90-5	E472	5.0	mg/kg		360	271	1730	1380	356
antimony	7440-36-0	E472	0.010	mg/kg		0.014	0.011	0.044	0.030	0.016
arsenic	7440-38-2	E472	0.030	mg/kg		1.12	1.13	3.03	2.52	1.44
barium	7440-39-3	E472	0.050	mg/kg		5.34	5.53	87.6	57.9	11.7
beryllium	7440-41-7	E472	0.010	mg/kg		0.012	<0.010	0.059	0.050	0.012
bismuth	7440-69-9	E472	0.010	mg/kg		<0.010	<0.010	0.014	0.010	<0.010
boron	7440-42-8	E472	1.0	mg/kg		<1.0	<1.0	1.7	1.5	<1.0
cadmium	7440-43-9	E472	0.010	mg/kg		0.996	0.793	2.22	1.58	0.786
calcium	7440-70-2	E472	20	mg/kg		1600	1470	2350	2110	1050
cesium	7440-46-2	E472	0.0050	mg/kg		0.0434	0.0433	0.210	0.117	0.0440
chromium	7440-47-3	E472	0.20	mg/kg		0.77	1.04	5.06	5.41	1.14
cobalt	7440-48-4	E472	0.020	mg/kg		0.910	1.04	3.03	2.27	1.01
copper	7440-50-8	E472	0.20	mg/kg		22.8	56.2	77.4	74.5	34.8
iron	7439-89-6	E472	5.0	mg/kg		618	537	3610	2540	671
lead	7439-92-1	E472	0.050	mg/kg		0.139	0.135	0.881	0.751	0.190
lithium	7439-93-2	E472	0.50	mg/kg		<0.50	<0.50	1.60	1.26	<0.50
magnesium	7439-95-4	E472	2.0	mg/kg		1570	1830	2420	2310	1480
manganese	7439-96-5	E472	0.050	mg/kg		101	125	597	407	206
mercury	7439-97-6	E511	0.0050	mg/kg		0.0463	0.0545	0.0780	0.102	0.0642
molybdenum	7439-98-7	E472	0.040	mg/kg		0.262	0.325	0.815	1.05	2.52
nickel	7440-02-0	E472	0.20	mg/kg		20.1	1.64	3.18	5.61	6.54
phosphorus	7723-14-0	E472	10	mg/kg		9860	9640	9580	9980	8080
potassium	7440-09-7	E472	20	mg/kg		9570	9240	11100	12200	7720
rubidium	7440-17-7	E472	0.050	mg/kg		4.69	4.61	5.52	4.38	3.18
selenium	7782-49-2	E472	0.10	mg/kg		2.18	1.71	1.91	2.20	1.74
silver	7440-22-4	E472.Ag	0.0050	mg/kg		0.0558	0.0907	0.108	0.185	0.0362
sodium	7440-23-5	E472	20	mg/kg		11400	4260	9590	9570	3110
strontium	7440-24-6	E472	0.10	mg/kg		5.54	6.83	13.3	13.8	5.93

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	E3_INV-3_2022-08	E4_INV-4_2022-08	E5_INV-5_2022-08	E6_INV-6_2022-08	E7_INV-7_2022-08
					Client sampling date / time	05-Aug-2022	04-Aug-2022	04-Aug-2022	04-Aug-2022	04-Aug-2022
						VA22B8779-091	VA22B8779-092	VA22B8779-093	VA22B8779-094	VA22B8779-095
						Result	Result	Result	Result	Result
Metals										
tellurium	13494-80-9	E472	0.020	mg/kg		<0.020	<0.020	<0.020	<0.020	<0.020
thallium	7440-28-0	E472	0.0020	mg/kg		0.0135	0.0089	0.0240	0.0193	0.0063
tin	7440-31-5	E472	0.10	mg/kg		<0.10	0.13	<0.10	<0.10	<0.10
titanium	7440-32-6	E472.Ti	0.50	mg/kg		28.3	14.4	105	77.0	17.8
uranium	7440-61-1	E472	0.0020	mg/kg		0.0268	0.0251	0.157	0.130	0.0321
vanadium	7440-62-2	E472	0.10	mg/kg		1.73	1.32	9.79	6.75	1.46
zinc	7440-66-6	E472	1.0	mg/kg		106	124	143	128	106
zirconium	7440-67-7	E472	0.20	mg/kg		0.30	<0.20	1.34	1.12	0.28

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	E8_INV-8_2022-08	HAC-R1_INVCAD-1_2022-08	HAC-R1_INVCAD-2_2022-08	HAC-R1_INVCAD-3_2022-08	HAC-R1_INVCAD-4_2022-08
					Client sampling date / time	04-Aug-2022	10-Aug-2022	10-Aug-2022	10-Aug-2022	10-Aug-2022
						VA22B8779-096	VA22B8779-097	VA22B8779-098	VA22B8779-099	VA22B8779-100
						Result	Result	Result	Result	Result
Physical Tests										
moisture	----	E144-H	2.0	%		79.5	68.2	78.3	73.1	68.8
Metals										
aluminum	7429-90-5	E472	5.0	mg/kg		2280	18.0	34.3	80.8	14.7
antimony	7440-36-0	E472	0.010	mg/kg		0.046	0.014	0.016	0.018	0.014
arsenic	7440-38-2	E472	0.030	mg/kg		4.72	0.220	0.192	0.361	0.279
barium	7440-39-3	E472	0.050	mg/kg		37.7	1.55	1.19	2.45	1.07
beryllium	7440-41-7	E472	0.010	mg/kg		0.068	<0.010	<0.010	<0.010	<0.010
bismuth	7440-69-9	E472	0.010	mg/kg		0.016	<0.010	<0.010	<0.010	<0.010
boron	7440-42-8	E472	1.0	mg/kg		1.9	<1.0	<1.0	<1.0	<1.0
cadmium	7440-43-9	E472	0.010	mg/kg		3.56	<0.010	<0.010	0.021	<0.010
calcium	7440-70-2	E472	20	mg/kg		4990	497	512	568	397
cesium	7440-46-2	E472	0.0050	mg/kg		0.242	<0.0050	0.0065	0.0088	<0.0050
chromium	7440-47-3	E472	0.20	mg/kg		4.74	<0.20	<0.20	0.23	<0.20
cobalt	7440-48-4	E472	0.020	mg/kg		4.00	0.063	0.064	0.157	0.063
copper	7440-50-8	E472	0.20	mg/kg		128	11.5	14.8	16.3	11.1
iron	7439-89-6	E472	5.0	mg/kg		4220	95.0	127	191	85.0
lead	7439-92-1	E472	0.050	mg/kg		0.911	<0.050	<0.050	0.204	<0.050
lithium	7439-93-2	E472	0.50	mg/kg		2.04	<0.50	<0.50	<0.50	<0.50
magnesium	7439-95-4	E472	2.0	mg/kg		2470	987	1470	1040	894
manganese	7439-96-5	E472	0.050	mg/kg		600	99.4	58.5	235	67.6
mercury	7439-97-6	E511	0.0050	mg/kg		0.127	0.0471	0.0603	0.0446	0.0444
molybdenum	7439-98-7	E472	0.040	mg/kg		0.895	3.87	2.63	5.09	6.85
nickel	7440-02-0	E472	0.20	mg/kg		4.82	<0.20	<0.20	0.29	<0.20
phosphorus	7723-14-0	E472	10	mg/kg		9210	7180	8460	6860	6660
potassium	7440-09-7	E472	20	mg/kg		9460	5670	7880	6290	5670
rubidium	7440-17-7	E472	0.050	mg/kg		8.15	0.707	0.983	1.06	0.716
selenium	7782-49-2	E472	0.10	mg/kg		2.55	4.50	5.29	5.46	6.93
silver	7440-22-4	E472.Ag	0.0050	mg/kg		0.0778	<0.0050	<0.0050	<0.0050	<0.0050
sodium	7440-23-5	E472	20	mg/kg		3680	2320	3200	2180	1960
strontium	7440-24-6	E472	0.10	mg/kg		19.0	3.50	3.32	3.63	2.37

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	E8_INV-8_2022-08	HAC-R1_INVCAD-1_2022-08	HAC-R1_INVCAD-2_2022-08	HAC-R1_INVCAD-3_2022-08	HAC-R1_INVCAD-4_2022-08
					Client sampling date / time	04-Aug-2022	10-Aug-2022	10-Aug-2022	10-Aug-2022	10-Aug-2022
						VA22B8779-096	VA22B8779-097	VA22B8779-098	VA22B8779-099	VA22B8779-100
						Result	Result	Result	Result	Result
Metals										
tellurium	13494-80-9	E472	0.020	mg/kg		<0.020	<0.020	<0.020	<0.020	<0.020
thallium	7440-28-0	E472	0.0020	mg/kg		0.0266	<0.0020	<0.0020	<0.0020	<0.0020
tin	7440-31-5	E472	0.10	mg/kg		<0.10	<0.10	<0.10	<0.10	<0.10
titanium	7440-32-6	E472.Ti	0.50	mg/kg		119	1.22	2.10	5.45	1.37
uranium	7440-61-1	E472	0.0020	mg/kg		0.160	<0.0020	0.0024	0.0077	<0.0020
vanadium	7440-62-2	E472	0.10	mg/kg		11.4	0.12	0.15	0.50	0.15
zinc	7440-66-6	E472	1.0	mg/kg		121	63.4	62.0	101	76.8
zirconium	7440-67-7	E472	0.20	mg/kg		1.43	<0.20	<0.20	<0.20	<0.20

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	HAC-R1_INVCAD-5_2022-08	HAC-R1_INVCAD-6_2022-08	HAC-R1_INVCAD-7_2022-08	HAC-R1_INVCAD-8_2022-08	HAC-U_INVCAD-1_2022-08
					Client sampling date / time	10-Aug-2022	10-Aug-2022	10-Aug-2022	10-Aug-2022	06-Aug-2022
						VA22B8779-101	VA22B8779-102	VA22B8779-103	VA22B8779-104	VA22B8779-105
						Result	Result	Result	Result	Result
Physical Tests										
moisture	----	E144-H	2.0	%		67.6	73.2	71.0	73.6	74.7
Metals										
aluminum	7429-90-5	E472	5.0	mg/kg		126	69.1	64.4	56.3	172
antimony	7440-36-0	E472	0.010	mg/kg		0.022	0.021	0.021	0.026	0.024
arsenic	7440-38-2	E472	0.030	mg/kg		0.389	0.334	0.317	0.338	0.493
barium	7440-39-3	E472	0.050	mg/kg		7.10	4.57	2.49	5.84	11.0
beryllium	7440-41-7	E472	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	<0.010
bismuth	7440-69-9	E472	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	<0.010
boron	7440-42-8	E472	1.0	mg/kg		<1.0	<1.0	<1.0	<1.0	1.6
cadmium	7440-43-9	E472	0.010	mg/kg		0.125	0.039	0.035	0.043	0.094
calcium	7440-70-2	E472	20	mg/kg		850	803	664	701	1740
cesium	7440-46-2	E472	0.0050	mg/kg		0.0140	0.0096	0.0082	0.0078	0.0226
chromium	7440-47-3	E472	0.20	mg/kg		0.53	0.21	0.40	0.25	1.10
cobalt	7440-48-4	E472	0.020	mg/kg		0.277	0.121	0.140	0.269	0.324
copper	7440-50-8	E472	0.20	mg/kg		23.6	16.6	14.3	16.4	23.4
iron	7439-89-6	E472	5.0	mg/kg		286	179	175	177	353
lead	7439-92-1	E472	0.050	mg/kg		0.076	<0.050	0.056	<0.050	0.110
lithium	7439-93-2	E472	0.50	mg/kg		<0.50	<0.50	<0.50	<0.50	<0.50
magnesium	7439-95-4	E472	2.0	mg/kg		876	1060	999	1020	1220
manganese	7439-96-5	E472	0.050	mg/kg		266	130	151	368	516
mercury	7439-97-6	E511	0.0050	mg/kg		0.0410	0.0325	0.0329	0.0429	0.0380
molybdenum	7439-98-7	E472	0.040	mg/kg		9.55	9.88	8.77	5.49	11.1
nickel	7440-02-0	E472	0.20	mg/kg		0.82	<0.20	0.27	0.23	0.77
phosphorus	7723-14-0	E472	10	mg/kg		6940	6800	6450	6540	7980
potassium	7440-09-7	E472	20	mg/kg		6920	6370	6130	5850	6560
rubidium	7440-17-7	E472	0.050	mg/kg		1.26	1.20	1.01	1.14	1.43
selenium	7782-49-2	E472	0.10	mg/kg		10.4	7.69	7.87	5.35	10.1
silver	7440-22-4	E472.Ag	0.0050	mg/kg		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
sodium	7440-23-5	E472	20	mg/kg		2180	2440	2400	2440	2570
strontium	7440-24-6	E472	0.10	mg/kg		5.24	5.59	3.95	4.80	13.3

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	HAC-R1_INVCAD-5_2022-08	HAC-R1_INVCAD-6_2022-08	HAC-R1_INVCAD-7_2022-08	HAC-R1_INVCAD-8_2022-08	HAC-U_INVCAD-1_2022-08
					Client sampling date / time	10-Aug-2022	10-Aug-2022	10-Aug-2022	10-Aug-2022	06-Aug-2022
						VA22B8779-101	VA22B8779-102	VA22B8779-103	VA22B8779-104	VA22B8779-105
						Result	Result	Result	Result	Result
Metals										
tellurium	13494-80-9	E472	0.020	mg/kg		<0.020	<0.020	<0.020	<0.020	<0.020
thallium	7440-28-0	E472	0.0020	mg/kg		<0.0020	<0.0020	<0.0020	<0.0020	0.0021
tin	7440-31-5	E472	0.10	mg/kg		<0.10	<0.10	<0.10	<0.10	<0.10
titanium	7440-32-6	E472.Ti	0.50	mg/kg		7.56	4.24	3.56	3.54	9.92
uranium	7440-61-1	E472	0.0020	mg/kg		0.0152	0.0070	0.0065	0.0116	0.0266
vanadium	7440-62-2	E472	0.10	mg/kg		0.75	0.47	0.40	0.42	0.93
zinc	7440-66-6	E472	1.0	mg/kg		119	83.6	87.0	99.3	104
zirconium	7440-67-7	E472	0.20	mg/kg		<0.20	<0.20	<0.20	<0.20	<0.20

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	HAC-U_INVCAD-2_2022-08	HAC-U_INVCAD-3_2022-08	HAC-U_INVCAD-4_2022-08	HAC-U_INVCAD-5_2022-08	HAC-U_INVCAD-6_2022-08
					Client sampling date / time	06-Aug-2022	06-Aug-2022	06-Aug-2022	05-Aug-2022	05-Aug-2022
						VA22B8779-106	VA22B8779-107	VA22B8779-108	VA22B8779-109	VA22B8779-110
						Result	Result	Result	Result	Result
Physical Tests										
moisture	----	E144-H	2.0	%		74.9	72.0	74.7	71.6	76.4
Metals										
aluminum	7429-90-5	E472	5.0	mg/kg		245	65.0	67.4	138	62.8
antimony	7440-36-0	E472	0.010	mg/kg		0.019	0.014	0.015	0.016	0.021
arsenic	7440-38-2	E472	0.030	mg/kg		0.494	0.348	0.443	0.383	0.447
barium	7440-39-3	E472	0.050	mg/kg		5.29	3.26	3.60	4.62	4.32
beryllium	7440-41-7	E472	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	<0.010
bismuth	7440-69-9	E472	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	<0.010
boron	7440-42-8	E472	1.0	mg/kg		<1.0	<1.0	<1.0	<1.0	<1.0
cadmium	7440-43-9	E472	0.010	mg/kg		0.049	0.029	0.073	0.058	0.110
calcium	7440-70-2	E472	20	mg/kg		1620	1000	804	1160	1170
cesium	7440-46-2	E472	0.0050	mg/kg		0.0138	0.0084	0.0108	0.0124	0.0107
chromium	7440-47-3	E472	0.20	mg/kg		0.46	0.27	0.26	0.26	0.21
cobalt	7440-48-4	E472	0.020	mg/kg		0.221	0.092	0.166	0.182	0.242
copper	7440-50-8	E472	0.20	mg/kg		20.0	18.0	21.0	17.1	23.1
iron	7439-89-6	E472	5.0	mg/kg		507	163	178	215	173
lead	7439-92-1	E472	0.050	mg/kg		0.094	<0.050	<0.050	0.079	0.054
lithium	7439-93-2	E472	0.50	mg/kg		<0.50	<0.50	<0.50	<0.50	<0.50
magnesium	7439-95-4	E472	2.0	mg/kg		1170	1000	1220	1060	1100
manganese	7439-96-5	E472	0.050	mg/kg		246	158	292	297	329
mercury	7439-97-6	E511	0.0050	mg/kg		0.0233	0.0303	0.0456	0.0433	0.0424
molybdenum	7439-98-7	E472	0.040	mg/kg		12.4	9.71	9.67	9.20	8.68
nickel	7440-02-0	E472	0.20	mg/kg		0.37	0.21	0.27	0.26	0.33
phosphorus	7723-14-0	E472	10	mg/kg		7660	7440	7670	6780	7190
potassium	7440-09-7	E472	20	mg/kg		6160	6040	7120	6180	6700
rubidium	7440-17-7	E472	0.050	mg/kg		1.12	1.02	1.22	1.24	1.34
selenium	7782-49-2	E472	0.10	mg/kg		17.8	12.4	15.4	13.1	12.0
silver	7440-22-4	E472.Ag	0.0050	mg/kg		0.0051	<0.0050	<0.0050	<0.0050	<0.0050
sodium	7440-23-5	E472	20	mg/kg		2580	2480	2810	2240	2330
strontium	7440-24-6	E472	0.10	mg/kg		12.5	6.87	5.60	5.99	6.45

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	HAC-U_INVCAD-2_2022-08	HAC-U_INVCAD-3_2022-08	HAC-U_INVCAD-4_2022-08	HAC-U_INVCAD-5_2022-08	HAC-U_INVCAD-6_2022-08
					Client sampling date / time	06-Aug-2022	06-Aug-2022	06-Aug-2022	05-Aug-2022	05-Aug-2022
						VA22B8779-106	VA22B8779-107	VA22B8779-108	VA22B8779-109	VA22B8779-110
						Result	Result	Result	Result	Result
Metals										
tellurium	13494-80-9	E472	0.020	mg/kg		<0.020	<0.020	<0.020	<0.020	<0.020
thallium	7440-28-0	E472	0.0020	mg/kg		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
tin	7440-31-5	E472	0.10	mg/kg		<0.10	<0.10	<0.10	<0.10	<0.10
titanium	7440-32-6	E472.Ti	0.50	mg/kg		27.2	5.09	4.08	5.22	3.33
uranium	7440-61-1	E472	0.0020	mg/kg		0.0244	0.0081	0.0137	0.0160	0.0258
vanadium	7440-62-2	E472	0.10	mg/kg		1.87	0.44	0.48	0.68	0.52
zinc	7440-66-6	E472	1.0	mg/kg		76.0	71.2	82.1	88.3	88.3
zirconium	7440-67-7	E472	0.20	mg/kg		<0.20	<0.20	<0.20	<0.20	<0.20

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	HAC-U_INVCAD-7_2022-08	HAC-U_INVCAD-8_2022-08	HAC-D_INVCAD-1_2022-08	HAC-D_INVCAD-2_2022-08	HAC-D_INVCAD-3_2022-08
					Client sampling date / time	06-Aug-2022	05-Aug-2022	05-Aug-2022	05-Aug-2022	05-Aug-2022
						VA22B8779-111	VA22B8779-112	VA22B8779-113	VA22B8779-114	VA22B8779-115
						Result	Result	Result	Result	Result
Physical Tests										
moisture	----	E144-H	2.0	%		71.7	74.3	75.7	71.6	74.0
Metals										
aluminum	7429-90-5	E472	5.0	mg/kg		73.6	82.1	222	311	357
antimony	7440-36-0	E472	0.010	mg/kg		0.016	0.021	0.029	0.025	0.035
arsenic	7440-38-2	E472	0.030	mg/kg		0.448	0.400	0.758	0.874	0.946
barium	7440-39-3	E472	0.050	mg/kg		6.74	2.97	17.7	20.0	23.5
beryllium	7440-41-7	E472	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	0.015
bismuth	7440-69-9	E472	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	<0.010
boron	7440-42-8	E472	1.0	mg/kg		<1.0	<1.0	<1.0	<1.0	1.4
cadmium	7440-43-9	E472	0.010	mg/kg		0.072	0.033	0.457	0.638	0.528
calcium	7440-70-2	E472	20	mg/kg		1240	650	934	1230	2240
cesium	7440-46-2	E472	0.0050	mg/kg		0.0133	0.0112	0.0352	0.0375	0.0458
chromium	7440-47-3	E472	0.20	mg/kg		0.32	0.24	0.51	1.18	1.22
cobalt	7440-48-4	E472	0.020	mg/kg		0.195	0.160	0.493	0.626	0.960
copper	7440-50-8	E472	0.20	mg/kg		19.6	19.4	30.4	39.0	45.6
iron	7439-89-6	E472	5.0	mg/kg		184	205	437	565	754
lead	7439-92-1	E472	0.050	mg/kg		0.054	0.055	0.178	0.202	0.250
lithium	7439-93-2	E472	0.50	mg/kg		<0.50	<0.50	<0.50	<0.50	<0.50
magnesium	7439-95-4	E472	2.0	mg/kg		1140	1190	1340	1460	1240
manganese	7439-96-5	E472	0.050	mg/kg		512	242	575	492	777
mercury	7439-97-6	E511	0.0050	mg/kg		0.0398	0.0750	0.0466	0.0482	0.0673
molybdenum	7439-98-7	E472	0.040	mg/kg		11.8	8.16	4.15	3.07	3.25
nickel	7440-02-0	E472	0.20	mg/kg		0.36	0.27	0.76	1.12	1.44
phosphorus	7723-14-0	E472	10	mg/kg		7640	7090	7730	8340	7180
potassium	7440-09-7	E472	20	mg/kg		6150	6770	7000	7790	7040
rubidium	7440-17-7	E472	0.050	mg/kg		1.17	1.17	1.33	1.60	1.42
selenium	7782-49-2	E472	0.10	mg/kg		14.7	9.65	5.56	5.59	5.43
silver	7440-22-4	E472.Ag	0.0050	mg/kg		<0.0050	<0.0050	0.0094	0.0131	0.0201
sodium	7440-23-5	E472	20	mg/kg		2370	2570	2410	2600	1970
strontium	7440-24-6	E472	0.10	mg/kg		8.13	4.17	7.03	9.27	11.1

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	HAC-U_INVCAD-7_2022-08	HAC-U_INVCAD-8_2022-08	HAC-D_INVCAD-1_2022-08	HAC-D_INVCAD-2_2022-08	HAC-D_INVCAD-3_2022-08
					Client sampling date / time	06-Aug-2022	05-Aug-2022	05-Aug-2022	05-Aug-2022	05-Aug-2022
						VA22B8779-111	VA22B8779-112	VA22B8779-113	VA22B8779-114	VA22B8779-115
						Result	Result	Result	Result	Result
Metals										
tellurium	13494-80-9	E472	0.020	mg/kg		<0.020	<0.020	<0.020	<0.020	<0.020
thallium	7440-28-0	E472	0.0020	mg/kg		<0.0020	<0.0020	0.0048	0.0041	0.0046
tin	7440-31-5	E472	0.10	mg/kg		<0.10	<0.10	<0.10	<0.10	<0.10
titanium	7440-32-6	E472.Ti	0.50	mg/kg		4.18	4.90	11.3	15.7	20.2
uranium	7440-61-1	E472	0.0020	mg/kg		0.0198	0.0102	0.0270	0.0371	0.0828
vanadium	7440-62-2	E472	0.10	mg/kg		0.55	0.47	1.01	1.36	1.90
zinc	7440-66-6	E472	1.0	mg/kg		98.4	82.0	168	146	147
zirconium	7440-67-7	E472	0.20	mg/kg		<0.20	<0.20	<0.20	0.24	0.28

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	HAC-D_INVCAD-4_2022-08	HAC-D_INVCAD-5_2022-08	HAC-D_INVCAD-6_2022-08	HAC-D_INVCAD-7_2022-08	HAC-D_INVCAD-8_2022-08
					Client sampling date / time	05-Aug-2022	05-Aug-2022	05-Aug-2022	05-Aug-2022	05-Aug-2022
						VA22B8779-116	VA22B8779-117	VA22B8779-118	VA22B8779-119	VA22B8779-120
						Result	Result	Result	Result	Result
Physical Tests										
moisture	----	E144-H	2.0	%		72.6	76.2	73.6	70.1	75.0
Metals										
aluminum	7429-90-5	E472	5.0	mg/kg		339	2040	130	186	56.9
antimony	7440-36-0	E472	0.010	mg/kg		0.027	0.049	0.022	0.019	0.015
arsenic	7440-38-2	E472	0.030	mg/kg		0.982	1.90	0.644	0.782	0.512
barium	7440-39-3	E472	0.050	mg/kg		42.9	14.6	8.07	12.7	3.44
beryllium	7440-41-7	E472	0.010	mg/kg		0.011	0.044	<0.010	<0.010	<0.010
bismuth	7440-69-9	E472	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	<0.010
boron	7440-42-8	E472	1.0	mg/kg		<1.0	1.5	<1.0	<1.0	<1.0
cadmium	7440-43-9	E472	0.010	mg/kg		0.592	0.181	0.156	0.193	0.058
calcium	7440-70-2	E472	20	mg/kg		1120	3580	712	980	549
cesium	7440-46-2	E472	0.0050	mg/kg		0.0498	0.0689	0.0220	0.0269	0.0130
chromium	7440-47-3	E472	0.20	mg/kg		1.29	2.59	0.50	0.86	<0.20
cobalt	7440-48-4	E472	0.020	mg/kg		0.882	1.04	0.573	0.488	0.227
copper	7440-50-8	E472	0.20	mg/kg		41.1	30.1	27.3	28.3	18.3
iron	7439-89-6	E472	5.0	mg/kg		672	2370	356	396	229
lead	7439-92-1	E472	0.050	mg/kg		0.238	3.94	0.122	0.130	0.058
lithium	7439-93-2	E472	0.50	mg/kg		<0.50	0.88	<0.50	<0.50	<0.50
magnesium	7439-95-4	E472	2.0	mg/kg		1300	1680	1220	1070	987
manganese	7439-96-5	E472	0.050	mg/kg		873	539	472	534	223
mercury	7439-97-6	E511	0.0050	mg/kg		0.0586	0.0472	0.0500	0.0353	0.0433
molybdenum	7439-98-7	E472	0.040	mg/kg		3.55	3.88	3.88	4.15	3.99
nickel	7440-02-0	E472	0.20	mg/kg		1.36	1.95	0.67	0.86	0.33
phosphorus	7723-14-0	E472	10	mg/kg		7440	6790	7220	6340	6450
potassium	7440-09-7	E472	20	mg/kg		7460	6790	7220	6210	6480
rubidium	7440-17-7	E472	0.050	mg/kg		1.41	1.47	1.14	1.38	1.08
selenium	7782-49-2	E472	0.10	mg/kg		5.13	4.04	3.86	3.21	3.84
silver	7440-22-4	E472.Ag	0.0050	mg/kg		0.0186	0.0281	0.0068	0.0065	<0.0050
sodium	7440-23-5	E472	20	mg/kg		2080	2760	2790	2170	2240
strontium	7440-24-6	E472	0.10	mg/kg		7.22	14.1	5.18	7.72	4.12

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	HAC-D_INVCAD-4_2022-08	HAC-D_INVCAD-5_2022-08	HAC-D_INVCAD-6_2022-08	HAC-D_INVCAD-7_2022-08	HAC-D_INVCAD-8_2022-08
					Client sampling date / time	05-Aug-2022	05-Aug-2022	05-Aug-2022	05-Aug-2022	05-Aug-2022
						VA22B8779-116	VA22B8779-117	VA22B8779-118	VA22B8779-119	VA22B8779-120
						Result	Result	Result	Result	Result
Metals										
tellurium	13494-80-9	E472	0.020	mg/kg		<0.020	<0.020	<0.020	<0.020	<0.020
thallium	7440-28-0	E472	0.0020	mg/kg		0.0044	0.0055	0.0022	0.0040	<0.0020
tin	7440-31-5	E472	0.10	mg/kg		<0.10	0.11	<0.10	0.10	<0.10
titanium	7440-32-6	E472.Ti	0.50	mg/kg		17.7	145	7.54	11.0	3.41
uranium	7440-61-1	E472	0.0020	mg/kg		0.0485	0.0765	0.0261	0.0190	0.0080
vanadium	7440-62-2	E472	0.10	mg/kg		1.61	12.2	0.86	1.02	0.42
zinc	7440-66-6	E472	1.0	mg/kg		140	87.3	100	84.3	70.7
zirconium	7440-67-7	E472	0.20	mg/kg		0.26	2.30	0.29	<0.20	<0.20

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	EDC-U_INVCAD-1_2022-08	EDC-U_INVCAD-2_2022-08	EDC-U_INVCAD-3_2022-08	EDC-U_INVCAD-4_2022-08	EDC-U_INVCAD-5_2022-08
					Client sampling date / time	08-Aug-2022	07-Aug-2022	07-Aug-2022	07-Aug-2022	07-Aug-2022
						VA22B8779-121	VA22B8779-122	VA22B8779-123	VA22B8779-124	VA22B8779-125
						Result	Result	Result	Result	Result
Physical Tests										
moisture	----	E144-H	2.0	%		75.3	75.1	75.7	75.2	78.3
Metals										
aluminum	7429-90-5	E472	5.0	mg/kg		89.4	21.2	80.5	1670	34.1
antimony	7440-36-0	E472	0.010	mg/kg		0.013	0.012	0.012	0.036	<0.010
arsenic	7440-38-2	E472	0.030	mg/kg		0.634	0.409	0.532	2.96	0.382
barium	7440-39-3	E472	0.050	mg/kg		3.88	1.32	10.6	117	2.73
beryllium	7440-41-7	E472	0.010	mg/kg		<0.010	<0.010	<0.010	0.060	<0.010
bismuth	7440-69-9	E472	0.010	mg/kg		<0.010	<0.010	<0.010	0.012	<0.010
boron	7440-42-8	E472	1.0	mg/kg		<1.0	<1.0	<1.0	2.6	<1.0
cadmium	7440-43-9	E472	0.010	mg/kg		0.207	<0.017 DLM	0.116	1.09	0.031
calcium	7440-70-2	E472	20	mg/kg		548	514	695	1560	558
cesium	7440-46-2	E472	0.0050	mg/kg		0.0071	<0.0050	0.0061	0.0981	<0.0050
chromium	7440-47-3	E472	0.20	mg/kg		0.35	0.23	1.15	11.8	<0.20
cobalt	7440-48-4	E472	0.020	mg/kg		0.348	0.149	0.456	6.59	0.251
copper	7440-50-8	E472	0.20	mg/kg		17.1	13.0	15.4	24.3	14.3
iron	7439-89-6	E472	5.0	mg/kg		224	109	242	3620	131
lead	7439-92-1	E472	0.050	mg/kg		0.057	<0.050	0.066	0.626	<0.050
lithium	7439-93-2	E472	0.50	mg/kg		<0.50	<0.50	<0.50	1.22	<0.50
magnesium	7439-95-4	E472	2.0	mg/kg		1330	1200	1400	1800	1270
manganese	7439-96-5	E472	0.050	mg/kg		205	107	400	4330	154
mercury	7439-97-6	E511	0.0050	mg/kg		0.0418	0.0294	0.0392	0.0561	0.0370
molybdenum	7439-98-7	E472	0.040	mg/kg		24.2	16.7	14.5	1.28	9.63
nickel	7440-02-0	E472	0.20	mg/kg		0.32	<0.20	0.79	10.6	<0.20
phosphorus	7723-14-0	E472	10	mg/kg		7850	7520	9190	7710	8060
potassium	7440-09-7	E472	20	mg/kg		7170	6720	8350	12900	7410
rubidium	7440-17-7	E472	0.050	mg/kg		3.49	2.28	3.00	5.06	2.49
selenium	7782-49-2	E472	0.10	mg/kg		0.74	0.68	0.68	0.59	0.72
silver	7440-22-4	E472.Ag	0.0050	mg/kg		0.0830	0.0552	0.0374	0.0802	0.0351
sodium	7440-23-5	E472	20	mg/kg		2920	2660	3170	2390	2950
strontium	7440-24-6	E472	0.10	mg/kg		3.52	3.36	4.92	13.7	4.19

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	EDC-U_INVCAD-1_2022-08	EDC-U_INVCAD-2_2022-08	EDC-U_INVCAD-3_2022-08	EDC-U_INVCAD-4_2022-08	EDC-U_INVCAD-5_2022-08
					Client sampling date / time	08-Aug-2022	07-Aug-2022	07-Aug-2022	07-Aug-2022	07-Aug-2022
						VA22B8779-121	VA22B8779-122	VA22B8779-123	VA22B8779-124	VA22B8779-125
						Result	Result	Result	Result	Result
Metals										
tellurium	13494-80-9	E472	0.020	mg/kg		<0.020	<0.020	<0.020	<0.020	<0.020
thallium	7440-28-0	E472	0.0020	mg/kg		0.0034	<0.0020	<0.0020	0.0259	<0.0020
tin	7440-31-5	E472	0.10	mg/kg		<0.10	<0.10	<0.10	<0.10	<0.10
titanium	7440-32-6	E472.Ti	0.50	mg/kg		4.01	0.96	3.71	73.8	1.44
uranium	7440-61-1	E472	0.0020	mg/kg		0.0066	0.0029	0.0092	0.218	0.0037
vanadium	7440-62-2	E472	0.10	mg/kg		0.62	0.28	0.47	7.52	0.21
zinc	7440-66-6	E472	1.0	mg/kg		103	83.1	117	222	83.7
zirconium	7440-67-7	E472	0.20	mg/kg		<0.20	<0.20	<0.20	1.52	<0.20

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	EDC-U_INVCAD-6_2022-08	EDC-U_INVCAD-7_2022-08	EDC-U_INVCAD-8_2022-08	EDC-D_INVCAD-1_2022-08	EDC-D_INVCAD-2_2022-08
					Client sampling date / time	07-Aug-2022	07-Aug-2022	07-Aug-2022	04-Aug-2022	04-Aug-2022
						VA22B8779-126	VA22B8779-127	VA22B8779-128	VA22B8779-129	VA22B8779-130
						Result	Result	Result	Result	Result
Physical Tests										
moisture	----	E144-H	2.0	%		74.9	76.6	78.0	81.5	83.9
Metals										
aluminum	7429-90-5	E472	5.0	mg/kg		70.9	29.5	46.0	650	497
antimony	7440-36-0	E472	0.010	mg/kg		<0.010	<0.010	0.011	0.019	0.024
arsenic	7440-38-2	E472	0.030	mg/kg		0.312	0.417	0.324	2.91	2.16
barium	7440-39-3	E472	0.050	mg/kg		3.19	2.54	3.16	31.0	13.9
beryllium	7440-41-7	E472	0.010	mg/kg		<0.010	<0.010	<0.010	0.023	0.014
bismuth	7440-69-9	E472	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	0.124
boron	7440-42-8	E472	1.0	mg/kg		<1.0	<1.0	<1.0	<1.0	<1.0
cadmium	7440-43-9	E472	0.010	mg/kg		0.040	0.016	0.029	0.319	0.369
calcium	7440-70-2	E472	20	mg/kg		586	559	592	1570	903
cesium	7440-46-2	E472	0.0050	mg/kg		0.0051	<0.0050	<0.0050	0.0789	0.0489
chromium	7440-47-3	E472	0.20	mg/kg		0.80	0.37	1.84	4.11	2.42
cobalt	7440-48-4	E472	0.020	mg/kg		0.323	0.242	0.279	1.16	0.585
copper	7440-50-8	E472	0.20	mg/kg		12.2	14.1	15.6	17.2	23.1
iron	7439-89-6	E472	5.0	mg/kg		196	115	173	1320	913
lead	7439-92-1	E472	0.050	mg/kg		<0.050	<0.050	0.050	0.324	0.548
lithium	7439-93-2	E472	0.50	mg/kg		<0.50	<0.50	<0.50	0.62	<0.50
magnesium	7439-95-4	E472	2.0	mg/kg		1130	1340	1360	1490	1280
manganese	7439-96-5	E472	0.050	mg/kg		227	120	185	474	257
mercury	7439-97-6	E511	0.0050	mg/kg		0.0447	0.0309	0.0435	0.0591	0.102
molybdenum	7439-98-7	E472	0.040	mg/kg		6.23	11.5	4.86	5.60	2.65
nickel	7440-02-0	E472	0.20	mg/kg		0.37	0.24	0.44	3.88	5.88
phosphorus	7723-14-0	E472	10	mg/kg		7580	8040	8100	9140	7970
potassium	7440-09-7	E472	20	mg/kg		7070	7430	7520	9200	7880
rubidium	7440-17-7	E472	0.050	mg/kg		1.87	2.04	1.35	3.14	2.02
selenium	7782-49-2	E472	0.10	mg/kg		0.59	0.74	0.77	1.21	1.77
silver	7440-22-4	E472.Ag	0.0050	mg/kg		0.0331	0.0228	0.0285	0.0343	0.0480
sodium	7440-23-5	E472	20	mg/kg		2490	3100	3070	3280	2840
strontium	7440-24-6	E472	0.10	mg/kg		3.99	3.81	4.20	11.9	5.60

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	EDC-U_INVCAD-6_2022-08	EDC-U_INVCAD-7_2022-08	EDC-U_INVCAD-8_2022-08	EDC-D_INVCAD-1_2022-08	EDC-D_INVCAD-2_2022-08
					Client sampling date / time	07-Aug-2022	07-Aug-2022	07-Aug-2022	04-Aug-2022	04-Aug-2022
						VA22B8779-126	VA22B8779-127	VA22B8779-128	VA22B8779-129	VA22B8779-130
						Result	Result	Result	Result	Result
Metals										
tellurium	13494-80-9	E472	0.020	mg/kg		<0.020	<0.020	<0.020	<0.020	<0.020
thallium	7440-28-0	E472	0.0020	mg/kg		0.0022	<0.0020	<0.0020	0.0111	0.0075
tin	7440-31-5	E472	0.10	mg/kg		<0.10	<0.10	<0.10	<0.10	<0.10
titanium	7440-32-6	E472.Ti	0.50	mg/kg		2.76	1.24	1.87	27.2	17.9
uranium	7440-61-1	E472	0.0020	mg/kg		0.0059	0.0031	0.0042	0.0567	0.0400
vanadium	7440-62-2	E472	0.10	mg/kg		0.31	0.30	0.25	2.40	1.69
zinc	7440-66-6	E472	1.0	mg/kg		93.7	88.2	105	98.8	106
zirconium	7440-67-7	E472	0.20	mg/kg		<0.20	<0.20	<0.20	0.53	0.33

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	EDC-D_INVCAD-3_2022-08	EDC-D_INVCAD-4_2022-08	EDC-D_INVCAD-5_2022-08	EDC-D_INVCAD-6_2022-08	EDC-D_INVCAD-7_2022-08
					Client sampling date / time	03-Aug-2022	03-Aug-2022	03-Aug-2022	03-Aug-2022	03-Aug-2022
						VA22B8779-131	VA22B8779-132	VA22B8779-133	VA22B8779-134	VA22B8779-135
						Result	Result	Result	Result	Result
Physical Tests										
moisture	----	E144-H	2.0	%		78.7	66.6	83.0	85.8	74.9
Metals										
aluminum	7429-90-5	E472	5.0	mg/kg		1610	3400	1120	565	6900
antimony	7440-36-0	E472	0.010	mg/kg		0.060	0.033	0.038	0.031	0.030
arsenic	7440-38-2	E472	0.030	mg/kg		7.44	4.20	3.36	1.50	5.24
barium	7440-39-3	E472	0.050	mg/kg		90.3	22.9	64.8	26.7	112
beryllium	7440-41-7	E472	0.010	mg/kg		0.082	0.090	0.051	0.018	0.132
bismuth	7440-69-9	E472	0.010	mg/kg		0.015	0.032	0.010	0.036	0.032
boron	7440-42-8	E472	1.0	mg/kg		1.5	1.0	2.4	<1.0	1.7
cadmium	7440-43-9	E472	0.010	mg/kg		0.295	0.307	0.474	0.380	0.282
calcium	7440-70-2	E472	20	mg/kg		2110	2210	2350	1170	3090
cesium	7440-46-2	E472	0.0050	mg/kg		0.180	0.311	0.130	0.0979	0.388
chromium	7440-47-3	E472	0.20	mg/kg		10.8	32.9	15.7	5.27	9.95
cobalt	7440-48-4	E472	0.020	mg/kg		3.02	3.83	1.99	1.05	4.40
copper	7440-50-8	E472	0.20	mg/kg		19.7	19.4	23.1	19.9	22.9
iron	7439-89-6	E472	5.0	mg/kg		4450	7210	2560	1080	11300
lead	7439-92-1	E472	0.050	mg/kg		1.33	1.18	0.563	0.363	1.23
lithium	7439-93-2	E472	0.50	mg/kg		1.52	3.74	1.10	<0.50	5.41
magnesium	7439-95-4	E472	2.0	mg/kg		1760	3950	1700	1440	4030
manganese	7439-96-5	E472	0.050	mg/kg		1100	270	870	466	569
mercury	7439-97-6	E511	0.0050	mg/kg		0.0548	0.0579	0.0698	0.0769	0.0853
molybdenum	7439-98-7	E472	0.040	mg/kg		4.56	2.12	2.28	2.91	3.90
nickel	7440-02-0	E472	0.20	mg/kg		8.01	21.5	10.9	4.59	9.34
phosphorus	7723-14-0	E472	10	mg/kg		7430	5700	7840	8680	8490
potassium	7440-09-7	E472	20	mg/kg		8790	5100	8780	7960	7120
rubidium	7440-17-7	E472	0.050	mg/kg		3.96	2.93	3.67	2.20	2.94
selenium	7782-49-2	E472	0.10	mg/kg		1.51	1.10	1.97	1.85	1.63
silver	7440-22-4	E472.Ag	0.0050	mg/kg		0.0406	0.0566	0.0502	0.0368	0.119
sodium	7440-23-5	E472	20	mg/kg		2520	1910	2980	3100	5760
strontium	7440-24-6	E472	0.10	mg/kg		22.4	12.8	17.3	7.92	24.5

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	EDC-D_INVCAD-3_2022-08	EDC-D_INVCAD-4_2022-08	EDC-D_INVCAD-5_2022-08	EDC-D_INVCAD-6_2022-08	EDC-D_INVCAD-7_2022-08
					Client sampling date / time	03-Aug-2022	03-Aug-2022	03-Aug-2022	03-Aug-2022	03-Aug-2022
						VA22B8779-131	VA22B8779-132	VA22B8779-133	VA22B8779-134	VA22B8779-135
						Result	Result	Result	Result	Result
Metals										
tellurium	13494-80-9	E472	0.020	mg/kg		<0.020	<0.020	<0.020	<0.020	0.055
thallium	7440-28-0	E472	0.0020	mg/kg		0.0193	0.0166	0.0188	0.0083	0.0140
tin	7440-31-5	E472	0.10	mg/kg		<0.10	<0.10	<0.10	<0.10	<0.10
titanium	7440-32-6	E472.Ti	0.50	mg/kg		80.7	160	43.6	22.1	252
uranium	7440-61-1	E472	0.0020	mg/kg		0.160	0.182	0.178	0.0434	0.149
vanadium	7440-62-2	E472	0.10	mg/kg		9.81	17.1	5.32	2.60	34.0
zinc	7440-66-6	E472	1.0	mg/kg		110	73.2	138	160	114
zirconium	7440-67-7	E472	0.20	mg/kg		1.47	2.30	0.92	0.52	2.52

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	EDC-D_INVCAD-8_2022-08	E1_INVCAD-1_2022-08	E1_INVCAD-2_2022-08	E1_INVCAD-3_2022-08	E1_INVCAD-4_2022-08
					Client sampling date / time	03-Aug-2022	05-Aug-2022	05-Aug-2022	05-Aug-2022	04-Aug-2022
						VA22B8779-136	VA22B8779-137	VA22B8779-138	VA22B8779-139	VA22B8779-140
						Result	Result	Result	Result	Result
Physical Tests										
moisture	----	E144-H	2.0	%		73.5	77.6	81.3	82.2	78.5
Metals										
aluminum	7429-90-5	E472	5.0	mg/kg		344	89.5	2030	2900	5990
antimony	7440-36-0	E472	0.010	mg/kg		<0.010	<0.010	0.046	0.085	0.080
arsenic	7440-38-2	E472	0.030	mg/kg		0.901	0.592	4.88	4.69	7.54
barium	7440-39-3	E472	0.050	mg/kg		6.34	4.75	86.9	129	187
beryllium	7440-41-7	E472	0.010	mg/kg		0.012	<0.010	0.063	0.116	0.202
bismuth	7440-69-9	E472	0.010	mg/kg		<0.010	<0.010	0.018	0.027	0.043
boron	7440-42-8	E472	1.0	mg/kg		<1.0	<1.0	2.1	3.9	6.5
cadmium	7440-43-9	E472	0.010	mg/kg		0.053	0.095	0.319	1.44	0.962
calcium	7440-70-2	E472	20	mg/kg		1310	1030	1890	3370	4520
cesium	7440-46-2	E472	0.0050	mg/kg		0.0181	0.0137	0.214	0.318	0.587
chromium	7440-47-3	E472	0.20	mg/kg		2.50	0.46	12.1	26.4	30.0
cobalt	7440-48-4	E472	0.020	mg/kg		0.257	0.158	3.19	5.47	7.77
copper	7440-50-8	E472	0.20	mg/kg		12.7	14.4	34.0	81.4	127
iron	7439-89-6	E472	5.0	mg/kg		831	237	4060	6440	12100
lead	7439-92-1	E472	0.050	mg/kg		0.150	0.063	0.998	1.60	2.78
lithium	7439-93-2	E472	0.50	mg/kg		<0.50	<0.50	2.18	2.78	5.71
magnesium	7439-95-4	E472	2.0	mg/kg		1440	1270	2120	2760	4070
manganese	7439-96-5	E472	0.050	mg/kg		82.9	103	717	1080	1420
mercury	7439-97-6	E511	0.0050	mg/kg		0.0295	0.0421	0.0417	0.0658	0.0613
molybdenum	7439-98-7	E472	0.040	mg/kg		3.69	3.80	2.36	1.14	1.39
nickel	7440-02-0	E472	0.20	mg/kg		1.46	0.63	9.45	20.2	21.7
phosphorus	7723-14-0	E472	10	mg/kg		8210	8190	7960	8370	7210
potassium	7440-09-7	E472	20	mg/kg		5490	6810	10500	15600	15100
rubidium	7440-17-7	E472	0.050	mg/kg		1.29	2.20	4.78	7.33	9.39
selenium	7782-49-2	E472	0.10	mg/kg		0.67	0.91	1.31	1.75	1.52
silver	7440-22-4	E472.Ag	0.0050	mg/kg		0.0117	0.0254	0.0361	0.130	0.131
sodium	7440-23-5	E472	20	mg/kg		2580	3040	3080	3840	3510
strontium	7440-24-6	E472	0.10	mg/kg		7.65	6.50	14.9	20.4	36.3

Analytical Results

Sub-Matrix: Tissue (Matrix: Biota)					Client sample ID	EDC-D_INVCAD-8_2022-08	E1_INVCAD-1_2022-08	E1_INVCAD-2_2022-08	E1_INVCAD-3_2022-08	E1_INVCAD-4_2022-08
					Client sampling date / time	03-Aug-2022	05-Aug-2022	05-Aug-2022	05-Aug-2022	04-Aug-2022
Analyte	CAS Number	Method	LOR	Unit		VA22B8779-136	VA22B8779-137	VA22B8779-138	VA22B8779-139	VA22B8779-140
						Result	Result	Result	Result	Result
Metals										
tellurium	13494-80-9	E472	0.020	mg/kg		<0.020	<0.020	<0.020	<0.020	<0.020
thallium	7440-28-0	E472	0.0020	mg/kg		0.0036	0.0029	0.0203	0.0358	0.0511
tin	7440-31-5	E472	0.10	mg/kg		<0.10	<0.10	<0.10	<0.10	0.16
titanium	7440-32-6	E472.Ti	0.50	mg/kg		31.1	4.17	96.4	158	327
uranium	7440-61-1	E472	0.0020	mg/kg		0.0166	0.0130	0.151	0.428	0.527
vanadium	7440-62-2	E472	0.10	mg/kg		2.85	0.42	8.60	16.0	30.9
zinc	7440-66-6	E472	1.0	mg/kg		80.6	89.6	126	167	138
zirconium	7440-67-7	E472	0.20	mg/kg		0.20	<0.20	1.54	2.47	4.09

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	E1_INVCAD-5_2022-08	E1_INVCAD-6_2022-08	E1_INVCAD-7_2022-08	E1_INVCAD-8_2022-08	HAC-R1_PERT-7X_2022-08
					Client sampling date / time	04-Aug-2022	04-Aug-2022	04-Aug-2022	04-Aug-2022	10-Aug-2022
						VA22B8779-141	VA22B8779-142	VA22B8779-143	VA22B8779-144	VA22B8779-145
						Result	Result	Result	Result	Result
Physical Tests										
moisture	----	E144-H	2.0	%		80.4	83.0	76.8	78.4	72.4
Metals										
aluminum	7429-90-5	E472	5.0	mg/kg		4140	2980	4520	980	1650
antimony	7440-36-0	E472	0.010	mg/kg		0.073	0.070	0.076	0.027	0.069
arsenic	7440-38-2	E472	0.030	mg/kg		6.05	5.22	6.24	1.86	2.16
barium	7440-39-3	E472	0.050	mg/kg		163	175	179	55.6	96.1
beryllium	7440-41-7	E472	0.010	mg/kg		0.148	0.121	0.164	0.036	0.056
bismuth	7440-69-9	E472	0.010	mg/kg		0.032	0.026	0.033	<0.010	<0.010
boron	7440-42-8	E472	1.0	mg/kg		5.3	4.7	4.4	1.4	284
cadmium	7440-43-9	E472	0.010	mg/kg		0.903	1.24	0.923	0.695	0.218
calcium	7440-70-2	E472	20	mg/kg		3120	2810	3530	1770	196000
cesium	7440-46-2	E472	0.0050	mg/kg		0.392	0.265	0.447	0.0956	0.176
chromium	7440-47-3	E472	0.20	mg/kg		23.2	9.81	13.8	4.60	11.2
cobalt	7440-48-4	E472	0.020	mg/kg		6.32	5.34	6.06	1.62	2.99
copper	7440-50-8	E472	0.20	mg/kg		118	117	130	57.5	56.8
iron	7439-89-6	E472	5.0	mg/kg		8410	6570	9370	2050	3850
lead	7439-92-1	E472	0.050	mg/kg		1.96	1.69	2.05	0.510	0.512
lithium	7439-93-2	E472	0.50	mg/kg		4.09	2.72	4.20	0.94	1.47
magnesium	7439-95-4	E472	2.0	mg/kg		3240	2830	3240	1680	3220
manganese	7439-96-5	E472	0.050	mg/kg		1310	1680	1650	591	2410
mercury	7439-97-6	E511	0.0050	mg/kg		0.0480	0.0577	0.0489	0.0743	0.0088
molybdenum	7439-98-7	E472	0.040	mg/kg		1.86	1.42	1.84	3.94	1.67
nickel	7440-02-0	E472	0.20	mg/kg		16.8	10.4	12.2	4.03	6.42
phosphorus	7723-14-0	E472	10	mg/kg		6890	8010	6870	10300	879
potassium	7440-09-7	E472	20	mg/kg		13700	17000	13200	10500	4280
rubidium	7440-17-7	E472	0.050	mg/kg		6.10	6.25	6.40	4.37	4.52
selenium	7782-49-2	E472	0.10	mg/kg		1.44	1.73	1.59	1.78	1.82
silver	7440-22-4	E472.Ag	0.0050	mg/kg		0.0882	0.0968	0.0919	0.0704	0.0195
sodium	7440-23-5	E472	20	mg/kg		3380	3870	2690	3460	306
strontium	7440-24-6	E472	0.10	mg/kg		27.0	22.0	26.5	12.7	432

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	E1_INVCAD-5_2022-08	E1_INVCAD-6_2022-08	E1_INVCAD-7_2022-08	E1_INVCAD-8_2022-08	HAC-R1_PERT-7X_2022-08
					Client sampling date / time	04-Aug-2022	04-Aug-2022	04-Aug-2022	04-Aug-2022	10-Aug-2022
						VA22B8779-141	VA22B8779-142	VA22B8779-143	VA22B8779-144	VA22B8779-145
						Result	Result	Result	Result	Result
Metals										
tellurium	13494-80-9	E472	0.020	mg/kg		<0.020	<0.020	<0.020	<0.020	0.022
thallium	7440-28-0	E472	0.0020	mg/kg		0.0351	0.0357	0.0306	0.0145	0.0066
tin	7440-31-5	E472	0.10	mg/kg		0.12	<0.10	0.11	<0.10	<0.10
titanium	7440-32-6	E472.Ti	0.50	mg/kg		224	152	232	54.2	304
uranium	7440-61-1	E472	0.0020	mg/kg		0.383	0.403	0.352	0.0922	0.132
vanadium	7440-62-2	E472	0.10	mg/kg		19.3	15.0	24.6	4.56	11.8
zinc	7440-66-6	E472	1.0	mg/kg		154	157	137	128	19.7
zirconium	7440-67-7	E472	0.20	mg/kg		3.12	2.57	3.45	0.85	2.67

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	HAC-R1_PERT-8X_2022-08	HAC-D_PERT-7X_2022-08	E1_PERT-5X_2022-08	E1_PERT-7X_2022-08	HAC-R1_INV-7X_2022-08
					Client sampling date / time	10-Aug-2022	05-Aug-2022	04-Aug-2022	04-Aug-2022	10-Aug-2022
						VA22B8779-146	VA22B8779-147	VA22B8779-148	VA22B8779-149	VA22B8779-150
						Result	Result	Result	Result	Result
Physical Tests										
moisture	----	E144-H	2.0	%		60.2	56.8	91.2	79.9	77.0
Metals										
aluminum	7429-90-5	E472	5.0	mg/kg		1880	2700	19300	14500	838
antimony	7440-36-0	E472	0.010	mg/kg		0.084	0.065	0.057	0.070	0.036
arsenic	7440-38-2	E472	0.030	mg/kg		2.78	5.47	9.62	11.9	1.60
barium	7440-39-3	E472	0.050	mg/kg		90.7	163	550	573	26.0
beryllium	7440-41-7	E472	0.010	mg/kg		0.064	0.096	0.417	0.447	0.029
bismuth	7440-69-9	E472	0.010	mg/kg		0.014	0.019	0.073	0.084	<0.010
boron	7440-42-8	E472	1.0	mg/kg		179	39.9	14.8	24.8	2.6
cadmium	7440-43-9	E472	0.010	mg/kg		0.218	0.317	0.256	0.342	0.873
calcium	7440-70-2	E472	20	mg/kg		204000	202000	13200	12600	2600
cesium	7440-46-2	E472	0.0050	mg/kg		0.173	0.325	1.18	1.28	0.0752
chromium	7440-47-3	E472	0.20	mg/kg		123	8.89	65.6	33.1	2.63
cobalt	7440-48-4	E472	0.020	mg/kg		2.14	3.39	14.6	11.1	1.46
copper	7440-50-8	E472	0.20	mg/kg		56.0	102	164	520	107
iron	7439-89-6	E472	5.0	mg/kg		4250	6470	35700	27100	1530
lead	7439-92-1	E472	0.050	mg/kg		0.828	1.47	5.78	5.25	0.344
lithium	7439-93-2	E472	0.50	mg/kg		1.60	2.70	14.7	13.0	0.67
magnesium	7439-95-4	E472	2.0	mg/kg		2730	3540	11000	7290	1440
manganese	7439-96-5	E472	0.050	mg/kg		1580	3820	1300	1600	780
mercury	7439-97-6	E511	0.0050	mg/kg		0.0102	0.0245	0.0451	0.0602	0.0460
molybdenum	7439-98-7	E472	0.040	mg/kg		1.05	1.19	1.85	1.77	4.54
nickel	7440-02-0	E472	0.20	mg/kg		8.33	5.67	40.6	25.0	2.82
phosphorus	7723-14-0	E472	10	mg/kg		1040	1440	2580	2300	8290
potassium	7440-09-7	E472	20	mg/kg		2680	2920	3510	3170	7940
rubidium	7440-17-7	E472	0.050	mg/kg		2.98	5.07	9.43	10.4	2.82
selenium	7782-49-2	E472	0.10	mg/kg		1.62	1.78	0.97	2.03	4.48
silver	7440-22-4	E472.Ag	0.0050	mg/kg		0.0228	0.0285	0.109	0.150	0.0219
sodium	7440-23-5	E472	20	mg/kg		295	267	1560	441	3040
strontium	7440-24-6	E472	0.10	mg/kg		429	522	148	117	14.4

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	HAC-R1_PERT-8X_2022-08	HAC-D_PERT-7X_2022-08	E1_PERT-5X_2022-08	E1_PERT-7X_2022-08	HAC-R1_INV-7X_2022-08
					Client sampling date / time	10-Aug-2022	05-Aug-2022	04-Aug-2022	04-Aug-2022	10-Aug-2022
						VA22B8779-146	VA22B8779-147	VA22B8779-148	VA22B8779-149	VA22B8779-150
						Result	Result	Result	Result	Result
Metals										
tellurium	13494-80-9	E472	0.020	mg/kg		<0.024 DLA	<0.024 DLA	0.021	0.028	<0.020
thallium	7440-28-0	E472	0.0020	mg/kg		0.0066	0.0285	0.0498	0.0737	0.0044
tin	7440-31-5	E472	0.10	mg/kg		<0.12 DLA	0.12	0.31	0.38	<0.10
titanium	7440-32-6	E472.Ti	0.50	mg/kg		162	190	1260	786	45.8
uranium	7440-61-1	E472	0.0020	mg/kg		0.152	0.215	0.652	0.613	0.0908
vanadium	7440-62-2	E472	0.10	mg/kg		12.8	19.4	121	71.7	5.12
zinc	7440-66-6	E472	1.0	mg/kg		40.8	21.1	62.6	57.5	108
zirconium	7440-67-7	E472	0.20	mg/kg		1.35	1.65	13.0	7.97	0.57

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	HAC-R1_INV-8X_2022-08	HAC-D_INV-7X_2022-08	E1_INV-5X_2022-08	E1_INV-7X_2022-08	HAC-R1_INVCAD-7X_2022-08
					Client sampling date / time	10-Aug-2022	05-Aug-2022	04-Aug-2022	04-Aug-2022	10-Aug-2022
						VA22B8779-151	VA22B8779-152	VA22B8779-153	VA22B8779-154	VA22B8779-155
						Result	Result	Result	Result	Result
Physical Tests										
moisture	----	E144-H	2.0	%		85.3	80.3	79.6	78.2	72.9
Metals										
aluminum	7429-90-5	E472	5.0	mg/kg		2200	1820	1930	1910	84.8
antimony	7440-36-0	E472	0.010	mg/kg		0.080	0.089	0.045	0.048	0.019
arsenic	7440-38-2	E472	0.030	mg/kg		3.48	3.39	3.91	3.38	0.321
barium	7440-39-3	E472	0.050	mg/kg		50.9	35.9	68.1	70.0	2.93
beryllium	7440-41-7	E472	0.010	mg/kg		0.078	0.084	0.058	0.067	<0.010
bismuth	7440-69-9	E472	0.010	mg/kg		0.013	0.010	0.015	0.016	<0.010
boron	7440-42-8	E472	1.0	mg/kg		4.0	3.1	2.3	2.4	<1.0
cadmium	7440-43-9	E472	0.010	mg/kg		1.15	1.31	1.84	1.50	0.020
calcium	7440-70-2	E472	20	mg/kg		5560	4640	2240	2540	643
cesium	7440-46-2	E472	0.0050	mg/kg		0.210	0.399	0.226	0.214	0.0100
chromium	7440-47-3	E472	0.20	mg/kg		5.04	5.17	6.49	6.16	0.31
cobalt	7440-48-4	E472	0.020	mg/kg		2.83	2.51	3.76	3.42	0.128
copper	7440-50-8	E472	0.20	mg/kg		223	68.0	87.9	90.0	16.5
iron	7439-89-6	E472	5.0	mg/kg		4080	4730	3950	4040	210
lead	7439-92-1	E472	0.050	mg/kg		0.832	1.62	0.914	0.985	<0.050
lithium	7439-93-2	E472	0.50	mg/kg		1.76	1.86	1.77	1.82	<0.50
magnesium	7439-95-4	E472	2.0	mg/kg		2440	2160	2090	2260	1010
manganese	7439-96-5	E472	0.050	mg/kg		1140	983	481	848	125
mercury	7439-97-6	E511	0.0050	mg/kg		0.0637	0.0656	0.0554	0.0700	0.0366
molybdenum	7439-98-7	E472	0.040	mg/kg		5.68	1.74	0.874	1.06	7.37
nickel	7440-02-0	E472	0.20	mg/kg		4.96	3.53	5.91	5.91	0.23
phosphorus	7723-14-0	E472	10	mg/kg		8220	8190	8550	7780	6400
potassium	7440-09-7	E472	20	mg/kg		10300	7820	9940	9830	5520
rubidium	7440-17-7	E472	0.050	mg/kg		4.04	2.66	6.66	5.63	1.24
selenium	7782-49-2	E472	0.10	mg/kg		6.07	3.59	2.04	2.03	6.17
silver	7440-22-4	E472.Ag	0.0050	mg/kg		0.0557	0.0337	0.0970	0.0955	<0.0050
sodium	7440-23-5	E472	20	mg/kg		5710	6690	3820	3010	2200
strontium	7440-24-6	E472	0.10	mg/kg		28.1	21.4	17.1	16.5	3.95

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	HAC-R1_INV-8X_2022-08	HAC-D_INV-7X_2022-08	E1_INV-5X_2022-08	E1_INV-7X_2022-08	HAC-R1_INVCAD-7X_2022-08
					Client sampling date / time	10-Aug-2022	05-Aug-2022	04-Aug-2022	04-Aug-2022	10-Aug-2022
						VA22B8779-151	VA22B8779-152	VA22B8779-153	VA22B8779-154	VA22B8779-155
						Result	Result	Result	Result	Result
Metals										
tellurium	13494-80-9	E472	0.020	mg/kg		<0.020	<0.020	<0.020	<0.020	<0.020
thallium	7440-28-0	E472	0.0020	mg/kg		0.0167	0.0229	0.0226	0.0226	<0.0020
tin	7440-31-5	E472	0.10	mg/kg		<0.10	<0.10	<0.10	<0.10	<0.10
titanium	7440-32-6	E472.Ti	0.50	mg/kg		128	204	109	100	5.59
uranium	7440-61-1	E472	0.0020	mg/kg		0.237	0.118	0.159	0.183	0.0072
vanadium	7440-62-2	E472	0.10	mg/kg		14.2	13.2	10.1	9.34	0.52
zinc	7440-66-6	E472	1.0	mg/kg		122	116	139	132	79.0
zirconium	7440-67-7	E472	0.20	mg/kg		1.30	1.98	1.52	1.65	<0.20

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	HAC-R1_INVCAD-8X_2022-08	HAC-D_INVCAD-7X_2022-08	E1_INVCAD-5X_2022-08	E1_INVCAD-7X_2022-08	----
					Client sampling date / time	10-Aug-2022	05-Aug-2022	04-Aug-2022	04-Aug-2022	----
						VA22B8779-156	VA22B8779-157	VA22B8779-158	VA22B8779-159	--------
						Result	Result	Result	Result	----
Physical Tests										
moisture	----	E144-H	2.0	%		73.1	70.6	82.4	78.0	----
Metals										
aluminum	7429-90-5	E472	5.0	mg/kg		33.7	166	4750	3900	----
antimony	7440-36-0	E472	0.010	mg/kg		0.018	0.019	0.076	0.067	----
arsenic	7440-38-2	E472	0.030	mg/kg		0.272	0.547	6.66	6.20	----
barium	7440-39-3	E472	0.050	mg/kg		3.80	6.08	215	171	----
beryllium	7440-41-7	E472	0.010	mg/kg		<0.010	<0.010	0.161	0.135	----
bismuth	7440-69-9	E472	0.010	mg/kg		<0.010	<0.010	0.038	0.030	----
boron	7440-42-8	E472	1.0	mg/kg		<1.0	<1.0	4.9	4.3	----
cadmium	7440-43-9	E472	0.010	mg/kg		0.013	0.079	1.10	0.895	----
calcium	7440-70-2	E472	20	mg/kg		748	790	3920	3130	----
cesium	7440-46-2	E472	0.0050	mg/kg		0.0060	0.0261	0.453	0.407	----
chromium	7440-47-3	E472	0.20	mg/kg		<0.20	0.47	16.1	10.4	----
cobalt	7440-48-4	E472	0.020	mg/kg		0.079	0.243	6.80	5.61	----
copper	7440-50-8	E472	0.20	mg/kg		13.7	20.6	137	121	----
iron	7439-89-6	E472	5.0	mg/kg		119	376	9940	8180	----
lead	7439-92-1	E472	0.050	mg/kg		<0.050	0.113	2.34	1.87	----
lithium	7439-93-2	E472	0.50	mg/kg		<0.50	<0.50	4.26	3.51	----
magnesium	7439-95-4	E472	2.0	mg/kg		1070	1090	3590	2960	----
manganese	7439-96-5	E472	0.050	mg/kg		170	354	1640	1630	----
mercury	7439-97-6	E511	0.0050	mg/kg		0.0364	0.0480	0.0578	0.0531	----
molybdenum	7439-98-7	E472	0.040	mg/kg		9.03	5.68	1.53	1.54	----
nickel	7440-02-0	E472	0.20	mg/kg		<0.20	0.42	14.5	10.5	----
phosphorus	7723-14-0	E472	10	mg/kg		6880	6480	7430	7020	----
potassium	7440-09-7	E472	20	mg/kg		5680	5850	15300	14100	----
rubidium	7440-17-7	E472	0.050	mg/kg		1.09	1.14	7.21	7.09	----
selenium	7782-49-2	E472	0.10	mg/kg		7.35	4.18	1.65	1.69	----
silver	7440-22-4	E472.Ag	0.0050	mg/kg		<0.0050	<0.0050	0.0993	0.0882	----
sodium	7440-23-5	E472	20	mg/kg		2160	2070	3520	2710	----
strontium	7440-24-6	E472	0.10	mg/kg		5.48	5.90	31.6	24.2	----

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	HAC-R1_INVCAD-8X_2022-08	HAC-D_INVCAD-7X_2022-08	E1_INVCAD-5X_2022-08	E1_INVCAD-7X_2022-08	----
					Client sampling date / time	10-Aug-2022	05-Aug-2022	04-Aug-2022	04-Aug-2022	----
						VA22B8779-156	VA22B8779-157	VA22B8779-158	VA22B8779-159	--------
						Result	Result	Result	Result	----
Metals										
tellurium	13494-80-9	E472	0.020	mg/kg		<0.020	<0.020	<0.020	<0.020	----
thallium	7440-28-0	E472	0.0020	mg/kg		<0.0020	0.0022	0.0416	0.0327	----
tin	7440-31-5	E472	0.10	mg/kg		<0.10	<0.10	0.16	0.12	----
titanium	7440-32-6	E472.Ti	0.50	mg/kg		2.17	9.79	262	213	----
uranium	7440-61-1	E472	0.0020	mg/kg		0.0035	0.0131	0.451	0.319	----
vanadium	7440-62-2	E472	0.10	mg/kg		0.21	0.97	23.8	20.8	----
zinc	7440-66-6	E472	1.0	mg/kg		92.3	81.4	171	138	----
zirconium	7440-67-7	E472	0.20	mg/kg		<0.20	<0.20	3.49	3.10	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

ALS Canada Ltd.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA22B8779**	Page	: 1 of 97
Client	: **Mount Polley Mining Corporation**	Laboratory	: Vancouver - Environmental
Contact	: Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: ----	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 12-Aug-2022 12:25
PO	: 5590008044 Q2 2022	Issue Date	: 07-Nov-2022 09:07
C-O-C number	: ----		
Sampler	: KBa		
Site	: ----		
Quote number	: VA22-MPMC100-002		
No. of samples received	: 159		
No. of samples analysed	: 159		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- Duplicate outliers occur - please see following pages for full details.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- Reference Material (RM) Sample outliers occur - please see the following pages for full details.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- Quality Control Sample Frequency Outliers occur - please see following pages for full details.

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **Biota**

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment
Duplicate (DUP) RPDs								
Metals	VA22B8779-081	EDC-D_INV-1_2022-08	aluminum	7429-90-5	E472	51.1 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22B8779-061	HAC-U_INV-5_2022-08	aluminum	7429-90-5	E472	156 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22B8779-061	HAC-U_INV-5_2022-08	antimony	7440-36-0	E472	0.037 % DUP-H, J	Diff <2x LOR	Low Level DUP DQO exceeded (difference > 2 LOR).
Metals	VA22B8779-061	HAC-U_INV-5_2022-08	arsenic	7440-38-2	E472	52.0 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22B8779-061	HAC-U_INV-5_2022-08	barium	7440-39-3	E472	98.5 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22B8779-061	HAC-U_INV-5_2022-08	beryllium	7440-41-7	E472	160 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22B8779-061	HAC-U_INV-5_2022-08	boron	7440-42-8	E472	102 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22B8779-081	EDC-D_INV-1_2022-08	cesium	7440-46-2	E472	51.0 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22B8779-061	HAC-U_INV-5_2022-08	cesium	7440-46-2	E472	121 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22B8779-081	EDC-D_INV-1_2022-08	chromium	7440-47-3	E472	52.6 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22B8779-061	HAC-U_INV-5_2022-08	chromium	7440-47-3	E472	107 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22B8779-141	E1_INVCAD-5_2022-08	chromium	7440-47-3	E472	41.5 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22B8779-061	HAC-U_INV-5_2022-08	cobalt	7440-48-4	E472	98.8 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22B8779-061	HAC-U_INV-5_2022-08	copper	7440-50-8	E472	82.9 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22B8779-081	EDC-D_INV-1_2022-08	iron	7439-89-6	E472	48.8 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22B8779-061	HAC-U_INV-5_2022-08	iron	7439-89-6	E472	131 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22B8779-001	HAC-R1_PERT-1_2022-08	lead	7439-92-1	E472	59.6 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22B8779-061	HAC-U_INV-5_2022-08	lead	7439-92-1	E472	129 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.

Matrix: **Biota**

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment
Duplicate (DUP) RPDs - Continued								
Metals	VA22B8779-061	HAC-U_INV-5_2022-08	lithium	7439-93-2	E472	1.58 % DUP-H, J	Diff <2x LOR	Low Level DUP DQO exceeded (difference > 2 LOR).
Metals	VA22B8779-061	HAC-U_INV-5_2022-08	nickel	7440-02-0	E472	73.6 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22B8779-061	HAC-U_INV-5_2022-08	thallium	7440-28-0	E472	136 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22B8779-061	HAC-U_INV-5_2022-08	uranium	7440-61-1	E472	98.9 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22B8779-081	EDC-D_INV-1_2022-08	vanadium	7440-62-2	E472	43.8 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22B8779-061	HAC-U_INV-5_2022-08	vanadium	7440-62-2	E472	146 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22B8779-081	EDC-D_INV-1_2022-08	zirconium	7440-67-7	E472	0.44 % DUP-H	Diff <2x LOR	Low Level DUP DQO exceeded (difference > 2 LOR).
Metals	VA22B8779-021	HAC-D_PERT-5_2022-08	silver	7440-22-4	E472.Ag	51.1 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22B8779-061	HAC-U_INV-5_2022-08	silver	7440-22-4	E472.Ag	132 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22B8779-081	EDC-D_INV-1_2022-08	titanium	7440-32-6	E472.Ti	53.9 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22B8779-061	HAC-U_INV-5_2022-08	titanium	7440-32-6	E472.Ti	140 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.

Result Qualifiers

Qualifier	Description
DUP-H	*Duplicate results outside ALS DQO, due to sample heterogeneity.*
J	*Duplicate results and limits are expressed in terms of absolute difference.*

Reference Material (RM) Sample								
Metals	QC-MRG4-676933003	----	titanium	7440-32-6	E472.Ti	64.4 % MES	70.0-130%	Recovery less than lower control limit

Result Qualifiers

Qualifier	Description
MES	*Data Quality Objective was marginally exceeded (by < 10% absolute) for < 10% of analytes in a Multi-Element Scan / Multi-Parameter Scan (considered acceptable as per OMOE & CCME).*

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Biota by CVAAS (DRY units, Biopsy)										
LDPE bag EDC-U_PERT-3_2022-08	E512	07-Aug-2022	27-Sep-2022	----	----		28-Sep-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Biopsy)										
LDPE bag E1_PERT-1_2022-08	E512	05-Aug-2022	29-Sep-2022	----	----		29-Sep-2022	365 days	55 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Biopsy)										
LDPE bag E1_PERT-2_2022-08	E512	05-Aug-2022	29-Sep-2022	----	----		29-Sep-2022	365 days	55 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Biopsy)										
LDPE bag E1_PERT-4_2022-08	E512	04-Aug-2022	29-Sep-2022	----	----		29-Sep-2022	365 days	56 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Biopsy)										
LDPE bag EDC-D_PERT-5_2022-08	E512	03-Aug-2022	27-Sep-2022	----	----		28-Sep-2022	365 days	57 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Biopsy)										
LDPE bag EDC-D_PERT-6_2022-08	E512	03-Aug-2022	27-Sep-2022	----	----		28-Sep-2022	365 days	57 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Biopsy)										
LDPE bag HAC-D_PERT-1_2022-08	E512	05-Aug-2022	23-Sep-2022	----	----		30-Sep-2022	365 days	57 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag HAC-R1_PERT-1_2022-08	E511	10-Aug-2022	23-Sep-2022	----	----		24-Sep-2022	365 days	46 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag HAC-R1_PERT-2_2022-08	E511	10-Aug-2022	23-Sep-2022	----	----		24-Sep-2022	365 days	46 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag HAC-R1_PERT-3_2022-08	E511	10-Aug-2022	23-Sep-2022	----	----		24-Sep-2022	365 days	46 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag HAC-R1_PERT-4_2022-08	E511	10-Aug-2022	23-Sep-2022	----	----		24-Sep-2022	365 days	46 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag HAC-R1_PERT-5_2022-08	E511	10-Aug-2022	23-Sep-2022	----	----		24-Sep-2022	365 days	46 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag HAC-R1_PERT-6_2022-08	E511	10-Aug-2022	23-Sep-2022	----	----		24-Sep-2022	365 days	46 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag HAC-R1_PERT-7_2022-08	E511	10-Aug-2022	23-Sep-2022	----	----		24-Sep-2022	365 days	46 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag HAC-R1_PERT-8_2022-08	E511	10-Aug-2022	23-Sep-2022	----	----		24-Sep-2022	365 days	46 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag E1_PERT-6_2022-08	E511	12-Aug-2022	29-Sep-2022	----	----		29-Sep-2022	365 days	48 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag E1_PERT-7_2022-08	E511	12-Aug-2022	29-Sep-2022	----	----		29-Sep-2022	365 days	48 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag E1_PERT-8_2022-08	E511	12-Aug-2022	29-Sep-2022	----	----		29-Sep-2022	365 days	48 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag HAC-R1_INV-1_2022-08	E511	10-Aug-2022	29-Sep-2022	----	----		29-Sep-2022	365 days	50 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag HAC-R1_INV-2_2022-08	E511	10-Aug-2022	29-Sep-2022	----	----		29-Sep-2022	365 days	50 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag HAC-R1_INV-3_2022-08	E511	10-Aug-2022	29-Sep-2022	----	----		29-Sep-2022	365 days	50 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag HAC-R1_INV-4_2022-08	E511	10-Aug-2022	29-Sep-2022	----	----		29-Sep-2022	365 days	50 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag HAC-R1_INV-5_2022-08	E511	10-Aug-2022	29-Sep-2022	----	----		29-Sep-2022	365 days	50 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag HAC-R1_INV-6_2022-08	E511	10-Aug-2022	29-Sep-2022	----	----		29-Sep-2022	365 days	50 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag HAC-R1_INV-7_2022-08	E511	10-Aug-2022	29-Sep-2022	----	----		29-Sep-2022	365 days	50 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag HAC-R1_INV-8_2022-08	E511	10-Aug-2022	29-Sep-2022	----	----		29-Sep-2022	365 days	50 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag HAC-U_PERT-1_2022-08	E511	06-Aug-2022	23-Sep-2022	----	----		24-Sep-2022	365 days	50 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag HAC-U_PERT-2_2022-08	E511	06-Aug-2022	23-Sep-2022	----	----		24-Sep-2022	365 days	50 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag HAC-U_PERT-3_2022-08	E511	06-Aug-2022	23-Sep-2022	----	----		24-Sep-2022	365 days	50 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag HAC-U_PERT-4_2022-08	E511	06-Aug-2022	23-Sep-2022	----	----		24-Sep-2022	365 days	50 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag HAC-U_PERT-7_2022-08	E511	06-Aug-2022	23-Sep-2022	----	----		24-Sep-2022	365 days	50 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag HAC-D_PERT-2_2022-08	E511	05-Aug-2022	23-Sep-2022	----	----		24-Sep-2022	365 days	51 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag HAC-D_PERT-3_2022-08	E511	05-Aug-2022	23-Sep-2022	----	----		24-Sep-2022	365 days	51 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag HAC-D_PERT-4_2022-08	E511	05-Aug-2022	23-Sep-2022	----	----		24-Sep-2022	365 days	51 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag HAC-U_PERT-5_2022-08	E511	05-Aug-2022	23-Sep-2022	----	----		24-Sep-2022	365 days	51 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag HAC-U_PERT-6_2022-08	E511	05-Aug-2022	23-Sep-2022	----	----		24-Sep-2022	365 days	51 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag HAC-U_PERT-8_2022-08	E511	05-Aug-2022	23-Sep-2022	----	----		24-Sep-2022	365 days	51 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag EDC-U_INV-1_2022-08	E511	08-Aug-2022	28-Sep-2022	----	----		29-Sep-2022	365 days	52 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag EDC-U_PERT-1_2022-08	E511	08-Aug-2022	27-Sep-2022	----	----		28-Sep-2022	365 days	52 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag EDC-U_INV-2_2022-08	E511	07-Aug-2022	28-Sep-2022	----	----		29-Sep-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag EDC-U_INV-3_2022-08	E511	07-Aug-2022	28-Sep-2022	----	----		29-Sep-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag EDC-U_INV-4_2022-08	E511	07-Aug-2022	28-Sep-2022	----	----		29-Sep-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag EDC-U_INV-5_2022-08	E511	07-Aug-2022	28-Sep-2022	----	----		29-Sep-2022	365 days	53 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag EDC-U_INV-6_2022-08	E511	07-Aug-2022	28-Sep-2022	----	----		29-Sep-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag EDC-U_INV-7_2022-08	E511	07-Aug-2022	28-Sep-2022	----	----		29-Sep-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag EDC-U_INV-8_2022-08	E511	07-Aug-2022	28-Sep-2022	----	----		29-Sep-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag EDC-U_PERT-2_2022-08	E511	07-Aug-2022	27-Sep-2022	----	----		28-Sep-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag EDC-U_PERT-4_2022-08	E511	07-Aug-2022	27-Sep-2022	----	----		28-Sep-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag EDC-U_PERT-5_2022-08	E511	07-Aug-2022	27-Sep-2022	----	----		28-Sep-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag EDC-U_PERT-6_2022-08	E511	07-Aug-2022	27-Sep-2022	----	----		28-Sep-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag EDC-U_PERT-7_2022-08	E511	07-Aug-2022	27-Sep-2022	----	----		28-Sep-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag EDC-U_PERT-8_2022-08	E511	07-Aug-2022	27-Sep-2022	----	----		28-Sep-2022	365 days	53 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag HAC-U_INV-1_2022-08	E511	06-Aug-2022	29-Sep-2022	----	----		29-Sep-2022	365 days	54 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag HAC-U_INV-2_2022-08	E511	06-Aug-2022	29-Sep-2022	----	----		29-Sep-2022	365 days	54 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag HAC-U_INV-3_2022-08	E511	06-Aug-2022	29-Sep-2022	----	----		29-Sep-2022	365 days	54 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag HAC-U_INV-4_2022-08	E511	06-Aug-2022	29-Sep-2022	----	----		29-Sep-2022	365 days	54 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag HAC-U_INV-7_2022-08	E511	06-Aug-2022	28-Sep-2022	----	----		29-Sep-2022	365 days	54 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag E1_PERT-3_2022-08	E511	05-Aug-2022	29-Sep-2022	----	----		29-Sep-2022	365 days	55 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag HAC-D_INV-1_2022-08	E511	05-Aug-2022	28-Sep-2022	----	----		29-Sep-2022	365 days	55 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag HAC-D_INV-2_2022-08	E511	05-Aug-2022	28-Sep-2022	----	----		29-Sep-2022	365 days	55 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag HAC-D_INV-3_2022-08	E511	05-Aug-2022	28-Sep-2022	----	----		29-Sep-2022	365 days	55 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag HAC-D_INV-4_2022-08	E511	05-Aug-2022	28-Sep-2022	----	----		29-Sep-2022	365 days	55 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag HAC-D_INV-5_2022-08	E511	05-Aug-2022	28-Sep-2022	----	----		29-Sep-2022	365 days	55 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag HAC-D_INV-6_2022-08	E511	05-Aug-2022	28-Sep-2022	----	----		29-Sep-2022	365 days	55 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag HAC-D_INV-7_2022-08	E511	05-Aug-2022	28-Sep-2022	----	----		29-Sep-2022	365 days	55 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag HAC-D_INV-8_2022-08	E511	05-Aug-2022	28-Sep-2022	----	----		29-Sep-2022	365 days	55 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag HAC-D_PERT-5_2022-08	E511	05-Aug-2022	27-Sep-2022	----	----		28-Sep-2022	365 days	55 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag HAC-D_PERT-6_2022-08	E511	05-Aug-2022	27-Sep-2022	----	----		28-Sep-2022	365 days	55 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag HAC-D_PERT-7_2022-08	E511	05-Aug-2022	27-Sep-2022	----	----		28-Sep-2022	365 days	55 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag HAC-D_PERT-8_2022-08	E511	05-Aug-2022	27-Sep-2022	----	----		28-Sep-2022	365 days	55 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag HAC-U_INV-5_2022-08	E511	05-Aug-2022	28-Sep-2022	----	----		29-Sep-2022	365 days	55 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag HAC-U_INV-6_2022-08	E511	05-Aug-2022	28-Sep-2022	----	----		29-Sep-2022	365 days	55 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag HAC-U_INV-8_2022-08	E511	05-Aug-2022	28-Sep-2022	----	----		29-Sep-2022	365 days	55 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag E1_PERT-5_2022-08	E511	04-Aug-2022	29-Sep-2022	----	----		29-Sep-2022	365 days	56 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag EDC-D_PERT-1_2022-08	E511	04-Aug-2022	27-Sep-2022	----	----		28-Sep-2022	365 days	56 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag EDC-D_PERT-2_2022-08	E511	04-Aug-2022	27-Sep-2022	----	----		28-Sep-2022	365 days	56 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag HAC-R1_INVCAD-1_2022-08	E511	10-Aug-2022	05-Oct-2022	----	----		05-Oct-2022	365 days	56 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag HAC-R1_INVCAD-2_2022-08	E511	10-Aug-2022	05-Oct-2022	----	----		05-Oct-2022	365 days	56 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag HAC-R1_INVCAD-3_2022-08	E511	10-Aug-2022	05-Oct-2022	----	----		05-Oct-2022	365 days	56 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag HAC-R1_INVCAD-4_2022-08	E511	10-Aug-2022	05-Oct-2022	----	----		05-Oct-2022	365 days	56 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag EDC-D_PERT-3_2022-08	E511	03-Aug-2022	27-Sep-2022	----	----		28-Sep-2022	365 days	57 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag EDC-D_PERT-4_2022-08	E511	03-Aug-2022	27-Sep-2022	----	----		28-Sep-2022	365 days	57 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag EDC-D_PERT-7_2022-08	E511	03-Aug-2022	27-Sep-2022	----	----		28-Sep-2022	365 days	57 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag EDC-D_PERT-8_2022-08	E511	03-Aug-2022	27-Sep-2022	----	----		28-Sep-2022	365 days	57 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag EDC-U_INVCAD-1_2022-08	E511	08-Aug-2022	04-Oct-2022	----	----		04-Oct-2022	365 days	58 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag HAC-R1_INVCAD-5_2022-08	E511	10-Aug-2022	06-Oct-2022	----	----		06-Oct-2022	365 days	58 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag HAC-R1_INVCAD-6_2022-08	E511	10-Aug-2022	06-Oct-2022	----	----		06-Oct-2022	365 days	58 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag HAC-R1_INVCAD-7_2022-08	E511	10-Aug-2022	06-Oct-2022	----	----		06-Oct-2022	365 days	58 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag HAC-R1_INVCAD-8_2022-08	E511	10-Aug-2022	06-Oct-2022	----	----		06-Oct-2022	365 days	58 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag EDC-U_INVCAD-2_2022-08	E511	07-Aug-2022	04-Oct-2022	----	----		04-Oct-2022	365 days	59 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag EDC-U_INVCAD-3_2022-08	E511	07-Aug-2022	04-Oct-2022	----	----		04-Oct-2022	365 days	59 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag EDC-U_INVCAD-4_2022-08	E511	07-Aug-2022	04-Oct-2022	----	----		04-Oct-2022	365 days	59 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag EDC-U_INVCAD-5_2022-08	E511	07-Aug-2022	04-Oct-2022	----	----		04-Oct-2022	365 days	59 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag EDC-U_INVCAD-6_2022-08	E511	07-Aug-2022	04-Oct-2022	----	----		04-Oct-2022	365 days	59 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag EDC-U_INVCAD-7_2022-08	E511	07-Aug-2022	04-Oct-2022	----	----		04-Oct-2022	365 days	59 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag EDC-U_INVCAD-8_2022-08	E511	07-Aug-2022	04-Oct-2022	----	----		04-Oct-2022	365 days	59 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag HAC-R1_INV-7X_2022-08	E511	10-Aug-2022	06-Oct-2022	----	----		07-Oct-2022	365 days	59 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag HAC-R1_INV-8X_2022-08	E511	10-Aug-2022	06-Oct-2022	----	----		07-Oct-2022	365 days	59 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag HAC-R1_INVCAD-7X_2022-08	E511	10-Aug-2022	06-Oct-2022	----	----		07-Oct-2022	365 days	59 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag HAC-R1_INVCAD-8X_2022-08	E511	10-Aug-2022	06-Oct-2022	----	----		07-Oct-2022	365 days	59 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag HAC-R1_PERT-7X_2022-08	E511	10-Aug-2022	06-Oct-2022	----	----		07-Oct-2022	365 days	59 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag HAC-R1_PERT-8X_2022-08	E511	10-Aug-2022	06-Oct-2022	----	----		07-Oct-2022	365 days	59 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag E1_INV-1_2022-08	E511	05-Aug-2022	05-Oct-2022	----	----		05-Oct-2022	365 days	61 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag E1_INVCAD-1_2022-08	E511	05-Aug-2022	04-Oct-2022	----	----		04-Oct-2022	365 days	61 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag E1_INVCAD-2_2022-08	E511	05-Aug-2022	04-Oct-2022	----	----		04-Oct-2022	365 days	61 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag E1_INVCAD-3_2022-08	E511	05-Aug-2022	04-Oct-2022	----	----		04-Oct-2022	365 days	61 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag E2_INV-2_2022-08	E511	05-Aug-2022	05-Oct-2022	----	----		05-Oct-2022	365 days	61 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag E3_INV-3_2022-08	E511	05-Aug-2022	05-Oct-2022	----	----		05-Oct-2022	365 days	61 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag E1_INVCAD-4_2022-08	E511	04-Aug-2022	04-Oct-2022	----	----		04-Oct-2022	365 days	62 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag E4_INV-4_2022-08	E511	04-Aug-2022	05-Oct-2022	----	----		05-Oct-2022	365 days	62 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag E5_INV-5_2022-08	E511	04-Aug-2022	05-Oct-2022	----	----		05-Oct-2022	365 days	62 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag E6_INV-6_2022-08	E511	04-Aug-2022	05-Oct-2022	----	----		05-Oct-2022	365 days	62 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag E7_INV-7_2022-08	E511	04-Aug-2022	05-Oct-2022	----	----		05-Oct-2022	365 days	62 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag E8_INV-8_2022-08	E511	04-Aug-2022	05-Oct-2022	----	----		05-Oct-2022	365 days	62 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag EDC-D_INV-1_2022-08	E511	04-Aug-2022	05-Oct-2022	----	----		05-Oct-2022	365 days	62 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag EDC-D_INV-2_2022-08	E511	04-Aug-2022	05-Oct-2022	----	----		05-Oct-2022	365 days	62 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag EDC-D_INVCAD-1_2022-08	E511	04-Aug-2022	04-Oct-2022	----	----		04-Oct-2022	365 days	62 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag EDC-D_INVCAD-2_2022-08	E511	04-Aug-2022	04-Oct-2022	----	----		04-Oct-2022	365 days	62 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag HAC-U_INVCAD-1_2022-08	E511	06-Aug-2022	06-Oct-2022	----	----		06-Oct-2022	365 days	62 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag HAC-U_INVCAD-2_2022-08	E511	06-Aug-2022	06-Oct-2022	----	----		06-Oct-2022	365 days	62 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag HAC-U_INVCAD-3_2022-08	E511	06-Aug-2022	06-Oct-2022	----	----		06-Oct-2022	365 days	62 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag HAC-U_INVCAD-4_2022-08	E511	06-Aug-2022	06-Oct-2022	----	----		06-Oct-2022	365 days	62 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag HAC-U_INVCAD-7_2022-08	E511	06-Aug-2022	06-Oct-2022	----	----		06-Oct-2022	365 days	62 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag EDC-D_INV-3_2022-08	E511	03-Aug-2022	05-Oct-2022	----	----		05-Oct-2022	365 days	63 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag EDC-D_INV-4_2022-08	E511	03-Aug-2022	05-Oct-2022	----	----		05-Oct-2022	365 days	63 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag EDC-D_INV-5_2022-08	E511	03-Aug-2022	05-Oct-2022	----	----		05-Oct-2022	365 days	63 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag EDC-D_INV-6_2022-08	E511	03-Aug-2022	05-Oct-2022	----	----		05-Oct-2022	365 days	63 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag EDC-D_INV-7_2022-08	E511	03-Aug-2022	05-Oct-2022	----	----		05-Oct-2022	365 days	63 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag EDC-D_INV-8_2022-08	E511	03-Aug-2022	05-Oct-2022	----	----		05-Oct-2022	365 days	63 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag EDC-D_INVCAD-3_2022-08	E511	03-Aug-2022	04-Oct-2022	----	----		04-Oct-2022	365 days	63 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag EDC-D_INVCAD-4_2022-08	E511	03-Aug-2022	04-Oct-2022	----	----		04-Oct-2022	365 days	63 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag EDC-D_INVCAD-5_2022-08	E511	03-Aug-2022	04-Oct-2022	----	----		04-Oct-2022	365 days	63 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag EDC-D_INVCAD-6_2022-08	E511	03-Aug-2022	04-Oct-2022	----	----		04-Oct-2022	365 days	63 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag EDC-D_INVCAD-7_2022-08	E511	03-Aug-2022	04-Oct-2022	----	----		04-Oct-2022	365 days	63 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag EDC-D_INVCAD-8_2022-08	E511	03-Aug-2022	04-Oct-2022	----	----		04-Oct-2022	365 days	63 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag HAC-D_INVCAD-1_2022-08	E511	05-Aug-2022	06-Oct-2022	----	----		06-Oct-2022	365 days	63 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag HAC-D_INVCAD-2_2022-08	E511	05-Aug-2022	06-Oct-2022	----	----		06-Oct-2022	365 days	63 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag HAC-D_INVCAD-3_2022-08	E511	05-Aug-2022	06-Oct-2022	----	----		06-Oct-2022	365 days	63 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag HAC-D_INVCAD-4_2022-08	E511	05-Aug-2022	06-Oct-2022	----	----		06-Oct-2022	365 days	63 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag HAC-D_INVCAD-5_2022-08	E511	05-Aug-2022	06-Oct-2022	----	----		06-Oct-2022	365 days	63 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag HAC-D_INVCAD-6_2022-08	E511	05-Aug-2022	06-Oct-2022	----	----		06-Oct-2022	365 days	63 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag HAC-D_INVCAD-7_2022-08	E511	05-Aug-2022	06-Oct-2022	----	----		06-Oct-2022	365 days	63 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag HAC-D_INVCAD-8_2022-08	E511	05-Aug-2022	06-Oct-2022	----	----		06-Oct-2022	365 days	63 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag HAC-U_INVCAD-5_2022-08	E511	05-Aug-2022	06-Oct-2022	----	----		06-Oct-2022	365 days	63 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag HAC-U_INVCAD-6_2022-08	E511	05-Aug-2022	06-Oct-2022	----	----		06-Oct-2022	365 days	63 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag HAC-U_INVCAD-8_2022-08	E511	05-Aug-2022	06-Oct-2022	----	----		06-Oct-2022	365 days	63 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag HAC-D_INV-7X_2022-08	E511	05-Aug-2022	06-Oct-2022	----	----		07-Oct-2022	365 days	64 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag HAC-D_INVCAD-7X_2022-08	E511	05-Aug-2022	06-Oct-2022	----	----		07-Oct-2022	365 days	64 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag HAC-D_PERT-7X_2022-08	E511	05-Aug-2022	06-Oct-2022	----	----		07-Oct-2022	365 days	64 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag E1_INV-5X_2022-08	E511	04-Aug-2022	06-Oct-2022	----	----		07-Oct-2022	365 days	65 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag E1_INV-7X_2022-08	E511	04-Aug-2022	06-Oct-2022	----	----		07-Oct-2022	365 days	65 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag E1_INVCAD-5_2022-08	E511	04-Aug-2022	06-Oct-2022	----	----		07-Oct-2022	365 days	65 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag E1_INVCAD-5X_2022-08	E511	04-Aug-2022	06-Oct-2022	----	----		07-Oct-2022	365 days	65 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag E1_INVCAD-6_2022-08	E511	04-Aug-2022	06-Oct-2022	----	----		07-Oct-2022	365 days	65 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag E1_INVCAD-7_2022-08	E511	04-Aug-2022	06-Oct-2022	----	----		07-Oct-2022	365 days	65 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag E1_INVCAD-7X_2022-08	E511	04-Aug-2022	06-Oct-2022	----	----		07-Oct-2022	365 days	65 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag E1_INVCAD-8_2022-08	E511	04-Aug-2022	06-Oct-2022	----	----		07-Oct-2022	365 days	65 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag E1_PERT-5X_2022-08	E511	04-Aug-2022	06-Oct-2022	----	----		07-Oct-2022	365 days	65 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag E1_PERT-7X_2022-08	E511	04-Aug-2022	06-Oct-2022	----	----		07-Oct-2022	365 days	65 days	✓
Metals : Metals by CRC ICPMS (DRY units, Biopsy)										
LDPE bag HAC-D_PERT-1_2022-08	E475	05-Aug-2022	23-Sep-2022	----	----		24-Sep-2022	730 days	51 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Metals by CRC ICPMS (DRY units, Biopsy)										
LDPE bag EDC-U_PERT-3_2022-08	E475	07-Aug-2022	27-Sep-2022	----	----		27-Sep-2022	730 days	52 days	✓
Metals : Metals by CRC ICPMS (DRY units, Biopsy)										
LDPE bag E1_PERT-1_2022-08	E475	05-Aug-2022	29-Sep-2022	----	----		30-Sep-2022	730 days	56 days	✓
Metals : Metals by CRC ICPMS (DRY units, Biopsy)										
LDPE bag E1_PERT-2_2022-08	E475	05-Aug-2022	29-Sep-2022	----	----		30-Sep-2022	730 days	56 days	✓
Metals : Metals by CRC ICPMS (DRY units, Biopsy)										
LDPE bag EDC-D_PERT-5_2022-08	E475	03-Aug-2022	27-Sep-2022	----	----		27-Sep-2022	730 days	56 days	✓
Metals : Metals by CRC ICPMS (DRY units, Biopsy)										
LDPE bag EDC-D_PERT-6_2022-08	E475	03-Aug-2022	27-Sep-2022	----	----		27-Sep-2022	730 days	56 days	✓
Metals : Metals by CRC ICPMS (DRY units, Biopsy)										
LDPE bag E1_PERT-4_2022-08	E475	04-Aug-2022	29-Sep-2022	----	----		30-Sep-2022	730 days	57 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-R1_PERT-1_2022-08	E472	10-Aug-2022	23-Sep-2022	----	----		24-Sep-2022	730 days	46 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-R1_PERT-2_2022-08	E472	10-Aug-2022	23-Sep-2022	----	----		24-Sep-2022	730 days	46 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-R1_PERT-3_2022-08	E472	10-Aug-2022	23-Sep-2022	----	----		24-Sep-2022	730 days	46 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-R1_PERT-4_2022-08	E472	10-Aug-2022	23-Sep-2022	----	----		24-Sep-2022	730 days	46 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-R1_PERT-5_2022-08	E472	10-Aug-2022	23-Sep-2022	----	----		24-Sep-2022	730 days	46 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-R1_PERT-6_2022-08	E472	10-Aug-2022	23-Sep-2022	----	----		24-Sep-2022	730 days	46 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-R1_PERT-7_2022-08	E472	10-Aug-2022	23-Sep-2022	----	----		24-Sep-2022	730 days	46 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-R1_PERT-8_2022-08	E472	10-Aug-2022	23-Sep-2022	----	----		24-Sep-2022	730 days	46 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag E1_PERT-6_2022-08	E472	12-Aug-2022	29-Sep-2022	----	----		30-Sep-2022	730 days	49 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag E1_PERT-7_2022-08	E472	12-Aug-2022	29-Sep-2022	----	----		30-Sep-2022	730 days	49 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag E1_PERT-8_2022-08	E472	12-Aug-2022	29-Sep-2022	----	----		30-Sep-2022	730 days	49 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-U_PERT-1_2022-08	E472	06-Aug-2022	23-Sep-2022	----	----		24-Sep-2022	730 days	50 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-U_PERT-2_2022-08	E472	06-Aug-2022	23-Sep-2022	----	----		24-Sep-2022	730 days	50 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-U_PERT-3_2022-08	E472	06-Aug-2022	23-Sep-2022	----	----		24-Sep-2022	730 days	50 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-U_PERT-4_2022-08	E472	06-Aug-2022	23-Sep-2022	----	----		24-Sep-2022	730 days	50 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-U_PERT-7_2022-08	E472	06-Aug-2022	23-Sep-2022	----	----		24-Sep-2022	730 days	50 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-U_PERT-1_2022-08	E472	08-Aug-2022	27-Sep-2022	----	----		27-Sep-2022	730 days	51 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-D_PERT-2_2022-08	E472	05-Aug-2022	23-Sep-2022	----	----		24-Sep-2022	730 days	51 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-D_PERT-3_2022-08	E472	05-Aug-2022	23-Sep-2022	----	----		24-Sep-2022	730 days	51 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-D_PERT-4_2022-08	E472	05-Aug-2022	23-Sep-2022	----	----		24-Sep-2022	730 days	51 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-R1_INV-1_2022-08	E472	10-Aug-2022	29-Sep-2022	----	----		30-Sep-2022	730 days	51 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-R1_INV-2_2022-08	E472	10-Aug-2022	29-Sep-2022	----	----		30-Sep-2022	730 days	51 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-R1_INV-3_2022-08	E472	10-Aug-2022	29-Sep-2022	----	----		30-Sep-2022	730 days	51 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-R1_INV-4_2022-08	E472	10-Aug-2022	29-Sep-2022	----	----		30-Sep-2022	730 days	51 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-R1_INV-5_2022-08	E472	10-Aug-2022	29-Sep-2022	----	----		30-Sep-2022	730 days	51 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-R1_INV-6_2022-08	E472	10-Aug-2022	29-Sep-2022	----	----		30-Sep-2022	730 days	51 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-R1_INV-7_2022-08	E472	10-Aug-2022	29-Sep-2022	----	----		30-Sep-2022	730 days	51 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-R1_INV-8_2022-08	E472	10-Aug-2022	29-Sep-2022	----	----		30-Sep-2022	730 days	51 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-U_PERT-5_2022-08	E472	05-Aug-2022	23-Sep-2022	----	----		24-Sep-2022	730 days	51 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-U_PERT-6_2022-08	E472	05-Aug-2022	23-Sep-2022	----	----		24-Sep-2022	730 days	51 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-U_PERT-8_2022-08	E472	05-Aug-2022	23-Sep-2022	----	----		24-Sep-2022	730 days	51 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-U_INV-1_2022-08	E472	08-Aug-2022	28-Sep-2022	----	----		28-Sep-2022	730 days	52 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-U_PERT-2_2022-08	E472	07-Aug-2022	27-Sep-2022	----	----		27-Sep-2022	730 days	52 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-U_PERT-4_2022-08	E472	07-Aug-2022	27-Sep-2022	----	----		27-Sep-2022	730 days	52 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-U_PERT-5_2022-08	E472	07-Aug-2022	27-Sep-2022	----	----		27-Sep-2022	730 days	52 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-U_PERT-6_2022-08	E472	07-Aug-2022	27-Sep-2022	----	----		27-Sep-2022	730 days	52 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-U_PERT-7_2022-08	E472	07-Aug-2022	27-Sep-2022	----	----		27-Sep-2022	730 days	52 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-U_PERT-8_2022-08	E472	07-Aug-2022	27-Sep-2022	----	----		27-Sep-2022	730 days	52 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-U_INV-2_2022-08	E472	07-Aug-2022	28-Sep-2022	----	----		28-Sep-2022	730 days	53 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-U_INV-3_2022-08	E472	07-Aug-2022	28-Sep-2022	----	----		28-Sep-2022	730 days	53 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-U_INV-4_2022-08	E472	07-Aug-2022	28-Sep-2022	----	----		28-Sep-2022	730 days	53 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-U_INV-5_2022-08	E472	07-Aug-2022	28-Sep-2022	----	----		28-Sep-2022	730 days	53 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-U_INV-6_2022-08	E472	07-Aug-2022	28-Sep-2022	----	----		28-Sep-2022	730 days	53 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-U_INV-7_2022-08	E472	07-Aug-2022	28-Sep-2022	----	----		28-Sep-2022	730 days	53 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-U_INV-8_2022-08	E472	07-Aug-2022	28-Sep-2022	----	----		28-Sep-2022	730 days	53 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-D_PERT-5_2022-08	E472	05-Aug-2022	27-Sep-2022	----	----		27-Sep-2022	730 days	54 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-D_PERT-6_2022-08	E472	05-Aug-2022	27-Sep-2022	----	----		27-Sep-2022	730 days	54 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-D_PERT-7_2022-08	E472	05-Aug-2022	27-Sep-2022	----	----		27-Sep-2022	730 days	54 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-D_PERT-8_2022-08	E472	05-Aug-2022	27-Sep-2022	----	----		27-Sep-2022	730 days	54 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-U_INV-7_2022-08	E472	06-Aug-2022	28-Sep-2022	----	----		28-Sep-2022	730 days	54 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-D_PERT-1_2022-08	E472	04-Aug-2022	27-Sep-2022	----	----		27-Sep-2022	730 days	55 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-D_PERT-2_2022-08	E472	04-Aug-2022	27-Sep-2022	----	----		27-Sep-2022	730 days	55 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-D_INV-1_2022-08	E472	05-Aug-2022	28-Sep-2022	----	----		28-Sep-2022	730 days	55 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-D_INV-2_2022-08	E472	05-Aug-2022	28-Sep-2022	----	----		28-Sep-2022	730 days	55 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-D_INV-3_2022-08	E472	05-Aug-2022	28-Sep-2022	----	----		28-Sep-2022	730 days	55 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-D_INV-4_2022-08	E472	05-Aug-2022	28-Sep-2022	----	----		28-Sep-2022	730 days	55 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-D_INV-5_2022-08	E472	05-Aug-2022	28-Sep-2022	----	----		28-Sep-2022	730 days	55 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-D_INV-6_2022-08	E472	05-Aug-2022	28-Sep-2022	----	----		28-Sep-2022	730 days	55 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-D_INV-7_2022-08	E472	05-Aug-2022	28-Sep-2022	----	----		28-Sep-2022	730 days	55 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-D_INV-8_2022-08	E472	05-Aug-2022	28-Sep-2022	----	----		28-Sep-2022	730 days	55 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-U_INV-1_2022-08	E472	06-Aug-2022	29-Sep-2022	----	----		30-Sep-2022	730 days	55 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-U_INV-2_2022-08	E472	06-Aug-2022	29-Sep-2022	----	----		30-Sep-2022	730 days	55 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-U_INV-3_2022-08	E472	06-Aug-2022	29-Sep-2022	----	----		30-Sep-2022	730 days	55 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-U_INV-4_2022-08	E472	06-Aug-2022	29-Sep-2022	----	----		30-Sep-2022	730 days	55 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-U_INV-5_2022-08	E472	05-Aug-2022	28-Sep-2022	----	----		28-Sep-2022	730 days	55 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-U_INV-6_2022-08	E472	05-Aug-2022	28-Sep-2022	----	----		28-Sep-2022	730 days	55 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-U_INV-8_2022-08	E472	05-Aug-2022	28-Sep-2022	----	----		28-Sep-2022	730 days	55 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag E1_PERT-3_2022-08	E472	05-Aug-2022	29-Sep-2022	----	----		30-Sep-2022	730 days	56 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-D_PERT-3_2022-08	E472	03-Aug-2022	27-Sep-2022	----	----		27-Sep-2022	730 days	56 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-D_PERT-4_2022-08	E472	03-Aug-2022	27-Sep-2022	----	----		27-Sep-2022	730 days	56 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-D_PERT-7_2022-08	E472	03-Aug-2022	27-Sep-2022	----	----		27-Sep-2022	730 days	56 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-D_PERT-8_2022-08	E472	03-Aug-2022	27-Sep-2022	----	----		27-Sep-2022	730 days	56 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-R1_INVCAD-1_2022-08	E472	10-Aug-2022	05-Oct-2022	----	----		05-Oct-2022	730 days	56 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-R1_INVCAD-2_2022-08	E472	10-Aug-2022	05-Oct-2022	----	----		05-Oct-2022	730 days	56 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-R1_INVCAD-3_2022-08	E472	10-Aug-2022	05-Oct-2022	----	----		05-Oct-2022	730 days	56 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-R1_INVCAD-4_2022-08	E472	10-Aug-2022	05-Oct-2022	----	----		05-Oct-2022	730 days	56 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag E1_PERT-5_2022-08	E472	04-Aug-2022	29-Sep-2022	----	----		30-Sep-2022	730 days	57 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-U_INVCAD-1_2022-08	E472	08-Aug-2022	04-Oct-2022	----	----		04-Oct-2022	730 days	58 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-R1_INVCAD-5_2022-08	E472	10-Aug-2022	06-Oct-2022	----	----		06-Oct-2022	730 days	58 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-R1_INVCAD-6_2022-08	E472	10-Aug-2022	06-Oct-2022	----	----		06-Oct-2022	730 days	58 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-R1_INVCAD-7_2022-08	E472	10-Aug-2022	06-Oct-2022	----	----		06-Oct-2022	730 days	58 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-R1_INVCAD-8_2022-08	E472	10-Aug-2022	06-Oct-2022	----	----		06-Oct-2022	730 days	58 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-U_INVCAD-2_2022-08	E472	07-Aug-2022	04-Oct-2022	----	----		04-Oct-2022	730 days	59 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-U_INVCAD-3_2022-08	E472	07-Aug-2022	04-Oct-2022	----	----		04-Oct-2022	730 days	59 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-U_INVCAD-4_2022-08	E472	07-Aug-2022	04-Oct-2022	----	----		04-Oct-2022	730 days	59 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-U_INVCAD-5_2022-08	E472	07-Aug-2022	04-Oct-2022	----	----		04-Oct-2022	730 days	59 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-U_INVCAD-6_2022-08	E472	07-Aug-2022	04-Oct-2022	----	----		04-Oct-2022	730 days	59 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-U_INVCAD-7_2022-08	E472	07-Aug-2022	04-Oct-2022	----	----		04-Oct-2022	730 days	59 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-U_INVCAD-8_2022-08	E472	07-Aug-2022	04-Oct-2022	----	----		04-Oct-2022	730 days	59 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-R1_INV-7X_2022-08	E472	10-Aug-2022	06-Oct-2022	----	----		07-Oct-2022	730 days	59 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-R1_INV-8X_2022-08	E472	10-Aug-2022	06-Oct-2022	----	----		07-Oct-2022	730 days	59 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-R1_INVCAD-7X_2022-08	E472	10-Aug-2022	06-Oct-2022	----	----		07-Oct-2022	730 days	59 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-R1_INVCAD-8X_2022-08	E472	10-Aug-2022	06-Oct-2022	----	----		07-Oct-2022	730 days	59 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-R1_PERT-7X_2022-08	E472	10-Aug-2022	06-Oct-2022	----	----		07-Oct-2022	730 days	59 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-R1_PERT-8X_2022-08	E472	10-Aug-2022	06-Oct-2022	----	----		07-Oct-2022	730 days	59 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag E1_INV-1_2022-08	E472	05-Aug-2022	05-Oct-2022	----	----		05-Oct-2022	730 days	61 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag E1_INVCAD-1_2022-08	E472	05-Aug-2022	04-Oct-2022	----	----		04-Oct-2022	730 days	61 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag E1_INVCAD-2_2022-08	E472	05-Aug-2022	04-Oct-2022	----	----		04-Oct-2022	730 days	61 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag E1_INVCAD-3_2022-08	E472	05-Aug-2022	04-Oct-2022	----	----		04-Oct-2022	730 days	61 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag E2_INV-2_2022-08	E472	05-Aug-2022	05-Oct-2022	----	----		05-Oct-2022	730 days	61 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag E3_INV-3_2022-08	E472	05-Aug-2022	05-Oct-2022	----	----		05-Oct-2022	730 days	61 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag E1_INVCAD-4_2022-08	E472	04-Aug-2022	04-Oct-2022	----	----		04-Oct-2022	730 days	62 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag E4_INV-4_2022-08	E472	04-Aug-2022	05-Oct-2022	----	----		05-Oct-2022	730 days	62 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag E5_INV-5_2022-08	E472	04-Aug-2022	05-Oct-2022	----	----		05-Oct-2022	730 days	62 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag E6_INV-6_2022-08	E472	04-Aug-2022	05-Oct-2022	----	----		05-Oct-2022	730 days	62 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag E7_INV-7_2022-08	E472	04-Aug-2022	05-Oct-2022	----	----		05-Oct-2022	730 days	62 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag E8_INV-8_2022-08	E472	04-Aug-2022	05-Oct-2022	----	----		05-Oct-2022	730 days	62 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-D_INV-1_2022-08	E472	04-Aug-2022	05-Oct-2022	----	----		05-Oct-2022	730 days	62 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-D_INV-2_2022-08	E472	04-Aug-2022	05-Oct-2022	----	----		05-Oct-2022	730 days	62 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-D_INVCAD-1_2022-08	E472	04-Aug-2022	04-Oct-2022	----	----		04-Oct-2022	730 days	62 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-D_INVCAD-2_2022-08	E472	04-Aug-2022	04-Oct-2022	----	----		04-Oct-2022	730 days	62 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-U_INVCAD-1_2022-08	E472	06-Aug-2022	06-Oct-2022	----	----		06-Oct-2022	730 days	62 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-U_INVCAD-2_2022-08	E472	06-Aug-2022	06-Oct-2022	----	----		06-Oct-2022	730 days	62 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-U_INVCAD-3_2022-08	E472	06-Aug-2022	06-Oct-2022	----	----		06-Oct-2022	730 days	62 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-U_INVCAD-4_2022-08	E472	06-Aug-2022	06-Oct-2022	----	----		06-Oct-2022	730 days	62 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-U_INVCAD-7_2022-08	E472	06-Aug-2022	06-Oct-2022	----	----		06-Oct-2022	730 days	62 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-D_INV-3_2022-08	E472	03-Aug-2022	05-Oct-2022	----	----		05-Oct-2022	730 days	63 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-D_INV-4_2022-08	E472	03-Aug-2022	05-Oct-2022	----	----		05-Oct-2022	730 days	63 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-D_INV-5_2022-08	E472	03-Aug-2022	05-Oct-2022	----	----		05-Oct-2022	730 days	63 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-D_INV-6_2022-08	E472	03-Aug-2022	05-Oct-2022	----	----		05-Oct-2022	730 days	63 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-D_INV-7_2022-08	E472	03-Aug-2022	05-Oct-2022	----	----		05-Oct-2022	730 days	63 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-D_INV-8_2022-08	E472	03-Aug-2022	05-Oct-2022	----	----		05-Oct-2022	730 days	63 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-D_INVCAD-3_2022-08	E472	03-Aug-2022	04-Oct-2022	----	----		04-Oct-2022	730 days	63 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-D_INVCAD-4_2022-08	E472	03-Aug-2022	04-Oct-2022	----	----		04-Oct-2022	730 days	63 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-D_INVCAD-5_2022-08	E472	03-Aug-2022	04-Oct-2022	----	----		04-Oct-2022	730 days	63 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-D_INVCAD-6_2022-08	E472	03-Aug-2022	04-Oct-2022	----	----		04-Oct-2022	730 days	63 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-D_INVCAD-7_2022-08	E472	03-Aug-2022	04-Oct-2022	----	----		04-Oct-2022	730 days	63 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-D_INVCAD-8_2022-08	E472	03-Aug-2022	04-Oct-2022	----	----		04-Oct-2022	730 days	63 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-D_INVCAD-1_2022-08	E472	05-Aug-2022	06-Oct-2022	----	----		06-Oct-2022	730 days	63 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-D_INVCAD-2_2022-08	E472	05-Aug-2022	06-Oct-2022	----	----		06-Oct-2022	730 days	63 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-D_INVCAD-3_2022-08	E472	05-Aug-2022	06-Oct-2022	----	----		06-Oct-2022	730 days	63 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-D_INVCAD-4_2022-08	E472	05-Aug-2022	06-Oct-2022	----	----		06-Oct-2022	730 days	63 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-D_INVCAD-5_2022-08	E472	05-Aug-2022	06-Oct-2022	----	----		06-Oct-2022	730 days	63 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-D_INVCAD-6_2022-08	E472	05-Aug-2022	06-Oct-2022	----	----		06-Oct-2022	730 days	63 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-D_INVCAD-7_2022-08	E472	05-Aug-2022	06-Oct-2022	----	----		06-Oct-2022	730 days	63 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-D_INVCAD-8_2022-08	E472	05-Aug-2022	06-Oct-2022	----	----		06-Oct-2022	730 days	63 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-U_INVCAD-5_2022-08	E472	05-Aug-2022	06-Oct-2022	----	----		06-Oct-2022	730 days	63 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-U_INVCAD-6_2022-08	E472	05-Aug-2022	06-Oct-2022	----	----		06-Oct-2022	730 days	63 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-U_INVCAD-8_2022-08	E472	05-Aug-2022	06-Oct-2022	----	----		06-Oct-2022	730 days	63 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-D_INV-7X_2022-08	E472	05-Aug-2022	06-Oct-2022	----	----		07-Oct-2022	730 days	64 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-D_INVCAD-7X_2022-08	E472	05-Aug-2022	06-Oct-2022	----	----		07-Oct-2022	730 days	64 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-D_PERT-7X_2022-08	E472	05-Aug-2022	06-Oct-2022	----	----		07-Oct-2022	730 days	64 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag E1_INV-5X_2022-08	E472	04-Aug-2022	06-Oct-2022	----	----		07-Oct-2022	730 days	65 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag E1_INV-7X_2022-08	E472	04-Aug-2022	06-Oct-2022	----	----		07-Oct-2022	730 days	65 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag E1_INVCAD-5_2022-08	E472	04-Aug-2022	06-Oct-2022	----	----		07-Oct-2022	730 days	65 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag E1_INVCAD-5X_2022-08	E472	04-Aug-2022	06-Oct-2022	----	----		07-Oct-2022	730 days	65 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag E1_INVCAD-6_2022-08	E472	04-Aug-2022	06-Oct-2022	----	----		07-Oct-2022	730 days	65 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag E1_INVCAD-7_2022-08	E472	04-Aug-2022	06-Oct-2022	----	----		07-Oct-2022	730 days	65 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag E1_INVCAD-7X_2022-08	E472	04-Aug-2022	06-Oct-2022	----	----		07-Oct-2022	730 days	65 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag E1_INVCAD-8_2022-08	E472	04-Aug-2022	06-Oct-2022	----	----		07-Oct-2022	730 days	65 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag E1_PERT-5X_2022-08	E472	04-Aug-2022	06-Oct-2022	----	----		07-Oct-2022	730 days	65 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag E1_PERT-7X_2022-08	E472	04-Aug-2022	06-Oct-2022	----	----		07-Oct-2022	730 days	65 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag HAC-D_PERT-1_2022-08	E475.Ag	05-Aug-2022	23-Sep-2022	----	----		24-Sep-2022	730 days	51 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag EDC-U_PERT-3_2022-08	E475.Ag	07-Aug-2022	27-Sep-2022	----	----		27-Sep-2022	730 days	52 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag E1_PERT-1_2022-08	E475.Ag	05-Aug-2022	29-Sep-2022	----	----		30-Sep-2022	730 days	56 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag E1_PERT-2_2022-08	E475.Ag	05-Aug-2022	29-Sep-2022	----	----		30-Sep-2022	730 days	56 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Silver in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag EDC-D_PERT-5_2022-08	E475.Ag	03-Aug-2022	27-Sep-2022	----	----		27-Sep-2022	730 days	56 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag EDC-D_PERT-6_2022-08	E475.Ag	03-Aug-2022	27-Sep-2022	----	----		27-Sep-2022	730 days	56 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag E1_PERT-4_2022-08	E475.Ag	04-Aug-2022	29-Sep-2022	----	----		30-Sep-2022	730 days	57 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-R1_PERT-1_2022-08	E472.Ag	10-Aug-2022	23-Sep-2022	----	----		24-Sep-2022	730 days	46 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-R1_PERT-2_2022-08	E472.Ag	10-Aug-2022	23-Sep-2022	----	----		24-Sep-2022	730 days	46 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-R1_PERT-3_2022-08	E472.Ag	10-Aug-2022	23-Sep-2022	----	----		24-Sep-2022	730 days	46 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-R1_PERT-4_2022-08	E472.Ag	10-Aug-2022	23-Sep-2022	----	----		24-Sep-2022	730 days	46 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-R1_PERT-5_2022-08	E472.Ag	10-Aug-2022	23-Sep-2022	----	----		24-Sep-2022	730 days	46 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-R1_PERT-6_2022-08	E472.Ag	10-Aug-2022	23-Sep-2022	----	----		24-Sep-2022	730 days	46 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-R1_PERT-7_2022-08	E472.Ag	10-Aug-2022	23-Sep-2022	----	----		24-Sep-2022	730 days	46 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-R1_PERT-8_2022-08	E472.Ag	10-Aug-2022	23-Sep-2022	----	----		24-Sep-2022	730 days	46 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag E1_PERT-6_2022-08	E472.Ag	12-Aug-2022	29-Sep-2022	----	----		30-Sep-2022	730 days	49 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag E1_PERT-7_2022-08	E472.Ag	12-Aug-2022	29-Sep-2022	----	----		30-Sep-2022	730 days	49 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag E1_PERT-8_2022-08	E472.Ag	12-Aug-2022	29-Sep-2022	----	----		30-Sep-2022	730 days	49 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-U_PERT-1_2022-08	E472.Ag	06-Aug-2022	23-Sep-2022	----	----		24-Sep-2022	730 days	50 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-U_PERT-2_2022-08	E472.Ag	06-Aug-2022	23-Sep-2022	----	----		24-Sep-2022	730 days	50 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-U_PERT-3_2022-08	E472.Ag	06-Aug-2022	23-Sep-2022	----	----		24-Sep-2022	730 days	50 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-U_PERT-4_2022-08	E472.Ag	06-Aug-2022	23-Sep-2022	----	----		24-Sep-2022	730 days	50 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-U_PERT-7_2022-08	E472.Ag	06-Aug-2022	23-Sep-2022	----	----		24-Sep-2022	730 days	50 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-U_PERT-1_2022-08	E472.Ag	08-Aug-2022	27-Sep-2022	----	----		27-Sep-2022	730 days	51 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-D_PERT-2_2022-08	E472.Ag	05-Aug-2022	23-Sep-2022	----	----		24-Sep-2022	730 days	51 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-D_PERT-3_2022-08	E472.Ag	05-Aug-2022	23-Sep-2022	----	----		24-Sep-2022	730 days	51 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-D_PERT-4_2022-08	E472.Ag	05-Aug-2022	23-Sep-2022	----	----		24-Sep-2022	730 days	51 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-R1_INV-1_2022-08	E472.Ag	10-Aug-2022	29-Sep-2022	----	----		30-Sep-2022	730 days	51 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-R1_INV-2_2022-08	E472.Ag	10-Aug-2022	29-Sep-2022	----	----		30-Sep-2022	730 days	51 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-R1_INV-3_2022-08	E472.Ag	10-Aug-2022	29-Sep-2022	----	----		30-Sep-2022	730 days	51 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-R1_INV-4_2022-08	E472.Ag	10-Aug-2022	29-Sep-2022	----	----		30-Sep-2022	730 days	51 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-R1_INV-5_2022-08	E472.Ag	10-Aug-2022	29-Sep-2022	----	----		30-Sep-2022	730 days	51 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-R1_INV-6_2022-08	E472.Ag	10-Aug-2022	29-Sep-2022	----	----		30-Sep-2022	730 days	51 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-R1_INV-7_2022-08	E472.Ag	10-Aug-2022	29-Sep-2022	----	----		30-Sep-2022	730 days	51 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-R1_INV-8_2022-08	E472.Ag	10-Aug-2022	29-Sep-2022	----	----		30-Sep-2022	730 days	51 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-U_PERT-5_2022-08	E472.Ag	05-Aug-2022	23-Sep-2022	----	----		24-Sep-2022	730 days	51 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-U_PERT-6_2022-08	E472.Ag	05-Aug-2022	23-Sep-2022	----	----		24-Sep-2022	730 days	51 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-U_PERT-8_2022-08	E472.Ag	05-Aug-2022	23-Sep-2022	----	----		24-Sep-2022	730 days	51 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-U_INV-1_2022-08	E472.Ag	08-Aug-2022	28-Sep-2022	----	----		28-Sep-2022	730 days	52 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-U_PERT-2_2022-08	E472.Ag	07-Aug-2022	27-Sep-2022	----	----		27-Sep-2022	730 days	52 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-U_PERT-4_2022-08	E472.Ag	07-Aug-2022	27-Sep-2022	----	----		27-Sep-2022	730 days	52 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-U_PERT-5_2022-08	E472.Ag	07-Aug-2022	27-Sep-2022	----	----		27-Sep-2022	730 days	52 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-U_PERT-6_2022-08	E472.Ag	07-Aug-2022	27-Sep-2022	----	----		27-Sep-2022	730 days	52 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-U_PERT-7_2022-08	E472.Ag	07-Aug-2022	27-Sep-2022	----	----		27-Sep-2022	730 days	52 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-U_PERT-8_2022-08	E472.Ag	07-Aug-2022	27-Sep-2022	----	----		27-Sep-2022	730 days	52 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-U_INV-2_2022-08	E472.Ag	07-Aug-2022	28-Sep-2022	----	----		28-Sep-2022	730 days	53 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-U_INV-3_2022-08	E472.Ag	07-Aug-2022	28-Sep-2022	----	----		28-Sep-2022	730 days	53 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-U_INV-4_2022-08	E472.Ag	07-Aug-2022	28-Sep-2022	----	----		28-Sep-2022	730 days	53 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-U_INV-5_2022-08	E472.Ag	07-Aug-2022	28-Sep-2022	----	----		28-Sep-2022	730 days	53 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-U_INV-6_2022-08	E472.Ag	07-Aug-2022	28-Sep-2022	----	----		28-Sep-2022	730 days	53 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-U_INV-7_2022-08	E472.Ag	07-Aug-2022	28-Sep-2022	----	----		28-Sep-2022	730 days	53 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-U_INV-8_2022-08	E472.Ag	07-Aug-2022	28-Sep-2022	----	----		28-Sep-2022	730 days	53 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-D_PERT-5_2022-08	E472.Ag	05-Aug-2022	27-Sep-2022	----	----		27-Sep-2022	730 days	54 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-D_PERT-6_2022-08	E472.Ag	05-Aug-2022	27-Sep-2022	----	----		27-Sep-2022	730 days	54 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-D_PERT-7_2022-08	E472.Ag	05-Aug-2022	27-Sep-2022	----	----		27-Sep-2022	730 days	54 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-D_PERT-8_2022-08	E472.Ag	05-Aug-2022	27-Sep-2022	----	----		27-Sep-2022	730 days	54 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-U_INV-7_2022-08	E472.Ag	06-Aug-2022	28-Sep-2022	----	----		28-Sep-2022	730 days	54 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-D_PERT-1_2022-08	E472.Ag	04-Aug-2022	27-Sep-2022	----	----		27-Sep-2022	730 days	55 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag										
EDC-D_PERT-2_2022-08	E472.Ag	04-Aug-2022	27-Sep-2022	----	----		27-Sep-2022	730 days	55 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag										
HAC-D_INV-1_2022-08	E472.Ag	05-Aug-2022	28-Sep-2022	----	----		28-Sep-2022	730 days	55 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag										
HAC-D_INV-2_2022-08	E472.Ag	05-Aug-2022	28-Sep-2022	----	----		28-Sep-2022	730 days	55 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag										
HAC-D_INV-3_2022-08	E472.Ag	05-Aug-2022	28-Sep-2022	----	----		28-Sep-2022	730 days	55 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag										
HAC-D_INV-4_2022-08	E472.Ag	05-Aug-2022	28-Sep-2022	----	----		28-Sep-2022	730 days	55 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag										
HAC-D_INV-5_2022-08	E472.Ag	05-Aug-2022	28-Sep-2022	----	----		28-Sep-2022	730 days	55 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag										
HAC-D_INV-6_2022-08	E472.Ag	05-Aug-2022	28-Sep-2022	----	----		28-Sep-2022	730 days	55 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag										
HAC-D_INV-7_2022-08	E472.Ag	05-Aug-2022	28-Sep-2022	----	----		28-Sep-2022	730 days	55 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag										
HAC-D_INV-8_2022-08	E472.Ag	05-Aug-2022	28-Sep-2022	----	----		28-Sep-2022	730 days	55 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-U_INV-1_2022-08	E472.Ag	06-Aug-2022	29-Sep-2022	----	----		30-Sep-2022	730 days	55 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-U_INV-2_2022-08	E472.Ag	06-Aug-2022	29-Sep-2022	----	----		30-Sep-2022	730 days	55 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-U_INV-3_2022-08	E472.Ag	06-Aug-2022	29-Sep-2022	----	----		30-Sep-2022	730 days	55 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-U_INV-4_2022-08	E472.Ag	06-Aug-2022	29-Sep-2022	----	----		30-Sep-2022	730 days	55 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-U_INV-5_2022-08	E472.Ag	05-Aug-2022	28-Sep-2022	----	----		28-Sep-2022	730 days	55 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-U_INV-6_2022-08	E472.Ag	05-Aug-2022	28-Sep-2022	----	----		28-Sep-2022	730 days	55 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-U_INV-8_2022-08	E472.Ag	05-Aug-2022	28-Sep-2022	----	----		28-Sep-2022	730 days	55 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag E1_PERT-3_2022-08	E472.Ag	05-Aug-2022	29-Sep-2022	----	----		30-Sep-2022	730 days	56 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-D_PERT-3_2022-08	E472.Ag	03-Aug-2022	27-Sep-2022	----	----		27-Sep-2022	730 days	56 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-D_PERT-4_2022-08	E472.Ag	03-Aug-2022	27-Sep-2022	----	----		27-Sep-2022	730 days	56 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-D_PERT-7_2022-08	E472.Ag	03-Aug-2022	27-Sep-2022	----	----		27-Sep-2022	730 days	56 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-D_PERT-8_2022-08	E472.Ag	03-Aug-2022	27-Sep-2022	----	----		27-Sep-2022	730 days	56 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-R1_INVCAD-1_2022-08	E472.Ag	10-Aug-2022	05-Oct-2022	----	----		05-Oct-2022	730 days	56 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-R1_INVCAD-2_2022-08	E472.Ag	10-Aug-2022	05-Oct-2022	----	----		05-Oct-2022	730 days	56 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-R1_INVCAD-3_2022-08	E472.Ag	10-Aug-2022	05-Oct-2022	----	----		05-Oct-2022	730 days	56 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-R1_INVCAD-4_2022-08	E472.Ag	10-Aug-2022	05-Oct-2022	----	----		05-Oct-2022	730 days	56 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag E1_PERT-5_2022-08	E472.Ag	04-Aug-2022	29-Sep-2022	----	----		30-Sep-2022	730 days	57 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-U_INVCAD-1_2022-08	E472.Ag	08-Aug-2022	04-Oct-2022	----	----		04-Oct-2022	730 days	58 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-R1_INVCAD-5_2022-08	E472.Ag	10-Aug-2022	06-Oct-2022	----	----		06-Oct-2022	730 days	58 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-R1_INVCAD-6_2022-08	E472.Ag	10-Aug-2022	06-Oct-2022	----	----		06-Oct-2022	730 days	58 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-R1_INVCAD-7_2022-08	E472.Ag	10-Aug-2022	06-Oct-2022	----	----		06-Oct-2022	730 days	58 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-R1_INVCAD-8_2022-08	E472.Ag	10-Aug-2022	06-Oct-2022	----	----		06-Oct-2022	730 days	58 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-U_INVCAD-2_2022-08	E472.Ag	07-Aug-2022	04-Oct-2022	----	----		04-Oct-2022	730 days	59 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-U_INVCAD-3_2022-08	E472.Ag	07-Aug-2022	04-Oct-2022	----	----		04-Oct-2022	730 days	59 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-U_INVCAD-4_2022-08	E472.Ag	07-Aug-2022	04-Oct-2022	----	----		04-Oct-2022	730 days	59 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-U_INVCAD-5_2022-08	E472.Ag	07-Aug-2022	04-Oct-2022	----	----		04-Oct-2022	730 days	59 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-U_INVCAD-6_2022-08	E472.Ag	07-Aug-2022	04-Oct-2022	----	----		04-Oct-2022	730 days	59 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-U_INVCAD-7_2022-08	E472.Ag	07-Aug-2022	04-Oct-2022	----	----		04-Oct-2022	730 days	59 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-U_INVCAD-8_2022-08	E472.Ag	07-Aug-2022	04-Oct-2022	----	----		04-Oct-2022	730 days	59 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-R1_INV-7X_2022-08	E472.Ag	10-Aug-2022	06-Oct-2022	----	----		07-Oct-2022	730 days	59 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-R1_INV-8X_2022-08	E472.Ag	10-Aug-2022	06-Oct-2022	----	----		07-Oct-2022	730 days	59 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-R1_INVCAD-7X_2022-08	E472.Ag	10-Aug-2022	06-Oct-2022	----	----		07-Oct-2022	730 days	59 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-R1_INVCAD-8X_2022-08	E472.Ag	10-Aug-2022	06-Oct-2022	----	----		07-Oct-2022	730 days	59 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-R1_PERT-7X_2022-08	E472.Ag	10-Aug-2022	06-Oct-2022	----	----		07-Oct-2022	730 days	59 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-R1_PERT-8X_2022-08	E472.Ag	10-Aug-2022	06-Oct-2022	----	----		07-Oct-2022	730 days	59 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag E1_INV-1_2022-08	E472.Ag	05-Aug-2022	05-Oct-2022	----	----		05-Oct-2022	730 days	61 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag E1_INVCAD-1_2022-08	E472.Ag	05-Aug-2022	04-Oct-2022	----	----		04-Oct-2022	730 days	61 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag E1_INVCAD-2_2022-08	E472.Ag	05-Aug-2022	04-Oct-2022	----	----		04-Oct-2022	730 days	61 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag E1_INVCAD-3_2022-08	E472.Ag	05-Aug-2022	04-Oct-2022	----	----		04-Oct-2022	730 days	61 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag E2_INV-2_2022-08	E472.Ag	05-Aug-2022	05-Oct-2022	----	----		05-Oct-2022	730 days	61 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag E3_INV-3_2022-08	E472.Ag	05-Aug-2022	05-Oct-2022	----	----		05-Oct-2022	730 days	61 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag E1_INVCAD-4_2022-08	E472.Ag	04-Aug-2022	04-Oct-2022	----	----		04-Oct-2022	730 days	62 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag E4_INV-4_2022-08	E472.Ag	04-Aug-2022	05-Oct-2022	----	----		05-Oct-2022	730 days	62 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag E5_INV-5_2022-08	E472.Ag	04-Aug-2022	05-Oct-2022	----	----		05-Oct-2022	730 days	62 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag E6_INV-6_2022-08	E472.Ag	04-Aug-2022	05-Oct-2022	----	----		05-Oct-2022	730 days	62 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag E7_INV-7_2022-08	E472.Ag	04-Aug-2022	05-Oct-2022	----	----		05-Oct-2022	730 days	62 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag E8_INV-8_2022-08	E472.Ag	04-Aug-2022	05-Oct-2022	----	----		05-Oct-2022	730 days	62 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-D_INV-1_2022-08	E472.Ag	04-Aug-2022	05-Oct-2022	----	----		05-Oct-2022	730 days	62 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-D_INV-2_2022-08	E472.Ag	04-Aug-2022	05-Oct-2022	----	----		05-Oct-2022	730 days	62 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-D_INVCAD-1_2022-08	E472.Ag	04-Aug-2022	04-Oct-2022	----	----		04-Oct-2022	730 days	62 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-D_INVCAD-2_2022-08	E472.Ag	04-Aug-2022	04-Oct-2022	----	----		04-Oct-2022	730 days	62 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-U_INVCAD-1_2022-08	E472.Ag	06-Aug-2022	06-Oct-2022	----	----		06-Oct-2022	730 days	62 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-U_INVCAD-2_2022-08	E472.Ag	06-Aug-2022	06-Oct-2022	----	----		06-Oct-2022	730 days	62 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-U_INVCAD-3_2022-08	E472.Ag	06-Aug-2022	06-Oct-2022	----	----		06-Oct-2022	730 days	62 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-U_INVCAD-4_2022-08	E472.Ag	06-Aug-2022	06-Oct-2022	----	----		06-Oct-2022	730 days	62 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-U_INVCAD-7_2022-08	E472.Ag	06-Aug-2022	06-Oct-2022	----	----		06-Oct-2022	730 days	62 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-D_INV-3_2022-08	E472.Ag	03-Aug-2022	05-Oct-2022	----	----		05-Oct-2022	730 days	63 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-D_INV-4_2022-08	E472.Ag	03-Aug-2022	05-Oct-2022	----	----		05-Oct-2022	730 days	63 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-D_INV-5_2022-08	E472.Ag	03-Aug-2022	05-Oct-2022	----	----		05-Oct-2022	730 days	63 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-D_INV-6_2022-08	E472.Ag	03-Aug-2022	05-Oct-2022	----	----		05-Oct-2022	730 days	63 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-D_INV-7_2022-08	E472.Ag	03-Aug-2022	05-Oct-2022	----	----		05-Oct-2022	730 days	63 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-D_INV-8_2022-08	E472.Ag	03-Aug-2022	05-Oct-2022	----	----		05-Oct-2022	730 days	63 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-D_INVCAD-3_2022-08	E472.Ag	03-Aug-2022	04-Oct-2022	----	----		04-Oct-2022	730 days	63 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-D_INVCAD-4_2022-08	E472.Ag	03-Aug-2022	04-Oct-2022	----	----		04-Oct-2022	730 days	63 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-D_INVCAD-5_2022-08	E472.Ag	03-Aug-2022	04-Oct-2022	----	----		04-Oct-2022	730 days	63 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-D_INVCAD-6_2022-08	E472.Ag	03-Aug-2022	04-Oct-2022	----	----		04-Oct-2022	730 days	63 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-D_INVCAD-7_2022-08	E472.Ag	03-Aug-2022	04-Oct-2022	----	----		04-Oct-2022	730 days	63 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-D_INVCAD-8_2022-08	E472.Ag	03-Aug-2022	04-Oct-2022	----	----		04-Oct-2022	730 days	63 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-D_INVCAD-1_2022-08	E472.Ag	05-Aug-2022	06-Oct-2022	----	----		06-Oct-2022	730 days	63 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-D_INVCAD-2_2022-08	E472.Ag	05-Aug-2022	06-Oct-2022	----	----		06-Oct-2022	730 days	63 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-D_INVCAD-3_2022-08	E472.Ag	05-Aug-2022	06-Oct-2022	----	----		06-Oct-2022	730 days	63 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-D_INVCAD-4_2022-08	E472.Ag	05-Aug-2022	06-Oct-2022	----	----		06-Oct-2022	730 days	63 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-D_INVCAD-5_2022-08	E472.Ag	05-Aug-2022	06-Oct-2022	----	----		06-Oct-2022	730 days	63 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-D_INVCAD-6_2022-08	E472.Ag	05-Aug-2022	06-Oct-2022	----	----		06-Oct-2022	730 days	63 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-D_INVCAD-7_2022-08	E472.Ag	05-Aug-2022	06-Oct-2022	----	----		06-Oct-2022	730 days	63 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-D_INVCAD-8_2022-08	E472.Ag	05-Aug-2022	06-Oct-2022	----	----		06-Oct-2022	730 days	63 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-U_INVCAD-5_2022-08	E472.Ag	05-Aug-2022	06-Oct-2022	----	----		06-Oct-2022	730 days	63 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-U_INVCAD-6_2022-08	E472.Ag	05-Aug-2022	06-Oct-2022	----	----		06-Oct-2022	730 days	63 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-U_INVCAD-8_2022-08	E472.Ag	05-Aug-2022	06-Oct-2022	----	----		06-Oct-2022	730 days	63 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-D_INV-7X_2022-08	E472.Ag	05-Aug-2022	06-Oct-2022	----	----		07-Oct-2022	730 days	64 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-D_INVCAD-7X_2022-08	E472.Ag	05-Aug-2022	06-Oct-2022	----	----		07-Oct-2022	730 days	64 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-D_PERT-7X_2022-08	E472.Ag	05-Aug-2022	06-Oct-2022	----	----		07-Oct-2022	730 days	64 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag E1_INV-5X_2022-08	E472.Ag	04-Aug-2022	06-Oct-2022	----	----		07-Oct-2022	730 days	65 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag E1_INV-7X_2022-08	E472.Ag	04-Aug-2022	06-Oct-2022	----	----		07-Oct-2022	730 days	65 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag E1_INVCAD-5_2022-08	E472.Ag	04-Aug-2022	06-Oct-2022	----	----		07-Oct-2022	730 days	65 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag E1_INVCAD-5X_2022-08	E472.Ag	04-Aug-2022	06-Oct-2022	----	----		07-Oct-2022	730 days	65 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag E1_INVCAD-6_2022-08	E472.Ag	04-Aug-2022	06-Oct-2022	----	----		07-Oct-2022	730 days	65 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag E1_INVCAD-7_2022-08	E472.Ag	04-Aug-2022	06-Oct-2022	----	----		07-Oct-2022	730 days	65 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag E1_INVCAD-7X_2022-08	E472.Ag	04-Aug-2022	06-Oct-2022	----	----		07-Oct-2022	730 days	65 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag E1_INVCAD-8_2022-08	E472.Ag	04-Aug-2022	06-Oct-2022	----	----		07-Oct-2022	730 days	65 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag E1_PERT-5X_2022-08	E472.Ag	04-Aug-2022	06-Oct-2022	----	----		07-Oct-2022	730 days	65 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag E1_PERT-7X_2022-08	E472.Ag	04-Aug-2022	06-Oct-2022	----	----		07-Oct-2022	730 days	65 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag HAC-D_PERT-1_2022-08	E475.Ti	05-Aug-2022	23-Sep-2022	----	----		24-Sep-2022	730 days	51 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag EDC-U_PERT-3_2022-08	E475.Ti	07-Aug-2022	27-Sep-2022	----	----		27-Sep-2022	730 days	52 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag E1_PERT-1_2022-08	E475.Ti	05-Aug-2022	29-Sep-2022	----	----		30-Sep-2022	730 days	56 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag E1_PERT-2_2022-08	E475.Ti	05-Aug-2022	29-Sep-2022	----	----		30-Sep-2022	730 days	56 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag EDC-D_PERT-5_2022-08	E475.Ti	03-Aug-2022	27-Sep-2022	----	----		27-Sep-2022	730 days	56 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag EDC-D_PERT-6_2022-08	E475.Ti	03-Aug-2022	27-Sep-2022	----	----		27-Sep-2022	730 days	56 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag E1_PERT-4_2022-08	E475.Ti	04-Aug-2022	29-Sep-2022	----	----		30-Sep-2022	730 days	57 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-R1_PERT-1_2022-08	E472.Ti	10-Aug-2022	23-Sep-2022	----	----		24-Sep-2022	730 days	46 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-R1_PERT-2_2022-08	E472.Ti	10-Aug-2022	23-Sep-2022	----	----		24-Sep-2022	730 days	46 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-R1_PERT-3_2022-08	E472.Ti	10-Aug-2022	23-Sep-2022	----	----		24-Sep-2022	730 days	46 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-R1_PERT-4_2022-08	E472.Ti	10-Aug-2022	23-Sep-2022	----	----		24-Sep-2022	730 days	46 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-R1_PERT-5_2022-08	E472.Ti	10-Aug-2022	23-Sep-2022	----	----		24-Sep-2022	730 days	46 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-R1_PERT-6_2022-08	E472.Ti	10-Aug-2022	23-Sep-2022	----	----		24-Sep-2022	730 days	46 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-R1_PERT-7_2022-08	E472.Ti	10-Aug-2022	23-Sep-2022	----	----		24-Sep-2022	730 days	46 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-R1_PERT-8_2022-08	E472.Ti	10-Aug-2022	23-Sep-2022	----	----		24-Sep-2022	730 days	46 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag E1_PERT-6_2022-08	E472.Ti	12-Aug-2022	29-Sep-2022	----	----		30-Sep-2022	730 days	49 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag E1_PERT-7_2022-08	E472.Ti	12-Aug-2022	29-Sep-2022	----	----		30-Sep-2022	730 days	49 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag E1_PERT-8_2022-08	E472.Ti	12-Aug-2022	29-Sep-2022	----	----		30-Sep-2022	730 days	49 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-U_PERT-1_2022-08	E472.Ti	06-Aug-2022	23-Sep-2022	----	----		24-Sep-2022	730 days	50 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-U_PERT-2_2022-08	E472.Ti	06-Aug-2022	23-Sep-2022	----	----		24-Sep-2022	730 days	50 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-U_PERT-3_2022-08	E472.Ti	06-Aug-2022	23-Sep-2022	----	----		24-Sep-2022	730 days	50 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-U_PERT-4_2022-08	E472.Ti	06-Aug-2022	23-Sep-2022	----	----		24-Sep-2022	730 days	50 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-U_PERT-7_2022-08	E472.Ti	06-Aug-2022	23-Sep-2022	----	----		24-Sep-2022	730 days	50 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-U_PERT-1_2022-08	E472.Ti	08-Aug-2022	27-Sep-2022	----	----		27-Sep-2022	730 days	51 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-D_PERT-2_2022-08	E472.Ti	05-Aug-2022	23-Sep-2022	----	----		24-Sep-2022	730 days	51 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-D_PERT-3_2022-08	E472.Ti	05-Aug-2022	23-Sep-2022	----	----		24-Sep-2022	730 days	51 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-D_PERT-4_2022-08	E472.Ti	05-Aug-2022	23-Sep-2022	----	----		24-Sep-2022	730 days	51 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-R1_INV-1_2022-08	E472.Ti	10-Aug-2022	29-Sep-2022	----	----		30-Sep-2022	730 days	51 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-R1_INV-2_2022-08	E472.Ti	10-Aug-2022	29-Sep-2022	----	----		30-Sep-2022	730 days	51 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-R1_INV-3_2022-08	E472.Ti	10-Aug-2022	29-Sep-2022	----	----		30-Sep-2022	730 days	51 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-R1_INV-4_2022-08	E472.Ti	10-Aug-2022	29-Sep-2022	----	----		30-Sep-2022	730 days	51 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-R1_INV-5_2022-08	E472.Ti	10-Aug-2022	29-Sep-2022	----	----		30-Sep-2022	730 days	51 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-R1_INV-6_2022-08	E472.Ti	10-Aug-2022	29-Sep-2022	----	----		30-Sep-2022	730 days	51 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-R1_INV-7_2022-08	E472.Ti	10-Aug-2022	29-Sep-2022	----	----		30-Sep-2022	730 days	51 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-R1_INV-8_2022-08	E472.Ti	10-Aug-2022	29-Sep-2022	----	----		30-Sep-2022	730 days	51 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-U_PERT-5_2022-08	E472.Ti	05-Aug-2022	23-Sep-2022	----	----		24-Sep-2022	730 days	51 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-U_PERT-6_2022-08	E472.Ti	05-Aug-2022	23-Sep-2022	----	----		24-Sep-2022	730 days	51 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-U_PERT-8_2022-08	E472.Ti	05-Aug-2022	23-Sep-2022	----	----		24-Sep-2022	730 days	51 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-U_INV-1_2022-08	E472.Ti	08-Aug-2022	28-Sep-2022	----	----		28-Sep-2022	730 days	52 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-U_PERT-2_2022-08	E472.Ti	07-Aug-2022	27-Sep-2022	----	----		27-Sep-2022	730 days	52 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-U_PERT-4_2022-08	E472.Ti	07-Aug-2022	27-Sep-2022	----	----		27-Sep-2022	730 days	52 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-U_PERT-5_2022-08	E472.Ti	07-Aug-2022	27-Sep-2022	----	----		27-Sep-2022	730 days	52 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-U_PERT-6_2022-08	E472.Ti	07-Aug-2022	27-Sep-2022	----	----		27-Sep-2022	730 days	52 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-U_PERT-7_2022-08	E472.Ti	07-Aug-2022	27-Sep-2022	----	----		27-Sep-2022	730 days	52 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-U_PERT-8_2022-08	E472.Ti	07-Aug-2022	27-Sep-2022	----	----		27-Sep-2022	730 days	52 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-U_INV-2_2022-08	E472.Ti	07-Aug-2022	28-Sep-2022	----	----		28-Sep-2022	730 days	53 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-U_INV-3_2022-08	E472.Ti	07-Aug-2022	28-Sep-2022	----	----		28-Sep-2022	730 days	53 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-U_INV-4_2022-08	E472.Ti	07-Aug-2022	28-Sep-2022	----	----		28-Sep-2022	730 days	53 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-U_INV-5_2022-08	E472.Ti	07-Aug-2022	28-Sep-2022	----	----		28-Sep-2022	730 days	53 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-U_INV-6_2022-08	E472.Ti	07-Aug-2022	28-Sep-2022	----	----		28-Sep-2022	730 days	53 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-U_INV-7_2022-08	E472.Ti	07-Aug-2022	28-Sep-2022	----	----		28-Sep-2022	730 days	53 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-U_INV-8_2022-08	E472.Ti	07-Aug-2022	28-Sep-2022	----	----		28-Sep-2022	730 days	53 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-D_PERT-5_2022-08	E472.Ti	05-Aug-2022	27-Sep-2022	----	----		27-Sep-2022	730 days	54 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-D_PERT-6_2022-08	E472.Ti	05-Aug-2022	27-Sep-2022	----	----		27-Sep-2022	730 days	54 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-D_PERT-7_2022-08	E472.Ti	05-Aug-2022	27-Sep-2022	----	----		27-Sep-2022	730 days	54 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-D_PERT-8_2022-08	E472.Ti	05-Aug-2022	27-Sep-2022	----	----		27-Sep-2022	730 days	54 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-U_INV-7_2022-08	E472.Ti	06-Aug-2022	28-Sep-2022	----	----		28-Sep-2022	730 days	54 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-D_PERT-1_2022-08	E472.Ti	04-Aug-2022	27-Sep-2022	----	----		27-Sep-2022	730 days	55 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-D_PERT-2_2022-08	E472.Ti	04-Aug-2022	27-Sep-2022	----	----		27-Sep-2022	730 days	55 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-D_INV-1_2022-08	E472.Ti	05-Aug-2022	28-Sep-2022	----	----		28-Sep-2022	730 days	55 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-D_INV-2_2022-08	E472.Ti	05-Aug-2022	28-Sep-2022	----	----		28-Sep-2022	730 days	55 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-D_INV-3_2022-08	E472.Ti	05-Aug-2022	28-Sep-2022	----	----		28-Sep-2022	730 days	55 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-D_INV-4_2022-08	E472.Ti	05-Aug-2022	28-Sep-2022	----	----		28-Sep-2022	730 days	55 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-D_INV-5_2022-08	E472.Ti	05-Aug-2022	28-Sep-2022	----	----		28-Sep-2022	730 days	55 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-D_INV-6_2022-08	E472.Ti	05-Aug-2022	28-Sep-2022	----	----		28-Sep-2022	730 days	55 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-D_INV-7_2022-08	E472.Ti	05-Aug-2022	28-Sep-2022	----	----		28-Sep-2022	730 days	55 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-D_INV-8_2022-08	E472.Ti	05-Aug-2022	28-Sep-2022	----	----		28-Sep-2022	730 days	55 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-U_INV-1_2022-08	E472.Ti	06-Aug-2022	29-Sep-2022	----	----		30-Sep-2022	730 days	55 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-U_INV-2_2022-08	E472.Ti	06-Aug-2022	29-Sep-2022	----	----		30-Sep-2022	730 days	55 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-U_INV-3_2022-08	E472.Ti	06-Aug-2022	29-Sep-2022	----	----		30-Sep-2022	730 days	55 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-U_INV-4_2022-08	E472.Ti	06-Aug-2022	29-Sep-2022	----	----		30-Sep-2022	730 days	55 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-U_INV-5_2022-08	E472.Ti	05-Aug-2022	28-Sep-2022	----	----		28-Sep-2022	730 days	55 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-U_INV-6_2022-08	E472.Ti	05-Aug-2022	28-Sep-2022	----	----		28-Sep-2022	730 days	55 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-U_INV-8_2022-08	E472.Ti	05-Aug-2022	28-Sep-2022	----	----		28-Sep-2022	730 days	55 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag E1_PERT-3_2022-08	E472.Ti	05-Aug-2022	29-Sep-2022	----	----		30-Sep-2022	730 days	56 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-D_PERT-3_2022-08	E472.Ti	03-Aug-2022	27-Sep-2022	----	----		27-Sep-2022	730 days	56 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-D_PERT-4_2022-08	E472.Ti	03-Aug-2022	27-Sep-2022	----	----		27-Sep-2022	730 days	56 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-D_PERT-7_2022-08	E472.Ti	03-Aug-2022	27-Sep-2022	----	----		27-Sep-2022	730 days	56 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-D_PERT-8_2022-08	E472.Ti	03-Aug-2022	27-Sep-2022	----	----		27-Sep-2022	730 days	56 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-R1_INVCAD-1_2022-08	E472.Ti	10-Aug-2022	05-Oct-2022	----	----		05-Oct-2022	730 days	56 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-R1_INVCAD-2_2022-08	E472.Ti	10-Aug-2022	05-Oct-2022	----	----		05-Oct-2022	730 days	56 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-R1_INVCAD-3_2022-08	E472.Ti	10-Aug-2022	05-Oct-2022	----	----		05-Oct-2022	730 days	56 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-R1_INVCAD-4_2022-08	E472.Ti	10-Aug-2022	05-Oct-2022	----	----		05-Oct-2022	730 days	56 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag E1_PERT-5_2022-08	E472.Ti	04-Aug-2022	29-Sep-2022	----	----		30-Sep-2022	730 days	57 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-U_INVCAD-1_2022-08	E472.Ti	08-Aug-2022	04-Oct-2022	----	----		04-Oct-2022	730 days	58 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-R1_INVCAD-5_2022-08	E472.Ti	10-Aug-2022	06-Oct-2022	----	----		06-Oct-2022	730 days	58 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-R1_INVCAD-6_2022-08	E472.Ti	10-Aug-2022	06-Oct-2022	----	----		06-Oct-2022	730 days	58 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-R1_INVCAD-7_2022-08	E472.Ti	10-Aug-2022	06-Oct-2022	----	----		06-Oct-2022	730 days	58 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-R1_INVCAD-8_2022-08	E472.Ti	10-Aug-2022	06-Oct-2022	----	----		06-Oct-2022	730 days	58 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-U_INVCAD-2_2022-08	E472.Ti	07-Aug-2022	04-Oct-2022	----	----		04-Oct-2022	730 days	59 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-U_INVCAD-3_2022-08	E472.Ti	07-Aug-2022	04-Oct-2022	----	----		04-Oct-2022	730 days	59 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-U_INVCAD-4_2022-08	E472.Ti	07-Aug-2022	04-Oct-2022	----	----		04-Oct-2022	730 days	59 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-U_INVCAD-5_2022-08	E472.Ti	07-Aug-2022	04-Oct-2022	----	----		04-Oct-2022	730 days	59 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-U_INVCAD-6_2022-08	E472.Ti	07-Aug-2022	04-Oct-2022	----	----		04-Oct-2022	730 days	59 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-U_INVCAD-7_2022-08	E472.Ti	07-Aug-2022	04-Oct-2022	----	----		04-Oct-2022	730 days	59 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-U_INVCAD-8_2022-08	E472.Ti	07-Aug-2022	04-Oct-2022	----	----		04-Oct-2022	730 days	59 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-R1_INV-7X_2022-08	E472.Ti	10-Aug-2022	06-Oct-2022	----	----		07-Oct-2022	730 days	59 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-R1_INV-8X_2022-08	E472.Ti	10-Aug-2022	06-Oct-2022	----	----		07-Oct-2022	730 days	59 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-R1_INVCAD-7X_2022-08	E472.Ti	10-Aug-2022	06-Oct-2022	----	----		07-Oct-2022	730 days	59 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-R1_INVCAD-8X_2022-08	E472.Ti	10-Aug-2022	06-Oct-2022	----	----		07-Oct-2022	730 days	59 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-R1_PERT-7X_2022-08	E472.Ti	10-Aug-2022	06-Oct-2022	----	----		07-Oct-2022	730 days	59 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-R1_PERT-8X_2022-08	E472.Ti	10-Aug-2022	06-Oct-2022	----	----		07-Oct-2022	730 days	59 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag E1_INV-1_2022-08	E472.Ti	05-Aug-2022	05-Oct-2022	----	----		05-Oct-2022	730 days	61 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag E1_INVCAD-1_2022-08	E472.Ti	05-Aug-2022	04-Oct-2022	----	----		04-Oct-2022	730 days	61 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag E1_INVCAD-2_2022-08	E472.Ti	05-Aug-2022	04-Oct-2022	----	----		04-Oct-2022	730 days	61 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag E1_INVCAD-3_2022-08	E472.Ti	05-Aug-2022	04-Oct-2022	----	----		04-Oct-2022	730 days	61 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag E2_INV-2_2022-08	E472.Ti	05-Aug-2022	05-Oct-2022	----	----		05-Oct-2022	730 days	61 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag E3_INV-3_2022-08	E472.Ti	05-Aug-2022	05-Oct-2022	----	----		05-Oct-2022	730 days	61 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag E1_INVCAD-4_2022-08	E472.Ti	04-Aug-2022	04-Oct-2022	----	----		04-Oct-2022	730 days	62 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag E4_INV-4_2022-08	E472.Ti	04-Aug-2022	05-Oct-2022	----	----		05-Oct-2022	730 days	62 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag E5_INV-5_2022-08	E472.Ti	04-Aug-2022	05-Oct-2022	----	----		05-Oct-2022	730 days	62 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag E6_INV-6_2022-08	E472.Ti	04-Aug-2022	05-Oct-2022	----	----		05-Oct-2022	730 days	62 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag E7_INV-7_2022-08	E472.Ti	04-Aug-2022	05-Oct-2022	----	----		05-Oct-2022	730 days	62 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag E8_INV-8_2022-08	E472.Ti	04-Aug-2022	05-Oct-2022	----	----		05-Oct-2022	730 days	62 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-D_INV-1_2022-08	E472.Ti	04-Aug-2022	05-Oct-2022	----	----		05-Oct-2022	730 days	62 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-D_INV-2_2022-08	E472.Ti	04-Aug-2022	05-Oct-2022	----	----		05-Oct-2022	730 days	62 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-D_INVCAD-1_2022-08	E472.Ti	04-Aug-2022	04-Oct-2022	----	----		04-Oct-2022	730 days	62 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-D_INVCAD-2_2022-08	E472.Ti	04-Aug-2022	04-Oct-2022	----	----		04-Oct-2022	730 days	62 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-U_INVCAD-1_2022-08	E472.Ti	06-Aug-2022	06-Oct-2022	----	----		06-Oct-2022	730 days	62 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-U_INVCAD-2_2022-08	E472.Ti	06-Aug-2022	06-Oct-2022	----	----		06-Oct-2022	730 days	62 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-U_INVCAD-3_2022-08	E472.Ti	06-Aug-2022	06-Oct-2022	----	----		06-Oct-2022	730 days	62 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-U_INVCAD-4_2022-08	E472.Ti	06-Aug-2022	06-Oct-2022	----	----		06-Oct-2022	730 days	62 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-U_INVCAD-7_2022-08	E472.Ti	06-Aug-2022	06-Oct-2022	----	----		06-Oct-2022	730 days	62 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-D_INV-3_2022-08	E472.Ti	03-Aug-2022	05-Oct-2022	----	----		05-Oct-2022	730 days	63 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-D_INV-4_2022-08	E472.Ti	03-Aug-2022	05-Oct-2022	----	----		05-Oct-2022	730 days	63 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-D_INV-5_2022-08	E472.Ti	03-Aug-2022	05-Oct-2022	----	----		05-Oct-2022	730 days	63 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-D_INV-6_2022-08	E472.Ti	03-Aug-2022	05-Oct-2022	----	----		05-Oct-2022	730 days	63 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-D_INV-7_2022-08	E472.Ti	03-Aug-2022	05-Oct-2022	----	----		05-Oct-2022	730 days	63 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-D_INV-8_2022-08	E472.Ti	03-Aug-2022	05-Oct-2022	----	----		05-Oct-2022	730 days	63 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-D_INVCAD-3_2022-08	E472.Ti	03-Aug-2022	04-Oct-2022	----	----		04-Oct-2022	730 days	63 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-D_INVCAD-4_2022-08	E472.Ti	03-Aug-2022	04-Oct-2022	----	----		04-Oct-2022	730 days	63 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-D_INVCAD-5_2022-08	E472.Ti	03-Aug-2022	04-Oct-2022	----	----		04-Oct-2022	730 days	63 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-D_INVCAD-6_2022-08	E472.Ti	03-Aug-2022	04-Oct-2022	----	----		04-Oct-2022	730 days	63 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-D_INVCAD-7_2022-08	E472.Ti	03-Aug-2022	04-Oct-2022	----	----		04-Oct-2022	730 days	63 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag EDC-D_INVCAD-8_2022-08	E472.Ti	03-Aug-2022	04-Oct-2022	----	----		04-Oct-2022	730 days	63 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-D_INVCAD-1_2022-08	E472.Ti	05-Aug-2022	06-Oct-2022	----	----		06-Oct-2022	730 days	63 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-D_INVCAD-2_2022-08	E472.Ti	05-Aug-2022	06-Oct-2022	----	----		06-Oct-2022	730 days	63 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-D_INVCAD-3_2022-08	E472.Ti	05-Aug-2022	06-Oct-2022	----	----		06-Oct-2022	730 days	63 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-D_INVCAD-4_2022-08	E472.Ti	05-Aug-2022	06-Oct-2022	----	----		06-Oct-2022	730 days	63 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-D_INVCAD-5_2022-08	E472.Ti	05-Aug-2022	06-Oct-2022	----	----		06-Oct-2022	730 days	63 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-D_INVCAD-6_2022-08	E472.Ti	05-Aug-2022	06-Oct-2022	----	----		06-Oct-2022	730 days	63 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-D_INVCAD-7_2022-08	E472.Ti	05-Aug-2022	06-Oct-2022	----	----		06-Oct-2022	730 days	63 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-D_INVCAD-8_2022-08	E472.Ti	05-Aug-2022	06-Oct-2022	----	----		06-Oct-2022	730 days	63 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-U_INVCAD-5_2022-08	E472.Ti	05-Aug-2022	06-Oct-2022	----	----		06-Oct-2022	730 days	63 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-U_INVCAD-6_2022-08	E472.Ti	05-Aug-2022	06-Oct-2022	----	----		06-Oct-2022	730 days	63 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-U_INVCAD-8_2022-08	E472.Ti	05-Aug-2022	06-Oct-2022	----	----		06-Oct-2022	730 days	63 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-D_INV-7X_2022-08	E472.Ti	05-Aug-2022	06-Oct-2022	----	----		07-Oct-2022	730 days	64 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-D_INVCAD-7X_2022-08	E472.Ti	05-Aug-2022	06-Oct-2022	----	----		07-Oct-2022	730 days	64 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag HAC-D_PERT-7X_2022-08	E472.Ti	05-Aug-2022	06-Oct-2022	----	----		07-Oct-2022	730 days	64 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag E1_INV-5X_2022-08	E472.Ti	04-Aug-2022	06-Oct-2022	----	----		07-Oct-2022	730 days	65 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag E1_INV-7X_2022-08	E472.Ti	04-Aug-2022	06-Oct-2022	----	----		07-Oct-2022	730 days	65 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag E1_INVCAD-5_2022-08	E472.Ti	04-Aug-2022	06-Oct-2022	----	----		07-Oct-2022	730 days	65 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag E1_INVCAD-5X_2022-08	E472.Ti	04-Aug-2022	06-Oct-2022	----	----		07-Oct-2022	730 days	65 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag E1_INVCAD-6_2022-08	E472.Ti	04-Aug-2022	06-Oct-2022	----	----		07-Oct-2022	730 days	65 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag E1_INVCAD-7_2022-08	E472.Ti	04-Aug-2022	06-Oct-2022	----	----		07-Oct-2022	730 days	65 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag E1_INVCAD-7X_2022-08	E472.Ti	04-Aug-2022	06-Oct-2022	----	----		07-Oct-2022	730 days	65 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag E1_INVCAD-8_2022-08	E472.Ti	04-Aug-2022	06-Oct-2022	----	----		07-Oct-2022	730 days	65 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag E1_PERT-5X_2022-08	E472.Ti	04-Aug-2022	06-Oct-2022	----	----		07-Oct-2022	730 days	65 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag E1_PERT-7X_2022-08	E472.Ti	04-Aug-2022	06-Oct-2022	----	----		07-Oct-2022	730 days	65 days	✓
Physical Tests : Moisture Content by Gravimetry (Biopsy)										
LDPE bag E1_PERT-1_2022-08	E144A	05-Aug-2022	----	----	----		28-Sep-2022	----	----	

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Moisture Content by Gravimetry (Biopsy)										
LDPE bag E1_PERT-2_2022-08	E144A	05-Aug-2022	----	----	----		28-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Biopsy)										
LDPE bag E1_PERT-4_2022-08	E144A	04-Aug-2022	----	----	----		28-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Biopsy)										
LDPE bag EDC-D_PERT-5_2022-08	E144A	03-Aug-2022	----	----	----		27-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Biopsy)										
LDPE bag EDC-D_PERT-6_2022-08	E144A	03-Aug-2022	----	----	----		27-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Biopsy)										
LDPE bag EDC-U_PERT-3_2022-08	E144A	07-Aug-2022	----	----	----		27-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Biopsy)										
LDPE bag HAC-D_PERT-1_2022-08	E144A	05-Aug-2022	----	----	----		23-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag E1_INV-1_2022-08	E144-H	05-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag E1_INV-5X_2022-08	E144-H	04-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag E1_INV-7X_2022-08	E144-H	04-Aug-2022	----	----	----		16-Sep-2022	----	----	

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag E1_INVCAD-1_2022-08	E144-H	05-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag E1_INVCAD-2_2022-08	E144-H	05-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag E1_INVCAD-3_2022-08	E144-H	05-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag E1_INVCAD-4_2022-08	E144-H	04-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag E1_INVCAD-5_2022-08	E144-H	04-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag E1_INVCAD-5X_2022-08	E144-H	04-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag E1_INVCAD-6_2022-08	E144-H	04-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag E1_INVCAD-7_2022-08	E144-H	04-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag E1_INVCAD-7X_2022-08	E144-H	04-Aug-2022	----	----	----		16-Sep-2022	----	----	

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag E1_INVCAD-8_2022-08	E144-H	04-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag E1_PERT-3_2022-08	E144-H	05-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag E1_PERT-5_2022-08	E144-H	04-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag E1_PERT-5X_2022-08	E144-H	04-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag E1_PERT-6_2022-08	E144-H	12-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag E1_PERT-7_2022-08	E144-H	12-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag E1_PERT-7X_2022-08	E144-H	04-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag E1_PERT-8_2022-08	E144-H	12-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag E2_INV-2_2022-08	E144-H	05-Aug-2022	----	----	----		16-Sep-2022	----	----	

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag E3_INV-3_2022-08	E144-H	05-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag E4_INV-4_2022-08	E144-H	04-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag E5_INV-5_2022-08	E144-H	04-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag E6_INV-6_2022-08	E144-H	04-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag E7_INV-7_2022-08	E144-H	04-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag E8_INV-8_2022-08	E144-H	04-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag EDC-D_INV-1_2022-08	E144-H	04-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag EDC-D_INV-2_2022-08	E144-H	04-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag EDC-D_INV-3_2022-08	E144-H	03-Aug-2022	----	----	----		16-Sep-2022	----	----	

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag EDC-D_INV-4_2022-08	E144-H	03-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag EDC-D_INV-5_2022-08	E144-H	03-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag EDC-D_INV-6_2022-08	E144-H	03-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag EDC-D_INV-7_2022-08	E144-H	03-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag EDC-D_INV-8_2022-08	E144-H	03-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag EDC-D_INVCAD-1_2022-08	E144-H	04-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag EDC-D_INVCAD-2_2022-08	E144-H	04-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag EDC-D_INVCAD-3_2022-08	E144-H	03-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag EDC-D_INVCAD-4_2022-08	E144-H	03-Aug-2022	----	----	----		16-Sep-2022	----	----	

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag EDC-D_INVCAD-5_2022-08	E144-H	03-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag EDC-D_INVCAD-6_2022-08	E144-H	03-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag EDC-D_INVCAD-7_2022-08	E144-H	03-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag EDC-D_INVCAD-8_2022-08	E144-H	03-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag EDC-D_PERT-1_2022-08	E144-H	04-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag EDC-D_PERT-2_2022-08	E144-H	04-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag EDC-D_PERT-3_2022-08	E144-H	03-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag EDC-D_PERT-4_2022-08	E144-H	03-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag EDC-D_PERT-7_2022-08	E144-H	03-Aug-2022	----	----	----		16-Sep-2022	----	----	

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag EDC-D_PERT-8_2022-08	E144-H	03-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag EDC-U_INV-1_2022-08	E144-H	08-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag EDC-U_INV-2_2022-08	E144-H	07-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag EDC-U_INV-3_2022-08	E144-H	07-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag EDC-U_INV-4_2022-08	E144-H	07-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag EDC-U_INV-5_2022-08	E144-H	07-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag EDC-U_INV-6_2022-08	E144-H	07-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag EDC-U_INV-7_2022-08	E144-H	07-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag EDC-U_INV-8_2022-08	E144-H	07-Aug-2022	----	----	----		16-Sep-2022	----	----	

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag EDC-U_INVCAD-1_2022-08	E144-H	08-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag EDC-U_INVCAD-2_2022-08	E144-H	07-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag EDC-U_INVCAD-3_2022-08	E144-H	07-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag EDC-U_INVCAD-4_2022-08	E144-H	07-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag EDC-U_INVCAD-5_2022-08	E144-H	07-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag EDC-U_INVCAD-6_2022-08	E144-H	07-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag EDC-U_INVCAD-7_2022-08	E144-H	07-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag EDC-U_INVCAD-8_2022-08	E144-H	07-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag EDC-U_PERT-1_2022-08	E144-H	08-Aug-2022	----	----	----		16-Sep-2022	----	----	

Matrix: **Biota**

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Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag EDC-U_PERT-2_2022-08	E144-H	07-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag EDC-U_PERT-4_2022-08	E144-H	07-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag EDC-U_PERT-5_2022-08	E144-H	07-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag EDC-U_PERT-6_2022-08	E144-H	07-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag EDC-U_PERT-7_2022-08	E144-H	07-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag EDC-U_PERT-8_2022-08	E144-H	07-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag HAC-D_INV-1_2022-08	E144-H	05-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag HAC-D_INV-2_2022-08	E144-H	05-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag HAC-D_INV-3_2022-08	E144-H	05-Aug-2022	----	----	----		16-Sep-2022	----	----	

Matrix: **Biota**

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Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag HAC-D_INV-4_2022-08	E144-H	05-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag HAC-D_INV-5_2022-08	E144-H	05-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag HAC-D_INV-6_2022-08	E144-H	05-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag HAC-D_INV-7_2022-08	E144-H	05-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag HAC-D_INV-7X_2022-08	E144-H	05-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag HAC-D_INV-8_2022-08	E144-H	05-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag HAC-D_INVCAD-1_2022-08	E144-H	05-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag HAC-D_INVCAD-2_2022-08	E144-H	05-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag HAC-D_INVCAD-3_2022-08	E144-H	05-Aug-2022	----	----	----		16-Sep-2022	----	----	

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Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag HAC-D_INVCAD-4_2022-08	E144-H	05-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag HAC-D_INVCAD-5_2022-08	E144-H	05-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag HAC-D_INVCAD-6_2022-08	E144-H	05-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag HAC-D_INVCAD-7_2022-08	E144-H	05-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag HAC-D_INVCAD-7X_2022-08	E144-H	05-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag HAC-D_INVCAD-8_2022-08	E144-H	05-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag HAC-D_PERT-2_2022-08	E144-H	05-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag HAC-D_PERT-3_2022-08	E144-H	05-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag HAC-D_PERT-4_2022-08	E144-H	05-Aug-2022	----	----	----		16-Sep-2022	----	----	

Matrix: **Biota**

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Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag HAC-D_PERT-5_2022-08	E144-H	05-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag HAC-D_PERT-6_2022-08	E144-H	05-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag HAC-D_PERT-7_2022-08	E144-H	05-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag HAC-D_PERT-7X_2022-08	E144-H	05-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag HAC-D_PERT-8_2022-08	E144-H	05-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag HAC-R1_INV-1_2022-08	E144-H	10-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag HAC-R1_INV-2_2022-08	E144-H	10-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag HAC-R1_INV-3_2022-08	E144-H	10-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag HAC-R1_INV-4_2022-08	E144-H	10-Aug-2022	----	----	----		16-Sep-2022	----	----	

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag HAC-R1_INV-5_2022-08	E144-H	10-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag HAC-R1_INV-6_2022-08	E144-H	10-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag HAC-R1_INV-7_2022-08	E144-H	10-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag HAC-R1_INV-7X_2022-08	E144-H	10-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag HAC-R1_INV-8_2022-08	E144-H	10-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag HAC-R1_INV-8X_2022-08	E144-H	10-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag HAC-R1_INVCAD-1_2022-08	E144-H	10-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag HAC-R1_INVCAD-2_2022-08	E144-H	10-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag HAC-R1_INVCAD-3_2022-08	E144-H	10-Aug-2022	----	----	----		16-Sep-2022	----	----	

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag HAC-R1_INVCAD-4_2022-08	E144-H	10-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag HAC-R1_INVCAD-5_2022-08	E144-H	10-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag HAC-R1_INVCAD-6_2022-08	E144-H	10-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag HAC-R1_INVCAD-7_2022-08	E144-H	10-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag HAC-R1_INVCAD-7X_2022-08	E144-H	10-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag HAC-R1_INVCAD-8_2022-08	E144-H	10-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag HAC-R1_INVCAD-8X_2022-08	E144-H	10-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag HAC-R1_PERT-1_2022-08	E144-H	10-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag HAC-R1_PERT-2_2022-08	E144-H	10-Aug-2022	----	----	----		16-Sep-2022	----	----	

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag HAC-R1_PERT-3_2022-08	E144-H	10-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag HAC-R1_PERT-4_2022-08	E144-H	10-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag HAC-R1_PERT-5_2022-08	E144-H	10-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag HAC-R1_PERT-6_2022-08	E144-H	10-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag HAC-R1_PERT-7_2022-08	E144-H	10-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag HAC-R1_PERT-7X_2022-08	E144-H	10-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag HAC-R1_PERT-8_2022-08	E144-H	10-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag HAC-R1_PERT-8X_2022-08	E144-H	10-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag HAC-U_INV-1_2022-08	E144-H	06-Aug-2022	----	----	----		16-Sep-2022	----	----	

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag HAC-U_INV-2_2022-08	E144-H	06-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag HAC-U_INV-3_2022-08	E144-H	06-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag HAC-U_INV-4_2022-08	E144-H	06-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag HAC-U_INV-5_2022-08	E144-H	05-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag HAC-U_INV-6_2022-08	E144-H	05-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag HAC-U_INV-7_2022-08	E144-H	06-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag HAC-U_INV-8_2022-08	E144-H	05-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag HAC-U_INVCAD-1_2022-08	E144-H	06-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag HAC-U_INVCAD-2_2022-08	E144-H	06-Aug-2022	----	----	----		16-Sep-2022	----	----	

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag HAC-U_INVCAD-3_2022-08	E144-H	06-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag HAC-U_INVCAD-4_2022-08	E144-H	06-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag HAC-U_INVCAD-5_2022-08	E144-H	05-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag HAC-U_INVCAD-6_2022-08	E144-H	05-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag HAC-U_INVCAD-7_2022-08	E144-H	06-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag HAC-U_INVCAD-8_2022-08	E144-H	05-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag HAC-U_PERT-1_2022-08	E144-H	06-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag HAC-U_PERT-2_2022-08	E144-H	06-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag HAC-U_PERT-3_2022-08	E144-H	06-Aug-2022	----	----	----		16-Sep-2022	----	----	

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag HAC-U_PERT-4_2022-08	E144-H	06-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag HAC-U_PERT-5_2022-08	E144-H	05-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag HAC-U_PERT-6_2022-08	E144-H	05-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag HAC-U_PERT-7_2022-08	E144-H	06-Aug-2022	----	----	----		16-Sep-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag HAC-U_PERT-8_2022-08	E144-H	05-Aug-2022	----	----	----		16-Sep-2022	----	----	

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Biota**

Evaluation: ✘ = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Mercury in Biota by CVAAS (DRY units, Micro)	E511	660770	6	152	3.9	5.0	✘
Metals in Biota by CRC ICPMS (DRY units, Micro)	E472	660771	7	152	4.6	5.0	✘
Moisture Content by Gravimetry (Micro)	E144-H	650126	8	152	5.2	5.0	✓
Silver in Biota by CRC ICPMS (DRY units, Micro)	E472.Ag	660768	7	152	4.6	5.0	✘
Titanium in Biota by CRC ICPMS (DRY units, Micro)	E472.Ti	660769	7	152	4.6	5.0	✘
Laboratory Control Samples (LCS)							
Mercury in Biota by CVAAS (DRY units, Biopsy)	E512	661601	6	7	85.7	10.0	✓
Mercury in Biota by CVAAS (DRY units, Micro)	E511	660770	16	152	10.5	10.0	✓
Metals by CRC ICPMS (DRY units, Biopsy)	E475	661604	6	7	85.7	10.0	✓
Metals in Biota by CRC ICPMS (DRY units, Micro)	E472	660771	17	152	11.1	10.0	✓
Moisture Content by Gravimetry (Biopsy)	E144A	661600	3	7	42.8	5.0	✓
Moisture Content by Gravimetry (Micro)	E144-H	650126	8	152	5.2	5.0	✓
Silver in Biota by CRC ICPMS (DRY units, Biopsy)	E475.Ag	661602	6	7	85.7	10.0	✓
Silver in Biota by CRC ICPMS (DRY units, Micro)	E472.Ag	660768	16	152	10.5	10.0	✓
Titanium in Biota by CRC ICPMS (DRY units, Biopsy)	E475.Ti	661603	3	7	42.8	10.0	✓
Titanium in Biota by CRC ICPMS (DRY units, Micro)	E472.Ti	660769	9	152	5.9	10.0	✘
Method Blanks (MB)							
Mercury in Biota by CVAAS (DRY units, Biopsy)	E512	661601	3	7	42.8	5.0	✓
Mercury in Biota by CVAAS (DRY units, Micro)	E511	660770	8	152	5.2	5.0	✓
Metals by CRC ICPMS (DRY units, Biopsy)	E475	661604	3	7	42.8	5.0	✓
Metals in Biota by CRC ICPMS (DRY units, Micro)	E472	660771	8	152	5.2	5.0	✓
Moisture Content by Gravimetry (Biopsy)	E144A	661600	3	7	42.8	5.0	✓
Moisture Content by Gravimetry (Micro)	E144-H	650126	8	152	5.2	5.0	✓
Silver in Biota by CRC ICPMS (DRY units, Biopsy)	E475.Ag	661602	3	7	42.8	5.0	✓
Silver in Biota by CRC ICPMS (DRY units, Micro)	E472.Ag	660768	8	152	5.2	5.0	✓
Titanium in Biota by CRC ICPMS (DRY units, Biopsy)	E475.Ti	661603	3	7	42.8	5.0	✓
Titanium in Biota by CRC ICPMS (DRY units, Micro)	E472.Ti	660769	8	152	5.2	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Moisture Content by Gravimetry (Biopsy)	E144A Vancouver - Environmental	Biota	Puget Sound Water Quality Authority/CCME PHC in Soil - Tier 1	This analysis is carried out gravimetrically by drying the sample at < 60 deg. C for a minimum of three days.
Moisture Content by Gravimetry (Micro)	E144-H Vancouver - Environmental	Biota	Puget Sound Water Quality Authority/BC MOE Lab Manual	Moisture is measured gravimetrically by drying the sample at < 60°C for a minimum of 3 days to constant weight. Moisture content is calculated as the weight loss (due to water) divided by the wet weight of soil, expressed as a percentage.
Metals in Biota by CRC ICPMS (DRY units, Micro)	E472 Vancouver - Environmental	Biota	EPA 200.3/6020B (mod)	Tissue samples are homogenized and sub-sampled prior to hotblock digestion with HNO3, HCl, and H2O2. Analysis is by Collision/Reaction Cell ICPMS. Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.
Silver in Biota by CRC ICPMS (DRY units, Micro)	E472.Ag Vancouver - Environmental	Biota	EPA 200.3/6020B (mod)	Tissue samples are homogenized and sub-sampled prior to hotblock digestion with HNO3, HCl, and H2O2. Analysis is by Collision/Reaction Cell ICPMS. Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.
Titanium in Biota by CRC ICPMS (DRY units, Micro)	E472.Ti Vancouver - Environmental	Biota	EPA 200.3/6020B (mod)	Tissue samples are homogenized and sub-sampled prior to hotblock digestion with HNO3, HCl, and H2O2. Analysis is by Collision/Reaction Cell ICPMS. Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.
Metals by CRC ICPMS (DRY units, Biopsy)	E475 Vancouver - Environmental	Biota	EPA 200.3/6020B (mod)	Samples are digested with nitric acid, hydrochloric acid, and hydrogen peroxide. Analysis is by Collision/Reaction Cell ICPMS: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Silver in Biota by CRC ICPMS (DRY units, Biopsy)	E475.Ag Vancouver - Environmental	Biota	EPA 200.3/6020B (mod)	Samples are digested with nitric acid, hydrochloric acid, and hydrogen peroxide. Analysis is by Collision/Reaction Cell ICPMS. Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.
Titanium in Biota by CRC ICPMS (DRY units, Biopsy)	E475.Ti Vancouver - Environmental	Biota	EPA 200.3/6020B (mod)	Samples are digested with nitric acid, hydrochloric acid, and hydrogen peroxide. Analysis is by Collision/Reaction Cell ICPMS. Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.
Mercury in Biota by CVAAS (DRY units, Micro)	E511 Vancouver - Environmental	Biota	EPA 200.3/1631E (mod)	Samples are homogenized and sub-sampled prior to hotblock digestion with nitric acid, hydrochloric acid, and hydrogen peroxide. Analysis is by CVAAS.
Mercury in Biota by CVAAS (DRY units, Biopsy)	E512 Vancouver - Environmental	Biota	EPA 200.3/1631E (mod)	Samples are digested with nitric acid, hydrochloric acid, and hydrogen peroxide. Analysis is by CVAAS.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Metals and Mercury Biota Digestion (Micro)	EP472 Vancouver - Environmental	Biota	EPA 200.3	This method, designed for small sample amounts, uses a heated strong acid digestion with HNO3, HCl, and H2O2 and is intended to provide a conservative estimate of bio-available metals.
Metals and Mercury Biota Digestion (Biopsy)	EP475 Vancouver - Environmental	Biota	EPA 200.3/200.8 (mod)	Samples are digested with nitric acid, hydrochloric acid, and hydrogen peroxide. Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.

ALS Canada Ltd.

QUALITY CONTROL REPORT

Work Order	: **VA22B8779**	Page	: 1 of 51
Client	: Mount Polley Mining Corporation	Laboratory	: Vancouver - Environmental
Contact	: Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 12-Aug-2022 12:25
PO	: 5590008044 Q2 2022	Date Analysis Commenced	: 16-Sep-2022
C-O-C number	: ----	Issue Date	: 07-Nov-2022 09:07
Sampler	: KBa ----		
Site	: ----		
Quote number	: VA22-MPMC100-002		
No. of samples received	: 159		
No. of samples analysed	: 159		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Reference Material (RM) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Benjamin Oke	Lab Assistant	Vancouver Metals, Burnaby, British Columbia
Hamideh Moradi	Analyst	Vancouver Metals, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Vancouver Metals, Burnaby, British Columbia
Owen Cheng		Vancouver Metals, Burnaby, British Columbia
Qammar Almas	Lab Assistant	Vancouver Metals, Burnaby, British Columbia
Salimah Khimani	Lab Assistant	Vancouver Metals, Burnaby, British Columbia

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Biota**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 650126)											
VA22B8779-001	HAC-R1_PERT-1_2022-08	moisture	----	E144-H	2.0	%	65.7	64.4	1.98%	20%	----
Physical Tests (QC Lot: 650129)											
VA22B8779-021	HAC-D_PERT-5_2022-08	moisture	----	E144-H	2.0	%	64.0	63.8	0.293%	20%	----
Physical Tests (QC Lot: 650130)											
VA22B8779-041	E1_PERT-1_2022-08	moisture	----	E144-H	2.0	%	92.1	91.9	0.264%	20%	----
Physical Tests (QC Lot: 650207)											
VA22B8779-061	HAC-U_INV-5_2022-08	moisture	----	E144-H	2.0	%	85.5	81.0	5.38%	20%	----
Physical Tests (QC Lot: 650212)											
VA22B8779-081	EDC-D_INV-1_2022-08	moisture	----	E144-H	2.0	%	73.2	73.0	0.338%	20%	----
Physical Tests (QC Lot: 650220)											
VA22B8779-112	HAC-U_INVCAD-8_2022-08	moisture	----	E144-H	2.0	%	74.3	74.8	0.635%	20%	----
Physical Tests (QC Lot: 650226)											
VA22B8779-121	EDC-U_INVCAD-1_2022-08	moisture	----	E144-H	2.0	%	75.3	76.3	1.33%	20%	----
Physical Tests (QC Lot: 650234)											
VA22B8779-141	E1_INVCAD-5_2022-08	moisture	----	E144-H	2.0	%	80.4	81.2	1.03%	20%	----
Metals (QC Lot: 660768)											
VA22B8779-001	HAC-R1_PERT-1_2022-08	silver	7440-22-4	E472.Ag	0.0062	mg/kg	0.0138	0.0094	0.0044	Diff <2x LOR	----
Metals (QC Lot: 660769)											
VA22B8779-001	HAC-R1_PERT-1_2022-08	titanium	7440-32-6	E472.Ti	0.62	mg/kg	132	115	13.9%	40%	----
Metals (QC Lot: 660770)											
VA22B8779-001	HAC-R1_PERT-1_2022-08	mercury	7439-97-6	E511	0.0050	mg/kg	0.0096	0.0073	0.0023	Diff <2x LOR	----
Metals (QC Lot: 660771)											
VA22B8779-001	HAC-R1_PERT-1_2022-08	aluminum	7429-90-5	E472	6.2	mg/kg	2010	1490	29.6%	40%	----
		antimony	7440-36-0	E472	0.012	mg/kg	0.080	0.070	14.1%	40%	----
		arsenic	7440-38-2	E472	0.037	mg/kg	2.30	2.00	14.0%	40%	----
		barium	7440-39-3	E472	0.062	mg/kg	133	111	18.4%	40%	----
		beryllium	7440-41-7	E472	0.012	mg/kg	0.057	0.050	0.006	Diff <2x LOR	----
		bismuth	7440-69-9	E472	0.012	mg/kg	<0.012	<0.012	0.000005	Diff <2x LOR	----
		boron	7440-42-8	E472	1.2	mg/kg	363	333	8.61%	40%	----

Sub-Matrix: **Biota**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Metals (QC Lot: 660771) - continued											
VA22B8779-001	HAC-R1_PERT-1_2022-08	cadmium	7440-43-9	E472	0.012	mg/kg	0.148	0.150	1.88%	40%	----
		calcium	7440-70-2	E472	25	mg/kg	224000	228000	1.85%	60%	----
		cesium	7440-46-2	E472	0.0062	mg/kg	0.216	0.205	4.83%	40%	----
		chromium	7440-47-3	E472	0.25	mg/kg	2.64	3.18	18.7%	40%	----
		cobalt	7440-48-4	E472	0.025	mg/kg	2.00	1.72	15.2%	40%	----
		copper	7440-50-8	E472	0.25	mg/kg	42.1	40.8	3.06%	40%	----
		iron	7439-89-6	E472	6.2	mg/kg	2840	2180	26.0%	40%	----
		lead	7439-92-1	E472	0.062	mg/kg	0.644	0.349	59.6%	40%	DUP-H
		lithium	7439-93-2	E472	0.62	mg/kg	1.59	1.23	0.36	Diff <2x LOR	----
		magnesium	7439-95-4	E472	2.5	mg/kg	3090	3080	0.285%	40%	----
		manganese	7439-96-5	E472	0.062	mg/kg	1240	1170	5.69%	40%	----
		molybdenum	7439-98-7	E472	0.049	mg/kg	1.50	1.39	7.32%	40%	----
		nickel	7440-02-0	E472	0.25	mg/kg	3.13	3.54	12.2%	40%	----
		phosphorus	7723-14-0	E472	12	mg/kg	866	808	6.88%	40%	----
		potassium	7440-09-7	E472	25	mg/kg	4980	4740	4.90%	40%	----
		rubidium	7440-17-7	E472	0.062	mg/kg	5.14	4.48	13.6%	40%	----
		selenium	7782-49-2	E472	0.12	mg/kg	2.22	2.39	7.48%	40%	----
		sodium	7440-23-5	E472	25	mg/kg	326	331	1.54%	40%	----
		strontium	7440-24-6	E472	0.12	mg/kg	513	500	2.60%	60%	----
		tellurium	13494-80-9	E472	0.025	mg/kg	<0.025	0.026	0.026	Diff <2x LOR	----
		thallium	7440-28-0	E472	0.0025	mg/kg	0.0070	0.0060	0.0010	Diff <2x LOR	----
		tin	7440-31-5	E472	0.12	mg/kg	<0.12	<0.12	0.00005	Diff <2x LOR	----
		uranium	7440-61-1	E472	0.0025	mg/kg	0.156	0.125	22.0%	40%	----
		vanadium	7440-62-2	E472	0.12	mg/kg	10.7	8.59	22.2%	40%	----
		zinc	7440-66-6	E472	1.2	mg/kg	19.2	18.5	3.76%	40%	----
		zirconium	7440-67-7	E472	0.25	mg/kg	1.42	1.20	16.3%	40%	----
Metals (QC Lot: 667415)											
VA22B8779-021	HAC-D_PERT-5_2022-08	silver	7440-22-4	E472.Ag	0.0050	mg/kg	0.0226	0.0381	51.1%	40%	DUP-H
Metals (QC Lot: 667416)											
VA22B8779-021	HAC-D_PERT-5_2022-08	titanium	7440-32-6	E472.Ti	0.50	mg/kg	178	189	6.03%	40%	----
Metals (QC Lot: 667417)											
VA22B8779-021	HAC-D_PERT-5_2022-08	mercury	7439-97-6	E511	0.0050	mg/kg	0.0266	0.0196	0.0070	Diff <2x LOR	----
Metals (QC Lot: 667418)											
VA22B8779-021	HAC-D_PERT-5_2022-08	aluminum	7429-90-5	E472	5.0	mg/kg	2580	2770	6.97%	40%	----

Sub-Matrix: **Biota**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Metals (QC Lot: 667418) - continued											
VA22B8779-021	HAC-D_PERT-5_2022-08	antimony	7440-36-0	E472	0.010	mg/kg	0.060	0.058	3.10%	40%	----
		arsenic	7440-38-2	E472	0.030	mg/kg	5.89	6.27	6.33%	40%	----
		barium	7440-39-3	E472	0.050	mg/kg	164	163	0.749%	40%	----
		beryllium	7440-41-7	E472	0.010	mg/kg	0.104	0.128	21.4%	40%	----
		bismuth	7440-69-9	E472	0.010	mg/kg	0.017	0.016	0.0004	Diff <2x LOR	----
		boron	7440-42-8	E472	1.0	mg/kg	38.0	34.0	11.0%	40%	----
		cadmium	7440-43-9	E472	0.010	mg/kg	0.318	0.305	4.29%	40%	----
		calcium	7440-70-2	E472	20	mg/kg	230000	231000	0.793%	60%	----
		cesium	7440-46-2	E472	0.0050	mg/kg	0.325	0.336	3.41%	40%	----
		chromium	7440-47-3	E472	0.20	mg/kg	9.29	12.4	28.6%	40%	----
		cobalt	7440-48-4	E472	0.020	mg/kg	2.82	2.95	4.61%	40%	----
		copper	7440-50-8	E472	0.20	mg/kg	75.2	76.2	1.29%	40%	----
		iron	7439-89-6	E472	5.0	mg/kg	5200	5590	7.16%	40%	----
		lead	7439-92-1	E472	0.050	mg/kg	1.25	1.21	3.34%	40%	----
		lithium	7439-93-2	E472	0.50	mg/kg	2.80	2.95	5.45%	40%	----
		magnesium	7439-95-4	E472	2.0	mg/kg	3740	3800	1.74%	40%	----
		manganese	7439-96-5	E472	0.050	mg/kg	3280	3120	4.86%	40%	----
		molybdenum	7439-98-7	E472	0.040	mg/kg	0.703	0.789	11.5%	40%	----
		nickel	7440-02-0	E472	0.20	mg/kg	5.67	7.95	33.5%	40%	----
		phosphorus	7723-14-0	E472	10	mg/kg	1690	1720	1.68%	40%	----
		potassium	7440-09-7	E472	20	mg/kg	3610	3460	4.30%	40%	----
		rubidium	7440-17-7	E472	0.050	mg/kg	6.69	6.72	0.438%	40%	----
		selenium	7782-49-2	E472	0.10	mg/kg	1.67	1.66	1.18%	40%	----
		sodium	7440-23-5	E472	20	mg/kg	306	305	0.288%	40%	----
		strontium	7440-24-6	E472	0.10	mg/kg	604	588	2.59%	60%	----
		tellurium	13494-80-9	E472	0.020	mg/kg	0.033	0.026	0.007	Diff <2x LOR	----
		thallium	7440-28-0	E472	0.0020	mg/kg	0.0256	0.0263	2.72%	40%	----
		tin	7440-31-5	E472	0.10	mg/kg	<0.10	<0.10	0	Diff <2x LOR	----
		uranium	7440-61-1	E472	0.0020	mg/kg	0.219	0.232	5.80%	40%	----
		vanadium	7440-62-2	E472	0.10	mg/kg	17.1	18.0	5.08%	40%	----
		zinc	7440-66-6	E472	1.0	mg/kg	17.8	19.3	8.13%	40%	----
		zirconium	7440-67-7	E472	0.20	mg/kg	1.75	1.89	7.84%	40%	----
Metals (QC Lot: 669491)											
VA22B8779-061	HAC-U_INV-5_2022-08	silver	7440-22-4	E472.Ag	0.0050	mg/kg	0.0880	0.429	132%	40%	DUP-H

Sub-Matrix: **Biota**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Metals (QC Lot: 669492)											
VA22B8779-061	HAC-U_INV-5_2022-08	titanium	7440-32-6	E472.Ti	0.50	mg/kg	20.4	117	140%	40%	DUP-H
Metals (QC Lot: 669493)											
VA22B8779-061	HAC-U_INV-5_2022-08	mercury	7439-97-6	E511	0.0050	mg/kg	0.107	0.140	27.1%	40%	----
Metals (QC Lot: 669494)											
VA22B8779-061	HAC-U_INV-5_2022-08	aluminum	7429-90-5	E472	5.0	mg/kg	373	3030	156%	40%	DUP-H
		antimony	7440-36-0	E472	0.010	mg/kg	0.022	# 0.059	0.037	Diff <2x LOR	DUP-H,J
		arsenic	7440-38-2	E472	0.030	mg/kg	3.12	5.32	52.0%	40%	DUP-H
		barium	7440-39-3	E472	0.050	mg/kg	35.7	105	98.5%	40%	DUP-H
		beryllium	7440-41-7	E472	0.010	mg/kg	0.012	0.110	160%	40%	DUP-H
		bismuth	7440-69-9	E472	0.010	mg/kg	<0.010	0.012	0.002	Diff <2x LOR	----
		boron	7440-42-8	E472	1.0	mg/kg	2.9	8.9	102%	40%	DUP-H
		cadmium	7440-43-9	E472	0.010	mg/kg	0.720	0.804	11.0%	40%	----
		calcium	7440-70-2	E472	20	mg/kg	20400	35400	54.0%	60%	----
		cesium	7440-46-2	E472	0.0050	mg/kg	0.0713	0.290	121%	40%	DUP-H
		chromium	7440-47-3	E472	0.20	mg/kg	1.06	3.50	107%	40%	DUP-H
		cobalt	7440-48-4	E472	0.020	mg/kg	1.25	3.70	98.8%	40%	DUP-H
		copper	7440-50-8	E472	0.20	mg/kg	403	975	82.9%	40%	DUP-H
		iron	7439-89-6	E472	5.0	mg/kg	962	4640	131%	40%	DUP-H
		lead	7439-92-1	E472	0.050	mg/kg	0.187	0.871	129%	40%	DUP-H
		lithium	7439-93-2	E472	0.50	mg/kg	<0.50	# 2.08	1.58	Diff <2x LOR	DUP-H,J
		magnesium	7439-95-4	E472	2.0	mg/kg	3320	4810	36.6%	40%	----
		manganese	7439-96-5	E472	0.050	mg/kg	851	1060	21.8%	40%	----
		molybdenum	7439-98-7	E472	0.040	mg/kg	1.76	1.92	8.96%	40%	----
		nickel	7440-02-0	E472	0.20	mg/kg	3.31	7.17	73.6%	40%	DUP-H
		phosphorus	7723-14-0	E472	10	mg/kg	11500	15300	28.9%	40%	----
		potassium	7440-09-7	E472	20	mg/kg	6750	7280	7.53%	40%	----
		rubidium	7440-17-7	E472	0.050	mg/kg	4.97	6.12	20.7%	40%	----
		selenium	7782-49-2	E472	0.10	mg/kg	6.06	8.98	38.8%	40%	----
		sodium	7440-23-5	E472	20	mg/kg	3770	3900	3.50%	40%	----
		strontium	7440-24-6	E472	0.10	mg/kg	80.5	139	53.4%	60%	----
		tellurium	13494-80-9	E472	0.020	mg/kg	<0.020	<0.020	0	Diff <2x LOR	----
		thallium	7440-28-0	E472	0.0020	mg/kg	0.0070	0.0372	136%	40%	DUP-H
		tin	7440-31-5	E472	0.10	mg/kg	<0.10	<0.10	0	Diff <2x LOR	----
		uranium	7440-61-1	E472	0.0020	mg/kg	0.114	0.337	98.9%	40%	DUP-H

Sub-Matrix: **Biota**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Metals (QC Lot: 669494) - continued											
VA22B8779-061	HAC-U_INV-5_2022-08	vanadium	7440-62-2	E472	0.10	mg/kg	2.50	16.2	146%	40%	DUP-H
		zinc	7440-66-6	E472	1.0	mg/kg	99.8	120	18.6%	40%	----
		zirconium	7440-67-7	E472	0.20	mg/kg	0.27	0.23	0.04	Diff <2x LOR	----
Metals (QC Lot: 676929)											
VA22B8779-081	EDC-D_INV-1_2022-08	silver	7440-22-4	E472.Ag	0.0050	mg/kg	0.164	0.184	11.7%	40%	----
Metals (QC Lot: 676930)											
VA22B8779-081	EDC-D_INV-1_2022-08	titanium	7440-32-6	E472.Ti	0.50	mg/kg	18.2	10.5	53.9%	40%	DUP-H
Metals (QC Lot: 676932)											
VA22B8779-081	EDC-D_INV-1_2022-08	aluminum	7429-90-5	E472	5.0	mg/kg	424	252	51.1%	40%	DUP-H
		antimony	7440-36-0	E472	0.010	mg/kg	0.020	0.014	0.007	Diff <2x LOR	----
		arsenic	7440-38-2	E472	0.030	mg/kg	1.96	1.56	22.5%	40%	----
		barium	7440-39-3	E472	0.050	mg/kg	8.50	6.59	25.3%	40%	----
		beryllium	7440-41-7	E472	0.010	mg/kg	0.014	<0.010	0.004	Diff <2x LOR	----
		bismuth	7440-69-9	E472	0.010	mg/kg	<0.010	<0.010	0	Diff <2x LOR	----
		boron	7440-42-8	E472	1.0	mg/kg	<1.0	1.2	0.2	Diff <2x LOR	----
		cadmium	7440-43-9	E472	0.010	mg/kg	0.946	0.702	29.5%	40%	----
		calcium	7440-70-2	E472	20	mg/kg	1800	1460	20.8%	60%	----
		cesium	7440-46-2	E472	0.0050	mg/kg	0.0625	0.0371	51.0%	40%	DUP-H
		chromium	7440-47-3	E472	0.20	mg/kg	2.02	1.18	52.6%	40%	DUP-H
		cobalt	7440-48-4	E472	0.020	mg/kg	0.896	0.628	35.2%	40%	----
		copper	7440-50-8	E472	0.20	mg/kg	38.0	40.0	5.26%	40%	----
		iron	7439-89-6	E472	5.0	mg/kg	848	516	48.8%	40%	DUP-H
		lead	7439-92-1	E472	0.050	mg/kg	0.198	0.128	0.070	Diff <2x LOR	----
		lithium	7439-93-2	E472	0.50	mg/kg	<0.50	<0.50	0	Diff <2x LOR	----
		magnesium	7439-95-4	E472	2.0	mg/kg	1300	1290	0.597%	40%	----
		manganese	7439-96-5	E472	0.050	mg/kg	238	196	19.2%	40%	----
		molybdenum	7439-98-7	E472	0.040	mg/kg	0.670	0.626	6.89%	40%	----
		nickel	7440-02-0	E472	0.20	mg/kg	2.47	1.84	29.6%	40%	----
		phosphorus	7723-14-0	E472	10	mg/kg	7140	7480	4.61%	40%	----
		potassium	7440-09-7	E472	20	mg/kg	7040	6880	2.30%	40%	----
		rubidium	7440-17-7	E472	0.050	mg/kg	2.88	2.43	16.9%	40%	----
		selenium	7782-49-2	E472	0.10	mg/kg	1.76	1.36	25.9%	40%	----
		sodium	7440-23-5	E472	20	mg/kg	3190	3290	3.16%	40%	----
		strontium	7440-24-6	E472	0.10	mg/kg	9.63	9.58	0.545%	60%	----

Sub-Matrix: **Biota**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Metals (QC Lot: 676932) - continued											
VA22B8779-081	EDC-D_INV-1_2022-08	tellurium	13494-80-9	E472	0.020	mg/kg	<0.020	<0.020	0	Diff <2x LOR	----
		thallium	7440-28-0	E472	0.0020	mg/kg	0.0143	0.0124	13.9%	40%	----
		tin	7440-31-5	E472	0.10	mg/kg	<0.10	<0.10	0	Diff <2x LOR	----
		uranium	7440-61-1	E472	0.0020	mg/kg	0.0448	0.0406	9.79%	40%	----
		vanadium	7440-62-2	E472	0.10	mg/kg	1.52	0.98	43.8%	40%	DUP-H
		zinc	7440-66-6	E472	1.0	mg/kg	119	147	20.7%	40%	----
		zirconium	7440-67-7	E472	0.20	mg/kg	0.64	# 1.08	0.44	Diff <2x LOR	DUP-H
Metals (QC Lot: 676933)											
VA22B8779-121	EDC-U_INVCAD-1_2022-08	silver	7440-22-4	E472.Ag	0.0050	mg/kg	0.0830	0.0644	25.2%	40%	----
Metals (QC Lot: 676934)											
VA22B8779-121	EDC-U_INVCAD-1_2022-08	titanium	7440-32-6	E472.Ti	0.50	mg/kg	4.01	5.77	36.1%	40%	DUP-H
Metals (QC Lot: 676935)											
VA22B8779-121	EDC-U_INVCAD-1_2022-08	mercury	7439-97-6	E511	0.0050	mg/kg	0.0418	0.0363	14.2%	40%	----
Metals (QC Lot: 676936)											
VA22B8779-121	EDC-U_INVCAD-1_2022-08	aluminum	7429-90-5	E472	5.0	mg/kg	89.4	93.3	4.23%	40%	----
		antimony	7440-36-0	E472	0.010	mg/kg	0.013	0.014	0.0002	Diff <2x LOR	----
		arsenic	7440-38-2	E472	0.030	mg/kg	0.634	0.557	13.0%	40%	----
		barium	7440-39-3	E472	0.050	mg/kg	3.88	4.55	16.0%	40%	----
		beryllium	7440-41-7	E472	0.010	mg/kg	<0.010	<0.010	0	Diff <2x LOR	----
		bismuth	7440-69-9	E472	0.010	mg/kg	<0.010	<0.010	0	Diff <2x LOR	----
		boron	7440-42-8	E472	1.0	mg/kg	<1.0	<1.0	0	Diff <2x LOR	----
		cadmium	7440-43-9	E472	0.010	mg/kg	0.207	0.207	0.0453%	40%	----
		calcium	7440-70-2	E472	20	mg/kg	548	573	4.49%	60%	----
		cesium	7440-46-2	E472	0.0050	mg/kg	0.0071	0.0072	0.00008	Diff <2x LOR	----
		chromium	7440-47-3	E472	0.20	mg/kg	0.35	0.41	0.06	Diff <2x LOR	----
		cobalt	7440-48-4	E472	0.020	mg/kg	0.348	0.278	22.5%	40%	----
		copper	7440-50-8	E472	0.20	mg/kg	17.1	13.6	22.9%	40%	----
		iron	7439-89-6	E472	5.0	mg/kg	224	212	5.24%	40%	----
		lead	7439-92-1	E472	0.050	mg/kg	0.057	0.057	0.0001	Diff <2x LOR	----
		lithium	7439-93-2	E472	0.50	mg/kg	<0.50	<0.50	0	Diff <2x LOR	----
		magnesium	7439-95-4	E472	2.0	mg/kg	1330	1260	5.74%	40%	----
		manganese	7439-96-5	E472	0.050	mg/kg	205	238	15.1%	40%	----

Sub-Matrix: **Biota**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Metals (QC Lot: 676936) - continued											
VA22B8779-121	EDC-U_INVCAD-1_2022-08	molybdenum	7439-98-7	E472	0.040	mg/kg	24.2	21.8	10.3%	40%	----
		nickel	7440-02-0	E472	0.20	mg/kg	0.32	0.29	0.03	Diff <2x LOR	----
		phosphorus	7723-14-0	E472	10	mg/kg	7850	7040	11.0%	40%	----
		potassium	7440-09-7	E472	20	mg/kg	7170	6180	14.8%	40%	----
		rubidium	7440-17-7	E472	0.050	mg/kg	3.49	3.10	12.0%	40%	----
		selenium	7782-49-2	E472	0.10	mg/kg	0.74	0.60	20.8%	40%	----
		sodium	7440-23-5	E472	20	mg/kg	2920	2570	12.7%	40%	----
		strontium	7440-24-6	E472	0.10	mg/kg	3.52	3.60	2.17%	60%	----
		tellurium	13494-80-9	E472	0.020	mg/kg	<0.020	<0.020	0	Diff <2x LOR	----
		thallium	7440-28-0	E472	0.0020	mg/kg	0.0034	0.0030	0.0004	Diff <2x LOR	----
		tin	7440-31-5	E472	0.10	mg/kg	<0.10	<0.10	0	Diff <2x LOR	----
		uranium	7440-61-1	E472	0.0020	mg/kg	0.0066	0.0090	0.0024	Diff <2x LOR	----
		vanadium	7440-62-2	E472	0.10	mg/kg	0.62	0.57	7.49%	40%	----
		zinc	7440-66-6	E472	1.0	mg/kg	103	107	3.70%	40%	----
		zirconium	7440-67-7	E472	0.20	mg/kg	<0.20	<0.20	0	Diff <2x LOR	----
Metals (QC Lot: 678979)											
VA22B8779-112	HAC-U_INVCAD-8_2022-08	silver	7440-22-4	E472.Ag	0.0050	mg/kg	<0.0050	<0.0050	0	Diff <2x LOR	----
Metals (QC Lot: 678980)											
VA22B8779-112	HAC-U_INVCAD-8_2022-08	titanium	7440-32-6	E472.Ti	0.50	mg/kg	4.90	4.30	13.1%	40%	----
Metals (QC Lot: 678981)											
VA22B8779-112	HAC-U_INVCAD-8_2022-08	mercury	7439-97-6	E511	0.0050	mg/kg	0.0750	0.0709	5.68%	40%	----
Metals (QC Lot: 678982)											
VA22B8779-112	HAC-U_INVCAD-8_2022-08	aluminum	7429-90-5	E472	5.0	mg/kg	82.1	73.1	11.6%	40%	----
		antimony	7440-36-0	E472	0.010	mg/kg	0.021	0.018	0.003	Diff <2x LOR	----
		arsenic	7440-38-2	E472	0.030	mg/kg	0.400	0.392	2.22%	40%	----
		barium	7440-39-3	E472	0.050	mg/kg	2.97	2.68	10.2%	40%	----
		beryllium	7440-41-7	E472	0.010	mg/kg	<0.010	<0.010	0	Diff <2x LOR	----
		bismuth	7440-69-9	E472	0.010	mg/kg	<0.010	<0.010	0	Diff <2x LOR	----
		boron	7440-42-8	E472	1.0	mg/kg	<1.0	<1.0	0	Diff <2x LOR	----
		cadmium	7440-43-9	E472	0.010	mg/kg	0.033	0.030	0.002	Diff <2x LOR	----
		calcium	7440-70-2	E472	20	mg/kg	650	588	10.0%	60%	----
		cesium	7440-46-2	E472	0.0050	mg/kg	0.0112	0.0099	0.0013	Diff <2x LOR	----

Sub-Matrix: **Biota**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Metals (QC Lot: 678982) - continued											
VA22B8779-112	HAC-U_INVCAD-8_2022-08	chromium	7440-47-3	E472	0.20	mg/kg	0.24	0.23	0.009	Diff <2x LOR	----
		cobalt	7440-48-4	E472	0.020	mg/kg	0.160	0.149	7.17%	40%	----
		copper	7440-50-8	E472	0.20	mg/kg	19.4	17.9	8.03%	40%	----
		iron	7439-89-6	E472	5.0	mg/kg	205	192	6.62%	40%	----
		lead	7439-92-1	E472	0.050	mg/kg	0.055	0.051	0.003	Diff <2x LOR	----
		lithium	7439-93-2	E472	0.50	mg/kg	<0.50	<0.50	0	Diff <2x LOR	----
		magnesium	7439-95-4	E472	2.0	mg/kg	1190	1120	6.58%	40%	----
		manganese	7439-96-5	E472	0.050	mg/kg	242	240	0.900%	40%	----
		molybdenum	7439-98-7	E472	0.040	mg/kg	8.16	7.58	7.41%	40%	----
		nickel	7440-02-0	E472	0.20	mg/kg	0.27	0.26	0.008	Diff <2x LOR	----
		phosphorus	7723-14-0	E472	10	mg/kg	7090	6780	4.37%	40%	----
		potassium	7440-09-7	E472	20	mg/kg	6770	6620	2.15%	40%	----
		rubidium	7440-17-7	E472	0.050	mg/kg	1.17	1.13	3.90%	40%	----
		selenium	7782-49-2	E472	0.10	mg/kg	9.65	9.17	5.18%	40%	----
		sodium	7440-23-5	E472	20	mg/kg	2570	2510	2.68%	40%	----
		strontium	7440-24-6	E472	0.10	mg/kg	4.17	3.88	7.32%	60%	----
		tellurium	13494-80-9	E472	0.020	mg/kg	<0.020	<0.020	0	Diff <2x LOR	----
		thallium	7440-28-0	E472	0.0020	mg/kg	<0.0020	<0.0020	0	Diff <2x LOR	----
		tin	7440-31-5	E472	0.10	mg/kg	<0.10	<0.10	0	Diff <2x LOR	----
		uranium	7440-61-1	E472	0.0020	mg/kg	0.0102	0.0088	0.0014	Diff <2x LOR	----
		vanadium	7440-62-2	E472	0.10	mg/kg	0.47	0.42	0.05	Diff <2x LOR	----
		zinc	7440-66-6	E472	1.0	mg/kg	82.0	74.8	9.26%	40%	----
		zirconium	7440-67-7	E472	0.20	mg/kg	<0.20	<0.20	0	Diff <2x LOR	----
Metals (QC Lot: 678986)											
VA22B8779-141	E1_INVCAD-5_2022-08	silver	7440-22-4	E472.Ag	0.0050	mg/kg	0.0882	0.0865	1.98%	40%	----
Metals (QC Lot: 678987)											
VA22B8779-141	E1_INVCAD-5_2022-08	titanium	7440-32-6	E472.Ti	0.50	mg/kg	224	205	8.74%	40%	----
Metals (QC Lot: 678988)											
VA22B8779-141	E1_INVCAD-5_2022-08	mercury	7439-97-6	E511	0.0050	mg/kg	0.0480	0.0481	0.246%	40%	----
Metals (QC Lot: 678989)											
VA22B8779-141	E1_INVCAD-5_2022-08	aluminum	7429-90-5	E472	5.0	mg/kg	4140	3900	6.12%	40%	----
		antimony	7440-36-0	E472	0.010	mg/kg	0.073	0.072	1.20%	40%	----
		arsenic	7440-38-2	E472	0.030	mg/kg	6.05	6.07	0.364%	40%	----

Sub-Matrix: **Biota**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Metals (QC Lot: 678989) - continued											
VA22B8779-141	E1_INVCAD-5_2022-08	barium	7440-39-3	E472	0.050	mg/kg	163	159	2.89%	40%	----
		beryllium	7440-41-7	E472	0.010	mg/kg	0.148	0.139	6.11%	40%	----
		bismuth	7440-69-9	E472	0.010	mg/kg	0.032	0.031	0.0003	Diff <2x LOR	----
		boron	7440-42-8	E472	1.0	mg/kg	5.3	5.2	1.41%	40%	----
		cadmium	7440-43-9	E472	0.010	mg/kg	0.903	0.882	2.30%	40%	----
		calcium	7440-70-2	E472	20	mg/kg	3120	2870	8.30%	60%	----
		cesium	7440-46-2	E472	0.0050	mg/kg	0.392	0.400	2.08%	40%	----
		chromium	7440-47-3	E472	0.20	mg/kg	23.2	15.2	41.5%	40%	DUP-H
		cobalt	7440-48-4	E472	0.020	mg/kg	6.32	6.15	2.74%	40%	----
		copper	7440-50-8	E472	0.20	mg/kg	118	119	0.580%	40%	----
		iron	7439-89-6	E472	5.0	mg/kg	8410	8130	3.43%	40%	----
		lead	7439-92-1	E472	0.050	mg/kg	1.96	1.88	4.03%	40%	----
		lithium	7439-93-2	E472	0.50	mg/kg	4.09	3.77	8.23%	40%	----
		magnesium	7439-95-4	E472	2.0	mg/kg	3240	3120	3.73%	40%	----
		manganese	7439-96-5	E472	0.050	mg/kg	1310	1330	2.13%	40%	----
		molybdenum	7439-98-7	E472	0.040	mg/kg	1.86	1.44	25.6%	40%	----
		nickel	7440-02-0	E472	0.20	mg/kg	16.8	13.4	21.9%	40%	----
		phosphorus	7723-14-0	E472	10	mg/kg	6890	7020	1.86%	40%	----
		potassium	7440-09-7	E472	20	mg/kg	13700	14000	2.03%	40%	----
		rubidium	7440-17-7	E472	0.050	mg/kg	6.10	6.14	0.683%	40%	----
		selenium	7782-49-2	E472	0.10	mg/kg	1.44	1.47	2.28%	40%	----
		sodium	7440-23-5	E472	20	mg/kg	3380	3410	0.773%	40%	----
		strontium	7440-24-6	E472	0.10	mg/kg	27.0	25.6	5.43%	60%	----
		tellurium	13494-80-9	E472	0.020	mg/kg	<0.020	<0.020	0	Diff <2x LOR	----
		thallium	7440-28-0	E472	0.0020	mg/kg	0.0351	0.0341	2.97%	40%	----
		tin	7440-31-5	E472	0.10	mg/kg	0.12	0.10	0.02	Diff <2x LOR	----
		uranium	7440-61-1	E472	0.0020	mg/kg	0.383	0.359	6.35%	40%	----
		vanadium	7440-62-2	E472	0.10	mg/kg	19.3	18.8	2.83%	40%	----
		zinc	7440-66-6	E472	1.0	mg/kg	154	152	1.14%	40%	----
		zirconium	7440-67-7	E472	0.20	mg/kg	3.12	3.00	4.03%	40%	----

Qualifiers

Qualifier	Description
DUP-H	Duplicate results outside ALS DQO, due to sample heterogeneity.
J	Duplicate results and limits are expressed in terms of absolute difference.

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Biota**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 650126)						
moisture	----	E144-H	2	%	<2.0	----
Physical Tests (QCLot: 650129)						
moisture	----	E144-H	2	%	<2.0	----
Physical Tests (QCLot: 650130)						
moisture	----	E144-H	2	%	<2.0	----
Physical Tests (QCLot: 650207)						
moisture	----	E144-H	2	%	<2.0	----
Physical Tests (QCLot: 650212)						
moisture	----	E144-H	2	%	<2.0	----
Physical Tests (QCLot: 650220)						
moisture	----	E144-H	2	%	<2.0	----
Physical Tests (QCLot: 650226)						
moisture	----	E144-H	2	%	<2.0	----
Physical Tests (QCLot: 650234)						
moisture	----	E144-H	2	%	<2.0	----
Physical Tests (QCLot: 661600)						
moisture	----	E144A	2	%	<2.0	----
Physical Tests (QCLot: 667445)						
moisture	----	E144A	2	%	<2.0	----
Physical Tests (QCLot: 670357)						
moisture	----	E144A	2	%	<2.0	----
Metals (QCLot: 660768)						
silver	7440-22-4	E472.Ag	0.005	mg/kg	<0.0050	----
Metals (QCLot: 660769)						
titanium	7440-32-6	E472.Ti	0.5	mg/kg	<0.50	----
Metals (QCLot: 660770)						
mercury	7439-97-6	E511	0.005	mg/kg	<0.0050	----
Metals (QCLot: 660771)						
aluminum	7429-90-5	E472	5	mg/kg	<5.0	----
antimony	7440-36-0	E472	0.01	mg/kg	<0.010	----
arsenic	7440-38-2	E472	0.03	mg/kg	<0.030	----
barium	7440-39-3	E472	0.05	mg/kg	<0.050	----

Sub-Matrix: **Biota**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 660771) - continued						
beryllium	7440-41-7	E472	0.01	mg/kg	<0.010	----
bismuth	7440-69-9	E472	0.01	mg/kg	<0.010	----
boron	7440-42-8	E472	1	mg/kg	<1.0	----
cadmium	7440-43-9	E472	0.01	mg/kg	<0.010	----
calcium	7440-70-2	E472	20	mg/kg	<20	----
cesium	7440-46-2	E472	0.005	mg/kg	<0.0050	----
chromium	7440-47-3	E472	0.2	mg/kg	<0.20	----
cobalt	7440-48-4	E472	0.02	mg/kg	<0.020	----
copper	7440-50-8	E472	0.2	mg/kg	<0.20	----
iron	7439-89-6	E472	5	mg/kg	<5.0	----
lead	7439-92-1	E472	0.05	mg/kg	<0.050	----
lithium	7439-93-2	E472	0.5	mg/kg	<0.50	----
magnesium	7439-95-4	E472	2	mg/kg	<2.0	----
manganese	7439-96-5	E472	0.05	mg/kg	<0.050	----
molybdenum	7439-98-7	E472	0.04	mg/kg	<0.040	----
nickel	7440-02-0	E472	0.2	mg/kg	<0.20	----
phosphorus	7723-14-0	E472	10	mg/kg	<10	----
potassium	7440-09-7	E472	20	mg/kg	<20	----
rubidium	7440-17-7	E472	0.05	mg/kg	<0.050	----
selenium	7782-49-2	E472	0.1	mg/kg	<0.10	----
sodium	7440-23-5	E472	20	mg/kg	<20	----
strontium	7440-24-6	E472	0.1	mg/kg	<0.10	----
tellurium	13494-80-9	E472	0.02	mg/kg	<0.020	----
thallium	7440-28-0	E472	0.002	mg/kg	<0.0020	----
tin	7440-31-5	E472	0.1	mg/kg	<0.10	----
uranium	7440-61-1	E472	0.002	mg/kg	<0.0020	----
vanadium	7440-62-2	E472	0.1	mg/kg	<0.10	----
zinc	7440-66-6	E472	1	mg/kg	<1.0	----
zirconium	7440-67-7	E472	0.2	mg/kg	<0.20	----
Metals (QCLot: 661601)						
mercury	7439-97-6	E512	0.01	mg/kg	<0.010	----
Metals (QCLot: 661602)						
silver	7440-22-4	E475.Ag	0.005	mg/kg	<0.0050	----
Metals (QCLot: 661603)						
titanium	7440-32-6	E475.Ti	0.5	mg/kg	<0.50	----

Sub-Matrix: **Biota**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 661604)						
aluminum	7429-90-5	E475	5	mg/kg	<5.0	----
antimony	7440-36-0	E475	0.02	mg/kg	<0.020	----
arsenic	7440-38-2	E475	0.05	mg/kg	<0.050	----
barium	7440-39-3	E475	0.05	mg/kg	<0.050	----
beryllium	7440-41-7	E475	0.01	mg/kg	<0.010	----
bismuth	7440-69-9	E475	0.01	mg/kg	<0.010	----
boron	7440-42-8	E475	1	mg/kg	<1.0	----
cadmium	7440-43-9	E475	0.01	mg/kg	<0.010	----
calcium	7440-70-2	E475	20	mg/kg	<20	----
cesium	7440-46-2	E475	0.005	mg/kg	<0.0050	----
chromium	7440-47-3	E475	0.2	mg/kg	<0.20	----
cobalt	7440-48-4	E475	0.02	mg/kg	<0.020	----
copper	7440-50-8	E475	0.2	mg/kg	<0.20	----
iron	7439-89-6	E475	5	mg/kg	<5.0	----
lead	7439-92-1	E475	0.05	mg/kg	<0.050	----
lithium	7439-93-2	E475	0.5	mg/kg	<0.50	----
magnesium	7439-95-4	E475	2	mg/kg	<2.0	----
manganese	7439-96-5	E475	0.05	mg/kg	<0.050	----
molybdenum	7439-98-7	E475	0.04	mg/kg	<0.040	----
nickel	7440-02-0	E475	0.2	mg/kg	<0.20	----
phosphorus	7723-14-0	E475	20	mg/kg	<20	----
potassium	7440-09-7	E475	20	mg/kg	<20	----
rubidium	7440-17-7	E475	0.05	mg/kg	<0.050	----
selenium	7782-49-2	E475	0.1	mg/kg	<0.10	----
sodium	7440-23-5	E475	20	mg/kg	<20	----
strontium	7440-24-6	E475	0.1	mg/kg	<0.10	----
tellurium	13494-80-9	E475	0.02	mg/kg	<0.020	----
thallium	7440-28-0	E475	0.002	mg/kg	<0.0020	----
tin	7440-31-5	E475	0.1	mg/kg	<0.10	----
uranium	7440-61-1	E475	0.002	mg/kg	<0.0020	----
vanadium	7440-62-2	E475	0.1	mg/kg	<0.10	----
zinc	7440-66-6	E475	1	mg/kg	<1.0	----
zirconium	7440-67-7	E475	0.2	mg/kg	<0.20	----
Metals (QCLot: 667415)						
silver	7440-22-4	E472.Ag	0.005	mg/kg	<0.0050	----

Sub-Matrix: **Biota**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 667416)						
titanium	7440-32-6	E472.Ti	0.5	mg/kg	<0.50	----
Metals (QCLot: 667417)						
mercury	7439-97-6	E511	0.005	mg/kg	<0.0050	----
Metals (QCLot: 667418)						
aluminum	7429-90-5	E472	5	mg/kg	<5.0	----
antimony	7440-36-0	E472	0.01	mg/kg	<0.010	----
arsenic	7440-38-2	E472	0.03	mg/kg	<0.030	----
barium	7440-39-3	E472	0.05	mg/kg	<0.050	----
beryllium	7440-41-7	E472	0.01	mg/kg	<0.010	----
bismuth	7440-69-9	E472	0.01	mg/kg	<0.010	----
boron	7440-42-8	E472	1	mg/kg	<1.0	----
cadmium	7440-43-9	E472	0.01	mg/kg	<0.010	----
calcium	7440-70-2	E472	20	mg/kg	<20	----
cesium	7440-46-2	E472	0.005	mg/kg	<0.0050	----
chromium	7440-47-3	E472	0.2	mg/kg	<0.20	----
cobalt	7440-48-4	E472	0.02	mg/kg	<0.020	----
copper	7440-50-8	E472	0.2	mg/kg	<0.20	----
iron	7439-89-6	E472	5	mg/kg	<5.0	----
lead	7439-92-1	E472	0.05	mg/kg	<0.050	----
lithium	7439-93-2	E472	0.5	mg/kg	<0.50	----
magnesium	7439-95-4	E472	2	mg/kg	<2.0	----
manganese	7439-96-5	E472	0.05	mg/kg	<0.050	----
molybdenum	7439-98-7	E472	0.04	mg/kg	<0.040	----
nickel	7440-02-0	E472	0.2	mg/kg	<0.20	----
phosphorus	7723-14-0	E472	10	mg/kg	<10	----
potassium	7440-09-7	E472	20	mg/kg	<20	----
rubidium	7440-17-7	E472	0.05	mg/kg	<0.050	----
selenium	7782-49-2	E472	0.1	mg/kg	<0.10	----
sodium	7440-23-5	E472	20	mg/kg	<20	----
strontium	7440-24-6	E472	0.1	mg/kg	<0.10	----
tellurium	13494-80-9	E472	0.02	mg/kg	<0.020	----
thallium	7440-28-0	E472	0.002	mg/kg	<0.0020	----
tin	7440-31-5	E472	0.1	mg/kg	<0.10	----
uranium	7440-61-1	E472	0.002	mg/kg	<0.0020	----
vanadium	7440-62-2	E472	0.1	mg/kg	<0.10	----

Sub-Matrix: **Biota**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 667418) - continued						
zinc	7440-66-6	E472	1	mg/kg	<1.0	----
zirconium	7440-67-7	E472	0.2	mg/kg	<0.20	----
Metals (QCLot: 667450)						
mercury	7439-97-6	E512	0.01	mg/kg	<0.010	----
Metals (QCLot: 667451)						
silver	7440-22-4	E475.Ag	0.005	mg/kg	<0.0050	----
Metals (QCLot: 667452)						
titanium	7440-32-6	E475.Ti	0.5	mg/kg	<0.50	----
Metals (QCLot: 667453)						
aluminum	7429-90-5	E475	5	mg/kg	<5.0	----
antimony	7440-36-0	E475	0.02	mg/kg	<0.020	----
arsenic	7440-38-2	E475	0.05	mg/kg	<0.050	----
barium	7440-39-3	E475	0.05	mg/kg	<0.050	----
beryllium	7440-41-7	E475	0.01	mg/kg	<0.010	----
bismuth	7440-69-9	E475	0.01	mg/kg	<0.010	----
boron	7440-42-8	E475	1	mg/kg	<1.0	----
cadmium	7440-43-9	E475	0.01	mg/kg	<0.010	----
calcium	7440-70-2	E475	20	mg/kg	<20	----
cesium	7440-46-2	E475	0.005	mg/kg	<0.0050	----
chromium	7440-47-3	E475	0.2	mg/kg	<0.20	----
cobalt	7440-48-4	E475	0.02	mg/kg	<0.020	----
copper	7440-50-8	E475	0.2	mg/kg	<0.20	----
iron	7439-89-6	E475	5	mg/kg	<5.0	----
lead	7439-92-1	E475	0.05	mg/kg	<0.050	----
lithium	7439-93-2	E475	0.5	mg/kg	<0.50	----
magnesium	7439-95-4	E475	2	mg/kg	<2.0	----
manganese	7439-96-5	E475	0.05	mg/kg	<0.050	----
molybdenum	7439-98-7	E475	0.04	mg/kg	<0.040	----
nickel	7440-02-0	E475	0.2	mg/kg	<0.20	----
phosphorus	7723-14-0	E475	20	mg/kg	<20	----
potassium	7440-09-7	E475	20	mg/kg	<20	----
rubidium	7440-17-7	E475	0.05	mg/kg	<0.050	----
selenium	7782-49-2	E475	0.1	mg/kg	<0.10	----
sodium	7440-23-5	E475	20	mg/kg	<20	----
strontium	7440-24-6	E475	0.1	mg/kg	<0.10	----

Sub-Matrix: **Biota**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 667453) - continued						
tellurium	13494-80-9	E475	0.02	mg/kg	<0.020	----
thallium	7440-28-0	E475	0.002	mg/kg	<0.0020	----
tin	7440-31-5	E475	0.1	mg/kg	<0.10	----
uranium	7440-61-1	E475	0.002	mg/kg	<0.0020	----
vanadium	7440-62-2	E475	0.1	mg/kg	<0.10	----
zinc	7440-66-6	E475	1	mg/kg	<1.0	----
zirconium	7440-67-7	E475	0.2	mg/kg	<0.20	----
Metals (QCLot: 669485)						
silver	7440-22-4	E472.Ag	0.005	mg/kg	<0.0050	----
Metals (QCLot: 669486)						
titanium	7440-32-6	E472.Ti	0.5	mg/kg	<0.50	----
Metals (QCLot: 669487)						
mercury	7439-97-6	E511	0.005	mg/kg	<0.0050	----
Metals (QCLot: 669488)						
aluminum	7429-90-5	E472	5	mg/kg	<5.0	----
antimony	7440-36-0	E472	0.01	mg/kg	<0.010	----
arsenic	7440-38-2	E472	0.03	mg/kg	<0.030	----
barium	7440-39-3	E472	0.05	mg/kg	<0.050	----
beryllium	7440-41-7	E472	0.01	mg/kg	<0.010	----
bismuth	7440-69-9	E472	0.01	mg/kg	<0.010	----
boron	7440-42-8	E472	1	mg/kg	<1.0	----
cadmium	7440-43-9	E472	0.01	mg/kg	<0.010	----
calcium	7440-70-2	E472	20	mg/kg	<20	----
cesium	7440-46-2	E472	0.005	mg/kg	<0.0050	----
chromium	7440-47-3	E472	0.2	mg/kg	<0.20	----
cobalt	7440-48-4	E472	0.02	mg/kg	<0.020	----
copper	7440-50-8	E472	0.2	mg/kg	<0.20	----
iron	7439-89-6	E472	5	mg/kg	<5.0	----
lead	7439-92-1	E472	0.05	mg/kg	<0.050	----
lithium	7439-93-2	E472	0.5	mg/kg	<0.50	----
magnesium	7439-95-4	E472	2	mg/kg	<2.0	----
manganese	7439-96-5	E472	0.05	mg/kg	<0.050	----
molybdenum	7439-98-7	E472	0.04	mg/kg	<0.040	----
nickel	7440-02-0	E472	0.2	mg/kg	<0.20	----
phosphorus	7723-14-0	E472	10	mg/kg	<10	----

Sub-Matrix: **Biota**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 669488) - continued						
potassium	7440-09-7	E472	20	mg/kg	<20	----
rubidium	7440-17-7	E472	0.05	mg/kg	<0.050	----
selenium	7782-49-2	E472	0.1	mg/kg	<0.10	----
sodium	7440-23-5	E472	20	mg/kg	<20	----
strontium	7440-24-6	E472	0.1	mg/kg	<0.10	----
tellurium	13494-80-9	E472	0.02	mg/kg	<0.020	----
thallium	7440-28-0	E472	0.002	mg/kg	<0.0020	----
tin	7440-31-5	E472	0.1	mg/kg	<0.10	----
uranium	7440-61-1	E472	0.002	mg/kg	<0.0020	----
vanadium	7440-62-2	E472	0.1	mg/kg	<0.10	----
zinc	7440-66-6	E472	1	mg/kg	<1.0	----
zirconium	7440-67-7	E472	0.2	mg/kg	<0.20	----
Metals (QCLot: 669491)						
silver	7440-22-4	E472.Ag	0.005	mg/kg	<0.0050	----
Metals (QCLot: 669492)						
titanium	7440-32-6	E472.Ti	0.5	mg/kg	<0.50	----
Metals (QCLot: 669493)						
mercury	7439-97-6	E511	0.005	mg/kg	<0.0050	----
Metals (QCLot: 669494)						
aluminum	7429-90-5	E472	5	mg/kg	<5.0	----
antimony	7440-36-0	E472	0.01	mg/kg	<0.010	----
arsenic	7440-38-2	E472	0.03	mg/kg	<0.030	----
barium	7440-39-3	E472	0.05	mg/kg	<0.050	----
beryllium	7440-41-7	E472	0.01	mg/kg	<0.010	----
bismuth	7440-69-9	E472	0.01	mg/kg	<0.010	----
boron	7440-42-8	E472	1	mg/kg	<1.0	----
cadmium	7440-43-9	E472	0.01	mg/kg	<0.010	----
calcium	7440-70-2	E472	20	mg/kg	<20	----
cesium	7440-46-2	E472	0.005	mg/kg	<0.0050	----
chromium	7440-47-3	E472	0.2	mg/kg	<0.20	----
cobalt	7440-48-4	E472	0.02	mg/kg	<0.020	----
copper	7440-50-8	E472	0.2	mg/kg	<0.20	----
iron	7439-89-6	E472	5	mg/kg	<5.0	----
lead	7439-92-1	E472	0.05	mg/kg	<0.050	----
lithium	7439-93-2	E472	0.5	mg/kg	<0.50	----

Sub-Matrix: **Biota**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 669494) - continued						
magnesium	7439-95-4	E472	2	mg/kg	<2.0	----
manganese	7439-96-5	E472	0.05	mg/kg	<0.050	----
molybdenum	7439-98-7	E472	0.04	mg/kg	<0.040	----
nickel	7440-02-0	E472	0.2	mg/kg	<0.20	----
phosphorus	7723-14-0	E472	10	mg/kg	<10	----
potassium	7440-09-7	E472	20	mg/kg	<20	----
rubidium	7440-17-7	E472	0.05	mg/kg	<0.050	----
selenium	7782-49-2	E472	0.1	mg/kg	<0.10	----
sodium	7440-23-5	E472	20	mg/kg	<20	----
strontium	7440-24-6	E472	0.1	mg/kg	<0.10	----
tellurium	13494-80-9	E472	0.02	mg/kg	<0.020	----
thallium	7440-28-0	E472	0.002	mg/kg	<0.0020	----
tin	7440-31-5	E472	0.1	mg/kg	<0.10	----
uranium	7440-61-1	E472	0.002	mg/kg	<0.0020	----
vanadium	7440-62-2	E472	0.1	mg/kg	<0.10	----
zinc	7440-66-6	E472	1	mg/kg	<1.0	----
zirconium	7440-67-7	E472	0.2	mg/kg	<0.20	----
Metals (QCLot: 670360)						
mercury	7439-97-6	E512	0.01	mg/kg	<0.010	----
Metals (QCLot: 670361)						
silver	7440-22-4	E475.Ag	0.005	mg/kg	<0.0050	----
Metals (QCLot: 670362)						
titanium	7440-32-6	E475.Ti	0.5	mg/kg	<0.50	----
Metals (QCLot: 670363)						
aluminum	7429-90-5	E475	5	mg/kg	<5.0	----
antimony	7440-36-0	E475	0.02	mg/kg	<0.020	----
arsenic	7440-38-2	E475	0.05	mg/kg	<0.050	----
barium	7440-39-3	E475	0.05	mg/kg	<0.050	----
beryllium	7440-41-7	E475	0.01	mg/kg	<0.010	----
bismuth	7440-69-9	E475	0.01	mg/kg	<0.010	----
boron	7440-42-8	E475	1	mg/kg	<1.0	----
cadmium	7440-43-9	E475	0.01	mg/kg	<0.010	----
calcium	7440-70-2	E475	20	mg/kg	<20	----
cesium	7440-46-2	E475	0.005	mg/kg	<0.0050	----
chromium	7440-47-3	E475	0.2	mg/kg	<0.20	----

Sub-Matrix: **Biota**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 670363) - continued						
cobalt	7440-48-4	E475	0.02	mg/kg	<0.020	----
copper	7440-50-8	E475	0.2	mg/kg	<0.20	----
iron	7439-89-6	E475	5	mg/kg	<5.0	----
lead	7439-92-1	E475	0.05	mg/kg	<0.050	----
lithium	7439-93-2	E475	0.5	mg/kg	<0.50	----
magnesium	7439-95-4	E475	2	mg/kg	<2.0	----
manganese	7439-96-5	E475	0.05	mg/kg	<0.050	----
molybdenum	7439-98-7	E475	0.04	mg/kg	<0.040	----
nickel	7440-02-0	E475	0.2	mg/kg	<0.20	----
phosphorus	7723-14-0	E475	20	mg/kg	<20	----
potassium	7440-09-7	E475	20	mg/kg	<20	----
rubidium	7440-17-7	E475	0.05	mg/kg	<0.050	----
selenium	7782-49-2	E475	0.1	mg/kg	<0.10	----
sodium	7440-23-5	E475	20	mg/kg	<20	----
strontium	7440-24-6	E475	0.1	mg/kg	<0.10	----
tellurium	13494-80-9	E475	0.02	mg/kg	<0.020	----
thallium	7440-28-0	E475	0.002	mg/kg	<0.0020	----
tin	7440-31-5	E475	0.1	mg/kg	<0.10	----
uranium	7440-61-1	E475	0.002	mg/kg	<0.0020	----
vanadium	7440-62-2	E475	0.1	mg/kg	<0.10	----
zinc	7440-66-6	E475	1	mg/kg	<1.0	----
zirconium	7440-67-7	E475	0.2	mg/kg	<0.20	----
Metals (QCLot: 676929)						
silver	7440-22-4	E472.Ag	0.005	mg/kg	<0.0050	----
Metals (QCLot: 676930)						
titanium	7440-32-6	E472.Ti	0.5	mg/kg	<0.50	----
Metals (QCLot: 676931)						
mercury	7439-97-6	E511	0.005	mg/kg	<0.0050	----
Metals (QCLot: 676932)						
aluminum	7429-90-5	E472	5	mg/kg	<5.0	----
antimony	7440-36-0	E472	0.01	mg/kg	<0.010	----
arsenic	7440-38-2	E472	0.03	mg/kg	<0.030	----
barium	7440-39-3	E472	0.05	mg/kg	<0.050	----
beryllium	7440-41-7	E472	0.01	mg/kg	<0.010	----
bismuth	7440-69-9	E472	0.01	mg/kg	<0.010	----

Sub-Matrix: **Biota**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 676932) - continued						
boron	7440-42-8	E472	1	mg/kg	<1.0	----
cadmium	7440-43-9	E472	0.01	mg/kg	<0.010	----
calcium	7440-70-2	E472	20	mg/kg	<20	----
cesium	7440-46-2	E472	0.005	mg/kg	<0.0050	----
chromium	7440-47-3	E472	0.2	mg/kg	<0.20	----
cobalt	7440-48-4	E472	0.02	mg/kg	<0.020	----
copper	7440-50-8	E472	0.2	mg/kg	<0.20	----
iron	7439-89-6	E472	5	mg/kg	<5.0	----
lead	7439-92-1	E472	0.05	mg/kg	<0.050	----
lithium	7439-93-2	E472	0.5	mg/kg	<0.50	----
magnesium	7439-95-4	E472	2	mg/kg	<2.0	----
manganese	7439-96-5	E472	0.05	mg/kg	<0.050	----
molybdenum	7439-98-7	E472	0.04	mg/kg	<0.040	----
nickel	7440-02-0	E472	0.2	mg/kg	<0.20	----
phosphorus	7723-14-0	E472	10	mg/kg	<10	----
potassium	7440-09-7	E472	20	mg/kg	<20	----
rubidium	7440-17-7	E472	0.05	mg/kg	<0.050	----
selenium	7782-49-2	E472	0.1	mg/kg	<0.10	----
sodium	7440-23-5	E472	20	mg/kg	<20	----
strontium	7440-24-6	E472	0.1	mg/kg	<0.10	----
tellurium	13494-80-9	E472	0.02	mg/kg	<0.020	----
thallium	7440-28-0	E472	0.002	mg/kg	<0.0020	----
tin	7440-31-5	E472	0.1	mg/kg	<0.10	----
uranium	7440-61-1	E472	0.002	mg/kg	<0.0020	----
vanadium	7440-62-2	E472	0.1	mg/kg	<0.10	----
zinc	7440-66-6	E472	1	mg/kg	<1.0	----
zirconium	7440-67-7	E472	0.2	mg/kg	<0.20	----
Metals (QCLot: 676933)						
silver	7440-22-4	E472.Ag	0.005	mg/kg	<0.0050	----
Metals (QCLot: 676934)						
titanium	7440-32-6	E472.Ti	0.5	mg/kg	<0.50	----
Metals (QCLot: 676935)						
mercury	7439-97-6	E511	0.005	mg/kg	<0.0050	----
Metals (QCLot: 676936)						
aluminum	7429-90-5	E472	5	mg/kg	<5.0	----

Sub-Matrix: **Biota**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 676936) - continued						
antimony	7440-36-0	E472	0.01	mg/kg	<0.010	----
arsenic	7440-38-2	E472	0.03	mg/kg	<0.030	----
barium	7440-39-3	E472	0.05	mg/kg	<0.050	----
beryllium	7440-41-7	E472	0.01	mg/kg	<0.010	----
bismuth	7440-69-9	E472	0.01	mg/kg	<0.010	----
boron	7440-42-8	E472	1	mg/kg	<1.0	----
cadmium	7440-43-9	E472	0.01	mg/kg	<0.010	----
calcium	7440-70-2	E472	20	mg/kg	<20	----
cesium	7440-46-2	E472	0.005	mg/kg	<0.0050	----
chromium	7440-47-3	E472	0.2	mg/kg	<0.20	----
cobalt	7440-48-4	E472	0.02	mg/kg	<0.020	----
copper	7440-50-8	E472	0.2	mg/kg	<0.20	----
iron	7439-89-6	E472	5	mg/kg	<5.0	----
lead	7439-92-1	E472	0.05	mg/kg	<0.050	----
lithium	7439-93-2	E472	0.5	mg/kg	<0.50	----
magnesium	7439-95-4	E472	2	mg/kg	<2.0	----
manganese	7439-96-5	E472	0.05	mg/kg	<0.050	----
molybdenum	7439-98-7	E472	0.04	mg/kg	<0.040	----
nickel	7440-02-0	E472	0.2	mg/kg	<0.20	----
phosphorus	7723-14-0	E472	10	mg/kg	<10	----
potassium	7440-09-7	E472	20	mg/kg	<20	----
rubidium	7440-17-7	E472	0.05	mg/kg	<0.050	----
selenium	7782-49-2	E472	0.1	mg/kg	<0.10	----
sodium	7440-23-5	E472	20	mg/kg	<20	----
strontium	7440-24-6	E472	0.1	mg/kg	<0.10	----
tellurium	13494-80-9	E472	0.02	mg/kg	<0.020	----
thallium	7440-28-0	E472	0.002	mg/kg	<0.0020	----
tin	7440-31-5	E472	0.1	mg/kg	<0.10	----
uranium	7440-61-1	E472	0.002	mg/kg	<0.0020	----
vanadium	7440-62-2	E472	0.1	mg/kg	<0.10	----
zinc	7440-66-6	E472	1	mg/kg	<1.0	----
zirconium	7440-67-7	E472	0.2	mg/kg	<0.20	----
Metals (QCLot: 678979)						
silver	7440-22-4	E472.Ag	0.005	mg/kg	<0.0050	----
Metals (QCLot: 678980)						

Sub-Matrix: **Biota**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 678980) - continued						
titanium	7440-32-6	E472.Ti	0.5	mg/kg	<0.50	----
Metals (QCLot: 678981)						
mercury	7439-97-6	E511	0.005	mg/kg	<0.0050	----
Metals (QCLot: 678982)						
aluminum	7429-90-5	E472	5	mg/kg	<5.0	----
antimony	7440-36-0	E472	0.01	mg/kg	<0.010	----
arsenic	7440-38-2	E472	0.03	mg/kg	<0.030	----
barium	7440-39-3	E472	0.05	mg/kg	<0.050	----
beryllium	7440-41-7	E472	0.01	mg/kg	<0.010	----
bismuth	7440-69-9	E472	0.01	mg/kg	<0.010	----
boron	7440-42-8	E472	1	mg/kg	<1.0	----
cadmium	7440-43-9	E472	0.01	mg/kg	<0.010	----
calcium	7440-70-2	E472	20	mg/kg	<20	----
cesium	7440-46-2	E472	0.005	mg/kg	<0.0050	----
chromium	7440-47-3	E472	0.2	mg/kg	<0.20	----
cobalt	7440-48-4	E472	0.02	mg/kg	<0.020	----
copper	7440-50-8	E472	0.2	mg/kg	<0.20	----
iron	7439-89-6	E472	5	mg/kg	<5.0	----
lead	7439-92-1	E472	0.05	mg/kg	<0.050	----
lithium	7439-93-2	E472	0.5	mg/kg	<0.50	----
magnesium	7439-95-4	E472	2	mg/kg	<2.0	----
manganese	7439-96-5	E472	0.05	mg/kg	<0.050	----
molybdenum	7439-98-7	E472	0.04	mg/kg	<0.040	----
nickel	7440-02-0	E472	0.2	mg/kg	<0.20	----
phosphorus	7723-14-0	E472	10	mg/kg	<10	----
potassium	7440-09-7	E472	20	mg/kg	<20	----
rubidium	7440-17-7	E472	0.05	mg/kg	<0.050	----
selenium	7782-49-2	E472	0.1	mg/kg	<0.10	----
sodium	7440-23-5	E472	20	mg/kg	<20	----
strontium	7440-24-6	E472	0.1	mg/kg	<0.10	----
tellurium	13494-80-9	E472	0.02	mg/kg	<0.020	----
thallium	7440-28-0	E472	0.002	mg/kg	<0.0020	----
tin	7440-31-5	E472	0.1	mg/kg	<0.10	----
uranium	7440-61-1	E472	0.002	mg/kg	<0.0020	----
vanadium	7440-62-2	E472	0.1	mg/kg	<0.10	----

Sub-Matrix: **Biota**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 678982) - continued						
zinc	7440-66-6	E472	1	mg/kg	<1.0	----
zirconium	7440-67-7	E472	0.2	mg/kg	<0.20	----
Metals (QCLot: 678986)						
silver	7440-22-4	E472.Ag	0.005	mg/kg	<0.0050	----
Metals (QCLot: 678987)						
titanium	7440-32-6	E472.Ti	0.5	mg/kg	<0.50	----
Metals (QCLot: 678988)						
mercury	7439-97-6	E511	0.005	mg/kg	<0.0050	----
Metals (QCLot: 678989)						
aluminum	7429-90-5	E472	5	mg/kg	<5.0	----
antimony	7440-36-0	E472	0.01	mg/kg	<0.010	----
arsenic	7440-38-2	E472	0.03	mg/kg	<0.030	----
barium	7440-39-3	E472	0.05	mg/kg	<0.050	----
beryllium	7440-41-7	E472	0.01	mg/kg	<0.010	----
bismuth	7440-69-9	E472	0.01	mg/kg	<0.010	----
boron	7440-42-8	E472	1	mg/kg	<1.0	----
cadmium	7440-43-9	E472	0.01	mg/kg	<0.010	----
calcium	7440-70-2	E472	20	mg/kg	<20	----
cesium	7440-46-2	E472	0.005	mg/kg	<0.0050	----
chromium	7440-47-3	E472	0.2	mg/kg	<0.20	----
cobalt	7440-48-4	E472	0.02	mg/kg	<0.020	----
copper	7440-50-8	E472	0.2	mg/kg	<0.20	----
iron	7439-89-6	E472	5	mg/kg	<5.0	----
lead	7439-92-1	E472	0.05	mg/kg	<0.050	----
lithium	7439-93-2	E472	0.5	mg/kg	<0.50	----
magnesium	7439-95-4	E472	2	mg/kg	<2.0	----
manganese	7439-96-5	E472	0.05	mg/kg	<0.050	----
molybdenum	7439-98-7	E472	0.04	mg/kg	<0.040	----
nickel	7440-02-0	E472	0.2	mg/kg	<0.20	----
phosphorus	7723-14-0	E472	10	mg/kg	<10	----
potassium	7440-09-7	E472	20	mg/kg	<20	----
rubidium	7440-17-7	E472	0.05	mg/kg	<0.050	----
selenium	7782-49-2	E472	0.1	mg/kg	<0.10	----
sodium	7440-23-5	E472	20	mg/kg	<20	----
strontium	7440-24-6	E472	0.1	mg/kg	<0.10	----

Sub-Matrix: **Biota**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 678989) - continued						
tellurium	13494-80-9	E472	0.02	mg/kg	<0.020	----
thallium	7440-28-0	E472	0.002	mg/kg	<0.0020	----
tin	7440-31-5	E472	0.1	mg/kg	<0.10	----
uranium	7440-61-1	E472	0.002	mg/kg	<0.0020	----
vanadium	7440-62-2	E472	0.1	mg/kg	<0.10	----
zinc	7440-66-6	E472	1	mg/kg	<1.0	----
zirconium	7440-67-7	E472	0.2	mg/kg	<0.20	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Biota**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 650126)									
moisture	----	E144-H	2	%	100 %	100	90.0	110	----
Physical Tests (QCLot: 650129)									
moisture	----	E144-H	2	%	100 %	100	90.0	110	----
Physical Tests (QCLot: 650130)									
moisture	----	E144-H	2	%	100 %	100	90.0	110	----
Physical Tests (QCLot: 650207)									
moisture	----	E144-H	2	%	100 %	100	90.0	110	----
Physical Tests (QCLot: 650212)									
moisture	----	E144-H	2	%	100 %	100	90.0	110	----
Physical Tests (QCLot: 650220)									
moisture	----	E144-H	2	%	100 %	100	90.0	110	----
Physical Tests (QCLot: 650226)									
moisture	----	E144-H	2	%	100 %	100	90.0	110	----
Physical Tests (QCLot: 650234)									
moisture	----	E144-H	2	%	100 %	100	90.0	110	----
Physical Tests (QCLot: 661600)									
moisture	----	E144A	2	%	100 %	100	90.0	110	----
Physical Tests (QCLot: 667445)									
moisture	----	E144A	2	%	100 %	100	90.0	110	----
Physical Tests (QCLot: 670357)									
moisture	----	E144A	2	%	100 %	100	90.0	110	----
Metals (QCLot: 660768)									
silver	7440-22-4	E472.Ag	0.005	mg/kg	1 mg/kg	92.6	80.0	120	----
Metals (QCLot: 660769)									
titanium	7440-32-6	E472.Ti	0.5	mg/kg	2.5 mg/kg	98.5	80.0	120	----
Metals (QCLot: 660770)									
mercury	7439-97-6	E511	0.005	mg/kg	0.02 mg/kg	93.0	80.0	120	----
Metals (QCLot: 660771)									
aluminum	7429-90-5	E472	5	mg/kg	20 mg/kg	97.1	80.0	120	----
antimony	7440-36-0	E472	0.01	mg/kg	10 mg/kg	102	80.0	120	----
arsenic	7440-38-2	E472	0.03	mg/kg	10 mg/kg	106	80.0	120	----

Sub-Matrix: **Biota**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Metals (QCLot: 660771) - continued									
barium	7440-39-3	E472	0.05	mg/kg	2.5 mg/kg	105	80.0	120	----
beryllium	7440-41-7	E472	0.01	mg/kg	1 mg/kg	89.4	80.0	120	----
bismuth	7440-69-9	E472	0.01	mg/kg	10 mg/kg	98.5	80.0	120	----
boron	7440-42-8	E472	1	mg/kg	10 mg/kg	86.4	80.0	120	----
cadmium	7440-43-9	E472	0.01	mg/kg	1 mg/kg	100	80.0	120	----
calcium	7440-70-2	E472	20	mg/kg	500 mg/kg	94.1	80.0	120	----
cesium	7440-46-2	E472	0.005	mg/kg	0.5 mg/kg	103	80.0	120	----
chromium	7440-47-3	E472	0.2	mg/kg	2.5 mg/kg	101	80.0	120	----
cobalt	7440-48-4	E472	0.02	mg/kg	2.5 mg/kg	103	80.0	120	----
copper	7440-50-8	E472	0.2	mg/kg	2.5 mg/kg	101	80.0	120	----
iron	7439-89-6	E472	5	mg/kg	10 mg/kg	101	80.0	120	----
lead	7439-92-1	E472	0.05	mg/kg	5 mg/kg	98.7	80.0	120	----
lithium	7439-93-2	E472	0.5	mg/kg	2.5 mg/kg	91.2	80.0	120	----
magnesium	7439-95-4	E472	2	mg/kg	500 mg/kg	94.2	80.0	120	----
manganese	7439-96-5	E472	0.05	mg/kg	2.5 mg/kg	101	80.0	120	----
molybdenum	7439-98-7	E472	0.04	mg/kg	2.5 mg/kg	108	80.0	120	----
nickel	7440-02-0	E472	0.2	mg/kg	5 mg/kg	101	80.0	120	----
phosphorus	7723-14-0	E472	10	mg/kg	100 mg/kg	98.1	80.0	120	----
potassium	7440-09-7	E472	20	mg/kg	500 mg/kg	94.5	80.0	120	----
rubidium	7440-17-7	E472	0.05	mg/kg	1 mg/kg	106	80.0	120	----
selenium	7782-49-2	E472	0.1	mg/kg	10 mg/kg	100	80.0	120	----
sodium	7440-23-5	E472	20	mg/kg	500 mg/kg	96.2	80.0	120	----
strontium	7440-24-6	E472	0.1	mg/kg	2.5 mg/kg	102	80.0	120	----
tellurium	13494-80-9	E472	0.02	mg/kg	1 mg/kg	98.1	80.0	120	----
thallium	7440-28-0	E472	0.002	mg/kg	10 mg/kg	99.6	80.0	120	----
tin	7440-31-5	E472	0.1	mg/kg	5 mg/kg	103	80.0	120	----
uranium	7440-61-1	E472	0.002	mg/kg	0.05 mg/kg	104	80.0	120	----
vanadium	7440-62-2	E472	0.1	mg/kg	5 mg/kg	101	80.0	120	----
zinc	7440-66-6	E472	1	mg/kg	5 mg/kg	96.6	80.0	120	----
zirconium	7440-67-7	E472	0.2	mg/kg	1 mg/kg	102	80.0	120	----
Metals (QCLot: 661601)									
mercury	7439-97-6	E512	0.01	mg/kg	0.05 mg/kg	93.0	80.0	120	----
Metals (QCLot: 661602)									
silver	7440-22-4	E475.Ag	0.005	mg/kg	2.5 mg/kg	92.6	80.0	120	----
Metals (QCLot: 661603)									
titanium	7440-32-6	E475.Ti	0.5	mg/kg	6.25 mg/kg	98.5	80.0	120	----

Sub-Matrix: **Biota**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Metals (QCLot: 661604)									
aluminum	7429-90-5	E475	5	mg/kg	50 mg/kg	97.1	80.0	120	----
antimony	7440-36-0	E475	0.02	mg/kg	25 mg/kg	102	80.0	120	----
arsenic	7440-38-2	E475	0.05	mg/kg	25 mg/kg	106	80.0	120	----
barium	7440-39-3	E475	0.05	mg/kg	6.25 mg/kg	105	80.0	120	----
beryllium	7440-41-7	E475	0.01	mg/kg	2.5 mg/kg	89.4	80.0	120	----
bismuth	7440-69-9	E475	0.01	mg/kg	25 mg/kg	98.5	80.0	120	----
boron	7440-42-8	E475	1	mg/kg	25 mg/kg	86.4	80.0	120	----
cadmium	7440-43-9	E475	0.01	mg/kg	2.5 mg/kg	100	80.0	120	----
calcium	7440-70-2	E475	20	mg/kg	1250 mg/kg	94.1	80.0	120	----
cesium	7440-46-2	E475	0.005	mg/kg	1.25 mg/kg	103	80.0	120	----
chromium	7440-47-3	E475	0.2	mg/kg	6.25 mg/kg	101	80.0	120	----
cobalt	7440-48-4	E475	0.02	mg/kg	6.25 mg/kg	103	80.0	120	----
copper	7440-50-8	E475	0.2	mg/kg	6.25 mg/kg	101	80.0	120	----
iron	7439-89-6	E475	5	mg/kg	25 mg/kg	101	80.0	120	----
lead	7439-92-1	E475	0.05	mg/kg	12.5 mg/kg	98.7	80.0	120	----
lithium	7439-93-2	E475	0.5	mg/kg	6.25 mg/kg	91.2	80.0	120	----
magnesium	7439-95-4	E475	2	mg/kg	1250 mg/kg	94.2	80.0	120	----
manganese	7439-96-5	E475	0.05	mg/kg	6.25 mg/kg	101	80.0	120	----
molybdenum	7439-98-7	E475	0.04	mg/kg	6.25 mg/kg	108	80.0	120	----
nickel	7440-02-0	E475	0.2	mg/kg	12.5 mg/kg	101	80.0	120	----
phosphorus	7723-14-0	E475	20	mg/kg	250 mg/kg	98.1	80.0	120	----
potassium	7440-09-7	E475	20	mg/kg	1250 mg/kg	94.5	80.0	120	----
rubidium	7440-17-7	E475	0.05	mg/kg	2.5 mg/kg	106	80.0	120	----
selenium	7782-49-2	E475	0.1	mg/kg	25 mg/kg	100	80.0	120	----
sodium	7440-23-5	E475	20	mg/kg	1250 mg/kg	96.2	80.0	120	----
strontium	7440-24-6	E475	0.1	mg/kg	6.25 mg/kg	102	80.0	120	----
tellurium	13494-80-9	E475	0.02	mg/kg	2.5 mg/kg	98.1	80.0	120	----
thallium	7440-28-0	E475	0.002	mg/kg	25 mg/kg	99.6	80.0	120	----
tin	7440-31-5	E475	0.1	mg/kg	12.5 mg/kg	103	80.0	120	----
uranium	7440-61-1	E475	0.002	mg/kg	0.125 mg/kg	104	80.0	120	----
vanadium	7440-62-2	E475	0.1	mg/kg	12.5 mg/kg	101	80.0	120	----
zinc	7440-66-6	E475	1	mg/kg	12.5 mg/kg	96.6	80.0	120	----
zirconium	7440-67-7	E475	0.2	mg/kg	2.5 mg/kg	102	80.0	120	----
Metals (QCLot: 667415)									
silver	7440-22-4	E472.Ag	0.005	mg/kg	1 mg/kg	95.4	80.0	120	----
Metals (QCLot: 667416)									

Sub-Matrix: **Biota**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Metals (QCLot: 667416) - continued									
titanium	7440-32-6	E472.Ti	0.5	mg/kg	2.5 mg/kg	103	80.0	120	----
Metals (QCLot: 667417)									
mercury	7439-97-6	E511	0.005	mg/kg	0.02 mg/kg	102	80.0	120	----
Metals (QCLot: 667418)									
aluminum	7429-90-5	E472	5	mg/kg	20 mg/kg	107	80.0	120	----
antimony	7440-36-0	E472	0.01	mg/kg	10 mg/kg	105	80.0	120	----
arsenic	7440-38-2	E472	0.03	mg/kg	10 mg/kg	109	80.0	120	----
barium	7440-39-3	E472	0.05	mg/kg	2.5 mg/kg	107	80.0	120	----
beryllium	7440-41-7	E472	0.01	mg/kg	1 mg/kg	108	80.0	120	----
bismuth	7440-69-9	E472	0.01	mg/kg	10 mg/kg	100.0	80.0	120	----
boron	7440-42-8	E472	1	mg/kg	10 mg/kg	102	80.0	120	----
cadmium	7440-43-9	E472	0.01	mg/kg	1 mg/kg	102	80.0	120	----
calcium	7440-70-2	E472	20	mg/kg	500 mg/kg	104	80.0	120	----
cesium	7440-46-2	E472	0.005	mg/kg	0.5 mg/kg	107	80.0	120	----
chromium	7440-47-3	E472	0.2	mg/kg	2.5 mg/kg	104	80.0	120	----
cobalt	7440-48-4	E472	0.02	mg/kg	2.5 mg/kg	103	80.0	120	----
copper	7440-50-8	E472	0.2	mg/kg	2.5 mg/kg	98.6	80.0	120	----
iron	7439-89-6	E472	5	mg/kg	10 mg/kg	104	80.0	120	----
lead	7439-92-1	E472	0.05	mg/kg	5 mg/kg	103	80.0	120	----
lithium	7439-93-2	E472	0.5	mg/kg	2.5 mg/kg	111	80.0	120	----
magnesium	7439-95-4	E472	2	mg/kg	500 mg/kg	105	80.0	120	----
manganese	7439-96-5	E472	0.05	mg/kg	2.5 mg/kg	105	80.0	120	----
molybdenum	7439-98-7	E472	0.04	mg/kg	2.5 mg/kg	112	80.0	120	----
nickel	7440-02-0	E472	0.2	mg/kg	5 mg/kg	100	80.0	120	----
phosphorus	7723-14-0	E472	10	mg/kg	100 mg/kg	111	80.0	120	----
potassium	7440-09-7	E472	20	mg/kg	500 mg/kg	104	80.0	120	----
rubidium	7440-17-7	E472	0.05	mg/kg	1 mg/kg	108	80.0	120	----
selenium	7782-49-2	E472	0.1	mg/kg	10 mg/kg	97.2	80.0	120	----
sodium	7440-23-5	E472	20	mg/kg	500 mg/kg	106	80.0	120	----
strontium	7440-24-6	E472	0.1	mg/kg	2.5 mg/kg	108	80.0	120	----
tellurium	13494-80-9	E472	0.02	mg/kg	1 mg/kg	101	80.0	120	----
thallium	7440-28-0	E472	0.002	mg/kg	10 mg/kg	101	80.0	120	----
tin	7440-31-5	E472	0.1	mg/kg	5 mg/kg	107	80.0	120	----
uranium	7440-61-1	E472	0.002	mg/kg	0.05 mg/kg	106	80.0	120	----
vanadium	7440-62-2	E472	0.1	mg/kg	5 mg/kg	104	80.0	120	----
zinc	7440-66-6	E472	1	mg/kg	5 mg/kg	98.3	80.0	120	----

Sub-Matrix: **Biota**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Metals (QCLot: 667418) - continued									
zirconium	7440-67-7	E472	0.2	mg/kg	1 mg/kg	111	80.0	120	----
Metals (QCLot: 667450)									
mercury	7439-97-6	E512	0.01	mg/kg	0.05 mg/kg	102	80.0	120	----
Metals (QCLot: 667451)									
silver	7440-22-4	E475.Ag	0.005	mg/kg	2.5 mg/kg	95.4	80.0	120	----
Metals (QCLot: 667452)									
titanium	7440-32-6	E475.Ti	0.5	mg/kg	6.25 mg/kg	103	80.0	120	----
Metals (QCLot: 667453)									
aluminum	7429-90-5	E475	5	mg/kg	50 mg/kg	107	80.0	120	----
antimony	7440-36-0	E475	0.02	mg/kg	25 mg/kg	105	80.0	120	----
arsenic	7440-38-2	E475	0.05	mg/kg	25 mg/kg	109	80.0	120	----
barium	7440-39-3	E475	0.05	mg/kg	6.25 mg/kg	107	80.0	120	----
beryllium	7440-41-7	E475	0.01	mg/kg	2.5 mg/kg	108	80.0	120	----
bismuth	7440-69-9	E475	0.01	mg/kg	25 mg/kg	100.0	80.0	120	----
boron	7440-42-8	E475	1	mg/kg	25 mg/kg	102	80.0	120	----
cadmium	7440-43-9	E475	0.01	mg/kg	2.5 mg/kg	102	80.0	120	----
calcium	7440-70-2	E475	20	mg/kg	1250 mg/kg	104	80.0	120	----
cesium	7440-46-2	E475	0.005	mg/kg	1.25 mg/kg	107	80.0	120	----
chromium	7440-47-3	E475	0.2	mg/kg	6.25 mg/kg	104	80.0	120	----
cobalt	7440-48-4	E475	0.02	mg/kg	6.25 mg/kg	103	80.0	120	----
copper	7440-50-8	E475	0.2	mg/kg	6.25 mg/kg	98.6	80.0	120	----
iron	7439-89-6	E475	5	mg/kg	25 mg/kg	104	80.0	120	----
lead	7439-92-1	E475	0.05	mg/kg	12.5 mg/kg	103	80.0	120	----
lithium	7439-93-2	E475	0.5	mg/kg	6.25 mg/kg	111	80.0	120	----
magnesium	7439-95-4	E475	2	mg/kg	1250 mg/kg	105	80.0	120	----
manganese	7439-96-5	E475	0.05	mg/kg	6.25 mg/kg	105	80.0	120	----
molybdenum	7439-98-7	E475	0.04	mg/kg	6.25 mg/kg	112	80.0	120	----
nickel	7440-02-0	E475	0.2	mg/kg	12.5 mg/kg	100	80.0	120	----
phosphorus	7723-14-0	E475	20	mg/kg	250 mg/kg	111	80.0	120	----
potassium	7440-09-7	E475	20	mg/kg	1250 mg/kg	104	80.0	120	----
rubidium	7440-17-7	E475	0.05	mg/kg	2.5 mg/kg	108	80.0	120	----
selenium	7782-49-2	E475	0.1	mg/kg	25 mg/kg	97.2	80.0	120	----
sodium	7440-23-5	E475	20	mg/kg	1250 mg/kg	106	80.0	120	----
strontium	7440-24-6	E475	0.1	mg/kg	6.25 mg/kg	108	80.0	120	----
tellurium	13494-80-9	E475	0.02	mg/kg	2.5 mg/kg	101	80.0	120	----
thallium	7440-28-0	E475	0.002	mg/kg	25 mg/kg	101	80.0	120	----

Sub-Matrix: **Biota**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Metals (QCLot: 667453) - continued									
tin	7440-31-5	E475	0.1	mg/kg	12.5 mg/kg	107	80.0	120	----
uranium	7440-61-1	E475	0.002	mg/kg	0.125 mg/kg	106	80.0	120	----
vanadium	7440-62-2	E475	0.1	mg/kg	12.5 mg/kg	104	80.0	120	----
zinc	7440-66-6	E475	1	mg/kg	12.5 mg/kg	98.3	80.0	120	----
zirconium	7440-67-7	E475	0.2	mg/kg	2.5 mg/kg	111	80.0	120	----
Metals (QCLot: 669485)									
silver	7440-22-4	E472.Ag	0.005	mg/kg	1 mg/kg	89.5	80.0	120	----
Metals (QCLot: 669486)									
titanium	7440-32-6	E472.Ti	0.5	mg/kg	2.5 mg/kg	90.6	80.0	120	----
Metals (QCLot: 669487)									
mercury	7439-97-6	E511	0.005	mg/kg	0.02 mg/kg	90.2	80.0	120	----
Metals (QCLot: 669488)									
aluminum	7429-90-5	E472	5	mg/kg	20 mg/kg	92.3	80.0	120	----
antimony	7440-36-0	E472	0.01	mg/kg	10 mg/kg	96.4	80.0	120	----
arsenic	7440-38-2	E472	0.03	mg/kg	10 mg/kg	98.8	80.0	120	----
barium	7440-39-3	E472	0.05	mg/kg	2.5 mg/kg	94.2	80.0	120	----
beryllium	7440-41-7	E472	0.01	mg/kg	1 mg/kg	94.2	80.0	120	----
bismuth	7440-69-9	E472	0.01	mg/kg	10 mg/kg	93.9	80.0	120	----
boron	7440-42-8	E472	1	mg/kg	10 mg/kg	86.8	80.0	120	----
cadmium	7440-43-9	E472	0.01	mg/kg	1 mg/kg	93.4	80.0	120	----
calcium	7440-70-2	E472	20	mg/kg	500 mg/kg	94.7	80.0	120	----
cesium	7440-46-2	E472	0.005	mg/kg	0.5 mg/kg	94.2	80.0	120	----
chromium	7440-47-3	E472	0.2	mg/kg	2.5 mg/kg	94.8	80.0	120	----
cobalt	7440-48-4	E472	0.02	mg/kg	2.5 mg/kg	93.6	80.0	120	----
copper	7440-50-8	E472	0.2	mg/kg	2.5 mg/kg	90.8	80.0	120	----
iron	7439-89-6	E472	5	mg/kg	10 mg/kg	92.9	80.0	120	----
lead	7439-92-1	E472	0.05	mg/kg	5 mg/kg	94.7	80.0	120	----
lithium	7439-93-2	E472	0.5	mg/kg	2.5 mg/kg	98.0	80.0	120	----
magnesium	7439-95-4	E472	2	mg/kg	500 mg/kg	91.5	80.0	120	----
manganese	7439-96-5	E472	0.05	mg/kg	2.5 mg/kg	92.9	80.0	120	----
molybdenum	7439-98-7	E472	0.04	mg/kg	2.5 mg/kg	99.5	80.0	120	----
nickel	7440-02-0	E472	0.2	mg/kg	5 mg/kg	92.0	80.0	120	----
phosphorus	7723-14-0	E472	10	mg/kg	100 mg/kg	101	80.0	120	----
potassium	7440-09-7	E472	20	mg/kg	500 mg/kg	93.9	80.0	120	----
rubidium	7440-17-7	E472	0.05	mg/kg	1 mg/kg	97.6	80.0	120	----
selenium	7782-49-2	E472	0.1	mg/kg	10 mg/kg	93.4	80.0	120	----

Sub-Matrix: **Biota**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Metals (QCLot: 669488) - continued									
sodium	7440-23-5	E472	20	mg/kg	500 mg/kg	97.1	80.0	120	----
strontium	7440-24-6	E472	0.1	mg/kg	2.5 mg/kg	95.6	80.0	120	----
tellurium	13494-80-9	E472	0.02	mg/kg	1 mg/kg	92.7	80.0	120	----
thallium	7440-28-0	E472	0.002	mg/kg	10 mg/kg	95.0	80.0	120	----
tin	7440-31-5	E472	0.1	mg/kg	5 mg/kg	95.5	80.0	120	----
uranium	7440-61-1	E472	0.002	mg/kg	0.05 mg/kg	98.8	80.0	120	----
vanadium	7440-62-2	E472	0.1	mg/kg	5 mg/kg	96.8	80.0	120	----
zinc	7440-66-6	E472	1	mg/kg	5 mg/kg	90.5	80.0	120	----
zirconium	7440-67-7	E472	0.2	mg/kg	1 mg/kg	95.1	80.0	120	----
Metals (QCLot: 669491)									
silver	7440-22-4	E472.Ag	0.005	mg/kg	1 mg/kg	93.9	80.0	120	----
Metals (QCLot: 669492)									
titanium	7440-32-6	E472.Ti	0.5	mg/kg	2.5 mg/kg	101	80.0	120	----
Metals (QCLot: 669493)									
mercury	7439-97-6	E511	0.005	mg/kg	0.02 mg/kg	98.6	80.0	120	----
Metals (QCLot: 669494)									
aluminum	7429-90-5	E472	5	mg/kg	20 mg/kg	104	80.0	120	----
antimony	7440-36-0	E472	0.01	mg/kg	10 mg/kg	101	80.0	120	----
arsenic	7440-38-2	E472	0.03	mg/kg	10 mg/kg	106	80.0	120	----
barium	7440-39-3	E472	0.05	mg/kg	2.5 mg/kg	98.3	80.0	120	----
beryllium	7440-41-7	E472	0.01	mg/kg	1 mg/kg	103	80.0	120	----
bismuth	7440-69-9	E472	0.01	mg/kg	10 mg/kg	97.9	80.0	120	----
boron	7440-42-8	E472	1	mg/kg	10 mg/kg	96.9	80.0	120	----
cadmium	7440-43-9	E472	0.01	mg/kg	1 mg/kg	99.8	80.0	120	----
calcium	7440-70-2	E472	20	mg/kg	500 mg/kg	101	80.0	120	----
cesium	7440-46-2	E472	0.005	mg/kg	0.5 mg/kg	101	80.0	120	----
chromium	7440-47-3	E472	0.2	mg/kg	2.5 mg/kg	103	80.0	120	----
cobalt	7440-48-4	E472	0.02	mg/kg	2.5 mg/kg	100	80.0	120	----
copper	7440-50-8	E472	0.2	mg/kg	2.5 mg/kg	98.2	80.0	120	----
iron	7439-89-6	E472	5	mg/kg	10 mg/kg	102	80.0	120	----
lead	7439-92-1	E472	0.05	mg/kg	5 mg/kg	100	80.0	120	----
lithium	7439-93-2	E472	0.5	mg/kg	2.5 mg/kg	105	80.0	120	----
magnesium	7439-95-4	E472	2	mg/kg	500 mg/kg	101	80.0	120	----
manganese	7439-96-5	E472	0.05	mg/kg	2.5 mg/kg	101	80.0	120	----
molybdenum	7439-98-7	E472	0.04	mg/kg	2.5 mg/kg	105	80.0	120	----
nickel	7440-02-0	E472	0.2	mg/kg	5 mg/kg	99.7	80.0	120	----

Sub-Matrix: **Biota**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Metals (QCLot: 669494) - continued									
phosphorus	7723-14-0	E472	10	mg/kg	100 mg/kg	105	80.0	120	----
potassium	7440-09-7	E472	20	mg/kg	500 mg/kg	99.3	80.0	120	----
rubidium	7440-17-7	E472	0.05	mg/kg	1 mg/kg	105	80.0	120	----
selenium	7782-49-2	E472	0.1	mg/kg	10 mg/kg	98.9	80.0	120	----
sodium	7440-23-5	E472	20	mg/kg	500 mg/kg	105	80.0	120	----
strontium	7440-24-6	E472	0.1	mg/kg	2.5 mg/kg	102	80.0	120	----
tellurium	13494-80-9	E472	0.02	mg/kg	1 mg/kg	97.1	80.0	120	----
thallium	7440-28-0	E472	0.002	mg/kg	10 mg/kg	100	80.0	120	----
tin	7440-31-5	E472	0.1	mg/kg	5 mg/kg	101	80.0	120	----
uranium	7440-61-1	E472	0.002	mg/kg	0.05 mg/kg	106	80.0	120	----
vanadium	7440-62-2	E472	0.1	mg/kg	5 mg/kg	104	80.0	120	----
zinc	7440-66-6	E472	1	mg/kg	5 mg/kg	97.4	80.0	120	----
zirconium	7440-67-7	E472	0.2	mg/kg	1 mg/kg	100	80.0	120	----
Metals (QCLot: 670360)									
mercury	7439-97-6	E512	0.01	mg/kg	0.05 mg/kg	90.1	80.0	120	----
Metals (QCLot: 670361)									
silver	7440-22-4	E475.Ag	0.005	mg/kg	2.5 mg/kg	89.5	80.0	120	----
Metals (QCLot: 670362)									
titanium	7440-32-6	E475.Ti	0.5	mg/kg	6.25 mg/kg	90.6	80.0	120	----
Metals (QCLot: 670363)									
aluminum	7429-90-5	E475	5	mg/kg	50 mg/kg	92.3	80.0	120	----
antimony	7440-36-0	E475	0.02	mg/kg	25 mg/kg	96.4	80.0	120	----
arsenic	7440-38-2	E475	0.05	mg/kg	25 mg/kg	98.8	80.0	120	----
barium	7440-39-3	E475	0.05	mg/kg	6.25 mg/kg	94.2	80.0	120	----
beryllium	7440-41-7	E475	0.01	mg/kg	2.5 mg/kg	94.2	80.0	120	----
bismuth	7440-69-9	E475	0.01	mg/kg	25 mg/kg	93.9	80.0	120	----
boron	7440-42-8	E475	1	mg/kg	25 mg/kg	86.8	80.0	120	----
cadmium	7440-43-9	E475	0.01	mg/kg	2.5 mg/kg	93.4	80.0	120	----
calcium	7440-70-2	E475	20	mg/kg	1250 mg/kg	94.7	80.0	120	----
cesium	7440-46-2	E475	0.005	mg/kg	1.25 mg/kg	94.2	80.0	120	----
chromium	7440-47-3	E475	0.2	mg/kg	6.25 mg/kg	94.8	80.0	120	----
cobalt	7440-48-4	E475	0.02	mg/kg	6.25 mg/kg	93.6	80.0	120	----
copper	7440-50-8	E475	0.2	mg/kg	6.25 mg/kg	90.8	80.0	120	----
iron	7439-89-6	E475	5	mg/kg	25 mg/kg	92.9	80.0	120	----
lead	7439-92-1	E475	0.05	mg/kg	12.5 mg/kg	94.7	80.0	120	----
lithium	7439-93-2	E475	0.5	mg/kg	6.25 mg/kg	98.0	80.0	120	----

Sub-Matrix: **Biota**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Metals (QCLot: 670363) - continued									
magnesium	7439-95-4	E475	2	mg/kg	1250 mg/kg	91.5	80.0	120	----
manganese	7439-96-5	E475	0.05	mg/kg	6.25 mg/kg	92.9	80.0	120	----
molybdenum	7439-98-7	E475	0.04	mg/kg	6.25 mg/kg	99.5	80.0	120	----
nickel	7440-02-0	E475	0.2	mg/kg	12.5 mg/kg	92.0	80.0	120	----
phosphorus	7723-14-0	E475	20	mg/kg	250 mg/kg	101	80.0	120	----
potassium	7440-09-7	E475	20	mg/kg	1250 mg/kg	93.9	80.0	120	----
rubidium	7440-17-7	E475	0.05	mg/kg	2.5 mg/kg	97.6	80.0	120	----
selenium	7782-49-2	E475	0.1	mg/kg	25 mg/kg	93.4	80.0	120	----
sodium	7440-23-5	E475	20	mg/kg	1250 mg/kg	97.1	80.0	120	----
strontium	7440-24-6	E475	0.1	mg/kg	6.25 mg/kg	95.6	80.0	120	----
tellurium	13494-80-9	E475	0.02	mg/kg	2.5 mg/kg	92.7	80.0	120	----
thallium	7440-28-0	E475	0.002	mg/kg	25 mg/kg	95.0	80.0	120	----
tin	7440-31-5	E475	0.1	mg/kg	12.5 mg/kg	95.5	80.0	120	----
uranium	7440-61-1	E475	0.002	mg/kg	0.125 mg/kg	98.8	80.0	120	----
vanadium	7440-62-2	E475	0.1	mg/kg	12.5 mg/kg	96.8	80.0	120	----
zinc	7440-66-6	E475	1	mg/kg	12.5 mg/kg	90.5	80.0	120	----
zirconium	7440-67-7	E475	0.2	mg/kg	2.5 mg/kg	95.1	80.0	120	----
Metals (QCLot: 676929)									
silver	7440-22-4	E472.Ag	0.005	mg/kg	1 mg/kg	82.9	80.0	120	----
Metals (QCLot: 676930)									
titanium	7440-32-6	E472.Ti	0.5	mg/kg	2.5 mg/kg	101	80.0	120	----
Metals (QCLot: 676931)									
mercury	7439-97-6	E511	0.005	mg/kg	0.02 mg/kg	95.6	80.0	120	----
Metals (QCLot: 676932)									
aluminum	7429-90-5	E472	5	mg/kg	20 mg/kg	108	80.0	120	----
antimony	7440-36-0	E472	0.01	mg/kg	10 mg/kg	96.3	80.0	120	----
arsenic	7440-38-2	E472	0.03	mg/kg	10 mg/kg	109	80.0	120	----
barium	7440-39-3	E472	0.05	mg/kg	2.5 mg/kg	102	80.0	120	----
beryllium	7440-41-7	E472	0.01	mg/kg	1 mg/kg	98.9	80.0	120	----
bismuth	7440-69-9	E472	0.01	mg/kg	10 mg/kg	95.0	80.0	120	----
boron	7440-42-8	E472	1	mg/kg	10 mg/kg	94.7	80.0	120	----
cadmium	7440-43-9	E472	0.01	mg/kg	1 mg/kg	91.1	80.0	120	----
calcium	7440-70-2	E472	20	mg/kg	500 mg/kg	97.6	80.0	120	----
cesium	7440-46-2	E472	0.005	mg/kg	0.5 mg/kg	95.9	80.0	120	----
chromium	7440-47-3	E472	0.2	mg/kg	2.5 mg/kg	103	80.0	120	----
cobalt	7440-48-4	E472	0.02	mg/kg	2.5 mg/kg	103	80.0	120	----

Sub-Matrix: **Biota**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Metals (QCLot: 676932) - continued									
copper	7440-50-8	E472	0.2	mg/kg	2.5 mg/kg	100	80.0	120	----
iron	7439-89-6	E472	5	mg/kg	10 mg/kg	95.4	80.0	120	----
lead	7439-92-1	E472	0.05	mg/kg	5 mg/kg	97.3	80.0	120	----
lithium	7439-93-2	E472	0.5	mg/kg	2.5 mg/kg	104	80.0	120	----
magnesium	7439-95-4	E472	2	mg/kg	500 mg/kg	105	80.0	120	----
manganese	7439-96-5	E472	0.05	mg/kg	2.5 mg/kg	105	80.0	120	----
molybdenum	7439-98-7	E472	0.04	mg/kg	2.5 mg/kg	95.2	80.0	120	----
nickel	7440-02-0	E472	0.2	mg/kg	5 mg/kg	101	80.0	120	----
phosphorus	7723-14-0	E472	10	mg/kg	100 mg/kg	113	80.0	120	----
potassium	7440-09-7	E472	20	mg/kg	500 mg/kg	104	80.0	120	----
rubidium	7440-17-7	E472	0.05	mg/kg	1 mg/kg	109	80.0	120	----
selenium	7782-49-2	E472	0.1	mg/kg	10 mg/kg	97.1	80.0	120	----
sodium	7440-23-5	E472	20	mg/kg	500 mg/kg	110	80.0	120	----
strontium	7440-24-6	E472	0.1	mg/kg	2.5 mg/kg	93.5	80.0	120	----
tellurium	13494-80-9	E472	0.02	mg/kg	1 mg/kg	90.8	80.0	120	----
thallium	7440-28-0	E472	0.002	mg/kg	10 mg/kg	96.8	80.0	120	----
tin	7440-31-5	E472	0.1	mg/kg	5 mg/kg	98.5	80.0	120	----
uranium	7440-61-1	E472	0.002	mg/kg	0.05 mg/kg	101	80.0	120	----
vanadium	7440-62-2	E472	0.1	mg/kg	5 mg/kg	109	80.0	120	----
zinc	7440-66-6	E472	1	mg/kg	5 mg/kg	99.2	80.0	120	----
zirconium	7440-67-7	E472	0.2	mg/kg	1 mg/kg	96.3	80.0	120	----
Metals (QCLot: 676933)									
silver	7440-22-4	E472.Ag	0.005	mg/kg	1 mg/kg	83.4	80.0	120	----
Metals (QCLot: 676934)									
titanium	7440-32-6	E472.Ti	0.5	mg/kg	2.5 mg/kg	102	80.0	120	----
Metals (QCLot: 676935)									
mercury	7439-97-6	E511	0.005	mg/kg	0.02 mg/kg	91.4	80.0	120	----
Metals (QCLot: 676936)									
aluminum	7429-90-5	E472	5	mg/kg	20 mg/kg	101	80.0	120	----
antimony	7440-36-0	E472	0.01	mg/kg	10 mg/kg	97.9	80.0	120	----
arsenic	7440-38-2	E472	0.03	mg/kg	10 mg/kg	105	80.0	120	----
barium	7440-39-3	E472	0.05	mg/kg	2.5 mg/kg	95.4	80.0	120	----
beryllium	7440-41-7	E472	0.01	mg/kg	1 mg/kg	96.5	80.0	120	----
bismuth	7440-69-9	E472	0.01	mg/kg	10 mg/kg	95.9	80.0	120	----
boron	7440-42-8	E472	1	mg/kg	10 mg/kg	97.6	80.0	120	----
cadmium	7440-43-9	E472	0.01	mg/kg	1 mg/kg	90.4	80.0	120	----

Sub-Matrix: **Biota**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Metals (QCLot: 676936) - continued									
calcium	7440-70-2	E472	20	mg/kg	500 mg/kg	94.6	80.0	120	----
cesium	7440-46-2	E472	0.005	mg/kg	0.5 mg/kg	92.0	80.0	120	----
chromium	7440-47-3	E472	0.2	mg/kg	2.5 mg/kg	97.6	80.0	120	----
cobalt	7440-48-4	E472	0.02	mg/kg	2.5 mg/kg	96.7	80.0	120	----
copper	7440-50-8	E472	0.2	mg/kg	2.5 mg/kg	94.8	80.0	120	----
iron	7439-89-6	E472	5	mg/kg	10 mg/kg	94.4	80.0	120	----
lead	7439-92-1	E472	0.05	mg/kg	5 mg/kg	97.0	80.0	120	----
lithium	7439-93-2	E472	0.5	mg/kg	2.5 mg/kg	98.4	80.0	120	----
magnesium	7439-95-4	E472	2	mg/kg	500 mg/kg	99.0	80.0	120	----
manganese	7439-96-5	E472	0.05	mg/kg	2.5 mg/kg	98.4	80.0	120	----
molybdenum	7439-98-7	E472	0.04	mg/kg	2.5 mg/kg	97.5	80.0	120	----
nickel	7440-02-0	E472	0.2	mg/kg	5 mg/kg	94.4	80.0	120	----
phosphorus	7723-14-0	E472	10	mg/kg	100 mg/kg	111	80.0	120	----
potassium	7440-09-7	E472	20	mg/kg	500 mg/kg	100	80.0	120	----
rubidium	7440-17-7	E472	0.05	mg/kg	1 mg/kg	103	80.0	120	----
selenium	7782-49-2	E472	0.1	mg/kg	10 mg/kg	95.1	80.0	120	----
sodium	7440-23-5	E472	20	mg/kg	500 mg/kg	103	80.0	120	----
strontium	7440-24-6	E472	0.1	mg/kg	2.5 mg/kg	92.8	80.0	120	----
tellurium	13494-80-9	E472	0.02	mg/kg	1 mg/kg	91.6	80.0	120	----
thallium	7440-28-0	E472	0.002	mg/kg	10 mg/kg	94.2	80.0	120	----
tin	7440-31-5	E472	0.1	mg/kg	5 mg/kg	97.2	80.0	120	----
uranium	7440-61-1	E472	0.002	mg/kg	0.05 mg/kg	99.8	80.0	120	----
vanadium	7440-62-2	E472	0.1	mg/kg	5 mg/kg	102	80.0	120	----
zinc	7440-66-6	E472	1	mg/kg	5 mg/kg	93.2	80.0	120	----
zirconium	7440-67-7	E472	0.2	mg/kg	1 mg/kg	94.8	80.0	120	----
Metals (QCLot: 678979)									
silver	7440-22-4	E472.Ag	0.005	mg/kg	1 mg/kg	91.0	80.0	120	----
Metals (QCLot: 678980)									
titanium	7440-32-6	E472.Ti	0.5	mg/kg	2.5 mg/kg	102	80.0	120	----
Metals (QCLot: 678981)									
mercury	7439-97-6	E511	0.005	mg/kg	0.02 mg/kg	98.8	80.0	120	----
Metals (QCLot: 678982)									
aluminum	7429-90-5	E472	5	mg/kg	20 mg/kg	110	80.0	120	----
antimony	7440-36-0	E472	0.01	mg/kg	10 mg/kg	104	80.0	120	----
arsenic	7440-38-2	E472	0.03	mg/kg	10 mg/kg	110	80.0	120	----
barium	7440-39-3	E472	0.05	mg/kg	2.5 mg/kg	106	80.0	120	----

Sub-Matrix: **Biota**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Metals (QCLot: 678982) - continued									
beryllium	7440-41-7	E472	0.01	mg/kg	1 mg/kg	102	80.0	120	----
bismuth	7440-69-9	E472	0.01	mg/kg	10 mg/kg	103	80.0	120	----
boron	7440-42-8	E472	1	mg/kg	10 mg/kg	97.7	80.0	120	----
cadmium	7440-43-9	E472	0.01	mg/kg	1 mg/kg	101	80.0	120	----
calcium	7440-70-2	E472	20	mg/kg	500 mg/kg	102	80.0	120	----
cesium	7440-46-2	E472	0.005	mg/kg	0.5 mg/kg	104	80.0	120	----
chromium	7440-47-3	E472	0.2	mg/kg	2.5 mg/kg	106	80.0	120	----
cobalt	7440-48-4	E472	0.02	mg/kg	2.5 mg/kg	103	80.0	120	----
copper	7440-50-8	E472	0.2	mg/kg	2.5 mg/kg	100	80.0	120	----
iron	7439-89-6	E472	5	mg/kg	10 mg/kg	104	80.0	120	----
lead	7439-92-1	E472	0.05	mg/kg	5 mg/kg	103	80.0	120	----
lithium	7439-93-2	E472	0.5	mg/kg	2.5 mg/kg	104	80.0	120	----
magnesium	7439-95-4	E472	2	mg/kg	500 mg/kg	103	80.0	120	----
manganese	7439-96-5	E472	0.05	mg/kg	2.5 mg/kg	105	80.0	120	----
molybdenum	7439-98-7	E472	0.04	mg/kg	2.5 mg/kg	106	80.0	120	----
nickel	7440-02-0	E472	0.2	mg/kg	5 mg/kg	102	80.0	120	----
phosphorus	7723-14-0	E472	10	mg/kg	100 mg/kg	108	80.0	120	----
potassium	7440-09-7	E472	20	mg/kg	500 mg/kg	106	80.0	120	----
rubidium	7440-17-7	E472	0.05	mg/kg	1 mg/kg	107	80.0	120	----
selenium	7782-49-2	E472	0.1	mg/kg	10 mg/kg	99.8	80.0	120	----
sodium	7440-23-5	E472	20	mg/kg	500 mg/kg	107	80.0	120	----
strontium	7440-24-6	E472	0.1	mg/kg	2.5 mg/kg	104	80.0	120	----
tellurium	13494-80-9	E472	0.02	mg/kg	1 mg/kg	99.3	80.0	120	----
thallium	7440-28-0	E472	0.002	mg/kg	10 mg/kg	102	80.0	120	----
tin	7440-31-5	E472	0.1	mg/kg	5 mg/kg	106	80.0	120	----
uranium	7440-61-1	E472	0.002	mg/kg	0.05 mg/kg	107	80.0	120	----
vanadium	7440-62-2	E472	0.1	mg/kg	5 mg/kg	108	80.0	120	----
zinc	7440-66-6	E472	1	mg/kg	5 mg/kg	98.7	80.0	120	----
zirconium	7440-67-7	E472	0.2	mg/kg	1 mg/kg	104	80.0	120	----
Metals (QCLot: 678986)									
silver	7440-22-4	E472.Ag	0.005	mg/kg	1 mg/kg	84.3	80.0	120	----
Metals (QCLot: 678987)									
titanium	7440-32-6	E472.Ti	0.5	mg/kg	2.5 mg/kg	97.4	80.0	120	----
Metals (QCLot: 678988)									
mercury	7439-97-6	E511	0.005	mg/kg	0.02 mg/kg	85.9	80.0	120	----
Metals (QCLot: 678989)									

Sub-Matrix: **Biota**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Metals (QCLot: 678989) - continued									
aluminum	7429-90-5	E472	5	mg/kg	20 mg/kg	106	80.0	120	----
antimony	7440-36-0	E472	0.01	mg/kg	10 mg/kg	95.9	80.0	120	----
arsenic	7440-38-2	E472	0.03	mg/kg	10 mg/kg	99.5	80.0	120	----
barium	7440-39-3	E472	0.05	mg/kg	2.5 mg/kg	97.1	80.0	120	----
beryllium	7440-41-7	E472	0.01	mg/kg	1 mg/kg	97.6	80.0	120	----
bismuth	7440-69-9	E472	0.01	mg/kg	10 mg/kg	96.4	80.0	120	----
boron	7440-42-8	E472	1	mg/kg	10 mg/kg	92.0	80.0	120	----
cadmium	7440-43-9	E472	0.01	mg/kg	1 mg/kg	94.2	80.0	120	----
calcium	7440-70-2	E472	20	mg/kg	500 mg/kg	91.4	80.0	120	----
cesium	7440-46-2	E472	0.005	mg/kg	0.5 mg/kg	96.8	80.0	120	----
chromium	7440-47-3	E472	0.2	mg/kg	2.5 mg/kg	97.8	80.0	120	----
cobalt	7440-48-4	E472	0.02	mg/kg	2.5 mg/kg	95.4	80.0	120	----
copper	7440-50-8	E472	0.2	mg/kg	2.5 mg/kg	92.6	80.0	120	----
iron	7439-89-6	E472	5	mg/kg	10 mg/kg	96.6	80.0	120	----
lead	7439-92-1	E472	0.05	mg/kg	5 mg/kg	97.3	80.0	120	----
lithium	7439-93-2	E472	0.5	mg/kg	2.5 mg/kg	98.5	80.0	120	----
magnesium	7439-95-4	E472	2	mg/kg	500 mg/kg	98.1	80.0	120	----
manganese	7439-96-5	E472	0.05	mg/kg	2.5 mg/kg	97.7	80.0	120	----
molybdenum	7439-98-7	E472	0.04	mg/kg	2.5 mg/kg	99.2	80.0	120	----
nickel	7440-02-0	E472	0.2	mg/kg	5 mg/kg	94.1	80.0	120	----
phosphorus	7723-14-0	E472	10	mg/kg	100 mg/kg	107	80.0	120	----
potassium	7440-09-7	E472	20	mg/kg	500 mg/kg	99.0	80.0	120	----
rubidium	7440-17-7	E472	0.05	mg/kg	1 mg/kg	98.2	80.0	120	----
selenium	7782-49-2	E472	0.1	mg/kg	10 mg/kg	92.3	80.0	120	----
sodium	7440-23-5	E472	20	mg/kg	500 mg/kg	97.5	80.0	120	----
strontium	7440-24-6	E472	0.1	mg/kg	2.5 mg/kg	98.6	80.0	120	----
tellurium	13494-80-9	E472	0.02	mg/kg	1 mg/kg	91.8	80.0	120	----
thallium	7440-28-0	E472	0.002	mg/kg	10 mg/kg	93.7	80.0	120	----
tin	7440-31-5	E472	0.1	mg/kg	5 mg/kg	98.4	80.0	120	----
uranium	7440-61-1	E472	0.002	mg/kg	0.05 mg/kg	98.7	80.0	120	----
vanadium	7440-62-2	E472	0.1	mg/kg	5 mg/kg	99.9	80.0	120	----
zinc	7440-66-6	E472	1	mg/kg	5 mg/kg	92.9	80.0	120	----
zirconium	7440-67-7	E472	0.2	mg/kg	1 mg/kg	96.6	80.0	120	----

Reference Material (RM) Report

A Reference Material (RM) is a homogenous material with known and well-established analyte concentrations. RMs are processed in an identical manner to test samples, and are used to monitor and control the accuracy and precision of a test method for a typical sample matrix. RM results are expressed as percent recovery of the target analyte concentration. RM targets may be certified target concentrations provided by the RM supplier, or may be ALS long-term mean values (for empirical test methods).

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Metals (QCLot: 660768)									
	RM	silver	7440-22-4	E472.Ag	2.05 mg/kg	87.0	70.0	130	----
Metals (QCLot: 660770)									
	RM	mercury	7439-97-6	E511	0.331 mg/kg	94.4	70.0	130	----
Metals (QCLot: 660771)									
	RM	aluminum	7429-90-5	E472	11.2 mg/kg	101	70.0	130	----
	RM	arsenic	7440-38-2	E472	34.6 mg/kg	97.0	70.0	130	----
	RM	bismuth	7440-69-9	E472	0.0247 mg/kg	85.1	60.0	140	----
	RM	cadmium	7440-43-9	E472	14.5 mg/kg	90.7	70.0	130	----
	RM	calcium	7440-70-2	E472	550 mg/kg	93.6	70.0	130	----
	RM	cesium	7440-46-2	E472	0.0712 mg/kg	93.5	70.0	130	----
	RM	chromium	7440-47-3	E472	1.96 mg/kg	99.8	70.0	130	----
	RM	cobalt	7440-48-4	E472	0.267 mg/kg	92.3	70.0	130	----
	RM	copper	7440-50-8	E472	35 mg/kg	93.6	70.0	130	----
	RM	iron	7439-89-6	E472	1070 mg/kg	94.2	70.0	130	----
	RM	lead	7439-92-1	E472	0.162 mg/kg	95.4	70.0	130	----
	RM	magnesium	7439-95-4	E472	940 mg/kg	98.6	70.0	130	----
	RM	manganese	7439-96-5	E472	8.91 mg/kg	97.4	70.0	130	----
	RM	molybdenum	7439-98-7	E472	1.41 mg/kg	96.9	70.0	130	----
	RM	nickel	7440-02-0	E472	1.57 mg/kg	104	70.0	130	----
	RM	phosphorus	7723-14-0	E472	11500 mg/kg	106	70.0	130	----
	RM	potassium	7440-09-7	E472	14400 mg/kg	104	70.0	130	----
	RM	rubidium	7440-17-7	E472	5.11 mg/kg	96.8	70.0	130	----
	RM	selenium	7782-49-2	E472	8 mg/kg	97.0	70.0	130	----
	RM	sodium	7440-23-5	E472	10673 mg/kg	98.6	70.0	130	----
	RM	strontium	7440-24-6	E472	3.92 mg/kg	93.8	70.0	130	----
	RM	thallium	7440-28-0	E472	0.013 mg/kg	91.0	70.0	130	----
	RM	uranium	7440-61-1	E472	0.0786 mg/kg	102	70.0	130	----
	RM	vanadium	7440-62-2	E472	0.51 mg/kg	95.9	70.0	130	----

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Metals (QCLot: 660771) - continued									
	RM	zinc	7440-66-6	E472	105.3 mg/kg	94.3	70.0	130	----
Metals (QCLot: 661601)									
	RM	mercury	7439-97-6	E512	0.331 mg/kg	94.4	70.0	130	----
Metals (QCLot: 661602)									
	RM	silver	7440-22-4	E475.Ag	2.05 mg/kg	87.0	70.0	130	----
Metals (QCLot: 661604)									
	RM	aluminum	7429-90-5	E475	11.2 mg/kg	101	70.0	130	----
	RM	arsenic	7440-38-2	E475	34.6 mg/kg	97.0	70.0	130	----
	RM	bismuth	7440-69-9	E475	0.0247 mg/kg	85.1	60.0	140	----
	RM	cadmium	7440-43-9	E475	14.5 mg/kg	90.7	70.0	130	----
	RM	calcium	7440-70-2	E475	550 mg/kg	93.6	70.0	130	----
	RM	cesium	7440-46-2	E475	0.0712 mg/kg	93.5	70.0	130	----
	RM	chromium	7440-47-3	E475	1.96 mg/kg	99.8	70.0	130	----
	RM	cobalt	7440-48-4	E475	0.267 mg/kg	92.3	70.0	130	----
	RM	copper	7440-50-8	E475	35 mg/kg	93.6	70.0	130	----
	RM	iron	7439-89-6	E475	1070 mg/kg	94.2	70.0	130	----
	RM	lead	7439-92-1	E475	0.162 mg/kg	95.4	70.0	130	----
	RM	magnesium	7439-95-4	E475	940 mg/kg	98.6	70.0	130	----
	RM	manganese	7439-96-5	E475	8.91 mg/kg	97.4	70.0	130	----
	RM	molybdenum	7439-98-7	E475	1.41 mg/kg	96.9	70.0	130	----
	RM	nickel	7440-02-0	E475	1.57 mg/kg	104	70.0	130	----
	RM	phosphorus	7723-14-0	E475	11500 mg/kg	106	70.0	130	----
	RM	potassium	7440-09-7	E475	14400 mg/kg	104	70.0	130	----
	RM	rubidium	7440-17-7	E475	5.11 mg/kg	96.8	70.0	130	----
	RM	selenium	7782-49-2	E475	8 mg/kg	97.0	70.0	130	----
	RM	sodium	7440-23-5	E475	10673 mg/kg	98.6	70.0	130	----
	RM	strontium	7440-24-6	E475	3.92 mg/kg	93.8	70.0	130	----
	RM	thallium	7440-28-0	E475	0.013 mg/kg	91.0	70.0	130	----
	RM	uranium	7440-61-1	E475	0.0786 mg/kg	102	70.0	130	----
	RM	vanadium	7440-62-2	E475	0.51 mg/kg	95.9	70.0	130	----
	RM	zinc	7440-66-6	E475	105.3 mg/kg	94.3	70.0	130	----

Sub-Matrix:

Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Reference Material (RM) Report: RM Target Concentration	Recovery (%): RM	Recovery Limits (%): Low	Recovery Limits (%): High	Qualifier
Metals (QCLot: 667415)									
	RM	silver	7440-22-4	E472.Ag	2.05 mg/kg	95.7	70.0	130	----
Metals (QCLot: 667417)									
	RM	mercury	7439-97-6	E511	0.331 mg/kg	108	70.0	130	----
Metals (QCLot: 667418)									
	RM	aluminum	7429-90-5	E472	11.2 mg/kg	103	70.0	130	----
	RM	arsenic	7440-38-2	E472	34.6 mg/kg	105	70.0	130	----
	RM	bismuth	7440-69-9	E472	0.0247 mg/kg	82.6	60.0	140	----
	RM	cadmium	7440-43-9	E472	14.5 mg/kg	97.3	70.0	130	----
	RM	calcium	7440-70-2	E472	550 mg/kg	112	70.0	130	----
	RM	cesium	7440-46-2	E472	0.0712 mg/kg	102	70.0	130	----
	RM	chromium	7440-47-3	E472	1.96 mg/kg	91.0	70.0	130	----
	RM	cobalt	7440-48-4	E472	0.267 mg/kg	94.9	70.0	130	----
	RM	copper	7440-50-8	E472	35 mg/kg	97.3	70.0	130	----
	RM	iron	7439-89-6	E472	1070 mg/kg	101	70.0	130	----
	RM	lead	7439-92-1	E472	0.162 mg/kg	91.7	70.0	130	----
	RM	magnesium	7439-95-4	E472	940 mg/kg	103	70.0	130	----
	RM	manganese	7439-96-5	E472	8.91 mg/kg	101	70.0	130	----
	RM	molybdenum	7439-98-7	E472	1.41 mg/kg	106	70.0	130	----
	RM	nickel	7440-02-0	E472	1.57 mg/kg	95.7	70.0	130	----
	RM	phosphorus	7723-14-0	E472	11500 mg/kg	111	70.0	130	----
	RM	potassium	7440-09-7	E472	14400 mg/kg	107	70.0	130	----
	RM	rubidium	7440-17-7	E472	5.11 mg/kg	102	70.0	130	----
	RM	selenium	7782-49-2	E472	8 mg/kg	102	70.0	130	----
	RM	sodium	7440-23-5	E472	10673 mg/kg	103	70.0	130	----
	RM	strontium	7440-24-6	E472	3.92 mg/kg	105	70.0	130	----
	RM	thallium	7440-28-0	E472	0.013 mg/kg	87.9	70.0	130	----
	RM	uranium	7440-61-1	E472	0.0786 mg/kg	103	70.0	130	----
	RM	vanadium	7440-62-2	E472	0.51 mg/kg	99.6	70.0	130	----
	RM	zinc	7440-66-6	E472	105.3 mg/kg	101	70.0	130	----
Metals (QCLot: 667450)									
	RM	mercury	7439-97-6	E512	0.331 mg/kg	109	70.0	130	----

Sub-Matrix:

Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Reference Material (RM) Report: RM Target Concentration	Recovery (%): RM	Recovery Limits (%): Low	Recovery Limits (%): High	Qualifier
Metals (QCLot: 667451)									
	RM	silver	7440-22-4	E475.Ag	2.05 mg/kg	95.7	70.0	130	----
Metals (QCLot: 667453)									
	RM	aluminum	7429-90-5	E475	11.2 mg/kg	103	70.0	130	----
	RM	arsenic	7440-38-2	E475	34.6 mg/kg	105	70.0	130	----
	RM	bismuth	7440-69-9	E475	0.0247 mg/kg	82.6	60.0	140	----
	RM	cadmium	7440-43-9	E475	14.5 mg/kg	97.3	70.0	130	----
	RM	calcium	7440-70-2	E475	550 mg/kg	112	70.0	130	----
	RM	cesium	7440-46-2	E475	0.0712 mg/kg	102	70.0	130	----
	RM	chromium	7440-47-3	E475	1.96 mg/kg	91.0	70.0	130	----
	RM	cobalt	7440-48-4	E475	0.267 mg/kg	94.9	70.0	130	----
	RM	copper	7440-50-8	E475	35 mg/kg	97.3	70.0	130	----
	RM	iron	7439-89-6	E475	1070 mg/kg	101	70.0	130	----
	RM	lead	7439-92-1	E475	0.162 mg/kg	91.7	70.0	130	----
	RM	magnesium	7439-95-4	E475	940 mg/kg	103	70.0	130	----
	RM	manganese	7439-96-5	E475	8.91 mg/kg	101	70.0	130	----
	RM	molybdenum	7439-98-7	E475	1.41 mg/kg	106	70.0	130	----
	RM	nickel	7440-02-0	E475	1.57 mg/kg	95.7	70.0	130	----
	RM	phosphorus	7723-14-0	E475	11500 mg/kg	111	70.0	130	----
	RM	potassium	7440-09-7	E475	14400 mg/kg	107	70.0	130	----
	RM	rubidium	7440-17-7	E475	5.11 mg/kg	102	70.0	130	----
	RM	selenium	7782-49-2	E475	8 mg/kg	102	70.0	130	----
	RM	sodium	7440-23-5	E475	10673 mg/kg	103	70.0	130	----
	RM	strontium	7440-24-6	E475	3.92 mg/kg	105	70.0	130	----
	RM	thallium	7440-28-0	E475	0.013 mg/kg	87.9	70.0	130	----
	RM	uranium	7440-61-1	E475	0.0786 mg/kg	103	70.0	130	----
	RM	vanadium	7440-62-2	E475	0.51 mg/kg	99.6	70.0	130	----
	RM	zinc	7440-66-6	E475	105.3 mg/kg	101	70.0	130	----
Metals (QCLot: 669485)									
	RM	silver	7440-22-4	E472.Ag	2.05 mg/kg	93.7	70.0	130	----
Metals (QCLot: 669487)									
	RM	mercury	7439-97-6	E511	0.331 mg/kg	104	70.0	130	----

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target Concentration	Recovery (%) RM	Recovery Limits (%) Low	Recovery Limits (%) High	
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method					Qualifier
Metals (QCLot: 669488)									
	RM	aluminum	7429-90-5	E472	11.2 mg/kg	84.7	70.0	130	----
	RM	arsenic	7440-38-2	E472	34.6 mg/kg	100	70.0	130	----
	RM	cadmium	7440-43-9	E472	14.5 mg/kg	93.1	70.0	130	----
	RM	calcium	7440-70-2	E472	550 mg/kg	96.3	70.0	130	----
	RM	cesium	7440-46-2	E472	0.0712 mg/kg	95.4	70.0	130	----
	RM	chromium	7440-47-3	E472	1.96 mg/kg	103	70.0	130	----
	RM	cobalt	7440-48-4	E472	0.267 mg/kg	93.0	70.0	130	----
	RM	copper	7440-50-8	E472	35 mg/kg	95.2	70.0	130	----
	RM	iron	7439-89-6	E472	1070 mg/kg	95.7	70.0	130	----
	RM	lead	7439-92-1	E472	0.162 mg/kg	101	70.0	130	----
	RM	magnesium	7439-95-4	E472	940 mg/kg	94.1	70.0	130	----
	RM	manganese	7439-96-5	E472	8.91 mg/kg	94.6	70.0	130	----
	RM	molybdenum	7439-98-7	E472	1.41 mg/kg	106	70.0	130	----
	RM	phosphorus	7723-14-0	E472	11500 mg/kg	100	70.0	130	----
	RM	potassium	7440-09-7	E472	14400 mg/kg	97.3	70.0	130	----
	RM	rubidium	7440-17-7	E472	5.11 mg/kg	96.3	70.0	130	----
	RM	selenium	7782-49-2	E472	8 mg/kg	100	70.0	130	----
	RM	sodium	7440-23-5	E472	10673 mg/kg	97.2	70.0	130	----
	RM	strontium	7440-24-6	E472	3.92 mg/kg	95.0	70.0	130	----
	RM	thallium	7440-28-0	E472	0.013 mg/kg	94.5	70.0	130	----
	RM	uranium	7440-61-1	E472	0.0786 mg/kg	106	70.0	130	----
	RM	vanadium	7440-62-2	E472	0.51 mg/kg	91.8	70.0	130	----
	RM	zinc	7440-66-6	E472	105.3 mg/kg	96.8	70.0	130	----
Metals (QCLot: 669491)									
	RM	silver	7440-22-4	E472.Ag	2.05 mg/kg	90.6	70.0	130	----
Metals (QCLot: 669493)									
	RM	mercury	7439-97-6	E511	0.331 mg/kg	102	70.0	130	----
Metals (QCLot: 669494)									
	RM	aluminum	7429-90-5	E472	11.2 mg/kg	84.3	70.0	130	----
	RM	arsenic	7440-38-2	E472	34.6 mg/kg	95.1	70.0	130	----
	RM	cadmium	7440-43-9	E472	14.5 mg/kg	90.0	70.0	130	----

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Metals (QCLot: 669494) - continued									
	RM	calcium	7440-70-2	E472	550 mg/kg	95.6	70.0	130	----
	RM	cesium	7440-46-2	E472	0.0712 mg/kg	93.0	70.0	130	----
	RM	cobalt	7440-48-4	E472	0.267 mg/kg	89.8	70.0	130	----
	RM	copper	7440-50-8	E472	35 mg/kg	91.4	70.0	130	----
	RM	iron	7439-89-6	E472	1070 mg/kg	93.1	70.0	130	----
	RM	lead	7439-92-1	E472	0.162 mg/kg	98.9	70.0	130	----
	RM	magnesium	7439-95-4	E472	940 mg/kg	95.4	70.0	130	----
	RM	manganese	7439-96-5	E472	8.91 mg/kg	93.4	70.0	130	----
	RM	molybdenum	7439-98-7	E472	1.41 mg/kg	115	70.0	130	----
	RM	phosphorus	7723-14-0	E472	11500 mg/kg	95.9	70.0	130	----
	RM	potassium	7440-09-7	E472	14400 mg/kg	95.3	70.0	130	----
	RM	rubidium	7440-17-7	E472	5.11 mg/kg	92.2	70.0	130	----
	RM	selenium	7782-49-2	E472	8 mg/kg	96.3	70.0	130	----
	RM	sodium	7440-23-5	E472	10673 mg/kg	95.5	70.0	130	----
	RM	strontium	7440-24-6	E472	3.92 mg/kg	90.2	70.0	130	----
	RM	thallium	7440-28-0	E472	0.013 mg/kg	91.0	70.0	130	----
	RM	uranium	7440-61-1	E472	0.0786 mg/kg	104	70.0	130	----
	RM	vanadium	7440-62-2	E472	0.51 mg/kg	90.2	70.0	130	----
	RM	zinc	7440-66-6	E472	105.3 mg/kg	92.3	70.0	130	----
Metals (QCLot: 670360)									
	RM	mercury	7439-97-6	E512	0.331 mg/kg	105	70.0	130	----
Metals (QCLot: 670361)									
	RM	silver	7440-22-4	E475.Ag	2.05 mg/kg	93.7	70.0	130	----
Metals (QCLot: 670363)									
	RM	aluminum	7429-90-5	E475	11.2 mg/kg	84.7	70.0	130	----
	RM	arsenic	7440-38-2	E475	34.6 mg/kg	100	70.0	130	----
	RM	cadmium	7440-43-9	E475	14.5 mg/kg	93.1	70.0	130	----
	RM	calcium	7440-70-2	E475	550 mg/kg	96.3	70.0	130	----
	RM	cesium	7440-46-2	E475	0.0712 mg/kg	95.4	70.0	130	----
	RM	chromium	7440-47-3	E475	1.96 mg/kg	103	70.0	130	----
	RM	cobalt	7440-48-4	E475	0.267 mg/kg	93.0	70.0	130	----

Sub-Matrix:

Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Reference Material (RM) Report: RM Target Concentration	Recovery (%): RM	Recovery Limits (%): Low	Recovery Limits (%): High	Qualifier
Metals (QCLot: 670363) - continued									
	RM	copper	7440-50-8	E475	35 mg/kg	95.2	70.0	130	----
	RM	iron	7439-89-6	E475	1070 mg/kg	95.7	70.0	130	----
	RM	lead	7439-92-1	E475	0.162 mg/kg	101	70.0	130	----
	RM	magnesium	7439-95-4	E475	940 mg/kg	94.1	70.0	130	----
	RM	manganese	7439-96-5	E475	8.91 mg/kg	94.6	70.0	130	----
	RM	molybdenum	7439-98-7	E475	1.41 mg/kg	106	70.0	130	----
	RM	phosphorus	7723-14-0	E475	11500 mg/kg	100	70.0	130	----
	RM	potassium	7440-09-7	E475	14400 mg/kg	97.3	70.0	130	----
	RM	rubidium	7440-17-7	E475	5.11 mg/kg	96.3	70.0	130	----
	RM	selenium	7782-49-2	E475	8 mg/kg	100	70.0	130	----
	RM	sodium	7440-23-5	E475	10673 mg/kg	97.2	70.0	130	----
	RM	strontium	7440-24-6	E475	3.92 mg/kg	95.0	70.0	130	----
	RM	thallium	7440-28-0	E475	0.013 mg/kg	94.5	70.0	130	----
	RM	uranium	7440-61-1	E475	0.0786 mg/kg	106	70.0	130	----
	RM	vanadium	7440-62-2	E475	0.51 mg/kg	91.8	70.0	130	----
	RM	zinc	7440-66-6	E475	105.3 mg/kg	96.8	70.0	130	----
Metals (QCLot: 676929)									
	RM	silver	7440-22-4	E472.Ag	2.05 mg/kg	79.8	70.0	130	----
Metals (QCLot: 676931)									
	RM	mercury	7439-97-6	E511	0.331 mg/kg	95.7	70.0	130	----
Metals (QCLot: 676932)									
	RM	aluminum	7429-90-5	E472	11.2 mg/kg	89.4	70.0	130	----
	RM	arsenic	7440-38-2	E472	34.6 mg/kg	95.5	70.0	130	----
	RM	bismuth	7440-69-9	E472	0.0247 mg/kg	102	60.0	140	----
	RM	cadmium	7440-43-9	E472	14.5 mg/kg	88.3	70.0	130	----
	RM	calcium	7440-70-2	E472	550 mg/kg	95.4	70.0	130	----
	RM	cesium	7440-46-2	E472	0.0712 mg/kg	87.5	70.0	130	----
	RM	chromium	7440-47-3	E472	1.96 mg/kg	85.3	70.0	130	----
	RM	cobalt	7440-48-4	E472	0.267 mg/kg	88.2	70.0	130	----
	RM	copper	7440-50-8	E472	35 mg/kg	93.3	70.0	130	----
	RM	iron	7439-89-6	E472	1070 mg/kg	89.4	70.0	130	----

Sub-Matrix:

Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Reference Material (RM) Report: RM Target Concentration	Recovery (%): RM	Recovery Limits (%): Low	Recovery Limits (%): High	Qualifier
Metals (QCLot: 676932) - continued									
	RM	lead	7439-92-1	E472	0.162 mg/kg	74.2	70.0	130	----
	RM	magnesium	7439-95-4	E472	940 mg/kg	98.0	70.0	130	----
	RM	manganese	7439-96-5	E472	8.91 mg/kg	93.2	70.0	130	----
	RM	molybdenum	7439-98-7	E472	1.41 mg/kg	88.0	70.0	130	----
	RM	nickel	7440-02-0	E472	1.57 mg/kg	87.9	70.0	130	----
	RM	phosphorus	7723-14-0	E472	11500 mg/kg	102	70.0	130	----
	RM	potassium	7440-09-7	E472	14400 mg/kg	99.7	70.0	130	----
	RM	rubidium	7440-17-7	E472	5.11 mg/kg	93.7	70.0	130	----
	RM	selenium	7782-49-2	E472	8 mg/kg	91.9	70.0	130	----
	RM	sodium	7440-23-5	E472	10673 mg/kg	99.3	70.0	130	----
	RM	strontium	7440-24-6	E472	3.92 mg/kg	89.8	70.0	130	----
	RM	thallium	7440-28-0	E472	0.013 mg/kg	79.6	70.0	130	----
	RM	uranium	7440-61-1	E472	0.0786 mg/kg	95.1	70.0	130	----
	RM	vanadium	7440-62-2	E472	0.51 mg/kg	90.4	70.0	130	----
	RM	zinc	7440-66-6	E472	105.3 mg/kg	92.4	70.0	130	----
Metals (QCLot: 676933)									
	RM	silver	7440-22-4	E472.Ag	2.05 mg/kg	83.5	70.0	130	----
Metals (QCLot: 676934)									
	RM	titanium	7440-32-6	E472.Ti	1.05 mg/kg	# 64.4	70.0	130	MES
Metals (QCLot: 676935)									
	RM	mercury	7439-97-6	E511	0.331 mg/kg	101	70.0	130	----
Metals (QCLot: 676936)									
	RM	aluminum	7429-90-5	E472	11.2 mg/kg	104	70.0	130	----
	RM	arsenic	7440-38-2	E472	34.6 mg/kg	101	70.0	130	----
	RM	bismuth	7440-69-9	E472	0.0247 mg/kg	81.7	60.0	140	----
	RM	cadmium	7440-43-9	E472	14.5 mg/kg	90.1	70.0	130	----
	RM	calcium	7440-70-2	E472	550 mg/kg	93.9	70.0	130	----
	RM	cesium	7440-46-2	E472	0.0712 mg/kg	90.5	70.0	130	----
	RM	chromium	7440-47-3	E472	1.96 mg/kg	98.1	70.0	130	----
	RM	cobalt	7440-48-4	E472	0.267 mg/kg	95.0	70.0	130	----
	RM	copper	7440-50-8	E472	35 mg/kg	97.3	70.0	130	----

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Metals (QCLot: 676936) - continued									
	RM	iron	7439-89-6	E472	1070 mg/kg	96.0	70.0	130	----
	RM	lead	7439-92-1	E472	0.162 mg/kg	103	70.0	130	----
	RM	magnesium	7439-95-4	E472	940 mg/kg	102	70.0	130	----
	RM	manganese	7439-96-5	E472	8.91 mg/kg	99.3	70.0	130	----
	RM	molybdenum	7439-98-7	E472	1.41 mg/kg	90.7	70.0	130	----
	RM	nickel	7440-02-0	E472	1.57 mg/kg	87.6	70.0	130	----
	RM	phosphorus	7723-14-0	E472	11500 mg/kg	110	70.0	130	----
	RM	potassium	7440-09-7	E472	14400 mg/kg	107	70.0	130	----
	RM	rubidium	7440-17-7	E472	5.11 mg/kg	101	70.0	130	----
	RM	selenium	7782-49-2	E472	8 mg/kg	97.6	70.0	130	----
	RM	sodium	7440-23-5	E472	10673 mg/kg	104	70.0	130	----
	RM	strontium	7440-24-6	E472	3.92 mg/kg	86.7	70.0	130	----
	RM	thallium	7440-28-0	E472	0.013 mg/kg	87.1	70.0	130	----
	RM	uranium	7440-61-1	E472	0.0786 mg/kg	105	70.0	130	----
	RM	vanadium	7440-62-2	E472	0.51 mg/kg	96.6	70.0	130	----
	RM	zinc	7440-66-6	E472	105.3 mg/kg	97.8	70.0	130	----
Metals (QCLot: 678979)									
	RM	silver	7440-22-4	E472.Ag	2.05 mg/kg	84.7	70.0	130	----
Metals (QCLot: 678981)									
	RM	mercury	7439-97-6	E511	0.331 mg/kg	98.3	70.0	130	----
Metals (QCLot: 678982)									
	RM	aluminum	7429-90-5	E472	11.2 mg/kg	103	70.0	130	----
	RM	arsenic	7440-38-2	E472	34.6 mg/kg	95.9	70.0	130	----
	RM	bismuth	7440-69-9	E472	0.0247 mg/kg	89.2	60.0	140	----
	RM	cadmium	7440-43-9	E472	14.5 mg/kg	88.8	70.0	130	----
	RM	calcium	7440-70-2	E472	550 mg/kg	91.0	70.0	130	----
	RM	cesium	7440-46-2	E472	0.0712 mg/kg	91.6	70.0	130	----
	RM	chromium	7440-47-3	E472	1.96 mg/kg	87.5	70.0	130	----
	RM	cobalt	7440-48-4	E472	0.267 mg/kg	87.0	70.0	130	----
	RM	copper	7440-50-8	E472	35 mg/kg	89.3	70.0	130	----
	RM	iron	7439-89-6	E472	1070 mg/kg	91.9	70.0	130	----

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Metals (QCLot: 678982) - continued									
	RM	lead	7439-92-1	E472	0.162 mg/kg	129	70.0	130	----
	RM	magnesium	7439-95-4	E472	940 mg/kg	92.9	70.0	130	----
	RM	manganese	7439-96-5	E472	8.91 mg/kg	91.9	70.0	130	----
	RM	molybdenum	7439-98-7	E472	1.41 mg/kg	93.4	70.0	130	----
	RM	nickel	7440-02-0	E472	1.57 mg/kg	85.5	70.0	130	----
	RM	phosphorus	7723-14-0	E472	11500 mg/kg	98.4	70.0	130	----
	RM	potassium	7440-09-7	E472	14400 mg/kg	97.0	70.0	130	----
	RM	rubidium	7440-17-7	E472	5.11 mg/kg	91.8	70.0	130	----
	RM	selenium	7782-49-2	E472	8 mg/kg	94.4	70.0	130	----
	RM	sodium	7440-23-5	E472	10673 mg/kg	92.5	70.0	130	----
	RM	strontium	7440-24-6	E472	3.92 mg/kg	90.4	70.0	130	----
	RM	thallium	7440-28-0	E472	0.013 mg/kg	81.1	70.0	130	----
	RM	uranium	7440-61-1	E472	0.0786 mg/kg	97.2	70.0	130	----
	RM	vanadium	7440-62-2	E472	0.51 mg/kg	90.4	70.0	130	----
	RM	zinc	7440-66-6	E472	105.3 mg/kg	93.0	70.0	130	----
Metals (QCLot: 678986)									
	RM	silver	7440-22-4	E472.Ag	2.05 mg/kg	82.3	70.0	130	----
Metals (QCLot: 678988)									
	RM	mercury	7439-97-6	E511	0.331 mg/kg	88.0	70.0	130	----
Metals (QCLot: 678989)									
	RM	aluminum	7429-90-5	E472	11.2 mg/kg	114	70.0	130	----
	RM	arsenic	7440-38-2	E472	34.6 mg/kg	89.8	70.0	130	----
	RM	bismuth	7440-69-9	E472	0.0247 mg/kg	78.3	60.0	140	----
	RM	cadmium	7440-43-9	E472	14.5 mg/kg	87.4	70.0	130	----
	RM	calcium	7440-70-2	E472	550 mg/kg	97.8	70.0	130	----
	RM	cesium	7440-46-2	E472	0.0712 mg/kg	88.6	70.0	130	----
	RM	chromium	7440-47-3	E472	1.96 mg/kg	91.7	70.0	130	----
	RM	cobalt	7440-48-4	E472	0.267 mg/kg	86.6	70.0	130	----
	RM	copper	7440-50-8	E472	35 mg/kg	87.1	70.0	130	----
	RM	iron	7439-89-6	E472	1070 mg/kg	93.4	70.0	130	----
	RM	lead	7439-92-1	E472	0.162 mg/kg	95.2	70.0	130	----

Sub-Matrix:

Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Reference Material (RM) Report: RM Target Concentration	Recovery (%): RM	Recovery Limits (%): Low	Recovery Limits (%): High	Qualifier
Metals (QCLot: 678989) - continued									
	RM	magnesium	7439-95-4	E472	940 mg/kg	90.4	70.0	130	----
	RM	manganese	7439-96-5	E472	8.91 mg/kg	90.9	70.0	130	----
	RM	molybdenum	7439-98-7	E472	1.41 mg/kg	90.1	70.0	130	----
	RM	nickel	7440-02-0	E472	1.57 mg/kg	91.6	70.0	130	----
	RM	phosphorus	7723-14-0	E472	11500 mg/kg	98.1	70.0	130	----
	RM	potassium	7440-09-7	E472	14400 mg/kg	97.4	70.0	130	----
	RM	rubidium	7440-17-7	E472	5.11 mg/kg	87.2	70.0	130	----
	RM	selenium	7782-49-2	E472	8 mg/kg	90.9	70.0	130	----
	RM	sodium	7440-23-5	E472	10673 mg/kg	89.7	70.0	130	----
	RM	strontium	7440-24-6	E472	3.92 mg/kg	91.2	70.0	130	----
	RM	thallium	7440-28-0	E472	0.013 mg/kg	78.4	70.0	130	----
	RM	uranium	7440-61-1	E472	0.0786 mg/kg	92.5	70.0	130	----
	RM	vanadium	7440-62-2	E472	0.51 mg/kg	88.9	70.0	130	----
	RM	zinc	7440-66-6	E472	105.3 mg/kg	89.7	70.0	130	----

Qualifiers

Qualifier	Description
MES	*Data Quality Objective was marginally exceeded (by < 10% absolute) for < 10% of analytes in a Multi-Element Scan / Multi-Parameter Scan (considered acceptable as per OMOE & CCME).*

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Affix ALS barcode label here
(lab use only)

COC Number: 15 -

Environmental Division
Vancouver
Work Order Reference
VA22B8779

Telephone : +1 604 253 4188

Report To	Contact and company name below will appear on the final report
Company:	Mount Polley Mining Corporation
Contact:	Gabriel Holmes
Phone:	236-317-4939
	Company address below will appear on the final report
Street:	PO Box 12
City/Province:	Likely, BC
Postal Code:	V0L 1N0
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☐ NO
Company:	
Contact:	

Report Format / Distribution

Select Report Format: ☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)
Quality Control (QC) Report with Report ☑ YES ☐ NO
☐ Compare Results to Criteria on Report - provide details below if box checked
Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax: kala.ivens@mountpolley.com
Email 2: gabriel.holmes@mountpolley.com
Email 3: pstecko@minnow.ca; kbatchelar@minnow.ca

Invoice Distribution

Select Invoice Distribution: ☑ EMAIL ☑ MAIL ☐ FAX
Email 1 or Fax: gabriel.holmes@mountpolley.com
Email 2:

Project Information

ALS Account # / Quote #: VA22-MPMC100-002
Job #:
PO / AFE:
LSD:

Oil and Gas Required Fields (client use)

AFE/Cost Center: PO#
Major/Minor Code: Routing Code:
Requisitioner:
Location:

ALS Lab Work Order # (lab use only): B8779
ALS Contact: Can Dang
Sampler: KBa

Select Service Level Below - Please confirm all E&P TATs with you

Regular [R] ☑ Standard TAT if received by

PRIORITY (Business Days): 4 day [P4] ☐ | 3 day [P3] ☐ | 2 day [P2] ☐
EMERGENCY: 1 B | Sa | S

Date and Time Required for all E&P TATs:

For tests that can not be performed according to the service level

Analysis Re

Indicate Filtered (F), Preserved (P) or Filtered and

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Moisture Content by Gravimetry (E144)	Mercury in Biota by CVAAS (DRY units, Routine) (E510)	Metals in Biota by CRC ICPMS (DRY units, Routine) (E440)	Silver in Biota by CRC ICPMS (DRY units, Routine) (E440.Ag)	Titanium in Biota by CRC ICPMS (DRY units, Routine) (E440.Ti)	Number of Containers
1	HAC-R1_PERT-1_2022-08	10-Aug-22		Tissue	R	R	R	R	R	1
2	HAC-R1_PERT-2_2022-08	10-Aug-22		Tissue	R	R	R	R	R	1
3	HAC-R1_PERT-3_2022-08	10-Aug-22		Tissue	R	R	R	R	R	1
4	HAC-R1_PERT-4_2022-08	10-Aug-22		Tissue	R	R	R	R	R	1
5	HAC-R1_PERT-5_2022-08	10-Aug-22		Tissue	R	R	R	R	R	1
6	HAC-R1_PERT-6_2022-08	10-Aug-22		Tissue	R	R	R	R	R	1
7	HAC-R1_PERT-7_2022-08	10-Aug-22		Tissue	R	R	R	R	R	1
8	HAC-R1_PERT-8_2022-08	10-Aug-22		Tissue	R	R	R	R	R	1
9	HAC-U_PERT-1_2022-08	06-Aug-22		Tissue	R	R	R	R	R	1
10	HAC-U_PERT-2_2022-08	06-Aug-22		Tissue	R	R	R	R	R	1
11	HAC-U_PERT-3_2022-08	06-Aug-22		Tissue	R	R	R	R	R	1
12	HAC-U_PERT-4_2022-08	06-Aug-22		Tissue	R	R	R	R	R	1

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System?
☐ YES ☐ NO

Are samples for human drinking water use?
☐ YES ☐ NO

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

If sample is insufficient for regular digestion and analysis, please contact kbatchelar@minnow.ca or pstecko@minnow.ca to discuss analysis options.

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ | SIF Observations Yes ☐ No ☐
Ice Packs ☑ Ice Cubes ☐ | Custody seal intact Yes ☐ No ☐
Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C	
			6°C (avg 5)	

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Katharina Batchelar	Date: 11-Aug-22	Time: 12:00	Received by:	Date:	Time:	Received by: JC	Date: AUG 12 2022	Time: 12pm

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

OCTOBER 2015 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form.**

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Affix ALS barcode label here (lab use only)

COC Number: 15 -

Report To	Contact and company name below will appear on the final report
Company:	Mount Polley Mining Corporation
Contact:	Gabriel Holmes
Phone:	236-317-4939
	Company address below will appear on the final report
Street:	PO Box 12
City/Province:	Likely, BC
Postal Code:	V0L 1N0
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☐ NO
Company:	
Contact:	

Report Format / Distribution	
Select Report Format:	☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)
Quality Control (QC) Report with Report	☑ YES ☐ NO
☐ Compare Results to Criteria on Report - provide details below if box checked	
Select Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	kala.ivens@mountpolley.com
Email 2	gabriel.holmes@mountpolley.com
Email 3	pstecko@minnow.ca; kbatchelar@minnow.ca

Invoice Distribution	
Select Invoice Distribution:	☑ EMAIL ☑ MAIL ☐ FAX
Email 1 or Fax	gabriel.holmes@mountpolley.com
Email 2	

Project Information	
ALS Account # / Quote #:	VA22-MPMC100-002
Job #:	
PO / AFE:	
LSD:	

Oil and Gas Required Fields (client use)	
AFE/Cost Center:	PO#
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Lab Work Order # (lab use only)

ALS Contact: Can Dang **Sampler:** KBox

Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply

Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days)			EMERGENCY	
	4 day [P4]	☐	1 Business day [E1]	☐
	3 day [P3]	☐	Same Day, Weekend or Statutory holiday [E0]	☐
	2 day [P2]	☐		

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm

For tests that can not be performed according to the service level selected, you will be contacted.

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Moisture Content by Gravimetry (E144)	Mercury in Biota by CVAAS (DRY units, Routine) (E510)	Metals in Biota by CRC ICPMS (DRY units, Routine) (E440)	Silver in Biota by CRC ICPMS (DRY units, Routine) (E440.Ag)	Titanium in Biota by CRC ICPMS (DRY units, Routine) (E440.Ti)	Number of Containers
13	HAC-U_PERT-5_2022-08	05-Aug-22		Tissue	R	R	R	R	R	1
14	HAC-U_PERT-6_2022-08	05-Aug-22		Tissue	R	R	R	R	R	1
15	HAC-U_PERT-7_2022-08	06-Aug-22		Tissue	R	R	R	R	R	1
16	HAC-U_PERT-8_2022-08	05-Aug-22		Tissue	R	R	R	R	R	1
17	HAC-D_PERT-1_2022-08	05-Aug-22		Tissue	R	R	R	R	R	1
18	HAC-D_PERT-2_2022-08	05-Aug-22		Tissue	R	R	R	R	R	1
19	HAC-D_PERT-3_2022-08	05-Aug-22		Tissue	R	R	R	R	R	1
20	HAC-D_PERT-4_2022-08	05-Aug-22		Tissue	R	R	R	R	R	1
21	HAC-D_PERT-5_2022-08	05-Aug-22		Tissue	R	R	R	R	R	1
22	HAC-D_PERT-6_2022-08	05-Aug-22		Tissue	R	R	R	R	R	1
23	HAC-D_PERT-7_2022-08	05-Aug-22		Tissue	R	R	R	R	R	1
24	HAC-D_PERT-8_2022-08	05-Aug-22		Tissue	R	R	R	R	R	1

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☐ NO

Are samples for human drinking water use? ☐ YES ☐ NO

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

If sample is insufficient for regular digestion and analysis, please contact kbatchelar@minnow.ca or pstecko@minnow.ca to discuss analysis options.

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice Packs ☑ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C	
			6°C (avg 5)	

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Katharina Batchelar	Date: 11-Aug-22	Time: 1200	Received by:	Date:	Time:	Received by: JC	Date: AUG 12 2022	Time: 12pm

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

OCTOBER 2015 FRONT

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1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form**.

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Affix ALS barcode label here (lab use only)

COC Number: 15 -

Report To	Contact and company name below will appear on the final report
Company:	Mount Polley Mining Corporation
Contact:	Gabriel Holmes
Phone:	236-317-4939
	Company address below will appear on the final report
Street:	PO Box 12
City/Province:	Likely, BC
Postal Code:	V0L 1N0
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☐ NO
Company:	
Contact:	

Report Format / Distribution

Select Report Format: ☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)
Quality Control (QC) Report with Report ☑ YES ☐ NO
☐ Compare Results to Criteria on Report - provide details below if box checked
Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax: kala.ivens@mountpolley.com
Email 2: gabriel.holmes@mountpolley.com
Email 3: pstecko@minnow.ca; kbatchelar@minnow.ca

Invoice Distribution

Select Invoice Distribution: ☑ EMAIL ☑ MAIL ☐ FAX
Email 1 or Fax: gabriel.holmes@mountpolley.com
Email 2:

Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply

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PRIORITY (Business Days)		EMERGENCY	
	4 day [P4] ☐		1 Business day [E1] ☐
	3 day [P3] ☐		Same Day, Weekend or Statutory holiday [E0] ☐
	2 day [P2] ☐		

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm

For tests that can not be performed according to the service level selected, you will be contacted.

Project Information

ALS Account # / Quote #:	VA22-MPMC100-002
Job #:	
PO / AFE:	
LSD:	

Oil and Gas Required Fields (client use)

AFE/Cost Center:	PO#:
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Lab Work Order # (lab use only):

ALS Contact: Can Dang **Sampler:** KBa

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Moisture Content by Gravimetry (E144)	Mercury in Biota by CVAAS (DRY units, Routine) (E510)	Metals in Biota by CRC ICPMS (DRY units, Routine) (E440)	Silver in Biota by CRC ICPMS (DRY units, Routine) (E440.Ag)	Titanium in Biota by CRC ICPMS (DRY units, Routine) (E440.Ti)	Number of Containers
25	EDC-U_PERT-1_2022-08	08-Aug-22		Tissue	R	R	R	R	R	1
26	EDC-U_PERT-2_2022-08	07-Aug-22		Tissue	R	R	R	R	R	1
27	EDC-U_PERT-3_2022-08	07-Aug-22		Tissue	R	R	R	R	R	1
28	EDC-U_PERT-4_2022-08	07-Aug-22		Tissue	R	R	R	R	R	1
29	EDC-U_PERT-5_2022-08	07-Aug-22		Tissue	R	R	R	R	R	1
30	EDC-U_PERT-6_2022-08	07-Aug-22		Tissue	R	R	R	R	R	1
31	EDC-U_PERT-7_2022-08	07-Aug-22		Tissue	R	R	R	R	R	1
32	EDC-U_PERT-8_2022-08	07-Aug-22		Tissue	R	R	R	R	R	1
33	EDC-D_PERT-1_2022-08	04-Aug-22		Tissue	R	R	R	R	R	1
34	EDC-D_PERT-2_2022-08	04-Aug-22		Tissue	R	R	R	R	R	1
35	EDC-D_PERT-3_2022-08	03-Aug-22		Tissue	R	R	R	R	R	1
36	EDC-D_PERT-4_2022-08	03-Aug-22		Tissue	R	R	R	R	R	1

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☐ NO

Are samples for human drinking water use? ☐ YES ☐ NO

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

If sample is insufficient for regular digestion and analysis, please contact kbatchelar@minnow.ca or pstecko@minnow.ca to discuss analysis options.

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐
Ice Packs ☑ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐
Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C	
			6.8 (avg 5)	

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Kathrina Batchelar	Date: 11-Aug-22	Time: 12:00	Received by:	Date:	Time:	Received by: JC	Date: AUG 12 2022	Time: 12pm

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

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1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

Chain of Custody (COC) / Analytical Request Form

ALS Environmental
www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Affix ALS barcode label here
(lab use only)

COC Number: 15 -

Report To	Contact and company name below will appear on the final report
Company:	Mount Polley Mining Corporation
Contact:	Gabriel Holmes
Phone:	236-317-4939
	Company address below will appear on the final report
Street:	PO Box 12
City/Province:	Likely, BC
Postal Code:	V0L 1N0
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☐ NO
Company:	
Contact:	

Report Format / Distribution

Select Report Format: ☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)
Quality Control (QC) Report with Report ☑ YES ☐ NO
☐ Compare Results to Criteria on Report - provide details below if box checked
Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax	kala.ivens@mountpolley.com
Email 2	gabriel.holmes@mountpolley.com
Email 3	pstecko@minnow.ca; kbatchelar@minnow.ca

Invoice Distribution

Select Invoice Distribution: ☑ EMAIL ☑ MAIL ☐ FAX

Email 1 or Fax	gabriel.holmes@mountpolley.com
Email 2	

Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply

Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days)		EMERGENCY	
	4 day [P4] ☐		1 Business day [E1] ☐
	3 day [P3] ☐		Same Day, Weekend or Statutory holiday [E0] ☐
	2 day [P2] ☐		

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm

For tests that can not be performed according to the service level selected, you will be contacted.

Project Information

ALS Account # / Quote #:	VA22-MPMC100-002
Job #:	
PO / AFE:	
LSD:	

Oil and Gas Required Fields (client use)

AFE/Cost Center:	PO#
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Lab Work Order # (lab use only)

ALS Contact: Can Dang **Sampler:** KBa

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Moisture Content by Gravimetry (E144)	Mercury in Biota by CVAAS (DRY units, Routine) (E510)	Metals in Biota by CRC ICPMS (DRY units, Routine) (E440)	Silver in Biota by CRC ICPMS (DRY units, Routine) (E440 Ag)	Titanium in Biota by CRC ICPMS (DRY units, Routine) (E440 Ti)	Number of Containers
37	EDC-D_PERT-5_2022-08	03-Aug-22		Tissue	R	R	R	R	R	1
38	EDC-D_PERT-6_2022-08	03-Aug-22		Tissue	R	R	R	R	R	1
39	EDC-D_PERT-7_2022-08	03-Aug-22		Tissue	R	R	R	R	R	1
40	EDC-D_PERT-8_2022-08	03-Aug-22		Tissue	R	R	R	R	R	1
41	E1_PERT-1_2022-08	05-Aug-22		Tissue	R	R	R	R	R	1
42	E1_PERT-2_2022-08	05-Aug-22		Tissue	R	R	R	R	R	1
43	E1_PERT-3_2022-08	05-Aug-22		Tissue	R	R	R	R	R	1
44	E1_PERT-4_2022-08	04-Aug-22		Tissue	R	R	R	R	R	1
45	E1_PERT-5_2022-08	04-Aug-22		Tissue	R	R	R	R	R	1
46	E1_PERT-6_2022-08	04-Aug-22		Tissue	R	R	R	R	R	1
47	E1_PERT-7_2022-08	04-Aug-22		Tissue	R	R	R	R	R	1
48	E1_PERT-8_2022-08	04-Aug-22		Tissue	R	R	R	R	R	1

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System?
☐ YES ☐ NO

Are samples for human drinking water use?
☐ YES ☐ NO

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

If sample is insufficient for regular digestion and analysis, please contact kbatchelar@minnow.ca or pstecko@minnow.ca to discuss analysis options.

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐
Ice Packs ☑ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐
Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C	
			6°C (avg 5)	

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by:	Date:	Time:	Received by:	Date:	Time:	Received by:	Date:	Time:
Katharina Batchelar	11-Aug-22	12:00				JC	AUG 17 2022	12pm

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION WHITE - LABORATORY COPY YELLOW - CLIENT COPY

OCTOBER 2015 FRONT

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1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form.**

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Affix ALS barcode label here (lab use only)

COC Number: 15 -

Page 5 of #14

Report To	Contact and company name below will appear on the final report
Company:	Mount Polley Mining Corporation
Contact:	Gabriel Holmes
Phone:	236-317-4939
	Company address below will appear on the final report
Street:	PO Box 12
City/Province:	Likely, BC
Postal Code:	V0L 1N0
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☐ NO
Company:	
Contact:	

Report Format / Distribution

Select Report Format: ☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)

Quality Control (QC) Report with Report ☑ YES ☐ NO

☐ Compare Results to Criteria on Report - provide details below if box checked

Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: kala.ivens@mountpolley.com

Email 2: gabriel.holmes@mountpolley.com

Email 3: pstecko@minnow.ca; kbatchelar@minnow.ca

Invoice Distribution

Select Invoice Distribution: ☑ EMAIL ☑ MAIL ☐ FAX

Email 1 or Fax: gabriel.holmes@mountpolley.com

Email 2:

Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply

Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days): 4 day [P4] ☐ | 3 day [P3] ☐ | 2 day [P2] ☐

EMERGENCY: 1 Business day [E1] ☐ | Same Day, Weekend or Statutory holiday [E0] ☐

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm

For tests that can not be performed according to the service level selected, you will be contacted.

Project Information		Oil and Gas Required Fields (client use)	
ALS Account # / Quote #:	VA22-MPMC100-002	AFE/Cost Center:	PO#:
Job #:		Major/Minor Code:	Routing Code:
PO / AFE:		Requisitioner:	
LSD:		Location:	

ALS Lab Work Order # (lab use only):

ALS Contact: Can Dang **Sampler:** KBa

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Moisture Content by Gravimetry (E144)	Mercury in Biota by CVAAS (DRY units, Routine) (E510)	Metals in Biota by CRC ICPMS (DRY units, Routine) (E440)	Silver in Biota by CRC ICPMS (DRY units, Routine) (E440.Ag)	Titanium in Biota by CRC ICPMS (DRY units, Routine) (E440.Ti)	Number of Containers
49	HAC-R1_INV-1_2022-08	10-Aug-22		Tissue	R	R	R	R	R	1
50	HAC-R1_INV-2_2022-08	10-Aug-22		Tissue	R	R	R	R	R	1
51	HAC-R1_INV-3_2022-08	10-Aug-22		Tissue	R	R	R	R	R	1
52	HAC-R1_INV-4_2022-08	10-Aug-22		Tissue	R	R	R	R	R	1
53	HAC-R1_INV-5_2022-08	10-Aug-22		Tissue	R	R	R	R	R	1
54	HAC-R1_INV-6_2022-08	10-Aug-22		Tissue	R	R	R	R	R	1
55	HAC-R1_INV-7_2022-08	10-Aug-22		Tissue	R	R	R	R	R	1
56	HAC-R1_INV-8_2022-08	10-Aug-22		Tissue	R	R	R	R	R	1
57	HAC-U_INV-1_2022-08	06-Aug-22		Tissue	R	R	R	R	R	1
58	HAC-U_INV-2_2022-08	06-Aug-22		Tissue	R	R	R	R	R	1
59	HAC-U_INV-3_2022-08	06-Aug-22		Tissue	R	R	R	R	R	1
60	HAC-U_INV-4_2022-08	06-Aug-22		Tissue	R	R	R	R	R	1

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☐ NO

Are samples for human drinking water use? ☐ YES ☐ NO

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Ice Packs ☑ Ice Cubes ☐ | Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C	
			6°C (Aug 5)	

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Katharina Batchelar	Date: 11-Aug-22	Time: 12:00	Received by:	Date:	Time:	Received by: JC	Date: AUG 12 2022	Time: 12 pm

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ALS Environmental

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COC Number: 15 -

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Phone:	236-317-4939
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Postal Code:	V0L 1N0
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☐ NO
Company:	
Contact:	

Report Format / Distribution

Select Report Format: ☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)
Quality Control (QC) Report with Report ☑ YES ☐ NO
☐ Compare Results to Criteria on Report - provide details below if box checked
Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax	kala.ivens@mountpolley.com
Email 2	gabriel.holmes@mountpolley.com
Email 3	pstecko@minnow.ca; kbatchelar@minnow.ca

Invoice Distribution

Select Invoice Distribution: ☑ EMAIL ☑ MAIL ☐ FAX

Email 1 or Fax	gabriel.holmes@mountpolley.com
Email 2	

Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply

Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days)		EMERGENCY	
	4 day [P4] ☐		1 Business day [E1] ☐
	3 day [P3] ☐		Same Day, Weekend or Statutory holiday [E0] ☐
	2 day [P2] ☐		

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm

For tests that can not be performed according to the service level selected, you will be contacted.

Project Information

ALS Account # / Quote #:	VA22-MPMC100-002
Job #:	
PO / AFE:	
LSD:	

Oil and Gas Required Fields (client use)

AFE/Cost Center:	PO#
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Lab Work Order # (lab use only)

ALS Contact: Can Dang **Sampler:** KBa

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Moisture Content by Gravimetry (E144)	Mercury in Biota by CVAAS (DRY units, Routine) (E510)	Metals in Biota by CRC ICPMS (DRY units, Routine) (E440)	Silver in Biota by CRC ICPMS (DRY units, Routine) (E440.Ag)	Titanium in Biota by CRC ICPMS (DRY units, Routine) (E440.Ti)	Number of Containers
C1	HAC-U_INV-5_2022-08	05-Aug-22		Tissue	R	R	R	R	R	1
C2	HAC-U_INV-6_2022-08	05-Aug-22		Tissue	R	R	R	R	R	1
C3	HAC-U_INV-7_2022-08	06-Aug-22		Tissue	R	R	R	R	R	1
C4	HAC-U_INV-8_2022-08	05-Aug-22		Tissue	R	R	R	R	R	1
C5	HAC-D_INV-1_2022-08	05-Aug-22		Tissue	R	R	R	R	R	1
C6	HAC-D_INV-2_2022-08	05-Aug-22		Tissue	R	R	R	R	R	1
C7	HAC-D_INV-3_2022-08	05-Aug-22		Tissue	R	R	R	R	R	1
C8	HAC-D_INV-4_2022-08	05-Aug-22		Tissue	R	R	R	R	R	1
C9	HAC-D_INV-5_2022-08	05-Aug-22		Tissue	R	R	R	R	R	1
70	HAC-D_INV-6_2022-08	05-Aug-22		Tissue	R	R	R	R	R	1
71	HAC-D_INV-7_2022-08	05-Aug-22		Tissue	R	R	R	R	R	1
72	HAC-D_INV-8_2022-08	05-Aug-22		Tissue	R	R	R	R	R	1

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☐ NO

Are samples for human drinking water use? ☐ YES ☐ NO

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

If sample is insufficient for regular digestion and analysis, please contact kbatchelar@minnow.ca or pstecko@minnow.ca to discuss analysis options.

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐
Ice Packs ☒ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐
Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C	
			6°C	(avg 5)

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by:	Date:	Time:	Received by:	Date:	Time:	Received by: JR	Date: AUG 12 2022	Time: 12pm
Katharina Batchelar	11-Aug-22	12:00						

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

OCTOBER 2015 FRONT

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1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Affix ALS barcode label here (lab use only)

COC Number: 15 -

Report To	Contact and company name below will appear on the final report
Company:	Mount Polley Mining Corporation
Contact:	Gabriel Holmes
Phone:	236-317-4939
	Company address below will appear on the final report
Street:	PO Box 12
City/Province:	Likely, BC
Postal Code:	V0L 1N0
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☐ NO
Company:	
Contact:	

Report Format / Distribution

Select Report Format: ☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)

Quality Control (QC) Report with Report ☑ YES ☐ NO

☐ Compare Results to Criteria on Report - provide details below if box checked

Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: kala.ivens@mountpolley.com

Email 2: gabriel.holmes@mountpolley.com

Email 3: pstecko@minnow.ca; kbatchelar@minnow.ca

Invoice Distribution

Select Invoice Distribution: ☑ EMAIL ☑ MAIL ☐ FAX

Email 1 or Fax: gabriel.holmes@mountpolley.com

Email 2:

Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply

Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days)		EMERGENCY	
4 day [P4]	☐	1 Business day [E1]	☐
3 day [P3]	☐	Same Day, Weekend or Statutory holiday [E0]	☐
2 day [P2]	☐		

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm

For tests that can not be performed according to the service level selected, you will be contacted.

Project Information

ALS Account # / Quote #: VA22-MPMC100-002

Job #:

PO / AFE:

LSD:

Oil and Gas Required Fields (client use)

AFE/Cost Center: PO#

Major/Minor Code: Routing Code:

Requisitioner:

Location:

ALS Lab Work Order # (lab use only):

ALS Contact: Can Dang

Sampler: KBa

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Moisture Content by Gravimetry (E144)	Mercury in Biota by CVAAS (DRY units, Routine) (E510)	Metals in Biota by CRC ICPMS (DRY units, Routine) (E440)	Silver in Biota by CRC ICPMS (DRY units, Routine) (E440.Ag)	Titanium in Biota by CRC ICPMS (DRY units, Routine) (E440.Ti)	Number of Containers
73	EDC-U_INV-1_2022-08	08-Aug-22		Tissue	R	R	R	R	R	1
74	EDC-U_INV-2_2022-08	07-Aug-22		Tissue	R	R	R	R	R	1
75	EDC-U_INV-3_2022-08	07-Aug-22		Tissue	R	R	R	R	R	1
76	EDC-U_INV-4_2022-08	07-Aug-22		Tissue	R	R	R	R	R	1
77	EDC-U_INV-5_2022-08	07-Aug-22		Tissue	R	R	R	R	R	1
78	EDC-U_INV-6_2022-08	07-Aug-22		Tissue	R	R	R	R	R	1
79	EDC-U_INV-7_2022-08	07-Aug-22		Tissue	R	R	R	R	R	1
80	EDC-U_INV-8_2022-08	07-Aug-22		Tissue	R	R	R	R	R	1
81	EDC-D_INV-1_2022-08	04-Aug-22		Tissue	R	R	R	R	R	1
82	EDC-D_INV-2_2022-08	04-Aug-22		Tissue	R	R	R	R	R	1
83	EDC-D_INV-3_2022-08	03-Aug-22		Tissue	R	R	R	R	R	1
84	EDC-D_INV-4_2022-08	03-Aug-22		Tissue	R	R	R	R	R	1

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☐ NO

Are samples for human drinking water use? ☐ YES ☐ NO

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

If sample is insufficient for regular digestion and analysis, please contact kbatchelar@minnow.ca or pstecko@minnow.ca to discuss analysis options.

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice Packs ☑ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C	
			6°C (avg 5)	

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Katharina Batchelar	Date: 11-Aug-22	Time: 12:00	Received by:	Date:	Time:	Received by: JZ	Date: AUG 12 2022	Time: 12 pm

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

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1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form**.

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Affix ALS barcode label here (lab use only)

COC Number: 15 -

Page 8 of 14

Report To	Contact and company name below will appear on the final report
Company:	Mount Polley Mining Corporation
Contact:	Gabriel Holmes
Phone:	236-317-4939
	Company address below will appear on the final report
Street:	PO Box 12
City/Province:	Likely, BC
Postal Code:	V0L 1N0
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☐ NO
Company:	
Contact:	

Report Format / Distribution	
Select Report Format:	☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)
Quality Control (QC) Report with Report	☑ YES ☐ NO
☐ Compare Results to Criteria on Report - provide details below if box checked	
Select Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	kala.ivens@mountpolley.com
Email 2	gabriel.holmes@mountpolley.com
Email 3	pstecko@minnow.ca; kbatchelar@minnow.ca

Invoice Distribution	
Select Invoice Distribution:	☑ EMAIL ☑ MAIL ☐ FAX
Email 1 or Fax	gabriel.holmes@mountpolley.com
Email 2	

Project Information	
ALS Account # / Quote #:	VA22-MPMC100-002
Job #:	
PO / AFE:	
LSD:	

Oil and Gas Required Fields (client use)	
AFE/Cost Center:	PO#
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Lab Work Order # (lab use only):

ALS Contact: Can Dang

Sampler: KBa

Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply

Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days)			EMERGENCY	
	4 day [P4]	☐	1 Business day [E1]	☐
	3 day [P3]	☐	Same Day, Weekend or Statutory holiday [E0]	☐
	2 day [P2]	☐		

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm

For tests that can not be performed according to the service level selected, you will be contacted.

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Moisture Content by Gravimetry (E144)	Mercury in Biota by CVAAS (DRY units, Routine) (E510)	Metals in Biota by CRC ICPMS (DRY units, Routine) (E440)	Silver in Biota by CRC ICPMS (DRY units, Routine) (E440.Ag)	Titanium in Biota by CRC ICPMS (DRY units, Routine) (E440.Ti)	Number of Containers
85	EDC-D_INV-5_2022-08	03-Aug-22		Tissue	R	R	R	R	R	1
86	EDC-D_INV-6_2022-08	03-Aug-22		Tissue	R	R	R	R	R	1
87	EDC-D_INV-7_2022-08	03-Aug-22		Tissue	R	R	R	R	R	1
88	EDC-D_INV-8_2022-08	03-Aug-22		Tissue	R	R	R	R	R	1
89	E1_INV-1_2022-08	05-Aug-22		Tissue	R	R	R	R	R	1
90	E1_INV-2_2022-08	05-Aug-22		Tissue	R	R	R	R	R	1
91	E1_INV-3_2022-08	05-Aug-22		Tissue	R	R	R	R	R	1
92	E1_INV-4_2022-08	04-Aug-22		Tissue	R	R	R	R	R	1
93	E1_INV-5_2022-08	04-Aug-22		Tissue	R	R	R	R	R	1
94	E1_INV-6_2022-08	04-Aug-22		Tissue	R	R	R	R	R	1
95	E1_INV-7_2022-08	04-Aug-22		Tissue	R	R	R	R	R	1
96	E1_INV-8_2022-08	04-Aug-22		Tissue	R	R	R	R	R	1

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☐ NO

Are samples for human drinking water use? ☐ YES ☐ NO

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

If sample is insufficient for regular digestion and analysis, please contact kbatchelar@minnow.ca or pstecko@minnow.ca to discuss analysis options.

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice Packs ☑ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C
			6°C (avg5)

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by:	Date:	Time:	Received by:	Date:	Time:	Received by:	Date:	Time:
Katharina Batchelar	11-Aug-22	1200				JZ	AUG 12 2022	12 pm

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

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1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form**.

Chain of Custody (COC) / Analytical Request Form

ALS Environmental
www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Affix ALS barcode label here
(lab use only)

COC Number: 15 -

Report To	Contact and company name below will appear on the final report
Company:	Mount Polley Mining Corporation
Contact:	Gabriel Holmes
Phone:	236-317-4939
	Company address below will appear on the final report
Street:	PO Box 12
City/Province:	Likely, BC
Postal Code:	V0L 1N0
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☐ NO
Company:	
Contact:	

Report Format / Distribution	
Select Report Format:	☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)
Quality Control (QC) Report with Report	☑ YES ☐ NO
☐ Compare Results to Criteria on Report - provide details below if box checked	
Select Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	kala.ivens@mountpolley.com
Email 2	gabriel.holmes@mountpolley.com
Email 3	pstecko@minnow.ca; kbatchelar@minnow.ca

Invoice Distribution	
Select Invoice Distribution:	☑ EMAIL ☑ MAIL ☐ FAX
Email 1 or Fax	gabriel.holmes@mountpolley.com
Email 2	

Project Information	
ALS Account # / Quote #:	VA22-MPMC100-002
Job #:	
PO / AFE:	
LSD:	

Oil and Gas Required Fields (client use)	
AFE/Cost Center:	PO#
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Lab Work Order # (lab use only)	ALS Contact: Can Dang	Sampler: KBa

Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply

Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days): 4 day [P4] ☐ | 3 day [P3] ☐ | 2 day [P2] ☐

EMERGENCY: 1 Business day [E1] ☐ | Same Day, Weekend or Statutory holiday [E0] ☐

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm

For tests that can not be performed according to the service level selected, you will be contacted.

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Moisture Content by Gravimetry (E144)	Mercury in Biota by CVAAS (DRY units, Routine) (E510)	Metals in Biota by CRC ICPMS (DRY units, Routine) (E440)	Silver in Biota by CRC ICPMS (DRY units, Routine) (E440.Ag)	Titanium in Biota by CRC ICPMS (DRY units, Routine) (E440.Ti)	Number of Containers
97	HAC-R1_INVCAD-1_2022-08	10-Aug-22		Tissue	R	R	R	R	R	1
98	HAC-R1_INVCAD-2_2022-08	10-Aug-22		Tissue	R	R	R	R	R	1
99	HAC-R1_INVCAD-3_2022-08	10-Aug-22		Tissue	R	R	R	R	R	1
100	HAC-R1_INVCAD-4_2022-08	10-Aug-22		Tissue	R	R	R	R	R	1
101	HAC-R1_INVCAD-5_2022-08	10-Aug-22		Tissue	R	R	R	R	R	1
102	HAC-R1_INVCAD-6_2022-08	10-Aug-22		Tissue	R	R	R	R	R	1
103	HAC-R1_INVCAD-7_2022-08	10-Aug-22		Tissue	R	R	R	R	R	1
104	HAC-R1_INVCAD-8_2022-08	10-Aug-22		Tissue	R	R	R	R	R	1
105	HAC-U_INVCAD-1_2022-08	06-Aug-22		Tissue	R	R	R	R	R	1
106	HAC-U_INVCAD-2_2022-08	06-Aug-22		Tissue	R	R	R	R	R	1
107	HAC-U_INVCAD-3_2022-08	06-Aug-22		Tissue	R	R	R	R	R	1
108	HAC-U_INVCAD-4_2022-08	06-Aug-22		Tissue	R	R	R	R	R	1

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☐ NO

Are samples for human drinking water use? ☐ YES ☐ NO

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

If sample is insufficient for regular digestion and analysis, please contact kbatchelar@minnow.ca or pstecko@minnow.ca to discuss analysis options.

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ | SIF Observations Yes ☐ No ☐

Ice Packs ☑ Ice Cubes ☐ | Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C	
			6°C (Avg 5)	

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by:	Date:	Time:	Received by:	Date:	Time:	Received by:	Date:	Time:
Katharina Batchelar	11-Aug-22	12:00				JC	AUG 12 2022	12pm

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Affix ALS barcode label here
(lab use only)

COC Number: 15 -

Report To	Contact and company name below will appear on the final report
Company:	Mount Polley Mining Corporation
Contact:	Gabriel Holmes
Phone:	236-317-4939
	Company address below will appear on the final report
Street:	PO Box 12
City/Province:	Likely, BC
Postal Code:	V0L 1N0
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☐ NO
Company:	
Contact:	

Report Format / Distribution	
Select Report Format:	☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)
Quality Control (QC) Report with Report	☑ YES ☐ NO
☐ Compare Results to Criteria on Report - provide details below if box checked	
Select Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	kala.ivens@mountpolley.com
Email 2	gabriel.holmes@mountpolley.com
Email 3	pstecko@minnow.ca; kbatchelar@minnow.ca

Invoice Distribution	
Select Invoice Distribution:	☑ EMAIL ☑ MAIL ☐ FAX
Email 1 or Fax	gabriel.holmes@mountpolley.com
Email 2	

Project Information	
ALS Account # / Quote #:	VA22-MPMC100-002
Job #:	
PO / AFE:	
LSD:	

Oil and Gas Required Fields (client use)	
AFE/Cost Center:	PO#
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Lab Work Order # (lab use only):

ALS Contact: Can Dang **Sampler:** KBa

Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply

Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days)		EMERGENCY	
	4 day [P4] ☐		1 Business day [E1] ☐
	3 day [P3] ☐		Same Day, Weekend or Statutory holiday [E0] ☐
	2 day [P2] ☐		

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm

For tests that can not be performed according to the service level selected, you will be contacted.

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Moisture Content by Gravimetry (E144)	Mercury in Biota by CVAAS (DRY units, Routine) (E510)	Metals in Biota by CRC ICPMS (DRY units, Routine) (E440)	Silver in Biota by CRC ICPMS (DRY units, Routine) (E440.Ag)	Titanium in Biota by CRC ICPMS (DRY units, Routine) (E440.Ti)	Number of Containers
107	HAC-U_INVCAD-5_2022-08	05-Aug-22		Tissue	R	R	R	R	R	1
110	HAC-U_INVCAD-6_2022-08	05-Aug-22		Tissue	R	R	R	R	R	1
111	HAC-U_INVCAD-7_2022-08	06-Aug-22		Tissue	R	R	R	R	R	1
112	HAC-U_INVCAD-8_2022-08	05-Aug-22		Tissue	R	R	R	R	R	1
113	HAC-D_INVCAD-1_2022-08	05-Aug-22		Tissue	R	R	R	R	R	1
114	HAC-D_INVCAD-2_2022-08	05-Aug-22		Tissue	R	R	R	R	R	1
115	HAC-D_INVCAD-3_2022-08	05-Aug-22		Tissue	R	R	R	R	R	1
116	HAC-D_INVCAD-4_2022-08	05-Aug-22		Tissue	R	R	R	R	R	1
117	HAC-D_INVCAD-5_2022-08	05-Aug-22		Tissue	R	R	R	R	R	1
118	HAC-D_INVCAD-6_2022-08	05-Aug-22		Tissue	R	R	R	R	R	1
119	HAC-D_INVCAD-7_2022-08	05-Aug-22		Tissue	R	R	R	R	R	1
120	HAC-D_INVCAD-8_2022-08	05-Aug-22		Tissue	R	R	R	R	R	1

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☐ NO

Are samples for human drinking water use? ☐ YES ☐ NO

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

If sample is insufficient for regular digestion and analysis, please contact kbatchelar@minnow.ca or pstecko@minnow.ca to discuss analysis options.

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice Packs ☑ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C
			6°C (avg 5)

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by:	Date:	Time:	Received by:	Date:	Time:	Received by:	Date:	Time:
Katharina Batchelar	11-Aug-22	12:00				JC	AUG 12 2022	12pm

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

OCTOBER 2015 FRONT

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1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form**.

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Affix ALS barcode label here (lab use only)

COC Number: 15 -

Report To	Contact and company name below will appear on the final report
Company:	Mount Polley Mining Corporation
Contact:	Gabriel Holmes
Phone:	236-317-4939
	Company address below will appear on the final report
Street:	PO Box 12
City/Province:	Likely, BC
Postal Code:	V0L 1N0
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☐ NO
Company:	
Contact:	

Report Format / Distribution

Select Report Format: ☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)

Quality Control (QC) Report with Report ☑ YES ☐ NO

☐ Compare Results to Criteria on Report - provide details below if box checked

Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: kala.ivens@mountpolley.com

Email 2: gabriel.holmes@mountpolley.com

Email 3: pstecko@minnow.ca; kbatchelar@minnow.ca

Invoice Distribution

Select Invoice Distribution: ☑ EMAIL ☑ MAIL ☐ FAX

Email 1 or Fax: gabriel.holmes@mountpolley.com

Email 2:

Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply

Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days)			EMERGENCY	
	4 day [P4]	☐	1 Business day [E1]	☐
	3 day [P3]	☐	Same Day, Weekend or Statutory holiday [E0]	☐
	2 day [P2]	☐		

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm

For tests that can not be performed according to the service level selected, you will be contacted.

Project Information		Oil and Gas Required Fields (client use)	
ALS Account # / Quote #:	VA22-MPMC100-002	AFE/Cost Center:	PO#
Job #:		Major/Minor Code:	Routing Code:
PO / AFE:		Requisitioner:	
LSD:		Location:	
ALS Lab Work Order # (lab use only)		ALS Contact: Can Dang	Sampler: KBa

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Moisture Content by Gravimetry (E144)	Mercury in Biota by CVAAS (DRY units, Routine) (E510)	Metals in Biota by CRC ICPMS (DRY units, Routine) (E440)	Silver in Biota by CRC ICPMS (DRY units, Routine) (E440.Ag)	Titanium in Biota by CRC ICPMS (DRY units, Routine) (E440.Ti)	Number of Containers
121	EDC-U_INVCAD-1_2022-08	08-Aug-22		Tissue	R	R	R	R	R	1
122	EDC-U_INVCAD-2_2022-08	07-Aug-22		Tissue	R	R	R	R	R	1
123	EDC-U_INVCAD-3_2022-08	07-Aug-22		Tissue	R	R	R	R	R	1
124	EDC-U_INVCAD-4_2022-08	07-Aug-22		Tissue	R	R	R	R	R	1
125	EDC-U_INVCAD-5_2022-08	07-Aug-22		Tissue	R	R	R	R	R	1
126	EDC-U_INVCAD-6_2022-08	07-Aug-22		Tissue	R	R	R	R	R	1
127	EDC-U_INVCAD-7_2022-08	07-Aug-22		Tissue	R	R	R	R	R	1
128	EDC-U_INVCAD-8_2022-08	07-Aug-22		Tissue	R	R	R	R	R	1
129	EDC-D_INVCAD-1_2022-08	04-Aug-22		Tissue	R	R	R	R	R	1
130	EDC-D_INVCAD-2_2022-08	04-Aug-22		Tissue	R	R	R	R	R	1
131	EDC-D_INVCAD-3_2022-08	03-Aug-22		Tissue	R	R	R	R	R	1
132	EDC-D_INVCAD-4_2022-08	03-Aug-22		Tissue	R	R	R	R	R	1

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☐ NO

Are samples for human drinking water use? ☐ YES ☐ NO

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

If sample is insufficient for regular digestion and analysis, please contact kbatchelar@minnow.ca or pstecko@minnow.ca to discuss analysis options.

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice Packs ☑ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C	
			6°C (avg 5)	

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Katharina Batchelar	Date: 11-Aug-22	Time: 12:00	Received by:	Date:	Time:	Received by: JU	Date: AUG 12 2022	Time: 12 pm

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Contact:	Gabriel Holmes
Phone:	236-317-4939
	Company address below will appear on the final report
Street:	PO Box 12
City/Province:	Likely, BC
Postal Code:	V0L 1N0
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☐ NO
Company:	
Contact:	

Report Format / Distribution

Select Report Format: ☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)

Quality Control (QC) Report with Report ☑ YES ☐ NO

☐ Compare Results to Criteria on Report - provide details below if box checked

Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: kala.ivens@mountpolley.com

Email 2: gabriel.holmes@mountpolley.com

Email 3: pstecko@minnow.ca; kbatchelar@minnow.ca

Invoice Distribution

Select Invoice Distribution: ☑ EMAIL ☑ MAIL ☐ FAX

Email 1 or Fax: gabriel.holmes@mountpolley.com

Email 2:

Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply

Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days): 4 day [P4] ☐ | 3 day [P3] ☐ | 2 day [P2] ☐

EMERGENCY: 1 Business day [E1] ☐ | Same Day, Weekend or Statutory holiday [E0] ☐

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm

For tests that can not be performed according to the service level selected, you will be contacted.

Project Information

ALS Account # / Quote #: VA22-MPMC100-002

Job #:

PO / AFE:

LSD:

Oil and Gas Required Fields (client use)

AFE/Cost Center: | PO#

Major/Minor Code: | Routing Code:

Requisitioner:

Location:

ALS Lab Work Order # (lab use only)

ALS Contact: Can Dang **Sampler:** KBa

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Moisture Content by Gravimetry (E144)	Mercury in Biota by CVAAS (DRY units, Routine) (E510)	Metals in Biota by CRC ICPMS (DRY units, Routine) (E440)	Silver in Biota by CRC ICPMS (DRY units, Routine) (E440.Ag)	Titanium in Biota by CRC ICPMS (DRY units, Routine) (E440.Ti)	Number of Containers
133	EDC-D_INVCAD-5_2022-08	03-Aug-22		Tissue	R	R	R	R	R	1
134	EDC-D_INVCAD-6_2022-08	03-Aug-22		Tissue	R	R	R	R	R	1
135	EDC-D_INVCAD-7_2022-08	03-Aug-22		Tissue	R	R	R	R	R	1
136	EDC-D_INVCAD-8_2022-08	03-Aug-22		Tissue	R	R	R	R	R	1
137	E1_INVCAD-1_2022-08	05-Aug-22		Tissue	R	R	R	R	R	1
138	E1_INVCAD-2_2022-08	05-Aug-22		Tissue	R	R	R	R	R	1
139	E1_INVCAD-3_2022-08	05-Aug-22		Tissue	R	R	R	R	R	1
140	E1_INVCAD-4_2022-08	04-Aug-22		Tissue	R	R	R	R	R	1
141	E1_INVCAD-5_2022-08	04-Aug-22		Tissue	R	R	R	R	R	1
142	E1_INVCAD-6_2022-08	04-Aug-22		Tissue	R	R	R	R	R	1
143	E1_INVCAD-7_2022-08	04-Aug-22		Tissue	R	R	R	R	R	1
144	E1_INVCAD-8_2022-08	04-Aug-22		Tissue	R	R	R	R	R	1

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☐ NO

Are samples for human drinking water use? ☐ YES ☐ NO

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

If sample is insufficient for regular digestion and analysis, please contact kbatchelar@minnow.ca or pstecko@minnow.ca to discuss analysis options.

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ | SIF Observations Yes ☐ No ☐

Ice Packs ☑ Ice Cubes ☐ | Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C
			6°C (avg 5)

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Katharina Batchelar	Date: 11-Aug-22	Time: 12:00	Received by:	Date:	Time:	Received by: JU	Date: AUG 12 2022	Time: 12 pm

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www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Affix ALS barcode label here (lab use only)

COC Number: 15 -

Page 13 of 14

Report To	Contact and company name below will appear on the final report
Company:	Mount Polley Mining Corporation
Contact:	Gabriel Holmes
Phone:	236-317-4939
	Company address below will appear on the final report
Street:	PO Box 12
City/Province:	Likely, BC
Postal Code:	V0L 1N0
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☐ NO
Company:	
Contact:	

Report Format / Distribution	
Select Report Format:	☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)
Quality Control (QC) Report with Report	☑ YES ☐ NO
☐ Compare Results to Criteria on Report - provide details below if box checked	
Select Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	kala.ivens@mountpolley.com
Email 2	gabriel.holmes@mountpolley.com
Email 3	pstecko@minnow.ca; kbatchelar@minnow.ca
Invoice Distribution	
Select Invoice Distribution:	☑ EMAIL ☑ MAIL ☐ FAX
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Email 2	

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PO / AFE:		Requisitioner:	
LSD:		Location:	
ALS Lab Work Order # (lab use only)		ALS Contact: Can Dang	Sampler: KTBa

Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply

Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days)		EMERGENCY	
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Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

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145	HAC-RI_PERT-7X_2022-08	10-Aug-22		Tissue	R	R	R	R	R	1
146	HAC-RI_PERT-8X_2022-08	10-Aug-22		Tissue	R	R	R	R	R	1
147	HAC-D_PERT-7X_2022-08	05-Aug-22		Tissue	R	R	R	R	R	1
148	EI_PERT-5X_2022-08	04-Aug-22		Tissue	R	R	R	R	R	1
149	EI-PERT-7X_2022-08	04-Aug-22		Tissue	R	R	R	R	R	1
150	HAC-RI_INV-7X_2022-08	10-Aug-22		Tissue	R	R	R	R	R	1
151	HAC-RI_INV-8X_2022-08	10-Aug-22		Tissue	R	R	R	R	R	1
152	HAC-D_INV-7X_2022-08	05-Aug-22		Tissue	R	R	R	R	R	1
153	EI_INV-5X_2022-08	04-Aug-22		Tissue	R	R	R	R	R	1
154	EI_INV-7X_2022-08	04-Aug-22		Tissue	R	R	R	R	R	1
155	HAC-RI_INVCAD-7X_2022-08	10-Aug-22		Tissue	R	R	R	R	R	1
156	HAC-RI_INVCAD-8X_2022-08	10-Aug-22		Tissue	R	R	R	R	R	1

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☐ NO

Are samples for human drinking water use? ☐ YES ☐ NO

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

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SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice Packs ☑ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
			6°C (avg	5)	

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Katharina Batchelar	Date: 11-Aug-22	Time: 12:00	Received by:	Date:	Time:	Received by: JL	Date: AUG 12 2022	Time: 12pm

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Contact:	

Report Format / Distribution	
Select Report Format:	☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)
Quality Control (QC) Report with Report	☑ YES ☐ NO
☐ Compare Results to Criteria on Report - provide details below if box checked	
Select Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	kala.ivens@mountpolley.com
Email 2	gabriel.holmes@mountpolley.com
Email 3	pstecko@minnow.ca; kbatchelar@minnow.ca

Invoice Distribution	
Select Invoice Distribution:	☑ EMAIL ☑ MAIL ☐ FAX
Email 1 or Fax	gabriel.holmes@mountpolley.com
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Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply

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ALS Account # / Quote #:	VA22-MPMC100-002	AFE/Cost Center:	PO#
Job #:		Major/Minor Code:	Routing Code:
PO / AFE:		Requisitioner:	
LSD:		Location:	

ALS Lab Work Order # (lab use only):

ALS Contact: Can Dang

Sampler:

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Moisture Content by Gravimetry (E144)	Mercury in Biota by CVAAS (DRY units, Routine) (E510)	Metals in Biota by CRC ICPMS (DRY units, Routine) (E440)	Silver in Biota by CRC ICPMS (DRY units, Routine) (E440.Ag)	Titanium in Biota by CRC ICPMS (DRY units, Routine) (E440.Ti)	Number of Containers
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158	EI_INVCAD-5X_2022-08	04-Aug-22		Tissue	R	R	R	R	R	1
159	EI_INVCAD-7X_2022-08	04-Aug-22		Tissue	R	R	R	R	R	1
				Tissue	R	R	R	R	R	1
				Tissue	R	R	R	R	R	1
				Tissue	R	R	R	R	R	1
				Tissue	R	R	R	R	R	1
				Tissue	R	R	R	R	R	1
				Tissue	R	R	R	R	R	1
				Tissue	R	R	R	R	R	1
				Tissue	R	R	R	R	R	1
				Tissue	R	R	R	R	R	1

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☐ NO

Are samples for human drinking water use? ☐ YES ☐ NO

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

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Ice Packs ☑ Ice Cubes ☐ | Custody seal intact Yes ☐ No ☐

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INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C	
			6°C (ave	5)

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by:	Date:	Time:	Received by:	Date:	Time:	Received by:	Date:	Time:
Katherina Batchelar	11-Aug-22	12:00				JZ	AUG 12 2022	12pm

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1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

FISH TISSUE CHEMISTRY

ALS Laboratory Report VA22B2820

(Finalized December 5, 2022)

ALS Canada Ltd.

right solutions. right partner.

CERTIFICATE OF ANALYSIS

Work Order	: **VA22B2820**	Page	: 1 of 40
Amendment	: **1**		
Client	: **Mount Polley Mining Corporation**	Laboratory	: Vancouver - Environmental
Contact	: Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: ----	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 08-Jun-2022 10:30
PO	: 5590008044 Q2 2022	Date Analysis Commenced	: 08-Jul-2022
C-O-C number	: ----	Issue Date	: 05-Dec-2022 22:21
Sampler	: LBO		
Site	: ----		
Quote number	: VA22-MPMC100-002		
No. of samples received	: 72		
No. of samples analysed	: 72		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Kinny Wu	Lab Analyst	Metals, Burnaby, British Columbia

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances

LOR: Limit of Reporting (detection limit).

Unit	*Description*
%	percent
mg/kg	milligrams per kilogram
mg/kg wwt	milligrams per kilogram wet weight

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Workorder Comments

Amendment (05/12/2023): This report has been amended following changes to the analytical data reported. The quality system is being utilised to resolve this issue. The mercury data for the following samples has been modified: VA22B2820-051, -052, -058 and -064.

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	POL_RB-M-1_2 022-05	POL_RB-M-2_2 022-05	POL_RB-M-3_2 022-05	POL_RB-M-4_2 022-05	POL_RB-M-5_2 022-05
					Client sampling date / time	28-May-2022	29-May-2022	29-May-2022	29-May-2022	29-May-2022
						VA22B2820-001	VA22B2820-002	VA22B2820-003	VA22B2820-004	VA22B2820-005
						Result	Result	Result	Result	Result
Physical Tests										
moisture	----	E144-H	2.0	%		79.7	81.1	82.4	82.0	77.4
Metals										
aluminum	7429-90-5	E472	5.0	mg/kg		<5.0	<5.0	<5.0	5.7	<5.0
antimony	7440-36-0	E472	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	<0.010
arsenic	7440-38-2	E472	0.030	mg/kg		0.040	<0.030	0.044	0.069	0.039
barium	7440-39-3	E472	0.050	mg/kg		0.787	0.582	0.729	1.03	0.790
beryllium	7440-41-7	E472	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	<0.010
bismuth	7440-69-9	E472	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	<0.010
boron	7440-42-8	E472	1.0	mg/kg		<1.0	<1.0	1.0	<1.0	<1.0
cadmium	7440-43-9	E472	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	<0.010
calcium	7440-70-2	E472	20	mg/kg		835	1470	459	628	1020
cesium	7440-46-2	E472	0.0050	mg/kg		0.0698	0.112	0.0654	0.0593	0.0531
chromium	7440-47-3	E472	0.20	mg/kg		<0.20	<0.20	0.32	0.43	0.29
cobalt	7440-48-4	E472	0.020	mg/kg		0.020	0.020	0.028	0.030	<0.020
copper	7440-50-8	E472	0.20	mg/kg		2.64	1.84	3.71	3.48	1.30
iron	7439-89-6	E472	5.0	mg/kg		37.7	48.2	59.3	61.2	32.2
lead	7439-92-1	E472	0.050	mg/kg		<0.050	<0.050	<0.050	<0.050	0.060
lithium	7439-93-2	E472	0.50	mg/kg		<0.50	<0.50	<0.50	<0.50	<0.50
magnesium	7439-95-4	E472	2.0	mg/kg		1410	1300	1270	1430	1290
manganese	7439-96-5	E472	0.050	mg/kg		0.516	1.24	0.771	0.931	0.863
mercury	7439-97-6	E511	0.0050	mg/kg		0.523	0.991	1.01	0.759	0.335
mercury	7439-97-6	E511A	0.0010	mg/kg wwt		0.106	0.188	0.178	0.136	0.0760
molybdenum	7439-98-7	E472	0.040	mg/kg		<0.040	<0.040	<0.040	<0.040	<0.040
nickel	7440-02-0	E472	0.20	mg/kg		<0.20	<0.20	<0.20	0.21	<0.20
phosphorus	7723-14-0	E472	10	mg/kg		12600	15200	14500	14200	12800
potassium	7440-09-7	E472	20	mg/kg		21300	26700	26100	23900	21000
rubidium	7440-17-7	E472	0.050	mg/kg		10.2	18.5	12.1	8.97	8.86
selenium	7782-49-2	E472	0.10	mg/kg		3.65	7.41	4.52	3.72	3.50
silver	7440-22-4	E472.Ag	0.0050	mg/kg		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
sodium	7440-23-5	E472	20	mg/kg		1840	1550	3360	1380	866

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	POL_RB-M-1_2022-05	POL_RB-M-2_2022-05	POL_RB-M-3_2022-05	POL_RB-M-4_2022-05	POL_RB-M-5_2022-05
					Client sampling date / time	28-May-2022	29-May-2022	29-May-2022	29-May-2022	29-May-2022
						VA22B2820-001	VA22B2820-002	VA22B2820-003	VA22B2820-004	VA22B2820-005
						Result	Result	Result	Result	Result
Metals										
strontium	7440-24-6	E472	0.10	mg/kg		1.04	1.71	0.40	0.76	1.43
tellurium	13494-80-9	E472	0.020	mg/kg		<0.020	<0.020	<0.020	<0.020	<0.020
thallium	7440-28-0	E472	0.0020	mg/kg		0.0103	0.0036	0.0078	0.0059	0.0063
tin	7440-31-5	E472	0.10	mg/kg		0.75	0.95	0.67	1.66	0.65
titanium	7440-32-6	E472.Ti	0.50	mg/kg		<0.50	<0.50	<0.50	<0.50	<0.50
uranium	7440-61-1	E472	0.0020	mg/kg		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
vanadium	7440-62-2	E472	0.10	mg/kg		<0.10	<0.10	<0.10	<0.10	<0.10
zinc	7440-66-6	E472	1.0	mg/kg		14.4	21.3	24.6	23.9	20.5
zirconium	7440-67-7	E472	0.20	mg/kg		<0.20	<0.20	0.24	0.43	0.20

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	POL_RB-M-6_2022-05	POL_RB-M-7_2022-05	POL_RB-M-8_2022-05	POL_RB-O-1_2022-05	POL_RB-O-2_2022-05
					Client sampling date / time	29-May-2022	29-May-2022	29-May-2022	28-May-2022	29-May-2022
						VA22B2820-006	VA22B2820-007	VA22B2820-008	VA22B2820-009	VA22B2820-010
						Result	Result	Result	Result	Result
Physical Tests										
moisture	----	E144	0.50	%		----	----	----	72.1	----
moisture	----	E144-H	2.0	%		80.6	79.5	76.9	----	71.1
Metals										
aluminum	7429-90-5	E440	2.0	mg/kg		----	----	----	<2.0	----
aluminum	7429-90-5	E472	5.0	mg/kg		8.5	<5.0	<5.0	----	<5.0
antimony	7440-36-0	E472	0.010	mg/kg		<0.010	<0.010	<0.010	----	<0.010
antimony	7440-36-0	E440	0.010	mg/kg		----	----	----	<0.010	----
arsenic	7440-38-2	E440	0.020	mg/kg		----	----	----	0.035	----
arsenic	7440-38-2	E472	0.030	mg/kg		0.053	0.065	0.032	----	<0.030
barium	7440-39-3	E472	0.050	mg/kg		1.04	0.480	0.557	----	0.704
barium	7440-39-3	E440	0.050	mg/kg		----	----	----	0.524	----
beryllium	7440-41-7	E472	0.010	mg/kg		<0.010	<0.010	<0.010	----	<0.010
beryllium	7440-41-7	E440	0.010	mg/kg		----	----	----	<0.010	----
bismuth	7440-69-9	E472	0.010	mg/kg		<0.010	<0.010	<0.010	----	<0.010
bismuth	7440-69-9	E440	0.010	mg/kg		----	----	----	<0.010	----
boron	7440-42-8	E472	1.0	mg/kg		<1.0	<1.0	<1.0	----	<1.0
boron	7440-42-8	E440	1.0	mg/kg		----	----	----	<1.0	----
cadmium	7440-43-9	E440	0.0050	mg/kg		----	----	----	0.0055	----
cadmium	7440-43-9	E472	0.010	mg/kg		<0.010	<0.010	<0.010	----	<0.010
calcium	7440-70-2	E472	20	mg/kg		432	711	1870	----	886
calcium	7440-70-2	E440	20	mg/kg		----	----	----	1120	----
cesium	7440-46-2	E472	0.0050	mg/kg		0.0715	0.0619	0.0620	----	0.0470
cesium	7440-46-2	E440	0.0050	mg/kg		----	----	----	0.0258	----
chromium	7440-47-3	E440	0.050	mg/kg		----	----	----	<0.050	----
chromium	7440-47-3	E472	0.20	mg/kg		<0.20	0.52	0.23	----	<0.20
cobalt	7440-48-4	E472	0.020	mg/kg		0.020	0.032	0.020	----	0.124
cobalt	7440-48-4	E440	0.020	mg/kg		----	----	----	0.118	----
copper	7440-50-8	E440	0.10	mg/kg		----	----	----	7.25	----
copper	7440-50-8	E472	0.20	mg/kg		1.63	2.67	1.96	----	8.44
iron	7439-89-6	E440	3.0	mg/kg		----	----	----	111	----

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	POL_RB-M-6_2022-05	POL_RB-M-7_2022-05	POL_RB-M-8_2022-05	POL_RB-O-1_2022-05	POL_RB-O-2_2022-05
					Client sampling date / time	29-May-2022	29-May-2022	29-May-2022	28-May-2022	29-May-2022
						VA22B2820-006	VA22B2820-007	VA22B2820-008	VA22B2820-009	VA22B2820-010
						Result	Result	Result	Result	Result
Metals										
iron	7439-89-6	E472	5.0	mg/kg		42.9	54.9	44.9	----	101
lead	7439-92-1	E440	0.020	mg/kg		----	----	----	0.030	----
lead	7439-92-1	E472	0.050	mg/kg		<0.050	<0.050	<0.050	----	<0.050
lithium	7439-93-2	E472	0.50	mg/kg		<0.50	<0.50	<0.50	----	<0.50
lithium	7439-93-2	E440	0.50	mg/kg		----	----	----	<0.50	----
magnesium	7439-95-4	E472	2.0	mg/kg		1580	1350	874	----	1680
magnesium	7439-95-4	E440	2.0	mg/kg		----	----	----	1480	----
manganese	7439-96-5	E472	0.050	mg/kg		1.24	0.761	1.30	----	6.57
manganese	7439-96-5	E440	0.050	mg/kg		----	----	----	3.23	----
mercury	7439-97-6	E511	0.0050	mg/kg		1.05	0.537	0.512	----	0.0499
mercury	7439-97-6	E510	0.0050	mg/kg		----	----	----	0.0358	----
mercury	7439-97-6	E511A	0.0010	mg/kg wwt		0.205	0.110	0.118	----	0.0144
mercury	7439-97-6	E510A	0.0010	mg/kg wwt		----	----	----	0.0100	----
molybdenum	7439-98-7	E440	0.020	mg/kg		----	----	----	0.057	----
molybdenum	7439-98-7	E472	0.040	mg/kg		<0.040	<0.040	<0.040	----	0.099
nickel	7440-02-0	E472	0.20	mg/kg		<0.20	0.26	<0.20	----	<0.20
nickel	7440-02-0	E440	0.20	mg/kg		----	----	----	<0.20	----
phosphorus	7723-14-0	E472	10	mg/kg		14200	12800	11800	----	11800
phosphorus	7723-14-0	E440	10	mg/kg		----	----	----	12000	----
potassium	7440-09-7	E472	20	mg/kg		24700	20900	19600	----	8080
potassium	7440-09-7	E440	20	mg/kg		----	----	----	8670	----
rubidium	7440-17-7	E472	0.050	mg/kg		11.2	10.6	9.43	----	7.14
rubidium	7440-17-7	E440	0.050	mg/kg		----	----	----	4.95	----
selenium	7782-49-2	E440	0.050	mg/kg		----	----	----	7.30	----
selenium	7782-49-2	E472	0.10	mg/kg		5.10	3.89	4.33	----	10.6
silver	7440-22-4	E472.Ag	0.0050	mg/kg		<0.0050	<0.0050	<0.0050	----	<0.0050
silver	7440-22-4	E440.Ag	0.0050	mg/kg		----	----	----	<0.0050	----
sodium	7440-23-5	E472	20	mg/kg		1110	2060	2440	----	3300
sodium	7440-23-5	E440	20	mg/kg		----	----	----	5030	----
strontium	7440-24-6	E440	0.050	mg/kg		----	----	----	3.27	----

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	POL_RB-M-6_2022-05	POL_RB-M-7_2022-05	POL_RB-M-8_2022-05	POL_RB-O-1_2022-05	POL_RB-O-2_2022-05
					Client sampling date / time	29-May-2022	29-May-2022	29-May-2022	28-May-2022	29-May-2022
						VA22B2820-006	VA22B2820-007	VA22B2820-008	VA22B2820-009	VA22B2820-010
						Result	Result	Result	Result	Result
Metals										
strontium	7440-24-6	E472	0.10	mg/kg		0.56	0.82	2.36	----	2.45
tellurium	13494-80-9	E472	0.020	mg/kg		<0.020	<0.020	<0.020	----	<0.020
tellurium	13494-80-9	E440	0.020	mg/kg		----	----	----	<0.020	----
thallium	7440-28-0	E472	0.0020	mg/kg		0.0056	0.0068	0.0036	----	<0.0020
thallium	7440-28-0	E440	0.0020	mg/kg		----	----	----	0.0027	----
tin	7440-31-5	E472	0.10	mg/kg		1.07	0.93	0.59	----	0.48
tin	7440-31-5	E440	0.10	mg/kg		----	----	----	0.32	----
titanium	7440-32-6	E440.Ti	0.25	mg/kg		----	----	----	<0.25	----
titanium	7440-32-6	E472.Ti	0.50	mg/kg		0.55	<0.50	<0.50	----	<0.50
uranium	7440-61-1	E472	0.0020	mg/kg		<0.0020	<0.0020	<0.0020	----	0.0044
uranium	7440-61-1	E440	0.0020	mg/kg		----	----	----	<0.0020	----
vanadium	7440-62-2	E472	0.10	mg/kg		<0.10	<0.10	<0.10	----	0.23
vanadium	7440-62-2	E440	0.10	mg/kg		----	----	----	<0.10	----
zinc	7440-66-6	E440	0.50	mg/kg		----	----	----	103	----
zinc	7440-66-6	E472	1.0	mg/kg		22.3	24.3	19.4	----	82.5
zirconium	7440-67-7	E472	0.20	mg/kg		<0.20	0.38	<0.20	----	<0.20
zirconium	7440-67-7	E440	0.20	mg/kg		----	----	----	<0.20	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	POL_RB-O-3_2022-05	POL_RB-O-4_2022-05	POL_RB-O-5_2022-05	POL_RB-O-6_2022-05	POL_RB-O-7_2022-05
					Client sampling date / time	29-May-2022	29-May-2022	29-May-2022	29-May-2022	29-May-2022
						VA22B2820-011	VA22B2820-012	VA22B2820-013	VA22B2820-014	VA22B2820-015
						Result	Result	Result	Result	Result
Physical Tests										
moisture	----	E144	0.50	%		88.6	----	----	68.6	66.5
moisture	----	E144-H	2.0	%		----	65.9	73.0	----	----
Metals										
aluminum	7429-90-5	E440	2.0	mg/kg		18.1	----	----	<2.0	<2.0
aluminum	7429-90-5	E472	5.0	mg/kg		----	<5.0	12.8	----	----
antimony	7440-36-0	E472	0.010	mg/kg		----	<0.010	<0.010	----	----
antimony	7440-36-0	E440	0.010	mg/kg		<0.010	----	----	<0.010	<0.010
arsenic	7440-38-2	E440	0.020	mg/kg		0.078	----	----	0.060	0.042
arsenic	7440-38-2	E472	0.030	mg/kg		----	0.034	0.092	----	----
barium	7440-39-3	E472	0.050	mg/kg		----	0.631	0.338	----	----
barium	7440-39-3	E440	0.050	mg/kg		1.23	----	----	0.525	0.265
beryllium	7440-41-7	E472	0.010	mg/kg		----	<0.010	<0.010	----	----
beryllium	7440-41-7	E440	0.010	mg/kg		<0.010	----	----	<0.010	<0.010
bismuth	7440-69-9	E472	0.010	mg/kg		----	<0.010	<0.010	----	----
bismuth	7440-69-9	E440	0.010	mg/kg		<0.010	----	----	<0.010	<0.010
boron	7440-42-8	E472	1.0	mg/kg		----	<1.0	<1.0	----	----
boron	7440-42-8	E440	1.0	mg/kg		<1.0	----	----	<1.0	<1.0
cadmium	7440-43-9	E440	0.0050	mg/kg		0.0106	----	----	0.0076	<0.0050
cadmium	7440-43-9	E472	0.010	mg/kg		----	<0.010	0.024	----	----
calcium	7440-70-2	E472	20	mg/kg		----	1210	756	----	----
calcium	7440-70-2	E440	20	mg/kg		1070	----	----	1270	1150
cesium	7440-46-2	E472	0.0050	mg/kg		----	0.0143	0.0429	----	----
cesium	7440-46-2	E440	0.0050	mg/kg		0.0317	----	----	0.0191	0.0228
chromium	7440-47-3	E440	0.050	mg/kg		0.629	----	----	<0.050	0.055
chromium	7440-47-3	E472	0.20	mg/kg		----	<0.20	<0.20	----	----
cobalt	7440-48-4	E472	0.020	mg/kg		----	0.073	0.168	----	----
cobalt	7440-48-4	E440	0.020	mg/kg		0.175	----	----	0.115	0.110
copper	7440-50-8	E440	0.10	mg/kg		8.47	----	----	8.25	8.28
copper	7440-50-8	E472	0.20	mg/kg		----	6.62	17.5	----	----
iron	7439-89-6	E440	3.0	mg/kg		305	----	----	86.1	64.1

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	POL_RB-O-3_2022-05	POL_RB-O-4_2022-05	POL_RB-O-5_2022-05	POL_RB-O-6_2022-05	POL_RB-O-7_2022-05
					Client sampling date / time	29-May-2022	29-May-2022	29-May-2022	29-May-2022	29-May-2022
						VA22B2820-011	VA22B2820-012	VA22B2820-013	VA22B2820-014	VA22B2820-015
						Result	Result	Result	Result	Result
Metals										
iron	7439-89-6	E472	5.0	mg/kg		----	76.2	303	----	----
lead	7439-92-1	E440	0.020	mg/kg		0.032	----	----	<0.020	<0.020
lead	7439-92-1	E472	0.050	mg/kg		----	<0.050	<0.050	----	----
lithium	7439-93-2	E472	0.50	mg/kg		----	<0.50	<0.50	----	----
lithium	7439-93-2	E440	0.50	mg/kg		<0.50	----	----	<0.50	<0.50
magnesium	7439-95-4	E472	2.0	mg/kg		----	1400	735	----	----
magnesium	7439-95-4	E440	2.0	mg/kg		1030	----	----	1720	1520
manganese	7439-96-5	E472	0.050	mg/kg		----	4.23	22.8	----	----
manganese	7439-96-5	E440	0.050	mg/kg		4.63	----	----	4.54	3.09
mercury	7439-97-6	E511	0.0050	mg/kg		----	0.0224	0.0685	----	----
mercury	7439-97-6	E510	0.0050	mg/kg		0.247	----	----	0.0654	0.0130
mercury	7439-97-6	E511A	0.0010	mg/kg wwt		----	0.0076	0.0185	----	----
mercury	7439-97-6	E510A	0.0010	mg/kg wwt		0.0282	----	----	0.0205	0.0044
molybdenum	7439-98-7	E440	0.020	mg/kg		0.105	----	----	0.060	0.050
molybdenum	7439-98-7	E472	0.040	mg/kg		----	0.056	0.084	----	----
nickel	7440-02-0	E472	0.20	mg/kg		----	<0.20	<0.20	----	----
nickel	7440-02-0	E440	0.20	mg/kg		0.30	----	----	<0.20	<0.20
phosphorus	7723-14-0	E472	10	mg/kg		----	11300	11400	----	----
phosphorus	7723-14-0	E440	10	mg/kg		10600	----	----	12500	12200
potassium	7440-09-7	E472	20	mg/kg		----	7560	13700	----	----
potassium	7440-09-7	E440	20	mg/kg		10400	----	----	8170	7660
rubidium	7440-17-7	E472	0.050	mg/kg		----	3.28	8.15	----	----
rubidium	7440-17-7	E440	0.050	mg/kg		5.45	----	----	4.54	4.60
selenium	7782-49-2	E440	0.050	mg/kg		6.95	----	----	8.05	7.64
selenium	7782-49-2	E472	0.10	mg/kg		----	6.49	11.1	----	----
silver	7440-22-4	E472.Ag	0.0050	mg/kg		----	<0.0050	<0.0050	----	----
silver	7440-22-4	E440.Ag	0.0050	mg/kg		0.0051	----	----	0.0064	<0.0050
sodium	7440-23-5	E472	20	mg/kg		----	2350	3120	----	----
sodium	7440-23-5	E440	20	mg/kg		23700	----	----	3270	3150
strontium	7440-24-6	E440	0.050	mg/kg		2.36	----	----	3.27	3.10

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	POL_RB-O-3_2022-05	POL_RB-O-4_2022-05	POL_RB-O-5_2022-05	POL_RB-O-6_2022-05	POL_RB-O-7_2022-05
					Client sampling date / time	29-May-2022	29-May-2022	29-May-2022	29-May-2022	29-May-2022
						VA22B2820-011	VA22B2820-012	VA22B2820-013	VA22B2820-014	VA22B2820-015
						Result	Result	Result	Result	Result
Metals										
strontium	7440-24-6	E472	0.10	mg/kg		----	3.50	1.28	----	----
tellurium	13494-80-9	E472	0.020	mg/kg		----	<0.020	<0.020	----	----
tellurium	13494-80-9	E440	0.020	mg/kg		<0.020	----	----	<0.020	<0.020
thallium	7440-28-0	E472	0.0020	mg/kg		----	<0.0020	0.0111	----	----
thallium	7440-28-0	E440	0.0020	mg/kg		0.0040	----	----	<0.0020	<0.0020
tin	7440-31-5	E472	0.10	mg/kg		----	0.37	0.10	----	----
tin	7440-31-5	E440	0.10	mg/kg		1.33	----	----	0.28	0.12
titanium	7440-32-6	E440.Ti	0.25	mg/kg		1.48	----	----	<0.25	<0.25
titanium	7440-32-6	E472.Ti	0.50	mg/kg		----	<0.50	1.01	----	----
uranium	7440-61-1	E472	0.0020	mg/kg		----	<0.0020	0.0025	----	----
uranium	7440-61-1	E440	0.0020	mg/kg		0.0048	----	----	0.0026	<0.0020
vanadium	7440-62-2	E472	0.10	mg/kg		----	<0.10	0.16	----	----
vanadium	7440-62-2	E440	0.10	mg/kg		0.32	----	----	<0.10	<0.10
zinc	7440-66-6	E440	0.50	mg/kg		184	----	----	77.1	66.2
zinc	7440-66-6	E472	1.0	mg/kg		----	85.9	250	----	----
zirconium	7440-67-7	E472	0.20	mg/kg		----	<0.20	<0.20	----	----
zirconium	7440-67-7	E440	0.20	mg/kg		0.55	----	----	<0.20	<0.20

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	POL_RB-O-8_2022-05	POL_RB-Li-1_2022-05	POL_RB-Li-2_2022-05	POL_RB-Li-3_2022-05	POL_RB-Li-4_2022-05
					Client sampling date / time	29-May-2022	28-May-2022	29-May-2022	29-May-2022	29-May-2022
						VA22B2820-016	VA22B2820-017	VA22B2820-018	VA22B2820-019	VA22B2820-020
						Result	Result	Result	Result	Result
Physical Tests										
moisture	----	E144	0.50	%		64.2	----	----	----	----
moisture	----	E144-H	2.0	%		----	80.7	78.7	77.6	75.6
Metals										
aluminum	7429-90-5	E440	2.0	mg/kg		<2.0	----	----	----	----
aluminum	7429-90-5	E472	5.0	mg/kg		----	<5.0	8.8	<5.0	<5.0
antimony	7440-36-0	E472	0.010	mg/kg		----	<0.010	<0.010	<0.010	<0.010
antimony	7440-36-0	E440	0.010	mg/kg		<0.010	----	----	----	----
arsenic	7440-38-2	E440	0.020	mg/kg		0.028	----	----	----	----
arsenic	7440-38-2	E472	0.030	mg/kg		----	0.061	0.053	0.074	0.075
barium	7440-39-3	E472	0.050	mg/kg		----	0.663	0.762	0.785	0.786
barium	7440-39-3	E440	0.050	mg/kg		0.261	----	----	----	----
beryllium	7440-41-7	E472	0.010	mg/kg		----	<0.010	<0.010	<0.010	<0.010
beryllium	7440-41-7	E440	0.010	mg/kg		<0.010	----	----	----	----
bismuth	7440-69-9	E472	0.010	mg/kg		----	<0.010	<0.010	<0.010	<0.010
bismuth	7440-69-9	E440	0.010	mg/kg		<0.010	----	----	----	----
boron	7440-42-8	E472	1.0	mg/kg		----	<1.0	<1.0	<1.0	<1.0
boron	7440-42-8	E440	1.0	mg/kg		<1.0	----	----	----	----
cadmium	7440-43-9	E440	0.0050	mg/kg		<0.0050	----	----	----	----
cadmium	7440-43-9	E472	0.010	mg/kg		----	0.181	0.212	0.131	0.109
calcium	7440-70-2	E472	20	mg/kg		----	410	335	290	337
calcium	7440-70-2	E440	20	mg/kg		1140	----	----	----	----
cesium	7440-46-2	E472	0.0050	mg/kg		----	0.0561	0.0828	0.0549	0.0432
cesium	7440-46-2	E440	0.0050	mg/kg		0.0170	----	----	----	----
chromium	7440-47-3	E440	0.050	mg/kg		<0.050	----	----	----	----
chromium	7440-47-3	E472	0.20	mg/kg		----	0.28	0.27	<0.20	0.32
cobalt	7440-48-4	E472	0.020	mg/kg		----	0.137	0.181	0.104	0.120
cobalt	7440-48-4	E440	0.020	mg/kg		0.066	----	----	----	----
copper	7440-50-8	E440	0.10	mg/kg		8.29	----	----	----	----
copper	7440-50-8	E472	0.20	mg/kg		----	31.7	198	132	18.2
iron	7439-89-6	E440	3.0	mg/kg		56.6	----	----	----	----

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	POL_RB-O-8_2022-05	POL_RB-Li-1_2022-05	POL_RB-Li-2_2022-05	POL_RB-Li-3_2022-05	POL_RB-Li-4_2022-05
					Client sampling date / time	29-May-2022	28-May-2022	29-May-2022	29-May-2022	29-May-2022
						VA22B2820-016	VA22B2820-017	VA22B2820-018	VA22B2820-019	VA22B2820-020
						Result	Result	Result	Result	Result
Metals										
iron	7439-89-6	E472	5.0	mg/kg		----	2200	2200	2030	1880
lead	7439-92-1	E440	0.020	mg/kg		<0.020	----	----	----	----
lead	7439-92-1	E472	0.050	mg/kg		----	0.053	<0.050	<0.050	<0.050
lithium	7439-93-2	E472	0.50	mg/kg		----	<0.50	<0.50	<0.50	<0.50
lithium	7439-93-2	E440	0.50	mg/kg		<0.50	----	----	----	----
magnesium	7439-95-4	E472	2.0	mg/kg		----	660	1050	868	859
magnesium	7439-95-4	E440	2.0	mg/kg		1710	----	----	----	----
manganese	7439-96-5	E472	0.050	mg/kg		----	5.89	8.10	11.3	12.3
manganese	7439-96-5	E440	0.050	mg/kg		3.57	----	----	----	----
mercury	7439-97-6	E511	0.0050	mg/kg		----	0.498	0.653	0.909	0.536
mercury	7439-97-6	E510	0.0050	mg/kg		0.0113	----	----	----	----
mercury	7439-97-6	E511A	0.0010	mg/kg wwt		----	0.0963	0.139	0.203	0.130
mercury	7439-97-6	E510A	0.0010	mg/kg wwt		0.0040	----	----	----	----
molybdenum	7439-98-7	E440	0.020	mg/kg		0.040	----	----	----	----
molybdenum	7439-98-7	E472	0.040	mg/kg		----	0.941	1.14	1.42	0.934
nickel	7440-02-0	E472	0.20	mg/kg		----	<0.20	<0.20	<0.20	0.39
nickel	7440-02-0	E440	0.20	mg/kg		<0.20	----	----	----	----
phosphorus	7723-14-0	E472	10	mg/kg		----	14300	17300	15000	14600
phosphorus	7723-14-0	E440	10	mg/kg		12100	----	----	----	----
potassium	7440-09-7	E472	20	mg/kg		----	12400	14100	13300	11600
potassium	7440-09-7	E440	20	mg/kg		7780	----	----	----	----
rubidium	7440-17-7	E472	0.050	mg/kg		----	7.69	14.7	11.2	7.21
rubidium	7440-17-7	E440	0.050	mg/kg		4.31	----	----	----	----
selenium	7782-49-2	E440	0.050	mg/kg		8.03	----	----	----	----
selenium	7782-49-2	E472	0.10	mg/kg		----	14.8	34.8	31.6	15.6
silver	7440-22-4	E472.Ag	0.0050	mg/kg		----	0.0725	0.184	0.623	0.0492
silver	7440-22-4	E440.Ag	0.0050	mg/kg		<0.0050	----	----	----	----
sodium	7440-23-5	E472	20	mg/kg		----	9130	4070	6510	3780
sodium	7440-23-5	E440	20	mg/kg		2630	----	----	----	----
strontium	7440-24-6	E440	0.050	mg/kg		3.59	----	----	----	----

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	POL_RB-O-8_2022-05	POL_RB-Li-1_2022-05	POL_RB-Li-2_2022-05	POL_RB-Li-3_2022-05	POL_RB-Li-4_2022-05
					Client sampling date / time	29-May-2022	28-May-2022	29-May-2022	29-May-2022	29-May-2022
						VA22B2820-016	VA22B2820-017	VA22B2820-018	VA22B2820-019	VA22B2820-020
						Result	Result	Result	Result	Result
Metals										
strontium	7440-24-6	E472	0.10	mg/kg		----	0.78	0.53	0.48	0.50
tellurium	13494-80-9	E472	0.020	mg/kg		----	<0.020	<0.020	<0.020	<0.020
tellurium	13494-80-9	E440	0.020	mg/kg		<0.020	----	----	----	----
thallium	7440-28-0	E472	0.0020	mg/kg		----	0.142	0.0494	0.0851	0.0751
thallium	7440-28-0	E440	0.0020	mg/kg		<0.0020	----	----	----	----
tin	7440-31-5	E472	0.10	mg/kg		----	1.18	1.08	1.60	1.89
tin	7440-31-5	E440	0.10	mg/kg		<0.10	----	----	----	----
titanium	7440-32-6	E440.Ti	0.25	mg/kg		<0.25	----	----	----	----
titanium	7440-32-6	E472.Ti	0.50	mg/kg		----	<0.50	<0.50	<0.50	<0.50
uranium	7440-61-1	E472	0.0020	mg/kg		----	0.0024	0.0189	0.0084	0.0027
uranium	7440-61-1	E440	0.0020	mg/kg		<0.0020	----	----	----	----
vanadium	7440-62-2	E472	0.10	mg/kg		----	0.36	1.76	0.97	0.40
vanadium	7440-62-2	E440	0.10	mg/kg		<0.10	----	----	----	----
zinc	7440-66-6	E440	0.50	mg/kg		67.8	----	----	----	----
zinc	7440-66-6	E472	1.0	mg/kg		----	189	263	202	178
zirconium	7440-67-7	E472	0.20	mg/kg		----	0.28	0.30	0.24	0.30
zirconium	7440-67-7	E440	0.20	mg/kg		<0.20	----	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	POL_RB-Li-5_2022-05	POL_RB-Li-6_2022-05	POL_RB-Li-7_2022-05	POL_RB-Li-8_2022-05	POL_RB-Ki-1_2022-05
					Client sampling date / time	29-May-2022	29-May-2022	29-May-2022	29-May-2022	28-May-2022
						VA22B2820-021	VA22B2820-022	VA22B2820-023	VA22B2820-024	VA22B2820-025
						Result	Result	Result	Result	Result
Physical Tests										
moisture	----	E144-H	2.0	%		74.3	76.7	81.0	80.8	79.8
Metals										
aluminum	7429-90-5	E472	5.0	mg/kg		6.7	25.4	<5.0	<5.0	10.0
antimony	7440-36-0	E472	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	<0.010
arsenic	7440-38-2	E472	0.030	mg/kg		0.098	0.139	0.074	0.060	0.662
barium	7440-39-3	E472	0.050	mg/kg		1.37	1.57	1.30	1.08	0.320
beryllium	7440-41-7	E472	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	<0.010
bismuth	7440-69-9	E472	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	<0.010
boron	7440-42-8	E472	1.0	mg/kg		1.2	1.4	<1.0	<1.0	<1.0
cadmium	7440-43-9	E472	0.010	mg/kg		0.200	0.248	0.204	0.193	0.847
calcium	7440-70-2	E472	20	mg/kg		528	469	424	394	638
cesium	7440-46-2	E472	0.0050	mg/kg		0.0292	0.0574	0.0618	0.0396	0.0438
chromium	7440-47-3	E472	0.20	mg/kg		0.37	0.24	0.24	<0.20	0.29
cobalt	7440-48-4	E472	0.020	mg/kg		0.126	0.145	0.218	0.183	2.35
copper	7440-50-8	E472	0.20	mg/kg		115	153	59.8	28.2	8.16
iron	7439-89-6	E472	5.0	mg/kg		1470	1990	2300	2040	788
lead	7439-92-1	E472	0.050	mg/kg		<0.050	<0.050	<0.050	<0.050	0.078
lithium	7439-93-2	E472	0.50	mg/kg		<0.50	<0.50	<0.50	<0.50	<0.50
magnesium	7439-95-4	E472	2.0	mg/kg		892	856	690	705	661
manganese	7439-96-5	E472	0.050	mg/kg		7.86	12.2	12.8	6.96	3.40
mercury	7439-97-6	E511	0.0050	mg/kg		0.198	1.07	0.435	0.435	0.405
mercury	7439-97-6	E511A	0.0010	mg/kg wwt		0.0509	0.249	0.0826	0.0836	0.0818
molybdenum	7439-98-7	E472	0.040	mg/kg		1.17	1.30	1.08	1.15	0.499
nickel	7440-02-0	E472	0.20	mg/kg		0.21	<0.20	<0.20	<0.20	0.45
phosphorus	7723-14-0	E472	10	mg/kg		16500	14900	13800	14300	10900
potassium	7440-09-7	E472	20	mg/kg		13300	12000	13300	12500	10800
rubidium	7440-17-7	E472	0.050	mg/kg		10.7	8.54	9.18	6.95	6.24
selenium	7782-49-2	E472	0.10	mg/kg		45.9	38.9	23.6	18.3	13.8
silver	7440-22-4	E472.Ag	0.0050	mg/kg		0.360	0.599	0.263	0.168	<0.0050
sodium	7440-23-5	E472	20	mg/kg		3440	4940	9300	9420	8850

Analytical Results

Sub-Matrix: Tissue (Matrix: Biota)					Client sample ID	POL_RB-Li-5_2022-05	POL_RB-Li-6_2022-05	POL_RB-Li-7_2022-05	POL_RB-Li-8_2022-05	POL_RB-Ki-1_2022-05
					Client sampling date / time	29-May-2022	29-May-2022	29-May-2022	29-May-2022	28-May-2022
Analyte	CAS Number	Method	LOR	Unit		VA22B2820-021	VA22B2820-022	VA22B2820-023	VA22B2820-024	VA22B2820-025
						Result	Result	Result	Result	Result
Metals										
strontium	7440-24-6	E472	0.10	mg/kg		0.99	0.74	0.71	0.65	2.26
tellurium	13494-80-9	E472	0.020	mg/kg		<0.020	<0.020	<0.020	<0.020	<0.020
thallium	7440-28-0	E472	0.0020	mg/kg		0.0391	0.0337	0.105	0.0916	0.0780
tin	7440-31-5	E472	0.10	mg/kg		1.58	1.29	1.46	1.69	<0.10
titanium	7440-32-6	E472.Ti	0.50	mg/kg		<0.50	1.67	<0.50	<0.50	0.68
uranium	7440-61-1	E472	0.0020	mg/kg		0.0034	0.0127	0.0062	0.0101	0.0042
vanadium	7440-62-2	E472	0.10	mg/kg		0.19	0.98	0.36	0.77	0.50
zinc	7440-66-6	E472	1.0	mg/kg		124	183	205	151	195
zirconium	7440-67-7	E472	0.20	mg/kg		0.25	0.25	0.31	0.34	<0.20

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	POL_RB-Ki-2_2022-05	POL_RB-Ki-3_2022-05	POL_RB-Ki-4_2022-05	POL_RB-Ki-5_2022-05	POL_RB-Ki-6_2022-05
					Client sampling date / time	29-May-2022	29-May-2022	29-May-2022	29-May-2022	29-May-2022
						VA22B2820-026	VA22B2820-027	VA22B2820-028	VA22B2820-029	VA22B2820-030
						Result	Result	Result	Result	Result
Physical Tests										
moisture	----	E144-H	2.0	%		80.2	81.8	81.1	77.9	80.8
Metals										
aluminum	7429-90-5	E472	5.0	mg/kg		41.4	6.2	6.5	5.0	12.3
antimony	7440-36-0	E472	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	<0.010
arsenic	7440-38-2	E472	0.030	mg/kg		0.288	0.460	0.405	0.320	0.762
barium	7440-39-3	E472	0.050	mg/kg		2.55	1.35	0.253	1.46	2.22
beryllium	7440-41-7	E472	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	<0.010
bismuth	7440-69-9	E472	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	<0.010
boron	7440-42-8	E472	1.0	mg/kg		<1.0	<1.0	<1.0	1.5	<1.0
cadmium	7440-43-9	E472	0.010	mg/kg		0.307	0.894	0.819	0.588	0.761
calcium	7440-70-2	E472	20	mg/kg		20500	542	490	587	638
cesium	7440-46-2	E472	0.0050	mg/kg		0.0963	0.0417	0.0384	0.0349	0.0548
chromium	7440-47-3	E472	0.20	mg/kg		1.13	0.27	0.58	0.21	0.26
cobalt	7440-48-4	E472	0.020	mg/kg		1.80	1.82	0.999	2.76	1.34
copper	7440-50-8	E472	0.20	mg/kg		15.3	8.92	9.23	6.07	9.49
iron	7439-89-6	E472	5.0	mg/kg		742	1010	786	866	1030
lead	7439-92-1	E472	0.050	mg/kg		<0.050	<0.050	<0.050	<0.050	<0.050
lithium	7439-93-2	E472	0.50	mg/kg		<0.50	<0.50	<0.50	<0.50	<0.50
magnesium	7439-95-4	E472	2.0	mg/kg		1160	765	864	817	718
manganese	7439-96-5	E472	0.050	mg/kg		17.6	5.59	5.14	3.41	12.8
mercury	7439-97-6	E511	0.0050	mg/kg		0.517	0.871	0.609	0.229	1.19
mercury	7439-97-6	E511A	0.0010	mg/kg wwt		0.102	0.158	0.115	0.0505	0.230
molybdenum	7439-98-7	E472	0.040	mg/kg		0.538	0.432	0.445	0.434	0.586
nickel	7440-02-0	E472	0.20	mg/kg		0.97	0.33	0.45	0.64	0.47
phosphorus	7723-14-0	E472	10	mg/kg		27100	14100	14300	12300	13900
potassium	7440-09-7	E472	20	mg/kg		15200	13600	12800	12600	13200
rubidium	7440-17-7	E472	0.050	mg/kg		13.2	7.17	6.13	7.18	8.03
selenium	7782-49-2	E472	0.10	mg/kg		15.5	13.3	10.3	10.2	16.1
silver	7440-22-4	E472.Ag	0.0050	mg/kg		0.0053	0.0143	0.0059	<0.0050	0.0074
sodium	7440-23-5	E472	20	mg/kg		6530	9050	6980	4530	7130

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	POL_RB-Ki-2_2022-05	POL_RB-Ki-3_2022-05	POL_RB-Ki-4_2022-05	POL_RB-Ki-5_2022-05	POL_RB-Ki-6_2022-05
					Client sampling date / time	29-May-2022	29-May-2022	29-May-2022	29-May-2022	29-May-2022
						VA22B2820-026	VA22B2820-027	VA22B2820-028	VA22B2820-029	VA22B2820-030
						Result	Result	Result	Result	Result
Metals										
strontium	7440-24-6	E472	0.10	mg/kg		42.2	1.51	1.21	1.84	1.80
tellurium	13494-80-9	E472	0.020	mg/kg		<0.020	<0.020	<0.020	<0.020	<0.020
thallium	7440-28-0	E472	0.0020	mg/kg		0.0210	0.0385	0.0464	0.0556	0.0378
tin	7440-31-5	E472	0.10	mg/kg		<0.10	2.69	<0.10	2.65	1.43
titanium	7440-32-6	E472.Ti	0.50	mg/kg		3.46	<0.50	0.58	<0.50	0.97
uranium	7440-61-1	E472	0.0020	mg/kg		0.0328	0.0101	0.0036	0.0050	0.0174
vanadium	7440-62-2	E472	0.10	mg/kg		2.47	0.84	0.45	0.33	0.92
zinc	7440-66-6	E472	1.0	mg/kg		361	266	265	174	214
zirconium	7440-67-7	E472	0.20	mg/kg		<0.20	0.30	<0.20	0.20	0.24

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	POL_RB-Ki-7_2022-05	POL_RB-Ki-8_2022-05	BOL_RB-M-1_2022-05	BOL_RB-M-2_2022-05	BOL_RB-M-3_2022-05
					Client sampling date / time	29-May-2022	29-May-2022	30-May-2022	30-May-2022	30-May-2022
						VA22B2820-031	VA22B2820-032	VA22B2820-033	VA22B2820-034	VA22B2820-035
						Result	Result	Result	Result	Result
Physical Tests										
moisture	----	E144-H	2.0	%		83.3	78.3	82.7	77.9	77.3
Metals										
aluminum	7429-90-5	E472	5.0	mg/kg		6.6	7.8	<5.0	<5.0	<5.0
antimony	7440-36-0	E472	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	<0.010
arsenic	7440-38-2	E472	0.030	mg/kg		0.400	0.555	<0.030	<0.030	<0.030
barium	7440-39-3	E472	0.050	mg/kg		1.21	0.375	1.00	0.508	0.630
beryllium	7440-41-7	E472	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	<0.010
bismuth	7440-69-9	E472	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	<0.010
boron	7440-42-8	E472	1.0	mg/kg		<1.0	<1.0	<1.0	<1.0	<1.0
cadmium	7440-43-9	E472	0.010	mg/kg		0.496	0.824	<0.010	<0.010	<0.010
calcium	7440-70-2	E472	20	mg/kg		623	926	564	477	988
cesium	7440-46-2	E472	0.0050	mg/kg		0.0568	0.0452	0.0665	0.0413	0.0624
chromium	7440-47-3	E472	0.20	mg/kg		0.31	0.20	0.25	<0.20	<0.20
cobalt	7440-48-4	E472	0.020	mg/kg		1.97	0.754	<0.020	<0.020	<0.020
copper	7440-50-8	E472	0.20	mg/kg		4.75	7.45	1.97	1.53	2.39
iron	7439-89-6	E472	5.0	mg/kg		1250	962	49.2	43.7	21.0
lead	7439-92-1	E472	0.050	mg/kg		<0.050	<0.050	<0.050	<0.050	<0.050
lithium	7439-93-2	E472	0.50	mg/kg		<0.50	<0.50	<0.50	<0.50	<0.50
magnesium	7439-95-4	E472	2.0	mg/kg		611	688	1400	958	1310
manganese	7439-96-5	E472	0.050	mg/kg		2.02	4.18	0.799	0.525	0.798
mercury	7439-97-6	E511	0.0050	mg/kg		0.553	0.545	0.584	0.734	0.359
mercury	7439-97-6	E511A	0.0010	mg/kg wwt		0.0921	0.118	0.101	0.162	0.0814
molybdenum	7439-98-7	E472	0.040	mg/kg		0.272	0.517	<0.040	<0.040	<0.040
nickel	7440-02-0	E472	0.20	mg/kg		0.39	0.33	<0.20	<0.20	<0.20
phosphorus	7723-14-0	E472	10	mg/kg		11700	11600	14700	11200	12100
potassium	7440-09-7	E472	20	mg/kg		13800	11800	23200	18500	20000
rubidium	7440-17-7	E472	0.050	mg/kg		8.72	7.30	12.8	8.15	11.8
selenium	7782-49-2	E472	0.10	mg/kg		11.8	14.4	2.05	2.11	2.53
silver	7440-22-4	E472.Ag	0.0050	mg/kg		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
sodium	7440-23-5	E472	20	mg/kg		13800	7970	3230	2020	1430

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	POL_RB-Ki-7_2022-05	POL_RB-Ki-8_2022-05	BOL_RB-M-1_2022-05	BOL_RB-M-2_2022-05	BOL_RB-M-3_2022-05
					Client sampling date / time	29-May-2022	29-May-2022	30-May-2022	30-May-2022	30-May-2022
						VA22B2820-031	VA22B2820-032	VA22B2820-033	VA22B2820-034	VA22B2820-035
						Result	Result	Result	Result	Result
Metals										
strontium	7440-24-6	E472	0.10	mg/kg		1.72	2.48	0.66	0.63	1.50
tellurium	13494-80-9	E472	0.020	mg/kg		<0.020	<0.020	<0.020	<0.020	<0.020
thallium	7440-28-0	E472	0.0020	mg/kg		0.0348	0.0488	0.0075	0.0077	0.0109
tin	7440-31-5	E472	0.10	mg/kg		2.63	<0.10	1.24	0.61	0.61
titanium	7440-32-6	E472.Ti	0.50	mg/kg		<0.50	0.58	<0.50	<0.50	<0.50
uranium	7440-61-1	E472	0.0020	mg/kg		0.0057	0.0128	<0.0020	<0.0020	<0.0020
vanadium	7440-62-2	E472	0.10	mg/kg		0.32	0.97	<0.10	<0.10	<0.10
zinc	7440-66-6	E472	1.0	mg/kg		148	209	23.2	23.2	16.7
zirconium	7440-67-7	E472	0.20	mg/kg		0.34	<0.20	0.63	0.35	0.38

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BOL_RB-M-4_2022-05	BOL_RB-M-5_2022-05	BOL_RB-M-6_2022-05	BOL_RB-M-7_2022-05	BOL_RB-M-8_2022-05
					Client sampling date / time	30-May-2022	30-May-2022	30-May-2022	30-May-2022	30-May-2022
						VA22B2820-036	VA22B2820-037	VA22B2820-038	VA22B2820-039	VA22B2820-040
						Result	Result	Result	Result	Result
Physical Tests										
moisture	----	E144	0.50	%		----	----	----	----	80.8
moisture	----	E144-H	2.0	%		79.7	76.6	80.6	79.5	----
Metals										
aluminum	7429-90-5	E440	2.0	mg/kg		----	----	----	----	<2.0
aluminum	7429-90-5	E472	5.0	mg/kg		5.7	<5.0	<5.0	<5.0	----
antimony	7440-36-0	E472	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	----
antimony	7440-36-0	E440	0.010	mg/kg		----	----	----	----	<0.010
arsenic	7440-38-2	E440	0.020	mg/kg		----	----	----	----	0.025
arsenic	7440-38-2	E472	0.030	mg/kg		0.032	<0.030	0.034	0.031	----
barium	7440-39-3	E472	0.050	mg/kg		0.826	0.816	0.758	0.622	----
barium	7440-39-3	E440	0.050	mg/kg		----	----	----	----	0.890
beryllium	7440-41-7	E472	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	----
beryllium	7440-41-7	E440	0.010	mg/kg		----	----	----	----	<0.010
bismuth	7440-69-9	E472	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	----
bismuth	7440-69-9	E440	0.010	mg/kg		----	----	----	----	<0.010
boron	7440-42-8	E472	1.0	mg/kg		<1.0	1.3	<1.0	<1.0	----
boron	7440-42-8	E440	1.0	mg/kg		----	----	----	----	<1.0
cadmium	7440-43-9	E440	0.0050	mg/kg		----	----	----	----	<0.0050
cadmium	7440-43-9	E472	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	----
calcium	7440-70-2	E472	20	mg/kg		845	836	1310	516	----
calcium	7440-70-2	E440	20	mg/kg		----	----	----	----	1790
cesium	7440-46-2	E472	0.0050	mg/kg		0.0875	0.0594	0.0624	0.0611	----
cesium	7440-46-2	E440	0.0050	mg/kg		----	----	----	----	0.0721
chromium	7440-47-3	E440	0.050	mg/kg		----	----	----	----	0.150
chromium	7440-47-3	E472	0.20	mg/kg		<0.20	0.30	0.57	<0.20	----
cobalt	7440-48-4	E472	0.020	mg/kg		<0.020	<0.020	0.024	<0.020	----
cobalt	7440-48-4	E440	0.020	mg/kg		----	----	----	----	<0.020
copper	7440-50-8	E440	0.10	mg/kg		----	----	----	----	1.19
copper	7440-50-8	E472	0.20	mg/kg		2.53	2.12	2.86	2.14	----
iron	7439-89-6	E440	3.0	mg/kg		----	----	----	----	30.1

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BOL_RB-M-4_2022-05	BOL_RB-M-5_2022-05	BOL_RB-M-6_2022-05	BOL_RB-M-7_2022-05	BOL_RB-M-8_2022-05
					Client sampling date / time	30-May-2022	30-May-2022	30-May-2022	30-May-2022	30-May-2022
						VA22B2820-036	VA22B2820-037	VA22B2820-038	VA22B2820-039	VA22B2820-040
						Result	Result	Result	Result	Result
Metals										
iron	7439-89-6	E472	5.0	mg/kg		26.1	28.8	38.6	30.4	----
lead	7439-92-1	E440	0.020	mg/kg		----	----	----	----	<0.020
lead	7439-92-1	E472	0.050	mg/kg		<0.050	<0.050	<0.050	<0.050	----
lithium	7439-93-2	E472	0.50	mg/kg		<0.50	<0.50	<0.50	<0.50	----
lithium	7439-93-2	E440	0.50	mg/kg		----	----	----	----	<0.50
magnesium	7439-95-4	E472	2.0	mg/kg		1300	1420	1160	1390	----
magnesium	7439-95-4	E440	2.0	mg/kg		----	----	----	----	1390
manganese	7439-96-5	E472	0.050	mg/kg		1.03	0.850	0.954	0.714	----
manganese	7439-96-5	E440	0.050	mg/kg		----	----	----	----	0.789
mercury	7439-97-6	E511	0.0050	mg/kg		0.389	0.474	0.471	0.343	----
mercury	7439-97-6	E510	0.0050	mg/kg		----	----	----	----	0.574
mercury	7439-97-6	E511A	0.0010	mg/kg wwt		0.0790	0.111	0.0911	0.0703	----
mercury	7439-97-6	E510A	0.0010	mg/kg wwt		----	----	----	----	0.110
molybdenum	7439-98-7	E440	0.020	mg/kg		----	----	----	----	<0.020
molybdenum	7439-98-7	E472	0.040	mg/kg		<0.040	<0.040	<0.040	<0.040	----
nickel	7440-02-0	E472	0.20	mg/kg		<0.20	<0.20	<0.20	<0.20	----
nickel	7440-02-0	E440	0.20	mg/kg		----	----	----	----	<0.20
phosphorus	7723-14-0	E472	10	mg/kg		11900	13600	13000	14100	----
phosphorus	7723-14-0	E440	10	mg/kg		----	----	----	----	15700
potassium	7440-09-7	E472	20	mg/kg		18700	21600	21500	23700	----
potassium	7440-09-7	E440	20	mg/kg		----	----	----	----	25500
rubidium	7440-17-7	E472	0.050	mg/kg		13.1	9.70	11.0	11.9	----
rubidium	7440-17-7	E440	0.050	mg/kg		----	----	----	----	13.6
selenium	7782-49-2	E440	0.050	mg/kg		----	----	----	----	2.41
selenium	7782-49-2	E472	0.10	mg/kg		2.78	2.24	2.06	2.28	----
silver	7440-22-4	E472.Ag	0.0050	mg/kg		<0.0050	<0.0050	<0.0050	<0.0050	----
silver	7440-22-4	E440.Ag	0.0050	mg/kg		----	----	----	----	<0.0050
sodium	7440-23-5	E472	20	mg/kg		2100	2220	3130	2190	----
sodium	7440-23-5	E440	20	mg/kg		----	----	----	----	1760
strontium	7440-24-6	E440	0.050	mg/kg		----	----	----	----	2.74

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BOL_RB-M-4_2022-05	BOL_RB-M-5_2022-05	BOL_RB-M-6_2022-05	BOL_RB-M-7_2022-05	BOL_RB-M-8_2022-05
					Client sampling date / time	30-May-2022	30-May-2022	30-May-2022	30-May-2022	30-May-2022
						VA22B2820-036	VA22B2820-037	VA22B2820-038	VA22B2820-039	VA22B2820-040
						Result	Result	Result	Result	Result
Metals										
strontium	7440-24-6	E472	0.10	mg/kg		1.09	1.23	2.11	0.67	----
tellurium	13494-80-9	E472	0.020	mg/kg		<0.020	<0.020	<0.020	<0.020	----
tellurium	13494-80-9	E440	0.020	mg/kg		----	----	----	----	<0.020
thallium	7440-28-0	E472	0.0020	mg/kg		0.0065	0.0106	0.0102	0.0129	----
thallium	7440-28-0	E440	0.0020	mg/kg		----	----	----	----	0.0155
tin	7440-31-5	E472	0.10	mg/kg		0.73	1.08	1.11	1.34	----
tin	7440-31-5	E440	0.10	mg/kg		----	----	----	----	1.14
titanium	7440-32-6	E440.Ti	0.25	mg/kg		----	----	----	----	<0.25
titanium	7440-32-6	E472.Ti	0.50	mg/kg		<0.50	<0.50	<0.50	<0.50	----
uranium	7440-61-1	E472	0.0020	mg/kg		<0.0020	<0.0020	<0.0020	<0.0020	----
uranium	7440-61-1	E440	0.0020	mg/kg		----	----	----	----	<0.0020
vanadium	7440-62-2	E472	0.10	mg/kg		<0.10	<0.10	<0.10	<0.10	----
vanadium	7440-62-2	E440	0.10	mg/kg		----	----	----	----	<0.10
zinc	7440-66-6	E440	0.50	mg/kg		----	----	----	----	19.0
zinc	7440-66-6	E472	1.0	mg/kg		24.7	17.4	24.8	18.3	----
zirconium	7440-67-7	E472	0.20	mg/kg		<0.20	<0.20	0.33	0.25	----
zirconium	7440-67-7	E440	0.20	mg/kg		----	----	----	----	0.43

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BOL_RB-O-1_2022-05	BOL_RB-O-2_2022-05	BOL_RB-O-3_2022-05	BOL_RB-O-4_2022-05	BOL_RB-O-5_2022-05
					Client sampling date / time	30-May-2022	30-May-2022	30-May-2022	30-May-2022	30-May-2022
						VA22B2820-041	VA22B2820-042	VA22B2820-043	VA22B2820-044	VA22B2820-045
						Result	Result	Result	Result	Result
Physical Tests										
moisture	----	E144	0.50	%		67.7	68.4	64.0	63.4	----
moisture	----	E144-H	2.0	%		----	----	----	----	83.5
Metals										
aluminum	7429-90-5	E440	2.0	mg/kg		<2.0	<2.0	<2.0	<2.0	----
aluminum	7429-90-5	E472	5.0	mg/kg		----	----	----	----	<5.0
antimony	7440-36-0	E472	0.010	mg/kg		----	----	----	----	<0.010
antimony	7440-36-0	E440	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	----
arsenic	7440-38-2	E440	0.020	mg/kg		<0.020	0.032	0.021	<0.020	----
arsenic	7440-38-2	E472	0.030	mg/kg		----	----	----	----	0.043
barium	7440-39-3	E472	0.050	mg/kg		----	----	----	----	0.188
barium	7440-39-3	E440	0.050	mg/kg		0.548	0.599	0.502	0.738	----
beryllium	7440-41-7	E472	0.010	mg/kg		----	----	----	----	<0.010
beryllium	7440-41-7	E440	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	----
bismuth	7440-69-9	E472	0.010	mg/kg		----	----	----	----	<0.010
bismuth	7440-69-9	E440	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	----
boron	7440-42-8	E472	1.0	mg/kg		----	----	----	----	<1.0
boron	7440-42-8	E440	1.0	mg/kg		<1.0	<1.0	<1.0	<1.0	----
cadmium	7440-43-9	E440	0.0050	mg/kg		<0.0050	<0.0050	<0.0050	<0.0050	----
cadmium	7440-43-9	E472	0.010	mg/kg		----	----	----	----	0.018
calcium	7440-70-2	E472	20	mg/kg		----	----	----	----	581
calcium	7440-70-2	E440	20	mg/kg		1360	1490	1460	1190	----
cesium	7440-46-2	E472	0.0050	mg/kg		----	----	----	----	0.0319
cesium	7440-46-2	E440	0.0050	mg/kg		0.0186	0.0150	0.0161	0.0258	----
chromium	7440-47-3	E440	0.050	mg/kg		<0.050	<0.050	<0.050	<0.050	----
chromium	7440-47-3	E472	0.20	mg/kg		----	----	----	----	0.22
cobalt	7440-48-4	E472	0.020	mg/kg		----	----	----	----	0.113
cobalt	7440-48-4	E440	0.020	mg/kg		0.084	0.101	0.055	0.071	----
copper	7440-50-8	E440	0.10	mg/kg		7.06	10.1	11.3	7.20	----
copper	7440-50-8	E472	0.20	mg/kg		----	----	----	----	4.68
iron	7439-89-6	E440	3.0	mg/kg		55.4	96.3	55.2	57.6	----

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BOL_RB-O-1_2022-05	BOL_RB-O-2_2022-05	BOL_RB-O-3_2022-05	BOL_RB-O-4_2022-05	BOL_RB-O-5_2022-05
					Client sampling date / time	30-May-2022	30-May-2022	30-May-2022	30-May-2022	30-May-2022
						VA22B2820-041	VA22B2820-042	VA22B2820-043	VA22B2820-044	VA22B2820-045
						Result	Result	Result	Result	Result
Metals										
iron	7439-89-6	E472	5.0	mg/kg		----	----	----	----	283
lead	7439-92-1	E440	0.020	mg/kg		<0.020	<0.020	<0.020	<0.020	----
lead	7439-92-1	E472	0.050	mg/kg		----	----	----	----	<0.050
lithium	7439-93-2	E472	0.50	mg/kg		----	----	----	----	<0.50
lithium	7439-93-2	E440	0.50	mg/kg		<0.50	<0.50	<0.50	<0.50	----
magnesium	7439-95-4	E472	2.0	mg/kg		----	----	----	----	638
magnesium	7439-95-4	E440	2.0	mg/kg		1880	1550	1690	1690	----
manganese	7439-96-5	E472	0.050	mg/kg		----	----	----	----	6.45
manganese	7439-96-5	E440	0.050	mg/kg		7.70	7.67	4.10	7.82	----
mercury	7439-97-6	E511	0.0050	mg/kg		----	----	----	----	0.154
mercury	7439-97-6	E510	0.0050	mg/kg		0.0201	0.0345	0.0080	0.0124	----
mercury	7439-97-6	E511A	0.0010	mg/kg wwt		----	----	----	----	0.0254
mercury	7439-97-6	E510A	0.0010	mg/kg wwt		0.0065	0.0109	0.0029	0.0046	----
molybdenum	7439-98-7	E440	0.020	mg/kg		<0.020	0.039	0.043	0.048	----
molybdenum	7439-98-7	E472	0.040	mg/kg		----	----	----	----	0.080
nickel	7440-02-0	E472	0.20	mg/kg		----	----	----	----	<0.20
nickel	7440-02-0	E440	0.20	mg/kg		<0.20	<0.20	<0.20	<0.20	----
phosphorus	7723-14-0	E472	10	mg/kg		----	----	----	----	9980
phosphorus	7723-14-0	E440	10	mg/kg		12500	12000	12400	12100	----
potassium	7440-09-7	E472	20	mg/kg		----	----	----	----	11000
potassium	7440-09-7	E440	20	mg/kg		8170	8320	7330	7290	----
rubidium	7440-17-7	E472	0.050	mg/kg		----	----	----	----	6.15
rubidium	7440-17-7	E440	0.050	mg/kg		5.05	3.99	4.63	6.24	----
selenium	7782-49-2	E440	0.050	mg/kg		3.92	5.97	5.92	4.98	----
selenium	7782-49-2	E472	0.10	mg/kg		----	----	----	----	3.72
silver	7440-22-4	E472.Ag	0.0050	mg/kg		----	----	----	----	0.0070
silver	7440-22-4	E440.Ag	0.0050	mg/kg		<0.0050	0.0125	0.0105	0.0062	----
sodium	7440-23-5	E472	20	mg/kg		----	----	----	----	11000
sodium	7440-23-5	E440	20	mg/kg		3280	3490	2790	2200	----
strontium	7440-24-6	E440	0.050	mg/kg		3.58	3.97	4.75	3.57	----

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BOL_RB-O-1_2022-05	BOL_RB-O-2_2022-05	BOL_RB-O-3_2022-05	BOL_RB-O-4_2022-05	BOL_RB-O-5_2022-05
					Client sampling date / time	30-May-2022	30-May-2022	30-May-2022	30-May-2022	30-May-2022
						VA22B2820-041	VA22B2820-042	VA22B2820-043	VA22B2820-044	VA22B2820-045
						Result	Result	Result	Result	Result
Metals										
strontium	7440-24-6	E472	0.10	mg/kg		----	----	----	----	1.53
tellurium	13494-80-9	E472	0.020	mg/kg		----	----	----	----	<0.020
tellurium	13494-80-9	E440	0.020	mg/kg		<0.020	<0.020	<0.020	<0.020	----
thallium	7440-28-0	E472	0.0020	mg/kg		----	----	----	----	0.0097
thallium	7440-28-0	E440	0.0020	mg/kg		<0.0020	<0.0020	<0.0020	<0.0020	----
tin	7440-31-5	E472	0.10	mg/kg		----	----	----	----	<0.10
tin	7440-31-5	E440	0.10	mg/kg		<0.10	0.13	0.19	<0.10	----
titanium	7440-32-6	E440.Ti	0.25	mg/kg		<0.25	<0.25	<0.25	<0.25	----
titanium	7440-32-6	E472.Ti	0.50	mg/kg		----	----	----	----	<0.50
uranium	7440-61-1	E472	0.0020	mg/kg		----	----	----	----	0.0022
uranium	7440-61-1	E440	0.0020	mg/kg		<0.0020	<0.0020	<0.0020	<0.0020	----
vanadium	7440-62-2	E472	0.10	mg/kg		----	----	----	----	<0.10
vanadium	7440-62-2	E440	0.10	mg/kg		<0.10	<0.10	<0.10	<0.10	----
zinc	7440-66-6	E440	0.50	mg/kg		88.3	95.5	70.5	65.6	----
zinc	7440-66-6	E472	1.0	mg/kg		----	----	----	----	190
zirconium	7440-67-7	E472	0.20	mg/kg		----	----	----	----	<0.20
zirconium	7440-67-7	E440	0.20	mg/kg		<0.20	<0.20	<0.20	<0.20	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BOL_RB-O-6_2022-05	BOL_RB-O-7_2022-05	BOL_RB-O-8_2022-05	BOL_RB-Li-1_2022-05	BOL_RB-Li-2_2022-05
					Client sampling date / time	30-May-2022	30-May-2022	30-May-2022	30-May-2022	30-May-2022
						VA22B2820-046	VA22B2820-047	VA22B2820-048	VA22B2820-049	VA22B2820-050
						Result	Result	Result	Result	Result
Physical Tests										
moisture	----	E144	0.50	%		74.0	----	68.5	82.8	82.5
moisture	----	E144-H	2.0	%		----	82.6	----	----	----
Metals										
aluminum	7429-90-5	E440	2.0	mg/kg		<2.0	----	<2.0	5.4	2.6
aluminum	7429-90-5	E472	5.0	mg/kg		----	<5.0	----	----	----
antimony	7440-36-0	E472	0.010	mg/kg		----	<0.010	----	----	----
antimony	7440-36-0	E440	0.010	mg/kg		<0.010	----	<0.010	<0.010	<0.010
arsenic	7440-38-2	E440	0.020	mg/kg		0.034	----	0.024	0.030	0.054
arsenic	7440-38-2	E472	0.030	mg/kg		----	0.035	----	----	----
barium	7440-39-3	E472	0.050	mg/kg		----	0.378	----	----	----
barium	7440-39-3	E440	0.050	mg/kg		0.632	----	1.12	0.526	0.804
beryllium	7440-41-7	E472	0.010	mg/kg		----	<0.010	----	----	----
beryllium	7440-41-7	E440	0.010	mg/kg		<0.010	----	<0.010	<0.010	<0.010
bismuth	7440-69-9	E472	0.010	mg/kg		----	<0.010	----	----	----
bismuth	7440-69-9	E440	0.010	mg/kg		<0.010	----	<0.010	<0.010	<0.010
boron	7440-42-8	E472	1.0	mg/kg		----	<1.0	----	----	----
boron	7440-42-8	E440	1.0	mg/kg		<1.0	----	<1.0	<1.0	<1.0
cadmium	7440-43-9	E440	0.0050	mg/kg		0.0128	----	<0.0050	0.158	0.232
cadmium	7440-43-9	E472	0.010	mg/kg		----	0.012	----	----	----
calcium	7440-70-2	E472	20	mg/kg		----	637	----	----	----
calcium	7440-70-2	E440	20	mg/kg		1110	----	1440	418	596
cesium	7440-46-2	E472	0.0050	mg/kg		----	0.0444	----	----	----
cesium	7440-46-2	E440	0.0050	mg/kg		0.0211	----	0.0174	0.0483	0.0350
chromium	7440-47-3	E440	0.050	mg/kg		0.078	----	<0.050	0.257	0.087
chromium	7440-47-3	E472	0.20	mg/kg		----	<0.20	----	----	----
cobalt	7440-48-4	E472	0.020	mg/kg		----	0.143	----	----	----
cobalt	7440-48-4	E440	0.020	mg/kg		0.097	----	0.080	0.094	0.130
copper	7440-50-8	E440	0.10	mg/kg		6.50	----	10.3	175	111
copper	7440-50-8	E472	0.20	mg/kg		----	6.32	----	----	----
iron	7439-89-6	E440	3.0	mg/kg		142	----	61.9	1710	2490

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BOL_RB-O-6_2022-05	BOL_RB-O-7_2022-05	BOL_RB-O-8_2022-05	BOL_RB-Li-1_2022-05	BOL_RB-Li-2_2022-05
					Client sampling date / time	30-May-2022	30-May-2022	30-May-2022	30-May-2022	30-May-2022
						VA22B2820-046	VA22B2820-047	VA22B2820-048	VA22B2820-049	VA22B2820-050
						Result	Result	Result	Result	Result
Metals										
iron	7439-89-6	E472	5.0	mg/kg		----	291	----	----	----
lead	7439-92-1	E440	0.020	mg/kg		<0.020	----	<0.020	<0.020	<0.020
lead	7439-92-1	E472	0.050	mg/kg		----	<0.050	----	----	----
lithium	7439-93-2	E472	0.50	mg/kg		----	<0.50	----	----	----
lithium	7439-93-2	E440	0.50	mg/kg		<0.50	----	<0.50	<0.50	<0.50
magnesium	7439-95-4	E472	2.0	mg/kg		----	668	----	----	----
magnesium	7439-95-4	E440	2.0	mg/kg		1550	----	1650	966	901
manganese	7439-96-5	E472	0.050	mg/kg		----	5.44	----	----	----
manganese	7439-96-5	E440	0.050	mg/kg		5.48	----	12.9	8.89	6.90
mercury	7439-97-6	E511	0.0050	mg/kg		----	0.108	----	----	----
mercury	7439-97-6	E510	0.0050	mg/kg		0.0597	----	0.0192	0.485	0.686
mercury	7439-97-6	E511A	0.0010	mg/kg wwt		----	0.0189	----	----	----
mercury	7439-97-6	E510A	0.0010	mg/kg wwt		0.0155	----	0.0060	0.0834	0.120
molybdenum	7439-98-7	E440	0.020	mg/kg		0.051	----	0.045	1.11	1.33
molybdenum	7439-98-7	E472	0.040	mg/kg		----	0.073	----	----	----
nickel	7440-02-0	E472	0.20	mg/kg		----	<0.20	----	----	----
nickel	7440-02-0	E440	0.20	mg/kg		<0.20	----	<0.20	<0.20	<0.20
phosphorus	7723-14-0	E472	10	mg/kg		----	10300	----	----	----
phosphorus	7723-14-0	E440	10	mg/kg		12000	----	12800	18300	18400
potassium	7440-09-7	E472	20	mg/kg		----	11700	----	----	----
potassium	7440-09-7	E440	20	mg/kg		9470	----	8440	16000	15400
rubidium	7440-17-7	E472	0.050	mg/kg		----	7.82	----	----	----
rubidium	7440-17-7	E440	0.050	mg/kg		5.91	----	5.12	10.2	7.35
selenium	7782-49-2	E440	0.050	mg/kg		4.15	----	6.35	10.2	13.9
selenium	7782-49-2	E472	0.10	mg/kg		----	3.99	----	----	----
silver	7440-22-4	E472.Ag	0.0050	mg/kg		----	<0.0050	----	----	----
silver	7440-22-4	E440.Ag	0.0050	mg/kg		0.0135	----	0.0059	1.57	1.17
sodium	7440-23-5	E472	20	mg/kg		----	9200	----	----	----
sodium	7440-23-5	E440	20	mg/kg		5820	----	3860	10000	11100
strontium	7440-24-6	E440	0.050	mg/kg		3.66	----	4.16	0.704	1.07

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BOL_RB-O-6_2022-05	BOL_RB-O-7_2022-05	BOL_RB-O-8_2022-05	BOL_RB-Li-1_2022-05	BOL_RB-Li-2_2022-05
					Client sampling date / time	30-May-2022	30-May-2022	30-May-2022	30-May-2022	30-May-2022
						VA22B2820-046	VA22B2820-047	VA22B2820-048	VA22B2820-049	VA22B2820-050
						Result	Result	Result	Result	Result
Metals										
strontium	7440-24-6	E472	0.10	mg/kg		----	1.70	----	----	----
tellurium	13494-80-9	E472	0.020	mg/kg		----	<0.020	----	----	----
tellurium	13494-80-9	E440	0.020	mg/kg		<0.020	----	<0.020	<0.020	<0.020
thallium	7440-28-0	E472	0.0020	mg/kg		----	0.0108	----	----	----
thallium	7440-28-0	E440	0.0020	mg/kg		0.0032	----	<0.0020	0.124	0.321
tin	7440-31-5	E472	0.10	mg/kg		----	0.12	----	----	----
tin	7440-31-5	E440	0.10	mg/kg		0.36	----	<0.10	0.57	0.71
titanium	7440-32-6	E440.Ti	0.25	mg/kg		<0.25	----	<0.25	<0.25	<0.25
titanium	7440-32-6	E472.Ti	0.50	mg/kg		----	<0.50	----	----	----
uranium	7440-61-1	E472	0.0020	mg/kg		----	0.0020	----	----	----
uranium	7440-61-1	E440	0.0020	mg/kg		<0.0020	----	<0.0020	0.0063	0.0085
vanadium	7440-62-2	E472	0.10	mg/kg		----	<0.10	----	----	----
vanadium	7440-62-2	E440	0.10	mg/kg		<0.10	----	<0.10	0.25	0.34
zinc	7440-66-6	E440	0.50	mg/kg		79.1	----	104	224	158
zinc	7440-66-6	E472	1.0	mg/kg		----	182	----	----	----
zirconium	7440-67-7	E472	0.20	mg/kg		----	<0.20	----	----	----
zirconium	7440-67-7	E440	0.20	mg/kg		<0.20	----	<0.20	<0.20	<0.20

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BOL_RB-Li-3_2022-05	BOL_RB-Li-4_2022-05	BOL_RB-Li-5_2022-05	BOL_RB-Li-6_2022-05	BOL_RB-Li-7_2022-05
					Client sampling date / time	30-May-2022	30-May-2022	30-May-2022	30-May-2022	30-May-2022
						VA22B2820-051	VA22B2820-052	VA22B2820-053	VA22B2820-054	VA22B2820-055
						Result	Result	Result	Result	Result
Physical Tests										
moisture	----	E144-H	2.0	%		76.9	78.8	79.6	79.1	74.5
Metals										
aluminum	7429-90-5	E472	5.0	mg/kg		<5.0	6.4	<5.0	<5.0	<5.0
antimony	7440-36-0	E472	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	<0.010
arsenic	7440-38-2	E472	0.030	mg/kg		<0.030	0.039	0.064	0.042	0.049
barium	7440-39-3	E472	0.050	mg/kg		1.18	1.51	0.791	0.822	0.085
beryllium	7440-41-7	E472	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	<0.010
bismuth	7440-69-9	E472	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	<0.010
boron	7440-42-8	E472	1.0	mg/kg		<1.0	1.5	<1.0	<1.0	<1.0
cadmium	7440-43-9	E472	0.010	mg/kg		0.123	0.317	0.118	0.142	0.135
calcium	7440-70-2	E472	20	mg/kg		446	368	365	322	279
cesium	7440-46-2	E472	0.0050	mg/kg		0.0299	0.0666	0.0292	0.0295	0.0336
chromium	7440-47-3	E472	0.20	mg/kg		0.32	0.28	<0.20	0.22	<0.20
cobalt	7440-48-4	E472	0.020	mg/kg		0.075	0.161	0.107	0.112	0.112
copper	7440-50-8	E472	0.20	mg/kg		66.9	69.7	86.9	22.1	137
iron	7439-89-6	E472	5.0	mg/kg		900	477	1250	1820	1290
lead	7439-92-1	E472	0.050	mg/kg		<0.050	<0.050	<0.050	<0.050	<0.050
lithium	7439-93-2	E472	0.50	mg/kg		<0.50	<0.50	<0.50	<0.50	<0.50
magnesium	7439-95-4	E472	2.0	mg/kg		704	721	749	834	706
manganese	7439-96-5	E472	0.050	mg/kg		4.80	6.57	8.74	6.15	6.14
mercury	7439-97-6	E511	0.0050	mg/kg		0.329	0.380	0.308	0.264	0.242
mercury	7439-97-6	E511A	0.0010	mg/kg wwt		0.0761	0.0805	0.0627	0.0552	0.0616
molybdenum	7439-98-7	E472	0.040	mg/kg		0.657	0.631	0.680	0.866	0.871
nickel	7440-02-0	E472	0.20	mg/kg		<0.20	<0.20	<0.20	<0.20	<0.20
phosphorus	7723-14-0	E472	10	mg/kg		14400	14500	14600	16300	15900
potassium	7440-09-7	E472	20	mg/kg		12700	13600	13300	14400	11800
rubidium	7440-17-7	E472	0.050	mg/kg		8.53	11.5	7.47	9.74	7.75
selenium	7782-49-2	E472	0.10	mg/kg		13.0	14.1	13.8	9.16	16.6
silver	7440-22-4	E472.Ag	0.0050	mg/kg		0.793	0.969	0.941	0.283	1.16
sodium	7440-23-5	E472	20	mg/kg		6370	6120	8230	7200	5170

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BOL_RB-Li-3_2022-05	BOL_RB-Li-4_2022-05	BOL_RB-Li-5_2022-05	BOL_RB-Li-6_2022-05	BOL_RB-Li-7_2022-05
					Client sampling date / time	30-May-2022	30-May-2022	30-May-2022	30-May-2022	30-May-2022
						VA22B2820-051	VA22B2820-052	VA22B2820-053	VA22B2820-054	VA22B2820-055
						Result	Result	Result	Result	Result
Metals										
strontium	7440-24-6	E472	0.10	mg/kg		0.99	0.93	0.73	0.60	0.56
tellurium	13494-80-9	E472	0.020	mg/kg		<0.020	<0.020	<0.020	<0.020	<0.020
thallium	7440-28-0	E472	0.0020	mg/kg		0.124	0.169	0.175	0.149	0.127
tin	7440-31-5	E472	0.10	mg/kg		0.90	0.95	0.79	1.18	<0.10
titanium	7440-32-6	E472.Ti	0.50	mg/kg		<0.50	<0.50	<0.50	<0.50	<0.50
uranium	7440-61-1	E472	0.0020	mg/kg		<0.0020	0.0064	0.0036	0.0052	0.0040
vanadium	7440-62-2	E472	0.10	mg/kg		0.11	0.21	0.14	0.20	0.20
zinc	7440-66-6	E472	1.0	mg/kg		152	133	226	186	188
zirconium	7440-67-7	E472	0.20	mg/kg		0.29	0.31	0.25	0.47	<0.20

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BOL_RB-Li-8_2022-05	BOL_RB-Ki-1_2022-05	BOL_RB-Ki-2_2022-05	BOL_RB-Ki-3_2022-05	BOL_RB-Ki-4_2022-05
					Client sampling date / time	30-May-2022	30-May-2022	30-May-2022	30-May-2022	30-May-2022
						VA22B2820-056	VA22B2820-057	VA22B2820-058	VA22B2820-059	VA22B2820-060
						Result	Result	Result	Result	Result
Physical Tests										
moisture	----	E144	0.50	%		82.5	83.7	----	----	----
moisture	----	E144-H	2.0	%		----	----	81.5	80.6	81.1
Metals										
aluminum	7429-90-5	E440	2.0	mg/kg		7.1	4.0	----	----	----
aluminum	7429-90-5	E472	5.0	mg/kg		----	----	7.3	<5.0	5.7
antimony	7440-36-0	E472	0.010	mg/kg		----	----	0.022	<0.010	<0.010
antimony	7440-36-0	E440	0.010	mg/kg		<0.010	0.012	----	----	----
arsenic	7440-38-2	E440	0.020	mg/kg		0.053	0.189	----	----	----
arsenic	7440-38-2	E472	0.030	mg/kg		----	----	0.457	0.152	0.288
barium	7440-39-3	E472	0.050	mg/kg		----	----	2.16	0.388	1.21
barium	7440-39-3	E440	0.050	mg/kg		0.905	1.22	----	----	----
beryllium	7440-41-7	E472	0.010	mg/kg		----	----	<0.010	<0.010	<0.010
beryllium	7440-41-7	E440	0.010	mg/kg		<0.010	<0.010	----	----	----
bismuth	7440-69-9	E472	0.010	mg/kg		----	----	<0.010	<0.010	<0.010
bismuth	7440-69-9	E440	0.010	mg/kg		<0.010	<0.010	----	----	----
boron	7440-42-8	E472	1.0	mg/kg		----	----	<1.0	<1.0	<1.0
boron	7440-42-8	E440	1.0	mg/kg		<1.0	<1.0	----	----	----
cadmium	7440-43-9	E440	0.0050	mg/kg		0.233	0.268	----	----	----
cadmium	7440-43-9	E472	0.010	mg/kg		----	----	0.717	0.470	0.710
calcium	7440-70-2	E472	20	mg/kg		----	----	904	723	931
calcium	7440-70-2	E440	20	mg/kg		543	533	----	----	----
cesium	7440-46-2	E472	0.0050	mg/kg		----	----	0.0344	0.0412	0.0747
cesium	7440-46-2	E440	0.0050	mg/kg		0.0412	0.0568	----	----	----
chromium	7440-47-3	E440	0.050	mg/kg		0.175	0.297	----	----	----
chromium	7440-47-3	E472	0.20	mg/kg		----	----	0.30	<0.20	0.48
cobalt	7440-48-4	E472	0.020	mg/kg		----	----	0.664	0.448	0.508
cobalt	7440-48-4	E440	0.020	mg/kg		0.134	0.411	----	----	----
copper	7440-50-8	E440	0.10	mg/kg		148	7.20	----	----	----
copper	7440-50-8	E472	0.20	mg/kg		----	----	7.83	6.16	5.54
iron	7439-89-6	E440	3.0	mg/kg		2270	682	----	----	----

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BOL_RB-Li-8_2022-05	BOL_RB-Ki-1_2022-05	BOL_RB-Ki-2_2022-05	BOL_RB-Ki-3_2022-05	BOL_RB-Ki-4_2022-05
					Client sampling date / time	30-May-2022	30-May-2022	30-May-2022	30-May-2022	30-May-2022
						VA22B2820-056	VA22B2820-057	VA22B2820-058	VA22B2820-059	VA22B2820-060
						Result	Result	Result	Result	Result
Metals										
iron	7439-89-6	E472	5.0	mg/kg		----	----	763	613	537
lead	7439-92-1	E440	0.020	mg/kg		<0.020	<0.020	----	----	----
lead	7439-92-1	E472	0.050	mg/kg		----	----	<0.050	<0.050	<0.050
lithium	7439-93-2	E472	0.50	mg/kg		----	----	<0.50	<0.50	<0.50
lithium	7439-93-2	E440	0.50	mg/kg		<0.50	<0.50	----	----	----
magnesium	7439-95-4	E472	2.0	mg/kg		----	----	726	641	771
magnesium	7439-95-4	E440	2.0	mg/kg		868	894	----	----	----
manganese	7439-96-5	E472	0.050	mg/kg		----	----	2.83	2.62	2.91
manganese	7439-96-5	E440	0.050	mg/kg		7.58	3.60	----	----	----
mercury	7439-97-6	E511	0.0050	mg/kg		----	----	0.695	0.304	0.328
mercury	7439-97-6	E510	0.0050	mg/kg		0.520	0.445	----	----	----
mercury	7439-97-6	E511A	0.0010	mg/kg wwt		----	----	0.129	0.0591	0.0619
mercury	7439-97-6	E510A	0.0010	mg/kg wwt		0.0910	0.0726	----	----	----
molybdenum	7439-98-7	E440	0.020	mg/kg		1.03	0.522	----	----	----
molybdenum	7439-98-7	E472	0.040	mg/kg		----	----	0.641	0.367	0.454
nickel	7440-02-0	E472	0.20	mg/kg		----	----	0.38	0.29	0.45
nickel	7440-02-0	E440	0.20	mg/kg		<0.20	0.25	----	----	----
phosphorus	7723-14-0	E472	10	mg/kg		----	----	11500	13300	13600
phosphorus	7723-14-0	E440	10	mg/kg		17500	16700	----	----	----
potassium	7440-09-7	E472	20	mg/kg		----	----	11500	12000	14000
potassium	7440-09-7	E440	20	mg/kg		14700	15900	----	----	----
rubidium	7440-17-7	E472	0.050	mg/kg		----	----	6.04	9.04	12.2
rubidium	7440-17-7	E440	0.050	mg/kg		9.77	10.0	----	----	----
selenium	7782-49-2	E440	0.050	mg/kg		18.5	9.95	----	----	----
selenium	7782-49-2	E472	0.10	mg/kg		----	----	12.9	7.60	10.1
silver	7440-22-4	E472.Ag	0.0050	mg/kg		----	----	0.0146	0.0056	<0.0050
silver	7440-22-4	E440.Ag	0.0050	mg/kg		1.26	0.0092	----	----	----
sodium	7440-23-5	E472	20	mg/kg		----	----	12700	9520	8880
sodium	7440-23-5	E440	20	mg/kg		8220	12300	----	----	----
strontium	7440-24-6	E440	0.050	mg/kg		1.08	1.56	----	----	----

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BOL_RB-Li-8_2022-05	BOL_RB-Ki-1_2022-05	BOL_RB-Ki-2_2022-05	BOL_RB-Ki-3_2022-05	BOL_RB-Ki-4_2022-05
					Client sampling date / time	30-May-2022	30-May-2022	30-May-2022	30-May-2022	30-May-2022
						VA22B2820-056	VA22B2820-057	VA22B2820-058	VA22B2820-059	VA22B2820-060
						Result	Result	Result	Result	Result
Metals										
strontium	7440-24-6	E472	0.10	mg/kg		----	----	3.76	2.03	3.10
tellurium	13494-80-9	E472	0.020	mg/kg		----	----	<0.020	<0.020	<0.020
tellurium	13494-80-9	E440	0.020	mg/kg		<0.020	<0.020	----	----	----
thallium	7440-28-0	E472	0.0020	mg/kg		----	----	0.0556	0.0434	0.0356
thallium	7440-28-0	E440	0.0020	mg/kg		0.224	0.0226	----	----	----
tin	7440-31-5	E472	0.10	mg/kg		----	----	1.50	<0.10	<0.10
tin	7440-31-5	E440	0.10	mg/kg		1.04	1.06	----	----	----
titanium	7440-32-6	E440.Ti	0.25	mg/kg		<0.25	0.25	----	----	----
titanium	7440-32-6	E472.Ti	0.50	mg/kg		----	----	<0.50	<0.50	0.50
uranium	7440-61-1	E472	0.0020	mg/kg		----	----	0.0116	0.0048	0.0135
uranium	7440-61-1	E440	0.0020	mg/kg		0.0117	0.0078	----	----	----
vanadium	7440-62-2	E472	0.10	mg/kg		----	----	0.41	0.21	0.32
vanadium	7440-62-2	E440	0.10	mg/kg		0.50	0.31	----	----	----
zinc	7440-66-6	E440	0.50	mg/kg		176	109	----	----	----
zinc	7440-66-6	E472	1.0	mg/kg		----	----	103	146	108
zirconium	7440-67-7	E472	0.20	mg/kg		----	----	<0.20	<0.20	<0.20
zirconium	7440-67-7	E440	0.20	mg/kg		<0.20	0.21	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BOL_RB-Ki-5_2022-05	BOL_RB-Ki-6_2022-05	BOL_RB-Ki-7_2022-05	BOL_RB-Ki-8_2022-05	POL_LSU-M-1_2022-05
					Client sampling date / time	30-May-2022	30-May-2022	30-May-2022	30-May-2022	28-May-2022
						VA22B2820-061	VA22B2820-062	VA22B2820-063	VA22B2820-064	VA22B2820-065
						Result	Result	Result	Result	Result
Physical Tests										
moisture	----	E144	0.50	%		----	----	----	----	78.7
moisture	----	E144-H	2.0	%		80.2	81.4	78.2	82.3	----
Metals										
aluminum	7429-90-5	E440	2.0	mg/kg		----	----	----	----	<2.0
aluminum	7429-90-5	E472	5.0	mg/kg		<5.0	6.5	<5.0	11.1	----
antimony	7440-36-0	E472	0.010	mg/kg		<0.010	<0.010	<0.010	0.012	----
antimony	7440-36-0	E440	0.010	mg/kg		----	----	----	----	<0.010
arsenic	7440-38-2	E440	0.020	mg/kg		----	----	----	----	0.156
arsenic	7440-38-2	E472	0.030	mg/kg		0.237	0.208	0.211	0.283	----
barium	7440-39-3	E472	0.050	mg/kg		0.488	0.683	0.911	1.88	----
barium	7440-39-3	E440	0.050	mg/kg		----	----	----	----	0.804
beryllium	7440-41-7	E472	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	----
beryllium	7440-41-7	E440	0.010	mg/kg		----	----	----	----	<0.010
bismuth	7440-69-9	E472	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	----
bismuth	7440-69-9	E440	0.010	mg/kg		----	----	----	----	<0.010
boron	7440-42-8	E472	1.0	mg/kg		<1.0	<1.0	<1.0	<1.0	----
boron	7440-42-8	E440	1.0	mg/kg		----	----	----	----	<1.0
cadmium	7440-43-9	E440	0.0050	mg/kg		----	----	----	----	<0.0050
cadmium	7440-43-9	E472	0.010	mg/kg		0.618	0.643	0.587	0.729	----
calcium	7440-70-2	E472	20	mg/kg		611	490	510	604	----
calcium	7440-70-2	E440	20	mg/kg		----	----	----	----	601
cesium	7440-46-2	E472	0.0050	mg/kg		0.0359	0.0402	0.0394	0.0420	----
cesium	7440-46-2	E440	0.0050	mg/kg		----	----	----	----	0.161
chromium	7440-47-3	E440	0.050	mg/kg		----	----	----	----	0.058
chromium	7440-47-3	E472	0.20	mg/kg		0.25	0.34	<0.20	0.53	----
cobalt	7440-48-4	E472	0.020	mg/kg		0.423	1.69	0.818	0.709	----
cobalt	7440-48-4	E440	0.020	mg/kg		----	----	----	----	<0.020
copper	7440-50-8	E440	0.10	mg/kg		----	----	----	----	1.42
copper	7440-50-8	E472	0.20	mg/kg		8.08	8.02	7.24	7.54	----
iron	7439-89-6	E440	3.0	mg/kg		----	----	----	----	17.4

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BOL_RB-Ki-5_2022-05	BOL_RB-Ki-6_2022-05	BOL_RB-Ki-7_2022-05	BOL_RB-Ki-8_2022-05	POL_LSU-M-1_2022-05
					Client sampling date / time	30-May-2022	30-May-2022	30-May-2022	30-May-2022	28-May-2022
						VA22B2820-061	VA22B2820-062	VA22B2820-063	VA22B2820-064	VA22B2820-065
						Result	Result	Result	Result	Result
Metals										
iron	7439-89-6	E472	5.0	mg/kg		721	689	749	634	----
lead	7439-92-1	E440	0.020	mg/kg		----	----	----	----	<0.020
lead	7439-92-1	E472	0.050	mg/kg		<0.050	<0.050	<0.050	<0.050	----
lithium	7439-93-2	E472	0.50	mg/kg		<0.50	<0.50	<0.50	<0.50	----
lithium	7439-93-2	E440	0.50	mg/kg		----	----	----	----	<0.50
magnesium	7439-95-4	E472	2.0	mg/kg		776	839	689	752	----
magnesium	7439-95-4	E440	2.0	mg/kg		----	----	----	----	1800
manganese	7439-96-5	E472	0.050	mg/kg		4.58	3.98	4.77	3.05	----
manganese	7439-96-5	E440	0.050	mg/kg		----	----	----	----	0.726
mercury	7439-97-6	E511	0.0050	mg/kg		0.466	0.422	0.370	0.445	----
mercury	7439-97-6	E510	0.0050	mg/kg		----	----	----	----	0.286
mercury	7439-97-6	E511A	0.0010	mg/kg wwt		0.0923	0.0785	0.0806	0.0787	----
mercury	7439-97-6	E510A	0.0010	mg/kg wwt		----	----	----	----	0.0610
molybdenum	7439-98-7	E440	0.020	mg/kg		----	----	----	----	<0.020
molybdenum	7439-98-7	E472	0.040	mg/kg		0.390	0.500	0.400	0.680	----
nickel	7440-02-0	E472	0.20	mg/kg		0.22	0.41	0.22	0.51	----
nickel	7440-02-0	E440	0.20	mg/kg		----	----	----	----	<0.20
phosphorus	7723-14-0	E472	10	mg/kg		13600	14700	12700	12900	----
phosphorus	7723-14-0	E440	10	mg/kg		----	----	----	----	13400
potassium	7440-09-7	E472	20	mg/kg		14200	14600	12600	13100	----
potassium	7440-09-7	E440	20	mg/kg		----	----	----	----	23800
rubidium	7440-17-7	E472	0.050	mg/kg		7.91	9.45	8.05	8.99	----
rubidium	7440-17-7	E440	0.050	mg/kg		----	----	----	----	15.8
selenium	7782-49-2	E440	0.050	mg/kg		----	----	----	----	6.79
selenium	7782-49-2	E472	0.10	mg/kg		7.82	8.88	8.29	10.8	----
silver	7440-22-4	E472.Ag	0.0050	mg/kg		0.0279	0.0184	0.0066	0.0066	----
silver	7440-22-4	E440.Ag	0.0050	mg/kg		----	----	----	----	<0.0050
sodium	7440-23-5	E472	20	mg/kg		9500	9790	6940	10200	----
sodium	7440-23-5	E440	20	mg/kg		----	----	----	----	1420
strontium	7440-24-6	E440	0.050	mg/kg		----	----	----	----	0.484

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BOL_RB-Ki-5_2022-05	BOL_RB-Ki-6_2022-05	BOL_RB-Ki-7_2022-05	BOL_RB-Ki-8_2022-05	POL_LSU-M-1_2022-05
					Client sampling date / time	30-May-2022	30-May-2022	30-May-2022	30-May-2022	28-May-2022
						VA22B2820-061	VA22B2820-062	VA22B2820-063	VA22B2820-064	VA22B2820-065
						Result	Result	Result	Result	Result
Metals										
strontium	7440-24-6	E472	0.10	mg/kg		2.11	1.74	1.69	2.26	----
tellurium	13494-80-9	E472	0.020	mg/kg		<0.020	<0.020	<0.020	<0.020	----
tellurium	13494-80-9	E440	0.020	mg/kg		----	----	----	----	<0.020
thallium	7440-28-0	E472	0.0020	mg/kg		0.0636	0.0710	0.0628	0.0578	----
thallium	7440-28-0	E440	0.0020	mg/kg		----	----	----	----	<0.0020
tin	7440-31-5	E472	0.10	mg/kg		<0.10	<0.10	<0.10	0.87	----
tin	7440-31-5	E440	0.10	mg/kg		----	----	----	----	0.23
titanium	7440-32-6	E440.Ti	0.25	mg/kg		----	----	----	----	<0.25
titanium	7440-32-6	E472.Ti	0.50	mg/kg		<0.50	0.64	<0.50	0.57	----
uranium	7440-61-1	E472	0.0020	mg/kg		0.0064	0.0083	0.0074	0.0156	----
uranium	7440-61-1	E440	0.0020	mg/kg		----	----	----	----	<0.0020
vanadium	7440-62-2	E472	0.10	mg/kg		0.16	0.26	0.28	0.63	----
vanadium	7440-62-2	E440	0.10	mg/kg		----	----	----	----	<0.10
zinc	7440-66-6	E440	0.50	mg/kg		----	----	----	----	38.5
zinc	7440-66-6	E472	1.0	mg/kg		272	321	164	136	----
zirconium	7440-67-7	E472	0.20	mg/kg		<0.20	<0.20	<0.20	<0.20	----
zirconium	7440-67-7	E440	0.20	mg/kg		----	----	----	----	<0.20

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	POL_LSU-M-2_ 2022-05	POL_LSU-M-3_ 2022-05	POL_LSU-M-4_ 2022-05	POL_LSU-M-5_ 2022-05	POL_LSU-M-6_ 2022-05
					Client sampling date / time	28-May-2022	28-May-2022	28-May-2022	28-May-2022	28-May-2022
						VA22B2820-066	VA22B2820-067	VA22B2820-068	VA22B2820-069	VA22B2820-070
						Result	Result	Result	Result	Result
Physical Tests										
moisture	----	E144	0.50	%		74.1	79.2	77.9	78.5	77.0
Metals										
aluminum	7429-90-5	E440	2.0	mg/kg		2.4	<2.0	<2.0	3.5	4.0
antimony	7440-36-0	E440	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	<0.010
arsenic	7440-38-2	E440	0.020	mg/kg		0.145	0.092	0.110	0.144	0.184
barium	7440-39-3	E440	0.050	mg/kg		0.976	0.922	0.804	1.01	0.725
beryllium	7440-41-7	E440	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	<0.010
bismuth	7440-69-9	E440	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	<0.010
boron	7440-42-8	E440	1.0	mg/kg		<1.0	<1.0	<1.0	<1.0	<1.0
cadmium	7440-43-9	E440	0.0050	mg/kg		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
calcium	7440-70-2	E440	20	mg/kg		238	433	913	844	698
cesium	7440-46-2	E440	0.0050	mg/kg		0.0446	0.162	0.148	0.0937	0.136
chromium	7440-47-3	E440	0.050	mg/kg		0.095	0.075	<0.050	0.116	0.210
cobalt	7440-48-4	E440	0.020	mg/kg		0.046	0.022	<0.020	<0.020	<0.020
copper	7440-50-8	E440	0.10	mg/kg		7.48	5.91	2.48	2.27	3.17
iron	7439-89-6	E440	3.0	mg/kg		90.4	64.7	31.5	22.2	30.5
lead	7439-92-1	E440	0.020	mg/kg		<0.020	<0.020	<0.020	<0.020	<0.020
lithium	7439-93-2	E440	0.50	mg/kg		<0.50	<0.50	<0.50	<0.50	<0.50
magnesium	7439-95-4	E440	2.0	mg/kg		775	1240	1500	1550	1430
manganese	7439-96-5	E440	0.050	mg/kg		1.11	0.832	1.38	1.49	1.37
mercury	7439-97-6	E510	0.0050	mg/kg		0.291	0.315	0.327	0.283	0.237
mercury	7439-97-6	E510A	0.0010	mg/kg wwt		0.0755	0.0656	0.0723	0.0610	0.0546
molybdenum	7439-98-7	E440	0.020	mg/kg		0.073	0.045	0.046	0.022	0.020
nickel	7440-02-0	E440	0.20	mg/kg		<0.20	<0.20	<0.20	<0.20	<0.20
phosphorus	7723-14-0	E440	10	mg/kg		9630	12200	12700	12800	11600
potassium	7440-09-7	E440	20	mg/kg		11800	19700	22600	21600	20200
rubidium	7440-17-7	E440	0.050	mg/kg		10.0	14.0	16.9	11.9	13.0
selenium	7782-49-2	E440	0.050	mg/kg		5.80	9.59	8.68	8.02	8.33
silver	7440-22-4	E440.Ag	0.0050	mg/kg		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
sodium	7440-23-5	E440	20	mg/kg		2050	1920	1660	1790	1420

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	POL_LSU-M-2_ 2022-05	POL_LSU-M-3_ 2022-05	POL_LSU-M-4_ 2022-05	POL_LSU-M-5_ 2022-05	POL_LSU-M-6_ 2022-05
					Client sampling date / time	28-May-2022	28-May-2022	28-May-2022	28-May-2022	28-May-2022
						VA22B2820-066	VA22B2820-067	VA22B2820-068	VA22B2820-069	VA22B2820-070
						Result	Result	Result	Result	Result
Metals										
strontium	7440-24-6	E440	0.050	mg/kg		0.278	0.413	1.15	0.950	0.744
tellurium	13494-80-9	E440	0.020	mg/kg		<0.020	<0.020	<0.020	<0.020	<0.020
thallium	7440-28-0	E440	0.0020	mg/kg		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
tin	7440-31-5	E440	0.10	mg/kg		0.47	0.32	0.21	0.51	0.70
titanium	7440-32-6	E440.Ti	0.25	mg/kg		<0.25	<0.25	<0.25	<0.25	0.27
uranium	7440-61-1	E440	0.0020	mg/kg		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
vanadium	7440-62-2	E440	0.10	mg/kg		<0.10	<0.10	<0.10	<0.10	<0.10
zinc	7440-66-6	E440	0.50	mg/kg		123	71.2	40.3	52.3	51.8
zirconium	7440-67-7	E440	0.20	mg/kg		<0.20	<0.20	<0.20	<0.20	0.28

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	POL_LSU-M-7_ 2022-05	POL_LSU-M-8_ 2022-05	----	----	----
					Client sampling date / time	28-May-2022	28-May-2022	----	----	----
						VA22B2820-071	VA22B2820-072	--------	--------	--------
						Result	Result	----	----	----
Physical Tests										
moisture	----	E144	0.50	%		77.7	76.0	----	----	----
Metals										
aluminum	7429-90-5	E440	2.0	mg/kg		<2.0	7.2	----	----	----
antimony	7440-36-0	E440	0.010	mg/kg		<0.010	<0.010	----	----	----
arsenic	7440-38-2	E440	0.020	mg/kg		0.105	0.101	----	----	----
barium	7440-39-3	E440	0.050	mg/kg		0.836	0.654	----	----	----
beryllium	7440-41-7	E440	0.010	mg/kg		<0.010	<0.010	----	----	----
bismuth	7440-69-9	E440	0.010	mg/kg		<0.010	<0.010	----	----	----
boron	7440-42-8	E440	1.0	mg/kg		<1.0	<1.0	----	----	----
cadmium	7440-43-9	E440	0.0050	mg/kg		<0.0050	<0.0050	----	----	----
calcium	7440-70-2	E440	20	mg/kg		1060	528	----	----	----
cesium	7440-46-2	E440	0.0050	mg/kg		0.100	0.0821	----	----	----
chromium	7440-47-3	E440	0.050	mg/kg		0.068	0.234	----	----	----
cobalt	7440-48-4	E440	0.020	mg/kg		<0.020	<0.020	----	----	----
copper	7440-50-8	E440	0.10	mg/kg		3.39	3.01	----	----	----
iron	7439-89-6	E440	3.0	mg/kg		33.9	37.7	----	----	----
lead	7439-92-1	E440	0.020	mg/kg		<0.020	<0.020	----	----	----
lithium	7439-93-2	E440	0.50	mg/kg		<0.50	<0.50	----	----	----
magnesium	7439-95-4	E440	2.0	mg/kg		1370	1350	----	----	----
manganese	7439-96-5	E440	0.050	mg/kg		1.50	0.985	----	----	----
mercury	7439-97-6	E510	0.0050	mg/kg		0.258	0.231	----	----	----
mercury	7439-97-6	E510A	0.0010	mg/kg wwt		0.0576	0.0556	----	----	----
molybdenum	7439-98-7	E440	0.020	mg/kg		0.027	0.023	----	----	----
nickel	7440-02-0	E440	0.20	mg/kg		<0.20	<0.20	----	----	----
phosphorus	7723-14-0	E440	10	mg/kg		12700	11200	----	----	----
potassium	7440-09-7	E440	20	mg/kg		22700	19200	----	----	----
rubidium	7440-17-7	E440	0.050	mg/kg		16.1	13.8	----	----	----
selenium	7782-49-2	E440	0.050	mg/kg		6.78	8.74	----	----	----
silver	7440-22-4	E440.Ag	0.0050	mg/kg		<0.0050	<0.0050	----	----	----
sodium	7440-23-5	E440	20	mg/kg		1870	1740	----	----	----

Analytical Results

Sub-Matrix: Tissue (Matrix: Biota)					Client sample ID	POL_LSU-M-7_2022-05	POL_LSU-M-8_2022-05	----	----	----
					Client sampling date / time	28-May-2022	28-May-2022	----	----	----
Analyte	CAS Number	Method	LOR	Unit		VA22B2820-071	VA22B2820-072	--------	--------	--------
						Result	Result	----	----	----
Metals										
strontium	7440-24-6	E440	0.050	mg/kg		1.53	0.555	----	----	----
tellurium	13494-80-9	E440	0.020	mg/kg		<0.020	<0.020	----	----	----
thallium	7440-28-0	E440	0.0020	mg/kg		<0.0020	<0.0020	----	----	----
tin	7440-31-5	E440	0.10	mg/kg		0.25	0.73	----	----	----
titanium	7440-32-6	E440.Ti	0.25	mg/kg		<0.25	<0.25	----	----	----
uranium	7440-61-1	E440	0.0020	mg/kg		<0.0020	<0.0020	----	----	----
vanadium	7440-62-2	E440	0.10	mg/kg		<0.10	<0.10	----	----	----
zinc	7440-66-6	E440	0.50	mg/kg		47.3	34.4	----	----	----
zirconium	7440-67-7	E440	0.20	mg/kg		<0.20	0.26	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

ALS Canada Ltd.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA22B2820**	Page	: 1 of 56
Amendment	: **1**		
Client	: **Mount Polley Mining Corporation**	Laboratory	: Vancouver - Environmental
Contact	: Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: ----	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 08-Jun-2022 10:30
PO	: 5590008044 Q2 2022	Issue Date	: 05-Dec-2022 22:21
C-O-C number	: ----		
Sampler	: LBO		
Site	: ----		
Quote number	: VA22-MPMC100-002		
No. of samples received	: 72		
No. of samples analysed	: 72		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- Duplicate outliers occur - please see following pages for full details.
- Laboratory Control Sample (LCS) outliers occur - please see following pages for full details.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- Reference Material (RM) Sample outliers occur - please see the following pages for full details.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- Quality Control Sample Frequency Outliers occur - please see following pages for full details.

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **Biota**

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment
Duplicate (DUP) RPDs								
Metals	Anonymous	Anonymous	chromium	7440-47-3	E472	0.41 % DUP-H, J	Diff <2x LOR	Low Level DUP DQO exceeded (difference > 2 LOR).
Laboratory Control Sample (LCS) Recoveries								
Metals	QC-MRG8-562335002	----	boron	7440-42-8	E472	72.6 % MES	80.0-120%	Recovery less than lower control limit
Metals	QC-MRG8-562335002	----	lithium	7439-93-2	E472	76.0 % MES	80.0-120%	Recovery less than lower control limit
Reference Material (RM) Sample								
Metals	QC-MRG8-562335003	----	lead	7439-92-1	E472	69.9 % MES	70.0-130%	Recovery less than lower control limit
Metals	QC-MRG8-562256003	----	nickel	7440-02-0	E472	136 % MES	70.0-130%	Recovery greater than upper control limit

Result Qualifiers

Qualifier	Description
DUP-H	*Duplicate results outside ALS DQO, due to sample heterogeneity.*
J	*Duplicate results and limits are expressed in terms of absolute difference.*

Result Qualifiers

Qualifier	Description
MES	*Data Quality Objective was marginally exceeded (by < 10% absolute) for < 10% of analytes in a Multi-Element Scan / Multi-Parameter Scan (considered acceptable as per OMOE & CCME).*

Result Qualifiers

Qualifier	Description
MES	*Data Quality Objective was marginally exceeded (by < 10% absolute) for < 10% of analytes in a Multi-Element Scan / Multi-Parameter Scan (considered acceptable as per OMOE & CCME).*

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag BOL_RB-Ki-2_2022-05	E511	30-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	52 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag BOL_RB-Ki-3_2022-05	E511	30-May-2022	19-Jul-2022	----	----		20-Jul-2022	365 days	52 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag BOL_RB-Ki-4_2022-05	E511	30-May-2022	19-Jul-2022	----	----		20-Jul-2022	365 days	52 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag BOL_RB-Ki-5_2022-05	E511	30-May-2022	19-Jul-2022	----	----		20-Jul-2022	365 days	52 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag BOL_RB-Ki-6_2022-05	E511	30-May-2022	19-Jul-2022	----	----		20-Jul-2022	365 days	52 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag BOL_RB-Ki-7_2022-05	E511	30-May-2022	19-Jul-2022	----	----		20-Jul-2022	365 days	52 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag BOL_RB-Ki-8_2022-05	E511	30-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	52 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag BOL_RB-Li-3_2022-05	E511	30-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	52 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag BOL_RB-Li-4_2022-05	E511	30-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	52 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag BOL_RB-Li-5_2022-05	E511	30-May-2022	19-Jul-2022	----	----		21-Jul-2022	365 days	52 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag BOL_RB-Li-6_2022-05	E511	30-May-2022	19-Jul-2022	----	----		20-Jul-2022	365 days	52 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag BOL_RB-Li-7_2022-05	E511	30-May-2022	19-Jul-2022	----	----		20-Jul-2022	365 days	52 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag BOL_RB-M-1_2022-05	E511	30-May-2022	19-Jul-2022	----	----		21-Jul-2022	365 days	52 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag BOL_RB-M-2_2022-05	E511	30-May-2022	19-Jul-2022	----	----		21-Jul-2022	365 days	52 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag BOL_RB-M-3_2022-05	E511	30-May-2022	19-Jul-2022	----	----		21-Jul-2022	365 days	52 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag BOL_RB-M-4_2022-05	E511	30-May-2022	20-Jul-2022	----	----		21-Jul-2022	365 days	52 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag BOL_RB-M-5_2022-05	E511	30-May-2022	20-Jul-2022	----	----		21-Jul-2022	365 days	52 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag BOL_RB-M-6_2022-05	E511	30-May-2022	19-Jul-2022	----	----		21-Jul-2022	365 days	52 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag BOL_RB-M-7_2022-05	E511	30-May-2022	19-Jul-2022	----	----		21-Jul-2022	365 days	52 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag BOL_RB-O-5_2022-05	E511	30-May-2022	20-Jul-2022	----	----		21-Jul-2022	365 days	52 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag BOL_RB-O-7_2022-05	E511	30-May-2022	20-Jul-2022	----	----		21-Jul-2022	365 days	52 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag POL_RB-Ki-2_2022-05	E511	29-May-2022	20-Jul-2022	----	----		21-Jul-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag POL_RB-Ki-3_2022-05	E511	29-May-2022	20-Jul-2022	----	----		21-Jul-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag POL_RB-Ki-4_2022-05	E511	29-May-2022	20-Jul-2022	----	----		21-Jul-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag POL_RB-Ki-5_2022-05	E511	29-May-2022	20-Jul-2022	----	----		21-Jul-2022	365 days	53 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag POL_RB-Ki-6_2022-05	E511	29-May-2022	20-Jul-2022	----	----		21-Jul-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag POL_RB-Ki-7_2022-05	E511	29-May-2022	20-Jul-2022	----	----		21-Jul-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag POL_RB-Ki-8_2022-05	E511	29-May-2022	20-Jul-2022	----	----		21-Jul-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag POL_RB-Li-2_2022-05	E511	29-May-2022	19-Jul-2022	----	----		21-Jul-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag POL_RB-Li-3_2022-05	E511	29-May-2022	20-Jul-2022	----	----		21-Jul-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag POL_RB-Li-4_2022-05	E511	29-May-2022	20-Jul-2022	----	----		21-Jul-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag POL_RB-Li-5_2022-05	E511	29-May-2022	20-Jul-2022	----	----		21-Jul-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag POL_RB-Li-6_2022-05	E511	29-May-2022	20-Jul-2022	----	----		21-Jul-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag POL_RB-Li-7_2022-05	E511	29-May-2022	20-Jul-2022	----	----		21-Jul-2022	365 days	53 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag POL_RB-Li-8_2022-05	E511	29-May-2022	20-Jul-2022	----	----		21-Jul-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag POL_RB-M-2_2022-05	E511	29-May-2022	19-Jul-2022	----	----		21-Jul-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag POL_RB-M-3_2022-05	E511	29-May-2022	19-Jul-2022	----	----		21-Jul-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag POL_RB-M-4_2022-05	E511	29-May-2022	19-Jul-2022	----	----		21-Jul-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag POL_RB-M-5_2022-05	E511	29-May-2022	19-Jul-2022	----	----		21-Jul-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag POL_RB-M-6_2022-05	E511	29-May-2022	19-Jul-2022	----	----		21-Jul-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag POL_RB-M-7_2022-05	E511	29-May-2022	19-Jul-2022	----	----		21-Jul-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag POL_RB-M-8_2022-05	E511	29-May-2022	19-Jul-2022	----	----		21-Jul-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag POL_RB-O-2_2022-05	E511	29-May-2022	19-Jul-2022	----	----		21-Jul-2022	365 days	53 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag POL_RB-O-4_2022-05	E511	29-May-2022	19-Jul-2022	----	----		21-Jul-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag POL_RB-O-5_2022-05	E511	29-May-2022	20-Jul-2022	----	----		21-Jul-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag POL_RB-Ki-1_2022-05	E511	28-May-2022	20-Jul-2022	----	----		21-Jul-2022	365 days	54 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag POL_RB-Li-1_2022-05	E511	28-May-2022	19-Jul-2022	----	----		21-Jul-2022	365 days	54 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag POL_RB-M-1_2022-05	E511	28-May-2022	19-Jul-2022	----	----		21-Jul-2022	365 days	54 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag BOL_RB-O-1_2022-05	E510	30-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	51 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag BOL_RB-Ki-1_2022-05	E510	30-May-2022	18-Jul-2022	----	----		20-Jul-2022	365 days	52 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag BOL_RB-Li-1_2022-05	E510	30-May-2022	18-Jul-2022	----	----		20-Jul-2022	365 days	52 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag BOL_RB-Li-2_2022-05	E510	30-May-2022	18-Jul-2022	----	----		20-Jul-2022	365 days	52 days	✓

Matrix: **Biota**

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Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag BOL_RB-Li-8_2022-05	E510	30-May-2022	18-Jul-2022	----	----		20-Jul-2022	365 days	52 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag BOL_RB-M-8_2022-05	E510	30-May-2022	18-Jul-2022	----	----		20-Jul-2022	365 days	52 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag BOL_RB-O-2_2022-05	E510	30-May-2022	18-Jul-2022	----	----		20-Jul-2022	365 days	52 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag BOL_RB-O-3_2022-05	E510	30-May-2022	18-Jul-2022	----	----		20-Jul-2022	365 days	52 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag BOL_RB-O-4_2022-05	E510	30-May-2022	18-Jul-2022	----	----		20-Jul-2022	365 days	52 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag BOL_RB-O-6_2022-05	E510	30-May-2022	18-Jul-2022	----	----		20-Jul-2022	365 days	52 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag BOL_RB-O-8_2022-05	E510	30-May-2022	18-Jul-2022	----	----		20-Jul-2022	365 days	52 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag POL_LSU-M-6_2022-05	E510	28-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag POL_LSU-M-7_2022-05	E510	28-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	53 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag POL_LSU-M-8_2022-05	E510	28-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag POL_RB-O-3_2022-05	E510	29-May-2022	18-Jul-2022	----	----		20-Jul-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag POL_RB-O-6_2022-05	E510	29-May-2022	18-Jul-2022	----	----		20-Jul-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag POL_RB-O-7_2022-05	E510	29-May-2022	18-Jul-2022	----	----		20-Jul-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag POL_RB-O-8_2022-05	E510	29-May-2022	18-Jul-2022	----	----		20-Jul-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag POL_LSU-M-1_2022-05	E510	28-May-2022	18-Jul-2022	----	----		20-Jul-2022	365 days	54 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag POL_LSU-M-2_2022-05	E510	28-May-2022	18-Jul-2022	----	----		20-Jul-2022	365 days	54 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag POL_LSU-M-3_2022-05	E510	28-May-2022	18-Jul-2022	----	----		20-Jul-2022	365 days	54 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag POL_LSU-M-4_2022-05	E510	28-May-2022	18-Jul-2022	----	----		20-Jul-2022	365 days	54 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag POL_LSU-M-5_2022-05	E510	28-May-2022	18-Jul-2022	----	----		20-Jul-2022	365 days	54 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag POL_RB-O-1_2022-05	E510	28-May-2022	18-Jul-2022	----	----		20-Jul-2022	365 days	54 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Micro)										
LDPE bag BOL_RB-Ki-8_2022-05	E511A	30-May-2022	18-Oct-2022	----	----		18-Oct-2022	365 days	142 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Micro)										
LDPE bag BOL_RB-M-4_2022-05	E511A	30-May-2022	18-Oct-2022	----	----		18-Oct-2022	365 days	142 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Micro)										
LDPE bag BOL_RB-Ki-2_2022-05	E511A	30-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	52 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Micro)										
LDPE bag BOL_RB-Ki-3_2022-05	E511A	30-May-2022	19-Jul-2022	----	----		20-Jul-2022	365 days	52 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Micro)										
LDPE bag BOL_RB-Ki-4_2022-05	E511A	30-May-2022	19-Jul-2022	----	----		20-Jul-2022	365 days	52 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Micro)										
LDPE bag BOL_RB-Ki-5_2022-05	E511A	30-May-2022	19-Jul-2022	----	----		20-Jul-2022	365 days	52 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Micro)										
LDPE bag BOL_RB-Ki-6_2022-05	E511A	30-May-2022	19-Jul-2022	----	----		20-Jul-2022	365 days	52 days	✓

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Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Biota by CVAAS (WET units, Micro)										
LDPE bag BOL_RB-Ki-7_2022-05	E511A	30-May-2022	19-Jul-2022	----	----		20-Jul-2022	365 days	52 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Micro)										
LDPE bag BOL_RB-Li-3_2022-05	E511A	30-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	52 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Micro)										
LDPE bag BOL_RB-Li-4_2022-05	E511A	30-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	52 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Micro)										
LDPE bag BOL_RB-Li-5_2022-05	E511A	30-May-2022	19-Jul-2022	----	----		21-Jul-2022	365 days	52 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Micro)										
LDPE bag BOL_RB-Li-6_2022-05	E511A	30-May-2022	19-Jul-2022	----	----		20-Jul-2022	365 days	52 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Micro)										
LDPE bag BOL_RB-Li-7_2022-05	E511A	30-May-2022	19-Jul-2022	----	----		20-Jul-2022	365 days	52 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Micro)										
LDPE bag BOL_RB-M-1_2022-05	E511A	30-May-2022	19-Jul-2022	----	----		21-Jul-2022	365 days	52 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Micro)										
LDPE bag BOL_RB-M-2_2022-05	E511A	30-May-2022	19-Jul-2022	----	----		21-Jul-2022	365 days	52 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Micro)										
LDPE bag BOL_RB-M-3_2022-05	E511A	30-May-2022	19-Jul-2022	----	----		21-Jul-2022	365 days	52 days	✓

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			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Biota by CVAAS (WET units, Micro)										
LDPE bag BOL_RB-M-5_2022-05	E511A	30-May-2022	20-Jul-2022	----	----		21-Jul-2022	365 days	52 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Micro)										
LDPE bag BOL_RB-M-6_2022-05	E511A	30-May-2022	19-Jul-2022	----	----		21-Jul-2022	365 days	52 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Micro)										
LDPE bag BOL_RB-M-7_2022-05	E511A	30-May-2022	19-Jul-2022	----	----		21-Jul-2022	365 days	52 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Micro)										
LDPE bag BOL_RB-O-5_2022-05	E511A	30-May-2022	20-Jul-2022	----	----		21-Jul-2022	365 days	52 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Micro)										
LDPE bag BOL_RB-O-7_2022-05	E511A	30-May-2022	20-Jul-2022	----	----		21-Jul-2022	365 days	52 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Micro)										
LDPE bag POL_RB-Ki-2_2022-05	E511A	29-May-2022	20-Jul-2022	----	----		21-Jul-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Micro)										
LDPE bag POL_RB-Ki-3_2022-05	E511A	29-May-2022	20-Jul-2022	----	----		21-Jul-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Micro)										
LDPE bag POL_RB-Ki-4_2022-05	E511A	29-May-2022	20-Jul-2022	----	----		21-Jul-2022	365 days	53 days	✓
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LDPE bag POL_RB-Ki-5_2022-05	E511A	29-May-2022	20-Jul-2022	----	----		21-Jul-2022	365 days	53 days	✓

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			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Biota by CVAAS (WET units, Micro)										
LDPE bag POL_RB-Ki-6_2022-05	E511A	29-May-2022	20-Jul-2022	----	----		21-Jul-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Micro)										
LDPE bag POL_RB-Ki-7_2022-05	E511A	29-May-2022	20-Jul-2022	----	----		21-Jul-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Micro)										
LDPE bag POL_RB-Ki-8_2022-05	E511A	29-May-2022	20-Jul-2022	----	----		21-Jul-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Micro)										
LDPE bag POL_RB-Li-2_2022-05	E511A	29-May-2022	19-Jul-2022	----	----		21-Jul-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Micro)										
LDPE bag POL_RB-Li-3_2022-05	E511A	29-May-2022	20-Jul-2022	----	----		21-Jul-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Micro)										
LDPE bag POL_RB-Li-4_2022-05	E511A	29-May-2022	20-Jul-2022	----	----		21-Jul-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Micro)										
LDPE bag POL_RB-Li-5_2022-05	E511A	29-May-2022	20-Jul-2022	----	----		21-Jul-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Micro)										
LDPE bag POL_RB-Li-6_2022-05	E511A	29-May-2022	20-Jul-2022	----	----		21-Jul-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Micro)										
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Metals : Mercury in Biota by CVAAS (WET units, Micro)										
LDPE bag POL_RB-M-2_2022-05	E511A	29-May-2022	19-Jul-2022	----	----		21-Jul-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Micro)										
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Metals : Mercury in Biota by CVAAS (WET units, Micro)										
LDPE bag POL_RB-M-4_2022-05	E511A	29-May-2022	19-Jul-2022	----	----		21-Jul-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Micro)										
LDPE bag POL_RB-M-5_2022-05	E511A	29-May-2022	19-Jul-2022	----	----		21-Jul-2022	365 days	53 days	✓
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Metals : Mercury in Biota by CVAAS (WET units, Micro)										
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Metals : Mercury in Biota by CVAAS (WET units, Micro)										
LDPE bag POL_RB-Ki-1_2022-05	E511A	28-May-2022	20-Jul-2022	----	----		21-Jul-2022	365 days	54 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Micro)										
LDPE bag POL_RB-Li-1_2022-05	E511A	28-May-2022	19-Jul-2022	----	----		21-Jul-2022	365 days	54 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Micro)										
LDPE bag POL_RB-M-1_2022-05	E511A	28-May-2022	19-Jul-2022	----	----		21-Jul-2022	365 days	54 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag BOL_RB-O-1_2022-05	E510A	30-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	51 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag BOL_RB-Ki-1_2022-05	E510A	30-May-2022	18-Jul-2022	----	----		20-Jul-2022	365 days	52 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag BOL_RB-Li-1_2022-05	E510A	30-May-2022	18-Jul-2022	----	----		20-Jul-2022	365 days	52 days	✓
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LDPE bag BOL_RB-Li-8_2022-05	E510A	30-May-2022	18-Jul-2022	----	----		20-Jul-2022	365 days	52 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag BOL_RB-M-8_2022-05	E510A	30-May-2022	18-Jul-2022	----	----		20-Jul-2022	365 days	52 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag BOL_RB-O-2_2022-05	E510A	30-May-2022	18-Jul-2022	----	----		20-Jul-2022	365 days	52 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag BOL_RB-O-3_2022-05	E510A	30-May-2022	18-Jul-2022	----	----		20-Jul-2022	365 days	52 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag BOL_RB-O-4_2022-05	E510A	30-May-2022	18-Jul-2022	----	----		20-Jul-2022	365 days	52 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag BOL_RB-O-6_2022-05	E510A	30-May-2022	18-Jul-2022	----	----		20-Jul-2022	365 days	52 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag BOL_RB-O-8_2022-05	E510A	30-May-2022	18-Jul-2022	----	----		20-Jul-2022	365 days	52 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag POL_LSU-M-6_2022-05	E510A	28-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag POL_LSU-M-7_2022-05	E510A	28-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	53 days	✓

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Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag POL_LSU-M-8_2022-05	E510A	28-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag POL_RB-O-3_2022-05	E510A	29-May-2022	18-Jul-2022	----	----		20-Jul-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag POL_RB-O-6_2022-05	E510A	29-May-2022	18-Jul-2022	----	----		20-Jul-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag POL_RB-O-7_2022-05	E510A	29-May-2022	18-Jul-2022	----	----		20-Jul-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag POL_RB-O-8_2022-05	E510A	29-May-2022	18-Jul-2022	----	----		20-Jul-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag POL_LSU-M-1_2022-05	E510A	28-May-2022	18-Jul-2022	----	----		20-Jul-2022	365 days	54 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag POL_LSU-M-2_2022-05	E510A	28-May-2022	18-Jul-2022	----	----		20-Jul-2022	365 days	54 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag POL_LSU-M-3_2022-05	E510A	28-May-2022	18-Jul-2022	----	----		20-Jul-2022	365 days	54 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag POL_LSU-M-4_2022-05	E510A	28-May-2022	18-Jul-2022	----	----		20-Jul-2022	365 days	54 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag POL_LSU-M-5_2022-05	E510A	28-May-2022	18-Jul-2022	----	----		20-Jul-2022	365 days	54 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag POL_RB-O-1_2022-05	E510A	28-May-2022	18-Jul-2022	----	----		20-Jul-2022	365 days	54 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag BOL_RB-Ki-2_2022-05	E472	30-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	47 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag BOL_RB-Ki-8_2022-05	E472	30-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	47 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag BOL_RB-Li-3_2022-05	E472	30-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	47 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag BOL_RB-Li-4_2022-05	E472	30-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	47 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag BOL_RB-Ki-3_2022-05	E472	30-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	52 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag BOL_RB-Ki-4_2022-05	E472	30-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	52 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag BOL_RB-Ki-5_2022-05	E472	30-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	52 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag BOL_RB-Ki-6_2022-05	E472	30-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	52 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag BOL_RB-Ki-7_2022-05	E472	30-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	52 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag BOL_RB-Li-5_2022-05	E472	30-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	52 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag BOL_RB-Li-6_2022-05	E472	30-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	52 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag BOL_RB-Li-7_2022-05	E472	30-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	52 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag BOL_RB-M-1_2022-05	E472	30-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	52 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag BOL_RB-M-2_2022-05	E472	30-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	52 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag BOL_RB-M-3_2022-05	E472	30-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	52 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag BOL_RB-M-4_2022-05	E472	30-May-2022	20-Jul-2022	----	----		20-Jul-2022	730 days	52 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag BOL_RB-M-5_2022-05	E472	30-May-2022	20-Jul-2022	----	----		20-Jul-2022	730 days	52 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag BOL_RB-M-6_2022-05	E472	30-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	52 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag BOL_RB-M-7_2022-05	E472	30-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	52 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag BOL_RB-O-5_2022-05	E472	30-May-2022	20-Jul-2022	----	----		20-Jul-2022	730 days	52 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag BOL_RB-O-7_2022-05	E472	30-May-2022	20-Jul-2022	----	----		20-Jul-2022	730 days	52 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_RB-Ki-2_2022-05	E472	29-May-2022	20-Jul-2022	----	----		20-Jul-2022	730 days	53 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_RB-Ki-3_2022-05	E472	29-May-2022	20-Jul-2022	----	----		20-Jul-2022	730 days	53 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_RB-Ki-4_2022-05	E472	29-May-2022	20-Jul-2022	----	----		20-Jul-2022	730 days	53 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_RB-Ki-5_2022-05	E472	29-May-2022	20-Jul-2022	----	----		20-Jul-2022	730 days	53 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_RB-Ki-6_2022-05	E472	29-May-2022	20-Jul-2022	----	----		20-Jul-2022	730 days	53 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_RB-Ki-7_2022-05	E472	29-May-2022	20-Jul-2022	----	----		20-Jul-2022	730 days	53 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_RB-Ki-8_2022-05	E472	29-May-2022	20-Jul-2022	----	----		20-Jul-2022	730 days	53 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_RB-Li-2_2022-05	E472	29-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	53 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_RB-Li-3_2022-05	E472	29-May-2022	20-Jul-2022	----	----		20-Jul-2022	730 days	53 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_RB-Li-4_2022-05	E472	29-May-2022	20-Jul-2022	----	----		20-Jul-2022	730 days	53 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_RB-Li-5_2022-05	E472	29-May-2022	20-Jul-2022	----	----		20-Jul-2022	730 days	53 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_RB-Li-6_2022-05	E472	29-May-2022	20-Jul-2022	----	----		20-Jul-2022	730 days	53 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_RB-Li-7_2022-05	E472	29-May-2022	20-Jul-2022	----	----		20-Jul-2022	730 days	53 days	✓

Matrix: **Biota**

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Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_RB-Li-8_2022-05	E472	29-May-2022	20-Jul-2022	----	----		20-Jul-2022	730 days	53 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_RB-M-2_2022-05	E472	29-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	53 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_RB-M-3_2022-05	E472	29-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	53 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_RB-M-4_2022-05	E472	29-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	53 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_RB-M-5_2022-05	E472	29-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	53 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_RB-M-6_2022-05	E472	29-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	53 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_RB-M-7_2022-05	E472	29-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	53 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_RB-M-8_2022-05	E472	29-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	53 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_RB-O-2_2022-05	E472	29-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	53 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_RB-O-4_2022-05	E472	29-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	53 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_RB-O-5_2022-05	E472	29-May-2022	20-Jul-2022	----	----		20-Jul-2022	730 days	53 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_RB-Ki-1_2022-05	E472	28-May-2022	20-Jul-2022	----	----		20-Jul-2022	730 days	54 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_RB-Li-1_2022-05	E472	28-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	54 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_RB-M-1_2022-05	E472	28-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	54 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_RB-O-1_2022-05	E440	30-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	46 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag POL_LSU-M-6_2022-05	E440	28-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	48 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag POL_LSU-M-7_2022-05	E440	28-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	48 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag POL_LSU-M-8_2022-05	E440	28-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	48 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_RB-Ki-1_2022-05	E440	30-May-2022	18-Jul-2022	----	----		18-Jul-2022	730 days	50 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_RB-Li-1_2022-05	E440	30-May-2022	18-Jul-2022	----	----		18-Jul-2022	730 days	50 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_RB-Li-2_2022-05	E440	30-May-2022	18-Jul-2022	----	----		18-Jul-2022	730 days	50 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_RB-Li-8_2022-05	E440	30-May-2022	18-Jul-2022	----	----		18-Jul-2022	730 days	50 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_RB-M-8_2022-05	E440	30-May-2022	18-Jul-2022	----	----		18-Jul-2022	730 days	50 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_RB-O-2_2022-05	E440	30-May-2022	18-Jul-2022	----	----		18-Jul-2022	730 days	50 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_RB-O-3_2022-05	E440	30-May-2022	18-Jul-2022	----	----		18-Jul-2022	730 days	50 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_RB-O-4_2022-05	E440	30-May-2022	18-Jul-2022	----	----		18-Jul-2022	730 days	50 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_RB-O-6_2022-05	E440	30-May-2022	18-Jul-2022	----	----		18-Jul-2022	730 days	50 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_RB-O-8_2022-05	E440	30-May-2022	18-Jul-2022	----	----		18-Jul-2022	730 days	50 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag POL_RB-O-3_2022-05	E440	29-May-2022	18-Jul-2022	----	----		18-Jul-2022	730 days	51 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag POL_RB-O-6_2022-05	E440	29-May-2022	18-Jul-2022	----	----		18-Jul-2022	730 days	51 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag POL_RB-O-7_2022-05	E440	29-May-2022	18-Jul-2022	----	----		18-Jul-2022	730 days	51 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag POL_RB-O-8_2022-05	E440	29-May-2022	18-Jul-2022	----	----		18-Jul-2022	730 days	51 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag POL_LSU-M-1_2022-05	E440	28-May-2022	18-Jul-2022	----	----		18-Jul-2022	730 days	52 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag POL_LSU-M-2_2022-05	E440	28-May-2022	18-Jul-2022	----	----		18-Jul-2022	730 days	52 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag POL_LSU-M-3_2022-05	E440	28-May-2022	18-Jul-2022	----	----		18-Jul-2022	730 days	52 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag POL_LSU-M-4_2022-05	E440	28-May-2022	18-Jul-2022	----	----		18-Jul-2022	730 days	52 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag POL_LSU-M-5_2022-05	E440	28-May-2022	18-Jul-2022	----	----		18-Jul-2022	730 days	52 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag POL_RB-O-1_2022-05	E440	28-May-2022	18-Jul-2022	----	----		18-Jul-2022	730 days	52 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag BOL_RB-Ki-2_2022-05	E472.Ag	30-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	47 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag BOL_RB-Ki-8_2022-05	E472.Ag	30-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	47 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag BOL_RB-Li-3_2022-05	E472.Ag	30-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	47 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag BOL_RB-Li-4_2022-05	E472.Ag	30-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	47 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag BOL_RB-Ki-3_2022-05	E472.Ag	30-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	52 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag BOL_RB-Ki-4_2022-05	E472.Ag	30-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	52 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag BOL_RB-Ki-5_2022-05	E472.Ag	30-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	52 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag BOL_RB-Ki-6_2022-05	E472.Ag	30-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	52 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag BOL_RB-Ki-7_2022-05	E472.Ag	30-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	52 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag BOL_RB-Li-5_2022-05	E472.Ag	30-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	52 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag BOL_RB-Li-6_2022-05	E472.Ag	30-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	52 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag BOL_RB-Li-7_2022-05	E472.Ag	30-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	52 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag BOL_RB-M-1_2022-05	E472.Ag	30-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	52 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag BOL_RB-M-2_2022-05	E472.Ag	30-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	52 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag BOL_RB-M-3_2022-05	E472.Ag	30-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	52 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag BOL_RB-M-4_2022-05	E472.Ag	30-May-2022	20-Jul-2022	----	----		20-Jul-2022	730 days	52 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag BOL_RB-M-5_2022-05	E472.Ag	30-May-2022	20-Jul-2022	----	----		20-Jul-2022	730 days	52 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag BOL_RB-M-6_2022-05	E472.Ag	30-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	52 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag BOL_RB-M-7_2022-05	E472.Ag	30-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	52 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag BOL_RB-O-5_2022-05	E472.Ag	30-May-2022	20-Jul-2022	----	----		20-Jul-2022	730 days	52 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag BOL_RB-O-7_2022-05	E472.Ag	30-May-2022	20-Jul-2022	----	----		20-Jul-2022	730 days	52 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_RB-Ki-2_2022-05	E472.Ag	29-May-2022	20-Jul-2022	----	----		20-Jul-2022	730 days	53 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_RB-Ki-3_2022-05	E472.Ag	29-May-2022	20-Jul-2022	----	----		20-Jul-2022	730 days	53 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_RB-Ki-4_2022-05	E472.Ag	29-May-2022	20-Jul-2022	----	----		20-Jul-2022	730 days	53 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_RB-Ki-5_2022-05	E472.Ag	29-May-2022	20-Jul-2022	----	----		20-Jul-2022	730 days	53 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_RB-Ki-6_2022-05	E472.Ag	29-May-2022	20-Jul-2022	----	----		20-Jul-2022	730 days	53 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_RB-Ki-7_2022-05	E472.Ag	29-May-2022	20-Jul-2022	----	----		20-Jul-2022	730 days	53 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_RB-Ki-8_2022-05	E472.Ag	29-May-2022	20-Jul-2022	----	----		20-Jul-2022	730 days	53 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_RB-Li-2_2022-05	E472.Ag	29-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	53 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_RB-Li-3_2022-05	E472.Ag	29-May-2022	20-Jul-2022	----	----		20-Jul-2022	730 days	53 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_RB-Li-4_2022-05	E472.Ag	29-May-2022	20-Jul-2022	----	----		20-Jul-2022	730 days	53 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_RB-Li-5_2022-05	E472.Ag	29-May-2022	20-Jul-2022	----	----		20-Jul-2022	730 days	53 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_RB-Li-6_2022-05	E472.Ag	29-May-2022	20-Jul-2022	----	----		20-Jul-2022	730 days	53 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_RB-Li-7_2022-05	E472.Ag	29-May-2022	20-Jul-2022	----	----		20-Jul-2022	730 days	53 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_RB-Li-8_2022-05	E472.Ag	29-May-2022	20-Jul-2022	----	----		20-Jul-2022	730 days	53 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_RB-M-2_2022-05	E472.Ag	29-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	53 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_RB-M-3_2022-05	E472.Ag	29-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	53 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_RB-M-4_2022-05	E472.Ag	29-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	53 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_RB-M-5_2022-05	E472.Ag	29-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	53 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_RB-M-6_2022-05	E472.Ag	29-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	53 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_RB-M-7_2022-05	E472.Ag	29-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	53 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_RB-M-8_2022-05	E472.Ag	29-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	53 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_RB-O-2_2022-05	E472.Ag	29-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	53 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_RB-O-4_2022-05	E472.Ag	29-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	53 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_RB-O-5_2022-05	E472.Ag	29-May-2022	20-Jul-2022	----	----		20-Jul-2022	730 days	53 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_RB-Ki-1_2022-05	E472.Ag	28-May-2022	20-Jul-2022	----	----		20-Jul-2022	730 days	54 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_RB-Li-1_2022-05	E472.Ag	28-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	54 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_RB-M-1_2022-05	E472.Ag	28-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	54 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_RB-O-1_2022-05	E440.Ag	30-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	46 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag POL_LSU-M-6_2022-05	E440.Ag	28-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	48 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag POL_LSU-M-7_2022-05	E440.Ag	28-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	48 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag POL_LSU-M-8_2022-05	E440.Ag	28-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	48 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_RB-Ki-1_2022-05	E440.Ag	30-May-2022	18-Jul-2022	----	----		18-Jul-2022	730 days	50 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_RB-Li-1_2022-05	E440.Ag	30-May-2022	18-Jul-2022	----	----		18-Jul-2022	730 days	50 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_RB-Li-2_2022-05	E440.Ag	30-May-2022	18-Jul-2022	----	----		18-Jul-2022	730 days	50 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_RB-Li-8_2022-05	E440.Ag	30-May-2022	18-Jul-2022	----	----		18-Jul-2022	730 days	50 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_RB-M-8_2022-05	E440.Ag	30-May-2022	18-Jul-2022	----	----		18-Jul-2022	730 days	50 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_RB-O-2_2022-05	E440.Ag	30-May-2022	18-Jul-2022	----	----		18-Jul-2022	730 days	50 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_RB-O-3_2022-05	E440.Ag	30-May-2022	18-Jul-2022	----	----		18-Jul-2022	730 days	50 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_RB-O-4_2022-05	E440.Ag	30-May-2022	18-Jul-2022	----	----		18-Jul-2022	730 days	50 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_RB-O-6_2022-05	E440.Ag	30-May-2022	18-Jul-2022	----	----		18-Jul-2022	730 days	50 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_RB-O-8_2022-05	E440.Ag	30-May-2022	18-Jul-2022	----	----		18-Jul-2022	730 days	50 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag POL_RB-O-3_2022-05	E440.Ag	29-May-2022	18-Jul-2022	----	----		18-Jul-2022	730 days	51 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag POL_RB-O-6_2022-05	E440.Ag	29-May-2022	18-Jul-2022	----	----		18-Jul-2022	730 days	51 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag POL_RB-O-7_2022-05	E440.Ag	29-May-2022	18-Jul-2022	----	----		18-Jul-2022	730 days	51 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag POL_RB-O-8_2022-05	E440.Ag	29-May-2022	18-Jul-2022	----	----		18-Jul-2022	730 days	51 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag POL_LSU-M-1_2022-05	E440.Ag	28-May-2022	18-Jul-2022	----	----		18-Jul-2022	730 days	52 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag POL_LSU-M-2_2022-05	E440.Ag	28-May-2022	18-Jul-2022	----	----		18-Jul-2022	730 days	52 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag POL_LSU-M-3_2022-05	E440.Ag	28-May-2022	18-Jul-2022	----	----		18-Jul-2022	730 days	52 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag POL_LSU-M-4_2022-05	E440.Ag	28-May-2022	18-Jul-2022	----	----		18-Jul-2022	730 days	52 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag POL_LSU-M-5_2022-05	E440.Ag	28-May-2022	18-Jul-2022	----	----		18-Jul-2022	730 days	52 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag POL_RB-O-1_2022-05	E440.Ag	28-May-2022	18-Jul-2022	----	----		18-Jul-2022	730 days	52 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag BOL_RB-Ki-2_2022-05	E472.Ti	30-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	47 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag BOL_RB-Ki-8_2022-05	E472.Ti	30-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	47 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag BOL_RB-Li-3_2022-05	E472.Ti	30-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	47 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag BOL_RB-Li-4_2022-05	E472.Ti	30-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	47 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag BOL_RB-Ki-3_2022-05	E472.Ti	30-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	52 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag BOL_RB-Ki-4_2022-05	E472.Ti	30-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	52 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag BOL_RB-Ki-5_2022-05	E472.Ti	30-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	52 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag BOL_RB-Ki-6_2022-05	E472.Ti	30-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	52 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag BOL_RB-Ki-7_2022-05	E472.Ti	30-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	52 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag BOL_RB-Li-5_2022-05	E472.Ti	30-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	52 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag BOL_RB-Li-6_2022-05	E472.Ti	30-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	52 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag BOL_RB-Li-7_2022-05	E472.Ti	30-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	52 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag BOL_RB-M-1_2022-05	E472.Ti	30-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	52 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag BOL_RB-M-2_2022-05	E472.Ti	30-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	52 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag BOL_RB-M-3_2022-05	E472.Ti	30-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	52 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag BOL_RB-M-4_2022-05	E472.Ti	30-May-2022	20-Jul-2022	----	----		20-Jul-2022	730 days	52 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag BOL_RB-M-5_2022-05	E472.Ti	30-May-2022	20-Jul-2022	----	----		20-Jul-2022	730 days	52 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag BOL_RB-M-6_2022-05	E472.Ti	30-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	52 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag BOL_RB-M-7_2022-05	E472.Ti	30-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	52 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag BOL_RB-O-5_2022-05	E472.Ti	30-May-2022	20-Jul-2022	----	----		20-Jul-2022	730 days	52 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag BOL_RB-O-7_2022-05	E472.Ti	30-May-2022	20-Jul-2022	----	----		20-Jul-2022	730 days	52 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_RB-Ki-2_2022-05	E472.Ti	29-May-2022	20-Jul-2022	----	----		20-Jul-2022	730 days	53 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_RB-Ki-3_2022-05	E472.Ti	29-May-2022	20-Jul-2022	----	----		20-Jul-2022	730 days	53 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_RB-Ki-4_2022-05	E472.Ti	29-May-2022	20-Jul-2022	----	----		20-Jul-2022	730 days	53 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_RB-Ki-5_2022-05	E472.Ti	29-May-2022	20-Jul-2022	----	----		20-Jul-2022	730 days	53 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_RB-Ki-6_2022-05	E472.Ti	29-May-2022	20-Jul-2022	----	----		20-Jul-2022	730 days	53 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_RB-Ki-7_2022-05	E472.Ti	29-May-2022	20-Jul-2022	----	----		20-Jul-2022	730 days	53 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_RB-Ki-8_2022-05	E472.Ti	29-May-2022	20-Jul-2022	----	----		20-Jul-2022	730 days	53 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_RB-Li-2_2022-05	E472.Ti	29-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	53 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_RB-Li-3_2022-05	E472.Ti	29-May-2022	20-Jul-2022	----	----		20-Jul-2022	730 days	53 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_RB-Li-4_2022-05	E472.Ti	29-May-2022	20-Jul-2022	----	----		20-Jul-2022	730 days	53 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_RB-Li-5_2022-05	E472.Ti	29-May-2022	20-Jul-2022	----	----		20-Jul-2022	730 days	53 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_RB-Li-6_2022-05	E472.Ti	29-May-2022	20-Jul-2022	----	----		20-Jul-2022	730 days	53 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_RB-Li-7_2022-05	E472.Ti	29-May-2022	20-Jul-2022	----	----		20-Jul-2022	730 days	53 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_RB-Li-8_2022-05	E472.Ti	29-May-2022	20-Jul-2022	----	----		20-Jul-2022	730 days	53 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_RB-M-2_2022-05	E472.Ti	29-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	53 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_RB-M-3_2022-05	E472.Ti	29-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	53 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_RB-M-4_2022-05	E472.Ti	29-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	53 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_RB-M-5_2022-05	E472.Ti	29-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	53 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_RB-M-6_2022-05	E472.Ti	29-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	53 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_RB-M-7_2022-05	E472.Ti	29-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	53 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_RB-M-8_2022-05	E472.Ti	29-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	53 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_RB-O-2_2022-05	E472.Ti	29-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	53 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_RB-O-4_2022-05	E472.Ti	29-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	53 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_RB-O-5_2022-05	E472.Ti	29-May-2022	20-Jul-2022	----	----		20-Jul-2022	730 days	53 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_RB-Ki-1_2022-05	E472.Ti	28-May-2022	20-Jul-2022	----	----		20-Jul-2022	730 days	54 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_RB-Li-1_2022-05	E472.Ti	28-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	54 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_RB-M-1_2022-05	E472.Ti	28-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	54 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_RB-O-1_2022-05	E440.Ti	30-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	46 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag POL_LSU-M-6_2022-05	E440.Ti	28-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	48 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag POL_LSU-M-7_2022-05	E440.Ti	28-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	48 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag POL_LSU-M-8_2022-05	E440.Ti	28-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	48 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_RB-Ki-1_2022-05	E440.Ti	30-May-2022	18-Jul-2022	----	----		18-Jul-2022	730 days	50 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_RB-Li-1_2022-05	E440.Ti	30-May-2022	18-Jul-2022	----	----		18-Jul-2022	730 days	50 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_RB-Li-2_2022-05	E440.Ti	30-May-2022	18-Jul-2022	----	----		18-Jul-2022	730 days	50 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_RB-Li-8_2022-05	E440.Ti	30-May-2022	18-Jul-2022	----	----		18-Jul-2022	730 days	50 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_RB-M-8_2022-05	E440.Ti	30-May-2022	18-Jul-2022	----	----		18-Jul-2022	730 days	50 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_RB-O-2_2022-05	E440.Ti	30-May-2022	18-Jul-2022	----	----		18-Jul-2022	730 days	50 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_RB-O-3_2022-05	E440.Ti	30-May-2022	18-Jul-2022	----	----		18-Jul-2022	730 days	50 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_RB-O-4_2022-05	E440.Ti	30-May-2022	18-Jul-2022	----	----		18-Jul-2022	730 days	50 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_RB-O-6_2022-05	E440.Ti	30-May-2022	18-Jul-2022	----	----		18-Jul-2022	730 days	50 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_RB-O-8_2022-05	E440.Ti	30-May-2022	18-Jul-2022	----	----		18-Jul-2022	730 days	50 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag POL_RB-O-3_2022-05	E440.Ti	29-May-2022	18-Jul-2022	----	----		18-Jul-2022	730 days	51 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag POL_RB-O-6_2022-05	E440.Ti	29-May-2022	18-Jul-2022	----	----		18-Jul-2022	730 days	51 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag POL_RB-O-7_2022-05	E440.Ti	29-May-2022	18-Jul-2022	----	----		18-Jul-2022	730 days	51 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag POL_RB-O-8_2022-05	E440.Ti	29-May-2022	18-Jul-2022	----	----		18-Jul-2022	730 days	51 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag POL_LSU-M-1_2022-05	E440.Ti	28-May-2022	18-Jul-2022	----	----		18-Jul-2022	730 days	52 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag POL_LSU-M-2_2022-05	E440.Ti	28-May-2022	18-Jul-2022	----	----		18-Jul-2022	730 days	52 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag POL_LSU-M-3_2022-05	E440.Ti	28-May-2022	18-Jul-2022	----	----		18-Jul-2022	730 days	52 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag POL_LSU-M-4_2022-05	E440.Ti	28-May-2022	18-Jul-2022	----	----		18-Jul-2022	730 days	52 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag POL_LSU-M-5_2022-05	E440.Ti	28-May-2022	18-Jul-2022	----	----		18-Jul-2022	730 days	52 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag POL_RB-O-1_2022-05	E440.Ti	28-May-2022	18-Jul-2022	----	----		18-Jul-2022	730 days	52 days	✓
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag BOL_RB-Ki-2_2022-05	E144-H	30-May-2022	----	----	----		12-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag BOL_RB-Ki-3_2022-05	E144-H	30-May-2022	----	----	----		12-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag BOL_RB-Ki-4_2022-05	E144-H	30-May-2022	----	----	----		12-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag BOL_RB-Ki-5_2022-05	E144-H	30-May-2022	----	----	----		12-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag BOL_RB-Ki-6_2022-05	E144-H	30-May-2022	----	----	----		12-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag BOL_RB-Ki-7_2022-05	E144-H	30-May-2022	----	----	----		12-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag BOL_RB-Ki-8_2022-05	E144-H	30-May-2022	----	----	----		12-Jul-2022	----	----	

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag BOL_RB-Li-3_2022-05	E144-H	30-May-2022	----	----	----		12-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag BOL_RB-Li-4_2022-05	E144-H	30-May-2022	----	----	----		12-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag BOL_RB-Li-5_2022-05	E144-H	30-May-2022	----	----	----		14-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag BOL_RB-Li-6_2022-05	E144-H	30-May-2022	----	----	----		12-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag BOL_RB-Li-7_2022-05	E144-H	30-May-2022	----	----	----		12-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag BOL_RB-M-1_2022-05	E144-H	30-May-2022	----	----	----		14-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag BOL_RB-M-2_2022-05	E144-H	30-May-2022	----	----	----		14-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag BOL_RB-M-3_2022-05	E144-H	30-May-2022	----	----	----		14-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag BOL_RB-M-4_2022-05	E144-H	30-May-2022	----	----	----		14-Jul-2022	----	----	

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag BOL_RB-M-5_2022-05	E144-H	30-May-2022	----	----	----		14-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag BOL_RB-M-6_2022-05	E144-H	30-May-2022	----	----	----		14-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag BOL_RB-M-7_2022-05	E144-H	30-May-2022	----	----	----		14-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag BOL_RB-O-5_2022-05	E144-H	30-May-2022	----	----	----		14-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag BOL_RB-O-7_2022-05	E144-H	30-May-2022	----	----	----		14-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag POL_RB-Ki-1_2022-05	E144-H	28-May-2022	----	----	----		14-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag POL_RB-Ki-2_2022-05	E144-H	29-May-2022	----	----	----		14-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag POL_RB-Ki-3_2022-05	E144-H	29-May-2022	----	----	----		14-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag POL_RB-Ki-4_2022-05	E144-H	29-May-2022	----	----	----		14-Jul-2022	----	----	

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Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag POL_RB-Ki-5_2022-05	E144-H	29-May-2022	----	----	----		14-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag POL_RB-Ki-6_2022-05	E144-H	29-May-2022	----	----	----		14-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag POL_RB-Ki-7_2022-05	E144-H	29-May-2022	----	----	----		14-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag POL_RB-Ki-8_2022-05	E144-H	29-May-2022	----	----	----		14-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag POL_RB-Li-1_2022-05	E144-H	28-May-2022	----	----	----		14-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag POL_RB-Li-2_2022-05	E144-H	29-May-2022	----	----	----		14-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag POL_RB-Li-3_2022-05	E144-H	29-May-2022	----	----	----		14-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag POL_RB-Li-4_2022-05	E144-H	29-May-2022	----	----	----		14-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag POL_RB-Li-5_2022-05	E144-H	29-May-2022	----	----	----		14-Jul-2022	----	----	

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag POL_RB-Li-6_2022-05	E144-H	29-May-2022	----	----	----		14-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag POL_RB-Li-7_2022-05	E144-H	29-May-2022	----	----	----		14-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag POL_RB-Li-8_2022-05	E144-H	29-May-2022	----	----	----		14-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag POL_RB-M-1_2022-05	E144-H	28-May-2022	----	----	----		14-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag POL_RB-M-2_2022-05	E144-H	29-May-2022	----	----	----		14-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag POL_RB-M-3_2022-05	E144-H	29-May-2022	----	----	----		14-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag POL_RB-M-4_2022-05	E144-H	29-May-2022	----	----	----		14-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag POL_RB-M-5_2022-05	E144-H	29-May-2022	----	----	----		14-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag POL_RB-M-6_2022-05	E144-H	29-May-2022	----	----	----		14-Jul-2022	----	----	

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag POL_RB-M-7_2022-05	E144-H	29-May-2022	----	----	----		14-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag POL_RB-M-8_2022-05	E144-H	29-May-2022	----	----	----		14-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag POL_RB-O-2_2022-05	E144-H	29-May-2022	----	----	----		14-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag POL_RB-O-4_2022-05	E144-H	29-May-2022	----	----	----		14-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag POL_RB-O-5_2022-05	E144-H	29-May-2022	----	----	----		14-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BOL_RB-Ki-1_2022-05	E144	30-May-2022	----	----	----		08-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BOL_RB-Li-1_2022-05	E144	30-May-2022	----	----	----		08-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BOL_RB-Li-2_2022-05	E144	30-May-2022	----	----	----		08-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BOL_RB-Li-8_2022-05	E144	30-May-2022	----	----	----		08-Jul-2022	----	----	

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BOL_RB-M-8_2022-05	E144	30-May-2022	----	----	----		08-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BOL_RB-O-1_2022-05	E144	30-May-2022	----	----	----		08-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BOL_RB-O-2_2022-05	E144	30-May-2022	----	----	----		08-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BOL_RB-O-3_2022-05	E144	30-May-2022	----	----	----		08-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BOL_RB-O-4_2022-05	E144	30-May-2022	----	----	----		08-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BOL_RB-O-6_2022-05	E144	30-May-2022	----	----	----		08-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BOL_RB-O-8_2022-05	E144	30-May-2022	----	----	----		08-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag POL_LSU-M-1_2022-05	E144	28-May-2022	----	----	----		08-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag POL_LSU-M-2_2022-05	E144	28-May-2022	----	----	----		08-Jul-2022	----	----	

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Moisture Content by Gravimetry										
LDPE bag POL_LSU-M-3_2022-05	E144	28-May-2022	----	----	----		08-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag POL_LSU-M-4_2022-05	E144	28-May-2022	----	----	----		08-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag POL_LSU-M-5_2022-05	E144	28-May-2022	----	----	----		08-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag POL_LSU-M-6_2022-05	E144	28-May-2022	----	----	----		08-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag POL_LSU-M-7_2022-05	E144	28-May-2022	----	----	----		08-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag POL_LSU-M-8_2022-05	E144	28-May-2022	----	----	----		08-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag POL_RB-O-1_2022-05	E144	28-May-2022	----	----	----		08-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag POL_RB-O-3_2022-05	E144	29-May-2022	----	----	----		08-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag POL_RB-O-6_2022-05	E144	29-May-2022	----	----	----		08-Jul-2022	----	----	

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Moisture Content by Gravimetry										
LDPE bag POL_RB-O-7_2022-05	E144	29-May-2022	----	----	----		08-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag POL_RB-O-8_2022-05	E144	29-May-2022	----	----	----		08-Jul-2022	----	----	

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Biota**

Evaluation: ✗ = QC frequency outside specification; ✓ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Mercury in Biota by CVAAS (DRY units, Micro)	E511	562251	4	68	5.8	5.0	✓
Mercury in Biota by CVAAS (DRY units, Routine)	E510	554213	2	40	5.0	5.0	✓
Mercury in Biota by CVAAS (WET units, Micro)	E511A	562252	4	68	5.8	5.0	✓
Mercury in Biota by CVAAS (WET units, Routine)	E510A	554211	2	40	5.0	5.0	✓
Metals in Biota by CRC ICPMS (DRY units, Micro)	E472	562253	6	68	8.8	5.0	✓
Metals in Biota by CRC ICPMS (DRY units, Routine)	E440	554210	2	40	5.0	5.0	✓
Moisture Content by Gravimetry	E144	554200	3	28	10.7	5.0	✓
Moisture Content by Gravimetry (Micro)	E144-H	559468	4	68	5.8	5.0	✓
Silver in Biota by CRC ICPMS (DRY units, Micro)	E472.Ag	562249	4	68	5.8	5.0	✓
Silver in Biota by CRC ICPMS (DRY units, Routine)	E440.Ag	554212	2	40	5.0	5.0	✓
Titanium in Biota by CRC ICPMS (DRY units, Micro)	E472.Ti	562250	4	68	5.8	5.0	✓
Titanium in Biota by CRC ICPMS (DRY units, Routine)	E440.Ti	554214	2	40	5.0	5.0	✓
Laboratory Control Samples (LCS)							
Mercury in Biota by CVAAS (DRY units, Micro)	E511	562251	8	68	11.7	10.0	✓
Mercury in Biota by CVAAS (DRY units, Routine)	E510	554213	4	40	10.0	10.0	✓
Mercury in Biota by CVAAS (WET units, Micro)	E511A	562252	10	68	14.7	10.0	✓
Mercury in Biota by CVAAS (WET units, Routine)	E510A	554211	4	40	10.0	10.0	✓
Metals in Biota by CRC ICPMS (DRY units, Micro)	E472	562253	8	68	11.7	10.0	✓
Metals in Biota by CRC ICPMS (DRY units, Routine)	E440	554210	4	40	10.0	10.0	✓
Moisture Content by Gravimetry	E144	554200	3	28	10.7	5.0	✓
Moisture Content by Gravimetry (Micro)	E144-H	559468	4	68	5.8	5.0	✓
Silver in Biota by CRC ICPMS (DRY units, Micro)	E472.Ag	562249	8	68	11.7	10.0	✓
Silver in Biota by CRC ICPMS (DRY units, Routine)	E440.Ag	554212	4	40	10.0	10.0	✓
Titanium in Biota by CRC ICPMS (DRY units, Micro)	E472.Ti	562250	4	68	5.8	10.0	✗
Titanium in Biota by CRC ICPMS (DRY units, Routine)	E440.Ti	554214	2	40	5.0	10.0	✗
Method Blanks (MB)							
Mercury in Biota by CVAAS (DRY units, Micro)	E511	562251	4	68	5.8	5.0	✓
Mercury in Biota by CVAAS (DRY units, Routine)	E510	554213	2	40	5.0	5.0	✓
Mercury in Biota by CVAAS (WET units, Micro)	E511A	562252	5	68	7.3	5.0	✓
Mercury in Biota by CVAAS (WET units, Routine)	E510A	554211	2	40	5.0	5.0	✓
Metals in Biota by CRC ICPMS (DRY units, Micro)	E472	562253	5	68	7.3	5.0	✓
Metals in Biota by CRC ICPMS (DRY units, Routine)	E440	554210	2	40	5.0	5.0	✓
Moisture Content by Gravimetry	E144	554200	3	28	10.7	5.0	✓
Moisture Content by Gravimetry (Micro)	E144-H	559468	4	68	5.8	5.0	✓
Silver in Biota by CRC ICPMS (DRY units, Micro)	E472.Ag	562249	4	68	5.8	5.0	✓

Matrix: **Biota**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Method Blanks (MB) - Continued							
Silver in Biota by CRC ICPMS (DRY units, Routine)	E440.Ag	554212	2	40	5.0	5.0	✓
Titanium in Biota by CRC ICPMS (DRY units, Micro)	E472.Ti	562250	4	68	5.8	5.0	✓
Titanium in Biota by CRC ICPMS (DRY units, Routine)	E440.Ti	554214	2	40	5.0	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Moisture Content by Gravimetry	E144 Vancouver - Environmental	Biota	Puget Sound Water Quality Authority/CCME PHC in Soil - Tier 1	Moisture is measured gravimetrically by drying the sample at 105°C. Moisture content is calculated as the weight loss (due to water) divided by the wet weight of the sample, expressed as a percentage.
Moisture Content by Gravimetry (Micro)	E144-H Vancouver - Environmental	Biota	Puget Sound Water Quality Authority/BC MOE Lab Manual	Moisture is measured gravimetrically by drying the sample at <60°C for a minimum of 3 days to constant weight. Moisture content is calculated as the weight loss (due to water) divided by the wet weight of soil, expressed as a percentage.
Metals in Biota by CRC ICPMS (DRY units, Routine)	E440 Vancouver - Environmental	Biota	EPA 200.3/6020B (mod)	Tissue samples are homogenized and sub-sampled prior to hotblock digestion with HNO3, HCl, and H2O2. Analysis is by Collision/Reaction Cell ICPMS. Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.
Silver in Biota by CRC ICPMS (DRY units, Routine)	E440.Ag Vancouver - Environmental	Biota	EPA 200.3/6020B (mod)	Tissue samples are homogenized and sub-sampled prior to hotblock digestion with HNO3, HCl, and H2O2. Analysis is by Collision/Reaction Cell ICPMS. Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.
Titanium in Biota by CRC ICPMS (DRY units, Routine)	E440.Ti Vancouver - Environmental	Biota	EPA 200.3/6020B (mod)	Tissue samples are homogenized and sub-sampled prior to hotblock digestion with HNO3, HCl, and H2O2. Analysis is by Collision/Reaction Cell ICPMS. Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.
Metals in Biota by CRC ICPMS (DRY units, Micro)	E472 Vancouver - Environmental	Biota	EPA 200.3/6020B (mod)	Tissue samples are homogenized and sub-sampled prior to hotblock digestion with HNO3, HCl, and H2O2. Analysis is by Collision/Reaction Cell ICPMS. Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Silver in Biota by CRC ICPMS (DRY units, Micro)	E472.Ag Vancouver - Environmental	Biota	EPA 200.3/6020B (mod)	Tissue samples are homogenized and sub-sampled prior to hotblock digestion with HNO3, HCl, and H2O2. Analysis is by Collision/Reaction Cell ICPMS. Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.
Titanium in Biota by CRC ICPMS (DRY units, Micro)	E472.Ti Vancouver - Environmental	Biota	EPA 200.3/6020B (mod)	Tissue samples are homogenized and sub-sampled prior to hotblock digestion with HNO3, HCl, and H2O2. Analysis is by Collision/Reaction Cell ICPMS. Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.
Mercury in Biota by CVAAS (DRY units, Routine)	E510 Vancouver - Environmental	Biota	EPA 200.3/1631 Appendix (mod)	Samples are homogenized and sub-sampled prior to hotblock digestion with HNO3, HCl, and H2O2. Analysis is by CVAAS.
Mercury in Biota by CVAAS (WET units, Routine)	E510A Vancouver - Environmental	Biota	EPA 200.3/1631 Appendix (mod)	Samples are homogenized and sub-sampled prior to hotblock digestion with HNO3, HCl, and H2O2. Analysis is by CVAAS.
Mercury in Biota by CVAAS (DRY units, Micro)	E511 Vancouver - Environmental	Biota	EPA 200.3/1631E (mod)	Samples are homogenized and sub-sampled prior to hotblock digestion with nitric acid, hydrochloric acid, and hydrogen peroxide. Analysis is by CVAAS.
Mercury in Biota by CVAAS (WET units, Micro)	E511A Vancouver - Environmental	Biota	EPA 200.3/1631E (mod)	Samples are homogenized and sub-sampled prior to hotblock digestion with nitric acid, hydrochloric acid, and hydrogen peroxide. Analysis is by CVAAS.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Metals and Mercury Biota Digestion	EP440 Vancouver - Environmental	Biota	EPA 200.3	This method uses a heated strong acid digestion with HNO3, HCl, and H2O2 and is intended to provide a conservative estimate of bio-available metals.
Metals and Mercury Biota Digestion (Micro)	EP472 Vancouver - Environmental	Biota	EPA 200.3	This method, designed for small sample amounts, uses a heated strong acid digestion with HNO3, HCl, and H2O2 and is intended to provide a conservative estimate of bio-available metals.

ALS Canada Ltd.

QUALITY CONTROL REPORT

Work Order	: **VA22B2820**	Page	: 1 of 34
Amendment	: **1**		
Client	: Mount Polley Mining Corporation	Laboratory	: Vancouver - Environmental
Contact	: Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 08-Jun-2022 10:30
PO	: 5590008044 Q2 2022	Date Analysis Commenced	: 08-Jul-2022
C-O-C number	: ----	Issue Date	: 05-Dec-2022 22:21
Sampler	: LBO ----		
Site	: ----		
Quote number	: VA22-MPMC100-002		
No. of samples received	: 72		
No. of samples analysed	: 72		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Reference Material (RM) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Vancouver Metals, Burnaby, British Columbia
Kinny Wu	Lab Analyst	Vancouver Metals, Burnaby, British Columbia

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Biota**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 554200)											
VA22B2820-015	POL_RB-O-7_2022-05	moisture	----	E144	0.50	%	66.5	67.1	0.898%	20%	----
Physical Tests (QC Lot: 554201)											
VA22B2820-071	POL_LSU-M-7_2022-05	moisture	----	E144	0.50	%	77.7	77.5	0.265%	20%	----
Physical Tests (QC Lot: 554262)											
VA22B2821-061	Anonymous	moisture	----	E144	0.50	%	61.8	62.1	0.420%	20%	----
Physical Tests (QC Lot: 559468)											
VA22B2821-013	Anonymous	moisture	----	E144-H	2.0	%	78.4	78.0	0.409%	20%	----
Physical Tests (QC Lot: 559474)											
VA22B2820-054	BOL_RB-Li-6_2022-05	moisture	----	E144-H	2.0	%	79.1	79.4	0.391%	20%	----
Physical Tests (QC Lot: 562243)											
VA22B2820-002	POL_RB-M-2_2022-05	moisture	----	E144-H	2.0	%	81.1	81.2	0.228%	20%	----
Physical Tests (QC Lot: 562254)											
VA22B2820-020	POL_RB-Li-4_2022-05	moisture	----	E144-H	2.0	%	75.6	76.0	0.454%	20%	----
Metals (QC Lot: 554210)											
VA22B2820-015	POL_RB-O-7_2022-05	aluminum	7429-90-5	E440	2.0	mg/kg	<2.0	<2.0	0	Diff <2x LOR	----
		antimony	7440-36-0	E440	0.010	mg/kg	<0.010	<0.010	0	Diff <2x LOR	----
		arsenic	7440-38-2	E440	0.020	mg/kg	0.042	0.038	0.005	Diff <2x LOR	----
		barium	7440-39-3	E440	0.050	mg/kg	0.265	0.267	1.02%	40%	----
		beryllium	7440-41-7	E440	0.010	mg/kg	<0.010	<0.010	0	Diff <2x LOR	----
		bismuth	7440-69-9	E440	0.010	mg/kg	<0.010	<0.010	0	Diff <2x LOR	----
		boron	7440-42-8	E440	1.0	mg/kg	<1.0	<1.0	0	Diff <2x LOR	----
		cadmium	7440-43-9	E440	0.0050	mg/kg	<0.0050	<0.0050	0	Diff <2x LOR	----
		calcium	7440-70-2	E440	20	mg/kg	1150	1140	0.478%	60%	----
		cesium	7440-46-2	E440	0.0050	mg/kg	0.0228	0.0230	0.0002	Diff <2x LOR	----
		chromium	7440-47-3	E440	0.050	mg/kg	0.055	0.075	0.020	Diff <2x LOR	----
		cobalt	7440-48-4	E440	0.020	mg/kg	0.110	0.115	4.23%	40%	----
		copper	7440-50-8	E440	0.10	mg/kg	8.28	8.54	3.01%	40%	----
		iron	7439-89-6	E440	3.0	mg/kg	64.1	64.1	0.00703%	40%	----
		lead	7439-92-1	E440	0.020	mg/kg	<0.020	<0.020	0	Diff <2x LOR	----
		lithium	7439-93-2	E440	0.50	mg/kg	<0.50	<0.50	0	Diff <2x LOR	----

Sub-Matrix: **Biota**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Metals (QC Lot: 554210) - continued											
VA22B2820-015	POL_RB-O-7_2022-05	magnesium	7439-95-4	E440	2.0	mg/kg	1520	1500	1.39%	40%	----
		manganese	7439-96-5	E440	0.050	mg/kg	3.09	3.06	1.22%	40%	----
		molybdenum	7439-98-7	E440	0.020	mg/kg	0.050	0.061	0.011	Diff <2x LOR	----
		nickel	7440-02-0	E440	0.20	mg/kg	<0.20	<0.20	0	Diff <2x LOR	----
		phosphorus	7723-14-0	E440	10	mg/kg	12200	11800	3.79%	40%	----
		potassium	7440-09-7	E440	20	mg/kg	7660	7870	2.82%	40%	----
		rubidium	7440-17-7	E440	0.050	mg/kg	4.60	4.72	2.68%	40%	----
		selenium	7782-49-2	E440	0.050	mg/kg	7.64	7.66	0.320%	40%	----
		sodium	7440-23-5	E440	20	mg/kg	3150	3260	3.25%	40%	----
		strontium	7440-24-6	E440	0.050	mg/kg	3.10	3.11	0.530%	60%	----
		tellurium	13494-80-9	E440	0.020	mg/kg	<0.020	<0.020	0	Diff <2x LOR	----
		thallium	7440-28-0	E440	0.0020	mg/kg	<0.0020	<0.0020	0	Diff <2x LOR	----
		tin	7440-31-5	E440	0.10	mg/kg	0.12	0.13	0.005	Diff <2x LOR	----
		uranium	7440-61-1	E440	0.0020	mg/kg	<0.0020	<0.0020	0	Diff <2x LOR	----
		vanadium	7440-62-2	E440	0.10	mg/kg	<0.10	<0.10	0	Diff <2x LOR	----
		zinc	7440-66-6	E440	0.50	mg/kg	66.2	75.6	13.2%	40%	----
		zirconium	7440-67-7	E440	0.20	mg/kg	<0.20	<0.20	0	Diff <2x LOR	----
Metals (QC Lot: 554211)											
VA22B2820-015	POL_RB-O-7_2022-05	mercury	7439-97-6	E510A	0.0010	mg/kg wwt	0.0044	0.0053	0.0010	Diff <2x LOR	----
Metals (QC Lot: 554212)											
VA22B2820-015	POL_RB-O-7_2022-05	silver	7440-22-4	E440.Ag	0.0050	mg/kg	<0.0050	<0.0050	0	Diff <2x LOR	----
Metals (QC Lot: 554213)											
VA22B2820-015	POL_RB-O-7_2022-05	mercury	7439-97-6	E510	0.0050	mg/kg	0.0130	0.0160	0.0029	Diff <2x LOR	----
Metals (QC Lot: 554214)											
VA22B2820-015	POL_RB-O-7_2022-05	titanium	7440-32-6	E440.Ti	0.25	mg/kg	<0.25	<0.25	0	Diff <2x LOR	----
Metals (QC Lot: 554356)											
VA22B2821-044	Anonymous	aluminum	7429-90-5	E440	2.0	mg/kg	<2.0	<2.0	0	Diff <2x LOR	----
		antimony	7440-36-0	E440	0.010	mg/kg	0.020	0.021	0.001	Diff <2x LOR	----
		arsenic	7440-38-2	E440	0.020	mg/kg	0.125	0.132	5.15%	40%	----
		barium	7440-39-3	E440	0.050	mg/kg	0.119	0.106	0.013	Diff <2x LOR	----
		beryllium	7440-41-7	E440	0.010	mg/kg	<0.010	<0.010	0	Diff <2x LOR	----
		bismuth	7440-69-9	E440	0.010	mg/kg	<0.010	<0.010	0	Diff <2x LOR	----
		boron	7440-42-8	E440	1.0	mg/kg	<1.0	<1.0	0	Diff <2x LOR	----
		cadmium	7440-43-9	E440	0.0050	mg/kg	0.411	0.430	4.66%	40%	----

Sub-Matrix: **Biota**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Metals (QC Lot: 554356) - continued											
VA22B2821-044	Anonymous	calcium	7440-70-2	E440	20	mg/kg	354	366	3.48%	60%	----
		cesium	7440-46-2	E440	0.0050	mg/kg	0.0164	0.0166	0.0003	Diff <2x LOR	----
		chromium	7440-47-3	E440	0.050	mg/kg	<0.050	0.055	0.005	Diff <2x LOR	----
		cobalt	7440-48-4	E440	0.020	mg/kg	0.102	0.108	6.56%	40%	----
		copper	7440-50-8	E440	0.10	mg/kg	9.52	9.63	1.14%	40%	----
		iron	7439-89-6	E440	3.0	mg/kg	147	150	2.17%	40%	----
		lead	7439-92-1	E440	0.020	mg/kg	<0.020	<0.020	0	Diff <2x LOR	----
		lithium	7439-93-2	E440	0.50	mg/kg	<0.50	<0.50	0	Diff <2x LOR	----
		magnesium	7439-95-4	E440	2.0	mg/kg	930	948	1.98%	40%	----
		manganese	7439-96-5	E440	0.050	mg/kg	9.72	9.83	1.10%	40%	----
		molybdenum	7439-98-7	E440	0.020	mg/kg	0.939	0.951	1.25%	40%	----
		nickel	7440-02-0	E440	0.20	mg/kg	<0.20	<0.20	0	Diff <2x LOR	----
		phosphorus	7723-14-0	E440	10	mg/kg	14800	15200	2.91%	40%	----
		potassium	7440-09-7	E440	20	mg/kg	12800	12900	0.616%	40%	----
		rubidium	7440-17-7	E440	0.050	mg/kg	7.77	7.88	1.44%	40%	----
		selenium	7782-49-2	E440	0.050	mg/kg	6.92	7.17	3.50%	40%	----
		sodium	7440-23-5	E440	20	mg/kg	8080	8290	2.59%	40%	----
		strontium	7440-24-6	E440	0.050	mg/kg	0.864	0.855	1.03%	60%	----
		tellurium	13494-80-9	E440	0.020	mg/kg	<0.020	<0.020	0	Diff <2x LOR	----
		thallium	7440-28-0	E440	0.0020	mg/kg	<0.0020	<0.0020	0	Diff <2x LOR	----
		tin	7440-31-5	E440	0.10	mg/kg	0.39	0.42	0.03	Diff <2x LOR	----
		uranium	7440-61-1	E440	0.0020	mg/kg	0.0040	0.0043	0.0003	Diff <2x LOR	----
		vanadium	7440-62-2	E440	0.10	mg/kg	0.22	0.22	0.006	Diff <2x LOR	----
		zinc	7440-66-6	E440	0.50	mg/kg	70.0	72.4	3.30%	40%	----
		zirconium	7440-67-7	E440	0.20	mg/kg	<0.20	<0.20	0	Diff <2x LOR	----
Metals (QC Lot: 554357)											
VA22B2821-044	Anonymous	mercury	7439-97-6	E510A	0.0011	mg/kg wwt	0.0358	0.0363	1.56%	40%	----
Metals (QC Lot: 554358)											
VA22B2821-044	Anonymous	silver	7440-22-4	E440.Ag	0.0050	mg/kg	0.0091	0.0088	0.0003	Diff <2x LOR	----
Metals (QC Lot: 554359)											
VA22B2821-044	Anonymous	mercury	7439-97-6	E510	0.0054	mg/kg	0.200	0.203	1.56%	40%	----
Metals (QC Lot: 554360)											
VA22B2821-044	Anonymous	titanium	7440-32-6	E440.Ti	0.25	mg/kg	<0.25	<0.25	0	Diff <2x LOR	----
Metals (QC Lot: 562249)											

Sub-Matrix: **Biota**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Metals (QC Lot: 562249) - continued											
VA22B2820-002	POL_RB-M-2_2022-05	silver	7440-22-4	E472.Ag	0.0050	mg/kg	<0.0050	<0.0050	0	Diff <2x LOR	----
Metals (QC Lot: 562250)											
VA22B2820-002	POL_RB-M-2_2022-05	titanium	7440-32-6	E472.Ti	0.50	mg/kg	<0.50	<0.50	0	Diff <2x LOR	----
Metals (QC Lot: 562251)											
VA22B2820-002	POL_RB-M-2_2022-05	mercury	7439-97-6	E511	0.0050	mg/kg	0.991	0.977	1.42%	40%	----
Metals (QC Lot: 562252)											
VA22B2820-002	POL_RB-M-2_2022-05	mercury	7439-97-6	E511A	0.0010	mg/kg wwt	0.188	0.185	1.42%	40%	----
Metals (QC Lot: 562253)											
VA22B2820-002	POL_RB-M-2_2022-05	aluminum	7429-90-5	E472	5.0	mg/kg	<5.0	<5.0	0	Diff <2x LOR	----
		antimony	7440-36-0	E472	0.010	mg/kg	<0.010	<0.010	0	Diff <2x LOR	----
		arsenic	7440-38-2	E472	0.030	mg/kg	<0.030	<0.030	0	Diff <2x LOR	----
		barium	7440-39-3	E472	0.050	mg/kg	0.582	0.701	18.6%	40%	----
		beryllium	7440-41-7	E472	0.010	mg/kg	<0.010	<0.010	0	Diff <2x LOR	----
		bismuth	7440-69-9	E472	0.010	mg/kg	<0.010	<0.010	0	Diff <2x LOR	----
		boron	7440-42-8	E472	1.0	mg/kg	<1.0	<1.0	0	Diff <2x LOR	----
		cadmium	7440-43-9	E472	0.010	mg/kg	<0.010	<0.010	0	Diff <2x LOR	----
		calcium	7440-70-2	E472	20	mg/kg	1470	1260	15.5%	60%	----
		cesium	7440-46-2	E472	0.0050	mg/kg	0.112	0.107	4.30%	40%	----
		chromium	7440-47-3	E472	0.20	mg/kg	<0.20	<0.20	0	Diff <2x LOR	----
		cobalt	7440-48-4	E472	0.020	mg/kg	0.020	<0.020	0.0005	Diff <2x LOR	----
		copper	7440-50-8	E472	0.20	mg/kg	1.84	2.02	9.70%	40%	----
		iron	7439-89-6	E472	5.0	mg/kg	48.2	47.8	0.919%	40%	----
		lead	7439-92-1	E472	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		lithium	7439-93-2	E472	0.50	mg/kg	<0.50	<0.50	0	Diff <2x LOR	----
		magnesium	7439-95-4	E472	2.0	mg/kg	1300	1150	12.2%	40%	----
		manganese	7439-96-5	E472	0.050	mg/kg	1.24	1.10	11.3%	40%	----
		molybdenum	7439-98-7	E472	0.040	mg/kg	<0.040	<0.040	0	Diff <2x LOR	----
		nickel	7440-02-0	E472	0.20	mg/kg	<0.20	<0.20	0	Diff <2x LOR	----
		phosphorus	7723-14-0	E472	10	mg/kg	15200	14300	5.66%	40%	----
		potassium	7440-09-7	E472	20	mg/kg	26700	25200	5.75%	40%	----
		rubidium	7440-17-7	E472	0.050	mg/kg	18.5	17.4	5.92%	40%	----
		selenium	7782-49-2	E472	0.10	mg/kg	7.41	7.29	1.54%	40%	----
		sodium	7440-23-5	E472	20	mg/kg	1550	1480	4.68%	40%	----
		strontium	7440-24-6	E472	0.10	mg/kg	1.71	1.48	14.4%	60%	----

Sub-Matrix: **Biota**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Metals (QC Lot: 562253) - continued											
VA22B2820-002	POL_RB-M-2_2022-05	tellurium	13494-80-9	E472	0.020	mg/kg	<0.020	<0.020	0	Diff <2x LOR	----
		thallium	7440-28-0	E472	0.0020	mg/kg	0.0036	0.0034	0.0001	Diff <2x LOR	----
		tin	7440-31-5	E472	0.10	mg/kg	0.95	1.29	30.3%	40%	----
		uranium	7440-61-1	E472	0.0020	mg/kg	<0.0020	<0.0020	0	Diff <2x LOR	----
		vanadium	7440-62-2	E472	0.10	mg/kg	<0.10	<0.10	0	Diff <2x LOR	----
		zinc	7440-66-6	E472	1.0	mg/kg	21.3	20.2	5.29%	40%	----
		zirconium	7440-67-7	E472	0.20	mg/kg	<0.20	<0.20	0	Diff <2x LOR	----
Metals (QC Lot: 562259)											
VA22B2820-020	POL_RB-Li-4_2022-05	silver	7440-22-4	E472.Ag	0.0050	mg/kg	0.0492	0.0493	0.195%	40%	----
Metals (QC Lot: 562260)											
VA22B2820-020	POL_RB-Li-4_2022-05	titanium	7440-32-6	E472.Ti	0.50	mg/kg	<0.50	<0.50	0	Diff <2x LOR	----
Metals (QC Lot: 562261)											
VA22B2820-020	POL_RB-Li-4_2022-05	mercury	7439-97-6	E511	0.0050	mg/kg	0.536	0.498	7.15%	40%	----
Metals (QC Lot: 562262)											
VA22B2820-020	POL_RB-Li-4_2022-05	mercury	7439-97-6	E511A	0.0010	mg/kg wwt	0.130	0.121	7.15%	40%	----
Metals (QC Lot: 562263)											
VA22B2820-020	POL_RB-Li-4_2022-05	arsenic	7440-38-2	E472	0.030	mg/kg	0.075	0.068	0.007	Diff <2x LOR	----
		chromium	7440-47-3	E472	0.20	mg/kg	0.32	0.27	0.04	Diff <2x LOR	----
VA22B2820-020	POL_RB-Li-4_2022-05	aluminum	7429-90-5	E472	5.0	mg/kg	<5.0	<5.0	0	Diff <2x LOR	----
		antimony	7440-36-0	E472	0.010	mg/kg	<0.010	<0.010	0	Diff <2x LOR	----
		barium	7440-39-3	E472	0.050	mg/kg	0.786	0.686	13.6%	40%	----
		beryllium	7440-41-7	E472	0.010	mg/kg	<0.010	<0.010	0	Diff <2x LOR	----
		bismuth	7440-69-9	E472	0.010	mg/kg	<0.010	<0.010	0	Diff <2x LOR	----
		boron	7440-42-8	E472	1.0	mg/kg	<1.0	<1.0	0	Diff <2x LOR	----
		cadmium	7440-43-9	E472	0.010	mg/kg	0.109	0.101	7.91%	40%	----
		calcium	7440-70-2	E472	20	mg/kg	337	287	16.2%	60%	----
		cesium	7440-46-2	E472	0.0050	mg/kg	0.0432	0.0397	8.42%	40%	----
		cobalt	7440-48-4	E472	0.020	mg/kg	0.120	0.098	20.6%	40%	----
		copper	7440-50-8	E472	0.20	mg/kg	18.2	17.4	4.88%	40%	----
		iron	7439-89-6	E472	5.0	mg/kg	1880	1860	1.22%	40%	----
		lead	7439-92-1	E472	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		lithium	7439-93-2	E472	0.50	mg/kg	<0.50	<0.50	0	Diff <2x LOR	----
		magnesium	7439-95-4	E472	2.0	mg/kg	859	797	7.41%	40%	----
		manganese	7439-96-5	E472	0.050	mg/kg	12.3	10.7	14.2%	40%	----

Sub-Matrix: **Biota**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Metals (QC Lot: 562263) - continued											
VA22B2820-020	POL_RB-Li-4_2022-05	molybdenum	7439-98-7	E472	0.040	mg/kg	0.934	0.897	4.07%	40%	----
		nickel	7440-02-0	E472	0.20	mg/kg	0.39	<0.20	0.19	Diff <2x LOR	----
		phosphorus	7723-14-0	E472	10	mg/kg	14600	13800	5.38%	40%	----
		potassium	7440-09-7	E472	20	mg/kg	11600	10900	6.44%	40%	----
		rubidium	7440-17-7	E472	0.050	mg/kg	7.21	6.47	10.8%	40%	----
		selenium	7782-49-2	E472	0.10	mg/kg	15.6	14.8	4.59%	40%	----
		sodium	7440-23-5	E472	20	mg/kg	3780	3420	10.0%	40%	----
		strontium	7440-24-6	E472	0.10	mg/kg	0.50	0.44	13.4%	60%	----
		tellurium	13494-80-9	E472	0.020	mg/kg	<0.020	<0.020	0	Diff <2x LOR	----
		thallium	7440-28-0	E472	0.0020	mg/kg	0.0751	0.0692	8.12%	40%	----
		tin	7440-31-5	E472	0.10	mg/kg	1.89	1.75	7.70%	40%	----
		uranium	7440-61-1	E472	0.0020	mg/kg	0.0027	0.0025	0.0001	Diff <2x LOR	----
		vanadium	7440-62-2	E472	0.10	mg/kg	0.40	0.38	0.02	Diff <2x LOR	----
		zinc	7440-66-6	E472	1.0	mg/kg	178	160	10.8%	40%	----
		zirconium	7440-67-7	E472	0.20	mg/kg	0.30	0.28	0.02	Diff <2x LOR	----
Metals (QC Lot: 562338)											
VA22B2821-013	Anonymous	silver	7440-22-4	E472.Ag	0.0050	mg/kg	0.0209	0.0205	0.0004	Diff <2x LOR	----
Metals (QC Lot: 562339)											
VA22B2821-013	Anonymous	titanium	7440-32-6	E472.Ti	0.50	mg/kg	0.89	0.84	0.05	Diff <2x LOR	----
Metals (QC Lot: 562340)											
VA22B2821-013	Anonymous	mercury	7439-97-6	E511	0.0050	mg/kg	0.0728	0.0708	2.79%	40%	----
Metals (QC Lot: 562341)											
VA22B2821-013	Anonymous	mercury	7439-97-6	E511A	0.0010	mg/kg wwt	0.0157	0.0156	1.01%	40%	----
Metals (QC Lot: 562342)											
VA22B2821-013	Anonymous	barium	7440-39-3	E472	0.050	mg/kg	1.25	1.12	10.4%	40%	----
		calcium	7440-70-2	E472	20	mg/kg	319	289	9.93%	60%	----
		magnesium	7439-95-4	E472	2.0	mg/kg	920	899	2.24%	40%	----
		manganese	7439-96-5	E472	0.050	mg/kg	12.0	10.7	11.3%	40%	----
		strontium	7440-24-6	E472	0.10	mg/kg	1.03	0.72	35.3%	60%	----
VA22B2821-013	Anonymous	aluminum	7429-90-5	E472	5.0	mg/kg	14.9	18.9	4.0	Diff <2x LOR	----
		antimony	7440-36-0	E472	0.010	mg/kg	0.016	0.012	0.003	Diff <2x LOR	----
		arsenic	7440-38-2	E472	0.030	mg/kg	0.188	0.186	1.07%	40%	----
		beryllium	7440-41-7	E472	0.010	mg/kg	<0.010	<0.010	0	Diff <2x LOR	----
		bismuth	7440-69-9	E472	0.010	mg/kg	<0.010	<0.010	0	Diff <2x LOR	----

Sub-Matrix: **Biota**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Metals (QC Lot: 562342) - continued											
VA22B2821-013	Anonymous	boron	7440-42-8	E472	1.0	mg/kg	<1.0	<1.0	0	Diff <2x LOR	----
		cadmium	7440-43-9	E472	0.010	mg/kg	0.114	0.115	0.912%	40%	----
		cesium	7440-46-2	E472	0.0050	mg/kg	0.0223	0.0222	0.00004	Diff <2x LOR	----
		chromium	7440-47-3	E472	0.20	mg/kg	0.62	# 1.03	0.41	Diff <2x LOR	DUP-H,J
		cobalt	7440-48-4	E472	0.020	mg/kg	0.108	0.108	0.362%	40%	----
		copper	7440-50-8	E472	0.20	mg/kg	56.0	51.6	8.11%	40%	----
		iron	7439-89-6	E472	5.0	mg/kg	160	165	2.72%	40%	----
		lead	7439-92-1	E472	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		lithium	7439-93-2	E472	0.50	mg/kg	<0.50	<0.50	0	Diff <2x LOR	----
		molybdenum	7439-98-7	E472	0.040	mg/kg	1.39	1.36	2.13%	40%	----
		nickel	7440-02-0	E472	0.20	mg/kg	<0.20	<0.20	0	Diff <2x LOR	----
		phosphorus	7723-14-0	E472	10	mg/kg	17200	13900	21.2%	40%	----
		potassium	7440-09-7	E472	20	mg/kg	13400	13200	1.92%	40%	----
		rubidium	7440-17-7	E472	0.050	mg/kg	9.41	9.35	0.582%	40%	----
		selenium	7782-49-2	E472	0.10	mg/kg	11.0	10.9	0.626%	40%	----
		sodium	7440-23-5	E472	20	mg/kg	5320	5210	2.15%	40%	----
		tellurium	13494-80-9	E472	0.020	mg/kg	<0.020	<0.020	0	Diff <2x LOR	----
		thallium	7440-28-0	E472	0.0020	mg/kg	<0.0020	<0.0020	0	Diff <2x LOR	----
		tin	7440-31-5	E472	0.10	mg/kg	0.59	0.62	5.19%	40%	----
		uranium	7440-61-1	E472	0.0020	mg/kg	<0.0020	<0.0020	0	Diff <2x LOR	----
		vanadium	7440-62-2	E472	0.10	mg/kg	0.30	0.29	0.009	Diff <2x LOR	----
		zinc	7440-66-6	E472	1.0	mg/kg	116	114	0.826%	40%	----
		zirconium	7440-67-7	E472	0.20	mg/kg	<0.20	<0.20	0	Diff <2x LOR	----
Metals (QC Lot: 562350)											
VA22B2820-054	BOL_RB-Li-6_2022-05	silver	7440-22-4	E472.Ag	0.0050	mg/kg	0.283	0.285	0.457%	40%	----
Metals (QC Lot: 562351)											
VA22B2820-054	BOL_RB-Li-6_2022-05	titanium	7440-32-6	E472.Ti	0.50	mg/kg	<0.50	<0.50	0	Diff <2x LOR	----
Metals (QC Lot: 562352)											
VA22B2820-054	BOL_RB-Li-6_2022-05	mercury	7439-97-6	E511	0.0050	mg/kg	0.264	0.261	1.31%	40%	----
Metals (QC Lot: 562353)											
VA22B2820-054	BOL_RB-Li-6_2022-05	mercury	7439-97-6	E511A	0.0010	mg/kg wwt	0.0552	0.0544	1.31%	40%	----
Metals (QC Lot: 562354)											
VA22B2820-054	BOL_RB-Li-6_2022-05	aluminum	7429-90-5	E472	5.0	mg/kg	<5.0	<5.0	0	Diff <2x LOR	----
		antimony	7440-36-0	E472	0.010	mg/kg	<0.010	<0.010	0	Diff <2x LOR	----

Sub-Matrix: **Biota**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Metals (QC Lot: 562354) - continued											
VA22B2820-054	BOL_RB-Li-6_2022-05	arsenic	7440-38-2	E472	0.030	mg/kg	0.042	0.041	0.001	Diff <2x LOR	----
		barium	7440-39-3	E472	0.050	mg/kg	0.822	0.857	4.19%	40%	----
		beryllium	7440-41-7	E472	0.010	mg/kg	<0.010	<0.010	0	Diff <2x LOR	----
		bismuth	7440-69-9	E472	0.010	mg/kg	<0.010	<0.010	0	Diff <2x LOR	----
		boron	7440-42-8	E472	1.0	mg/kg	<1.0	<1.0	0	Diff <2x LOR	----
		cadmium	7440-43-9	E472	0.010	mg/kg	0.142	0.143	0.416%	40%	----
		calcium	7440-70-2	E472	20	mg/kg	322	333	3.49%	60%	----
		cesium	7440-46-2	E472	0.0050	mg/kg	0.0295	0.0305	3.37%	40%	----
		chromium	7440-47-3	E472	0.20	mg/kg	0.22	<0.20	0.02	Diff <2x LOR	----
		cobalt	7440-48-4	E472	0.020	mg/kg	0.112	0.106	5.16%	40%	----
		copper	7440-50-8	E472	0.20	mg/kg	22.1	22.7	3.04%	40%	----
		iron	7439-89-6	E472	5.0	mg/kg	1820	1780	2.10%	40%	----
		lead	7439-92-1	E472	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		lithium	7439-93-2	E472	0.50	mg/kg	<0.50	<0.50	0	Diff <2x LOR	----
		magnesium	7439-95-4	E472	2.0	mg/kg	834	821	1.56%	40%	----
		manganese	7439-96-5	E472	0.050	mg/kg	6.15	6.26	1.77%	40%	----
		molybdenum	7439-98-7	E472	0.040	mg/kg	0.866	0.870	0.386%	40%	----
		nickel	7440-02-0	E472	0.20	mg/kg	<0.20	<0.20	0	Diff <2x LOR	----
		phosphorus	7723-14-0	E472	10	mg/kg	16300	16400	0.242%	40%	----
		potassium	7440-09-7	E472	20	mg/kg	14400	14600	0.785%	40%	----
		rubidium	7440-17-7	E472	0.050	mg/kg	9.74	9.86	1.24%	40%	----
		selenium	7782-49-2	E472	0.10	mg/kg	9.16	8.89	3.08%	40%	----
		sodium	7440-23-5	E472	20	mg/kg	7200	7230	0.502%	40%	----
		strontium	7440-24-6	E472	0.10	mg/kg	0.60	0.64	7.00%	60%	----
		tellurium	13494-80-9	E472	0.020	mg/kg	<0.020	<0.020	0	Diff <2x LOR	----
		thallium	7440-28-0	E472	0.0020	mg/kg	0.149	0.138	7.30%	40%	----
		tin	7440-31-5	E472	0.10	mg/kg	1.18	1.40	17.2%	40%	----
		uranium	7440-61-1	E472	0.0020	mg/kg	0.0052	0.0052	0.00005	Diff <2x LOR	----
		vanadium	7440-62-2	E472	0.10	mg/kg	0.20	0.20	0.002	Diff <2x LOR	----
		zinc	7440-66-6	E472	1.0	mg/kg	186	183	1.38%	40%	----
		zirconium	7440-67-7	E472	0.20	mg/kg	0.47	0.50	0.03	Diff <2x LOR	----

Qualifiers

Qualifier	Description
DUP-H	Duplicate results outside ALS DQO, due to sample heterogeneity.
J	Duplicate results and limits are expressed in terms of absolute difference.

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Biota**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 554200)						
moisture	----	E144	0.5	%	<0.50	----
Physical Tests (QCLot: 554201)						
moisture	----	E144	0.5	%	<0.50	----
Physical Tests (QCLot: 554262)						
moisture	----	E144	0.5	%	<0.50	----
Physical Tests (QCLot: 559468)						
moisture	----	E144-H	2	%	<2.0	----
Physical Tests (QCLot: 559474)						
moisture	----	E144-H	2	%	<2.0	----
Physical Tests (QCLot: 562243)						
moisture	----	E144-H	2	%	<2.0	----
Physical Tests (QCLot: 562254)						
moisture	----	E144-H	2	%	<2.0	----
Metals (QCLot: 554210)						
aluminum	7429-90-5	E440	2	mg/kg	<2.0	----
antimony	7440-36-0	E440	0.01	mg/kg	<0.010	----
arsenic	7440-38-2	E440	0.02	mg/kg	<0.020	----
barium	7440-39-3	E440	0.05	mg/kg	<0.050	----
beryllium	7440-41-7	E440	0.01	mg/kg	<0.010	----
bismuth	7440-69-9	E440	0.01	mg/kg	<0.010	----
boron	7440-42-8	E440	1	mg/kg	<1.0	----
cadmium	7440-43-9	E440	0.005	mg/kg	<0.0050	----
calcium	7440-70-2	E440	20	mg/kg	<20	----
cesium	7440-46-2	E440	0.005	mg/kg	<0.0050	----
chromium	7440-47-3	E440	0.05	mg/kg	<0.050	----
cobalt	7440-48-4	E440	0.02	mg/kg	<0.020	----
copper	7440-50-8	E440	0.1	mg/kg	<0.10	----
iron	7439-89-6	E440	3	mg/kg	<3.0	----
lead	7439-92-1	E440	0.02	mg/kg	<0.020	----
lithium	7439-93-2	E440	0.5	mg/kg	<0.50	----
magnesium	7439-95-4	E440	2	mg/kg	<2.0	----
manganese	7439-96-5	E440	0.05	mg/kg	<0.050	----

Sub-Matrix: **Biota**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 554210) - continued						
molybdenum	7439-98-7	E440	0.02	mg/kg	<0.020	----
nickel	7440-02-0	E440	0.2	mg/kg	<0.20	----
phosphorus	7723-14-0	E440	10	mg/kg	<10	----
potassium	7440-09-7	E440	20	mg/kg	<20	----
rubidium	7440-17-7	E440	0.05	mg/kg	<0.050	----
selenium	7782-49-2	E440	0.05	mg/kg	<0.050	----
sodium	7440-23-5	E440	20	mg/kg	<20	----
strontium	7440-24-6	E440	0.05	mg/kg	<0.050	----
tellurium	13494-80-9	E440	0.02	mg/kg	<0.020	----
thallium	7440-28-0	E440	0.002	mg/kg	<0.0020	----
tin	7440-31-5	E440	0.1	mg/kg	<0.10	----
uranium	7440-61-1	E440	0.002	mg/kg	<0.0020	----
vanadium	7440-62-2	E440	0.1	mg/kg	<0.10	----
zinc	7440-66-6	E440	0.5	mg/kg	<0.50	----
zirconium	7440-67-7	E440	0.2	mg/kg	<0.20	----
Metals (QCLot: 554211)						
mercury	7439-97-6	E510A	0.001	mg/kg wwt	<0.0010	----
Metals (QCLot: 554212)						
silver	7440-22-4	E440.Ag	0.005	mg/kg	<0.0050	----
Metals (QCLot: 554213)						
mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
Metals (QCLot: 554214)						
titanium	7440-32-6	E440.Ti	0.25	mg/kg	<0.25	----
Metals (QCLot: 554356)						
aluminum	7429-90-5	E440	2	mg/kg	<2.0	----
antimony	7440-36-0	E440	0.01	mg/kg	<0.010	----
arsenic	7440-38-2	E440	0.02	mg/kg	<0.020	----
barium	7440-39-3	E440	0.05	mg/kg	<0.050	----
beryllium	7440-41-7	E440	0.01	mg/kg	<0.010	----
bismuth	7440-69-9	E440	0.01	mg/kg	<0.010	----
boron	7440-42-8	E440	1	mg/kg	<1.0	----
cadmium	7440-43-9	E440	0.005	mg/kg	<0.0050	----
calcium	7440-70-2	E440	20	mg/kg	<20	----
cesium	7440-46-2	E440	0.005	mg/kg	<0.0050	----
chromium	7440-47-3	E440	0.05	mg/kg	<0.050	----

Sub-Matrix: **Biota**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 554356) - continued						
cobalt	7440-48-4	E440	0.02	mg/kg	<0.020	----
copper	7440-50-8	E440	0.1	mg/kg	<0.10	----
iron	7439-89-6	E440	3	mg/kg	<3.0	----
lead	7439-92-1	E440	0.02	mg/kg	<0.020	----
lithium	7439-93-2	E440	0.5	mg/kg	<0.50	----
magnesium	7439-95-4	E440	2	mg/kg	<2.0	----
manganese	7439-96-5	E440	0.05	mg/kg	<0.050	----
molybdenum	7439-98-7	E440	0.02	mg/kg	<0.020	----
nickel	7440-02-0	E440	0.2	mg/kg	<0.20	----
phosphorus	7723-14-0	E440	10	mg/kg	<10	----
potassium	7440-09-7	E440	20	mg/kg	<20	----
rubidium	7440-17-7	E440	0.05	mg/kg	<0.050	----
selenium	7782-49-2	E440	0.05	mg/kg	<0.050	----
sodium	7440-23-5	E440	20	mg/kg	<20	----
strontium	7440-24-6	E440	0.05	mg/kg	<0.050	----
tellurium	13494-80-9	E440	0.02	mg/kg	<0.020	----
thallium	7440-28-0	E440	0.002	mg/kg	<0.0020	----
tin	7440-31-5	E440	0.1	mg/kg	<0.10	----
uranium	7440-61-1	E440	0.002	mg/kg	<0.0020	----
vanadium	7440-62-2	E440	0.1	mg/kg	<0.10	----
zinc	7440-66-6	E440	0.5	mg/kg	<0.50	----
zirconium	7440-67-7	E440	0.2	mg/kg	<0.20	----
Metals (QCLot: 554357)						
mercury	7439-97-6	E510A	0.001	mg/kg wwt	<0.0010	----
Metals (QCLot: 554358)						
silver	7440-22-4	E440.Ag	0.005	mg/kg	<0.0050	----
Metals (QCLot: 554359)						
mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
Metals (QCLot: 554360)						
titanium	7440-32-6	E440.Ti	0.25	mg/kg	<0.25	----
Metals (QCLot: 562249)						
silver	7440-22-4	E472.Ag	0.005	mg/kg	<0.0050	----
Metals (QCLot: 562250)						
titanium	7440-32-6	E472.Ti	0.5	mg/kg	<0.50	----
Metals (QCLot: 562251)						

Sub-Matrix: **Biota**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 562251) - continued						
mercury	7439-97-6	E511	0.005	mg/kg	<0.0050	----
Metals (QCLot: 562252)						
mercury	7439-97-6	E511A	0.001	mg/kg wwt	<0.0010	----
Metals (QCLot: 562253)						
aluminum	7429-90-5	E472	5	mg/kg	<5.0	----
antimony	7440-36-0	E472	0.01	mg/kg	<0.010	----
arsenic	7440-38-2	E472	0.03	mg/kg	<0.030	----
barium	7440-39-3	E472	0.05	mg/kg	<0.050	----
beryllium	7440-41-7	E472	0.01	mg/kg	<0.010	----
bismuth	7440-69-9	E472	0.01	mg/kg	<0.010	----
boron	7440-42-8	E472	1	mg/kg	<1.0	----
cadmium	7440-43-9	E472	0.01	mg/kg	<0.010	----
calcium	7440-70-2	E472	20	mg/kg	<20	----
cesium	7440-46-2	E472	0.005	mg/kg	<0.0050	----
chromium	7440-47-3	E472	0.2	mg/kg	<0.20	----
cobalt	7440-48-4	E472	0.02	mg/kg	<0.020	----
copper	7440-50-8	E472	0.2	mg/kg	<0.20	----
iron	7439-89-6	E472	5	mg/kg	<5.0	----
lead	7439-92-1	E472	0.05	mg/kg	<0.050	----
lithium	7439-93-2	E472	0.5	mg/kg	<0.50	----
magnesium	7439-95-4	E472	2	mg/kg	<2.0	----
manganese	7439-96-5	E472	0.05	mg/kg	<0.050	----
molybdenum	7439-98-7	E472	0.04	mg/kg	<0.040	----
nickel	7440-02-0	E472	0.2	mg/kg	<0.20	----
phosphorus	7723-14-0	E472	10	mg/kg	<10	----
potassium	7440-09-7	E472	20	mg/kg	<20	----
rubidium	7440-17-7	E472	0.05	mg/kg	<0.050	----
selenium	7782-49-2	E472	0.1	mg/kg	<0.10	----
sodium	7440-23-5	E472	20	mg/kg	<20	----
strontium	7440-24-6	E472	0.1	mg/kg	<0.10	----
tellurium	13494-80-9	E472	0.02	mg/kg	<0.020	----
thallium	7440-28-0	E472	0.002	mg/kg	<0.0020	----
tin	7440-31-5	E472	0.1	mg/kg	<0.10	----
uranium	7440-61-1	E472	0.002	mg/kg	<0.0020	----
vanadium	7440-62-2	E472	0.1	mg/kg	<0.10	----

Sub-Matrix: **Biota**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 562253) - continued						
zinc	7440-66-6	E472	1	mg/kg	<1.0	----
zirconium	7440-67-7	E472	0.2	mg/kg	<0.20	----
Metals (QCLot: 562259)						
silver	7440-22-4	E472.Ag	0.005	mg/kg	<0.0050	----
Metals (QCLot: 562260)						
titanium	7440-32-6	E472.Ti	0.5	mg/kg	<0.50	----
Metals (QCLot: 562261)						
mercury	7439-97-6	E511	0.005	mg/kg	<0.0050	----
Metals (QCLot: 562262)						
mercury	7439-97-6	E511A	0.001	mg/kg wwt	<0.0010	----
Metals (QCLot: 562263)						
aluminum	7429-90-5	E472	5	mg/kg	<5.0	----
antimony	7440-36-0	E472	0.01	mg/kg	<0.010	----
arsenic	7440-38-2	E472	0.03	mg/kg	<0.030	----
barium	7440-39-3	E472	0.05	mg/kg	<0.050	----
beryllium	7440-41-7	E472	0.01	mg/kg	<0.010	----
bismuth	7440-69-9	E472	0.01	mg/kg	<0.010	----
boron	7440-42-8	E472	1	mg/kg	<1.0	----
cadmium	7440-43-9	E472	0.01	mg/kg	<0.010	----
calcium	7440-70-2	E472	20	mg/kg	<20	----
cesium	7440-46-2	E472	0.005	mg/kg	<0.0050	----
chromium	7440-47-3	E472	0.2	mg/kg	<0.20	----
cobalt	7440-48-4	E472	0.02	mg/kg	<0.020	----
copper	7440-50-8	E472	0.2	mg/kg	<0.20	----
iron	7439-89-6	E472	5	mg/kg	<5.0	----
lead	7439-92-1	E472	0.05	mg/kg	<0.050	----
lithium	7439-93-2	E472	0.5	mg/kg	<0.50	----
magnesium	7439-95-4	E472	2	mg/kg	<2.0	----
manganese	7439-96-5	E472	0.05	mg/kg	<0.050	----
molybdenum	7439-98-7	E472	0.04	mg/kg	<0.040	----
nickel	7440-02-0	E472	0.2	mg/kg	<0.20	----
phosphorus	7723-14-0	E472	10	mg/kg	<10	----
potassium	7440-09-7	E472	20	mg/kg	<20	----
rubidium	7440-17-7	E472	0.05	mg/kg	<0.050	----
selenium	7782-49-2	E472	0.1	mg/kg	<0.10	----

Sub-Matrix: **Biota**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 562263) - continued						
sodium	7440-23-5	E472	20	mg/kg	<20	----
strontium	7440-24-6	E472	0.1	mg/kg	<0.10	----
tellurium	13494-80-9	E472	0.02	mg/kg	<0.020	----
thallium	7440-28-0	E472	0.002	mg/kg	<0.0020	----
tin	7440-31-5	E472	0.1	mg/kg	<0.10	----
uranium	7440-61-1	E472	0.002	mg/kg	<0.0020	----
vanadium	7440-62-2	E472	0.1	mg/kg	<0.10	----
zinc	7440-66-6	E472	1	mg/kg	<1.0	----
zirconium	7440-67-7	E472	0.2	mg/kg	<0.20	----
Metals (QCLot: 562338)						
silver	7440-22-4	E472.Ag	0.005	mg/kg	<0.0050	----
Metals (QCLot: 562339)						
titanium	7440-32-6	E472.Ti	0.5	mg/kg	<0.50	----
Metals (QCLot: 562340)						
mercury	7439-97-6	E511	0.005	mg/kg	<0.0050	----
Metals (QCLot: 562341)						
mercury	7439-97-6	E511A	0.001	mg/kg wwt	<0.0010	----
Metals (QCLot: 562342)						
aluminum	7429-90-5	E472	5	mg/kg	<5.0	----
antimony	7440-36-0	E472	0.01	mg/kg	<0.010	----
arsenic	7440-38-2	E472	0.03	mg/kg	<0.030	----
barium	7440-39-3	E472	0.05	mg/kg	<0.050	----
beryllium	7440-41-7	E472	0.01	mg/kg	<0.010	----
bismuth	7440-69-9	E472	0.01	mg/kg	<0.010	----
boron	7440-42-8	E472	1	mg/kg	<1.0	----
cadmium	7440-43-9	E472	0.01	mg/kg	<0.010	----
calcium	7440-70-2	E472	20	mg/kg	<20	----
cesium	7440-46-2	E472	0.005	mg/kg	<0.0050	----
chromium	7440-47-3	E472	0.2	mg/kg	<0.20	----
cobalt	7440-48-4	E472	0.02	mg/kg	<0.020	----
copper	7440-50-8	E472	0.2	mg/kg	<0.20	----
iron	7439-89-6	E472	5	mg/kg	<5.0	----
lead	7439-92-1	E472	0.05	mg/kg	<0.050	----
lithium	7439-93-2	E472	0.5	mg/kg	<0.50	----
magnesium	7439-95-4	E472	2	mg/kg	<2.0	----

Sub-Matrix: **Biota**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 562342) - continued						
manganese	7439-96-5	E472	0.05	mg/kg	<0.050	----
molybdenum	7439-98-7	E472	0.04	mg/kg	<0.040	----
nickel	7440-02-0	E472	0.2	mg/kg	<0.20	----
phosphorus	7723-14-0	E472	10	mg/kg	<10	----
potassium	7440-09-7	E472	20	mg/kg	<20	----
rubidium	7440-17-7	E472	0.05	mg/kg	<0.050	----
selenium	7782-49-2	E472	0.1	mg/kg	<0.10	----
sodium	7440-23-5	E472	20	mg/kg	<20	----
strontium	7440-24-6	E472	0.1	mg/kg	<0.10	----
tellurium	13494-80-9	E472	0.02	mg/kg	<0.020	----
thallium	7440-28-0	E472	0.002	mg/kg	<0.0020	----
tin	7440-31-5	E472	0.1	mg/kg	<0.10	----
uranium	7440-61-1	E472	0.002	mg/kg	<0.0020	----
vanadium	7440-62-2	E472	0.1	mg/kg	<0.10	----
zinc	7440-66-6	E472	1	mg/kg	<1.0	----
zirconium	7440-67-7	E472	0.2	mg/kg	<0.20	----
Metals (QCLot: 562350)						
silver	7440-22-4	E472.Ag	0.005	mg/kg	<0.0050	----
Metals (QCLot: 562351)						
titanium	7440-32-6	E472.Ti	0.5	mg/kg	<0.50	----
Metals (QCLot: 562352)						
mercury	7439-97-6	E511	0.005	mg/kg	<0.0050	----
Metals (QCLot: 562353)						
mercury	7439-97-6	E511A	0.001	mg/kg wwt	<0.0010	----
Metals (QCLot: 562354)						
aluminum	7429-90-5	E472	5	mg/kg	<5.0	----
antimony	7440-36-0	E472	0.01	mg/kg	<0.010	----
arsenic	7440-38-2	E472	0.03	mg/kg	<0.030	----
barium	7440-39-3	E472	0.05	mg/kg	<0.050	----
beryllium	7440-41-7	E472	0.01	mg/kg	<0.010	----
bismuth	7440-69-9	E472	0.01	mg/kg	<0.010	----
boron	7440-42-8	E472	1	mg/kg	<1.0	----
cadmium	7440-43-9	E472	0.01	mg/kg	<0.010	----
calcium	7440-70-2	E472	20	mg/kg	<20	----
cesium	7440-46-2	E472	0.005	mg/kg	<0.0050	----

Sub-Matrix: **Biota**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 562354) - continued						
chromium	7440-47-3	E472	0.2	mg/kg	<0.20	----
cobalt	7440-48-4	E472	0.02	mg/kg	<0.020	----
copper	7440-50-8	E472	0.2	mg/kg	<0.20	----
iron	7439-89-6	E472	5	mg/kg	<5.0	----
lead	7439-92-1	E472	0.05	mg/kg	<0.050	----
lithium	7439-93-2	E472	0.5	mg/kg	<0.50	----
magnesium	7439-95-4	E472	2	mg/kg	<2.0	----
manganese	7439-96-5	E472	0.05	mg/kg	<0.050	----
molybdenum	7439-98-7	E472	0.04	mg/kg	<0.040	----
nickel	7440-02-0	E472	0.2	mg/kg	<0.20	----
phosphorus	7723-14-0	E472	10	mg/kg	<10	----
potassium	7440-09-7	E472	20	mg/kg	<20	----
rubidium	7440-17-7	E472	0.05	mg/kg	<0.050	----
selenium	7782-49-2	E472	0.1	mg/kg	<0.10	----
sodium	7440-23-5	E472	20	mg/kg	<20	----
strontium	7440-24-6	E472	0.1	mg/kg	<0.10	----
tellurium	13494-80-9	E472	0.02	mg/kg	<0.020	----
thallium	7440-28-0	E472	0.002	mg/kg	<0.0020	----
tin	7440-31-5	E472	0.1	mg/kg	<0.10	----
uranium	7440-61-1	E472	0.002	mg/kg	<0.0020	----
vanadium	7440-62-2	E472	0.1	mg/kg	<0.10	----
zinc	7440-66-6	E472	1	mg/kg	<1.0	----
zirconium	7440-67-7	E472	0.2	mg/kg	<0.20	----
Metals (QCLot: 701598)						
mercury	7439-97-6	E511A	0.001	mg/kg wwt	<0.0010	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Biota**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 554200)									
moisture	----	E144	0.5	%	50 %	100	90.0	110	----
Physical Tests (QCLot: 554201)									
moisture	----	E144	0.5	%	50 %	100	90.0	110	----
Physical Tests (QCLot: 554262)									
moisture	----	E144	0.5	%	50 %	100	90.0	110	----
Physical Tests (QCLot: 559468)									
moisture	----	E144-H	2	%	100 %	100	90.0	110	----
Physical Tests (QCLot: 559474)									
moisture	----	E144-H	2	%	100 %	100	90.0	110	----
Physical Tests (QCLot: 562243)									
moisture	----	E144-H	2	%	100 %	100	90.0	110	----
Physical Tests (QCLot: 562254)									
moisture	----	E144-H	2	%	100 %	100	90.0	110	----
Metals (QCLot: 554210)									
aluminum	7429-90-5	E440	2	mg/kg	20 mg/kg	106	80.0	120	----
antimony	7440-36-0	E440	0.01	mg/kg	10 mg/kg	108	80.0	120	----
arsenic	7440-38-2	E440	0.02	mg/kg	10 mg/kg	103	80.0	120	----
barium	7440-39-3	E440	0.05	mg/kg	2.5 mg/kg	101	80.0	120	----
beryllium	7440-41-7	E440	0.01	mg/kg	1 mg/kg	106	80.0	120	----
bismuth	7440-69-9	E440	0.01	mg/kg	10 mg/kg	105	80.0	120	----
boron	7440-42-8	E440	1	mg/kg	10 mg/kg	104	80.0	120	----
cadmium	7440-43-9	E440	0.005	mg/kg	1 mg/kg	99.8	80.0	120	----
calcium	7440-70-2	E440	20	mg/kg	500 mg/kg	106	80.0	120	----
cesium	7440-46-2	E440	0.005	mg/kg	0.5 mg/kg	105	80.0	120	----
chromium	7440-47-3	E440	0.05	mg/kg	2.5 mg/kg	100.0	80.0	120	----
cobalt	7440-48-4	E440	0.02	mg/kg	2.5 mg/kg	99.1	80.0	120	----
copper	7440-50-8	E440	0.1	mg/kg	2.5 mg/kg	99.6	80.0	120	----
iron	7439-89-6	E440	3	mg/kg	10 mg/kg	104	80.0	120	----
lead	7439-92-1	E440	0.02	mg/kg	5 mg/kg	106	80.0	120	----
lithium	7439-93-2	E440	0.5	mg/kg	2.5 mg/kg	108	80.0	120	----
magnesium	7439-95-4	E440	2	mg/kg	500 mg/kg	103	80.0	120	----

Sub-Matrix: **Biota**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Metals (QCLot: 554210) - continued									
manganese	7439-96-5	E440	0.05	mg/kg	2.5 mg/kg	99.9	80.0	120	----
molybdenum	7439-98-7	E440	0.02	mg/kg	2.5 mg/kg	105	80.0	120	----
nickel	7440-02-0	E440	0.2	mg/kg	5 mg/kg	99.0	80.0	120	----
phosphorus	7723-14-0	E440	10	mg/kg	100 mg/kg	107	80.0	120	----
potassium	7440-09-7	E440	20	mg/kg	500 mg/kg	104	80.0	120	----
rubidium	7440-17-7	E440	0.05	mg/kg	1 mg/kg	103	80.0	120	----
selenium	7782-49-2	E440	0.05	mg/kg	10 mg/kg	108	80.0	120	----
sodium	7440-23-5	E440	20	mg/kg	500 mg/kg	102	80.0	120	----
strontium	7440-24-6	E440	0.05	mg/kg	2.5 mg/kg	106	80.0	120	----
tellurium	13494-80-9	E440	0.02	mg/kg	1 mg/kg	102	80.0	120	----
thallium	7440-28-0	E440	0.002	mg/kg	10 mg/kg	108	80.0	120	----
tin	7440-31-5	E440	0.1	mg/kg	5 mg/kg	102	80.0	120	----
uranium	7440-61-1	E440	0.002	mg/kg	0.05 mg/kg	108	80.0	120	----
vanadium	7440-62-2	E440	0.1	mg/kg	5 mg/kg	102	80.0	120	----
zinc	7440-66-6	E440	0.5	mg/kg	5 mg/kg	99.6	80.0	120	----
zirconium	7440-67-7	E440	0.2	mg/kg	1 mg/kg	103	80.0	120	----
Metals (QCLot: 554211)									
mercury	7439-97-6	E510A	0.001	mg/kg wwt	0.02 mg/kg wwt	97.0	80.0	120	----
Metals (QCLot: 554212)									
silver	7440-22-4	E440.Ag	0.005	mg/kg	1 mg/kg	91.8	80.0	120	----
Metals (QCLot: 554213)									
mercury	7439-97-6	E510	0.005	mg/kg	0.02 mg/kg	97.0	80.0	120	----
Metals (QCLot: 554214)									
titanium	7440-32-6	E440.Ti	0.25	mg/kg	2.5 mg/kg	101	80.0	120	----
Metals (QCLot: 554356)									
aluminum	7429-90-5	E440	2	mg/kg	20 mg/kg	105	80.0	120	----
antimony	7440-36-0	E440	0.01	mg/kg	10 mg/kg	107	80.0	120	----
arsenic	7440-38-2	E440	0.02	mg/kg	10 mg/kg	104	80.0	120	----
barium	7440-39-3	E440	0.05	mg/kg	2.5 mg/kg	103	80.0	120	----
beryllium	7440-41-7	E440	0.01	mg/kg	1 mg/kg	102	80.0	120	----
bismuth	7440-69-9	E440	0.01	mg/kg	10 mg/kg	96.6	80.0	120	----
boron	7440-42-8	E440	1	mg/kg	10 mg/kg	102	80.0	120	----
cadmium	7440-43-9	E440	0.005	mg/kg	1 mg/kg	101	80.0	120	----
calcium	7440-70-2	E440	20	mg/kg	500 mg/kg	103	80.0	120	----
cesium	7440-46-2	E440	0.005	mg/kg	0.5 mg/kg	104	80.0	120	----
chromium	7440-47-3	E440	0.05	mg/kg	2.5 mg/kg	104	80.0	120	----

Sub-Matrix: **Biota**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Metals (QCLot: 554356) - continued									
cobalt	7440-48-4	E440	0.02	mg/kg	2.5 mg/kg	102	80.0	120	----
copper	7440-50-8	E440	0.1	mg/kg	2.5 mg/kg	101	80.0	120	----
iron	7439-89-6	E440	3	mg/kg	10 mg/kg	108	80.0	120	----
lead	7439-92-1	E440	0.02	mg/kg	5 mg/kg	101	80.0	120	----
lithium	7439-93-2	E440	0.5	mg/kg	2.5 mg/kg	106	80.0	120	----
magnesium	7439-95-4	E440	2	mg/kg	500 mg/kg	102	80.0	120	----
manganese	7439-96-5	E440	0.05	mg/kg	2.5 mg/kg	102	80.0	120	----
molybdenum	7439-98-7	E440	0.02	mg/kg	2.5 mg/kg	105	80.0	120	----
nickel	7440-02-0	E440	0.2	mg/kg	5 mg/kg	103	80.0	120	----
phosphorus	7723-14-0	E440	10	mg/kg	100 mg/kg	103	80.0	120	----
potassium	7440-09-7	E440	20	mg/kg	500 mg/kg	101	80.0	120	----
rubidium	7440-17-7	E440	0.05	mg/kg	1 mg/kg	106	80.0	120	----
selenium	7782-49-2	E440	0.05	mg/kg	10 mg/kg	105	80.0	120	----
sodium	7440-23-5	E440	20	mg/kg	500 mg/kg	103	80.0	120	----
strontium	7440-24-6	E440	0.05	mg/kg	2.5 mg/kg	108	80.0	120	----
tellurium	13494-80-9	E440	0.02	mg/kg	1 mg/kg	102	80.0	120	----
thallium	7440-28-0	E440	0.002	mg/kg	10 mg/kg	97.7	80.0	120	----
tin	7440-31-5	E440	0.1	mg/kg	5 mg/kg	103	80.0	120	----
uranium	7440-61-1	E440	0.002	mg/kg	0.05 mg/kg	104	80.0	120	----
vanadium	7440-62-2	E440	0.1	mg/kg	5 mg/kg	103	80.0	120	----
zinc	7440-66-6	E440	0.5	mg/kg	5 mg/kg	96.8	80.0	120	----
zirconium	7440-67-7	E440	0.2	mg/kg	1 mg/kg	105	80.0	120	----
Metals (QCLot: 554357)									
mercury	7439-97-6	E510A	0.001	mg/kg wwt	0.02 mg/kg wwt	97.1	80.0	120	----
Metals (QCLot: 554358)									
silver	7440-22-4	E440.Ag	0.005	mg/kg	1 mg/kg	96.2	80.0	120	----
Metals (QCLot: 554359)									
mercury	7439-97-6	E510	0.005	mg/kg	0.02 mg/kg	97.1	80.0	120	----
Metals (QCLot: 554360)									
titanium	7440-32-6	E440.Ti	0.25	mg/kg	2.5 mg/kg	103	80.0	120	----
Metals (QCLot: 562249)									
silver	7440-22-4	E472.Ag	0.005	mg/kg	1 mg/kg	90.8	80.0	120	----
Metals (QCLot: 562250)									
titanium	7440-32-6	E472.Ti	0.5	mg/kg	2.5 mg/kg	103	80.0	120	----
Metals (QCLot: 562251)									
mercury	7439-97-6	E511	0.005	mg/kg	0.02 mg/kg	100	80.0	120	----

Sub-Matrix: **Biota**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Metals (QCLot: 562252)									
mercury	7439-97-6	E511A	0.001	mg/kg wwt	0.02 mg/kg wwt	100	80.0	120	----
Metals (QCLot: 562253)									
aluminum	7429-90-5	E472	5	mg/kg	20 mg/kg	104	80.0	120	----
antimony	7440-36-0	E472	0.01	mg/kg	10 mg/kg	104	80.0	120	----
arsenic	7440-38-2	E472	0.03	mg/kg	10 mg/kg	106	80.0	120	----
barium	7440-39-3	E472	0.05	mg/kg	2.5 mg/kg	103	80.0	120	----
beryllium	7440-41-7	E472	0.01	mg/kg	1 mg/kg	99.6	80.0	120	----
bismuth	7440-69-9	E472	0.01	mg/kg	10 mg/kg	96.6	80.0	120	----
boron	7440-42-8	E472	1	mg/kg	10 mg/kg	105	80.0	120	----
cadmium	7440-43-9	E472	0.01	mg/kg	1 mg/kg	98.7	80.0	120	----
calcium	7440-70-2	E472	20	mg/kg	500 mg/kg	99.7	80.0	120	----
cesium	7440-46-2	E472	0.005	mg/kg	0.5 mg/kg	101	80.0	120	----
chromium	7440-47-3	E472	0.2	mg/kg	2.5 mg/kg	102	80.0	120	----
cobalt	7440-48-4	E472	0.02	mg/kg	2.5 mg/kg	98.7	80.0	120	----
copper	7440-50-8	E472	0.2	mg/kg	2.5 mg/kg	98.5	80.0	120	----
iron	7439-89-6	E472	5	mg/kg	10 mg/kg	102	80.0	120	----
lead	7439-92-1	E472	0.05	mg/kg	5 mg/kg	96.7	80.0	120	----
lithium	7439-93-2	E472	0.5	mg/kg	2.5 mg/kg	98.4	80.0	120	----
magnesium	7439-95-4	E472	2	mg/kg	500 mg/kg	101	80.0	120	----
manganese	7439-96-5	E472	0.05	mg/kg	2.5 mg/kg	103	80.0	120	----
molybdenum	7439-98-7	E472	0.04	mg/kg	2.5 mg/kg	108	80.0	120	----
nickel	7440-02-0	E472	0.2	mg/kg	5 mg/kg	99.5	80.0	120	----
phosphorus	7723-14-0	E472	10	mg/kg	100 mg/kg	108	80.0	120	----
potassium	7440-09-7	E472	20	mg/kg	500 mg/kg	101	80.0	120	----
rubidium	7440-17-7	E472	0.05	mg/kg	1 mg/kg	104	80.0	120	----
selenium	7782-49-2	E472	0.1	mg/kg	10 mg/kg	101	80.0	120	----
sodium	7440-23-5	E472	20	mg/kg	500 mg/kg	100	80.0	120	----
strontium	7440-24-6	E472	0.1	mg/kg	2.5 mg/kg	101	80.0	120	----
tellurium	13494-80-9	E472	0.02	mg/kg	1 mg/kg	101	80.0	120	----
thallium	7440-28-0	E472	0.002	mg/kg	10 mg/kg	96.8	80.0	120	----
tin	7440-31-5	E472	0.1	mg/kg	5 mg/kg	103	80.0	120	----
uranium	7440-61-1	E472	0.002	mg/kg	0.05 mg/kg	101	80.0	120	----
vanadium	7440-62-2	E472	0.1	mg/kg	5 mg/kg	105	80.0	120	----
zinc	7440-66-6	E472	1	mg/kg	5 mg/kg	95.2	80.0	120	----
zirconium	7440-67-7	E472	0.2	mg/kg	1 mg/kg	104	80.0	120	----
Metals (QCLot: 562259)									

Sub-Matrix: **Biota**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Metals (QCLot: 562259) - continued									
silver	7440-22-4	E472.Ag	0.005	mg/kg	1 mg/kg	89.9	80.0	120	----
Metals (QCLot: 562260)									
titanium	7440-32-6	E472.Ti	0.5	mg/kg	2.5 mg/kg	101	80.0	120	----
Metals (QCLot: 562261)									
mercury	7439-97-6	E511	0.005	mg/kg	0.02 mg/kg	91.7	80.0	120	----
Metals (QCLot: 562262)									
mercury	7439-97-6	E511A	0.001	mg/kg wwt	0.02 mg/kg wwt	91.7	80.0	120	----
Metals (QCLot: 562263)									
aluminum	7429-90-5	E472	5	mg/kg	20 mg/kg	101	80.0	120	----
antimony	7440-36-0	E472	0.01	mg/kg	10 mg/kg	104	80.0	120	----
arsenic	7440-38-2	E472	0.03	mg/kg	10 mg/kg	104	80.0	120	----
barium	7440-39-3	E472	0.05	mg/kg	2.5 mg/kg	98.4	80.0	120	----
beryllium	7440-41-7	E472	0.01	mg/kg	1 mg/kg	95.9	80.0	120	----
bismuth	7440-69-9	E472	0.01	mg/kg	10 mg/kg	95.6	80.0	120	----
boron	7440-42-8	E472	1	mg/kg	10 mg/kg	99.5	80.0	120	----
cadmium	7440-43-9	E472	0.01	mg/kg	1 mg/kg	98.6	80.0	120	----
calcium	7440-70-2	E472	20	mg/kg	500 mg/kg	97.2	80.0	120	----
cesium	7440-46-2	E472	0.005	mg/kg	0.5 mg/kg	100	80.0	120	----
chromium	7440-47-3	E472	0.2	mg/kg	2.5 mg/kg	99.0	80.0	120	----
cobalt	7440-48-4	E472	0.02	mg/kg	2.5 mg/kg	97.0	80.0	120	----
copper	7440-50-8	E472	0.2	mg/kg	2.5 mg/kg	96.5	80.0	120	----
iron	7439-89-6	E472	5	mg/kg	10 mg/kg	97.3	80.0	120	----
lead	7439-92-1	E472	0.05	mg/kg	5 mg/kg	97.3	80.0	120	----
lithium	7439-93-2	E472	0.5	mg/kg	2.5 mg/kg	96.2	80.0	120	----
magnesium	7439-95-4	E472	2	mg/kg	500 mg/kg	95.8	80.0	120	----
manganese	7439-96-5	E472	0.05	mg/kg	2.5 mg/kg	98.7	80.0	120	----
molybdenum	7439-98-7	E472	0.04	mg/kg	2.5 mg/kg	105	80.0	120	----
nickel	7440-02-0	E472	0.2	mg/kg	5 mg/kg	97.3	80.0	120	----
phosphorus	7723-14-0	E472	10	mg/kg	100 mg/kg	107	80.0	120	----
potassium	7440-09-7	E472	20	mg/kg	500 mg/kg	98.1	80.0	120	----
rubidium	7440-17-7	E472	0.05	mg/kg	1 mg/kg	100	80.0	120	----
selenium	7782-49-2	E472	0.1	mg/kg	10 mg/kg	97.9	80.0	120	----
sodium	7440-23-5	E472	20	mg/kg	500 mg/kg	99.0	80.0	120	----
strontium	7440-24-6	E472	0.1	mg/kg	2.5 mg/kg	99.4	80.0	120	----
tellurium	13494-80-9	E472	0.02	mg/kg	1 mg/kg	102	80.0	120	----
thallium	7440-28-0	E472	0.002	mg/kg	10 mg/kg	95.3	80.0	120	----

Sub-Matrix: **Biota**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Metals (QCLot: 562263) - continued									
tin	7440-31-5	E472	0.1	mg/kg	5 mg/kg	102	80.0	120	----
uranium	7440-61-1	E472	0.002	mg/kg	0.05 mg/kg	99.3	80.0	120	----
vanadium	7440-62-2	E472	0.1	mg/kg	5 mg/kg	102	80.0	120	----
zinc	7440-66-6	E472	1	mg/kg	5 mg/kg	96.7	80.0	120	----
zirconium	7440-67-7	E472	0.2	mg/kg	1 mg/kg	103	80.0	120	----
Metals (QCLot: 562338)									
silver	7440-22-4	E472.Ag	0.005	mg/kg	1 mg/kg	80.4	80.0	120	----
Metals (QCLot: 562339)									
titanium	7440-32-6	E472.Ti	0.5	mg/kg	2.5 mg/kg	89.2	80.0	120	----
Metals (QCLot: 562340)									
mercury	7439-97-6	E511	0.005	mg/kg	0.02 mg/kg	85.2	80.0	120	----
Metals (QCLot: 562341)									
mercury	7439-97-6	E511A	0.001	mg/kg wwt	0.02 mg/kg wwt	85.2	80.0	120	----
Metals (QCLot: 562342)									
aluminum	7429-90-5	E472	5	mg/kg	20 mg/kg	92.7	80.0	120	----
antimony	7440-36-0	E472	0.01	mg/kg	10 mg/kg	93.1	80.0	120	----
arsenic	7440-38-2	E472	0.03	mg/kg	10 mg/kg	95.1	80.0	120	----
barium	7440-39-3	E472	0.05	mg/kg	2.5 mg/kg	91.1	80.0	120	----
beryllium	7440-41-7	E472	0.01	mg/kg	1 mg/kg	85.8	80.0	120	----
bismuth	7440-69-9	E472	0.01	mg/kg	10 mg/kg	91.6	80.0	120	----
boron	7440-42-8	E472	1	mg/kg	10 mg/kg	# 72.6	80.0	120	MES
cadmium	7440-43-9	E472	0.01	mg/kg	1 mg/kg	88.4	80.0	120	----
calcium	7440-70-2	E472	20	mg/kg	500 mg/kg	87.2	80.0	120	----
cesium	7440-46-2	E472	0.005	mg/kg	0.5 mg/kg	92.0	80.0	120	----
chromium	7440-47-3	E472	0.2	mg/kg	2.5 mg/kg	89.5	80.0	120	----
cobalt	7440-48-4	E472	0.02	mg/kg	2.5 mg/kg	87.9	80.0	120	----
copper	7440-50-8	E472	0.2	mg/kg	2.5 mg/kg	87.0	80.0	120	----
iron	7439-89-6	E472	5	mg/kg	10 mg/kg	88.5	80.0	120	----
lead	7439-92-1	E472	0.05	mg/kg	5 mg/kg	90.3	80.0	120	----
lithium	7439-93-2	E472	0.5	mg/kg	2.5 mg/kg	# 76.0	80.0	120	MES
magnesium	7439-95-4	E472	2	mg/kg	500 mg/kg	89.9	80.0	120	----
manganese	7439-96-5	E472	0.05	mg/kg	2.5 mg/kg	89.7	80.0	120	----
molybdenum	7439-98-7	E472	0.04	mg/kg	2.5 mg/kg	93.7	80.0	120	----
nickel	7440-02-0	E472	0.2	mg/kg	5 mg/kg	87.8	80.0	120	----
phosphorus	7723-14-0	E472	10	mg/kg	100 mg/kg	82.0	80.0	120	----
potassium	7440-09-7	E472	20	mg/kg	500 mg/kg	90.3	80.0	120	----

Sub-Matrix: **Biota**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Metals (QCLot: 562342) - continued									
rubidium	7440-17-7	E472	0.05	mg/kg	1 mg/kg	92.1	80.0	120	----
selenium	7782-49-2	E472	0.1	mg/kg	10 mg/kg	88.5	80.0	120	----
sodium	7440-23-5	E472	20	mg/kg	500 mg/kg	89.6	80.0	120	----
strontium	7440-24-6	E472	0.1	mg/kg	2.5 mg/kg	91.8	80.0	120	----
tellurium	13494-80-9	E472	0.02	mg/kg	1 mg/kg	88.6	80.0	120	----
thallium	7440-28-0	E472	0.002	mg/kg	10 mg/kg	92.6	80.0	120	----
tin	7440-31-5	E472	0.1	mg/kg	5 mg/kg	92.9	80.0	120	----
uranium	7440-61-1	E472	0.002	mg/kg	0.05 mg/kg	94.4	80.0	120	----
vanadium	7440-62-2	E472	0.1	mg/kg	5 mg/kg	91.8	80.0	120	----
zinc	7440-66-6	E472	1	mg/kg	5 mg/kg	87.1	80.0	120	----
zirconium	7440-67-7	E472	0.2	mg/kg	1 mg/kg	95.2	80.0	120	----
Metals (QCLot: 562350)									
silver	7440-22-4	E472.Ag	0.005	mg/kg	1 mg/kg	85.1	80.0	120	----
Metals (QCLot: 562351)									
titanium	7440-32-6	E472.Ti	0.5	mg/kg	2.5 mg/kg	94.9	80.0	120	----
Metals (QCLot: 562352)									
mercury	7439-97-6	E511	0.005	mg/kg	0.02 mg/kg	89.8	80.0	120	----
Metals (QCLot: 562353)									
mercury	7439-97-6	E511A	0.001	mg/kg wwt	0.02 mg/kg wwt	89.8	80.0	120	----
Metals (QCLot: 562354)									
aluminum	7429-90-5	E472	5	mg/kg	20 mg/kg	96.0	80.0	120	----
antimony	7440-36-0	E472	0.01	mg/kg	10 mg/kg	96.4	80.0	120	----
arsenic	7440-38-2	E472	0.03	mg/kg	10 mg/kg	97.4	80.0	120	----
barium	7440-39-3	E472	0.05	mg/kg	2.5 mg/kg	93.4	80.0	120	----
beryllium	7440-41-7	E472	0.01	mg/kg	1 mg/kg	93.4	80.0	120	----
bismuth	7440-69-9	E472	0.01	mg/kg	10 mg/kg	89.3	80.0	120	----
boron	7440-42-8	E472	1	mg/kg	10 mg/kg	95.1	80.0	120	----
cadmium	7440-43-9	E472	0.01	mg/kg	1 mg/kg	92.1	80.0	120	----
calcium	7440-70-2	E472	20	mg/kg	500 mg/kg	94.1	80.0	120	----
cesium	7440-46-2	E472	0.005	mg/kg	0.5 mg/kg	95.3	80.0	120	----
chromium	7440-47-3	E472	0.2	mg/kg	2.5 mg/kg	93.0	80.0	120	----
cobalt	7440-48-4	E472	0.02	mg/kg	2.5 mg/kg	90.3	80.0	120	----
copper	7440-50-8	E472	0.2	mg/kg	2.5 mg/kg	89.4	80.0	120	----
iron	7439-89-6	E472	5	mg/kg	10 mg/kg	93.2	80.0	120	----
lead	7439-92-1	E472	0.05	mg/kg	5 mg/kg	91.5	80.0	120	----
lithium	7439-93-2	E472	0.5	mg/kg	2.5 mg/kg	93.7	80.0	120	----

Sub-Matrix: **Biota**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Metals (QCLot: 562354) - continued									
magnesium	7439-95-4	E472	2	mg/kg	500 mg/kg	92.6	80.0	120	----
manganese	7439-96-5	E472	0.05	mg/kg	2.5 mg/kg	93.7	80.0	120	----
molybdenum	7439-98-7	E472	0.04	mg/kg	2.5 mg/kg	99.6	80.0	120	----
nickel	7440-02-0	E472	0.2	mg/kg	5 mg/kg	90.2	80.0	120	----
phosphorus	7723-14-0	E472	10	mg/kg	100 mg/kg	101	80.0	120	----
potassium	7440-09-7	E472	20	mg/kg	500 mg/kg	94.1	80.0	120	----
rubidium	7440-17-7	E472	0.05	mg/kg	1 mg/kg	95.8	80.0	120	----
selenium	7782-49-2	E472	0.1	mg/kg	10 mg/kg	91.6	80.0	120	----
sodium	7440-23-5	E472	20	mg/kg	500 mg/kg	93.7	80.0	120	----
strontium	7440-24-6	E472	0.1	mg/kg	2.5 mg/kg	95.4	80.0	120	----
tellurium	13494-80-9	E472	0.02	mg/kg	1 mg/kg	94.7	80.0	120	----
thallium	7440-28-0	E472	0.002	mg/kg	10 mg/kg	90.6	80.0	120	----
tin	7440-31-5	E472	0.1	mg/kg	5 mg/kg	98.1	80.0	120	----
uranium	7440-61-1	E472	0.002	mg/kg	0.05 mg/kg	92.6	80.0	120	----
vanadium	7440-62-2	E472	0.1	mg/kg	5 mg/kg	95.8	80.0	120	----
zinc	7440-66-6	E472	1	mg/kg	5 mg/kg	89.1	80.0	120	----
zirconium	7440-67-7	E472	0.2	mg/kg	1 mg/kg	96.2	80.0	120	----
Metals (QCLot: 701598)									
mercury	7439-97-6	E511A	0.001	mg/kg wwt	0.02 mg/kg wwt	91.7	80.0	120	----

Qualifiers

Qualifier	Description
MES	*Data Quality Objective was marginally exceeded (by < 10% absolute) for < 10% of analytes in a Multi-Element Scan / Multi-Parameter Scan (considered acceptable as per OMOE & CCME).*

Reference Material (RM) Report

A Reference Material (RM) is a homogenous material with known and well-established analyte concentrations. RMs are processed in an identical manner to test samples, and are used to monitor and control the accuracy and precision of a test method for a typical sample matrix. RM results are expressed as percent recovery of the target analyte concentration. RM targets may be certified target concentrations provided by the RM supplier, or may be ALS long-term mean values (for empirical test methods).

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Metals (QCLot: 554210)									
	RM	aluminum	7429-90-5	E440	11.2 mg/kg	100	70.0	130	----
	RM	arsenic	7440-38-2	E440	34.6 mg/kg	104	70.0	130	----
	RM	bismuth	7440-69-9	E440	0.0247 mg/kg	131	60.0	140	----
	RM	cadmium	7440-43-9	E440	14.5 mg/kg	99.0	70.0	130	----
	RM	calcium	7440-70-2	E440	550 mg/kg	107	70.0	130	----
	RM	cesium	7440-46-2	E440	0.0712 mg/kg	103	70.0	130	----
	RM	chromium	7440-47-3	E440	1.96 mg/kg	104	70.0	130	----
	RM	cobalt	7440-48-4	E440	0.267 mg/kg	95.6	70.0	130	----
	RM	copper	7440-50-8	E440	35 mg/kg	103	70.0	130	----
	RM	iron	7439-89-6	E440	1070 mg/kg	102	70.0	130	----
	RM	lead	7439-92-1	E440	0.162 mg/kg	104	70.0	130	----
	RM	magnesium	7439-95-4	E440	940 mg/kg	104	70.0	130	----
	RM	manganese	7439-96-5	E440	8.91 mg/kg	102	70.0	130	----
	RM	molybdenum	7439-98-7	E440	1.41 mg/kg	101	70.0	130	----
	RM	nickel	7440-02-0	E440	1.57 mg/kg	105	70.0	130	----
	RM	phosphorus	7723-14-0	E440	11500 mg/kg	106	70.0	130	----
	RM	potassium	7440-09-7	E440	14400 mg/kg	108	70.0	130	----
	RM	rubidium	7440-17-7	E440	5.11 mg/kg	100	70.0	130	----
	RM	selenium	7782-49-2	E440	8 mg/kg	109	70.0	130	----
	RM	sodium	7440-23-5	E440	10673 mg/kg	104	70.0	130	----
	RM	strontium	7440-24-6	E440	3.92 mg/kg	101	70.0	130	----
	RM	thallium	7440-28-0	E440	0.013 mg/kg	103	70.0	130	----
	RM	uranium	7440-61-1	E440	0.0786 mg/kg	110	70.0	130	----
	RM	vanadium	7440-62-2	E440	0.51 mg/kg	99.6	70.0	130	----
	RM	zinc	7440-66-6	E440	105.3 mg/kg	104	70.0	130	----
Metals (QCLot: 554211)									
	RM	mercury	7439-97-6	E510A	0.331 mg/kg wwt	114	70.0	130	----
Metals (QCLot: 554212)									

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Metals (QCLot: 554212) - continued									
	RM	silver	7440-22-4	E440.Ag	2.05 mg/kg	99.0	70.0	130	----
Metals (QCLot: 554213)									
	RM	mercury	7439-97-6	E510	0.331 mg/kg	114	70.0	130	----
Metals (QCLot: 554356)									
	RM	aluminum	7429-90-5	E440	11.2 mg/kg	102	70.0	130	----
	RM	arsenic	7440-38-2	E440	34.6 mg/kg	102	70.0	130	----
	RM	bismuth	7440-69-9	E440	0.0247 mg/kg	85.2	60.0	140	----
	RM	cadmium	7440-43-9	E440	14.5 mg/kg	95.5	70.0	130	----
	RM	calcium	7440-70-2	E440	550 mg/kg	101	70.0	130	----
	RM	cesium	7440-46-2	E440	0.0712 mg/kg	104	70.0	130	----
	RM	chromium	7440-47-3	E440	1.96 mg/kg	110	70.0	130	----
	RM	cobalt	7440-48-4	E440	0.267 mg/kg	97.1	70.0	130	----
	RM	copper	7440-50-8	E440	35 mg/kg	101	70.0	130	----
	RM	iron	7439-89-6	E440	1070 mg/kg	101	70.0	130	----
	RM	lead	7439-92-1	E440	0.162 mg/kg	97.8	70.0	130	----
	RM	magnesium	7439-95-4	E440	940 mg/kg	100	70.0	130	----
	RM	manganese	7439-96-5	E440	8.91 mg/kg	100	70.0	130	----
	RM	molybdenum	7439-98-7	E440	1.41 mg/kg	102	70.0	130	----
	RM	nickel	7440-02-0	E440	1.57 mg/kg	97.6	70.0	130	----
	RM	phosphorus	7723-14-0	E440	11500 mg/kg	101	70.0	130	----
	RM	potassium	7440-09-7	E440	14400 mg/kg	102	70.0	130	----
	RM	rubidium	7440-17-7	E440	5.11 mg/kg	98.7	70.0	130	----
	RM	selenium	7782-49-2	E440	8 mg/kg	103	70.0	130	----
	RM	sodium	7440-23-5	E440	10673 mg/kg	99.8	70.0	130	----
	RM	strontium	7440-24-6	E440	3.92 mg/kg	100	70.0	130	----
	RM	thallium	7440-28-0	E440	0.013 mg/kg	86.7	70.0	130	----
	RM	uranium	7440-61-1	E440	0.0786 mg/kg	108	70.0	130	----
	RM	vanadium	7440-62-2	E440	0.51 mg/kg	99.2	70.0	130	----
	RM	zinc	7440-66-6	E440	105.3 mg/kg	98.9	70.0	130	----
Metals (QCLot: 554357)									
	RM	mercury	7439-97-6	E510A	0.331 mg/kg wwt	114	70.0	130	----

Sub-Matrix:

Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Reference Material (RM) Report: RM Target Concentration	Recovery (%): RM	Recovery Limits (%): Low	Recovery Limits (%): High	Qualifier
Metals (QCLot: 554358)									
	RM	silver	7440-22-4	E440.Ag	2.05 mg/kg	102	70.0	130	----
Metals (QCLot: 554359)									
	RM	mercury	7439-97-6	E510	0.331 mg/kg	114	70.0	130	----
Metals (QCLot: 562249)									
	RM	silver	7440-22-4	E472.Ag	2.05 mg/kg	87.0	70.0	130	----
Metals (QCLot: 562251)									
	RM	mercury	7439-97-6	E511	0.331 mg/kg	102	70.0	130	----
Metals (QCLot: 562252)									
	RM	mercury	7439-97-6	E511A	0.331 mg/kg wwt	102	70.0	130	----
Metals (QCLot: 562253)									
	RM	aluminum	7429-90-5	E472	11.2 mg/kg	86.2	70.0	130	----
	RM	arsenic	7440-38-2	E472	34.6 mg/kg	98.3	70.0	130	----
	RM	bismuth	7440-69-9	E472	0.0247 mg/kg	70.4	60.0	140	----
	RM	cadmium	7440-43-9	E472	14.5 mg/kg	91.5	70.0	130	----
	RM	calcium	7440-70-2	E472	550 mg/kg	93.3	70.0	130	----
	RM	cesium	7440-46-2	E472	0.0712 mg/kg	91.7	70.0	130	----
	RM	chromium	7440-47-3	E472	1.96 mg/kg	88.9	70.0	130	----
	RM	cobalt	7440-48-4	E472	0.267 mg/kg	90.3	70.0	130	----
	RM	copper	7440-50-8	E472	35 mg/kg	93.6	70.0	130	----
	RM	iron	7439-89-6	E472	1070 mg/kg	93.8	70.0	130	----
	RM	lead	7439-92-1	E472	0.162 mg/kg	78.8	70.0	130	----
	RM	magnesium	7439-95-4	E472	940 mg/kg	96.7	70.0	130	----
	RM	manganese	7439-96-5	E472	8.91 mg/kg	96.2	70.0	130	----
	RM	molybdenum	7439-98-7	E472	1.41 mg/kg	92.9	70.0	130	----
	RM	nickel	7440-02-0	E472	1.57 mg/kg	73.8	70.0	130	----
	RM	phosphorus	7723-14-0	E472	11500 mg/kg	100	70.0	130	----
	RM	potassium	7440-09-7	E472	14400 mg/kg	99.0	70.0	130	----
	RM	rubidium	7440-17-7	E472	5.11 mg/kg	93.4	70.0	130	----
	RM	selenium	7782-49-2	E472	8 mg/kg	94.9	70.0	130	----
	RM	sodium	7440-23-5	E472	10673 mg/kg	94.7	70.0	130	----
	RM	strontium	7440-24-6	E472	3.92 mg/kg	89.1	70.0	130	----
	RM	thallium	7440-28-0	E472	0.013 mg/kg	85.8	70.0	130	----

Sub-Matrix:

Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Reference Material (RM) Report: RM Target Concentration	Recovery (%): RM	Recovery Limits (%): Low	Recovery Limits (%): High	Qualifier
Metals (QCLot: 562253) - continued									
	RM	uranium	7440-61-1	E472	0.0786 mg/kg	96.7	70.0	130	----
	RM	vanadium	7440-62-2	E472	0.51 mg/kg	94.8	70.0	130	----
	RM	zinc	7440-66-6	E472	105.3 mg/kg	93.2	70.0	130	----
Metals (QCLot: 562259)									
	RM	silver	7440-22-4	E472.Ag	2.05 mg/kg	88.8	70.0	130	----
Metals (QCLot: 562261)									
	RM	mercury	7439-97-6	E511	0.331 mg/kg	106	70.0	130	----
Metals (QCLot: 562262)									
	RM	mercury	7439-97-6	E511A	0.331 mg/kg wwt	106	70.0	130	----
Metals (QCLot: 562263)									
	RM	aluminum	7429-90-5	E472	11.2 mg/kg	93.8	70.0	130	----
	RM	arsenic	7440-38-2	E472	34.6 mg/kg	95.9	70.0	130	----
	RM	bismuth	7440-69-9	E472	0.0247 mg/kg	73.8	60.0	140	----
	RM	cadmium	7440-43-9	E472	14.5 mg/kg	90.2	70.0	130	----
	RM	calcium	7440-70-2	E472	550 mg/kg	101	70.0	130	----
	RM	cesium	7440-46-2	E472	0.0712 mg/kg	93.3	70.0	130	----
	RM	chromium	7440-47-3	E472	1.96 mg/kg	108	70.0	130	----
	RM	cobalt	7440-48-4	E472	0.267 mg/kg	90.1	70.0	130	----
	RM	copper	7440-50-8	E472	35 mg/kg	90.8	70.0	130	----
	RM	iron	7439-89-6	E472	1070 mg/kg	92.8	70.0	130	----
	RM	lead	7439-92-1	E472	0.162 mg/kg	119	70.0	130	----
	RM	magnesium	7439-95-4	E472	940 mg/kg	95.1	70.0	130	----
	RM	manganese	7439-96-5	E472	8.91 mg/kg	93.2	70.0	130	----
	RM	molybdenum	7439-98-7	E472	1.41 mg/kg	99.3	70.0	130	----
	RM	nickel	7440-02-0	E472	1.57 mg/kg	# 136	70.0	130	MES
	RM	phosphorus	7723-14-0	E472	11500 mg/kg	98.4	70.0	130	----
	RM	potassium	7440-09-7	E472	14400 mg/kg	96.6	70.0	130	----
	RM	rubidium	7440-17-7	E472	5.11 mg/kg	89.5	70.0	130	----
	RM	selenium	7782-49-2	E472	8 mg/kg	96.2	70.0	130	----
	RM	sodium	7440-23-5	E472	10673 mg/kg	93.8	70.0	130	----
	RM	strontium	7440-24-6	E472	3.92 mg/kg	96.7	70.0	130	----

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Metals (QCLot: 562263) - continued									
	RM	thallium	7440-28-0	E472	0.013 mg/kg	92.7	70.0	130	----
	RM	uranium	7440-61-1	E472	0.0786 mg/kg	95.5	70.0	130	----
	RM	vanadium	7440-62-2	E472	0.51 mg/kg	92.6	70.0	130	----
	RM	zinc	7440-66-6	E472	105.3 mg/kg	94.6	70.0	130	----
Metals (QCLot: 562338)									
	RM	silver	7440-22-4	E472.Ag	2.05 mg/kg	80.1	70.0	130	----
Metals (QCLot: 562340)									
	RM	mercury	7439-97-6	E511	0.331 mg/kg	94.9	70.0	130	----
Metals (QCLot: 562341)									
	RM	mercury	7439-97-6	E511A	0.331 mg/kg wwt	94.9	70.0	130	----
Metals (QCLot: 562342)									
	RM	aluminum	7429-90-5	E472	11.2 mg/kg	125	70.0	130	----
	RM	arsenic	7440-38-2	E472	34.6 mg/kg	89.3	70.0	130	----
	RM	bismuth	7440-69-9	E472	0.0247 mg/kg	64.1	60.0	140	----
	RM	cadmium	7440-43-9	E472	14.5 mg/kg	81.8	70.0	130	----
	RM	calcium	7440-70-2	E472	550 mg/kg	81.1	70.0	130	----
	RM	cesium	7440-46-2	E472	0.0712 mg/kg	85.8	70.0	130	----
	RM	chromium	7440-47-3	E472	1.96 mg/kg	85.0	70.0	130	----
	RM	cobalt	7440-48-4	E472	0.267 mg/kg	82.0	70.0	130	----
	RM	copper	7440-50-8	E472	35 mg/kg	83.8	70.0	130	----
	RM	iron	7439-89-6	E472	1070 mg/kg	86.8	70.0	130	----
	RM	lead	7439-92-1	E472	0.162 mg/kg	# 69.9	70.0	130	MES
	RM	magnesium	7439-95-4	E472	940 mg/kg	86.3	70.0	130	----
	RM	manganese	7439-96-5	E472	8.91 mg/kg	85.3	70.0	130	----
	RM	molybdenum	7439-98-7	E472	1.41 mg/kg	85.4	70.0	130	----
	RM	nickel	7440-02-0	E472	1.57 mg/kg	73.9	70.0	130	----
	RM	phosphorus	7723-14-0	E472	11500 mg/kg	76.8	70.0	130	----
	RM	potassium	7440-09-7	E472	14400 mg/kg	90.3	70.0	130	----
	RM	rubidium	7440-17-7	E472	5.11 mg/kg	84.1	70.0	130	----
	RM	selenium	7782-49-2	E472	8 mg/kg	87.1	70.0	130	----
	RM	sodium	7440-23-5	E472	10673 mg/kg	84.0	70.0	130	----

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Metals (QCLot: 562342) - continued									
	RM	strontium	7440-24-6	E472	3.92 mg/kg	83.6	70.0	130	----
	RM	thallium	7440-28-0	E472	0.013 mg/kg	80.1	70.0	130	----
	RM	uranium	7440-61-1	E472	0.0786 mg/kg	90.1	70.0	130	----
	RM	vanadium	7440-62-2	E472	0.51 mg/kg	85.2	70.0	130	----
	RM	zinc	7440-66-6	E472	105.3 mg/kg	86.7	70.0	130	----
Metals (QCLot: 562350)									
	RM	silver	7440-22-4	E472.Ag	2.05 mg/kg	88.6	70.0	130	----
Metals (QCLot: 562352)									
	RM	mercury	7439-97-6	E511	0.331 mg/kg	102	70.0	130	----
Metals (QCLot: 562353)									
	RM	mercury	7439-97-6	E511A	0.331 mg/kg wwt	102	70.0	130	----
Metals (QCLot: 562354)									
	RM	aluminum	7429-90-5	E472	11.2 mg/kg	88.3	70.0	130	----
	RM	arsenic	7440-38-2	E472	34.6 mg/kg	97.0	70.0	130	----
	RM	bismuth	7440-69-9	E472	0.0247 mg/kg	84.2	60.0	140	----
	RM	cadmium	7440-43-9	E472	14.5 mg/kg	89.0	70.0	130	----
	RM	calcium	7440-70-2	E472	550 mg/kg	98.8	70.0	130	----
	RM	cesium	7440-46-2	E472	0.0712 mg/kg	93.4	70.0	130	----
	RM	chromium	7440-47-3	E472	1.96 mg/kg	84.7	70.0	130	----
	RM	cobalt	7440-48-4	E472	0.267 mg/kg	84.9	70.0	130	----
	RM	copper	7440-50-8	E472	35 mg/kg	90.7	70.0	130	----
	RM	iron	7439-89-6	E472	1070 mg/kg	93.1	70.0	130	----
	RM	lead	7439-92-1	E472	0.162 mg/kg	78.8	70.0	130	----
	RM	magnesium	7439-95-4	E472	940 mg/kg	92.9	70.0	130	----
	RM	manganese	7439-96-5	E472	8.91 mg/kg	93.2	70.0	130	----
	RM	molybdenum	7439-98-7	E472	1.41 mg/kg	95.1	70.0	130	----
	RM	nickel	7440-02-0	E472	1.57 mg/kg	84.0	70.0	130	----
	RM	phosphorus	7723-14-0	E472	11500 mg/kg	99.4	70.0	130	----
	RM	potassium	7440-09-7	E472	14400 mg/kg	97.9	70.0	130	----
	RM	rubidium	7440-17-7	E472	5.11 mg/kg	91.9	70.0	130	----
	RM	selenium	7782-49-2	E472	8 mg/kg	93.3	70.0	130	----

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Metals (QCLot: 562354) - continued									
	RM	sodium	7440-23-5	E472	10673 mg/kg	93.6	70.0	130	----
	RM	strontium	7440-24-6	E472	3.92 mg/kg	93.0	70.0	130	----
	RM	thallium	7440-28-0	E472	0.013 mg/kg	82.8	70.0	130	----
	RM	uranium	7440-61-1	E472	0.0786 mg/kg	94.1	70.0	130	----
	RM	vanadium	7440-62-2	E472	0.51 mg/kg	91.9	70.0	130	----
	RM	zinc	7440-66-6	E472	105.3 mg/kg	91.6	70.0	130	----
Metals (QCLot: 701598)									
	RM	mercury	7439-97-6	E511A	0.331 mg/kg wwt	106	70.0	130	----

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Affix ALS barcode label here (lab use only)

COC Number:

Page 1 of 12

Report To	Contact and company name below will appear on the final report
Company:	Mount Polley Mining Corporation
Contact:	Gabriel Holmes
Phone:	236-317-4946
	Company address below will appear on the final report
Street:	PO Box 12
City/Province:	Likely, BC
Postal Code:	V0L 1N0
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☐ NO
Company:	
Contact:	

Report Format / Distribution	
Select Report Format:	☑ EXCEL ☐ EDD (DIGITAL)
Quality Control (QC) Report with Report	☑ ☐ NO
☐ Compare Results to Criteria on Report - provide details below if box	
Select Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	gabriel.holmes@mountpolley.com
Email 2	kivens@mountpolley.com
Email 3	pstecko@minnow.ca; kbatchelar@minnow.ca

Invoice Distribution	
Select Invoice Distribution:	☑ EMAIL ☑ MAIL ☐ FAX
Email 1 or Fax	gabriel.holmes@mountpolley.com
Email 2	kala.ivens@mountpolley.com

Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply

Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days)		EMERGENCY	
	4 day [P4] ☐		1 Business day [E1] ☐
	3 day [P3] ☐		Same Day, Weekend or Statutory holiday [E0] ☐
	2 day [P2] ☐		

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm

For tests that can not be performed according to the service level selected, you will be contacted.

Project Information		Oil and Gas Required Fields (client use)	
ALS Account # / Quote #:	VA22-MPMC100-002	AFE/Cost Center:	PO#
Job #:		Major/Minor Code:	Routing Code:
PO / AFE:		Requisitioner:	
LSD:		Location:	
ALS Lab Work Order # (lab use only)	2820	ALS Contact: Can Dang	Sampler: LBO

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Moisture Content by Gravimetry (E144)	Mercury in Biota by CVAAS (DRY units, Routine) (E510)	Mercury in Biota by CVAAS (WET units, Routine) (E510A)	Metals in Biota by CRC ICPMS (DRY units, Routine) (E440)	Silver in Biota by CRC ICPMS (DRY units, Routine) (E440.Ag)	Titanium in Biota by CRC ICPMS (DRY units, Routine) (E440.Ti)	Number of Containers
1	POL_RB-M-1_2022-05	28-May-22	—	Tissue	R	R	R	R	R	R	1
2	POL_RB-M-2_2022-05	29-May-22	—	Tissue	R	R	R	R	R	R	1
3	POL_RB-M-3_2022-05	29-May-22	—	Tissue	R	R	R	R	R	R	1
4	POL_RB-M-4_2022-05	29-May-22	—	Tissue	R	R	R	R	R	R	1
5	POL_RB-M-5_2022-05	29-May-22	—	Tissue	R	R	R	R	R	R	1
6	POL_RB-M-6_2022-05	29-May-22	—	Tissue	R	R	R	R	R	R	1
7	POL_RB-M-7_2022-05	29-May-22	—	Tissue	R	R	R	R	R	R	1
8	POL_RB-M-8_2022-05	29-May-22	—	Tissue	R	R	R	R	R	R	1
9	POL_RB-O-1_2022-05	28-May-22	—	Tissue	R	R	R	R	R	R	1
10	POL_RB-O-2_2022-05	29-May-22	—	Tissue	R	R	R	R	R	R	1
11	POL_RB-O-3_2022-05	29-May-22	—	Tissue	R	R	R	R	R	R	1
12	POL_RB-O-4_2022-05	29-May-22	—	Tissue	R	R	R	R	R	R	1

Environmental Division
Vancouver
Work Order Reference
VA22B2820

Telephone : +1 604 253 4188

Ground Charge x1 cooler

Drinking Water (DW) Samples[1] (client use)	Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)
Are samples taken from a Regulated DW System? ☐ ☐	If sample insufficient for routine digestion and analysis, contact kbatchelar@minnow.ca to discuss analysis options (e.g., microdigestion and HR-ICPMS). Internal PO 22-29 Task 3
Are samples for human drinking water use? ☐ ☐	

SAMPLE CONDITION AS REC

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice Packs ☐ Ice Cubes ☑ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
0.4			8	5	

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by:	Date:	Time:	Received by:	Date:	Time:	Received by:	Date:	Time:
Katharina Batchelar	7-June-22	12:00				IT	Jun 8/22	10:30 AM

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

OCTOBER 2015 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Affix ALS barcode label here (lab use only)

COC Number:

Report To	Contact and company name below will appear on the final report
Company:	Mount Polley Mining Corporation
Contact:	Gabriel Holmes
Phone:	236-317-4946
	Company address below will appear on the final report
Street:	PO Box 12
City/Province:	Likely, BC
Postal Code:	V0L 1N0
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☐ NO
Company:	
Contact:	

Report Format / Distribution	
Select Report Format:	☑ EXCEL ☐ EDD (DIGITAL)
Quality Control (QC) Report with Report	☑ ☐ NO
☐ Compare Results to Criteria on Report - provide details below if box	
Select Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	gabriel.holmes@mountpolley.com
Email 2	kivens@mountpolley.com
Email 3	pstecko@minnow.ca; kbatchelar@minnow.ca

Invoice Distribution	
Select Invoice Distribution:	☑ EMAIL ☑ MAIL ☐ FAX
Email 1 or Fax	gabriel.holmes@mountpolley.com
Email 2	kala.ivens@mountpolley.com

Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply

Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days)		EMERGENCY	
4 day [P4]	☐	1 Business day [E1]	☐
3 day [P3]	☐	Same Day, Weekend or Statutory holiday [E0]	☐
2 day [P2]	☐		

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm

For tests that can not be performed according to the service level selected, you will be contacted.

Project Information		Oil and Gas Required Fields (client use)	
ALS Account # / Quote #:	VA22-MPMC100-002	AFE/Cost Center:	PO#
Job #:		Major/Minor Code:	Routing Code:
PO / AFE:		Requisitioner:	
LSD:		Location:	
ALS Lab Work Order # (lab use only)		ALS Contact: Can Dang	Sampler: LBo

Analysis Request — Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Moisture Content by Gravimetry (E144)	Mercury in Biota by CVAAS (DRY units, Routine) (E510)	Mercury in Biota by CVAAS (WET units, Routine) (E510A)	Metals in Biota by CRC ICPMS (DRY units, Routine) (E440)	Silver in Biota by CRC ICPMS (DRY units, Routine) (E440.Ag)	Titanium in Biota by CRC ICPMS (DRY units, Routine) (E440.Ti)	Number of Containers
13	POL_RB-O-5_2022-05	29-May-22	—	Tissue	R	R	R	R	R	R	1
14	POL_RB-O-6_2022-05	29-May-22	—	Tissue	R	R	R	R	R	R	1
15	POL_RB-O-7_2022-05	29-May-22	—	Tissue	R	R	R	R	R	R	1
16	POL_RB-O-8_2022-05	29-May-22	—	Tissue	R	R	R	R	R	R	1
17	POL_RB-Li-1_2022-05	28-May-22	—	Tissue	R	R	R	R	R	R	1
18	POL_RB-Li-2_2022-05	29-May-22	—	Tissue	R	R	R	R	R	R	1
19	POL_RB-Li-3_2022-05	29-May-22	—	Tissue	R	R	R	R	R	R	1
20	POL_RB-Li-4_2022-05	29-May-22	—	Tissue	R	R	R	R	R	R	1
21	POL_RB-Li-5_2022-05	29-May-22	—	Tissue	R	R	R	R	R	R	1
22	POL_RB-Li-6_2022-05	29-May-22	—	Tissue	R	R	R	R	R	R	1
23	POL_RB-Li-7_2022-05	29-May-22	—	Tissue	R	R	R	R	R	R	1
24	POL_RB-Li-8_2022-05	29-May-22	—	Tissue	R	R	R	R	R	R	1

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ ☐

Are samples for human drinking water use? ☐ ☐

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

If sample insufficient for routine digestion and analysis, contact kbatchelar@minnow.ca to discuss analysis options (e.g., microdigestion and HR-ICPMS). Internal PO 22-29 Task 3

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice Packs ☐ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
			8	8	

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by:	Date:	Time:	Received by:	Date:	Time:	Received by:	Date:	Time:
Katharina Batchelar	7-June-22	12:00				IT	Jun 8/22	10:30 AM

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

OCTOBER 2015 FRONT

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1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

ALS Environmental

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Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878

Affix ALS barcode label here (lab use only)

COC Number:

Page 3 of 12

Report To	Contact and company name below will appear on the final report
Company:	Mount Polley Mining Corporation
Contact:	Gabriel Holmes
Phone:	236-317-4946
	Company address below will appear on the final report
Street:	PO Box 12
City/Province:	Likely, BC
Postal Code:	V0L 1N0
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☐ NO
Company:	
Contact:	

Report Format / Distribution	
Select Report Format: ☑	☑ EXCEL ☐ EDD (DIGITAL)
Quality Control (QC) Report with Report	☑ ☐ NO
☐ Compare Results to Criteria on Report - provide details below if box	
Select Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	gabriel.holmes@mountpolley.com
Email 2	kivens@mountpolley.com
Email 3	pstecko@minnow.ca; kbatchelar@minnow.ca
Invoice Distribution	
Select Invoice Distribution:	☑ EMAIL ☑ MAIL ☐ FAX
Email 1 or Fax	gabriel.holmes@mountpolley.com
Email 2	kala.ivens@mountpolley.com

Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply

Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days)		EMERGENCY	
4 day [P4]	☐	1 Business day [E1]	☐
3 day [P3]	☐	Same Day, Weekend or Statutory holiday [E0]	☐
2 day [P2]	☐		

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm

For tests that can not be performed according to the service level selected, you will be contacted.

Project Information		Oil and Gas Required Fields (client use)	
ALS Account # / Quote #:	VA22-MPMC100-002	AFE/Cost Center:	PO#
Job #:		Major/Minor Code:	Routing Code:
PO / AFE:		Requisitioner:	
LSD:		Location:	
ALS Lab Work Order # (lab use only)		ALS Contact: Can Dang	Sampler: LBo

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Moisture Content by Gravimetry (E144)	Mercury in Biota by CVAAS (DRY units, Routine) (E510)	Mercury in Biota by CVAAS (WET units, Routine) (E510A)	Metals in Biota by CRC ICPMS (DRY units, Routine) (E440)	Silver in Biota by CRC ICPMS (DRY units, Routine) (E440.Ag)	Titanium in Biota by CRC ICPMS (DRY units, Routine) (E440.Ti)	Number of Containers
25	POL_RB-Ki-1_2022-05	28-May-22	—	Tissue	R	R	R	R	R	R	1
26	POL_RB-Ki-2_2022-05	29-May-22	—	Tissue	R	R	R	R	R	R	1
27	POL_RB-Ki-3_2022-05	29-May-22	—	Tissue	R	R	R	R	R	R	1
28	POL_RB-Ki-4_2022-05	29-May-22	—	Tissue	R	R	R	R	R	R	1
29	POL_RB-Ki-5_2022-05	29-May-22	—	Tissue	R	R	R	R	R	R	1
30	POL_RB-Ki-6_2022-05	29-May-22	—	Tissue	R	R	R	R	R	R	1
31	POL_RB-Ki-7_2022-05	29-May-22	—	Tissue	R	R	R	R	R	R	1
32	POL_RB-Ki-8_2022-05	29-May-22	—	Tissue	R	R	R	R	R	R	1
33	BOL_RB-M-1_2022-05	30-May-22	—	Tissue	R	R	R	R	R	R	1
34	BOL_RB-M-2_2022-05	30-May-22	—	Tissue	R	R	R	R	R	R	1
35	BOL_RB-M-3_2022-05	30-May-22	—	Tissue	R	R	R	R	R	R	1
36	BOL_RB-M-4_2022-05	30-May-22	—	Tissue	R	R	R	R	R	R	1

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ ☐

Are samples for human drinking water use? ☐ ☐

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

If sample insufficient for routine digestion and analysis, contact kbatchelar@minnow.ca to discuss analysis options (e.g., microdigestion and HR-ICPMS). Internal PO 22-29 Task 3

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice Packs ☐ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C		FINAL COOLER TEMPERATURES °C	
		8	8

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Katharina Batchelar	Date: 7-June-22	Time: 12:00	Received by:	Date:	Time:	Received by: IT	Date: Jun 8/22	Time: 10:30AM

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

OCTOBER 2015 FRONT

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1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form**.

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Affix ALS barcode label here (lab use only)

COC Number:

Page 4 of 12

Report To	Contact and company name below will appear on the final report	Report Format / Distribution	Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply
Company:	Mount Polley Mining Corporation	Select Report Format: ☑ EXCEL ☐ EDD (DIGITAL)	Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply
Contact:	Gabriel Holmes	Quality Control (QC) Report with Report ☑ ☐ NO	PRIORITY (Business Days): 4 day [P4] ☐ / 3 day [P3] ☐ / 2 day [P2] ☐ — EMERGENCY: 1 Business day [E1] ☐ / Same Day, Weekend or Statutory holiday [E0] ☐
Phone:	236-317-4946	☐ Compare Results to Criteria on Report - provide details below if box	Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm
	Company address below will appear on the final report	Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX	For tests that can not be performed according to the service level selected, you will be contacted.
Street:	PO Box 12	Email 1 or Fax: gabriel.holmes@mountpolley.com	
City/Province:	Likely, BC	Email 2: kivens@mountpolley.com	
Postal Code:	V0L 1N0	Email 3: pstecko@minnow.ca; kbatchelar@minnow.ca	
Invoice To	Same as Report To ☑ YES ☐ NO	Invoice Distribution	
	Copy of Invoice with Report ☐ YES ☐ NO	Select Invoice Distribution: ☑ EMAIL ☑ MAIL ☐ FAX	
Company:		Email 1 or Fax: gabriel.holmes@mountpolley.com	
Contact:		Email 2: kala.ivens@mountpolley.com	

Project Information		Oil and Gas Required Fields (client use)	
ALS Account # / Quote #:	VA22-MPMC100-002	AFE/Cost Center:	PO#
Job #:		Major/Minor Code:	Routing Code:
PO / AFE:		Requisitioner:	
LSD:		Location:	
ALS Lab Work Order # (lab use only)		ALS Contact: Can Dang	Sampler: LBo

Analysis Request — Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Moisture Content by Gravimetry (E144)	Mercury in Biota by CVAAS (DRY units, Routine) (E510)	Mercury in Biota by CVAAS (WET units, Routine) (E510A)	Metals in Biota by CRC ICPMS (DRY units, Routine) (E440)	Silver in Biota by CRC ICPMS (DRY units, Routine) (E440 Ag)	Titanium in Biota by CRC ICPMS (DRY units, Routine) (E440 Ti)	Number of Containers
37	BOL_RB-M-5_2022-05	30-May-22	—	Tissue	R	R	R	R	R	R	1
38	BOL_RB-M-6_2022-05	30-May-22	—	Tissue	R	R	R	R	R	R	1
39	BOL_RB-M-7_2022-05	30-May-22	—	Tissue	R	R	R	R	R	R	1
40	BOL_RB-M-8_2022-05	30-May-22	—	Tissue	R	R	R	R	R	R	1
41	BOL_RB-O-1_2022-05	30-May-22	—	Tissue	R	R	R	R	R	R	1
42	BOL_RB-O-2_2022-05	30-May-22	—	Tissue	R	R	R	R	R	R	1
43	BOL_RB-O-3_2022-05	30-May-22	—	Tissue	R	R	R	R	R	R	1
44	BOL_RB-O-4_2022-05	30-May-22	—	Tissue	R	R	R	R	R	R	1
45	BOL_RB-O-5_2022-05	30-May-22	—	Tissue	R	R	R	R	R	R	1
46	BOL_RB-O-6_2022-05	30-May-22	—	Tissue	R	R	R	R	R	R	1
47	BOL_RB-O-7_2022-05	30-May-22	—	Tissue	R	R	R	R	R	R	1
48	BOL_RB-O-8_2022-05	30-May-22	—	Tissue	R	R	R	R	R	R	1

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ ☐

Are samples for human drinking water use? ☐ ☐

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

If sample insufficient for routine digestion and analysis, contact kbatchelar@minnow.ca to discuss analysis options (e.g., microdigestion and HR-ICPMS). Internal PO 22-29 Task 3

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice Packs ☐ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
			8	8	

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Katharina Batchelar	Date: 7-June-22	Time: 12:00	Received by:	Date:	Time:	Received by: JT	Date: Jun 8/22	Time: 10:30 AM

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION — WHITE - LABORATORY COPY — YELLOW - CLIENT COPY — OCTOBER 2015 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Affix ALS barcode label here (lab use only)

COC Number:

Page 5 of 12

Report To	Contact and company name below will appear on the final report
Company:	Mount Polley Mining Corporation
Contact:	Gabriel Holmes
Phone:	236-317-4946
	Company address below will appear on the final report
Street:	PO Box 12
City/Province:	Likely, BC
Postal Code:	V0L 1N0
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☐ NO
Company:	
Contact:	

Report Format / Distribution	
Select Report Format:	☑ EXCEL ☐ EDD (DIGITAL)
Quality Control (QC) Report with Report	☑ ☐ NO
☐ Compare Results to Criteria on Report - provide details below if box	
Select Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	gabriel.holmes@mountpolley.com
Email 2	kivens@mountpolley.com
Email 3	pstecko@minnow.ca; kbatchelar@minnow.ca

Invoice Distribution	
Select Invoice Distribution:	☑ EMAIL ☑ MAIL ☐ FAX
Email 1 or Fax	gabriel.holmes@mountpolley.com
Email 2	kala.ivens@mountpolley.com

Project Information	
ALS Account # / Quote #:	VA22-MPMC100-002
Job #:	
PO / AFE:	
LSD:	

Oil and Gas Required Fields (client use)	
AFE/Cost Center:	PO#
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Lab Work Order # (lab use only)		ALS Contact: Can Dang	Sampler: LBo

Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply

Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days)		EMERGENCY	
4 day [P4]	☐	1 Business day [E1]	☐
3 day [P3]	☐	Same Day, Weekend or Statutory holiday [E0]	☐
2 day [P2]	☐		

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm

For tests that can not be performed according to the service level selected, you will be contacted.

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Moisture Content by Gravimetry (E144)	Mercury in Biota by CVAAS (DRY units, Routine) (E510)	Mercury in Biota by CVAAS (WET units, Routine) (E510A)	Metals in Biota by CRC ICPMS (DRY units, Routine) (E440)	Silver in Biota by CRC ICPMS (DRY units, Routine) (E440 Ag)	Titanium in Biota by CRC ICPMS (DRY units, Routine) (E440 Ti)	Number of Containers
49	BOL_RB-Li-1_2022-05	30-May-22	—	Tissue	R	R	R	R	R	R	1
50	BOL_RB-Li-2_2022-05	30-May-22	—	Tissue	R	R	R	R	R	R	1
51	BOL_RB-Li-3_2022-05	30-May-22	—	Tissue	R	R	R	R	R	R	1
52	BOL_RB-Li-4_2022-05	30-May-22	—	Tissue	R	R	R	R	R	R	1
53	BOL_RB-Li-5_2022-05	30-May-22	—	Tissue	R	R	R	R	R	R	1
54	BOL_RB-Li-6_2022-05	30-May-22	—	Tissue	R	R	R	R	R	R	1
55	BOL_RB-Li-7_2022-05	30-May-22	—	Tissue	R	R	R	R	R	R	1
56	BOL_RB-Li-8_2022-05	30-May-22	—	Tissue	R	R	R	R	R	R	1
57	BOL_RB-Ki-1_2022-05	30-May-22	—	Tissue	R	R	R	R	R	R	1
58	BOL_RB-Ki-2_2022-05	30-May-22	—	Tissue	R	R	R	R	R	R	1
59	BOL_RB-Ki-3_2022-05	30-May-22	—	Tissue	R	R	R	R	R	R	1
60	BOL_RB-Ki-4_2022-05	30-May-22	—	Tissue	R	R	R	R	R	R	1

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ ☐

Are samples for human drinking water use? ☐ ☐

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

If sample insufficient for routine digestion and analysis, contact kbatchelar@minnow.ca to discuss analysis options (e.g., microdigestion and HR-ICPMS). Internal PO 22-29 Task 3

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice Packs ☐ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
			8	8	

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by:	Date:	Time:	Received by:	Date:	Time:	Received by:	Date:	Time:
Katharina Batchelar	7-June-22	12:00				IT	Jun 8/22	10:30

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

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ALS Environmental

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Affix ALS barcode label here (lab use only)

COC Number:

Page 6 of 12

Report To	Contact and company name below will appear on the final report
Company:	Mount Polley Mining Corporation
Contact:	Gabriel Holmes
Phone:	236-317-4946
	Company address below will appear on the final report
Street:	PO Box 12
City/Province:	Likely, BC
Postal Code:	V0L 1N0
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☐ NO
Company:	
Contact:	

Report Format / Distribution

Select Report Format: ☑ ☑ EXCEL ☐ EDD (DIGITAL)

Quality Control (QC) Report with Report ☑ ☐ NO

☐ Compare Results to Criteria on Report - provide details below if box

Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: gabriel.holmes@mountpolley.com

Email 2: kala.ivens@mountpolley.com

Email 3: pstecko@minnow.ca; kbatchelar@minnow.ca

Invoice Distribution

Select Invoice Distribution: ☑ EMAIL ☑ MAIL ☐ FAX

Email 1 or Fax: gabriel.holmes@mountpolley.com

Email 2: kivens@mountpolley.com

Project Information

ALS Account # / Quote #: VA22-MPMC100-002

Job #:

PO / AFE:

LSD:

Oil and Gas Required Fields (client use)

AFE/Cost Center: PO#

Major/Minor Code: Routing Code:

Requisitioner:

Location:

ALS Lab Work Order # (lab use only):

ALS Contact: Can Dang Sampler: LBO

Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply

Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days): 4 day [P4] ☐ | 3 day [P3] ☐ | 2 day [P2] ☐

EMERGENCY: 1 Business day [E1] ☐ | Same Day, Weekend or Statutory holiday [E0] ☐

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm

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62	BOL_RB-Ki-6_2022-05	30-May-22	—	Tissue	R	R	R	R	R	R	1
63	BOL_RB-Ki-7_2022-05	30-May-22	—	Tissue	R	R	R	R	R	R	1
64	BOL_RB-Ki-8_2022-05	30-May-22	—	Tissue	R	R	R	R	R	R	1
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66	POL_LSU-M-2_2022-05	28-May-22	—	Tissue	R	R	R	R	R	R	1
67	POL_LSU-M-3_2022-05	28-May-22	—	Tissue	R	R	R	R	R	R	1
68	POL_LSU-M-4_2022-05	28-May-22	—	Tissue	R	R	R	R	R	R	1
69	POL_LSU-M-5_2022-05	28-May-22	—	Tissue	R	R	R	R	R	R	1
70	POL_LSU-M-6_2022-05	28-May-22	—	Tissue	R	R	R	R	R	R	1
71	POL_LSU-M-7_2022-05	28-May-22	—	Tissue	R	R	R	R	R	R	1
72	POL_LSU-M-8_2022-05	28-May-22	—	Tissue	R	R	R	R	R	R	1

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SAMPLE CONDITION AS RECEIVED (lab use only)

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			8	8	

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Released by: Katharina Batchelar	Date: 7-June-22	Time: 12:00	Received by:	Date:	Time:	Received by: IT	Date: Jun 8/22	Time: 10:30 AM

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

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1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

FISH TISSUE CHEMISTRY

ALS Laboratory Report VA22B2821

(Finalized December 5, 2022)

ALS Canada Ltd.

right solutions. right partner.

CERTIFICATE OF ANALYSIS

Work Order	: **VA22B2821**	Page	: 1 of 40
Amendment	: **1**		
Client	: **Mount Polley Mining Corporation**	Laboratory	: Vancouver - Environmental
Contact	: Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: ----	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 08-Jun-2022 10:30
PO	: 5590008044 Q2 2022	Date Analysis Commenced	: 06-Jul-2022
C-O-C number	: ----	Issue Date	: 05-Dec-2022 14:06
Sampler	: LBO		
Site	: ----		
Quote number	: VA22-MPMC100-002		
No. of samples received	: 68		
No. of samples analysed	: 68		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Angela Ren	Team Leader - Metals	Metals, Burnaby, British Columbia
Dan Gebert	Laboratory Analyst	Metals, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Kinny Wu	Lab Analyst	Metals, Burnaby, British Columbia
Owen Cheng		Metals, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Metals, Burnaby, British Columbia
Salimah Khimani	Lab Assistant	Metals, Burnaby, British Columbia

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances

LOR: Limit of Reporting (detection limit).

Unit	*Description*
%	percent
mg/kg	milligrams per kilogram
mg/kg wwt	milligrams per kilogram wet weight

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Workorder Comments

Amendment (05/12/2022): This report has been amended following changes to the analytical data reported. The quality system is being utilised to resolve this issue. The mercury data for the following samples has been modified: VA22B2821-013, -027, -031, -057, -059, -060 and -064.

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	POL_LSU-O-1_ 2022-05	POL_LSU-O-2_ 2022-05	POL_LSU-O-3_ 2022-05	POL_LSU-O-4_ 2022-05	POL_LSU-O-5_ 2022-05
					Client sampling date / time	28-May-2022	28-May-2022	28-May-2022	28-May-2022	28-May-2022
						VA22B2821-001	VA22B2821-002	VA22B2821-003	VA22B2821-004	VA22B2821-005
						Result	Result	Result	Result	Result
Physical Tests										
moisture	----	E144	0.50	%		64.3	68.3	62.5	63.8	63.7
Metals										
aluminum	7429-90-5	E440	2.0	mg/kg		<2.0	<2.0	<2.0	<2.0	<2.0
antimony	7440-36-0	E440	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	<0.010
arsenic	7440-38-2	E440	0.020	mg/kg		0.078	0.063	0.042	0.047	0.047
barium	7440-39-3	E440	0.050	mg/kg		0.152	0.095	0.146	0.177	0.160
beryllium	7440-41-7	E440	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	<0.010
bismuth	7440-69-9	E440	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	<0.010
boron	7440-42-8	E440	1.0	mg/kg		<1.0	<1.0	<1.0	<1.0	<1.0
cadmium	7440-43-9	E440	0.0050	mg/kg		<0.0050	<0.0050	0.0058	<0.0050	<0.0050
calcium	7440-70-2	E440	20	mg/kg		537	546	421	525	414
cesium	7440-46-2	E440	0.0050	mg/kg		0.0162	0.0126	0.0145	0.0168	0.0115
chromium	7440-47-3	E440	0.050	mg/kg		<0.050	<0.050	<0.050	<0.050	<0.050
cobalt	7440-48-4	E440	0.020	mg/kg		0.047	0.057	0.046	0.045	0.081
copper	7440-50-8	E440	0.10	mg/kg		3.07	3.22	3.54	3.45	4.12
iron	7439-89-6	E440	3.0	mg/kg		44.4	38.5	31.2	39.4	36.2
lead	7439-92-1	E440	0.020	mg/kg		<0.020	<0.020	<0.020	<0.020	<0.020
lithium	7439-93-2	E440	0.50	mg/kg		<0.50	<0.50	<0.50	<0.50	<0.50
magnesium	7439-95-4	E440	2.0	mg/kg		660	770	672	668	755
manganese	7439-96-5	E440	0.050	mg/kg		12.2	10.0	12.2	16.6	24.2
mercury	7439-97-6	E510	0.0050	mg/kg		0.0052	0.0119	0.0079	0.0070	0.0118
mercury	7439-97-6	E510A	0.0010	mg/kg wwt		0.0018	0.0038	0.0030	0.0025	0.0043
molybdenum	7439-98-7	E440	0.020	mg/kg		0.067	0.104	0.080	0.116	0.066
nickel	7440-02-0	E440	0.20	mg/kg		<0.20	<0.20	<0.20	<0.20	<0.20
phosphorus	7723-14-0	E440	10	mg/kg		11600	12000	12400	12300	11700
potassium	7440-09-7	E440	20	mg/kg		6400	7190	6360	6590	5980
rubidium	7440-17-7	E440	0.050	mg/kg		5.53	6.37	6.06	6.34	4.61
selenium	7782-49-2	E440	0.050	mg/kg		8.25	8.14	8.83	8.96	8.90
silver	7440-22-4	E440.Ag	0.0050	mg/kg		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
sodium	7440-23-5	E440	20	mg/kg		2060	2580	1580	1780	1550

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	POL_LSU-O-1_ 2022-05	POL_LSU-O-2_ 2022-05	POL_LSU-O-3_ 2022-05	POL_LSU-O-4_ 2022-05	POL_LSU-O-5_ 2022-05
					Client sampling date / time	28-May-2022	28-May-2022	28-May-2022	28-May-2022	28-May-2022
						VA22B2821-001	VA22B2821-002	VA22B2821-003	VA22B2821-004	VA22B2821-005
						Result	Result	Result	Result	Result
Metals										
strontium	7440-24-6	E440	0.050	mg/kg		0.603	0.402	0.351	0.551	0.477
tellurium	13494-80-9	E440	0.020	mg/kg		<0.020	<0.020	<0.020	<0.020	<0.020
thallium	7440-28-0	E440	0.0020	mg/kg		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
tin	7440-31-5	E440	0.10	mg/kg		<0.10	<0.10	<0.10	0.10	<0.10
titanium	7440-32-6	E440.Ti	0.25	mg/kg		<0.25	<0.25	<0.25	<0.25	<0.25
uranium	7440-61-1	E440	0.0020	mg/kg		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
vanadium	7440-62-2	E440	0.10	mg/kg		<0.10	0.14	0.14	<0.10	<0.10
zinc	7440-66-6	E440	0.50	mg/kg		96.4	91.9	90.1	86.8	83.3
zirconium	7440-67-7	E440	0.20	mg/kg		<0.20	<0.20	<0.20	<0.20	<0.20

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	POL_LSU-O-6_ 2022-05	POL_LSU-O-7_ 2022-05	POL_LSU-O-8_ 2022-05	POL_LSU-Li-1_ 2022-05	POL_LSU-Li-2_ 2022-05
					Client sampling date / time	28-May-2022	28-May-2022	28-May-2022	28-May-2022	28-May-2022
						VA22B2821-006	VA22B2821-007	VA22B2821-008	VA22B2821-009	VA22B2821-010
						Result	Result	Result	Result	Result
Physical Tests										
moisture	----	E144	0.50	%		63.0	63.0	63.7	76.7	76.8
Metals										
aluminum	7429-90-5	E440	2.0	mg/kg		<2.0	<2.0	<2.0	3.0	2.3
antimony	7440-36-0	E440	0.010	mg/kg		<0.010	<0.010	<0.010	0.032	0.045
arsenic	7440-38-2	E440	0.020	mg/kg		0.071	0.054	0.043	0.353	0.426
barium	7440-39-3	E440	0.050	mg/kg		0.165	0.327	0.134	0.311	0.152
beryllium	7440-41-7	E440	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	<0.010
bismuth	7440-69-9	E440	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	<0.010
boron	7440-42-8	E440	1.0	mg/kg		<1.0	<1.0	<1.0	<1.0	<1.0
cadmium	7440-43-9	E440	0.0050	mg/kg		<0.0050	<0.0050	<0.0050	0.394	0.715
calcium	7440-70-2	E440	20	mg/kg		442	464	445	190	165
cesium	7440-46-2	E440	0.0050	mg/kg		0.0206	0.0103	0.0113	0.0327	0.0234
chromium	7440-47-3	E440	0.050	mg/kg		<0.050	<0.050	<0.050	0.115	0.092
cobalt	7440-48-4	E440	0.020	mg/kg		0.128	0.049	0.057	0.124	0.133
copper	7440-50-8	E440	0.10	mg/kg		4.02	3.50	4.00	71.8	79.5
iron	7439-89-6	E440	3.0	mg/kg		40.1	47.2	53.3	232	430
lead	7439-92-1	E440	0.020	mg/kg		<0.020	<0.020	<0.020	<0.020	<0.020
lithium	7439-93-2	E440	0.50	mg/kg		<0.50	<0.50	<0.50	<0.50	<0.50
magnesium	7439-95-4	E440	2.0	mg/kg		693	679	756	1230	1010
manganese	7439-96-5	E440	0.050	mg/kg		18.4	14.1	23.4	15.0	9.90
mercury	7439-97-6	E510	0.0050	mg/kg		0.0052	0.0070	0.0052	0.0708	0.172
mercury	7439-97-6	E510A	0.0010	mg/kg wwt		0.0019	0.0026	0.0019	0.0165	0.0400
molybdenum	7439-98-7	E440	0.020	mg/kg		0.072	0.067	0.090	2.35	2.44
nickel	7440-02-0	E440	0.20	mg/kg		<0.20	<0.20	<0.20	<0.20	<0.20
phosphorus	7723-14-0	E440	10	mg/kg		12300	12200	12400	21000	18300
potassium	7440-09-7	E440	20	mg/kg		6400	5990	6400	17800	13900
rubidium	7440-17-7	E440	0.050	mg/kg		5.33	5.66	6.08	14.2	11.4
selenium	7782-49-2	E440	0.050	mg/kg		9.11	7.86	9.43	13.1	17.0
silver	7440-22-4	E440.Ag	0.0050	mg/kg		<0.0050	<0.0050	<0.0050	0.0223	0.0851
sodium	7440-23-5	E440	20	mg/kg		1790	1700	1590	4100	3520

Analytical Results

Sub-Matrix: Tissue (Matrix: Biota)					Client sample ID	POL_LSU-O-6_ 2022-05	POL_LSU-O-7_ 2022-05	POL_LSU-O-8_ 2022-05	POL_LSU-Li-1_ 2022-05	POL_LSU-Li-2_ 2022-05
					Client sampling date / time	28-May-2022	28-May-2022	28-May-2022	28-May-2022	28-May-2022
Analyte	CAS Number	Method	LOR	Unit		VA22B2821-006	VA22B2821-007	VA22B2821-008	VA22B2821-009	VA22B2821-010
						Result	Result	Result	Result	Result
Metals										
strontium	7440-24-6	E440	0.050	mg/kg		0.505	0.616	0.559	0.288	0.223
tellurium	13494-80-9	E440	0.020	mg/kg		<0.020	<0.020	<0.020	<0.020	<0.020
thallium	7440-28-0	E440	0.0020	mg/kg		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
tin	7440-31-5	E440	0.10	mg/kg		<0.10	0.13	0.13	0.77	0.52
titanium	7440-32-6	E440.Ti	0.25	mg/kg		<0.25	<0.25	<0.25	<0.25	<0.25
uranium	7440-61-1	E440	0.0020	mg/kg		<0.0020	<0.0020	<0.0020	<0.0020	0.0029
vanadium	7440-62-2	E440	0.10	mg/kg		<0.10	<0.10	<0.10	0.28	1.10
zinc	7440-66-6	E440	0.50	mg/kg		82.2	80.4	91.0	165	127
zirconium	7440-67-7	E440	0.20	mg/kg		<0.20	<0.20	<0.20	<0.20	<0.20

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	POL_LSU-Li-3_2022-05	POL_LSU-Li-4_2022-05	POL_LSU-Li-5_2022-05	POL_LSU-Li-6_2022-05	POL_LSU-Li-7_2022-05
					Client sampling date / time	28-May-2022	28-May-2022	28-May-2022	28-May-2022	28-May-2022
						VA22B2821-011	VA22B2821-012	VA22B2821-013	VA22B2821-014	VA22B2821-015
						Result	Result	Result	Result	Result
Physical Tests										
moisture	----	E144	0.50	%		77.4	77.3	----	77.1	----
moisture	----	E144-H	2.0	%		----	----	78.4	----	77.0
Metals										
aluminum	7429-90-5	E440	2.0	mg/kg		<2.0	7.7	----	<2.0	----
aluminum	7429-90-5	E472	5.0	mg/kg		----	----	14.9	----	<5.0
antimony	7440-36-0	E472	0.010	mg/kg		----	----	0.016	----	0.017
antimony	7440-36-0	E440	0.010	mg/kg		0.035	0.030	----	0.012	----
arsenic	7440-38-2	E440	0.020	mg/kg		0.244	0.323	----	0.208	----
arsenic	7440-38-2	E472	0.030	mg/kg		----	----	0.188	----	0.234
barium	7440-39-3	E472	0.050	mg/kg		----	----	1.25	----	0.659
barium	7440-39-3	E440	0.050	mg/kg		0.427	0.624	----	0.654	----
beryllium	7440-41-7	E472	0.010	mg/kg		----	----	<0.010	----	<0.010
beryllium	7440-41-7	E440	0.010	mg/kg		<0.010	<0.010	----	<0.010	----
bismuth	7440-69-9	E472	0.010	mg/kg		----	----	<0.010	----	<0.010
bismuth	7440-69-9	E440	0.010	mg/kg		<0.010	<0.010	----	0.015	----
boron	7440-42-8	E472	1.0	mg/kg		----	----	<1.0	----	<1.0
boron	7440-42-8	E440	1.0	mg/kg		<1.0	<1.0	----	<1.0	----
cadmium	7440-43-9	E440	0.0050	mg/kg		0.630	0.233	----	0.212	----
cadmium	7440-43-9	E472	0.010	mg/kg		----	----	0.114	----	0.253
calcium	7440-70-2	E472	20	mg/kg		----	----	319	----	218
calcium	7440-70-2	E440	20	mg/kg		209	329	----	162	----
cesium	7440-46-2	E472	0.0050	mg/kg		----	----	0.0223	----	0.0226
cesium	7440-46-2	E440	0.0050	mg/kg		0.0309	0.0356	----	0.0216	----
chromium	7440-47-3	E440	0.050	mg/kg		0.073	0.129	----	0.255	----
chromium	7440-47-3	E472	0.20	mg/kg		----	----	0.62	----	<0.20
cobalt	7440-48-4	E472	0.020	mg/kg		----	----	0.108	----	0.112
cobalt	7440-48-4	E440	0.020	mg/kg		0.109	0.127	----	0.121	----
copper	7440-50-8	E440	0.10	mg/kg		56.0	43.6	----	110	----
copper	7440-50-8	E472	0.20	mg/kg		----	----	56.0	----	56.9
iron	7439-89-6	E440	3.0	mg/kg		230	221	----	503	----

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	POL_LSU-Li-3_2022-05	POL_LSU-Li-4_2022-05	POL_LSU-Li-5_2022-05	POL_LSU-Li-6_2022-05	POL_LSU-Li-7_2022-05
					Client sampling date / time	28-May-2022	28-May-2022	28-May-2022	28-May-2022	28-May-2022
						VA22B2821-011	VA22B2821-012	VA22B2821-013	VA22B2821-014	VA22B2821-015
						Result	Result	Result	Result	Result
Metals										
iron	7439-89-6	E472	5.0	mg/kg		----	----	160	----	389
lead	7439-92-1	E440	0.020	mg/kg		<0.020	0.028	----	<0.020	----
lead	7439-92-1	E472	0.050	mg/kg		----	----	<0.050	----	<0.050
lithium	7439-93-2	E472	0.50	mg/kg		----	----	<0.50	----	<0.50
lithium	7439-93-2	E440	0.50	mg/kg		<0.50	<0.50	----	<0.50	----
magnesium	7439-95-4	E472	2.0	mg/kg		----	----	920	----	1040
magnesium	7439-95-4	E440	2.0	mg/kg		1270	1170	----	873	----
manganese	7439-96-5	E472	0.050	mg/kg		----	----	12.0	----	10.8
manganese	7439-96-5	E440	0.050	mg/kg		11.1	15.1	----	11.5	----
mercury	7439-97-6	E511	0.0050	mg/kg		----	----	0.0728	----	0.0762
mercury	7439-97-6	E510	0.0050	mg/kg		0.0971	0.0848	----	0.0633	----
mercury	7439-97-6	E511A	0.0010	mg/kg wwt		----	----	0.0157	----	0.0175
mercury	7439-97-6	E510A	0.0010	mg/kg wwt		0.0220	0.0192	----	0.0145	----
molybdenum	7439-98-7	E440	0.020	mg/kg		1.90	1.94	----	1.36	----
molybdenum	7439-98-7	E472	0.040	mg/kg		----	----	1.39	----	2.15
nickel	7440-02-0	E472	0.20	mg/kg		----	----	<0.20	----	<0.20
nickel	7440-02-0	E440	0.20	mg/kg		<0.20	<0.20	----	<0.20	----
phosphorus	7723-14-0	E472	10	mg/kg		----	----	17200	----	18500
phosphorus	7723-14-0	E440	10	mg/kg		20200	19000	----	14300	----
potassium	7440-09-7	E472	20	mg/kg		----	----	13400	----	14200
potassium	7440-09-7	E440	20	mg/kg		16400	14000	----	12900	----
rubidium	7440-17-7	E472	0.050	mg/kg		----	----	9.41	----	12.7
rubidium	7440-17-7	E440	0.050	mg/kg		15.0	12.6	----	9.72	----
selenium	7782-49-2	E440	0.050	mg/kg		14.2	12.8	----	11.0	----
selenium	7782-49-2	E472	0.10	mg/kg		----	----	11.0	----	12.2
silver	7440-22-4	E472.Ag	0.0050	mg/kg		----	----	0.0209	----	0.0226
silver	7440-22-4	E440.Ag	0.0050	mg/kg		0.0224	0.0172	----	0.0359	----
sodium	7440-23-5	E472	20	mg/kg		----	----	5320	----	4110
sodium	7440-23-5	E440	20	mg/kg		4520	5040	----	4600	----
strontium	7440-24-6	E440	0.050	mg/kg		0.291	0.698	----	0.310	----

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	POL_LSU-Li-3_ 2022-05	POL_LSU-Li-4_ 2022-05	POL_LSU-Li-5_ 2022-05	POL_LSU-Li-6_ 2022-05	POL_LSU-Li-7_ 2022-05
					Client sampling date / time	28-May-2022	28-May-2022	28-May-2022	28-May-2022	28-May-2022
						VA22B2821-011	VA22B2821-012	VA22B2821-013	VA22B2821-014	VA22B2821-015
						Result	Result	Result	Result	Result
Metals										
strontium	7440-24-6	E472	0.10	mg/kg		----	----	1.03	----	0.42
tellurium	13494-80-9	E472	0.020	mg/kg		----	----	<0.020	----	<0.020
tellurium	13494-80-9	E440	0.020	mg/kg		<0.020	<0.020	----	<0.020	----
thallium	7440-28-0	E472	0.0020	mg/kg		----	----	<0.0020	----	<0.0020
thallium	7440-28-0	E440	0.0020	mg/kg		<0.0020	<0.0020	----	<0.0020	----
tin	7440-31-5	E472	0.10	mg/kg		----	----	0.59	----	1.10
tin	7440-31-5	E440	0.10	mg/kg		0.59	0.49	----	0.57	----
titanium	7440-32-6	E440.Ti	0.25	mg/kg		<0.25	0.48	----	<0.25	----
titanium	7440-32-6	E472.Ti	0.50	mg/kg		----	----	0.89	----	<0.50
uranium	7440-61-1	E472	0.0020	mg/kg		----	----	<0.0020	----	<0.0020
uranium	7440-61-1	E440	0.0020	mg/kg		<0.0020	0.0024	----	<0.0020	----
vanadium	7440-62-2	E472	0.10	mg/kg		----	----	0.30	----	0.32
vanadium	7440-62-2	E440	0.10	mg/kg		0.88	0.36	----	0.25	----
zinc	7440-66-6	E440	0.50	mg/kg		123	146	----	125	----
zinc	7440-66-6	E472	1.0	mg/kg		----	----	116	----	127
zirconium	7440-67-7	E472	0.20	mg/kg		----	----	<0.20	----	0.29
zirconium	7440-67-7	E440	0.20	mg/kg		0.26	<0.20	----	0.21	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	POL_LSU-Li-8_ 2022-05	POL_LSU-Ki-1_ 2022-05	POL_LSU-Ki-2_ 2022-05	POL_LSU-Ki-3_ 2022-05	POL_LSU-Ki-4_ 2022-05
					Client sampling date / time	28-May-2022	28-May-2022	28-May-2022	28-May-2022	28-May-2022
						VA22B2821-016	VA22B2821-017	VA22B2821-018	VA22B2821-019	VA22B2821-020
						Result	Result	Result	Result	Result
Physical Tests										
moisture	----	E144	0.50	%		78.8	----	----	----	----
moisture	----	E144-H	2.0	%		----	79.9	78.9	78.2	78.6
Metals										
aluminum	7429-90-5	E440	2.0	mg/kg		<2.0	----	----	----	----
aluminum	7429-90-5	E472	5.0	mg/kg		----	<5.0	<5.0	<5.0	<5.0
antimony	7440-36-0	E472	0.010	mg/kg		----	<0.010	<0.010	<0.010	<0.010
antimony	7440-36-0	E440	0.010	mg/kg		0.015	----	----	----	----
arsenic	7440-38-2	E440	0.020	mg/kg		0.209	----	----	----	----
arsenic	7440-38-2	E472	0.030	mg/kg		----	0.210	0.146	0.156	0.144
barium	7440-39-3	E472	0.050	mg/kg		----	2.48	0.968	1.38	2.04
barium	7440-39-3	E440	0.050	mg/kg		0.455	----	----	----	----
beryllium	7440-41-7	E472	0.010	mg/kg		----	<0.010	<0.010	<0.010	<0.010
beryllium	7440-41-7	E440	0.010	mg/kg		<0.010	----	----	----	----
bismuth	7440-69-9	E472	0.010	mg/kg		----	<0.010	<0.010	<0.010	<0.010
bismuth	7440-69-9	E440	0.010	mg/kg		<0.010	----	----	----	----
boron	7440-42-8	E472	1.0	mg/kg		----	<1.0	<1.0	<1.0	<1.0
boron	7440-42-8	E440	1.0	mg/kg		<1.0	----	----	----	----
cadmium	7440-43-9	E440	0.0050	mg/kg		0.311	----	----	----	----
cadmium	7440-43-9	E472	0.010	mg/kg		----	1.89	2.80	4.61	1.02
calcium	7440-70-2	E472	20	mg/kg		----	386	417	534	361
calcium	7440-70-2	E440	20	mg/kg		251	----	----	----	----
cesium	7440-46-2	E472	0.0050	mg/kg		----	0.0409	0.0250	0.0423	0.0337
cesium	7440-46-2	E440	0.0050	mg/kg		0.0251	----	----	----	----
chromium	7440-47-3	E440	0.050	mg/kg		0.072	----	----	----	----
chromium	7440-47-3	E472	0.20	mg/kg		----	0.23	<0.20	<0.20	0.84
cobalt	7440-48-4	E472	0.020	mg/kg		----	0.530	0.374	0.520	0.272
cobalt	7440-48-4	E440	0.020	mg/kg		0.131	----	----	----	----
copper	7440-50-8	E440	0.10	mg/kg		58.3	----	----	----	----
copper	7440-50-8	E472	0.20	mg/kg		----	6.59	5.93	7.70	5.53
iron	7439-89-6	E440	3.0	mg/kg		308	----	----	----	----

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	POL_LSU-Li-8_ 2022-05	POL_LSU-Ki-1_ 2022-05	POL_LSU-Ki-2_ 2022-05	POL_LSU-Ki-3_ 2022-05	POL_LSU-Ki-4_ 2022-05
					Client sampling date / time	28-May-2022	28-May-2022	28-May-2022	28-May-2022	28-May-2022
						VA22B2821-016	VA22B2821-017	VA22B2821-018	VA22B2821-019	VA22B2821-020
						Result	Result	Result	Result	Result
Metals										
iron	7439-89-6	E472	5.0	mg/kg		----	600	453	317	571
lead	7439-92-1	E440	0.020	mg/kg		<0.020	----	----	----	----
lead	7439-92-1	E472	0.050	mg/kg		----	<0.050	<0.050	<0.050	<0.050
lithium	7439-93-2	E472	0.50	mg/kg		----	<0.50	<0.50	<0.50	<0.50
lithium	7439-93-2	E440	0.50	mg/kg		<0.50	----	----	----	----
magnesium	7439-95-4	E472	2.0	mg/kg		----	639	571	642	527
magnesium	7439-95-4	E440	2.0	mg/kg		1050	----	----	----	----
manganese	7439-96-5	E472	0.050	mg/kg		----	3.94	3.44	4.30	3.93
manganese	7439-96-5	E440	0.050	mg/kg		13.5	----	----	----	----
mercury	7439-97-6	E511	0.0050	mg/kg		----	0.0701	0.265	0.197	0.104
mercury	7439-97-6	E510	0.0050	mg/kg		0.0571	----	----	----	----
mercury	7439-97-6	E511A	0.0010	mg/kg wwt		----	0.0141	0.0561	0.0430	0.0222
mercury	7439-97-6	E510A	0.0010	mg/kg wwt		0.0121	----	----	----	----
molybdenum	7439-98-7	E440	0.020	mg/kg		1.76	----	----	----	----
molybdenum	7439-98-7	E472	0.040	mg/kg		----	1.36	1.46	1.86	1.29
nickel	7440-02-0	E472	0.20	mg/kg		----	0.50	0.37	0.58	0.46
nickel	7440-02-0	E440	0.20	mg/kg		<0.20	----	----	----	----
phosphorus	7723-14-0	E472	10	mg/kg		----	12900	12300	14000	11300
phosphorus	7723-14-0	E440	10	mg/kg		18100	----	----	----	----
potassium	7440-09-7	E472	20	mg/kg		----	12300	10500	11600	10100
potassium	7440-09-7	E440	20	mg/kg		14800	----	----	----	----
rubidium	7440-17-7	E472	0.050	mg/kg		----	11.1	9.68	12.0	10.5
rubidium	7440-17-7	E440	0.050	mg/kg		12.3	----	----	----	----
selenium	7782-49-2	E440	0.050	mg/kg		12.0	----	----	----	----
selenium	7782-49-2	E472	0.10	mg/kg		----	10.4	10.7	12.9	9.28
silver	7440-22-4	E472.Ag	0.0050	mg/kg		----	<0.0050	<0.0050	<0.0050	<0.0050
silver	7440-22-4	E440.Ag	0.0050	mg/kg		0.0262	----	----	----	----
sodium	7440-23-5	E472	20	mg/kg		----	6900	6010	6560	6960
sodium	7440-23-5	E440	20	mg/kg		5560	----	----	----	----
strontium	7440-24-6	E440	0.050	mg/kg		0.456	----	----	----	----

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	POL_LSU-Li-8_ 2022-05	POL_LSU-Ki-1_ 2022-05	POL_LSU-Ki-2_ 2022-05	POL_LSU-Ki-3_ 2022-05	POL_LSU-Ki-4_ 2022-05
					Client sampling date / time	28-May-2022	28-May-2022	28-May-2022	28-May-2022	28-May-2022
						VA22B2821-016	VA22B2821-017	VA22B2821-018	VA22B2821-019	VA22B2821-020
						Result	Result	Result	Result	Result
Metals										
strontium	7440-24-6	E472	0.10	mg/kg		----	0.71	0.63	0.77	0.60
tellurium	13494-80-9	E472	0.020	mg/kg		----	0.021	0.069	0.057	0.029
tellurium	13494-80-9	E440	0.020	mg/kg		<0.020	----	----	----	----
thallium	7440-28-0	E472	0.0020	mg/kg		----	0.0078	0.0028	0.0025	0.0059
thallium	7440-28-0	E440	0.0020	mg/kg		<0.0020	----	----	----	----
tin	7440-31-5	E472	0.10	mg/kg		----	1.31	0.70	0.77	1.30
tin	7440-31-5	E440	0.10	mg/kg		0.53	----	----	----	----
titanium	7440-32-6	E440.Ti	0.25	mg/kg		<0.25	----	----	----	----
titanium	7440-32-6	E472.Ti	0.50	mg/kg		----	<0.50	<0.50	<0.50	<0.50
uranium	7440-61-1	E472	0.0020	mg/kg		----	0.0033	0.0055	0.0059	0.0031
uranium	7440-61-1	E440	0.0020	mg/kg		<0.0020	----	----	----	----
vanadium	7440-62-2	E472	0.10	mg/kg		----	1.23	3.53	4.24	1.48
vanadium	7440-62-2	E440	0.10	mg/kg		0.42	----	----	----	----
zinc	7440-66-6	E440	0.50	mg/kg		118	----	----	----	----
zinc	7440-66-6	E472	1.0	mg/kg		----	258	148	220	167
zirconium	7440-67-7	E472	0.20	mg/kg		----	0.26	<0.20	0.26	0.32
zirconium	7440-67-7	E440	0.20	mg/kg		0.28	----	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	POL_LSU-Ki-5_ 2022-05	POL_LSU-Ki-6_ 2022-05	POL_LSU-Ki-7_ 2022-05	POL_LSU-Ki-8_ 2022-05	BOL_LSU-M-1_ 2022-05
					Client sampling date / time	28-May-2022	28-May-2022	28-May-2022	28-May-2022	30-May-2022
						VA22B2821-021	VA22B2821-022	VA22B2821-023	VA22B2821-024	VA22B2821-025
						Result	Result	Result	Result	Result
Physical Tests										
moisture	----	E144	0.50	%		----	----	----	----	75.5
moisture	----	E144-H	2.0	%		81.5	78.8	79.3	80.3	----
Metals										
aluminum	7429-90-5	E440	2.0	mg/kg		----	----	----	----	<2.0
aluminum	7429-90-5	E472	5.0	mg/kg		<5.0	<5.0	<5.0	<5.0	----
antimony	7440-36-0	E472	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	----
antimony	7440-36-0	E440	0.010	mg/kg		----	----	----	----	<0.010
arsenic	7440-38-2	E440	0.020	mg/kg		----	----	----	----	0.175
arsenic	7440-38-2	E472	0.030	mg/kg		0.156	0.318	0.126	0.137	----
barium	7440-39-3	E472	0.050	mg/kg		0.634	0.270	1.02	0.753	----
barium	7440-39-3	E440	0.050	mg/kg		----	----	----	----	0.682
beryllium	7440-41-7	E472	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	----
beryllium	7440-41-7	E440	0.010	mg/kg		----	----	----	----	<0.010
bismuth	7440-69-9	E472	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	----
bismuth	7440-69-9	E440	0.010	mg/kg		----	----	----	----	<0.010
boron	7440-42-8	E472	1.0	mg/kg		<1.0	<1.0	<1.0	<1.0	----
boron	7440-42-8	E440	1.0	mg/kg		----	----	----	----	<1.0
cadmium	7440-43-9	E440	0.0050	mg/kg		----	----	----	----	<0.0050
cadmium	7440-43-9	E472	0.010	mg/kg		1.37	0.133	2.00	2.52	----
calcium	7440-70-2	E472	20	mg/kg		481	411	352	530	----
calcium	7440-70-2	E440	20	mg/kg		----	----	----	----	586
cesium	7440-46-2	E472	0.0050	mg/kg		0.0441	0.0202	0.0358	0.0309	----
cesium	7440-46-2	E440	0.0050	mg/kg		----	----	----	----	0.123
chromium	7440-47-3	E440	0.050	mg/kg		----	----	----	----	0.090
chromium	7440-47-3	E472	0.20	mg/kg		1.15	2.16	<0.20	<0.20	----
cobalt	7440-48-4	E472	0.020	mg/kg		0.650	0.165	0.308	0.416	----
cobalt	7440-48-4	E440	0.020	mg/kg		----	----	----	----	<0.020
copper	7440-50-8	E440	0.10	mg/kg		----	----	----	----	2.04
copper	7440-50-8	E472	0.20	mg/kg		7.27	3.72	6.57	6.36	----
iron	7439-89-6	E440	3.0	mg/kg		----	----	----	----	26.5

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	POL_LSU-Ki-5_ 2022-05	POL_LSU-Ki-6_ 2022-05	POL_LSU-Ki-7_ 2022-05	POL_LSU-Ki-8_ 2022-05	BOL_LSU-M-1_ 2022-05
					Client sampling date / time	28-May-2022	28-May-2022	28-May-2022	28-May-2022	30-May-2022
						VA22B2821-021	VA22B2821-022	VA22B2821-023	VA22B2821-024	VA22B2821-025
						Result	Result	Result	Result	Result
Metals										
iron	7439-89-6	E472	5.0	mg/kg		415	1560	472	574	----
lead	7439-92-1	E440	0.020	mg/kg		----	----	----	----	<0.020
lead	7439-92-1	E472	0.050	mg/kg		<0.050	<0.050	<0.050	<0.050	----
lithium	7439-93-2	E472	0.50	mg/kg		<0.50	<0.50	<0.50	<0.50	----
lithium	7439-93-2	E440	0.50	mg/kg		----	----	----	----	<0.50
magnesium	7439-95-4	E472	2.0	mg/kg		750	377	638	669	----
magnesium	7439-95-4	E440	2.0	mg/kg		----	----	----	----	1200
manganese	7439-96-5	E472	0.050	mg/kg		9.00	1.66	4.47	7.18	----
manganese	7439-96-5	E440	0.050	mg/kg		----	----	----	----	1.02
mercury	7439-97-6	E511	0.0050	mg/kg		0.0930	0.0210	0.109	0.0721	----
mercury	7439-97-6	E510	0.0050	mg/kg		----	----	----	----	0.355
mercury	7439-97-6	E511A	0.0010	mg/kg wwt		0.0172	0.0044	0.0224	0.0142	----
mercury	7439-97-6	E510A	0.0010	mg/kg wwt		----	----	----	----	0.0871
molybdenum	7439-98-7	E440	0.020	mg/kg		----	----	----	----	<0.020
molybdenum	7439-98-7	E472	0.040	mg/kg		1.36	0.242	1.52	1.10	----
nickel	7440-02-0	E472	0.20	mg/kg		0.84	1.12	0.33	0.49	----
nickel	7440-02-0	E440	0.20	mg/kg		----	----	----	----	<0.20
phosphorus	7723-14-0	E472	10	mg/kg		16900	7880	13600	14700	----
phosphorus	7723-14-0	E440	10	mg/kg		----	----	----	----	9980
potassium	7440-09-7	E472	20	mg/kg		14700	12100	12300	14000	----
potassium	7440-09-7	E440	20	mg/kg		----	----	----	----	16800
rubidium	7440-17-7	E472	0.050	mg/kg		12.0	8.34	13.9	14.5	----
rubidium	7440-17-7	E440	0.050	mg/kg		----	----	----	----	11.0
selenium	7782-49-2	E440	0.050	mg/kg		----	----	----	----	2.74
selenium	7782-49-2	E472	0.10	mg/kg		11.8	9.33	9.57	12.0	----
silver	7440-22-4	E472.Ag	0.0050	mg/kg		<0.0050	<0.0050	<0.0050	<0.0050	----
silver	7440-22-4	E440.Ag	0.0050	mg/kg		----	----	----	----	<0.0050
sodium	7440-23-5	E472	20	mg/kg		8360	8510	5790	7040	----
sodium	7440-23-5	E440	20	mg/kg		----	----	----	----	1250
strontium	7440-24-6	E440	0.050	mg/kg		----	----	----	----	0.928

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	POL_LSU-Ki-5_ 2022-05	POL_LSU-Ki-6_ 2022-05	POL_LSU-Ki-7_ 2022-05	POL_LSU-Ki-8_ 2022-05	BOL_LSU-M-1_ 2022-05
					Client sampling date / time	28-May-2022	28-May-2022	28-May-2022	28-May-2022	30-May-2022
						VA22B2821-021	VA22B2821-022	VA22B2821-023	VA22B2821-024	VA22B2821-025
						Result	Result	Result	Result	Result
Metals										
strontium	7440-24-6	E472	0.10	mg/kg		0.96	0.77	0.71	0.98	----
tellurium	13494-80-9	E472	0.020	mg/kg		0.022	<0.020	0.023	<0.020	----
tellurium	13494-80-9	E440	0.020	mg/kg		----	----	----	----	<0.020
thallium	7440-28-0	E472	0.0020	mg/kg		0.0034	<0.0020	0.0043	0.0048	----
thallium	7440-28-0	E440	0.0020	mg/kg		----	----	----	----	<0.0020
tin	7440-31-5	E472	0.10	mg/kg		<0.10	0.16	<0.10	<0.10	----
tin	7440-31-5	E440	0.10	mg/kg		----	----	----	----	0.55
titanium	7440-32-6	E440.Ti	0.25	mg/kg		----	----	----	----	<0.25
titanium	7440-32-6	E472.Ti	0.50	mg/kg		<0.50	0.71	<0.50	<0.50	----
uranium	7440-61-1	E472	0.0020	mg/kg		0.0025	<0.0020	0.0052	0.0031	----
uranium	7440-61-1	E440	0.0020	mg/kg		----	----	----	----	<0.0020
vanadium	7440-62-2	E472	0.10	mg/kg		1.15	0.12	1.88	1.68	----
vanadium	7440-62-2	E440	0.10	mg/kg		----	----	----	----	<0.10
zinc	7440-66-6	E440	0.50	mg/kg		----	----	----	----	23.1
zinc	7440-66-6	E472	1.0	mg/kg		170	56.2	156	158	----
zirconium	7440-67-7	E472	0.20	mg/kg		<0.20	<0.20	<0.20	<0.20	----
zirconium	7440-67-7	E440	0.20	mg/kg		----	----	----	----	0.40

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BOL_LSU-M-2_2022-05	BOL_LSU-M-3_2022-05	BOL_LSU-M-4_2022-05	BOL_LSU-M-5_2022-05	BOL_LSU-M-6_2022-05
					Client sampling date / time	30-May-2022	30-May-2022	30-May-2022	31-May-2022	31-May-2022
						VA22B2821-026	VA22B2821-027	VA22B2821-028	VA22B2821-029	VA22B2821-030
						Result	Result	Result	Result	Result
Physical Tests										
moisture	----	E144	0.50	%		77.4	----	75.4	79.3	73.1
moisture	----	E144-H	2.0	%		----	74.2	----	----	----
Metals										
aluminum	7429-90-5	E440	2.0	mg/kg		3.2	----	<2.0	4.0	6.3
aluminum	7429-90-5	E472	5.0	mg/kg		----	<5.0	----	----	----
antimony	7440-36-0	E472	0.010	mg/kg		----	<0.010	----	----	----
antimony	7440-36-0	E440	0.010	mg/kg		<0.010	----	<0.010	<0.010	<0.010
arsenic	7440-38-2	E440	0.020	mg/kg		0.037	----	0.048	0.036	0.079
arsenic	7440-38-2	E472	0.030	mg/kg		----	0.433	----	----	----
barium	7440-39-3	E472	0.050	mg/kg		----	0.558	----	----	----
barium	7440-39-3	E440	0.050	mg/kg		1.34	----	0.887	0.948	1.22
beryllium	7440-41-7	E472	0.010	mg/kg		----	<0.010	----	----	----
beryllium	7440-41-7	E440	0.010	mg/kg		<0.010	----	<0.010	<0.010	<0.010
bismuth	7440-69-9	E472	0.010	mg/kg		----	<0.010	----	----	----
bismuth	7440-69-9	E440	0.010	mg/kg		<0.010	----	<0.010	<0.010	<0.010
boron	7440-42-8	E472	1.0	mg/kg		----	<1.0	----	----	----
boron	7440-42-8	E440	1.0	mg/kg		<1.0	----	<1.0	<1.0	<1.0
cadmium	7440-43-9	E440	0.0050	mg/kg		<0.0050	----	<0.0050	<0.0050	<0.0050
cadmium	7440-43-9	E472	0.010	mg/kg		----	<0.010	----	----	----
calcium	7440-70-2	E472	20	mg/kg		----	500	----	----	----
calcium	7440-70-2	E440	20	mg/kg		503	----	536	721	1200
cesium	7440-46-2	E472	0.0050	mg/kg		----	0.226	----	----	----
cesium	7440-46-2	E440	0.0050	mg/kg		0.115	----	0.108	0.137	0.0863
chromium	7440-47-3	E440	0.050	mg/kg		0.206	----	0.103	0.094	0.165
chromium	7440-47-3	E472	0.20	mg/kg		----	<0.20	----	----	----
cobalt	7440-48-4	E472	0.020	mg/kg		----	<0.020	----	----	----
cobalt	7440-48-4	E440	0.020	mg/kg		0.022	----	<0.020	<0.020	<0.020
copper	7440-50-8	E440	0.10	mg/kg		2.57	----	1.58	1.87	2.17
copper	7440-50-8	E472	0.20	mg/kg		----	1.13	----	----	----
iron	7439-89-6	E440	3.0	mg/kg		46.0	----	19.7	40.0	38.7

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BOL_LSU-M-2_2022-05	BOL_LSU-M-3_2022-05	BOL_LSU-M-4_2022-05	BOL_LSU-M-5_2022-05	BOL_LSU-M-6_2022-05
					Client sampling date / time	30-May-2022	30-May-2022	30-May-2022	31-May-2022	31-May-2022
						VA22B2821-026	VA22B2821-027	VA22B2821-028	VA22B2821-029	VA22B2821-030
						Result	Result	Result	Result	Result
Metals										
iron	7439-89-6	E472	5.0	mg/kg		----	15.1	----	----	----
lead	7439-92-1	E440	0.020	mg/kg		<0.020	----	<0.020	<0.020	<0.020
lead	7439-92-1	E472	0.050	mg/kg		----	<0.050	----	----	----
lithium	7439-93-2	E472	0.50	mg/kg		----	<0.50	----	----	----
lithium	7439-93-2	E440	0.50	mg/kg		<0.50	----	<0.50	<0.50	<0.50
magnesium	7439-95-4	E472	2.0	mg/kg		----	1310	----	----	----
magnesium	7439-95-4	E440	2.0	mg/kg		1390	----	1410	1370	1260
manganese	7439-96-5	E472	0.050	mg/kg		----	0.866	----	----	----
manganese	7439-96-5	E440	0.050	mg/kg		1.46	----	0.881	1.29	3.39
mercury	7439-97-6	E511	0.0050	mg/kg		----	0.330	----	----	----
mercury	7439-97-6	E510	0.0050	mg/kg		0.614	----	0.764	0.595	0.623
mercury	7439-97-6	E511A	0.0010	mg/kg wwt		----	0.0850	----	----	----
mercury	7439-97-6	E510A	0.0010	mg/kg wwt		0.139	----	0.188	0.123	0.168
molybdenum	7439-98-7	E440	0.020	mg/kg		0.022	----	<0.020	<0.020	<0.020
molybdenum	7439-98-7	E472	0.040	mg/kg		----	<0.040	----	----	----
nickel	7440-02-0	E472	0.20	mg/kg		----	<0.20	----	----	----
nickel	7440-02-0	E440	0.20	mg/kg		<0.20	----	<0.20	<0.20	<0.20
phosphorus	7723-14-0	E472	10	mg/kg		----	10700	----	----	----
phosphorus	7723-14-0	E440	10	mg/kg		11800	----	12400	11400	10400
potassium	7440-09-7	E472	20	mg/kg		----	19000	----	----	----
potassium	7440-09-7	E440	20	mg/kg		20800	----	20200	19100	15000
rubidium	7440-17-7	E472	0.050	mg/kg		----	14.3	----	----	----
rubidium	7440-17-7	E440	0.050	mg/kg		9.79	----	9.36	7.77	6.64
selenium	7782-49-2	E440	0.050	mg/kg		2.62	----	2.46	2.13	2.59
selenium	7782-49-2	E472	0.10	mg/kg		----	2.99	----	----	----
silver	7440-22-4	E472.Ag	0.0050	mg/kg		----	<0.0050	----	----	----
silver	7440-22-4	E440.Ag	0.0050	mg/kg		<0.0050	----	<0.0050	<0.0050	<0.0050
sodium	7440-23-5	E472	20	mg/kg		----	1180	----	----	----
sodium	7440-23-5	E440	20	mg/kg		1430	----	1280	2560	1270
strontium	7440-24-6	E440	0.050	mg/kg		0.694	----	0.770	1.17	2.73

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BOL_LSU-M-2_2022-05	BOL_LSU-M-3_2022-05	BOL_LSU-M-4_2022-05	BOL_LSU-M-5_2022-05	BOL_LSU-M-6_2022-05
					Client sampling date / time	30-May-2022	30-May-2022	30-May-2022	31-May-2022	31-May-2022
						VA22B2821-026	VA22B2821-027	VA22B2821-028	VA22B2821-029	VA22B2821-030
						Result	Result	Result	Result	Result
Metals										
strontium	7440-24-6	E472	0.10	mg/kg		----	0.76	----	----	----
tellurium	13494-80-9	E472	0.020	mg/kg		----	<0.020	----	----	----
tellurium	13494-80-9	E440	0.020	mg/kg		<0.020	----	<0.020	<0.020	<0.020
thallium	7440-28-0	E472	0.0020	mg/kg		----	<0.0020	----	----	----
thallium	7440-28-0	E440	0.0020	mg/kg		<0.0020	----	<0.0020	<0.0020	<0.0020
tin	7440-31-5	E472	0.10	mg/kg		----	0.45	----	----	----
tin	7440-31-5	E440	0.10	mg/kg		0.82	----	0.58	0.83	0.48
titanium	7440-32-6	E440.Ti	0.25	mg/kg		0.26	----	<0.25	0.36	0.64
titanium	7440-32-6	E472.Ti	0.50	mg/kg		----	<0.50	----	----	----
uranium	7440-61-1	E472	0.0020	mg/kg		----	<0.0020	----	----	----
uranium	7440-61-1	E440	0.0020	mg/kg		<0.0020	----	<0.0020	<0.0020	<0.0020
vanadium	7440-62-2	E472	0.10	mg/kg		----	<0.10	----	----	----
vanadium	7440-62-2	E440	0.10	mg/kg		<0.10	----	<0.10	<0.10	<0.10
zinc	7440-66-6	E440	0.50	mg/kg		34.5	----	29.4	23.8	26.8
zinc	7440-66-6	E472	1.0	mg/kg		----	22.1	----	----	----
zirconium	7440-67-7	E472	0.20	mg/kg		----	0.23	----	----	----
zirconium	7440-67-7	E440	0.20	mg/kg		0.43	----	0.36	0.37	0.33

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BOL_LSU-M-7_ 2022-05	BOL_LSU-M-8_ 2022-05	BOL_LSU-O-1_ 2022-05	BOL_LSU-O-2_ 2022-05	BOL_LSU-O-3_ 2022-05
					Client sampling date / time	31-May-2022	31-May-2022	30-May-2022	30-May-2022	30-May-2022
						VA22B2821-031	VA22B2821-032	VA22B2821-033	VA22B2821-034	VA22B2821-035
						Result	Result	Result	Result	Result
Physical Tests										
moisture	----	E144	0.50	%		----	77.1	63.2	65.9	67.2
moisture	----	E144-H	2.0	%		71.3	----	----	----	----
Metals										
aluminum	7429-90-5	E440	2.0	mg/kg		----	<2.0	<2.0	<2.0	<2.0
aluminum	7429-90-5	E472	5.0	mg/kg		7.3	----	----	----	----
antimony	7440-36-0	E472	0.010	mg/kg		<0.010	----	----	----	----
antimony	7440-36-0	E440	0.010	mg/kg		----	<0.010	<0.010	<0.010	<0.010
arsenic	7440-38-2	E440	0.020	mg/kg		----	0.098	0.091	0.026	0.133
arsenic	7440-38-2	E472	0.030	mg/kg		0.139	----	----	----	----
barium	7440-39-3	E472	0.050	mg/kg		1.16	----	----	----	----
barium	7440-39-3	E440	0.050	mg/kg		----	0.862	0.364	0.232	0.290
beryllium	7440-41-7	E472	0.010	mg/kg		<0.010	----	----	----	----
beryllium	7440-41-7	E440	0.010	mg/kg		----	<0.010	<0.010	<0.010	<0.010
bismuth	7440-69-9	E472	0.010	mg/kg		<0.010	----	----	----	----
bismuth	7440-69-9	E440	0.010	mg/kg		----	<0.010	<0.010	<0.010	<0.010
boron	7440-42-8	E472	1.0	mg/kg		<1.0	----	----	----	----
boron	7440-42-8	E440	1.0	mg/kg		----	<1.0	<1.0	<1.0	<1.0
cadmium	7440-43-9	E440	0.0050	mg/kg		----	<0.0050	<0.0050	<0.0050	0.0072
cadmium	7440-43-9	E472	0.010	mg/kg		<0.010	----	----	----	----
calcium	7440-70-2	E472	20	mg/kg		913	----	----	----	----
calcium	7440-70-2	E440	20	mg/kg		----	932	511	606	590
cesium	7440-46-2	E472	0.0050	mg/kg		0.0910	----	----	----	----
cesium	7440-46-2	E440	0.0050	mg/kg		----	0.235	0.0191	0.0164	0.0395
chromium	7440-47-3	E440	0.050	mg/kg		----	0.111	<0.050	0.068	<0.050
chromium	7440-47-3	E472	0.20	mg/kg		<0.20	----	----	----	----
cobalt	7440-48-4	E472	0.020	mg/kg		<0.020	----	----	----	----
cobalt	7440-48-4	E440	0.020	mg/kg		----	<0.020	0.044	0.053	0.063
copper	7440-50-8	E440	0.10	mg/kg		----	1.56	4.07	3.80	5.31
copper	7440-50-8	E472	0.20	mg/kg		4.00	----	----	----	----
iron	7439-89-6	E440	3.0	mg/kg		----	19.4	54.8	57.3	29.6

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BOL_LSU-M-7_2022-05	BOL_LSU-M-8_2022-05	BOL_LSU-O-1_2022-05	BOL_LSU-O-2_2022-05	BOL_LSU-O-3_2022-05
					Client sampling date / time	31-May-2022	31-May-2022	30-May-2022	30-May-2022	30-May-2022
						VA22B2821-031	VA22B2821-032	VA22B2821-033	VA22B2821-034	VA22B2821-035
						Result	Result	Result	Result	Result
Metals										
iron	7439-89-6	E472	5.0	mg/kg		30.2	----	----	----	----
lead	7439-92-1	E440	0.020	mg/kg		----	<0.020	<0.020	<0.020	<0.020
lead	7439-92-1	E472	0.050	mg/kg		<0.050	----	----	----	----
lithium	7439-93-2	E472	0.50	mg/kg		<0.50	----	----	----	----
lithium	7439-93-2	E440	0.50	mg/kg		----	<0.50	<0.50	<0.50	<0.50
magnesium	7439-95-4	E472	2.0	mg/kg		1010	----	----	----	----
magnesium	7439-95-4	E440	2.0	mg/kg		----	1520	726	747	913
manganese	7439-96-5	E472	0.050	mg/kg		2.45	----	----	----	----
manganese	7439-96-5	E440	0.050	mg/kg		----	1.90	16.3	12.6	12.2
mercury	7439-97-6	E511	0.0050	mg/kg		0.170	----	----	----	----
mercury	7439-97-6	E510	0.0050	mg/kg		----	0.608	0.0142	0.0160	0.0128
mercury	7439-97-6	E511A	0.0010	mg/kg wwt		0.0490	----	----	----	----
mercury	7439-97-6	E510A	0.0010	mg/kg wwt		----	0.139	0.0052	0.0055	0.0042
molybdenum	7439-98-7	E440	0.020	mg/kg		----	<0.020	0.065	0.068	0.078
molybdenum	7439-98-7	E472	0.040	mg/kg		<0.040	----	----	----	----
nickel	7440-02-0	E472	0.20	mg/kg		<0.20	----	----	----	----
nickel	7440-02-0	E440	0.20	mg/kg		----	<0.20	<0.20	<0.20	<0.20
phosphorus	7723-14-0	E472	10	mg/kg		8220	----	----	----	----
phosphorus	7723-14-0	E440	10	mg/kg		----	12800	11800	11100	12300
potassium	7440-09-7	E472	20	mg/kg		12400	----	----	----	----
potassium	7440-09-7	E440	20	mg/kg		----	21600	6290	6770	7760
rubidium	7440-17-7	E472	0.050	mg/kg		8.21	----	----	----	----
rubidium	7440-17-7	E440	0.050	mg/kg		----	11.9	5.28	3.97	8.20
selenium	7782-49-2	E440	0.050	mg/kg		----	2.74	4.83	5.00	4.94
selenium	7782-49-2	E472	0.10	mg/kg		2.63	----	----	----	----
silver	7440-22-4	E472.Ag	0.0050	mg/kg		<0.0050	----	----	----	----
silver	7440-22-4	E440.Ag	0.0050	mg/kg		----	<0.0050	<0.0050	0.0057	<0.0050
sodium	7440-23-5	E472	20	mg/kg		1320	----	----	----	----
sodium	7440-23-5	E440	20	mg/kg		----	1400	1640	2520	1990
strontium	7440-24-6	E440	0.050	mg/kg		----	1.53	0.687	0.632	0.924

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BOL_LSU-M-7_2022-05	BOL_LSU-M-8_2022-05	BOL_LSU-O-1_2022-05	BOL_LSU-O-2_2022-05	BOL_LSU-O-3_2022-05
					Client sampling date / time	31-May-2022	31-May-2022	30-May-2022	30-May-2022	30-May-2022
						VA22B2821-031	VA22B2821-032	VA22B2821-033	VA22B2821-034	VA22B2821-035
						Result	Result	Result	Result	Result
Metals										
strontium	7440-24-6	E472	0.10	mg/kg		1.93	----	----	----	----
tellurium	13494-80-9	E472	0.020	mg/kg		<0.020	----	----	----	----
tellurium	13494-80-9	E440	0.020	mg/kg		----	<0.020	<0.020	<0.020	<0.020
thallium	7440-28-0	E472	0.0020	mg/kg		<0.0020	----	----	----	----
thallium	7440-28-0	E440	0.0020	mg/kg		----	<0.0020	<0.0020	<0.0020	<0.0020
tin	7440-31-5	E472	0.10	mg/kg		0.60	----	----	----	----
tin	7440-31-5	E440	0.10	mg/kg		----	0.91	<0.10	<0.10	0.16
titanium	7440-32-6	E440.Ti	0.25	mg/kg		----	<0.25	<0.25	<0.25	<0.25
titanium	7440-32-6	E472.Ti	0.50	mg/kg		1.47	----	----	----	----
uranium	7440-61-1	E472	0.0020	mg/kg		<0.0020	----	----	----	----
uranium	7440-61-1	E440	0.0020	mg/kg		----	<0.0020	<0.0020	<0.0020	<0.0020
vanadium	7440-62-2	E472	0.10	mg/kg		<0.10	----	----	----	----
vanadium	7440-62-2	E440	0.10	mg/kg		----	<0.10	<0.10	<0.10	<0.10
zinc	7440-66-6	E440	0.50	mg/kg		----	17.4	67.2	84.1	86.8
zinc	7440-66-6	E472	1.0	mg/kg		20.2	----	----	----	----
zirconium	7440-67-7	E472	0.20	mg/kg		0.25	----	----	----	----
zirconium	7440-67-7	E440	0.20	mg/kg		----	0.33	<0.20	<0.20	<0.20

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BOL_LSU-O-4_ 2022-05	BOL_LSU-O-5_ 2022-05	BOL_LSU-O-6_ 2022-05	BOL_LSU-O-7_ 2022-05	BOL_LSU-O-8_ 2022-05
					Client sampling date / time	30-May-2022	31-May-2022	31-May-2022	31-May-2022	31-May-2022
						VA22B2821-036	VA22B2821-037	VA22B2821-038	VA22B2821-039	VA22B2821-040
						Result	Result	Result	Result	Result
Physical Tests										
moisture	----	E144	0.50	%		65.4	67.0	66.7	64.6	64.2
Metals										
aluminum	7429-90-5	E440	2.0	mg/kg		<2.0	2.6	<2.0	<2.0	<2.0
antimony	7440-36-0	E440	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	<0.010
arsenic	7440-38-2	E440	0.020	mg/kg		0.034	0.026	0.041	0.069	0.056
barium	7440-39-3	E440	0.050	mg/kg		0.307	0.280	0.264	0.195	0.264
beryllium	7440-41-7	E440	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	<0.010
bismuth	7440-69-9	E440	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	<0.010
boron	7440-42-8	E440	1.0	mg/kg		<1.0	<1.0	<1.0	<1.0	<1.0
cadmium	7440-43-9	E440	0.0050	mg/kg		<0.0050	0.0054	<0.0050	<0.0050	0.0051
calcium	7440-70-2	E440	20	mg/kg		508	510	532	448	574
cesium	7440-46-2	E440	0.0050	mg/kg		0.0113	0.0182	0.0179	0.0314	0.0311
chromium	7440-47-3	E440	0.050	mg/kg		<0.050	<0.050	<0.050	<0.050	<0.050
cobalt	7440-48-4	E440	0.020	mg/kg		0.048	0.040	0.050	0.032	0.036
copper	7440-50-8	E440	0.10	mg/kg		3.54	3.74	3.98	3.49	3.70
iron	7439-89-6	E440	3.0	mg/kg		55.9	79.0	64.8	45.0	48.8
lead	7439-92-1	E440	0.020	mg/kg		<0.020	<0.020	<0.020	<0.020	<0.020
lithium	7439-93-2	E440	0.50	mg/kg		<0.50	<0.50	<0.50	<0.50	<0.50
magnesium	7439-95-4	E440	2.0	mg/kg		761	758	792	726	780
manganese	7439-96-5	E440	0.050	mg/kg		5.48	6.11	16.5	13.6	16.0
mercury	7439-97-6	E510	0.0050	mg/kg		0.0184	0.0178	0.0170	0.0091	0.0170
mercury	7439-97-6	E510A	0.0010	mg/kg wwt		0.0064	0.0059	0.0057	0.0032	0.0061
molybdenum	7439-98-7	E440	0.020	mg/kg		0.059	0.065	0.066	0.051	0.060
nickel	7440-02-0	E440	0.20	mg/kg		<0.20	<0.20	<0.20	<0.20	<0.20
phosphorus	7723-14-0	E440	10	mg/kg		11700	11800	12100	11300	11900
potassium	7440-09-7	E440	20	mg/kg		7000	6940	7100	6760	6870
rubidium	7440-17-7	E440	0.050	mg/kg		4.26	3.43	4.07	5.98	5.19
selenium	7782-49-2	E440	0.050	mg/kg		4.32	3.78	4.38	5.21	4.58
silver	7440-22-4	E440.Ag	0.0050	mg/kg		0.0064	0.0064	0.0081	<0.0050	<0.0050
sodium	7440-23-5	E440	20	mg/kg		1920	2260	2150	1710	1630

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BOL_LSU-O-4_ 2022-05	BOL_LSU-O-5_ 2022-05	BOL_LSU-O-6_ 2022-05	BOL_LSU-O-7_ 2022-05	BOL_LSU-O-8_ 2022-05
					Client sampling date / time	30-May-2022	31-May-2022	31-May-2022	31-May-2022	31-May-2022
						VA22B2821-036	VA22B2821-037	VA22B2821-038	VA22B2821-039	VA22B2821-040
						Result	Result	Result	Result	Result
Metals										
strontium	7440-24-6	E440	0.050	mg/kg		0.672	0.733	0.757	0.537	0.691
tellurium	13494-80-9	E440	0.020	mg/kg		<0.020	<0.020	<0.020	<0.020	<0.020
thallium	7440-28-0	E440	0.0020	mg/kg		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
tin	7440-31-5	E440	0.10	mg/kg		<0.10	0.10	<0.10	0.13	0.13
titanium	7440-32-6	E440.Ti	0.25	mg/kg		<0.25	<0.25	<0.25	<0.25	<0.25
uranium	7440-61-1	E440	0.0020	mg/kg		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
vanadium	7440-62-2	E440	0.10	mg/kg		<0.10	<0.10	<0.10	<0.10	<0.10
zinc	7440-66-6	E440	0.50	mg/kg		75.2	76.8	75.2	73.1	77.4
zirconium	7440-67-7	E440	0.20	mg/kg		<0.20	<0.20	<0.20	<0.20	<0.20

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BOL_LSU-Li-1_2022-05	BOL_LSU-Li-2_2022-05	BOL_LSU-Li-3_2022-05	BOL_LSU-Li-4_2022-05	BOL_LSU-Li-5_2022-05
					Client sampling date / time	30-May-2022	30-May-2022	30-May-2022	30-May-2022	31-May-2022
						VA22B2821-041	VA22B2821-042	VA22B2821-043	VA22B2821-044	VA22B2821-045
						Result	Result	Result	Result	Result
Physical Tests										
moisture	----	E144	0.50	%		80.3	----	81.5	82.1	82.3
moisture	----	E144-H	2.0	%		----	80.4	----	----	----
Metals										
aluminum	7429-90-5	E440	2.0	mg/kg		2.5	----	5.9	<2.0	14.6
aluminum	7429-90-5	E472	5.0	mg/kg		----	<5.0	----	----	----
antimony	7440-36-0	E472	0.010	mg/kg		----	0.022	----	----	----
antimony	7440-36-0	E440	0.010	mg/kg		0.012	----	0.010	0.020	0.041
arsenic	7440-38-2	E440	0.020	mg/kg		0.158	----	0.150	0.125	0.182
arsenic	7440-38-2	E472	0.030	mg/kg		----	0.152	----	----	----
barium	7440-39-3	E472	0.050	mg/kg		----	0.454	----	----	----
barium	7440-39-3	E440	0.050	mg/kg		0.300	----	0.678	0.119	0.439
beryllium	7440-41-7	E472	0.010	mg/kg		----	<0.010	----	----	----
beryllium	7440-41-7	E440	0.010	mg/kg		<0.010	----	<0.010	<0.010	<0.010
bismuth	7440-69-9	E472	0.010	mg/kg		----	<0.010	----	----	----
bismuth	7440-69-9	E440	0.010	mg/kg		<0.010	----	<0.010	<0.010	<0.010
boron	7440-42-8	E472	1.0	mg/kg		----	<1.0	----	----	----
boron	7440-42-8	E440	1.0	mg/kg		<1.0	----	<1.0	<1.0	<1.0
cadmium	7440-43-9	E440	0.0050	mg/kg		0.209	----	0.221	0.411	0.313
cadmium	7440-43-9	E472	0.010	mg/kg		----	0.469	----	----	----
calcium	7440-70-2	E472	20	mg/kg		----	285	----	----	----
calcium	7440-70-2	E440	20	mg/kg		362	----	386	354	396
cesium	7440-46-2	E472	0.0050	mg/kg		----	0.0216	----	----	----
cesium	7440-46-2	E440	0.0050	mg/kg		0.0246	----	0.0449	0.0164	0.0353
chromium	7440-47-3	E440	0.050	mg/kg		0.073	----	0.098	<0.050	0.144
chromium	7440-47-3	E472	0.20	mg/kg		----	<0.20	----	----	----
cobalt	7440-48-4	E472	0.020	mg/kg		----	0.120	----	----	----
cobalt	7440-48-4	E440	0.020	mg/kg		0.086	----	0.098	0.102	0.135
copper	7440-50-8	E440	0.10	mg/kg		15.2	----	86.7	9.52	17.7
copper	7440-50-8	E472	0.20	mg/kg		----	23.0	----	----	----
iron	7439-89-6	E440	3.0	mg/kg		158	----	84.5	147	503

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BOL_LSU-Li-1_2022-05	BOL_LSU-Li-2_2022-05	BOL_LSU-Li-3_2022-05	BOL_LSU-Li-4_2022-05	BOL_LSU-Li-5_2022-05
					Client sampling date / time	30-May-2022	30-May-2022	30-May-2022	30-May-2022	31-May-2022
						VA22B2821-041	VA22B2821-042	VA22B2821-043	VA22B2821-044	VA22B2821-045
						Result	Result	Result	Result	Result
Metals										
iron	7439-89-6	E472	5.0	mg/kg		----	424	----	----	----
lead	7439-92-1	E440	0.020	mg/kg		<0.020	----	<0.020	<0.020	0.027
lead	7439-92-1	E472	0.050	mg/kg		----	<0.050	----	----	----
lithium	7439-93-2	E472	0.50	mg/kg		----	<0.50	----	----	----
lithium	7439-93-2	E440	0.50	mg/kg		<0.50	----	<0.50	<0.50	<0.50
magnesium	7439-95-4	E472	2.0	mg/kg		----	1030	----	----	----
magnesium	7439-95-4	E440	2.0	mg/kg		1040	----	1220	930	1260
manganese	7439-96-5	E472	0.050	mg/kg		----	14.2	----	----	----
manganese	7439-96-5	E440	0.050	mg/kg		11.4	----	21.2	9.72	30.8
mercury	7439-97-6	E511	0.0050	mg/kg		----	0.192	----	----	----
mercury	7439-97-6	E510	0.0050	mg/kg		0.138	----	0.137	0.200	0.215
mercury	7439-97-6	E511A	0.0010	mg/kg wwt		----	0.0376	----	----	----
mercury	7439-97-6	E510A	0.0010	mg/kg wwt		0.0272	----	0.0254	0.0358	0.0381
molybdenum	7439-98-7	E440	0.020	mg/kg		1.26	----	1.59	0.939	1.38
molybdenum	7439-98-7	E472	0.040	mg/kg		----	1.13	----	----	----
nickel	7440-02-0	E472	0.20	mg/kg		----	<0.20	----	----	----
nickel	7440-02-0	E440	0.20	mg/kg		<0.20	----	<0.20	<0.20	<0.20
phosphorus	7723-14-0	E472	10	mg/kg		----	15900	----	----	----
phosphorus	7723-14-0	E440	10	mg/kg		16400	----	17500	14800	19100
potassium	7440-09-7	E472	20	mg/kg		----	11300	----	----	----
potassium	7440-09-7	E440	20	mg/kg		13600	----	15600	12800	13800
rubidium	7440-17-7	E472	0.050	mg/kg		----	6.43	----	----	----
rubidium	7440-17-7	E440	0.050	mg/kg		10.5	----	15.5	7.77	7.93
selenium	7782-49-2	E440	0.050	mg/kg		6.19	----	6.79	6.92	7.51
selenium	7782-49-2	E472	0.10	mg/kg		----	6.89	----	----	----
silver	7440-22-4	E472.Ag	0.0050	mg/kg		----	0.0284	----	----	----
silver	7440-22-4	E440.Ag	0.0050	mg/kg		0.0181	----	0.110	0.0091	0.0184
sodium	7440-23-5	E472	20	mg/kg		----	6940	----	----	----
sodium	7440-23-5	E440	20	mg/kg		6780	----	7090	8080	8240
strontium	7440-24-6	E440	0.050	mg/kg		0.883	----	1.37	0.864	1.55

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BOL_LSU-Li-1_2022-05	BOL_LSU-Li-2_2022-05	BOL_LSU-Li-3_2022-05	BOL_LSU-Li-4_2022-05	BOL_LSU-Li-5_2022-05
					Client sampling date / time	30-May-2022	30-May-2022	30-May-2022	30-May-2022	31-May-2022
						VA22B2821-041	VA22B2821-042	VA22B2821-043	VA22B2821-044	VA22B2821-045
						Result	Result	Result	Result	Result
Metals										
strontium	7440-24-6	E472	0.10	mg/kg		----	0.64	----	----	----
tellurium	13494-80-9	E472	0.020	mg/kg		----	<0.020	----	----	----
tellurium	13494-80-9	E440	0.020	mg/kg		<0.020	----	<0.020	<0.020	<0.020
thallium	7440-28-0	E472	0.0020	mg/kg		----	0.0021	----	----	----
thallium	7440-28-0	E440	0.0020	mg/kg		<0.0020	----	<0.0020	<0.0020	<0.0020
tin	7440-31-5	E472	0.10	mg/kg		----	0.50	----	----	----
tin	7440-31-5	E440	0.10	mg/kg		0.31	----	0.54	0.39	0.44
titanium	7440-32-6	E440.Ti	0.25	mg/kg		<0.25	----	0.31	<0.25	0.75
titanium	7440-32-6	E472.Ti	0.50	mg/kg		----	<0.50	----	----	----
uranium	7440-61-1	E472	0.0020	mg/kg		----	0.0051	----	----	----
uranium	7440-61-1	E440	0.0020	mg/kg		0.0029	----	0.0032	0.0040	0.0102
vanadium	7440-62-2	E472	0.10	mg/kg		----	0.30	----	----	----
vanadium	7440-62-2	E440	0.10	mg/kg		0.24	----	0.14	0.22	0.76
zinc	7440-66-6	E440	0.50	mg/kg		80.0	----	118	70.0	88.8
zinc	7440-66-6	E472	1.0	mg/kg		----	79.9	----	----	----
zirconium	7440-67-7	E472	0.20	mg/kg		----	0.24	----	----	----
zirconium	7440-67-7	E440	0.20	mg/kg		<0.20	----	<0.20	<0.20	<0.20

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BOL_LSU-Li-6_2022-05	BOL_LSU-Li-7_2022-05	BOL_LSU-Li-8_2022-05	BOL_LSU-Ki-1_2022-05	BOL_LSU-Ki-2_2022-05
					Client sampling date / time	31-May-2022	31-May-2022	31-May-2022	30-May-2022	30-May-2022
						VA22B2821-046	VA22B2821-047	VA22B2821-048	VA22B2821-049	VA22B2821-050
						Result	Result	Result	Result	Result
Physical Tests										
moisture	----	E144	0.50	%		81.7	80.7	79.7	----	----
moisture	----	E144-H	2.0	%		----	----	----	79.3	81.4
Metals										
aluminum	7429-90-5	E440	2.0	mg/kg		3.7	2.3	3.2	----	----
aluminum	7429-90-5	E472	5.0	mg/kg		----	----	----	<5.0	<5.0
antimony	7440-36-0	E472	0.010	mg/kg		----	----	----	<0.010	<0.010
antimony	7440-36-0	E440	0.010	mg/kg		0.017	0.010	0.015	----	----
arsenic	7440-38-2	E440	0.020	mg/kg		0.124	0.107	0.133	----	----
arsenic	7440-38-2	E472	0.030	mg/kg		----	----	----	0.148	0.094
barium	7440-39-3	E472	0.050	mg/kg		----	----	----	1.06	2.82
barium	7440-39-3	E440	0.050	mg/kg		0.195	0.343	0.311	----	----
beryllium	7440-41-7	E472	0.010	mg/kg		----	----	----	<0.010	<0.010
beryllium	7440-41-7	E440	0.010	mg/kg		<0.010	<0.010	<0.010	----	----
bismuth	7440-69-9	E472	0.010	mg/kg		----	----	----	<0.010	<0.010
bismuth	7440-69-9	E440	0.010	mg/kg		<0.010	<0.010	<0.010	----	----
boron	7440-42-8	E472	1.0	mg/kg		----	----	----	<1.0	<1.0
boron	7440-42-8	E440	1.0	mg/kg		<1.0	<1.0	<1.0	----	----
cadmium	7440-43-9	E440	0.0050	mg/kg		0.318	0.0803	0.352	----	----
cadmium	7440-43-9	E472	0.010	mg/kg		----	----	----	1.11	1.89
calcium	7440-70-2	E472	20	mg/kg		----	----	----	670	856
calcium	7440-70-2	E440	20	mg/kg		334	319	483	----	----
cesium	7440-46-2	E472	0.0050	mg/kg		----	----	----	0.0281	0.0350
cesium	7440-46-2	E440	0.0050	mg/kg		0.0361	0.0397	0.0575	----	----
chromium	7440-47-3	E440	0.050	mg/kg		0.090	0.109	0.070	----	----
chromium	7440-47-3	E472	0.20	mg/kg		----	----	----	<0.20	<0.20
cobalt	7440-48-4	E472	0.020	mg/kg		----	----	----	0.134	0.283
cobalt	7440-48-4	E440	0.020	mg/kg		0.126	0.102	0.106	----	----
copper	7440-50-8	E440	0.10	mg/kg		19.9	17.9	21.2	----	----
copper	7440-50-8	E472	0.20	mg/kg		----	----	----	4.55	5.97
iron	7439-89-6	E440	3.0	mg/kg		584	261	313	----	----

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BOL_LSU-Li-6_ 2022-05	BOL_LSU-Li-7_ 2022-05	BOL_LSU-Li-8_ 2022-05	BOL_LSU-Ki-1_ 2022-05	BOL_LSU-Ki-2_ 2022-05
					Client sampling date / time	31-May-2022	31-May-2022	31-May-2022	30-May-2022	30-May-2022
						VA22B2821-046	VA22B2821-047	VA22B2821-048	VA22B2821-049	VA22B2821-050
						Result	Result	Result	Result	Result
Metals										
iron	7439-89-6	E472	5.0	mg/kg		----	----	----	486	276
lead	7439-92-1	E440	0.020	mg/kg		<0.020	<0.020	<0.020	----	----
lead	7439-92-1	E472	0.050	mg/kg		----	----	----	<0.050	<0.050
lithium	7439-93-2	E472	0.50	mg/kg		----	----	----	<0.50	<0.50
lithium	7439-93-2	E440	0.50	mg/kg		<0.50	<0.50	<0.50	----	----
magnesium	7439-95-4	E472	2.0	mg/kg		----	----	----	516	612
magnesium	7439-95-4	E440	2.0	mg/kg		1200	994	1150	----	----
manganese	7439-96-5	E472	0.050	mg/kg		----	----	----	11.7	20.4
manganese	7439-96-5	E440	0.050	mg/kg		12.6	9.69	16.8	----	----
mercury	7439-97-6	E511	0.0050	mg/kg		----	----	----	0.128	0.277
mercury	7439-97-6	E510	0.0050	mg/kg		0.166	0.0966	0.139	----	----
mercury	7439-97-6	E511A	0.0010	mg/kg wwt		----	----	----	0.0265	0.0514
mercury	7439-97-6	E510A	0.0010	mg/kg wwt		0.0303	0.0187	0.0283	----	----
molybdenum	7439-98-7	E440	0.020	mg/kg		1.19	1.42	1.16	----	----
molybdenum	7439-98-7	E472	0.040	mg/kg		----	----	----	0.575	0.719
nickel	7440-02-0	E472	0.20	mg/kg		----	----	----	0.29	0.58
nickel	7440-02-0	E440	0.20	mg/kg		<0.20	<0.20	<0.20	----	----
phosphorus	7723-14-0	E472	10	mg/kg		----	----	----	11600	13600
phosphorus	7723-14-0	E440	10	mg/kg		18100	15900	17600	----	----
potassium	7440-09-7	E472	20	mg/kg		----	----	----	9540	10800
potassium	7440-09-7	E440	20	mg/kg		14900	13500	14200	----	----
rubidium	7440-17-7	E472	0.050	mg/kg		----	----	----	7.70	7.06
rubidium	7440-17-7	E440	0.050	mg/kg		8.39	10.2	10.6	----	----
selenium	7782-49-2	E440	0.050	mg/kg		6.26	7.28	6.60	----	----
selenium	7782-49-2	E472	0.10	mg/kg		----	----	----	5.38	6.32
silver	7440-22-4	E472.Ag	0.0050	mg/kg		----	----	----	<0.0050	<0.0050
silver	7440-22-4	E440.Ag	0.0050	mg/kg		0.0261	0.0230	0.0280	----	----
sodium	7440-23-5	E472	20	mg/kg		----	----	----	8280	9340
sodium	7440-23-5	E440	20	mg/kg		7610	7100	6870	----	----
strontium	7440-24-6	E440	0.050	mg/kg		0.782	0.705	1.97	----	----

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BOL_LSU-Li-6_2022-05	BOL_LSU-Li-7_2022-05	BOL_LSU-Li-8_2022-05	BOL_LSU-Ki-1_2022-05	BOL_LSU-Ki-2_2022-05
					Client sampling date / time	31-May-2022	31-May-2022	31-May-2022	30-May-2022	30-May-2022
						VA22B2821-046	VA22B2821-047	VA22B2821-048	VA22B2821-049	VA22B2821-050
						Result	Result	Result	Result	Result
Metals										
strontium	7440-24-6	E472	0.10	mg/kg		----	----	----	1.55	1.72
tellurium	13494-80-9	E472	0.020	mg/kg		----	----	----	<0.020	0.044
tellurium	13494-80-9	E440	0.020	mg/kg		<0.020	<0.020	<0.020	----	----
thallium	7440-28-0	E472	0.0020	mg/kg		----	----	----	0.0174	0.0161
thallium	7440-28-0	E440	0.0020	mg/kg		<0.0020	<0.0020	<0.0020	----	----
tin	7440-31-5	E472	0.10	mg/kg		----	----	----	<0.10	<0.10
tin	7440-31-5	E440	0.10	mg/kg		<0.10	<0.10	<0.10	----	----
titanium	7440-32-6	E440.Ti	0.25	mg/kg		<0.25	<0.25	<0.25	----	----
titanium	7440-32-6	E472.Ti	0.50	mg/kg		----	----	----	<0.50	<0.50
uranium	7440-61-1	E472	0.0020	mg/kg		----	----	----	0.0078	0.0157
uranium	7440-61-1	E440	0.0020	mg/kg		0.0049	<0.0020	0.0032	----	----
vanadium	7440-62-2	E472	0.10	mg/kg		----	----	----	0.63	1.05
vanadium	7440-62-2	E440	0.10	mg/kg		0.27	0.13	0.16	----	----
zinc	7440-66-6	E440	0.50	mg/kg		87.9	86.5	78.0	----	----
zinc	7440-66-6	E472	1.0	mg/kg		----	----	----	95.8	156
zirconium	7440-67-7	E472	0.20	mg/kg		----	----	----	<0.20	<0.20
zirconium	7440-67-7	E440	0.20	mg/kg		<0.20	<0.20	<0.20	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BOL_LSU-Ki-3_2022-05	BOL_LSU-Ki-4_2022-05	BOL_LSU-Ki-5_2022-05	BOL_LSU-Ki-6_2022-05	BOL_LSU-Ki-7_2022-05
					Client sampling date / time	30-May-2022	30-May-2022	31-May-2022	31-May-2022	31-May-2022
						VA22B2821-051	VA22B2821-052	VA22B2821-053	VA22B2821-054	VA22B2821-055
						Result	Result	Result	Result	Result
Physical Tests										
moisture	----	E144	0.50	%		----	----	83.1	----	----
moisture	----	E144-H	2.0	%		79.2	78.4	----	79.0	78.4
Metals										
aluminum	7429-90-5	E440	2.0	mg/kg		----	----	7.8	----	----
aluminum	7429-90-5	E472	5.0	mg/kg		6.3	<5.0	----	<5.0	<5.0
antimony	7440-36-0	E472	0.010	mg/kg		<0.010	<0.010	----	<0.010	<0.010
antimony	7440-36-0	E440	0.010	mg/kg		----	----	0.012	----	----
arsenic	7440-38-2	E440	0.020	mg/kg		----	----	0.092	----	----
arsenic	7440-38-2	E472	0.030	mg/kg		0.230	0.092	----	0.093	0.122
barium	7440-39-3	E472	0.050	mg/kg		1.61	2.17	----	3.15	1.70
barium	7440-39-3	E440	0.050	mg/kg		----	----	3.27	----	----
beryllium	7440-41-7	E472	0.010	mg/kg		<0.010	<0.010	----	<0.010	<0.010
beryllium	7440-41-7	E440	0.010	mg/kg		----	----	<0.010	----	----
bismuth	7440-69-9	E472	0.010	mg/kg		<0.010	<0.010	----	<0.010	<0.010
bismuth	7440-69-9	E440	0.010	mg/kg		----	----	<0.010	----	----
boron	7440-42-8	E472	1.0	mg/kg		<1.0	<1.0	----	<1.0	<1.0
boron	7440-42-8	E440	1.0	mg/kg		----	----	<1.0	----	----
cadmium	7440-43-9	E440	0.0050	mg/kg		----	----	1.76	----	----
cadmium	7440-43-9	E472	0.010	mg/kg		1.08	2.49	----	1.75	0.448
calcium	7440-70-2	E472	20	mg/kg		633	968	----	2520	794
calcium	7440-70-2	E440	20	mg/kg		----	----	1380	----	----
cesium	7440-46-2	E472	0.0050	mg/kg		0.0734	0.0188	----	0.0459	0.0481
cesium	7440-46-2	E440	0.0050	mg/kg		----	----	0.0553	----	----
chromium	7440-47-3	E440	0.050	mg/kg		----	----	0.099	----	----
chromium	7440-47-3	E472	0.20	mg/kg		<0.20	<0.20	----	<0.20	<0.20
cobalt	7440-48-4	E472	0.020	mg/kg		0.266	0.294	----	0.452	0.299
cobalt	7440-48-4	E440	0.020	mg/kg		----	----	0.181	----	----
copper	7440-50-8	E440	0.10	mg/kg		----	----	6.10	----	----
copper	7440-50-8	E472	0.20	mg/kg		6.08	4.38	----	4.24	4.26
iron	7439-89-6	E440	3.0	mg/kg		----	----	502	----	----

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BOL_LSU-Ki-3_2022-05	BOL_LSU-Ki-4_2022-05	BOL_LSU-Ki-5_2022-05	BOL_LSU-Ki-6_2022-05	BOL_LSU-Ki-7_2022-05
					Client sampling date / time	30-May-2022	30-May-2022	31-May-2022	31-May-2022	31-May-2022
						VA22B2821-051	VA22B2821-052	VA22B2821-053	VA22B2821-054	VA22B2821-055
						Result	Result	Result	Result	Result
Metals										
iron	7439-89-6	E472	5.0	mg/kg		157	340	----	338	448
lead	7439-92-1	E440	0.020	mg/kg		----	----	<0.020	----	----
lead	7439-92-1	E472	0.050	mg/kg		<0.050	<0.050	----	<0.050	<0.050
lithium	7439-93-2	E472	0.50	mg/kg		<0.50	<0.50	----	<0.50	<0.50
lithium	7439-93-2	E440	0.50	mg/kg		----	----	<0.50	----	----
magnesium	7439-95-4	E472	2.0	mg/kg		609	448	----	692	556
magnesium	7439-95-4	E440	2.0	mg/kg		----	----	680	----	----
manganese	7439-96-5	E472	0.050	mg/kg		22.7	12.2	----	66.1	10.0
manganese	7439-96-5	E440	0.050	mg/kg		----	----	25.2	----	----
mercury	7439-97-6	E511	0.0050	mg/kg		0.108	0.266	----	0.306	0.0822
mercury	7439-97-6	E510	0.0050	mg/kg		----	----	0.340	----	----
mercury	7439-97-6	E511A	0.0010	mg/kg wwt		0.0224	0.0572	----	0.0641	0.0178
mercury	7439-97-6	E510A	0.0010	mg/kg wwt		----	----	0.0575	----	----
molybdenum	7439-98-7	E440	0.020	mg/kg		----	----	0.777	----	----
molybdenum	7439-98-7	E472	0.040	mg/kg		0.913	0.706	----	0.595	0.610
nickel	7440-02-0	E472	0.20	mg/kg		0.41	0.66	----	0.61	0.29
nickel	7440-02-0	E440	0.20	mg/kg		----	----	0.51	----	----
phosphorus	7723-14-0	E472	10	mg/kg		13200	10000	----	14500	11900
phosphorus	7723-14-0	E440	10	mg/kg		----	----	14500	----	----
potassium	7440-09-7	E472	20	mg/kg		10200	8230	----	12600	10700
potassium	7440-09-7	E440	20	mg/kg		----	----	13800	----	----
rubidium	7440-17-7	E472	0.050	mg/kg		11.4	5.50	----	6.44	8.31
rubidium	7440-17-7	E440	0.050	mg/kg		----	----	6.82	----	----
selenium	7782-49-2	E440	0.050	mg/kg		----	----	6.17	----	----
selenium	7782-49-2	E472	0.10	mg/kg		5.59	5.75	----	6.11	5.79
silver	7440-22-4	E472.Ag	0.0050	mg/kg		<0.0050	<0.0050	----	<0.0050	<0.0050
silver	7440-22-4	E440.Ag	0.0050	mg/kg		----	----	<0.0050	----	----
sodium	7440-23-5	E472	20	mg/kg		7870	7290	----	6460	7020
sodium	7440-23-5	E440	20	mg/kg		----	----	11400	----	----
strontium	7440-24-6	E440	0.050	mg/kg		----	----	3.09	----	----

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BOL_LSU-Ki-3_2022-05	BOL_LSU-Ki-4_2022-05	BOL_LSU-Ki-5_2022-05	BOL_LSU-Ki-6_2022-05	BOL_LSU-Ki-7_2022-05
					Client sampling date / time	30-May-2022	30-May-2022	31-May-2022	31-May-2022	31-May-2022
						VA22B2821-051	VA22B2821-052	VA22B2821-053	VA22B2821-054	VA22B2821-055
						Result	Result	Result	Result	Result
Metals										
strontium	7440-24-6	E472	0.10	mg/kg		1.59	2.26	----	6.84	1.46
tellurium	13494-80-9	E472	0.020	mg/kg		<0.020	0.030	----	0.024	<0.020
tellurium	13494-80-9	E440	0.020	mg/kg		----	----	0.060	----	----
thallium	7440-28-0	E472	0.0020	mg/kg		0.0143	0.0158	----	0.0125	0.0063
thallium	7440-28-0	E440	0.0020	mg/kg		----	----	0.0063	----	----
tin	7440-31-5	E472	0.10	mg/kg		0.91	0.63	----	0.66	0.65
tin	7440-31-5	E440	0.10	mg/kg		----	----	0.66	----	----
titanium	7440-32-6	E440.Ti	0.25	mg/kg		----	----	0.63	----	----
titanium	7440-32-6	E472.Ti	0.50	mg/kg		0.67	<0.50	----	<0.50	<0.50
uranium	7440-61-1	E472	0.0020	mg/kg		0.0086	0.0141	----	0.0186	0.0044
uranium	7440-61-1	E440	0.0020	mg/kg		----	----	0.0215	----	----
vanadium	7440-62-2	E472	0.10	mg/kg		0.30	0.97	----	0.97	0.40
vanadium	7440-62-2	E440	0.10	mg/kg		----	----	2.06	----	----
zinc	7440-66-6	E440	0.50	mg/kg		----	----	104	----	----
zinc	7440-66-6	E472	1.0	mg/kg		122	106	----	105	113
zirconium	7440-67-7	E472	0.20	mg/kg		0.23	0.22	----	0.20	<0.20
zirconium	7440-67-7	E440	0.20	mg/kg		----	----	<0.20	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BOL_LSU-Ki-8_2022-05	POL_RB-M-2X_2022-05	POL_LSU-M-8X_2022-05	BOL_RB-M-7X_2022-05	POL_RB-O-4X_2022-05
					Client sampling date / time	31-May-2022	29-May-2022	28-May-2022	30-May-2022	29-May-2022
						VA22B2821-056	VA22B2821-057	VA22B2821-058	VA22B2821-059	VA22B2821-060
						Result	Result	Result	Result	Result
Physical Tests										
moisture	----	E144	0.50	%		80.1	----	74.8	----	----
moisture	----	E144-H	2.0	%		----	82.5	----	79.4	70.4
Metals										
aluminum	7429-90-5	E440	2.0	mg/kg		<2.0	----	<2.0	----	----
aluminum	7429-90-5	E472	5.0	mg/kg		----	27.0	----	<5.0	<5.0
antimony	7440-36-0	E472	0.010	mg/kg		----	<0.010	----	<0.010	<0.010
antimony	7440-36-0	E440	0.010	mg/kg		<0.010	----	<0.010	----	----
arsenic	7440-38-2	E440	0.020	mg/kg		0.111	----	0.077	----	----
arsenic	7440-38-2	E472	0.030	mg/kg		----	0.031	----	0.031	0.032
barium	7440-39-3	E472	0.050	mg/kg		----	1.24	----	1.26	0.866
barium	7440-39-3	E440	0.050	mg/kg		2.20	----	0.905	----	----
beryllium	7440-41-7	E472	0.010	mg/kg		----	<0.010	----	<0.010	<0.010
beryllium	7440-41-7	E440	0.010	mg/kg		<0.010	----	<0.010	----	----
bismuth	7440-69-9	E472	0.010	mg/kg		----	<0.010	----	<0.010	<0.010
bismuth	7440-69-9	E440	0.010	mg/kg		<0.010	----	<0.010	----	----
boron	7440-42-8	E472	1.0	mg/kg		----	<1.0	----	<1.0	<1.0
boron	7440-42-8	E440	1.0	mg/kg		<1.0	----	<1.0	----	----
cadmium	7440-43-9	E440	0.0050	mg/kg		2.23	----	<0.0050	----	----
cadmium	7440-43-9	E472	0.010	mg/kg		----	<0.010	----	<0.010	<0.010
calcium	7440-70-2	E472	20	mg/kg		----	1500	----	828	1540
calcium	7440-70-2	E440	20	mg/kg		1300	----	394	----	----
cesium	7440-46-2	E472	0.0050	mg/kg		----	0.0976	----	0.0614	0.0157
cesium	7440-46-2	E440	0.0050	mg/kg		0.100	----	0.0707	----	----
chromium	7440-47-3	E440	0.050	mg/kg		0.063	----	0.065	----	----
chromium	7440-47-3	E472	0.20	mg/kg		----	<0.20	----	<0.20	<0.20
cobalt	7440-48-4	E472	0.020	mg/kg		----	0.032	----	<0.020	0.078
cobalt	7440-48-4	E440	0.020	mg/kg		0.214	----	<0.020	----	----
copper	7440-50-8	E440	0.10	mg/kg		5.15	----	4.15	----	----
copper	7440-50-8	E472	0.20	mg/kg		----	1.87	----	1.94	6.01
iron	7439-89-6	E440	3.0	mg/kg		523	----	45.4	----	----

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BOL_LSU-Ki-8_2022-05	POL_RB-M-2X_2022-05	POL_LSU-M-8X_2022-05	BOL_RB-M-7X_2022-05	POL_RB-O-4X_2022-05
					Client sampling date / time	31-May-2022	29-May-2022	28-May-2022	30-May-2022	29-May-2022
						VA22B2821-056	VA22B2821-057	VA22B2821-058	VA22B2821-059	VA22B2821-060
						Result	Result	Result	Result	Result
Metals										
iron	7439-89-6	E472	5.0	mg/kg		----	87.2	----	26.8	90.6
lead	7439-92-1	E440	0.020	mg/kg		<0.020	----	<0.020	----	----
lead	7439-92-1	E472	0.050	mg/kg		----	<0.050	----	<0.050	<0.050
lithium	7439-93-2	E472	0.50	mg/kg		----	<0.50	----	<0.50	<0.50
lithium	7439-93-2	E440	0.50	mg/kg		<0.50	----	<0.50	----	----
magnesium	7439-95-4	E472	2.0	mg/kg		----	1190	----	1170	1400
magnesium	7439-95-4	E440	2.0	mg/kg		698	----	1080	----	----
manganese	7439-96-5	E472	0.050	mg/kg		----	1.80	----	0.843	4.02
manganese	7439-96-5	E440	0.050	mg/kg		12.0	----	0.890	----	----
mercury	7439-97-6	E511	0.0050	mg/kg		----	0.842	----	0.320	0.0252
mercury	7439-97-6	E510	0.0050	mg/kg		0.217	----	0.199	----	----
mercury	7439-97-6	E511A	0.0010	mg/kg wwt		----	0.147	----	0.0659	0.0072
mercury	7439-97-6	E510A	0.0010	mg/kg wwt		0.0431	----	0.0502	----	----
molybdenum	7439-98-7	E440	0.020	mg/kg		0.751	----	0.029	----	----
molybdenum	7439-98-7	E472	0.040	mg/kg		----	<0.040	----	<0.040	0.062
nickel	7440-02-0	E472	0.20	mg/kg		----	<0.20	----	<0.20	<0.20
nickel	7440-02-0	E440	0.20	mg/kg		0.42	----	0.34	----	----
phosphorus	7723-14-0	E472	10	mg/kg		----	15000	----	14400	12100
phosphorus	7723-14-0	E440	10	mg/kg		13900	----	10100	----	----
potassium	7440-09-7	E472	20	mg/kg		----	25100	----	23600	8120
potassium	7440-09-7	E440	20	mg/kg		14200	----	16200	----	----
rubidium	7440-17-7	E472	0.050	mg/kg		----	17.1	----	11.9	3.39
rubidium	7440-17-7	E440	0.050	mg/kg		9.39	----	12.3	----	----
selenium	7782-49-2	E440	0.050	mg/kg		5.87	----	7.44	----	----
selenium	7782-49-2	E472	0.10	mg/kg		----	6.60	----	2.20	6.61
silver	7440-22-4	E472.Ag	0.0050	mg/kg		----	<0.0050	----	<0.0050	<0.0050
silver	7440-22-4	E440.Ag	0.0050	mg/kg		<0.0050	----	<0.0050	----	----
sodium	7440-23-5	E472	20	mg/kg		----	1080	----	1820	3130
sodium	7440-23-5	E440	20	mg/kg		7900	----	1790	----	----
strontium	7440-24-6	E440	0.050	mg/kg		2.83	----	0.459	----	----

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BOL_LSU-Ki-8_2022-05	POL_RB-M-2X_2022-05	POL_LSU-M-8X_2022-05	BOL_RB-M-7X_2022-05	POL_RB-O-4X_2022-05
					Client sampling date / time	31-May-2022	29-May-2022	28-May-2022	30-May-2022	29-May-2022
						VA22B2821-056	VA22B2821-057	VA22B2821-058	VA22B2821-059	VA22B2821-060
						Result	Result	Result	Result	Result
Metals										
strontium	7440-24-6	E472	0.10	mg/kg		----	2.04	----	1.30	3.81
tellurium	13494-80-9	E472	0.020	mg/kg		----	<0.020	----	<0.020	<0.020
tellurium	13494-80-9	E440	0.020	mg/kg		0.025	----	<0.020	----	----
thallium	7440-28-0	E472	0.0020	mg/kg		----	0.0032	----	0.0142	<0.0020
thallium	7440-28-0	E440	0.0020	mg/kg		0.0092	----	<0.0020	----	----
tin	7440-31-5	E472	0.10	mg/kg		----	0.78	----	0.89	0.20
tin	7440-31-5	E440	0.10	mg/kg		0.53	----	0.50	----	----
titanium	7440-32-6	E440.Ti	0.25	mg/kg		<0.25	----	<0.25	----	----
titanium	7440-32-6	E472.Ti	0.50	mg/kg		----	4.59	----	<0.50	<0.50
uranium	7440-61-1	E472	0.0020	mg/kg		----	<0.0020	----	<0.0020	<0.0020
uranium	7440-61-1	E440	0.0020	mg/kg		0.0091	----	<0.0020	----	----
vanadium	7440-62-2	E472	0.10	mg/kg		----	0.23	----	<0.10	<0.10
vanadium	7440-62-2	E440	0.10	mg/kg		0.48	----	<0.10	----	----
zinc	7440-66-6	E440	0.50	mg/kg		87.8	----	42.7	----	----
zinc	7440-66-6	E472	1.0	mg/kg		----	18.0	----	17.6	98.4
zirconium	7440-67-7	E472	0.20	mg/kg		----	0.29	----	<0.20	<0.20
zirconium	7440-67-7	E440	0.20	mg/kg		<0.20	----	<0.20	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	POL_RB-O-7X_ 2022-05	BOL_RB-O-8X_ 2022-05	POL_LSU-Li-3X _2022-05	POL_RB-Li-6X_ 2022-05	BOL_LSU-Li-2X _2022-05
					Client sampling date / time	29-May-2022	30-May-2022	28-May-2022	29-May-2022	30-May-2022
						VA22B2821-061	VA22B2821-062	VA22B2821-063	VA22B2821-064	VA22B2821-065
						Result	Result	Result	Result	Result
Physical Tests										
moisture	----	E144	0.50	%		61.8	68.5	78.0	----	----
moisture	----	E144-H	2.0	%		----	----	----	77.0	80.6
Metals										
aluminum	7429-90-5	E440	2.0	mg/kg		<2.0	<2.0	3.1	----	----
aluminum	7429-90-5	E472	5.0	mg/kg		----	----	----	11.9	<5.0
antimony	7440-36-0	E472	0.010	mg/kg		----	----	----	<0.010	0.022
antimony	7440-36-0	E440	0.010	mg/kg		<0.010	<0.010	0.032	----	----
arsenic	7440-38-2	E440	0.020	mg/kg		0.040	0.021	0.278	----	----
arsenic	7440-38-2	E472	0.030	mg/kg		----	----	----	0.122	0.153
barium	7440-39-3	E472	0.050	mg/kg		----	----	----	1.12	0.708
barium	7440-39-3	E440	0.050	mg/kg		0.148	1.04	0.663	----	----
beryllium	7440-41-7	E472	0.010	mg/kg		----	----	----	<0.010	<0.010
beryllium	7440-41-7	E440	0.010	mg/kg		<0.010	<0.010	<0.010	----	----
bismuth	7440-69-9	E472	0.010	mg/kg		----	----	----	<0.010	<0.010
bismuth	7440-69-9	E440	0.010	mg/kg		<0.010	<0.010	<0.010	----	----
boron	7440-42-8	E472	1.0	mg/kg		----	----	----	<1.0	<1.0
boron	7440-42-8	E440	1.0	mg/kg		<1.0	<1.0	<1.0	----	----
cadmium	7440-43-9	E440	0.0050	mg/kg		<0.0050	<0.0050	0.627	----	----
cadmium	7440-43-9	E472	0.010	mg/kg		----	----	----	0.218	0.459
calcium	7440-70-2	E472	20	mg/kg		----	----	----	310	293
calcium	7440-70-2	E440	20	mg/kg		1190	1410	243	----	----
cesium	7440-46-2	E472	0.0050	mg/kg		----	----	----	0.0453	0.0201
cesium	7440-46-2	E440	0.0050	mg/kg		0.0195	0.0168	0.0350	----	----
chromium	7440-47-3	E440	0.050	mg/kg		<0.050	<0.050	0.105	----	----
chromium	7440-47-3	E472	0.20	mg/kg		----	----	----	<0.20	<0.20
cobalt	7440-48-4	E472	0.020	mg/kg		----	----	----	0.108	0.112
cobalt	7440-48-4	E440	0.020	mg/kg		0.096	0.078	0.128	----	----
copper	7440-50-8	E440	0.10	mg/kg		8.90	10.5	67.1	----	----
copper	7440-50-8	E472	0.20	mg/kg		----	----	----	134	26.0
iron	7439-89-6	E440	3.0	mg/kg		48.5	67.4	256	----	----

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	POL_RB-O-7X_ 2022-05	BOL_RB-O-8X_ 2022-05	POL_LSU-Li-3X _2022-05	POL_RB-Li-6X_ 2022-05	BOL_LSU-Li-2X _2022-05
					Client sampling date / time	29-May-2022	30-May-2022	28-May-2022	29-May-2022	30-May-2022
						VA22B2821-061	VA22B2821-062	VA22B2821-063	VA22B2821-064	VA22B2821-065
						Result	Result	Result	Result	Result
Metals										
iron	7439-89-6	E472	5.0	mg/kg		----	----	----	2060	449
lead	7439-92-1	E440	0.020	mg/kg		<0.020	<0.020	<0.020	----	----
lead	7439-92-1	E472	0.050	mg/kg		----	----	----	<0.050	<0.050
lithium	7439-93-2	E472	0.50	mg/kg		----	----	----	<0.50	<0.50
lithium	7439-93-2	E440	0.50	mg/kg		<0.50	<0.50	<0.50	----	----
magnesium	7439-95-4	E472	2.0	mg/kg		----	----	----	562	959
magnesium	7439-95-4	E440	2.0	mg/kg		1580	1610	1300	----	----
manganese	7439-96-5	E472	0.050	mg/kg		----	----	----	13.7	12.7
manganese	7439-96-5	E440	0.050	mg/kg		3.00	12.0	11.7	----	----
mercury	7439-97-6	E511	0.0050	mg/kg		----	----	----	1.22	0.186
mercury	7439-97-6	E510	0.0050	mg/kg		0.0056	0.0209	0.104	----	----
mercury	7439-97-6	E511A	0.0010	mg/kg wwt		----	----	----	0.280	0.0362
mercury	7439-97-6	E510A	0.0010	mg/kg wwt		0.0021	0.0066	0.0230	----	----
molybdenum	7439-98-7	E440	0.020	mg/kg		0.056	0.047	2.10	----	----
molybdenum	7439-98-7	E472	0.040	mg/kg		----	----	----	1.35	1.08
nickel	7440-02-0	E472	0.20	mg/kg		----	----	----	<0.20	<0.20
nickel	7440-02-0	E440	0.20	mg/kg		<0.20	<0.20	<0.20	----	----
phosphorus	7723-14-0	E472	10	mg/kg		----	----	----	13500	15100
phosphorus	7723-14-0	E440	10	mg/kg		12100	12100	21400	----	----
potassium	7440-09-7	E472	20	mg/kg		----	----	----	10300	10600
potassium	7440-09-7	E440	20	mg/kg		7280	7920	17100	----	----
rubidium	7440-17-7	E472	0.050	mg/kg		----	----	----	7.39	6.21
rubidium	7440-17-7	E440	0.050	mg/kg		4.34	5.11	15.6	----	----
selenium	7782-49-2	E440	0.050	mg/kg		7.26	6.22	15.4	----	----
selenium	7782-49-2	E472	0.10	mg/kg		----	----	----	36.2	6.37
silver	7440-22-4	E472.Ag	0.0050	mg/kg		----	----	----	0.475	0.0316
silver	7440-22-4	E440.Ag	0.0050	mg/kg		0.0050	0.0072	0.0302	----	----
sodium	7440-23-5	E472	20	mg/kg		----	----	----	4170	6690
sodium	7440-23-5	E440	20	mg/kg		2090	3860	5050	----	----
strontium	7440-24-6	E440	0.050	mg/kg		3.28	4.07	0.373	----	----

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	POL_RB-O-7X_ 2022-05	BOL_RB-O-8X_ 2022-05	POL_LSU-Li-3X _2022-05	POL_RB-Li-6X_ 2022-05	BOL_LSU-Li-2X _2022-05
					Client sampling date / time	29-May-2022	30-May-2022	28-May-2022	29-May-2022	30-May-2022
						VA22B2821-061	VA22B2821-062	VA22B2821-063	VA22B2821-064	VA22B2821-065
						Result	Result	Result	Result	Result
Metals										
strontium	7440-24-6	E472	0.10	mg/kg		----	----	----	0.53	0.64
tellurium	13494-80-9	E472	0.020	mg/kg		----	----	----	<0.020	<0.020
tellurium	13494-80-9	E440	0.020	mg/kg		<0.020	<0.020	<0.020	----	----
thallium	7440-28-0	E472	0.0020	mg/kg		----	----	----	0.0342	<0.0020
thallium	7440-28-0	E440	0.0020	mg/kg		<0.0020	<0.0020	<0.0020	----	----
tin	7440-31-5	E472	0.10	mg/kg		----	----	----	0.53	0.50
tin	7440-31-5	E440	0.10	mg/kg		<0.10	0.14	0.62	----	----
titanium	7440-32-6	E440.Ti	0.25	mg/kg		<0.25	<0.25	<0.25	----	----
titanium	7440-32-6	E472.Ti	0.50	mg/kg		----	----	----	<0.50	<0.50
uranium	7440-61-1	E472	0.0020	mg/kg		----	----	----	0.0162	0.0048
uranium	7440-61-1	E440	0.0020	mg/kg		<0.0020	<0.0020	<0.0020	----	----
vanadium	7440-62-2	E472	0.10	mg/kg		----	----	----	0.98	0.31
vanadium	7440-62-2	E440	0.10	mg/kg		<0.10	<0.10	0.93	----	----
zinc	7440-66-6	E440	0.50	mg/kg		64.1	106	138	----	----
zinc	7440-66-6	E472	1.0	mg/kg		----	----	----	186	77.5
zirconium	7440-67-7	E472	0.20	mg/kg		----	----	----	<0.20	<0.20
zirconium	7440-67-7	E440	0.20	mg/kg		<0.20	<0.20	<0.20	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	POL_RB-Ki-1X_2022-05	POL_LSU-Ki-3X_2022-05	BOL_LSU-Ki-6X_2022-05	----	----
					Client sampling date / time	28-May-2022	28-May-2022	31-May-2022	----	----
						VA22B2821-066	VA22B2821-067	VA22B2821-068	--------	--------
						Result	Result	Result	----	----
Physical Tests										
moisture	----	E144-H	2.0	%		75.4	78.7	79.0	----	----
Metals										
aluminum	7429-90-5	E472	5.0	mg/kg		10.0	<5.0	<5.0	----	----
antimony	7440-36-0	E472	0.010	mg/kg		<0.010	<0.010	<0.010	----	----
arsenic	7440-38-2	E472	0.030	mg/kg		0.421	0.115	0.091	----	----
barium	7440-39-3	E472	0.050	mg/kg		0.113	0.606	2.28	----	----
beryllium	7440-41-7	E472	0.010	mg/kg		<0.010	<0.010	<0.010	----	----
bismuth	7440-69-9	E472	0.010	mg/kg		<0.010	<0.010	<0.010	----	----
boron	7440-42-8	E472	1.0	mg/kg		<1.0	<1.0	<1.0	----	----
cadmium	7440-43-9	E472	0.010	mg/kg		0.510	3.42	1.70	----	----
calcium	7440-70-2	E472	20	mg/kg		411	491	1040	----	----
cesium	7440-46-2	E472	0.0050	mg/kg		0.0318	0.0382	0.0483	----	----
chromium	7440-47-3	E472	0.20	mg/kg		<0.20	0.23	<0.20	----	----
cobalt	7440-48-4	E472	0.020	mg/kg		1.78	0.398	0.423	----	----
copper	7440-50-8	E472	0.20	mg/kg		6.64	6.00	4.30	----	----
iron	7439-89-6	E472	5.0	mg/kg		1100	385	513	----	----
lead	7439-92-1	E472	0.050	mg/kg		0.075	<0.050	<0.050	----	----
lithium	7439-93-2	E472	0.50	mg/kg		<0.50	<0.50	<0.50	----	----
magnesium	7439-95-4	E472	2.0	mg/kg		558	654	646	----	----
manganese	7439-96-5	E472	0.050	mg/kg		2.70	4.61	14.3	----	----
mercury	7439-97-6	E511	0.0050	mg/kg		0.418	0.148	0.282	----	----
mercury	7439-97-6	E511A	0.0010	mg/kg wwt		0.103	0.0315	0.0592	----	----
molybdenum	7439-98-7	E472	0.040	mg/kg		0.347	1.30	0.566	----	----
nickel	7440-02-0	E472	0.20	mg/kg		0.34	0.55	0.52	----	----
phosphorus	7723-14-0	E472	10	mg/kg		10800	14200	12800	----	----
potassium	7440-09-7	E472	20	mg/kg		9990	12400	13100	----	----
rubidium	7440-17-7	E472	0.050	mg/kg		5.59	11.7	6.39	----	----
selenium	7782-49-2	E472	0.10	mg/kg		11.5	11.7	5.93	----	----
silver	7440-22-4	E472.Ag	0.0050	mg/kg		<0.0050	<0.0050	<0.0050	----	----
sodium	7440-23-5	E472	20	mg/kg		6210	6380	6110	----	----

Analytical Results

Sub-Matrix: Tissue (Matrix: Biota)					Client sample ID	POL_RB-Ki-1X_ 2022-05	POL_LSU-Ki-3X _2022-05	BOL_LSU-Ki-6X _2022-05	----	----
					Client sampling date / time	28-May-2022	28-May-2022	31-May-2022	----	----
Analyte	CAS Number	Method	LOR	Unit		VA22B2821-066	VA22B2821-067	VA22B2821-068	--------	--------
						Result	Result	Result	----	----
Metals										
strontium	7440-24-6	E472	0.10	mg/kg		1.11	0.71	2.16	----	----
tellurium	13494-80-9	E472	0.020	mg/kg		<0.020	0.042	0.021	----	----
thallium	7440-28-0	E472	0.0020	mg/kg		0.0694	<0.0020	0.0138	----	----
tin	7440-31-5	E472	0.10	mg/kg		<0.10	<0.10	0.74	----	----
titanium	7440-32-6	E472.Ti	0.50	mg/kg		0.68	<0.50	<0.50	----	----
uranium	7440-61-1	E472	0.0020	mg/kg		0.0041	0.0049	0.0153	----	----
vanadium	7440-62-2	E472	0.10	mg/kg		0.47	3.53	0.86	----	----
zinc	7440-66-6	E472	1.0	mg/kg		186	172	107	----	----
zirconium	7440-67-7	E472	0.20	mg/kg		<0.20	<0.20	0.20	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

ALS Canada Ltd.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA22B2821**	Page	: 1 of 53
Amendment	: **1**		
Client	: **Mount Polley Mining Corporation**	Laboratory	: Vancouver - Environmental
Contact	: Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: ----	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 08-Jun-2022 10:30
PO	: 5590008044 Q2 2022	Issue Date	: 05-Dec-2022 14:10
C-O-C number	: ----		
Sampler	: LBO		
Site	: ----		
Quote number	: VA22-MPMC100-002		
No. of samples received	: 68		
No. of samples analysed	: 68		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- Duplicate outliers occur - please see following pages for full details.
- Laboratory Control Sample (LCS) outliers occur - please see following pages for full details.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- Reference Material (RM) Sample outliers occur - please see the following pages for full details.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- Quality Control Sample Frequency Outliers occur - please see following pages for full details.

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **Biota**

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment
Duplicate (DUP) RPDs								
Metals	VA22B2821-013	POL_LSU-Li-5_2022-05	chromium	7440-47-3	E472	0.41 % DUP-H, J	Diff <2x LOR	Low Level DUP DQO exceeded (difference > 2 LOR).
Metals	VA22B2821-042	BOL_LSU-Li-2_2022-05	chromium	7440-47-3	E472	0.46 % DUP-H, J	Diff <2x LOR	Low Level DUP DQO exceeded (difference > 2 LOR).

Result Qualifiers

Qualifier	Description
DUP-H	*Duplicate results outside ALS DQO, due to sample heterogeneity.*
J	*Duplicate results and limits are expressed in terms of absolute difference.*

Laboratory Control Sample (LCS) Recoveries								
Metals	QC-MRG8-562335002	----	boron	7440-42-8	E472	72.6 % MES	80.0-120%	Recovery less than lower control limit
Metals	QC-MRG8-562335002	----	lithium	7439-93-2	E472	76.0 % MES	80.0-120%	Recovery less than lower control limit

Result Qualifiers

Qualifier	Description
MES	*Data Quality Objective was marginally exceeded (by < 10% absolute) for < 10% of analytes in a Multi-Element Scan / Multi-Parameter Scan (considered acceptable as per OMOE & CCME).*

Reference Material (RM) Sample								
Metals	QC-MRG8-562335003	----	lead	7439-92-1	E472	69.9 % MES	70.0-130%	Recovery less than lower control limit

Result Qualifiers

Qualifier	Description
MES	*Data Quality Objective was marginally exceeded (by < 10% absolute) for < 10% of analytes in a Multi-Element Scan / Multi-Parameter Scan (considered acceptable as per OMOE & CCME).*

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag BOL_LSU-M-7_2022-05	E511	31-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	178 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag BOL_LSU-Ki-6_2022-05	E511	31-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	50 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag BOL_LSU-Ki-7_2022-05	E511	31-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	50 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag BOL_LSU-Ki-1_2022-05	E511	30-May-2022	19-Jul-2022	----	----		20-Jul-2022	365 days	51 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag BOL_LSU-Ki-2_2022-05	E511	30-May-2022	19-Jul-2022	----	----		20-Jul-2022	365 days	51 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag BOL_LSU-Ki-3_2022-05	E511	30-May-2022	19-Jul-2022	----	----		20-Jul-2022	365 days	51 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag BOL_LSU-Ki-4_2022-05	E511	30-May-2022	19-Jul-2022	----	----		20-Jul-2022	365 days	51 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag BOL_LSU-Ki-6X_2022-05	E511	31-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	51 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag BOL_LSU-Li-2_2022-05	E511	30-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	51 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag BOL_LSU-M-3_2022-05	E511	30-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	51 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag BOL_LSU-Li-2X_2022-05	E511	30-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	52 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag BOL_RB-M-7X_2022-05	E511	30-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	52 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag POL_RB-M-2X_2022-05	E511	29-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	52 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag POL_RB-O-4X_2022-05	E511	29-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	52 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag POL_LSU-Ki-1_2022-05	E511	28-May-2022	19-Jul-2022	----	----		20-Jul-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag POL_LSU-Ki-2_2022-05	E511	28-May-2022	19-Jul-2022	----	----		20-Jul-2022	365 days	53 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag POL_LSU-Ki-3_2022-05	E511	28-May-2022	19-Jul-2022	----	----		20-Jul-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag POL_LSU-Ki-4_2022-05	E511	28-May-2022	19-Jul-2022	----	----		20-Jul-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag POL_LSU-Ki-5_2022-05	E511	28-May-2022	19-Jul-2022	----	----		20-Jul-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag POL_LSU-Ki-6_2022-05	E511	28-May-2022	19-Jul-2022	----	----		20-Jul-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag POL_LSU-Ki-7_2022-05	E511	28-May-2022	19-Jul-2022	----	----		20-Jul-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag POL_LSU-Ki-8_2022-05	E511	28-May-2022	19-Jul-2022	----	----		20-Jul-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag POL_LSU-Li-5_2022-05	E511	28-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag POL_LSU-Li-7_2022-05	E511	28-May-2022	19-Jul-2022	----	----		20-Jul-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag POL_RB-Li-6X_2022-05	E511	29-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	53 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag POL_LSU-Ki-3X_2022-05	E511	28-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	54 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag POL_RB-Ki-1X_2022-05	E511	28-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	54 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag BOL_LSU-Ki-5_2022-05	E510	31-May-2022	14-Jul-2022	----	----		20-Jul-2022	365 days	50 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag BOL_LSU-Ki-8_2022-05	E510	31-May-2022	14-Jul-2022	----	----		20-Jul-2022	365 days	50 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag BOL_LSU-Li-5_2022-05	E510	31-May-2022	14-Jul-2022	----	----		20-Jul-2022	365 days	50 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag BOL_LSU-Li-6_2022-05	E510	31-May-2022	14-Jul-2022	----	----		20-Jul-2022	365 days	50 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag BOL_LSU-Li-7_2022-05	E510	31-May-2022	14-Jul-2022	----	----		20-Jul-2022	365 days	50 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag BOL_LSU-Li-8_2022-05	E510	31-May-2022	14-Jul-2022	----	----		20-Jul-2022	365 days	50 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag BOL_LSU-M-5_2022-05	E510	31-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	50 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag BOL_LSU-M-6_2022-05	E510	31-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	50 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag BOL_LSU-M-8_2022-05	E510	31-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	50 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag BOL_LSU-O-5_2022-05	E510	31-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	50 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag BOL_LSU-O-6_2022-05	E510	31-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	50 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag BOL_LSU-O-7_2022-05	E510	31-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	50 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag BOL_LSU-O-8_2022-05	E510	31-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	50 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag BOL_LSU-Li-1_2022-05	E510	30-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	51 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag BOL_LSU-Li-3_2022-05	E510	30-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	51 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag BOL_LSU-Li-4_2022-05	E510	30-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	51 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag BOL_LSU-M-1_2022-05	E510	30-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	51 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag BOL_LSU-M-2_2022-05	E510	30-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	51 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag BOL_LSU-M-4_2022-05	E510	30-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	51 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag BOL_LSU-O-1_2022-05	E510	30-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	51 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag BOL_LSU-O-2_2022-05	E510	30-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	51 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag BOL_LSU-O-3_2022-05	E510	30-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	51 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag BOL_LSU-O-4_2022-05	E510	30-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	51 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag BOL_RB-O-8X_2022-05	E510	30-May-2022	14-Jul-2022	----	----		20-Jul-2022	365 days	51 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag POL_RB-O-7X_2022-05	E510	29-May-2022	14-Jul-2022	----	----		20-Jul-2022	365 days	52 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag POL_LSU-Li-1_2022-05	E510	28-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag POL_LSU-Li-2_2022-05	E510	28-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag POL_LSU-Li-3_2022-05	E510	28-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag POL_LSU-Li-4_2022-05	E510	28-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag POL_LSU-Li-6_2022-05	E510	28-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag POL_LSU-Li-8_2022-05	E510	28-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag POL_LSU-O-1_2022-05	E510	28-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag POL_LSU-O-2_2022-05	E510	28-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag POL_LSU-O-3_2022-05	E510	28-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	53 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag POL_LSU-O-4_2022-05	E510	28-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag POL_LSU-O-5_2022-05	E510	28-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag POL_LSU-O-6_2022-05	E510	28-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag POL_LSU-O-7_2022-05	E510	28-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag POL_LSU-O-8_2022-05	E510	28-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag POL_LSU-Li-3X_2022-05	E510	28-May-2022	14-Jul-2022	----	----		20-Jul-2022	365 days	54 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag POL_LSU-M-8X_2022-05	E510	28-May-2022	14-Jul-2022	----	----		20-Jul-2022	365 days	54 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Micro)										
LDPE bag BOL_LSU-Ki-6_2022-05	E511A	31-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	50 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Micro)										
LDPE bag BOL_LSU-Ki-7_2022-05	E511A	31-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	50 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Biota by CVAAS (WET units, Micro)										
LDPE bag BOL_LSU-M-7_2022-05	E511A	31-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	50 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Micro)										
LDPE bag BOL_LSU-Ki-1_2022-05	E511A	30-May-2022	19-Jul-2022	----	----		20-Jul-2022	365 days	51 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Micro)										
LDPE bag BOL_LSU-Ki-2_2022-05	E511A	30-May-2022	19-Jul-2022	----	----		20-Jul-2022	365 days	51 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Micro)										
LDPE bag BOL_LSU-Ki-3_2022-05	E511A	30-May-2022	19-Jul-2022	----	----		20-Jul-2022	365 days	51 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Micro)										
LDPE bag BOL_LSU-Ki-4_2022-05	E511A	30-May-2022	19-Jul-2022	----	----		20-Jul-2022	365 days	51 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Micro)										
LDPE bag BOL_LSU-Ki-6X_2022-05	E511A	31-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	51 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Micro)										
LDPE bag BOL_LSU-Li-2_2022-05	E511A	30-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	51 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Micro)										
LDPE bag BOL_LSU-M-3_2022-05	E511A	30-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	51 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Micro)										
LDPE bag BOL_LSU-Li-2X_2022-05	E511A	30-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	52 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Biota by CVAAS (WET units, Micro)										
LDPE bag BOL_RB-M-7X_2022-05	E511A	30-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	52 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Micro)										
LDPE bag POL_RB-M-2X_2022-05	E511A	29-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	52 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Micro)										
LDPE bag POL_RB-O-4X_2022-05	E511A	29-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	52 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Micro)										
LDPE bag POL_LSU-Ki-1_2022-05	E511A	28-May-2022	19-Jul-2022	----	----		20-Jul-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Micro)										
LDPE bag POL_LSU-Ki-2_2022-05	E511A	28-May-2022	19-Jul-2022	----	----		20-Jul-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Micro)										
LDPE bag POL_LSU-Ki-3_2022-05	E511A	28-May-2022	19-Jul-2022	----	----		20-Jul-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Micro)										
LDPE bag POL_LSU-Ki-4_2022-05	E511A	28-May-2022	19-Jul-2022	----	----		20-Jul-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Micro)										
LDPE bag POL_LSU-Ki-5_2022-05	E511A	28-May-2022	19-Jul-2022	----	----		20-Jul-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Micro)										
LDPE bag POL_LSU-Ki-6_2022-05	E511A	28-May-2022	19-Jul-2022	----	----		20-Jul-2022	365 days	53 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Biota by CVAAS (WET units, Micro)										
LDPE bag POL_LSU-Ki-7_2022-05	E511A	28-May-2022	19-Jul-2022	----	----		20-Jul-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Micro)										
LDPE bag POL_LSU-Ki-8_2022-05	E511A	28-May-2022	19-Jul-2022	----	----		20-Jul-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Micro)										
LDPE bag POL_LSU-Li-5_2022-05	E511A	28-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Micro)										
LDPE bag POL_LSU-Li-7_2022-05	E511A	28-May-2022	19-Jul-2022	----	----		20-Jul-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Micro)										
LDPE bag POL_RB-Li-6X_2022-05	E511A	29-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Micro)										
LDPE bag POL_LSU-Ki-3X_2022-05	E511A	28-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	54 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Micro)										
LDPE bag POL_RB-Ki-1X_2022-05	E511A	28-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	54 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag BOL_LSU-Ki-5_2022-05	E510A	31-May-2022	14-Jul-2022	----	----		20-Jul-2022	365 days	50 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag BOL_LSU-Ki-8_2022-05	E510A	31-May-2022	14-Jul-2022	----	----		20-Jul-2022	365 days	50 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag BOL_LSU-Li-5_2022-05	E510A	31-May-2022	14-Jul-2022	----	----		20-Jul-2022	365 days	50 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag BOL_LSU-Li-6_2022-05	E510A	31-May-2022	14-Jul-2022	----	----		20-Jul-2022	365 days	50 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag BOL_LSU-Li-7_2022-05	E510A	31-May-2022	14-Jul-2022	----	----		20-Jul-2022	365 days	50 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag BOL_LSU-Li-8_2022-05	E510A	31-May-2022	14-Jul-2022	----	----		20-Jul-2022	365 days	50 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag BOL_LSU-M-5_2022-05	E510A	31-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	50 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag BOL_LSU-M-6_2022-05	E510A	31-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	50 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag BOL_LSU-M-8_2022-05	E510A	31-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	50 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag BOL_LSU-O-5_2022-05	E510A	31-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	50 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag BOL_LSU-O-6_2022-05	E510A	31-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	50 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag BOL_LSU-O-7_2022-05	E510A	31-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	50 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag BOL_LSU-O-8_2022-05	E510A	31-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	50 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag BOL_LSU-Li-1_2022-05	E510A	30-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	51 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag BOL_LSU-Li-3_2022-05	E510A	30-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	51 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag BOL_LSU-Li-4_2022-05	E510A	30-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	51 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag BOL_LSU-M-1_2022-05	E510A	30-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	51 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag BOL_LSU-M-2_2022-05	E510A	30-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	51 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag BOL_LSU-M-4_2022-05	E510A	30-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	51 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag BOL_LSU-O-1_2022-05	E510A	30-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	51 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag BOL_LSU-O-2_2022-05	E510A	30-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	51 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag BOL_LSU-O-3_2022-05	E510A	30-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	51 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag BOL_LSU-O-4_2022-05	E510A	30-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	51 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag BOL_RB-O-8X_2022-05	E510A	30-May-2022	14-Jul-2022	----	----		20-Jul-2022	365 days	51 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag POL_RB-O-7X_2022-05	E510A	29-May-2022	14-Jul-2022	----	----		20-Jul-2022	365 days	52 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag POL_LSU-Li-1_2022-05	E510A	28-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag POL_LSU-Li-2_2022-05	E510A	28-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag POL_LSU-Li-3_2022-05	E510A	28-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag POL_LSU-Li-4_2022-05	E510A	28-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	53 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag POL_LSU-Li-6_2022-05	E510A	28-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag POL_LSU-Li-8_2022-05	E510A	28-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag POL_LSU-O-1_2022-05	E510A	28-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag POL_LSU-O-2_2022-05	E510A	28-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag POL_LSU-O-3_2022-05	E510A	28-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag POL_LSU-O-4_2022-05	E510A	28-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag POL_LSU-O-5_2022-05	E510A	28-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag POL_LSU-O-6_2022-05	E510A	28-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag POL_LSU-O-7_2022-05	E510A	28-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	53 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag POL_LSU-O-8_2022-05	E510A	28-May-2022	15-Jul-2022	----	----		20-Jul-2022	365 days	53 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag POL_LSU-Li-3X_2022-05	E510A	28-May-2022	14-Jul-2022	----	----		20-Jul-2022	365 days	54 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag POL_LSU-M-8X_2022-05	E510A	28-May-2022	14-Jul-2022	----	----		20-Jul-2022	365 days	54 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag BOL_LSU-Ki-6_2022-05	E472	31-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	45 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag BOL_LSU-Ki-7_2022-05	E472	31-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	45 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag BOL_LSU-M-7_2022-05	E472	31-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	45 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag BOL_LSU-Ki-6X_2022-05	E472	31-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	46 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag BOL_LSU-Li-2_2022-05	E472	30-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	46 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag BOL_LSU-M-3_2022-05	E472	30-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	46 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag BOL_LSU-Li-2X_2022-05	E472	30-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	47 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag BOL_RB-M-7X_2022-05	E472	30-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	47 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_RB-M-2X_2022-05	E472	29-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	47 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_RB-O-4X_2022-05	E472	29-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	47 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_LSU-Li-5_2022-05	E472	28-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	48 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_RB-Li-6X_2022-05	E472	29-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	48 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_LSU-Ki-3X_2022-05	E472	28-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	49 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_RB-Ki-1X_2022-05	E472	28-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	49 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag BOL_LSU-Ki-1_2022-05	E472	30-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	51 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag BOL_LSU-Ki-2_2022-05	E472	30-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	51 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag BOL_LSU-Ki-3_2022-05	E472	30-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	51 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag BOL_LSU-Ki-4_2022-05	E472	30-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	51 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_LSU-Ki-1_2022-05	E472	28-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	53 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_LSU-Ki-2_2022-05	E472	28-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	53 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_LSU-Ki-3_2022-05	E472	28-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	53 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_LSU-Ki-4_2022-05	E472	28-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	53 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_LSU-Ki-5_2022-05	E472	28-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	53 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_LSU-Ki-6_2022-05	E472	28-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	53 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_LSU-Ki-7_2022-05	E472	28-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	53 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_LSU-Ki-8_2022-05	E472	28-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	53 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_LSU-Li-7_2022-05	E472	28-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	53 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_LSU-Ki-5_2022-05	E440	31-May-2022	14-Jul-2022	----	----		14-Jul-2022	730 days	44 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_LSU-Ki-8_2022-05	E440	31-May-2022	14-Jul-2022	----	----		14-Jul-2022	730 days	44 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_LSU-Li-5_2022-05	E440	31-May-2022	14-Jul-2022	----	----		14-Jul-2022	730 days	44 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_LSU-Li-6_2022-05	E440	31-May-2022	14-Jul-2022	----	----		14-Jul-2022	730 days	44 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_LSU-Li-7_2022-05	E440	31-May-2022	14-Jul-2022	----	----		14-Jul-2022	730 days	44 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_LSU-Li-8_2022-05	E440	31-May-2022	14-Jul-2022	----	----		14-Jul-2022	730 days	44 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_LSU-M-5_2022-05	E440	31-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	45 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_LSU-M-6_2022-05	E440	31-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	45 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_LSU-M-8_2022-05	E440	31-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	45 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_LSU-O-5_2022-05	E440	31-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	45 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_LSU-O-6_2022-05	E440	31-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	45 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_LSU-O-7_2022-05	E440	31-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	45 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_LSU-O-8_2022-05	E440	31-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	45 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_RB-O-8X_2022-05	E440	30-May-2022	14-Jul-2022	----	----		14-Jul-2022	730 days	45 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_LSU-Li-1_2022-05	E440	30-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	46 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_LSU-Li-3_2022-05	E440	30-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	46 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_LSU-Li-4_2022-05	E440	30-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	46 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_LSU-M-1_2022-05	E440	30-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	46 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_LSU-M-2_2022-05	E440	30-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	46 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_LSU-M-4_2022-05	E440	30-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	46 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_LSU-O-1_2022-05	E440	30-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	46 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_LSU-O-2_2022-05	E440	30-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	46 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_LSU-O-3_2022-05	E440	30-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	46 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_LSU-O-4_2022-05	E440	30-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	46 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag POL_RB-O-7X_2022-05	E440	29-May-2022	14-Jul-2022	----	----		14-Jul-2022	730 days	46 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag POL_LSU-Li-1_2022-05	E440	28-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	48 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag POL_LSU-Li-2_2022-05	E440	28-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	48 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag POL_LSU-Li-3_2022-05	E440	28-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	48 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag POL_LSU-Li-3X_2022-05	E440	28-May-2022	14-Jul-2022	----	----		14-Jul-2022	730 days	48 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag POL_LSU-Li-4_2022-05	E440	28-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	48 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag POL_LSU-Li-6_2022-05	E440	28-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	48 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag POL_LSU-Li-8_2022-05	E440	28-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	48 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag POL_LSU-M-8X_2022-05	E440	28-May-2022	14-Jul-2022	----	----		14-Jul-2022	730 days	48 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag POL_LSU-O-1_2022-05	E440	28-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	48 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag POL_LSU-O-2_2022-05	E440	28-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	48 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag POL_LSU-O-3_2022-05	E440	28-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	48 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag POL_LSU-O-4_2022-05	E440	28-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	48 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag POL_LSU-O-5_2022-05	E440	28-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	48 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag POL_LSU-O-6_2022-05	E440	28-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	48 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag POL_LSU-O-7_2022-05	E440	28-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	48 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag POL_LSU-O-8_2022-05	E440	28-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	48 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag BOL_LSU-Ki-6_2022-05	E472.Ag	31-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	45 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag BOL_LSU-Ki-7_2022-05	E472.Ag	31-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	45 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag BOL_LSU-M-7_2022-05	E472.Ag	31-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	45 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag BOL_LSU-Ki-6X_2022-05	E472.Ag	31-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	46 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag BOL_LSU-Li-2_2022-05	E472.Ag	30-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	46 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag BOL_LSU-M-3_2022-05	E472.Ag	30-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	46 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag BOL_LSU-Li-2X_2022-05	E472.Ag	30-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	47 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag BOL_RB-M-7X_2022-05	E472.Ag	30-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	47 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_RB-M-2X_2022-05	E472.Ag	29-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	47 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_RB-O-4X_2022-05	E472.Ag	29-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	47 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_LSU-Li-5_2022-05	E472.Ag	28-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	48 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_RB-Li-6X_2022-05	E472.Ag	29-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	48 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_LSU-Ki-3X_2022-05	E472.Ag	28-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	49 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_RB-Ki-1X_2022-05	E472.Ag	28-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	49 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag BOL_LSU-Ki-1_2022-05	E472.Ag	30-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	51 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag BOL_LSU-Ki-2_2022-05	E472.Ag	30-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	51 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag BOL_LSU-Ki-3_2022-05	E472.Ag	30-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	51 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag BOL_LSU-Ki-4_2022-05	E472.Ag	30-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	51 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_LSU-Ki-1_2022-05	E472.Ag	28-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	53 days	✓

Matrix: **Biota**

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Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_LSU-Ki-2_2022-05	E472.Ag	28-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	53 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_LSU-Ki-3_2022-05	E472.Ag	28-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	53 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_LSU-Ki-4_2022-05	E472.Ag	28-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	53 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_LSU-Ki-5_2022-05	E472.Ag	28-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	53 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_LSU-Ki-6_2022-05	E472.Ag	28-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	53 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_LSU-Ki-7_2022-05	E472.Ag	28-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	53 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_LSU-Ki-8_2022-05	E472.Ag	28-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	53 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_LSU-Li-7_2022-05	E472.Ag	28-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	53 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_LSU-Ki-5_2022-05	E440.Ag	31-May-2022	14-Jul-2022	----	----		14-Jul-2022	730 days	44 days	✓

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Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_LSU-Ki-8_2022-05	E440.Ag	31-May-2022	14-Jul-2022	----	----		14-Jul-2022	730 days	44 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_LSU-Li-5_2022-05	E440.Ag	31-May-2022	14-Jul-2022	----	----		14-Jul-2022	730 days	44 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_LSU-Li-6_2022-05	E440.Ag	31-May-2022	14-Jul-2022	----	----		14-Jul-2022	730 days	44 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_LSU-Li-7_2022-05	E440.Ag	31-May-2022	14-Jul-2022	----	----		14-Jul-2022	730 days	44 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_LSU-Li-8_2022-05	E440.Ag	31-May-2022	14-Jul-2022	----	----		14-Jul-2022	730 days	44 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_LSU-M-5_2022-05	E440.Ag	31-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	45 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_LSU-M-6_2022-05	E440.Ag	31-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	45 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_LSU-M-8_2022-05	E440.Ag	31-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	45 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_LSU-O-5_2022-05	E440.Ag	31-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	45 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_LSU-O-6_2022-05	E440.Ag	31-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	45 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_LSU-O-7_2022-05	E440.Ag	31-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	45 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_LSU-O-8_2022-05	E440.Ag	31-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	45 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_RB-O-8X_2022-05	E440.Ag	30-May-2022	14-Jul-2022	----	----		14-Jul-2022	730 days	45 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_LSU-Li-1_2022-05	E440.Ag	30-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	46 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_LSU-Li-3_2022-05	E440.Ag	30-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	46 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_LSU-Li-4_2022-05	E440.Ag	30-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	46 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_LSU-M-1_2022-05	E440.Ag	30-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	46 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_LSU-M-2_2022-05	E440.Ag	30-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	46 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_LSU-M-4_2022-05	E440.Ag	30-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	46 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_LSU-O-1_2022-05	E440.Ag	30-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	46 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_LSU-O-2_2022-05	E440.Ag	30-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	46 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_LSU-O-3_2022-05	E440.Ag	30-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	46 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_LSU-O-4_2022-05	E440.Ag	30-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	46 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag POL_RB-O-7X_2022-05	E440.Ag	29-May-2022	14-Jul-2022	----	----		14-Jul-2022	730 days	46 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag POL_LSU-Li-1_2022-05	E440.Ag	28-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	48 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag POL_LSU-Li-2_2022-05	E440.Ag	28-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	48 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag POL_LSU-Li-3_2022-05	E440.Ag	28-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	48 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag POL_LSU-Li-3X_2022-05	E440.Ag	28-May-2022	14-Jul-2022	----	----		14-Jul-2022	730 days	48 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag POL_LSU-Li-4_2022-05	E440.Ag	28-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	48 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag POL_LSU-Li-6_2022-05	E440.Ag	28-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	48 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag POL_LSU-Li-8_2022-05	E440.Ag	28-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	48 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag POL_LSU-M-8X_2022-05	E440.Ag	28-May-2022	14-Jul-2022	----	----		14-Jul-2022	730 days	48 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag POL_LSU-O-1_2022-05	E440.Ag	28-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	48 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag POL_LSU-O-2_2022-05	E440.Ag	28-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	48 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag POL_LSU-O-3_2022-05	E440.Ag	28-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	48 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag POL_LSU-O-4_2022-05	E440.Ag	28-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	48 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag POL_LSU-O-5_2022-05	E440.Ag	28-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	48 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag POL_LSU-O-6_2022-05	E440.Ag	28-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	48 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag POL_LSU-O-7_2022-05	E440.Ag	28-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	48 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag POL_LSU-O-8_2022-05	E440.Ag	28-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	48 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag BOL_LSU-Ki-6_2022-05	E472.Ti	31-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	45 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag BOL_LSU-Ki-7_2022-05	E472.Ti	31-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	45 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag BOL_LSU-M-7_2022-05	E472.Ti	31-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	45 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag BOL_LSU-Ki-6X_2022-05	E472.Ti	31-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	46 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag BOL_LSU-Li-2_2022-05	E472.Ti	30-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	46 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag BOL_LSU-M-3_2022-05	E472.Ti	30-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	46 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag BOL_LSU-Li-2X_2022-05	E472.Ti	30-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	47 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag BOL_RB-M-7X_2022-05	E472.Ti	30-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	47 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_RB-M-2X_2022-05	E472.Ti	29-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	47 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_RB-O-4X_2022-05	E472.Ti	29-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	47 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_LSU-Li-5_2022-05	E472.Ti	28-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	48 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_RB-Li-6X_2022-05	E472.Ti	29-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	48 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_LSU-Ki-3X_2022-05	E472.Ti	28-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	49 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_RB-Ki-1X_2022-05	E472.Ti	28-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	49 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag BOL_LSU-Ki-1_2022-05	E472.Ti	30-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	51 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag BOL_LSU-Ki-2_2022-05	E472.Ti	30-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	51 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag BOL_LSU-Ki-3_2022-05	E472.Ti	30-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	51 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag BOL_LSU-Ki-4_2022-05	E472.Ti	30-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	51 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_LSU-Ki-1_2022-05	E472.Ti	28-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	53 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_LSU-Ki-2_2022-05	E472.Ti	28-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	53 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_LSU-Ki-3_2022-05	E472.Ti	28-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	53 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_LSU-Ki-4_2022-05	E472.Ti	28-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	53 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_LSU-Ki-5_2022-05	E472.Ti	28-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	53 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_LSU-Ki-6_2022-05	E472.Ti	28-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	53 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_LSU-Ki-7_2022-05	E472.Ti	28-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	53 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_LSU-Ki-8_2022-05	E472.Ti	28-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	53 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag POL_LSU-Li-7_2022-05	E472.Ti	28-May-2022	19-Jul-2022	----	----		20-Jul-2022	730 days	53 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_LSU-Ki-5_2022-05	E440.Ti	31-May-2022	14-Jul-2022	----	----		14-Jul-2022	730 days	44 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_LSU-Ki-8_2022-05	E440.Ti	31-May-2022	14-Jul-2022	----	----		14-Jul-2022	730 days	44 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_LSU-Li-5_2022-05	E440.Ti	31-May-2022	14-Jul-2022	----	----		14-Jul-2022	730 days	44 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_LSU-Li-6_2022-05	E440.Ti	31-May-2022	14-Jul-2022	----	----		14-Jul-2022	730 days	44 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_LSU-Li-7_2022-05	E440.Ti	31-May-2022	14-Jul-2022	----	----		14-Jul-2022	730 days	44 days	✓

Matrix: **Biota**

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Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_LSU-Li-8_2022-05	E440.Ti	31-May-2022	14-Jul-2022	----	----		14-Jul-2022	730 days	44 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_LSU-M-5_2022-05	E440.Ti	31-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	45 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_LSU-M-6_2022-05	E440.Ti	31-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	45 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_LSU-M-8_2022-05	E440.Ti	31-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	45 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_LSU-O-5_2022-05	E440.Ti	31-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	45 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_LSU-O-6_2022-05	E440.Ti	31-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	45 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_LSU-O-7_2022-05	E440.Ti	31-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	45 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_LSU-O-8_2022-05	E440.Ti	31-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	45 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_RB-O-8X_2022-05	E440.Ti	30-May-2022	14-Jul-2022	----	----		14-Jul-2022	730 days	45 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_LSU-Li-1_2022-05	E440.Ti	30-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	46 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_LSU-Li-3_2022-05	E440.Ti	30-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	46 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_LSU-Li-4_2022-05	E440.Ti	30-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	46 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_LSU-M-1_2022-05	E440.Ti	30-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	46 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_LSU-M-2_2022-05	E440.Ti	30-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	46 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_LSU-M-4_2022-05	E440.Ti	30-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	46 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_LSU-O-1_2022-05	E440.Ti	30-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	46 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_LSU-O-2_2022-05	E440.Ti	30-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	46 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_LSU-O-3_2022-05	E440.Ti	30-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	46 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag BOL_LSU-O-4_2022-05	E440.Ti	30-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	46 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag POL_RB-O-7X_2022-05	E440.Ti	29-May-2022	14-Jul-2022	----	----		14-Jul-2022	730 days	46 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag POL_LSU-Li-1_2022-05	E440.Ti	28-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	48 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag POL_LSU-Li-2_2022-05	E440.Ti	28-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	48 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag POL_LSU-Li-3_2022-05	E440.Ti	28-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	48 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag POL_LSU-Li-3X_2022-05	E440.Ti	28-May-2022	14-Jul-2022	----	----		14-Jul-2022	730 days	48 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag POL_LSU-Li-4_2022-05	E440.Ti	28-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	48 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag POL_LSU-Li-6_2022-05	E440.Ti	28-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	48 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag POL_LSU-Li-8_2022-05	E440.Ti	28-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	48 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag POL_LSU-M-8X_2022-05	E440.Ti	28-May-2022	14-Jul-2022	----	----		14-Jul-2022	730 days	48 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag POL_LSU-O-1_2022-05	E440.Ti	28-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	48 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag POL_LSU-O-2_2022-05	E440.Ti	28-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	48 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag POL_LSU-O-3_2022-05	E440.Ti	28-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	48 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag POL_LSU-O-4_2022-05	E440.Ti	28-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	48 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag POL_LSU-O-5_2022-05	E440.Ti	28-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	48 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag POL_LSU-O-6_2022-05	E440.Ti	28-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	48 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag POL_LSU-O-7_2022-05	E440.Ti	28-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	48 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag POL_LSU-O-8_2022-05	E440.Ti	28-May-2022	15-Jul-2022	----	----		15-Jul-2022	730 days	48 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag BOL_LSU-Ki-1_2022-05	E144-H	30-May-2022	----	----	----		12-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag BOL_LSU-Ki-2_2022-05	E144-H	30-May-2022	----	----	----		12-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag BOL_LSU-Ki-3_2022-05	E144-H	30-May-2022	----	----	----		12-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag BOL_LSU-Ki-4_2022-05	E144-H	30-May-2022	----	----	----		12-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag BOL_LSU-Ki-6_2022-05	E144-H	31-May-2022	----	----	----		12-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag BOL_LSU-Ki-6X_2022-05	E144-H	31-May-2022	----	----	----		12-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag BOL_LSU-Ki-7_2022-05	E144-H	31-May-2022	----	----	----		12-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag BOL_LSU-Li-2_2022-05	E144-H	30-May-2022	----	----	----		12-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag BOL_LSU-Li-2X_2022-05	E144-H	30-May-2022	----	----	----		12-Jul-2022	----	----	

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag BOL_LSU-M-3_2022-05	E144-H	30-May-2022	----	----	----		12-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag BOL_LSU-M-7_2022-05	E144-H	31-May-2022	----	----	----		12-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag BOL_RB-M-7X_2022-05	E144-H	30-May-2022	----	----	----		12-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag POL_LSU-Ki-1_2022-05	E144-H	28-May-2022	----	----	----		12-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag POL_LSU-Ki-2_2022-05	E144-H	28-May-2022	----	----	----		12-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag POL_LSU-Ki-3_2022-05	E144-H	28-May-2022	----	----	----		12-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag POL_LSU-Ki-3X_2022-05	E144-H	28-May-2022	----	----	----		12-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag POL_LSU-Ki-4_2022-05	E144-H	28-May-2022	----	----	----		12-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag POL_LSU-Ki-5_2022-05	E144-H	28-May-2022	----	----	----		12-Jul-2022	----	----	

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag POL_LSU-Ki-6_2022-05	E144-H	28-May-2022	----	----	----		12-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag POL_LSU-Ki-7_2022-05	E144-H	28-May-2022	----	----	----		12-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag POL_LSU-Ki-8_2022-05	E144-H	28-May-2022	----	----	----		12-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag POL_LSU-Li-5_2022-05	E144-H	28-May-2022	----	----	----		12-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag POL_LSU-Li-7_2022-05	E144-H	28-May-2022	----	----	----		12-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag POL_RB-Ki-1X_2022-05	E144-H	28-May-2022	----	----	----		12-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag POL_RB-Li-6X_2022-05	E144-H	29-May-2022	----	----	----		12-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag POL_RB-M-2X_2022-05	E144-H	29-May-2022	----	----	----		12-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag POL_RB-O-4X_2022-05	E144-H	29-May-2022	----	----	----		12-Jul-2022	----	----	

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BOL_LSU-Ki-5_2022-05	E144	31-May-2022	----	----	----		06-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BOL_LSU-Ki-8_2022-05	E144	31-May-2022	----	----	----		06-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BOL_LSU-Li-1_2022-05	E144	30-May-2022	----	----	----		06-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BOL_LSU-Li-3_2022-05	E144	30-May-2022	----	----	----		06-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BOL_LSU-Li-4_2022-05	E144	30-May-2022	----	----	----		06-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BOL_LSU-Li-5_2022-05	E144	31-May-2022	----	----	----		06-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BOL_LSU-Li-6_2022-05	E144	31-May-2022	----	----	----		06-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BOL_LSU-Li-7_2022-05	E144	31-May-2022	----	----	----		06-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BOL_LSU-Li-8_2022-05	E144	31-May-2022	----	----	----		06-Jul-2022	----	----	

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BOL_LSU-M-1_2022-05	E144	30-May-2022	----	----	----		06-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BOL_LSU-M-2_2022-05	E144	30-May-2022	----	----	----		06-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BOL_LSU-M-4_2022-05	E144	30-May-2022	----	----	----		06-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BOL_LSU-M-5_2022-05	E144	31-May-2022	----	----	----		06-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BOL_LSU-M-6_2022-05	E144	31-May-2022	----	----	----		06-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BOL_LSU-M-8_2022-05	E144	31-May-2022	----	----	----		06-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BOL_LSU-O-1_2022-05	E144	30-May-2022	----	----	----		06-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BOL_LSU-O-2_2022-05	E144	30-May-2022	----	----	----		06-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BOL_LSU-O-3_2022-05	E144	30-May-2022	----	----	----		06-Jul-2022	----	----	

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BOL_LSU-O-4_2022-05	E144	30-May-2022	----	----	----		06-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BOL_LSU-O-5_2022-05	E144	31-May-2022	----	----	----		06-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BOL_LSU-O-6_2022-05	E144	31-May-2022	----	----	----		06-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BOL_LSU-O-7_2022-05	E144	31-May-2022	----	----	----		06-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BOL_LSU-O-8_2022-05	E144	31-May-2022	----	----	----		06-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BOL_RB-O-8X_2022-05	E144	30-May-2022	----	----	----		08-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag POL_LSU-Li-1_2022-05	E144	28-May-2022	----	----	----		06-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag POL_LSU-Li-2_2022-05	E144	28-May-2022	----	----	----		06-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag POL_LSU-Li-3_2022-05	E144	28-May-2022	----	----	----		06-Jul-2022	----	----	

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Moisture Content by Gravimetry										
LDPE bag POL_LSU-Li-3X_2022-05	E144	28-May-2022	----	----	----		08-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag POL_LSU-Li-4_2022-05	E144	28-May-2022	----	----	----		06-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag POL_LSU-Li-6_2022-05	E144	28-May-2022	----	----	----		06-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag POL_LSU-Li-8_2022-05	E144	28-May-2022	----	----	----		08-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag POL_LSU-M-8X_2022-05	E144	28-May-2022	----	----	----		06-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag POL_LSU-O-1_2022-05	E144	28-May-2022	----	----	----		06-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag POL_LSU-O-2_2022-05	E144	28-May-2022	----	----	----		06-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag POL_LSU-O-3_2022-05	E144	28-May-2022	----	----	----		06-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag POL_LSU-O-4_2022-05	E144	28-May-2022	----	----	----		06-Jul-2022	----	----	

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Moisture Content by Gravimetry										
LDPE bag POL_LSU-O-5_2022-05	E144	28-May-2022	----	----	----		06-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag POL_LSU-O-6_2022-05	E144	28-May-2022	----	----	----		06-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag POL_LSU-O-7_2022-05	E144	28-May-2022	----	----	----		06-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag POL_LSU-O-8_2022-05	E144	28-May-2022	----	----	----		06-Jul-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag POL_RB-O-7X_2022-05	E144	29-May-2022	----	----	----		08-Jul-2022	----	----	

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Biota**

Evaluation: × = QC frequency outside specification; ✓ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Mercury in Biota by CVAAS (DRY units, Micro)	E511	562340	3	38	7.8	5.0	✓
Mercury in Biota by CVAAS (DRY units, Routine)	E510	554359	3	45	6.6	5.0	✓
Mercury in Biota by CVAAS (WET units, Micro)	E511A	562341	3	37	8.1	5.0	✓
Mercury in Biota by CVAAS (WET units, Routine)	E510A	554357	3	45	6.6	5.0	✓
Metals in Biota by CRC ICPMS (DRY units, Micro)	E472	562342	5	38	13.1	5.0	✓
Metals in Biota by CRC ICPMS (DRY units, Routine)	E440	554356	3	45	6.6	5.0	✓
Moisture Content by Gravimetry	E144	551571	4	42	9.5	5.0	✓
Moisture Content by Gravimetry (Micro)	E144-H	559468	3	38	7.8	5.0	✓
Silver in Biota by CRC ICPMS (DRY units, Micro)	E472.Ag	562338	3	38	7.8	5.0	✓
Silver in Biota by CRC ICPMS (DRY units, Routine)	E440.Ag	554358	3	45	6.6	5.0	✓
Titanium in Biota by CRC ICPMS (DRY units, Micro)	E472.Ti	562339	3	38	7.8	5.0	✓
Titanium in Biota by CRC ICPMS (DRY units, Routine)	E440.Ti	554360	3	45	6.6	5.0	✓
Laboratory Control Samples (LCS)							
Mercury in Biota by CVAAS (DRY units, Micro)	E511	562340	6	38	15.7	10.0	✓
Mercury in Biota by CVAAS (DRY units, Routine)	E510	554359	6	45	13.3	10.0	✓
Mercury in Biota by CVAAS (WET units, Micro)	E511A	562341	6	37	16.2	10.0	✓
Mercury in Biota by CVAAS (WET units, Routine)	E510A	554357	6	45	13.3	10.0	✓
Metals in Biota by CRC ICPMS (DRY units, Micro)	E472	562342	6	38	15.7	10.0	✓
Metals in Biota by CRC ICPMS (DRY units, Routine)	E440	554356	6	45	13.3	10.0	✓
Moisture Content by Gravimetry	E144	551571	4	42	9.5	5.0	✓
Moisture Content by Gravimetry (Micro)	E144-H	559468	3	38	7.8	5.0	✓
Silver in Biota by CRC ICPMS (DRY units, Micro)	E472.Ag	562338	6	38	15.7	10.0	✓
Silver in Biota by CRC ICPMS (DRY units, Routine)	E440.Ag	554358	6	45	13.3	10.0	✓
Titanium in Biota by CRC ICPMS (DRY units, Micro)	E472.Ti	562339	3	38	7.8	10.0	×
Titanium in Biota by CRC ICPMS (DRY units, Routine)	E440.Ti	554360	3	45	6.6	10.0	×
Method Blanks (MB)							
Mercury in Biota by CVAAS (DRY units, Micro)	E511	562340	3	38	7.8	5.0	✓
Mercury in Biota by CVAAS (DRY units, Routine)	E510	554359	3	45	6.6	5.0	✓
Mercury in Biota by CVAAS (WET units, Micro)	E511A	562341	3	37	8.1	5.0	✓
Mercury in Biota by CVAAS (WET units, Routine)	E510A	554357	3	45	6.6	5.0	✓
Metals in Biota by CRC ICPMS (DRY units, Micro)	E472	562342	5	38	13.1	5.0	✓
Metals in Biota by CRC ICPMS (DRY units, Routine)	E440	554356	3	45	6.6	5.0	✓
Moisture Content by Gravimetry	E144	551571	4	42	9.5	5.0	✓
Moisture Content by Gravimetry (Micro)	E144-H	559468	3	38	7.8	5.0	✓
Silver in Biota by CRC ICPMS (DRY units, Micro)	E472.Ag	562338	3	38	7.8	5.0	✓

Matrix: **Biota**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Method Blanks (MB) - Continued							
Silver in Biota by CRC ICPMS (DRY units, Routine)	E440.Ag	554358	3	45	6.6	5.0	✓
Titanium in Biota by CRC ICPMS (DRY units, Micro)	E472.Ti	562339	3	38	7.8	5.0	✓
Titanium in Biota by CRC ICPMS (DRY units, Routine)	E440.Ti	554360	3	45	6.6	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Moisture Content by Gravimetry	E144 Vancouver - Environmental	Biota	Puget Sound Water Quality Authority/CCME PHC in Soil - Tier 1	Moisture is measured gravimetrically by drying the sample at 105°C. Moisture content is calculated as the weight loss (due to water) divided by the wet weight of the sample, expressed as a percentage.
Moisture Content by Gravimetry (Micro)	E144-H Vancouver - Environmental	Biota	Puget Sound Water Quality Authority/BC MOE Lab Manual	Moisture is measured gravimetrically by drying the sample at <60°C for a minimum of 3 days to constant weight. Moisture content is calculated as the weight loss (due to water) divided by the wet weight of soil, expressed as a percentage.
Metals in Biota by CRC ICPMS (DRY units, Routine)	E440 Vancouver - Environmental	Biota	EPA 200.3/6020B (mod)	Tissue samples are homogenized and sub-sampled prior to hotblock digestion with HNO3, HCl, and H2O2. Analysis is by Collision/Reaction Cell ICPMS. Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.
Silver in Biota by CRC ICPMS (DRY units, Routine)	E440.Ag Vancouver - Environmental	Biota	EPA 200.3/6020B (mod)	Tissue samples are homogenized and sub-sampled prior to hotblock digestion with HNO3, HCl, and H2O2. Analysis is by Collision/Reaction Cell ICPMS. Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.
Titanium in Biota by CRC ICPMS (DRY units, Routine)	E440.Ti Vancouver - Environmental	Biota	EPA 200.3/6020B (mod)	Tissue samples are homogenized and sub-sampled prior to hotblock digestion with HNO3, HCl, and H2O2. Analysis is by Collision/Reaction Cell ICPMS. Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.
Metals in Biota by CRC ICPMS (DRY units, Micro)	E472 Vancouver - Environmental	Biota	EPA 200.3/6020B (mod)	Tissue samples are homogenized and sub-sampled prior to hotblock digestion with HNO3, HCl, and H2O2. Analysis is by Collision/Reaction Cell ICPMS. Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Silver in Biota by CRC ICPMS (DRY units, Micro)	E472.Ag Vancouver - Environmental	Biota	EPA 200.3/6020B (mod)	Tissue samples are homogenized and sub-sampled prior to hotblock digestion with HNO3, HCl, and H2O2. Analysis is by Collision/Reaction Cell ICPMS. Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.
Titanium in Biota by CRC ICPMS (DRY units, Micro)	E472.Ti Vancouver - Environmental	Biota	EPA 200.3/6020B (mod)	Tissue samples are homogenized and sub-sampled prior to hotblock digestion with HNO3, HCl, and H2O2. Analysis is by Collision/Reaction Cell ICPMS. Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.
Mercury in Biota by CVAAS (DRY units, Routine)	E510 Vancouver - Environmental	Biota	EPA 200.3/1631 Appendix (mod)	Samples are homogenized and sub-sampled prior to hotblock digestion with HNO3, HCl, and H2O2. Analysis is by CVAAS.
Mercury in Biota by CVAAS (WET units, Routine)	E510A Vancouver - Environmental	Biota	EPA 200.3/1631 Appendix (mod)	Samples are homogenized and sub-sampled prior to hotblock digestion with HNO3, HCl, and H2O2. Analysis is by CVAAS.
Mercury in Biota by CVAAS (DRY units, Micro)	E511 Vancouver - Environmental	Biota	EPA 200.3/1631E (mod)	Samples are homogenized and sub-sampled prior to hotblock digestion with nitric acid, hydrochloric acid, and hydrogen peroxide. Analysis is by CVAAS.
Mercury in Biota by CVAAS (WET units, Micro)	E511A Vancouver - Environmental	Biota	EPA 200.3/1631E (mod)	Samples are homogenized and sub-sampled prior to hotblock digestion with nitric acid, hydrochloric acid, and hydrogen peroxide. Analysis is by CVAAS.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Metals and Mercury Biota Digestion	EP440 Vancouver - Environmental	Biota	EPA 200.3	This method uses a heated strong acid digestion with HNO3, HCl, and H2O2 and is intended to provide a conservative estimate of bio-available metals.
Metals and Mercury Biota Digestion (Micro)	EP472 Vancouver - Environmental	Biota	EPA 200.3	This method, designed for small sample amounts, uses a heated strong acid digestion with HNO3, HCl, and H2O2 and is intended to provide a conservative estimate of bio-available metals.

ALS Canada Ltd.

QUALITY CONTROL REPORT

Work Order	: **VA22B2821**	Page	: 1 of 34
Amendment	: **1**		
Client	: Mount Polley Mining Corporation	Laboratory	: Vancouver - Environmental
Contact	: Gabriel Holmes	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 08-Jun-2022 10:30
PO	: 5590008044 Q2 2022	Date Analysis Commenced	: 06-Jul-2022
C-O-C number	: ----	Issue Date	: 05-Dec-2022 14:14
Sampler	: LBO ----		
Site	: ----		
Quote number	: VA22-MPMC100-002		
No. of samples received	: 68		
No. of samples analysed	: 68		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Reference Material (RM) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Angela Ren	Team Leader - Metals	Vancouver Metals, Burnaby, British Columbia
Dan Gebert	Laboratory Analyst	Vancouver Metals, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Vancouver Metals, Burnaby, British Columbia
Kinny Wu	Lab Analyst	Vancouver Metals, Burnaby, British Columbia
Owen Cheng		Vancouver Metals, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Vancouver Metals, Burnaby, British Columbia
Salimah Khimani	Lab Assistant	Vancouver Metals, Burnaby, British Columbia

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Biota**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 551571)											
VA22B2821-004	POL_LSU-O-4_2022-05	moisture	----	E144	0.50	%	63.8	63.4	0.629%	20%	----
Physical Tests (QC Lot: 551572)											
VA22B2821-048	BOL_LSU-Li-8_2022-05	moisture	----	E144	0.50	%	79.7	79.6	0.126%	20%	----
Physical Tests (QC Lot: 551583)											
VA22B2821-035	BOL_LSU-O-3_2022-05	moisture	----	E144	0.50	%	67.2	67.3	0.149%	20%	----
Physical Tests (QC Lot: 554262)											
VA22B2821-061	POL_RB-O-7X_2022-05	moisture	----	E144	0.50	%	61.8	62.1	0.420%	20%	----
Physical Tests (QC Lot: 559468)											
VA22B2821-013	POL_LSU-Li-5_2022-05	moisture	----	E144-H	2.0	%	78.4	78.0	0.409%	20%	----
Physical Tests (QC Lot: 559474)											
VA22B2820-054	Anonymous	moisture	----	E144-H	2.0	%	79.1	79.4	0.391%	20%	----
Physical Tests (QC Lot: 559475)											
VA22B2821-042	BOL_LSU-Li-2_2022-05	moisture	----	E144-H	2.0	%	80.4	80.2	0.201%	20%	----
Metals (QC Lot: 554356)											
VA22B2821-044	BOL_LSU-Li-4_2022-05	aluminum	7429-90-5	E440	2.0	mg/kg	<2.0	<2.0	0	Diff <2x LOR	----
		antimony	7440-36-0	E440	0.010	mg/kg	0.020	0.021	0.001	Diff <2x LOR	----
		arsenic	7440-38-2	E440	0.020	mg/kg	0.125	0.132	5.15%	40%	----
		barium	7440-39-3	E440	0.050	mg/kg	0.119	0.106	0.013	Diff <2x LOR	----
		beryllium	7440-41-7	E440	0.010	mg/kg	<0.010	<0.010	0	Diff <2x LOR	----
		bismuth	7440-69-9	E440	0.010	mg/kg	<0.010	<0.010	0	Diff <2x LOR	----
		boron	7440-42-8	E440	1.0	mg/kg	<1.0	<1.0	0	Diff <2x LOR	----
		cadmium	7440-43-9	E440	0.0050	mg/kg	0.411	0.430	4.66%	40%	----
		calcium	7440-70-2	E440	20	mg/kg	354	366	3.48%	60%	----
		cesium	7440-46-2	E440	0.0050	mg/kg	0.0164	0.0166	0.0003	Diff <2x LOR	----
		chromium	7440-47-3	E440	0.050	mg/kg	<0.050	0.055	0.005	Diff <2x LOR	----
		cobalt	7440-48-4	E440	0.020	mg/kg	0.102	0.108	6.56%	40%	----
		copper	7440-50-8	E440	0.10	mg/kg	9.52	9.63	1.14%	40%	----
		iron	7439-89-6	E440	3.0	mg/kg	147	150	2.17%	40%	----
		lead	7439-92-1	E440	0.020	mg/kg	<0.020	<0.020	0	Diff <2x LOR	----
		lithium	7439-93-2	E440	0.50	mg/kg	<0.50	<0.50	0	Diff <2x LOR	----

Sub-Matrix: **Biota**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Metals (QC Lot: 554356) - continued											
VA22B2821-044	BOL_LSU-Li-4_2022-05	magnesium	7439-95-4	E440	2.0	mg/kg	930	948	1.98%	40%	----
		manganese	7439-96-5	E440	0.050	mg/kg	9.72	9.83	1.10%	40%	----
		molybdenum	7439-98-7	E440	0.020	mg/kg	0.939	0.951	1.25%	40%	----
		nickel	7440-02-0	E440	0.20	mg/kg	<0.20	<0.20	0	Diff <2x LOR	----
		phosphorus	7723-14-0	E440	10	mg/kg	14800	15200	2.91%	40%	----
		potassium	7440-09-7	E440	20	mg/kg	12800	12900	0.616%	40%	----
		rubidium	7440-17-7	E440	0.050	mg/kg	7.77	7.88	1.44%	40%	----
		selenium	7782-49-2	E440	0.050	mg/kg	6.92	7.17	3.50%	40%	----
		sodium	7440-23-5	E440	20	mg/kg	8080	8290	2.59%	40%	----
		strontium	7440-24-6	E440	0.050	mg/kg	0.864	0.855	1.03%	60%	----
		tellurium	13494-80-9	E440	0.020	mg/kg	<0.020	<0.020	0	Diff <2x LOR	----
		thallium	7440-28-0	E440	0.0020	mg/kg	<0.0020	<0.0020	0	Diff <2x LOR	----
		tin	7440-31-5	E440	0.10	mg/kg	0.39	0.42	0.03	Diff <2x LOR	----
		uranium	7440-61-1	E440	0.0020	mg/kg	0.0040	0.0043	0.0003	Diff <2x LOR	----
		vanadium	7440-62-2	E440	0.10	mg/kg	0.22	0.22	0.006	Diff <2x LOR	----
		zinc	7440-66-6	E440	0.50	mg/kg	70.0	72.4	3.30%	40%	----
		zirconium	7440-67-7	E440	0.20	mg/kg	<0.20	<0.20	0	Diff <2x LOR	----
Metals (QC Lot: 554357)											
VA22B2821-044	BOL_LSU-Li-4_2022-05	mercury	7439-97-6	E510A	0.0011	mg/kg wwt	0.0358	0.0363	1.56%	40%	----
Metals (QC Lot: 554358)											
VA22B2821-044	BOL_LSU-Li-4_2022-05	silver	7440-22-4	E440.Ag	0.0050	mg/kg	0.0091	0.0088	0.0003	Diff <2x LOR	----
Metals (QC Lot: 554359)											
VA22B2821-044	BOL_LSU-Li-4_2022-05	mercury	7439-97-6	E510	0.0054	mg/kg	0.200	0.203	1.56%	40%	----
Metals (QC Lot: 554360)											
VA22B2821-044	BOL_LSU-Li-4_2022-05	titanium	7440-32-6	E440.Ti	0.25	mg/kg	<0.25	<0.25	0	Diff <2x LOR	----
Metals (QC Lot: 554382)											
VA22B2821-040	BOL_LSU-O-8_2022-05	aluminum	7429-90-5	E440	2.0	mg/kg	<2.0	<2.0	0	Diff <2x LOR	----
		antimony	7440-36-0	E440	0.010	mg/kg	<0.010	<0.010	0	Diff <2x LOR	----
		arsenic	7440-38-2	E440	0.020	mg/kg	0.056	0.054	0.001	Diff <2x LOR	----
		barium	7440-39-3	E440	0.050	mg/kg	0.264	0.263	0.428%	40%	----
		beryllium	7440-41-7	E440	0.010	mg/kg	<0.010	<0.010	0	Diff <2x LOR	----
		bismuth	7440-69-9	E440	0.010	mg/kg	<0.010	<0.010	0	Diff <2x LOR	----
		boron	7440-42-8	E440	1.0	mg/kg	<1.0	<1.0	0	Diff <2x LOR	----
		cadmium	7440-43-9	E440	0.0050	mg/kg	0.0051	0.0063	0.0012	Diff <2x LOR	----

Sub-Matrix: **Biota**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Metals (QC Lot: 554382) - continued											
VA22B2821-040	BOL_LSU-O-8_2022-05	calcium	7440-70-2	E440	20	mg/kg	574	571	0.543%	60%	----
		cesium	7440-46-2	E440	0.0050	mg/kg	0.0311	0.0322	3.35%	40%	----
		chromium	7440-47-3	E440	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		cobalt	7440-48-4	E440	0.020	mg/kg	0.036	0.036	0.0005	Diff <2x LOR	----
		copper	7440-50-8	E440	0.10	mg/kg	3.70	3.64	1.63%	40%	----
		iron	7439-89-6	E440	3.0	mg/kg	48.8	48.0	1.67%	40%	----
		lead	7439-92-1	E440	0.020	mg/kg	<0.020	<0.020	0	Diff <2x LOR	----
		lithium	7439-93-2	E440	0.50	mg/kg	<0.50	<0.50	0	Diff <2x LOR	----
		magnesium	7439-95-4	E440	2.0	mg/kg	780	761	2.35%	40%	----
		manganese	7439-96-5	E440	0.050	mg/kg	16.0	15.8	0.689%	40%	----
		molybdenum	7439-98-7	E440	0.020	mg/kg	0.060	0.064	0.004	Diff <2x LOR	----
		nickel	7440-02-0	E440	0.20	mg/kg	<0.20	<0.20	0	Diff <2x LOR	----
		phosphorus	7723-14-0	E440	10	mg/kg	11900	11800	0.539%	40%	----
		potassium	7440-09-7	E440	20	mg/kg	6870	6820	0.702%	40%	----
		rubidium	7440-17-7	E440	0.050	mg/kg	5.19	5.09	2.01%	40%	----
		selenium	7782-49-2	E440	0.050	mg/kg	4.58	4.37	4.74%	40%	----
		sodium	7440-23-5	E440	20	mg/kg	1630	1650	1.12%	40%	----
		strontium	7440-24-6	E440	0.050	mg/kg	0.691	0.705	1.98%	60%	----
		tellurium	13494-80-9	E440	0.020	mg/kg	<0.020	<0.020	0	Diff <2x LOR	----
		thallium	7440-28-0	E440	0.0020	mg/kg	<0.0020	<0.0020	0	Diff <2x LOR	----
		tin	7440-31-5	E440	0.10	mg/kg	0.13	0.12	0.01	Diff <2x LOR	----
		uranium	7440-61-1	E440	0.0020	mg/kg	<0.0020	<0.0020	0	Diff <2x LOR	----
		vanadium	7440-62-2	E440	0.10	mg/kg	<0.10	<0.10	0	Diff <2x LOR	----
		zinc	7440-66-6	E440	0.50	mg/kg	77.4	78.0	0.769%	40%	----
		zirconium	7440-67-7	E440	0.20	mg/kg	<0.20	<0.20	0	Diff <2x LOR	----
Metals (QC Lot: 554383)											
VA22B2821-040	BOL_LSU-O-8_2022-05	mercury	7439-97-6	E510A	0.0010	mg/kg wwt	0.0061	0.0061	0.445%	40%	----
Metals (QC Lot: 554384)											
VA22B2821-040	BOL_LSU-O-8_2022-05	silver	7440-22-4	E440.Ag	0.0050	mg/kg	<0.0050	<0.0050	0	Diff <2x LOR	----
Metals (QC Lot: 554385)											
VA22B2821-040	BOL_LSU-O-8_2022-05	mercury	7439-97-6	E510	0.0050	mg/kg	0.0170	0.0171	0.00008	Diff <2x LOR	----
Metals (QC Lot: 554386)											
VA22B2821-040	BOL_LSU-O-8_2022-05	titanium	7440-32-6	E440.Ti	0.25	mg/kg	<0.25	<0.25	0	Diff <2x LOR	----
Metals (QC Lot: 554395)											

Sub-Matrix: **Biota**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Metals (QC Lot: 554395) - continued											
VA22B2821-046	BOL_LSU-Li-6_2022-05	aluminum	7429-90-5	E440	2.0	mg/kg	3.7	3.2	0.5	Diff <2x LOR	----
		antimony	7440-36-0	E440	0.010	mg/kg	0.017	0.018	0.0006	Diff <2x LOR	----
		arsenic	7440-38-2	E440	0.020	mg/kg	0.124	0.131	5.78%	40%	----
		barium	7440-39-3	E440	0.050	mg/kg	0.195	0.184	0.011	Diff <2x LOR	----
		beryllium	7440-41-7	E440	0.010	mg/kg	<0.010	<0.010	0	Diff <2x LOR	----
		bismuth	7440-69-9	E440	0.010	mg/kg	<0.010	<0.010	0	Diff <2x LOR	----
		boron	7440-42-8	E440	1.0	mg/kg	<1.0	<1.0	0	Diff <2x LOR	----
		cadmium	7440-43-9	E440	0.0050	mg/kg	0.318	0.328	2.92%	40%	----
		calcium	7440-70-2	E440	20	mg/kg	334	337	0.828%	60%	----
		cesium	7440-46-2	E440	0.0050	mg/kg	0.0361	0.0364	0.840%	40%	----
		chromium	7440-47-3	E440	0.050	mg/kg	0.090	0.068	0.021	Diff <2x LOR	----
		cobalt	7440-48-4	E440	0.020	mg/kg	0.126	0.124	1.56%	40%	----
		copper	7440-50-8	E440	0.10	mg/kg	19.9	20.2	1.45%	40%	----
		iron	7439-89-6	E440	3.0	mg/kg	584	584	0.0778%	40%	----
		lead	7439-92-1	E440	0.020	mg/kg	<0.020	<0.020	0	Diff <2x LOR	----
		lithium	7439-93-2	E440	0.50	mg/kg	<0.50	<0.50	0	Diff <2x LOR	----
		magnesium	7439-95-4	E440	2.0	mg/kg	1200	1180	1.32%	40%	----
		manganese	7439-96-5	E440	0.050	mg/kg	12.6	12.6	0.426%	40%	----
		molybdenum	7439-98-7	E440	0.020	mg/kg	1.19	1.27	6.46%	40%	----
		nickel	7440-02-0	E440	0.20	mg/kg	<0.20	<0.20	0	Diff <2x LOR	----
		phosphorus	7723-14-0	E440	10	mg/kg	18100	18500	2.08%	40%	----
		potassium	7440-09-7	E440	20	mg/kg	14900	14900	0.131%	40%	----
		rubidium	7440-17-7	E440	0.050	mg/kg	8.39	8.57	2.20%	40%	----
		selenium	7782-49-2	E440	0.050	mg/kg	6.26	6.44	2.83%	40%	----
		sodium	7440-23-5	E440	20	mg/kg	7610	7730	1.54%	40%	----
		strontium	7440-24-6	E440	0.050	mg/kg	0.782	0.806	2.94%	60%	----
		tellurium	13494-80-9	E440	0.020	mg/kg	<0.020	<0.020	0	Diff <2x LOR	----
		thallium	7440-28-0	E440	0.0020	mg/kg	<0.0020	<0.0020	0	Diff <2x LOR	----
		tin	7440-31-5	E440	0.10	mg/kg	<0.10	<0.10	0	Diff <2x LOR	----
		uranium	7440-61-1	E440	0.0020	mg/kg	0.0049	0.0042	0.0007	Diff <2x LOR	----
		vanadium	7440-62-2	E440	0.10	mg/kg	0.27	0.27	0.0007	Diff <2x LOR	----
		zinc	7440-66-6	E440	0.50	mg/kg	87.9	88.9	1.10%	40%	----
		zirconium	7440-67-7	E440	0.20	mg/kg	<0.20	<0.20	0	Diff <2x LOR	----
Metals (QC Lot: 554396)											

Sub-Matrix: **Biota**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Metals (QC Lot: 554396) - continued											
VA22B2821-046	BOL_LSU-Li-6_2022-05	mercury	7439-97-6	E510A	0.0010	mg/kg wwt	0.0303	0.0312	2.98%	40%	----
Metals (QC Lot: 554397)											
VA22B2821-046	BOL_LSU-Li-6_2022-05	silver	7440-22-4	E440.Ag	0.0050	mg/kg	0.0261	0.0264	1.15%	40%	----
Metals (QC Lot: 554398)											
VA22B2821-046	BOL_LSU-Li-6_2022-05	mercury	7439-97-6	E510	0.0050	mg/kg	0.166	0.170	2.98%	40%	----
Metals (QC Lot: 554399)											
VA22B2821-046	BOL_LSU-Li-6_2022-05	titanium	7440-32-6	E440.Ti	0.25	mg/kg	<0.25	<0.25	0	Diff <2x LOR	----
Metals (QC Lot: 562338)											
VA22B2821-013	POL_LSU-Li-5_2022-05	silver	7440-22-4	E472.Ag	0.0050	mg/kg	0.0209	0.0205	0.0004	Diff <2x LOR	----
Metals (QC Lot: 562339)											
VA22B2821-013	POL_LSU-Li-5_2022-05	titanium	7440-32-6	E472.Ti	0.50	mg/kg	0.89	0.84	0.05	Diff <2x LOR	----
Metals (QC Lot: 562340)											
VA22B2821-013	POL_LSU-Li-5_2022-05	mercury	7439-97-6	E511	0.0050	mg/kg	0.0728	0.0708	2.79%	40%	----
Metals (QC Lot: 562341)											
VA22B2821-013	POL_LSU-Li-5_2022-05	mercury	7439-97-6	E511A	0.0010	mg/kg wwt	0.0157	0.0156	1.01%	40%	----
Metals (QC Lot: 562342)											
VA22B2821-013	POL_LSU-Li-5_2022-05	barium	7440-39-3	E472	0.050	mg/kg	1.25	1.12	10.4%	40%	----
		calcium	7440-70-2	E472	20	mg/kg	319	289	9.93%	60%	----
		magnesium	7439-95-4	E472	2.0	mg/kg	920	899	2.24%	40%	----
		manganese	7439-96-5	E472	0.050	mg/kg	12.0	10.7	11.3%	40%	----
		strontium	7440-24-6	E472	0.10	mg/kg	1.03	0.72	35.3%	60%	----
VA22B2821-013	POL_LSU-Li-5_2022-05	aluminum	7429-90-5	E472	5.0	mg/kg	14.9	18.9	4.0	Diff <2x LOR	----
		antimony	7440-36-0	E472	0.010	mg/kg	0.016	0.012	0.003	Diff <2x LOR	----
		arsenic	7440-38-2	E472	0.030	mg/kg	0.188	0.186	1.07%	40%	----
		beryllium	7440-41-7	E472	0.010	mg/kg	<0.010	<0.010	0	Diff <2x LOR	----
		bismuth	7440-69-9	E472	0.010	mg/kg	<0.010	<0.010	0	Diff <2x LOR	----
		boron	7440-42-8	E472	1.0	mg/kg	<1.0	<1.0	0	Diff <2x LOR	----
		cadmium	7440-43-9	E472	0.010	mg/kg	0.114	0.115	0.912%	40%	----
		cesium	7440-46-2	E472	0.0050	mg/kg	0.0223	0.0222	0.00004	Diff <2x LOR	----
		chromium	7440-47-3	E472	0.20	mg/kg	0.62	# 1.03	0.41	Diff <2x LOR	DUP-H,J
		cobalt	7440-48-4	E472	0.020	mg/kg	0.108	0.108	0.362%	40%	----
		copper	7440-50-8	E472	0.20	mg/kg	56.0	51.6	8.11%	40%	----
		iron	7439-89-6	E472	5.0	mg/kg	160	165	2.72%	40%	----
		lead	7439-92-1	E472	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----

Sub-Matrix: **Biota**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Metals (QC Lot: 562342) - continued											
VA22B2821-013	POL_LSU-Li-5_2022-05	lithium	7439-93-2	E472	0.50	mg/kg	<0.50	<0.50	0	Diff <2x LOR	----
		molybdenum	7439-98-7	E472	0.040	mg/kg	1.39	1.36	2.13%	40%	----
		nickel	7440-02-0	E472	0.20	mg/kg	<0.20	<0.20	0	Diff <2x LOR	----
		phosphorus	7723-14-0	E472	10	mg/kg	17200	13900	21.2%	40%	----
		potassium	7440-09-7	E472	20	mg/kg	13400	13200	1.92%	40%	----
		rubidium	7440-17-7	E472	0.050	mg/kg	9.41	9.35	0.582%	40%	----
		selenium	7782-49-2	E472	0.10	mg/kg	11.0	10.9	0.626%	40%	----
		sodium	7440-23-5	E472	20	mg/kg	5320	5210	2.15%	40%	----
		tellurium	13494-80-9	E472	0.020	mg/kg	<0.020	<0.020	0	Diff <2x LOR	----
		thallium	7440-28-0	E472	0.0020	mg/kg	<0.0020	<0.0020	0	Diff <2x LOR	----
		tin	7440-31-5	E472	0.10	mg/kg	0.59	0.62	5.19%	40%	----
		uranium	7440-61-1	E472	0.0020	mg/kg	<0.0020	<0.0020	0	Diff <2x LOR	----
		vanadium	7440-62-2	E472	0.10	mg/kg	0.30	0.29	0.009	Diff <2x LOR	----
		zinc	7440-66-6	E472	1.0	mg/kg	116	114	0.826%	40%	----
		zirconium	7440-67-7	E472	0.20	mg/kg	<0.20	<0.20	0	Diff <2x LOR	----
Metals (QC Lot: 562350)											
VA22B2820-054	Anonymous	silver	7440-22-4	E472.Ag	0.0050	mg/kg	0.283	0.285	0.457%	40%	----
Metals (QC Lot: 562351)											
VA22B2820-054	Anonymous	titanium	7440-32-6	E472.Ti	0.50	mg/kg	<0.50	<0.50	0	Diff <2x LOR	----
Metals (QC Lot: 562352)											
VA22B2820-054	Anonymous	mercury	7439-97-6	E511	0.0050	mg/kg	0.264	0.261	1.31%	40%	----
Metals (QC Lot: 562353)											
VA22B2820-054	Anonymous	mercury	7439-97-6	E511A	0.0010	mg/kg wwt	0.0552	0.0544	1.31%	40%	----
Metals (QC Lot: 562354)											
VA22B2820-054	Anonymous	aluminum	7429-90-5	E472	5.0	mg/kg	<5.0	<5.0	0	Diff <2x LOR	----
		antimony	7440-36-0	E472	0.010	mg/kg	<0.010	<0.010	0	Diff <2x LOR	----
		arsenic	7440-38-2	E472	0.030	mg/kg	0.042	0.041	0.001	Diff <2x LOR	----
		barium	7440-39-3	E472	0.050	mg/kg	0.822	0.857	4.19%	40%	----
		beryllium	7440-41-7	E472	0.010	mg/kg	<0.010	<0.010	0	Diff <2x LOR	----
		bismuth	7440-69-9	E472	0.010	mg/kg	<0.010	<0.010	0	Diff <2x LOR	----
		boron	7440-42-8	E472	1.0	mg/kg	<1.0	<1.0	0	Diff <2x LOR	----
		cadmium	7440-43-9	E472	0.010	mg/kg	0.142	0.143	0.416%	40%	----
		calcium	7440-70-2	E472	20	mg/kg	322	333	3.49%	60%	----
		cesium	7440-46-2	E472	0.0050	mg/kg	0.0295	0.0305	3.37%	40%	----

Sub-Matrix: **Biota**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Metals (QC Lot: 562354) - continued											
VA22B2820-054	Anonymous	chromium	7440-47-3	E472	0.20	mg/kg	0.22	<0.20	0.02	Diff <2x LOR	----
		cobalt	7440-48-4	E472	0.020	mg/kg	0.112	0.106	5.16%	40%	----
		copper	7440-50-8	E472	0.20	mg/kg	22.1	22.7	3.04%	40%	----
		iron	7439-89-6	E472	5.0	mg/kg	1820	1780	2.10%	40%	----
		lead	7439-92-1	E472	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		lithium	7439-93-2	E472	0.50	mg/kg	<0.50	<0.50	0	Diff <2x LOR	----
		magnesium	7439-95-4	E472	2.0	mg/kg	834	821	1.56%	40%	----
		manganese	7439-96-5	E472	0.050	mg/kg	6.15	6.26	1.77%	40%	----
		molybdenum	7439-98-7	E472	0.040	mg/kg	0.866	0.870	0.386%	40%	----
		nickel	7440-02-0	E472	0.20	mg/kg	<0.20	<0.20	0	Diff <2x LOR	----
		phosphorus	7723-14-0	E472	10	mg/kg	16300	16400	0.242%	40%	----
		potassium	7440-09-7	E472	20	mg/kg	14400	14600	0.785%	40%	----
		rubidium	7440-17-7	E472	0.050	mg/kg	9.74	9.86	1.24%	40%	----
		selenium	7782-49-2	E472	0.10	mg/kg	9.16	8.89	3.08%	40%	----
		sodium	7440-23-5	E472	20	mg/kg	7200	7230	0.502%	40%	----
		strontium	7440-24-6	E472	0.10	mg/kg	0.60	0.64	7.00%	60%	----
		tellurium	13494-80-9	E472	0.020	mg/kg	<0.020	<0.020	0	Diff <2x LOR	----
		thallium	7440-28-0	E472	0.0020	mg/kg	0.149	0.138	7.30%	40%	----
		tin	7440-31-5	E472	0.10	mg/kg	1.18	1.40	17.2%	40%	----
		uranium	7440-61-1	E472	0.0020	mg/kg	0.0052	0.0052	0.00005	Diff <2x LOR	----
		vanadium	7440-62-2	E472	0.10	mg/kg	0.20	0.20	0.002	Diff <2x LOR	----
		zinc	7440-66-6	E472	1.0	mg/kg	186	183	1.38%	40%	----
		zirconium	7440-67-7	E472	0.20	mg/kg	0.47	0.50	0.03	Diff <2x LOR	----
Metals (QC Lot: 562361)											
VA22B2821-042	BOL_LSU-Li-2_2022-05	silver	7440-22-4	E472.Ag	0.0050	mg/kg	0.0284	0.0280	1.62%	40%	----
Metals (QC Lot: 562362)											
VA22B2821-042	BOL_LSU-Li-2_2022-05	titanium	7440-32-6	E472.Ti	0.50	mg/kg	<0.50	<0.50	0	Diff <2x LOR	----
Metals (QC Lot: 562363)											
VA22B2821-042	BOL_LSU-Li-2_2022-05	mercury	7439-97-6	E511	0.0050	mg/kg	0.192	0.183	4.69%	40%	----
Metals (QC Lot: 562364)											
VA22B2821-042	BOL_LSU-Li-2_2022-05	mercury	7439-97-6	E511A	0.0010	mg/kg wwt	0.0376	0.0359	4.69%	40%	----
Metals (QC Lot: 562365)											
VA22B2821-042	BOL_LSU-Li-2_2022-05	barium	7440-39-3	E472	0.050	mg/kg	0.454	0.523	14.0%	40%	----
VA22B2821-042	BOL_LSU-Li-2_2022-05	aluminum	7429-90-5	E472	5.0	mg/kg	<5.0	<5.0	0	Diff <2x LOR	----

Sub-Matrix: **Biota**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Metals (QC Lot: 562365) - continued											
VA22B2821-042	BOL_LSU-Li-2_2022-05	antimony	7440-36-0	E472	0.010	mg/kg	0.022	0.021	0.001	Diff <2x LOR	----
		arsenic	7440-38-2	E472	0.030	mg/kg	0.152	0.145	0.006	Diff <2x LOR	----
		beryllium	7440-41-7	E472	0.010	mg/kg	<0.010	<0.010	0	Diff <2x LOR	----
		bismuth	7440-69-9	E472	0.010	mg/kg	<0.010	<0.010	0	Diff <2x LOR	----
		boron	7440-42-8	E472	1.0	mg/kg	<1.0	<1.0	0	Diff <2x LOR	----
		cadmium	7440-43-9	E472	0.010	mg/kg	0.469	0.451	3.92%	40%	----
		calcium	7440-70-2	E472	20	mg/kg	285	274	3.77%	60%	----
		cesium	7440-46-2	E472	0.0050	mg/kg	0.0216	0.0209	0.0007	Diff <2x LOR	----
		chromium	7440-47-3	E472	0.20	mg/kg	<0.20	# 0.66	0.46	Diff <2x LOR	DUP-H,J
		cobalt	7440-48-4	E472	0.020	mg/kg	0.120	0.119	1.10%	40%	----
		copper	7440-50-8	E472	0.20	mg/kg	23.0	23.4	1.65%	40%	----
		iron	7439-89-6	E472	5.0	mg/kg	424	415	2.15%	40%	----
		lead	7439-92-1	E472	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		lithium	7439-93-2	E472	0.50	mg/kg	<0.50	<0.50	0	Diff <2x LOR	----
		magnesium	7439-95-4	E472	2.0	mg/kg	1030	1010	2.18%	40%	----
		manganese	7439-96-5	E472	0.050	mg/kg	14.2	13.7	4.13%	40%	----
		molybdenum	7439-98-7	E472	0.040	mg/kg	1.13	1.10	2.85%	40%	----
		nickel	7440-02-0	E472	0.20	mg/kg	<0.20	0.35	0.15	Diff <2x LOR	----
		phosphorus	7723-14-0	E472	10	mg/kg	15900	15300	3.93%	40%	----
		potassium	7440-09-7	E472	20	mg/kg	11300	11000	3.07%	40%	----
		rubidium	7440-17-7	E472	0.050	mg/kg	6.43	6.24	2.90%	40%	----
		selenium	7782-49-2	E472	0.10	mg/kg	6.89	6.67	3.34%	40%	----
		sodium	7440-23-5	E472	20	mg/kg	6940	6700	3.50%	40%	----
		strontium	7440-24-6	E472	0.10	mg/kg	0.64	0.61	4.68%	60%	----
		tellurium	13494-80-9	E472	0.020	mg/kg	<0.020	<0.020	0	Diff <2x LOR	----
		thallium	7440-28-0	E472	0.0020	mg/kg	0.0021	<0.0020	0.0001	Diff <2x LOR	----
		tin	7440-31-5	E472	0.10	mg/kg	0.50	0.46	0.04	Diff <2x LOR	----
		uranium	7440-61-1	E472	0.0020	mg/kg	0.0051	0.0048	0.0003	Diff <2x LOR	----
		vanadium	7440-62-2	E472	0.10	mg/kg	0.30	0.29	0.01	Diff <2x LOR	----
		zinc	7440-66-6	E472	1.0	mg/kg	79.9	75.8	5.28%	40%	----
		zirconium	7440-67-7	E472	0.20	mg/kg	0.24	<0.20	0.04	Diff <2x LOR	----

Qualifiers

Qualifier	Description
DUP-H	Duplicate results outside ALS DQO, due to sample heterogeneity.
J	Duplicate results and limits are expressed in terms of absolute difference.

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Biota**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 551571)						
moisture	----	E144	0.5	%	<0.50	----
Physical Tests (QCLot: 551572)						
moisture	----	E144	0.5	%	<0.50	----
Physical Tests (QCLot: 551583)						
moisture	----	E144	0.5	%	<0.50	----
Physical Tests (QCLot: 554262)						
moisture	----	E144	0.5	%	<0.50	----
Physical Tests (QCLot: 559468)						
moisture	----	E144-H	2	%	<2.0	----
Physical Tests (QCLot: 559474)						
moisture	----	E144-H	2	%	<2.0	----
Physical Tests (QCLot: 559475)						
moisture	----	E144-H	2	%	<2.0	----
Metals (QCLot: 554356)						
aluminum	7429-90-5	E440	2	mg/kg	<2.0	----
antimony	7440-36-0	E440	0.01	mg/kg	<0.010	----
arsenic	7440-38-2	E440	0.02	mg/kg	<0.020	----
barium	7440-39-3	E440	0.05	mg/kg	<0.050	----
beryllium	7440-41-7	E440	0.01	mg/kg	<0.010	----
bismuth	7440-69-9	E440	0.01	mg/kg	<0.010	----
boron	7440-42-8	E440	1	mg/kg	<1.0	----
cadmium	7440-43-9	E440	0.005	mg/kg	<0.0050	----
calcium	7440-70-2	E440	20	mg/kg	<20	----
cesium	7440-46-2	E440	0.005	mg/kg	<0.0050	----
chromium	7440-47-3	E440	0.05	mg/kg	<0.050	----
cobalt	7440-48-4	E440	0.02	mg/kg	<0.020	----
copper	7440-50-8	E440	0.1	mg/kg	<0.10	----
iron	7439-89-6	E440	3	mg/kg	<3.0	----
lead	7439-92-1	E440	0.02	mg/kg	<0.020	----
lithium	7439-93-2	E440	0.5	mg/kg	<0.50	----
magnesium	7439-95-4	E440	2	mg/kg	<2.0	----
manganese	7439-96-5	E440	0.05	mg/kg	<0.050	----

Sub-Matrix: **Biota**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 554356) - continued						
molybdenum	7439-98-7	E440	0.02	mg/kg	<0.020	----
nickel	7440-02-0	E440	0.2	mg/kg	<0.20	----
phosphorus	7723-14-0	E440	10	mg/kg	<10	----
potassium	7440-09-7	E440	20	mg/kg	<20	----
rubidium	7440-17-7	E440	0.05	mg/kg	<0.050	----
selenium	7782-49-2	E440	0.05	mg/kg	<0.050	----
sodium	7440-23-5	E440	20	mg/kg	<20	----
strontium	7440-24-6	E440	0.05	mg/kg	<0.050	----
tellurium	13494-80-9	E440	0.02	mg/kg	<0.020	----
thallium	7440-28-0	E440	0.002	mg/kg	<0.0020	----
tin	7440-31-5	E440	0.1	mg/kg	<0.10	----
uranium	7440-61-1	E440	0.002	mg/kg	<0.0020	----
vanadium	7440-62-2	E440	0.1	mg/kg	<0.10	----
zinc	7440-66-6	E440	0.5	mg/kg	<0.50	----
zirconium	7440-67-7	E440	0.2	mg/kg	<0.20	----
Metals (QCLot: 554357)						
mercury	7439-97-6	E510A	0.001	mg/kg wwt	<0.0010	----
Metals (QCLot: 554358)						
silver	7440-22-4	E440.Ag	0.005	mg/kg	<0.0050	----
Metals (QCLot: 554359)						
mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
Metals (QCLot: 554360)						
titanium	7440-32-6	E440.Ti	0.25	mg/kg	<0.25	----
Metals (QCLot: 554382)						
aluminum	7429-90-5	E440	2	mg/kg	<2.0	----
antimony	7440-36-0	E440	0.01	mg/kg	<0.010	----
arsenic	7440-38-2	E440	0.02	mg/kg	<0.020	----
barium	7440-39-3	E440	0.05	mg/kg	<0.050	----
beryllium	7440-41-7	E440	0.01	mg/kg	<0.010	----
bismuth	7440-69-9	E440	0.01	mg/kg	<0.010	----
boron	7440-42-8	E440	1	mg/kg	<1.0	----
cadmium	7440-43-9	E440	0.005	mg/kg	<0.0050	----
calcium	7440-70-2	E440	20	mg/kg	<20	----
cesium	7440-46-2	E440	0.005	mg/kg	<0.0050	----
chromium	7440-47-3	E440	0.05	mg/kg	<0.050	----

Sub-Matrix: **Biota**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 554382) - continued						
cobalt	7440-48-4	E440	0.02	mg/kg	<0.020	----
copper	7440-50-8	E440	0.1	mg/kg	<0.10	----
iron	7439-89-6	E440	3	mg/kg	<3.0	----
lead	7439-92-1	E440	0.02	mg/kg	<0.020	----
lithium	7439-93-2	E440	0.5	mg/kg	<0.50	----
magnesium	7439-95-4	E440	2	mg/kg	<2.0	----
manganese	7439-96-5	E440	0.05	mg/kg	<0.050	----
molybdenum	7439-98-7	E440	0.02	mg/kg	<0.020	----
nickel	7440-02-0	E440	0.2	mg/kg	<0.20	----
phosphorus	7723-14-0	E440	10	mg/kg	<10	----
potassium	7440-09-7	E440	20	mg/kg	<20	----
rubidium	7440-17-7	E440	0.05	mg/kg	<0.050	----
selenium	7782-49-2	E440	0.05	mg/kg	<0.050	----
sodium	7440-23-5	E440	20	mg/kg	<20	----
strontium	7440-24-6	E440	0.05	mg/kg	<0.050	----
tellurium	13494-80-9	E440	0.02	mg/kg	<0.020	----
thallium	7440-28-0	E440	0.002	mg/kg	<0.0020	----
tin	7440-31-5	E440	0.1	mg/kg	<0.10	----
uranium	7440-61-1	E440	0.002	mg/kg	<0.0020	----
vanadium	7440-62-2	E440	0.1	mg/kg	<0.10	----
zinc	7440-66-6	E440	0.5	mg/kg	<0.50	----
zirconium	7440-67-7	E440	0.2	mg/kg	<0.20	----
Metals (QCLot: 554383)						
mercury	7439-97-6	E510A	0.001	mg/kg wwt	<0.0010	----
Metals (QCLot: 554384)						
silver	7440-22-4	E440.Ag	0.005	mg/kg	<0.0050	----
Metals (QCLot: 554385)						
mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
Metals (QCLot: 554386)						
titanium	7440-32-6	E440.Ti	0.25	mg/kg	<0.25	----
Metals (QCLot: 554395)						
aluminum	7429-90-5	E440	2	mg/kg	<2.0	----
antimony	7440-36-0	E440	0.01	mg/kg	<0.010	----
arsenic	7440-38-2	E440	0.02	mg/kg	<0.020	----
barium	7440-39-3	E440	0.05	mg/kg	<0.050	----

Sub-Matrix: **Biota**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 554395) - continued						
beryllium	7440-41-7	E440	0.01	mg/kg	<0.010	----
bismuth	7440-69-9	E440	0.01	mg/kg	<0.010	----
boron	7440-42-8	E440	1	mg/kg	<1.0	----
cadmium	7440-43-9	E440	0.005	mg/kg	<0.0050	----
calcium	7440-70-2	E440	20	mg/kg	<20	----
cesium	7440-46-2	E440	0.005	mg/kg	<0.0050	----
chromium	7440-47-3	E440	0.05	mg/kg	<0.050	----
cobalt	7440-48-4	E440	0.02	mg/kg	<0.020	----
copper	7440-50-8	E440	0.1	mg/kg	<0.10	----
iron	7439-89-6	E440	3	mg/kg	<3.0	----
lead	7439-92-1	E440	0.02	mg/kg	<0.020	----
lithium	7439-93-2	E440	0.5	mg/kg	<0.50	----
magnesium	7439-95-4	E440	2	mg/kg	<2.0	----
manganese	7439-96-5	E440	0.05	mg/kg	<0.050	----
molybdenum	7439-98-7	E440	0.02	mg/kg	<0.020	----
nickel	7440-02-0	E440	0.2	mg/kg	<0.20	----
phosphorus	7723-14-0	E440	10	mg/kg	<10	----
potassium	7440-09-7	E440	20	mg/kg	<20	----
rubidium	7440-17-7	E440	0.05	mg/kg	<0.050	----
selenium	7782-49-2	E440	0.05	mg/kg	<0.050	----
sodium	7440-23-5	E440	20	mg/kg	<20	----
strontium	7440-24-6	E440	0.05	mg/kg	<0.050	----
tellurium	13494-80-9	E440	0.02	mg/kg	<0.020	----
thallium	7440-28-0	E440	0.002	mg/kg	<0.0020	----
tin	7440-31-5	E440	0.1	mg/kg	<0.10	----
uranium	7440-61-1	E440	0.002	mg/kg	<0.0020	----
vanadium	7440-62-2	E440	0.1	mg/kg	<0.10	----
zinc	7440-66-6	E440	0.5	mg/kg	<0.50	----
zirconium	7440-67-7	E440	0.2	mg/kg	<0.20	----
Metals (QCLot: 554396)						
mercury	7439-97-6	E510A	0.001	mg/kg wwt	<0.0010	----
Metals (QCLot: 554397)						
silver	7440-22-4	E440.Ag	0.005	mg/kg	<0.0050	----
Metals (QCLot: 554398)						
mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----

Sub-Matrix: **Biota**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 554399)						
titanium	7440-32-6	E440.Ti	0.25	mg/kg	<0.25	----
Metals (QCLot: 562338)						
silver	7440-22-4	E472.Ag	0.005	mg/kg	<0.0050	----
Metals (QCLot: 562339)						
titanium	7440-32-6	E472.Ti	0.5	mg/kg	<0.50	----
Metals (QCLot: 562340)						
mercury	7439-97-6	E511	0.005	mg/kg	<0.0050	----
Metals (QCLot: 562341)						
mercury	7439-97-6	E511A	0.001	mg/kg wwt	<0.0010	----
Metals (QCLot: 562342)						
aluminum	7429-90-5	E472	5	mg/kg	<5.0	----
antimony	7440-36-0	E472	0.01	mg/kg	<0.010	----
arsenic	7440-38-2	E472	0.03	mg/kg	<0.030	----
barium	7440-39-3	E472	0.05	mg/kg	<0.050	----
beryllium	7440-41-7	E472	0.01	mg/kg	<0.010	----
bismuth	7440-69-9	E472	0.01	mg/kg	<0.010	----
boron	7440-42-8	E472	1	mg/kg	<1.0	----
cadmium	7440-43-9	E472	0.01	mg/kg	<0.010	----
calcium	7440-70-2	E472	20	mg/kg	<20	----
cesium	7440-46-2	E472	0.005	mg/kg	<0.0050	----
chromium	7440-47-3	E472	0.2	mg/kg	<0.20	----
cobalt	7440-48-4	E472	0.02	mg/kg	<0.020	----
copper	7440-50-8	E472	0.2	mg/kg	<0.20	----
iron	7439-89-6	E472	5	mg/kg	<5.0	----
lead	7439-92-1	E472	0.05	mg/kg	<0.050	----
lithium	7439-93-2	E472	0.5	mg/kg	<0.50	----
magnesium	7439-95-4	E472	2	mg/kg	<2.0	----
manganese	7439-96-5	E472	0.05	mg/kg	<0.050	----
molybdenum	7439-98-7	E472	0.04	mg/kg	<0.040	----
nickel	7440-02-0	E472	0.2	mg/kg	<0.20	----
phosphorus	7723-14-0	E472	10	mg/kg	<10	----
potassium	7440-09-7	E472	20	mg/kg	<20	----
rubidium	7440-17-7	E472	0.05	mg/kg	<0.050	----
selenium	7782-49-2	E472	0.1	mg/kg	<0.10	----
sodium	7440-23-5	E472	20	mg/kg	<20	----

Sub-Matrix: **Biota**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 562342) - continued						
strontium	7440-24-6	E472	0.1	mg/kg	<0.10	----
tellurium	13494-80-9	E472	0.02	mg/kg	<0.020	----
thallium	7440-28-0	E472	0.002	mg/kg	<0.0020	----
tin	7440-31-5	E472	0.1	mg/kg	<0.10	----
uranium	7440-61-1	E472	0.002	mg/kg	<0.0020	----
vanadium	7440-62-2	E472	0.1	mg/kg	<0.10	----
zinc	7440-66-6	E472	1	mg/kg	<1.0	----
zirconium	7440-67-7	E472	0.2	mg/kg	<0.20	----
Metals (QCLot: 562350)						
silver	7440-22-4	E472.Ag	0.005	mg/kg	<0.0050	----
Metals (QCLot: 562351)						
titanium	7440-32-6	E472.Ti	0.5	mg/kg	<0.50	----
Metals (QCLot: 562352)						
mercury	7439-97-6	E511	0.005	mg/kg	<0.0050	----
Metals (QCLot: 562353)						
mercury	7439-97-6	E511A	0.001	mg/kg wwt	<0.0010	----
Metals (QCLot: 562354)						
aluminum	7429-90-5	E472	5	mg/kg	<5.0	----
antimony	7440-36-0	E472	0.01	mg/kg	<0.010	----
arsenic	7440-38-2	E472	0.03	mg/kg	<0.030	----
barium	7440-39-3	E472	0.05	mg/kg	<0.050	----
beryllium	7440-41-7	E472	0.01	mg/kg	<0.010	----
bismuth	7440-69-9	E472	0.01	mg/kg	<0.010	----
boron	7440-42-8	E472	1	mg/kg	<1.0	----
cadmium	7440-43-9	E472	0.01	mg/kg	<0.010	----
calcium	7440-70-2	E472	20	mg/kg	<20	----
cesium	7440-46-2	E472	0.005	mg/kg	<0.0050	----
chromium	7440-47-3	E472	0.2	mg/kg	<0.20	----
cobalt	7440-48-4	E472	0.02	mg/kg	<0.020	----
copper	7440-50-8	E472	0.2	mg/kg	<0.20	----
iron	7439-89-6	E472	5	mg/kg	<5.0	----
lead	7439-92-1	E472	0.05	mg/kg	<0.050	----
lithium	7439-93-2	E472	0.5	mg/kg	<0.50	----
magnesium	7439-95-4	E472	2	mg/kg	<2.0	----
manganese	7439-96-5	E472	0.05	mg/kg	<0.050	----

Sub-Matrix: **Biota**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 562354) - continued						
molybdenum	7439-98-7	E472	0.04	mg/kg	<0.040	----
nickel	7440-02-0	E472	0.2	mg/kg	<0.20	----
phosphorus	7723-14-0	E472	10	mg/kg	<10	----
potassium	7440-09-7	E472	20	mg/kg	<20	----
rubidium	7440-17-7	E472	0.05	mg/kg	<0.050	----
selenium	7782-49-2	E472	0.1	mg/kg	<0.10	----
sodium	7440-23-5	E472	20	mg/kg	<20	----
strontium	7440-24-6	E472	0.1	mg/kg	<0.10	----
tellurium	13494-80-9	E472	0.02	mg/kg	<0.020	----
thallium	7440-28-0	E472	0.002	mg/kg	<0.0020	----
tin	7440-31-5	E472	0.1	mg/kg	<0.10	----
uranium	7440-61-1	E472	0.002	mg/kg	<0.0020	----
vanadium	7440-62-2	E472	0.1	mg/kg	<0.10	----
zinc	7440-66-6	E472	1	mg/kg	<1.0	----
zirconium	7440-67-7	E472	0.2	mg/kg	<0.20	----
Metals (QCLot: 562361)						
silver	7440-22-4	E472.Ag	0.005	mg/kg	<0.0050	----
Metals (QCLot: 562362)						
titanium	7440-32-6	E472.Ti	0.5	mg/kg	<0.50	----
Metals (QCLot: 562363)						
mercury	7439-97-6	E511	0.005	mg/kg	<0.0050	----
Metals (QCLot: 562364)						
mercury	7439-97-6	E511A	0.001	mg/kg wwt	<0.0010	----
Metals (QCLot: 562365)						
aluminum	7429-90-5	E472	5	mg/kg	<5.0	----
antimony	7440-36-0	E472	0.01	mg/kg	<0.010	----
arsenic	7440-38-2	E472	0.03	mg/kg	<0.030	----
barium	7440-39-3	E472	0.05	mg/kg	<0.050	MBRR
beryllium	7440-41-7	E472	0.01	mg/kg	<0.010	----
bismuth	7440-69-9	E472	0.01	mg/kg	<0.010	----
boron	7440-42-8	E472	1	mg/kg	<1.0	----
cadmium	7440-43-9	E472	0.01	mg/kg	<0.010	----
calcium	7440-70-2	E472	20	mg/kg	<20	----
cesium	7440-46-2	E472	0.005	mg/kg	<0.0050	----
chromium	7440-47-3	E472	0.2	mg/kg	<0.20	----

Sub-Matrix: **Biota**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 562365) - continued						
cobalt	7440-48-4	E472	0.02	mg/kg	<0.020	----
copper	7440-50-8	E472	0.2	mg/kg	<0.20	----
iron	7439-89-6	E472	5	mg/kg	<5.0	----
lead	7439-92-1	E472	0.05	mg/kg	<0.050	----
lithium	7439-93-2	E472	0.5	mg/kg	<0.50	----
magnesium	7439-95-4	E472	2	mg/kg	<2.0	----
manganese	7439-96-5	E472	0.05	mg/kg	<0.050	----
molybdenum	7439-98-7	E472	0.04	mg/kg	<0.040	----
nickel	7440-02-0	E472	0.2	mg/kg	<0.20	----
phosphorus	7723-14-0	E472	10	mg/kg	<10	----
potassium	7440-09-7	E472	20	mg/kg	<20	----
rubidium	7440-17-7	E472	0.05	mg/kg	<0.050	----
selenium	7782-49-2	E472	0.1	mg/kg	<0.10	----
sodium	7440-23-5	E472	20	mg/kg	<20	----
strontium	7440-24-6	E472	0.1	mg/kg	<0.10	----
tellurium	13494-80-9	E472	0.02	mg/kg	<0.020	----
thallium	7440-28-0	E472	0.002	mg/kg	<0.0020	----
tin	7440-31-5	E472	0.1	mg/kg	<0.10	----
uranium	7440-61-1	E472	0.002	mg/kg	<0.0020	----
vanadium	7440-62-2	E472	0.1	mg/kg	<0.10	----
zinc	7440-66-6	E472	1	mg/kg	<1.0	----
zirconium	7440-67-7	E472	0.2	mg/kg	<0.20	----

Qualifiers

Qualifier	Description
MBRR	*Initial MB for this submission had positive results for flagged analyte (data not shown). Low level samples were repeated with new QC (2nd MB results shown). High level results (>5x initial MB level) and non-detect results were reported and are defensible*

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Biota**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 551571)									
moisture	----	E144	0.5	%	50 %	100	90.0	110	----
Physical Tests (QCLot: 551572)									
moisture	----	E144	0.5	%	50 %	100	90.0	110	----
Physical Tests (QCLot: 551583)									
moisture	----	E144	0.5	%	50 %	100	90.0	110	----
Physical Tests (QCLot: 554262)									
moisture	----	E144	0.5	%	50 %	100	90.0	110	----
Physical Tests (QCLot: 559468)									
moisture	----	E144-H	2	%	100 %	100	90.0	110	----
Physical Tests (QCLot: 559474)									
moisture	----	E144-H	2	%	100 %	100	90.0	110	----
Physical Tests (QCLot: 559475)									
moisture	----	E144-H	2	%	100 %	100	90.0	110	----
Metals (QCLot: 554356)									
aluminum	7429-90-5	E440	2	mg/kg	20 mg/kg	105	80.0	120	----
antimony	7440-36-0	E440	0.01	mg/kg	10 mg/kg	107	80.0	120	----
arsenic	7440-38-2	E440	0.02	mg/kg	10 mg/kg	104	80.0	120	----
barium	7440-39-3	E440	0.05	mg/kg	2.5 mg/kg	103	80.0	120	----
beryllium	7440-41-7	E440	0.01	mg/kg	1 mg/kg	102	80.0	120	----
bismuth	7440-69-9	E440	0.01	mg/kg	10 mg/kg	96.6	80.0	120	----
boron	7440-42-8	E440	1	mg/kg	10 mg/kg	102	80.0	120	----
cadmium	7440-43-9	E440	0.005	mg/kg	1 mg/kg	101	80.0	120	----
calcium	7440-70-2	E440	20	mg/kg	500 mg/kg	103	80.0	120	----
cesium	7440-46-2	E440	0.005	mg/kg	0.5 mg/kg	104	80.0	120	----
chromium	7440-47-3	E440	0.05	mg/kg	2.5 mg/kg	104	80.0	120	----
cobalt	7440-48-4	E440	0.02	mg/kg	2.5 mg/kg	102	80.0	120	----
copper	7440-50-8	E440	0.1	mg/kg	2.5 mg/kg	101	80.0	120	----
iron	7439-89-6	E440	3	mg/kg	10 mg/kg	108	80.0	120	----
lead	7439-92-1	E440	0.02	mg/kg	5 mg/kg	101	80.0	120	----
lithium	7439-93-2	E440	0.5	mg/kg	2.5 mg/kg	106	80.0	120	----
magnesium	7439-95-4	E440	2	mg/kg	500 mg/kg	102	80.0	120	----

Sub-Matrix: **Biota**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Metals (QCLot: 554356) - continued									
manganese	7439-96-5	E440	0.05	mg/kg	2.5 mg/kg	102	80.0	120	----
molybdenum	7439-98-7	E440	0.02	mg/kg	2.5 mg/kg	105	80.0	120	----
nickel	7440-02-0	E440	0.2	mg/kg	5 mg/kg	103	80.0	120	----
phosphorus	7723-14-0	E440	10	mg/kg	100 mg/kg	103	80.0	120	----
potassium	7440-09-7	E440	20	mg/kg	500 mg/kg	101	80.0	120	----
rubidium	7440-17-7	E440	0.05	mg/kg	1 mg/kg	106	80.0	120	----
selenium	7782-49-2	E440	0.05	mg/kg	10 mg/kg	105	80.0	120	----
sodium	7440-23-5	E440	20	mg/kg	500 mg/kg	103	80.0	120	----
strontium	7440-24-6	E440	0.05	mg/kg	2.5 mg/kg	108	80.0	120	----
tellurium	13494-80-9	E440	0.02	mg/kg	1 mg/kg	102	80.0	120	----
thallium	7440-28-0	E440	0.002	mg/kg	10 mg/kg	97.7	80.0	120	----
tin	7440-31-5	E440	0.1	mg/kg	5 mg/kg	103	80.0	120	----
uranium	7440-61-1	E440	0.002	mg/kg	0.05 mg/kg	104	80.0	120	----
vanadium	7440-62-2	E440	0.1	mg/kg	5 mg/kg	103	80.0	120	----
zinc	7440-66-6	E440	0.5	mg/kg	5 mg/kg	96.8	80.0	120	----
zirconium	7440-67-7	E440	0.2	mg/kg	1 mg/kg	105	80.0	120	----
Metals (QCLot: 554357)									
mercury	7439-97-6	E510A	0.001	mg/kg wwt	0.02 mg/kg wwt	97.1	80.0	120	----
Metals (QCLot: 554358)									
silver	7440-22-4	E440.Ag	0.005	mg/kg	1 mg/kg	96.2	80.0	120	----
Metals (QCLot: 554359)									
mercury	7439-97-6	E510	0.005	mg/kg	0.02 mg/kg	97.1	80.0	120	----
Metals (QCLot: 554360)									
titanium	7440-32-6	E440.Ti	0.25	mg/kg	2.5 mg/kg	103	80.0	120	----
Metals (QCLot: 554382)									
aluminum	7429-90-5	E440	2	mg/kg	20 mg/kg	109	80.0	120	----
antimony	7440-36-0	E440	0.01	mg/kg	10 mg/kg	108	80.0	120	----
arsenic	7440-38-2	E440	0.02	mg/kg	10 mg/kg	105	80.0	120	----
barium	7440-39-3	E440	0.05	mg/kg	2.5 mg/kg	104	80.0	120	----
beryllium	7440-41-7	E440	0.01	mg/kg	1 mg/kg	106	80.0	120	----
bismuth	7440-69-9	E440	0.01	mg/kg	10 mg/kg	100	80.0	120	----
boron	7440-42-8	E440	1	mg/kg	10 mg/kg	108	80.0	120	----
cadmium	7440-43-9	E440	0.005	mg/kg	1 mg/kg	102	80.0	120	----
calcium	7440-70-2	E440	20	mg/kg	500 mg/kg	103	80.0	120	----
cesium	7440-46-2	E440	0.005	mg/kg	0.5 mg/kg	105	80.0	120	----
chromium	7440-47-3	E440	0.05	mg/kg	2.5 mg/kg	105	80.0	120	----

Sub-Matrix: **Biota**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Metals (QCLot: 554382) - continued									
cobalt	7440-48-4	E440	0.02	mg/kg	2.5 mg/kg	102	80.0	120	----
copper	7440-50-8	E440	0.1	mg/kg	2.5 mg/kg	101	80.0	120	----
iron	7439-89-6	E440	3	mg/kg	10 mg/kg	106	80.0	120	----
lead	7439-92-1	E440	0.02	mg/kg	5 mg/kg	105	80.0	120	----
lithium	7439-93-2	E440	0.5	mg/kg	2.5 mg/kg	106	80.0	120	----
magnesium	7439-95-4	E440	2	mg/kg	500 mg/kg	108	80.0	120	----
manganese	7439-96-5	E440	0.05	mg/kg	2.5 mg/kg	104	80.0	120	----
molybdenum	7439-98-7	E440	0.02	mg/kg	2.5 mg/kg	108	80.0	120	----
nickel	7440-02-0	E440	0.2	mg/kg	5 mg/kg	103	80.0	120	----
phosphorus	7723-14-0	E440	10	mg/kg	100 mg/kg	109	80.0	120	----
potassium	7440-09-7	E440	20	mg/kg	500 mg/kg	105	80.0	120	----
rubidium	7440-17-7	E440	0.05	mg/kg	1 mg/kg	102	80.0	120	----
selenium	7782-49-2	E440	0.05	mg/kg	10 mg/kg	102	80.0	120	----
sodium	7440-23-5	E440	20	mg/kg	500 mg/kg	106	80.0	120	----
strontium	7440-24-6	E440	0.05	mg/kg	2.5 mg/kg	107	80.0	120	----
tellurium	13494-80-9	E440	0.02	mg/kg	1 mg/kg	106	80.0	120	----
thallium	7440-28-0	E440	0.002	mg/kg	10 mg/kg	101	80.0	120	----
tin	7440-31-5	E440	0.1	mg/kg	5 mg/kg	104	80.0	120	----
uranium	7440-61-1	E440	0.002	mg/kg	0.05 mg/kg	107	80.0	120	----
vanadium	7440-62-2	E440	0.1	mg/kg	5 mg/kg	104	80.0	120	----
zinc	7440-66-6	E440	0.5	mg/kg	5 mg/kg	98.6	80.0	120	----
zirconium	7440-67-7	E440	0.2	mg/kg	1 mg/kg	104	80.0	120	----
Metals (QCLot: 554383)									
mercury	7439-97-6	E510A	0.001	mg/kg wwt	0.02 mg/kg wwt	97.0	80.0	120	----
Metals (QCLot: 554384)									
silver	7440-22-4	E440.Ag	0.005	mg/kg	1 mg/kg	99.8	80.0	120	----
Metals (QCLot: 554385)									
mercury	7439-97-6	E510	0.005	mg/kg	0.02 mg/kg	97.0	80.0	120	----
Metals (QCLot: 554386)									
titanium	7440-32-6	E440.Ti	0.25	mg/kg	2.5 mg/kg	104	80.0	120	----
Metals (QCLot: 554395)									
aluminum	7429-90-5	E440	2	mg/kg	20 mg/kg	108	80.0	120	----
antimony	7440-36-0	E440	0.01	mg/kg	10 mg/kg	109	80.0	120	----
arsenic	7440-38-2	E440	0.02	mg/kg	10 mg/kg	105	80.0	120	----
barium	7440-39-3	E440	0.05	mg/kg	2.5 mg/kg	106	80.0	120	----
beryllium	7440-41-7	E440	0.01	mg/kg	1 mg/kg	107	80.0	120	----

Sub-Matrix: **Biota**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Metals (QCLot: 554395) - continued									
bismuth	7440-69-9	E440	0.01	mg/kg	10 mg/kg	101	80.0	120	----
boron	7440-42-8	E440	1	mg/kg	10 mg/kg	104	80.0	120	----
cadmium	7440-43-9	E440	0.005	mg/kg	1 mg/kg	103	80.0	120	----
calcium	7440-70-2	E440	20	mg/kg	500 mg/kg	104	80.0	120	----
cesium	7440-46-2	E440	0.005	mg/kg	0.5 mg/kg	105	80.0	120	----
chromium	7440-47-3	E440	0.05	mg/kg	2.5 mg/kg	105	80.0	120	----
cobalt	7440-48-4	E440	0.02	mg/kg	2.5 mg/kg	103	80.0	120	----
copper	7440-50-8	E440	0.1	mg/kg	2.5 mg/kg	102	80.0	120	----
iron	7439-89-6	E440	3	mg/kg	10 mg/kg	107	80.0	120	----
lead	7439-92-1	E440	0.02	mg/kg	5 mg/kg	107	80.0	120	----
lithium	7439-93-2	E440	0.5	mg/kg	2.5 mg/kg	106	80.0	120	----
magnesium	7439-95-4	E440	2	mg/kg	500 mg/kg	106	80.0	120	----
manganese	7439-96-5	E440	0.05	mg/kg	2.5 mg/kg	105	80.0	120	----
molybdenum	7439-98-7	E440	0.02	mg/kg	2.5 mg/kg	109	80.0	120	----
nickel	7440-02-0	E440	0.2	mg/kg	5 mg/kg	105	80.0	120	----
phosphorus	7723-14-0	E440	10	mg/kg	100 mg/kg	109	80.0	120	----
potassium	7440-09-7	E440	20	mg/kg	500 mg/kg	107	80.0	120	----
rubidium	7440-17-7	E440	0.05	mg/kg	1 mg/kg	103	80.0	120	----
selenium	7782-49-2	E440	0.05	mg/kg	10 mg/kg	102	80.0	120	----
sodium	7440-23-5	E440	20	mg/kg	500 mg/kg	105	80.0	120	----
strontium	7440-24-6	E440	0.05	mg/kg	2.5 mg/kg	110	80.0	120	----
tellurium	13494-80-9	E440	0.02	mg/kg	1 mg/kg	104	80.0	120	----
thallium	7440-28-0	E440	0.002	mg/kg	10 mg/kg	103	80.0	120	----
tin	7440-31-5	E440	0.1	mg/kg	5 mg/kg	104	80.0	120	----
uranium	7440-61-1	E440	0.002	mg/kg	0.05 mg/kg	108	80.0	120	----
vanadium	7440-62-2	E440	0.1	mg/kg	5 mg/kg	105	80.0	120	----
zinc	7440-66-6	E440	0.5	mg/kg	5 mg/kg	99.5	80.0	120	----
zirconium	7440-67-7	E440	0.2	mg/kg	1 mg/kg	104	80.0	120	----
Metals (QCLot: 554396)									
mercury	7439-97-6	E510A	0.001	mg/kg wwt	0.02 mg/kg wwt	95.7	80.0	120	----
Metals (QCLot: 554397)									
silver	7440-22-4	E440.Ag	0.005	mg/kg	1 mg/kg	99.4	80.0	120	----
Metals (QCLot: 554398)									
mercury	7439-97-6	E510	0.005	mg/kg	0.02 mg/kg	95.7	80.0	120	----
Metals (QCLot: 554399)									
titanium	7440-32-6	E440.Ti	0.25	mg/kg	2.5 mg/kg	104	80.0	120	----

Sub-Matrix: **Biota**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Metals (QCLot: 562338)									
silver	7440-22-4	E472.Ag	0.005	mg/kg	1 mg/kg	80.4	80.0	120	----
Metals (QCLot: 562339)									
titanium	7440-32-6	E472.Ti	0.5	mg/kg	2.5 mg/kg	89.2	80.0	120	----
Metals (QCLot: 562340)									
mercury	7439-97-6	E511	0.005	mg/kg	0.02 mg/kg	85.2	80.0	120	----
Metals (QCLot: 562341)									
mercury	7439-97-6	E511A	0.001	mg/kg wwt	0.02 mg/kg wwt	85.2	80.0	120	----
Metals (QCLot: 562342)									
aluminum	7429-90-5	E472	5	mg/kg	20 mg/kg	92.7	80.0	120	----
antimony	7440-36-0	E472	0.01	mg/kg	10 mg/kg	93.1	80.0	120	----
arsenic	7440-38-2	E472	0.03	mg/kg	10 mg/kg	95.1	80.0	120	----
barium	7440-39-3	E472	0.05	mg/kg	2.5 mg/kg	91.1	80.0	120	----
beryllium	7440-41-7	E472	0.01	mg/kg	1 mg/kg	85.8	80.0	120	----
bismuth	7440-69-9	E472	0.01	mg/kg	10 mg/kg	91.6	80.0	120	----
boron	7440-42-8	E472	1	mg/kg	10 mg/kg	# 72.6	80.0	120	MES
cadmium	7440-43-9	E472	0.01	mg/kg	1 mg/kg	88.4	80.0	120	----
calcium	7440-70-2	E472	20	mg/kg	500 mg/kg	87.2	80.0	120	----
cesium	7440-46-2	E472	0.005	mg/kg	0.5 mg/kg	92.0	80.0	120	----
chromium	7440-47-3	E472	0.2	mg/kg	2.5 mg/kg	89.5	80.0	120	----
cobalt	7440-48-4	E472	0.02	mg/kg	2.5 mg/kg	87.9	80.0	120	----
copper	7440-50-8	E472	0.2	mg/kg	2.5 mg/kg	87.0	80.0	120	----
iron	7439-89-6	E472	5	mg/kg	10 mg/kg	88.5	80.0	120	----
lead	7439-92-1	E472	0.05	mg/kg	5 mg/kg	90.3	80.0	120	----
lithium	7439-93-2	E472	0.5	mg/kg	2.5 mg/kg	# 76.0	80.0	120	MES
magnesium	7439-95-4	E472	2	mg/kg	500 mg/kg	89.9	80.0	120	----
manganese	7439-96-5	E472	0.05	mg/kg	2.5 mg/kg	89.7	80.0	120	----
molybdenum	7439-98-7	E472	0.04	mg/kg	2.5 mg/kg	93.7	80.0	120	----
nickel	7440-02-0	E472	0.2	mg/kg	5 mg/kg	87.8	80.0	120	----
phosphorus	7723-14-0	E472	10	mg/kg	100 mg/kg	82.0	80.0	120	----
potassium	7440-09-7	E472	20	mg/kg	500 mg/kg	90.3	80.0	120	----
rubidium	7440-17-7	E472	0.05	mg/kg	1 mg/kg	92.1	80.0	120	----
selenium	7782-49-2	E472	0.1	mg/kg	10 mg/kg	88.5	80.0	120	----
sodium	7440-23-5	E472	20	mg/kg	500 mg/kg	89.6	80.0	120	----
strontium	7440-24-6	E472	0.1	mg/kg	2.5 mg/kg	91.8	80.0	120	----
tellurium	13494-80-9	E472	0.02	mg/kg	1 mg/kg	88.6	80.0	120	----
thallium	7440-28-0	E472	0.002	mg/kg	10 mg/kg	92.6	80.0	120	----

Sub-Matrix: **Biota**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Metals (QCLot: 562342) - continued									
tin	7440-31-5	E472	0.1	mg/kg	5 mg/kg	92.9	80.0	120	----
uranium	7440-61-1	E472	0.002	mg/kg	0.05 mg/kg	94.4	80.0	120	----
vanadium	7440-62-2	E472	0.1	mg/kg	5 mg/kg	91.8	80.0	120	----
zinc	7440-66-6	E472	1	mg/kg	5 mg/kg	87.1	80.0	120	----
zirconium	7440-67-7	E472	0.2	mg/kg	1 mg/kg	95.2	80.0	120	----
Metals (QCLot: 562350)									
silver	7440-22-4	E472.Ag	0.005	mg/kg	1 mg/kg	85.1	80.0	120	----
Metals (QCLot: 562351)									
titanium	7440-32-6	E472.Ti	0.5	mg/kg	2.5 mg/kg	94.9	80.0	120	----
Metals (QCLot: 562352)									
mercury	7439-97-6	E511	0.005	mg/kg	0.02 mg/kg	89.8	80.0	120	----
Metals (QCLot: 562353)									
mercury	7439-97-6	E511A	0.001	mg/kg wwt	0.02 mg/kg wwt	89.8	80.0	120	----
Metals (QCLot: 562354)									
aluminum	7429-90-5	E472	5	mg/kg	20 mg/kg	96.0	80.0	120	----
antimony	7440-36-0	E472	0.01	mg/kg	10 mg/kg	96.4	80.0	120	----
arsenic	7440-38-2	E472	0.03	mg/kg	10 mg/kg	97.4	80.0	120	----
barium	7440-39-3	E472	0.05	mg/kg	2.5 mg/kg	93.4	80.0	120	----
beryllium	7440-41-7	E472	0.01	mg/kg	1 mg/kg	93.4	80.0	120	----
bismuth	7440-69-9	E472	0.01	mg/kg	10 mg/kg	89.3	80.0	120	----
boron	7440-42-8	E472	1	mg/kg	10 mg/kg	95.1	80.0	120	----
cadmium	7440-43-9	E472	0.01	mg/kg	1 mg/kg	92.1	80.0	120	----
calcium	7440-70-2	E472	20	mg/kg	500 mg/kg	94.1	80.0	120	----
cesium	7440-46-2	E472	0.005	mg/kg	0.5 mg/kg	95.3	80.0	120	----
chromium	7440-47-3	E472	0.2	mg/kg	2.5 mg/kg	93.0	80.0	120	----
cobalt	7440-48-4	E472	0.02	mg/kg	2.5 mg/kg	90.3	80.0	120	----
copper	7440-50-8	E472	0.2	mg/kg	2.5 mg/kg	89.4	80.0	120	----
iron	7439-89-6	E472	5	mg/kg	10 mg/kg	93.2	80.0	120	----
lead	7439-92-1	E472	0.05	mg/kg	5 mg/kg	91.5	80.0	120	----
lithium	7439-93-2	E472	0.5	mg/kg	2.5 mg/kg	93.7	80.0	120	----
magnesium	7439-95-4	E472	2	mg/kg	500 mg/kg	92.6	80.0	120	----
manganese	7439-96-5	E472	0.05	mg/kg	2.5 mg/kg	93.7	80.0	120	----
molybdenum	7439-98-7	E472	0.04	mg/kg	2.5 mg/kg	99.6	80.0	120	----
nickel	7440-02-0	E472	0.2	mg/kg	5 mg/kg	90.2	80.0	120	----
phosphorus	7723-14-0	E472	10	mg/kg	100 mg/kg	101	80.0	120	----
potassium	7440-09-7	E472	20	mg/kg	500 mg/kg	94.1	80.0	120	----

Sub-Matrix: **Biota**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Metals (QCLot: 562354) - continued									
rubidium	7440-17-7	E472	0.05	mg/kg	1 mg/kg	95.8	80.0	120	----
selenium	7782-49-2	E472	0.1	mg/kg	10 mg/kg	91.6	80.0	120	----
sodium	7440-23-5	E472	20	mg/kg	500 mg/kg	93.7	80.0	120	----
strontium	7440-24-6	E472	0.1	mg/kg	2.5 mg/kg	95.4	80.0	120	----
tellurium	13494-80-9	E472	0.02	mg/kg	1 mg/kg	94.7	80.0	120	----
thallium	7440-28-0	E472	0.002	mg/kg	10 mg/kg	90.6	80.0	120	----
tin	7440-31-5	E472	0.1	mg/kg	5 mg/kg	98.1	80.0	120	----
uranium	7440-61-1	E472	0.002	mg/kg	0.05 mg/kg	92.6	80.0	120	----
vanadium	7440-62-2	E472	0.1	mg/kg	5 mg/kg	95.8	80.0	120	----
zinc	7440-66-6	E472	1	mg/kg	5 mg/kg	89.1	80.0	120	----
zirconium	7440-67-7	E472	0.2	mg/kg	1 mg/kg	96.2	80.0	120	----
Metals (QCLot: 562361)									
silver	7440-22-4	E472.Ag	0.005	mg/kg	1 mg/kg	86.6	80.0	120	----
Metals (QCLot: 562362)									
titanium	7440-32-6	E472.Ti	0.5	mg/kg	2.5 mg/kg	99.7	80.0	120	----
Metals (QCLot: 562363)									
mercury	7439-97-6	E511	0.005	mg/kg	0.02 mg/kg	89.8	80.0	120	----
Metals (QCLot: 562364)									
mercury	7439-97-6	E511A	0.001	mg/kg wwt	0.02 mg/kg wwt	89.8	80.0	120	----
Metals (QCLot: 562365)									
aluminum	7429-90-5	E472	5	mg/kg	20 mg/kg	107	80.0	120	----
antimony	7440-36-0	E472	0.01	mg/kg	10 mg/kg	98.5	80.0	120	----
arsenic	7440-38-2	E472	0.03	mg/kg	10 mg/kg	102	80.0	120	----
barium	7440-39-3	E472	0.05	mg/kg	2.5 mg/kg	98.7	80.0	120	----
beryllium	7440-41-7	E472	0.01	mg/kg	1 mg/kg	96.0	80.0	120	----
bismuth	7440-69-9	E472	0.01	mg/kg	10 mg/kg	98.6	80.0	120	----
boron	7440-42-8	E472	1	mg/kg	10 mg/kg	98.1	80.0	120	----
cadmium	7440-43-9	E472	0.01	mg/kg	1 mg/kg	94.6	80.0	120	----
calcium	7440-70-2	E472	20	mg/kg	500 mg/kg	94.2	80.0	120	----
cesium	7440-46-2	E472	0.005	mg/kg	0.5 mg/kg	98.1	80.0	120	----
chromium	7440-47-3	E472	0.2	mg/kg	2.5 mg/kg	99.6	80.0	120	----
cobalt	7440-48-4	E472	0.02	mg/kg	2.5 mg/kg	97.6	80.0	120	----
copper	7440-50-8	E472	0.2	mg/kg	2.5 mg/kg	95.5	80.0	120	----
iron	7439-89-6	E472	5	mg/kg	10 mg/kg	99.8	80.0	120	----
lead	7439-92-1	E472	0.05	mg/kg	5 mg/kg	98.5	80.0	120	----
lithium	7439-93-2	E472	0.5	mg/kg	2.5 mg/kg	97.1	80.0	120	----

Sub-Matrix: **Biota**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Metals (QCLot: 562365) - continued									
magnesium	7439-95-4	E472	2	mg/kg	500 mg/kg	101	80.0	120	----
manganese	7439-96-5	E472	0.05	mg/kg	2.5 mg/kg	100	80.0	120	----
molybdenum	7439-98-7	E472	0.04	mg/kg	2.5 mg/kg	99.6	80.0	120	----
nickel	7440-02-0	E472	0.2	mg/kg	5 mg/kg	96.8	80.0	120	----
phosphorus	7723-14-0	E472	10	mg/kg	100 mg/kg	108	80.0	120	----
potassium	7440-09-7	E472	20	mg/kg	500 mg/kg	101	80.0	120	----
rubidium	7440-17-7	E472	0.05	mg/kg	1 mg/kg	103	80.0	120	----
selenium	7782-49-2	E472	0.1	mg/kg	10 mg/kg	98.2	80.0	120	----
sodium	7440-23-5	E472	20	mg/kg	500 mg/kg	102	80.0	120	----
strontium	7440-24-6	E472	0.1	mg/kg	2.5 mg/kg	98.0	80.0	120	----
tellurium	13494-80-9	E472	0.02	mg/kg	1 mg/kg	93.8	80.0	120	----
thallium	7440-28-0	E472	0.002	mg/kg	10 mg/kg	101	80.0	120	----
tin	7440-31-5	E472	0.1	mg/kg	5 mg/kg	98.0	80.0	120	----
uranium	7440-61-1	E472	0.002	mg/kg	0.05 mg/kg	102	80.0	120	----
vanadium	7440-62-2	E472	0.1	mg/kg	5 mg/kg	102	80.0	120	----
zinc	7440-66-6	E472	1	mg/kg	5 mg/kg	97.0	80.0	120	----
zirconium	7440-67-7	E472	0.2	mg/kg	1 mg/kg	98.9	80.0	120	----

Qualifiers

Qualifier	Description
MES	*Data Quality Objective was marginally exceeded (by < 10% absolute) for < 10% of analytes in a Multi-Element Scan / Multi-Parameter Scan (considered acceptable as per OMOE & CCME).*

Reference Material (RM) Report

A Reference Material (RM) is a homogenous material with known and well-established analyte concentrations. RMs are processed in an identical manner to test samples, and are used to monitor and control the accuracy and precision of a test method for a typical sample matrix. RM results are expressed as percent recovery of the target analyte concentration. RM targets may be certified target concentrations provided by the RM supplier, or may be ALS long-term mean values (for empirical test methods).

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Metals (QCLot: 554356)									
	RM	aluminum	7429-90-5	E440	11.2 mg/kg	102	70.0	130	----
	RM	arsenic	7440-38-2	E440	34.6 mg/kg	102	70.0	130	----
	RM	bismuth	7440-69-9	E440	0.0247 mg/kg	85.2	60.0	140	----
	RM	cadmium	7440-43-9	E440	14.5 mg/kg	95.5	70.0	130	----
	RM	calcium	7440-70-2	E440	550 mg/kg	101	70.0	130	----
	RM	cesium	7440-46-2	E440	0.0712 mg/kg	104	70.0	130	----
	RM	chromium	7440-47-3	E440	1.96 mg/kg	110	70.0	130	----
	RM	cobalt	7440-48-4	E440	0.267 mg/kg	97.1	70.0	130	----
	RM	copper	7440-50-8	E440	35 mg/kg	101	70.0	130	----
	RM	iron	7439-89-6	E440	1070 mg/kg	101	70.0	130	----
	RM	lead	7439-92-1	E440	0.162 mg/kg	97.8	70.0	130	----
	RM	magnesium	7439-95-4	E440	940 mg/kg	100	70.0	130	----
	RM	manganese	7439-96-5	E440	8.91 mg/kg	100	70.0	130	----
	RM	molybdenum	7439-98-7	E440	1.41 mg/kg	102	70.0	130	----
	RM	nickel	7440-02-0	E440	1.57 mg/kg	97.6	70.0	130	----
	RM	phosphorus	7723-14-0	E440	11500 mg/kg	101	70.0	130	----
	RM	potassium	7440-09-7	E440	14400 mg/kg	102	70.0	130	----
	RM	rubidium	7440-17-7	E440	5.11 mg/kg	98.7	70.0	130	----
	RM	selenium	7782-49-2	E440	8 mg/kg	103	70.0	130	----
	RM	sodium	7440-23-5	E440	10673 mg/kg	99.8	70.0	130	----
	RM	strontium	7440-24-6	E440	3.92 mg/kg	100	70.0	130	----
	RM	thallium	7440-28-0	E440	0.013 mg/kg	86.7	70.0	130	----
	RM	uranium	7440-61-1	E440	0.0786 mg/kg	108	70.0	130	----
	RM	vanadium	7440-62-2	E440	0.51 mg/kg	99.2	70.0	130	----
	RM	zinc	7440-66-6	E440	105.3 mg/kg	98.9	70.0	130	----
Metals (QCLot: 554357)									
	RM	mercury	7439-97-6	E510A	0.331 mg/kg wwt	114	70.0	130	----
Metals (QCLot: 554358)									

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Metals (QCLot: 554358) - continued									
	RM	silver	7440-22-4	E440.Ag	2.05 mg/kg	102	70.0	130	----
Metals (QCLot: 554359)									
	RM	mercury	7439-97-6	E510	0.331 mg/kg	114	70.0	130	----
Metals (QCLot: 554382)									
	RM	aluminum	7429-90-5	E440	11.2 mg/kg	90.8	70.0	130	----
	RM	arsenic	7440-38-2	E440	34.6 mg/kg	99.4	70.0	130	----
	RM	bismuth	7440-69-9	E440	0.0247 mg/kg	83.2	60.0	140	----
	RM	cadmium	7440-43-9	E440	14.5 mg/kg	92.7	70.0	130	----
	RM	calcium	7440-70-2	E440	550 mg/kg	98.8	70.0	130	----
	RM	cesium	7440-46-2	E440	0.0712 mg/kg	95.4	70.0	130	----
	RM	chromium	7440-47-3	E440	1.96 mg/kg	105	70.0	130	----
	RM	cobalt	7440-48-4	E440	0.267 mg/kg	95.6	70.0	130	----
	RM	copper	7440-50-8	E440	35 mg/kg	97.3	70.0	130	----
	RM	iron	7439-89-6	E440	1070 mg/kg	97.8	70.0	130	----
	RM	magnesium	7439-95-4	E440	940 mg/kg	101	70.0	130	----
	RM	manganese	7439-96-5	E440	8.91 mg/kg	99.9	70.0	130	----
	RM	molybdenum	7439-98-7	E440	1.41 mg/kg	99.3	70.0	130	----
	RM	nickel	7440-02-0	E440	1.57 mg/kg	95.9	70.0	130	----
	RM	phosphorus	7723-14-0	E440	11500 mg/kg	100	70.0	130	----
	RM	potassium	7440-09-7	E440	14400 mg/kg	101	70.0	130	----
	RM	rubidium	7440-17-7	E440	5.11 mg/kg	94.4	70.0	130	----
	RM	selenium	7782-49-2	E440	8 mg/kg	97.6	70.0	130	----
	RM	sodium	7440-23-5	E440	10673 mg/kg	101	70.0	130	----
	RM	strontium	7440-24-6	E440	3.92 mg/kg	97.2	70.0	130	----
	RM	thallium	7440-28-0	E440	0.013 mg/kg	73.0	70.0	130	----
	RM	uranium	7440-61-1	E440	0.0786 mg/kg	103	70.0	130	----
	RM	vanadium	7440-62-2	E440	0.51 mg/kg	97.0	70.0	130	----
	RM	zinc	7440-66-6	E440	105.3 mg/kg	96.8	70.0	130	----
Metals (QCLot: 554383)									
	RM	mercury	7439-97-6	E510A	0.331 mg/kg wwt	116	70.0	130	----
Metals (QCLot: 554384)									

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Metals (QCLot: 554384) - continued									
	RM	silver	7440-22-4	E440.Ag	2.05 mg/kg	99.3	70.0	130	----
Metals (QCLot: 554385)									
	RM	mercury	7439-97-6	E510	0.331 mg/kg	116	70.0	130	----
Metals (QCLot: 554395)									
	RM	aluminum	7429-90-5	E440	11.2 mg/kg	89.6	70.0	130	----
	RM	arsenic	7440-38-2	E440	34.6 mg/kg	99.5	70.0	130	----
	RM	bismuth	7440-69-9	E440	0.0247 mg/kg	88.8	60.0	140	----
	RM	cadmium	7440-43-9	E440	14.5 mg/kg	94.9	70.0	130	----
	RM	calcium	7440-70-2	E440	550 mg/kg	106	70.0	130	----
	RM	cesium	7440-46-2	E440	0.0712 mg/kg	98.8	70.0	130	----
	RM	chromium	7440-47-3	E440	1.96 mg/kg	99.3	70.0	130	----
	RM	cobalt	7440-48-4	E440	0.267 mg/kg	98.7	70.0	130	----
	RM	copper	7440-50-8	E440	35 mg/kg	99.3	70.0	130	----
	RM	iron	7439-89-6	E440	1070 mg/kg	98.3	70.0	130	----
	RM	lead	7439-92-1	E440	0.162 mg/kg	95.3	70.0	130	----
	RM	magnesium	7439-95-4	E440	940 mg/kg	101	70.0	130	----
	RM	manganese	7439-96-5	E440	8.91 mg/kg	100	70.0	130	----
	RM	molybdenum	7439-98-7	E440	1.41 mg/kg	99.7	70.0	130	----
	RM	nickel	7440-02-0	E440	1.57 mg/kg	92.0	70.0	130	----
	RM	phosphorus	7723-14-0	E440	11500 mg/kg	102	70.0	130	----
	RM	potassium	7440-09-7	E440	14400 mg/kg	100	70.0	130	----
	RM	rubidium	7440-17-7	E440	5.11 mg/kg	99.5	70.0	130	----
	RM	selenium	7782-49-2	E440	8 mg/kg	98.4	70.0	130	----
	RM	sodium	7440-23-5	E440	10673 mg/kg	98.0	70.0	130	----
	RM	strontium	7440-24-6	E440	3.92 mg/kg	101	70.0	130	----
	RM	thallium	7440-28-0	E440	0.013 mg/kg	75.3	70.0	130	----
	RM	uranium	7440-61-1	E440	0.0786 mg/kg	102	70.0	130	----
	RM	vanadium	7440-62-2	E440	0.51 mg/kg	99.3	70.0	130	----
	RM	zinc	7440-66-6	E440	105.3 mg/kg	97.2	70.0	130	----
Metals (QCLot: 554396)									
	RM	mercury	7439-97-6	E510A	0.331 mg/kg wwt	114	70.0	130	----

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Metals (QCLot: 554397)									
	RM	silver	7440-22-4	E440.Ag	2.05 mg/kg	100	70.0	130	----
Metals (QCLot: 554398)									
	RM	mercury	7439-97-6	E510	0.331 mg/kg	114	70.0	130	----
Metals (QCLot: 562338)									
	RM	silver	7440-22-4	E472.Ag	2.05 mg/kg	80.1	70.0	130	----
Metals (QCLot: 562340)									
	RM	mercury	7439-97-6	E511	0.331 mg/kg	94.9	70.0	130	----
Metals (QCLot: 562341)									
	RM	mercury	7439-97-6	E511A	0.331 mg/kg wwt	94.9	70.0	130	----
Metals (QCLot: 562342)									
	RM	aluminum	7429-90-5	E472	11.2 mg/kg	125	70.0	130	----
	RM	arsenic	7440-38-2	E472	34.6 mg/kg	89.3	70.0	130	----
	RM	bismuth	7440-69-9	E472	0.0247 mg/kg	64.1	60.0	140	----
	RM	cadmium	7440-43-9	E472	14.5 mg/kg	81.8	70.0	130	----
	RM	calcium	7440-70-2	E472	550 mg/kg	81.1	70.0	130	----
	RM	cesium	7440-46-2	E472	0.0712 mg/kg	85.8	70.0	130	----
	RM	chromium	7440-47-3	E472	1.96 mg/kg	85.0	70.0	130	----
	RM	cobalt	7440-48-4	E472	0.267 mg/kg	82.0	70.0	130	----
	RM	copper	7440-50-8	E472	35 mg/kg	83.8	70.0	130	----
	RM	iron	7439-89-6	E472	1070 mg/kg	86.8	70.0	130	----
	RM	lead	7439-92-1	E472	0.162 mg/kg	# 69.9	70.0	130	MES
	RM	magnesium	7439-95-4	E472	940 mg/kg	86.3	70.0	130	----
	RM	manganese	7439-96-5	E472	8.91 mg/kg	85.3	70.0	130	----
	RM	molybdenum	7439-98-7	E472	1.41 mg/kg	85.4	70.0	130	----
	RM	nickel	7440-02-0	E472	1.57 mg/kg	73.9	70.0	130	----
	RM	phosphorus	7723-14-0	E472	11500 mg/kg	76.8	70.0	130	----
	RM	potassium	7440-09-7	E472	14400 mg/kg	90.3	70.0	130	----
	RM	rubidium	7440-17-7	E472	5.11 mg/kg	84.1	70.0	130	----
	RM	selenium	7782-49-2	E472	8 mg/kg	87.1	70.0	130	----
	RM	sodium	7440-23-5	E472	10673 mg/kg	84.0	70.0	130	----
	RM	strontium	7440-24-6	E472	3.92 mg/kg	83.6	70.0	130	----
	RM	thallium	7440-28-0	E472	0.013 mg/kg	80.1	70.0	130	----

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Metals (QCLot: 562342) - continued									
	RM	uranium	7440-61-1	E472	0.0786 mg/kg	90.1	70.0	130	----
	RM	vanadium	7440-62-2	E472	0.51 mg/kg	85.2	70.0	130	----
	RM	zinc	7440-66-6	E472	105.3 mg/kg	86.7	70.0	130	----
Metals (QCLot: 562350)									
	RM	silver	7440-22-4	E472.Ag	2.05 mg/kg	88.6	70.0	130	----
Metals (QCLot: 562352)									
	RM	mercury	7439-97-6	E511	0.331 mg/kg	102	70.0	130	----
Metals (QCLot: 562353)									
	RM	mercury	7439-97-6	E511A	0.331 mg/kg wwt	102	70.0	130	----
Metals (QCLot: 562354)									
	RM	aluminum	7429-90-5	E472	11.2 mg/kg	88.3	70.0	130	----
	RM	arsenic	7440-38-2	E472	34.6 mg/kg	97.0	70.0	130	----
	RM	bismuth	7440-69-9	E472	0.0247 mg/kg	84.2	60.0	140	----
	RM	cadmium	7440-43-9	E472	14.5 mg/kg	89.0	70.0	130	----
	RM	calcium	7440-70-2	E472	550 mg/kg	98.8	70.0	130	----
	RM	cesium	7440-46-2	E472	0.0712 mg/kg	93.4	70.0	130	----
	RM	chromium	7440-47-3	E472	1.96 mg/kg	84.7	70.0	130	----
	RM	cobalt	7440-48-4	E472	0.267 mg/kg	84.9	70.0	130	----
	RM	copper	7440-50-8	E472	35 mg/kg	90.7	70.0	130	----
	RM	iron	7439-89-6	E472	1070 mg/kg	93.1	70.0	130	----
	RM	lead	7439-92-1	E472	0.162 mg/kg	78.8	70.0	130	----
	RM	magnesium	7439-95-4	E472	940 mg/kg	92.9	70.0	130	----
	RM	manganese	7439-96-5	E472	8.91 mg/kg	93.2	70.0	130	----
	RM	molybdenum	7439-98-7	E472	1.41 mg/kg	95.1	70.0	130	----
	RM	nickel	7440-02-0	E472	1.57 mg/kg	84.0	70.0	130	----
	RM	phosphorus	7723-14-0	E472	11500 mg/kg	99.4	70.0	130	----
	RM	potassium	7440-09-7	E472	14400 mg/kg	97.9	70.0	130	----
	RM	rubidium	7440-17-7	E472	5.11 mg/kg	91.9	70.0	130	----
	RM	selenium	7782-49-2	E472	8 mg/kg	93.3	70.0	130	----
	RM	sodium	7440-23-5	E472	10673 mg/kg	93.6	70.0	130	----
	RM	strontium	7440-24-6	E472	3.92 mg/kg	93.0	70.0	130	----

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Metals (QCLot: 562354) - continued									
	RM	thallium	7440-28-0	E472	0.013 mg/kg	82.8	70.0	130	----
	RM	uranium	7440-61-1	E472	0.0786 mg/kg	94.1	70.0	130	----
	RM	vanadium	7440-62-2	E472	0.51 mg/kg	91.9	70.0	130	----
	RM	zinc	7440-66-6	E472	105.3 mg/kg	91.6	70.0	130	----
Metals (QCLot: 562361)									
	RM	silver	7440-22-4	E472.Ag	2.05 mg/kg	83.4	70.0	130	----
Metals (QCLot: 562363)									
	RM	mercury	7439-97-6	E511	0.331 mg/kg	96.7	70.0	130	----
Metals (QCLot: 562364)									
	RM	mercury	7439-97-6	E511A	0.331 mg/kg wwt	96.7	70.0	130	----
Metals (QCLot: 562365)									
	RM	aluminum	7429-90-5	E472	11.2 mg/kg	84.7	70.0	130	----
	RM	arsenic	7440-38-2	E472	34.6 mg/kg	95.4	70.0	130	----
	RM	bismuth	7440-69-9	E472	0.0247 mg/kg	82.7	60.0	140	----
	RM	cadmium	7440-43-9	E472	14.5 mg/kg	87.0	70.0	130	----
	RM	calcium	7440-70-2	E472	550 mg/kg	86.0	70.0	130	----
	RM	cesium	7440-46-2	E472	0.0712 mg/kg	88.1	70.0	130	----
	RM	chromium	7440-47-3	E472	1.96 mg/kg	105	70.0	130	----
	RM	cobalt	7440-48-4	E472	0.267 mg/kg	87.5	70.0	130	----
	RM	copper	7440-50-8	E472	35 mg/kg	90.0	70.0	130	----
	RM	iron	7439-89-6	E472	1070 mg/kg	91.0	70.0	130	----
	RM	lead	7439-92-1	E472	0.162 mg/kg	78.2	70.0	130	----
	RM	magnesium	7439-95-4	E472	940 mg/kg	93.3	70.0	130	----
	RM	manganese	7439-96-5	E472	8.91 mg/kg	91.6	70.0	130	----
	RM	molybdenum	7439-98-7	E472	1.41 mg/kg	88.5	70.0	130	----
	RM	nickel	7440-02-0	E472	1.57 mg/kg	94.7	70.0	130	----
	RM	phosphorus	7723-14-0	E472	11500 mg/kg	102	70.0	130	----
	RM	potassium	7440-09-7	E472	14400 mg/kg	97.9	70.0	130	----
	RM	rubidium	7440-17-7	E472	5.11 mg/kg	91.1	70.0	130	----
	RM	selenium	7782-49-2	E472	8 mg/kg	96.0	70.0	130	----
	RM	sodium	7440-23-5	E472	10673 mg/kg	94.6	70.0	130	----

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Metals (QCLot: 562365) - continued									
	RM	strontium	7440-24-6	E472	3.92 mg/kg	85.9	70.0	130	----
	RM	thallium	7440-28-0	E472	0.013 mg/kg	81.6	70.0	130	----
	RM	uranium	7440-61-1	E472	0.0786 mg/kg	92.5	70.0	130	----
	RM	vanadium	7440-62-2	E472	0.51 mg/kg	89.5	70.0	130	----
	RM	zinc	7440-66-6	E472	105.3 mg/kg	92.3	70.0	130	----

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Affix ALS barcode label here (lab use only)

COC Number:

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Report To	Contact and company name below will appear on the final report
Company:	Mount Polley Mining Corporation
Contact:	Gabriel Holmes
Phone:	236-317-4946
	Company address below will appear on the final report
Street:	PO Box 12
City/Province:	Likely, BC
Postal Code:	V0L 1N0
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☐ NO
Company:	
Contact:	

Report Format / Distribution

Select Report Format: ☑ ☑ EXCEL ☐ EDD (DIGITAL)

Quality Control (QC) Report with Report ☑ ☐ NO

☐ Compare Results to Criteria on Report - provide details below if box

Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: gabriel.holmes@mountpolley.com

Email 2: kala.ivens@mountpolley.com

Email 3: pstecko@minnow.ca; kbatchelar@minnow.ca

Invoice Distribution

Select Invoice Distribution: ☑ EMAIL ☑ MAIL ☐ FAX

Email 1 or Fax: gabriel.holmes@mountpolley.com

Email 2: kivens@mountpolley.com

Project Information

ALS Account # / Quote #: VA22-MPMC100-002

Job #:

PO / AFE:

LSD:

Oil and Gas Required Fields (client use)

AFE/Cost Center: PO#

Major/Minor Code: Routing Code:

Requisitioner:

Location:

ALS Lab Work Order # (lab use only): 2821

ALS Contact: Can Dang

Sampler: LBo

Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply

Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days): 4 day [P4] ☐ | 3 day [P3] ☐ | 2 day [P2] ☐

EMERGENCY: 1 Business day [E1] ☐ | Same Day, Weekend or Statutory holiday [E0] ☐

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm

For tests that can not be performed according to the service level selected, you will be contacted.

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Moisture Content by Gravimetry (E144)	Mercury in Biota by CVAAS (DRY units, Routine) (E510)	Mercury in Biota by CVAAS (WET units, Routine) (E510A)	Metals in Biota by CRC ICPMS (DRY units, Routine) (E440)	Silver in Biota by CRC ICPMS (DRY units, Routine) (E440 Ag)	Titanium in Biota by CRC ICPMS (DRY units, Routine) (E440 Ti)	Number of Containers
1	POL_LSU-O-1_2022-05	28-May-22	—	Tissue	R	R	R	R	R	R	1
2	POL_LSU-O-2_2022-05	28-May-22	—	Tissue	R	R	R	R	R	R	1
3	POL_LSU-O-3_2022-05	28-May-22	—	Tissue	R	R	R	R	R	R	1
4	POL_LSU-O-4_2022-05	28-May-22	—	Tissue	R	R	R	R	R	R	1
5	POL_LSU-O-5_2022-05	28-May-22	—	Tissue	R	R	R	R	R	R	1
6	POL_LSU-O-6_2022-05	28-May-22	—	Tissue	R	R	R	R	R	R	1
7	POL_LSU-O-7_2022-05	28-May-22	—	Tissue	R	R	R	R	R	R	1
8	POL_LSU-O-8_2022-05	28-May-22	—	Tissue	R	R	R	R	R	R	1
9	POL_LSU-Li-1_2022-05	28-May-22	—	Tissue	R	R	R	R	R	R	1
10	POL_LSU-Li-2_2022-05	28-May-22	—	Tissue	R	R	R	R	R	R	1
11	POL_LSU-Li-3_2022-05	28-May-22	—	Tissue	R	R	R	R	R	R	1
12	POL_LSU-Li-4_2022-05	28-May-22	—	Tissue	R	R	R	R	R	R	1

Environmental Division
Vancouver
Work Order Reference
VA22B2821

Telephone : +1 604 253 4188

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ ☐

Are samples for human drinking water use? ☐ ☐

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

If sample insufficient for routine digestion and analysis, contact kbatchelar@minnow.ca to discuss analysis options (e.g., microdigestion and HR-ICPMS). Internal PO 22-29 Task 3

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice Packs ☐ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
			8	8	

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Katharina Batchelar	Date: 7-June-22	Time: 12:00	Received by:	Date:	Time:	Received by: IT	Date: Jun 8/22	Time: 10:30 AM

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

OCTOBER 2015 FRONT

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1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Affix ALS barcode label here (lab use only)

COC Number:

Report To	Contact and company name below will appear on the final report
Company:	Mount Polley Mining Corporation
Contact:	Gabriel Holmes
Phone:	236-317-4946
	Company address below will appear on the final report
Street:	PO Box 12
City/Province:	Likely, BC
Postal Code:	V0L 1N0
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☐ NO
Company:	
Contact:	

Report Format / Distribution

Select Report Format: ☑ ☑ EXCEL ☐ EDD (DIGITAL)

Quality Control (QC) Report with Report ☑ ☐ NO

☐ Compare Results to Criteria on Report - provide details below if box

Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: gabriel.holmes@mountpolley.com

Email 2: kala.ivens@mountpolley.com

Email 3: pstecko@minnow.ca; kbatchelar@minnow.ca

Invoice Distribution

Select Invoice Distribution: ☑ EMAIL ☑ MAIL ☐ FAX

Email 1 or Fax: gabriel.holmes@mountpolley.com

Email 2: kivens@mountpolley.com

Project Information

ALS Account # / Quote #: VA22-MPMC100-002

Job #:

PO / AFE:

LSD:

Oil and Gas Required Fields (client use)

AFE/Cost Center: PO#

Major/Minor Code: Routing Code:

Requisitioner:

Location:

ALS Lab Work Order # (lab use only):

ALS Contact: Can Dang

Sampler: LBo

Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply

Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days): 4 day [P4] ☐ | 3 day [P3] ☐ | 2 day [P2] ☐

EMERGENCY: 1 Business day [E1] ☐ | Same Day, Weekend or Statutory holiday [E0] ☐

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm

For tests that can not be performed according to the service level selected, you will be contacted.

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Moisture Content by Gravimetry (E144)	Mercury in Biota by CVAAS (DRY units, Routine) (E510)	Mercury in Biota by CVAAS (WET units, Routine) (E510A)	Metals in Biota by CRC ICPMS (DRY units, Routine) (E440)	Silver in Biota by CRC ICPMS (DRY units, Routine) (E440.Ag)	Titanium in Biota by CRC ICPMS (DRY units, Routine) (E440.Ti)	Number of Containers
13	POL_LSU-Li-5_2022-05	28-May-22	—	Tissue	R	R	R	R	R	R	1
14	POL_LSU-Li-6_2022-05	28-May-22	—	Tissue	R	R	R	R	R	R	1
15	POL_LSU-Li-7_2022-05	28-May-22	—	Tissue	R	R	R	R	R	R	1
16	POL_LSU-Li-8_2022-05	28-May-22	—	Tissue	R	R	R	R	R	R	1
17	POL_LSU-Ki-1_2022-05	28-May-22	—	Tissue	R	R	R	R	R	R	1
18	POL_LSU-Ki-2_2022-05	28-May-22	—	Tissue	R	R	R	R	R	R	1
19	POL_LSU-Ki-3_2022-05	28-May-22	—	Tissue	R	R	R	R	R	R	1
20	POL_LSU-Ki-4_2022-05	28-May-22	—	Tissue	R	R	R	R	R	R	1
21	POL_LSU-Ki-5_2022-05	28-May-22	—	Tissue	R	R	R	R	R	R	1
22	POL_LSU-Ki-6_2022-05	28-May-22	—	Tissue	R	R	R	R	R	R	1
23	POL_LSU-Ki-7_2022-05	28-May-22	—	Tissue	R	R	R	R	R	R	1
24	POL_LSU-Ki-8_2022-05	28-May-22	—	Tissue	R	R	R	R	R	R	1

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ ☐

Are samples for human drinking water use? ☐ ☐

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

If sample insufficient for routine digestion and analysis, contact kbatchelar@minnow.ca to discuss analysis options (e.g., microdigestion and HR-ICPMS). Internal PO 22-29 Task 3

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice Packs ☐ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C		FINAL COOLER TEMPERATURES °C	
		9	8

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Katharina Batchelar	Date: 7-June-22	Time: 12:00	Received by:	Date:	Time:	Received by: IT	Date: Jun 8/22	Time: 10:30

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

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OCTOBER 2015 FRONT

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1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form.**

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Affix ALS barcode label here (lab use only)

COC Number:

Page 9 of 12

Report To	Contact and company name below will appear on the final report
Company:	Mount Polley Mining Corporation
Contact:	Gabriel Holmes
Phone:	236-317-4946
	Company address below will appear on the final report
Street:	PO Box 12
City/Province:	Likely, BC
Postal Code:	V0L 1N0
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☐ NO
Company:	
Contact:	

Report Format / Distribution	
Select Report Format:	☑ EXCEL ☐ EDD (DIGITAL)
Quality Control (QC) Report with Report	☑ ☐ NO
☐ Compare Results to Criteria on Report - provide details below if box	
Select Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	gabriel.holmes@mountpolley.com
Email 2	kala.ivens@mountpolley.com
Email 3	pstecko@minnow.ca; kbatchelar@minnow.ca
Invoice Distribution	
Select Invoice Distribution:	☑ EMAIL ☑ MAIL ☐ FAX
Email 1 or Fax	gabriel.holmes@mountpolley.com
Email 2	kivens@mountpolley.com

Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply

Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days)		EMERGENCY	
	4 day [P4] ☐		1 Business day [E1] ☐
	3 day [P3] ☐		Same Day, Weekend or Statutory holiday [E0] ☐
	2 day [P2] ☐		

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm

For tests that can not be performed according to the service level selected, you will be contacted.

Project Information		Oil and Gas Required Fields (client use)	
ALS Account # / Quote #:	VA22-MPMC100-002	AFE/Cost Center:	PO#
Job #:		Major/Minor Code:	Routing Code:
PO / AFE:		Requisitioner:	
LSD:		Location:	
ALS Lab Work Order # (lab use only)		ALS Contact: Can Dang	Sampler: LBo

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Moisture Content by Gravimetry (E144)	Mercury in Biota by CVAAS (DRY units, Routine) (E510)	Mercury in Biota by CVAAS (WET units, Routine) (E510A)	Metals in Biota by CRC ICPMS (DRY units, Routine) (E440)	Silver in Biota by CRC ICPMS (DRY units) Routine) (E440-Ag)	Titanium in Biota by CRC ICPMS (DRY units, Routine) (E440-Ti)	Number of Containers
28	BOL_LSU-M-1_2022-05	30-May-22	—	Tissue	R	R	R	R	R	R	1
26	BOL_LSU-M-2_2022-05	30-May-22	—	Tissue	R	R	R	R	R	R	1
~~29~~	BOL_LSU-M-3_2022-05	30-May-22	—	Tissue	R	R	R	R	R	R	1
28	BOL_LSU-M-4_2022-05	30-May-22	—	Tissue	R	R	R	R	R	R	1
29	BOL_LSU-M-5_2022-05	31-May-22	—	Tissue	R	R	R	R	R	R	1
30	BOL_LSU-M-6_2022-05	31-May-22	—	Tissue	R	R	R	R	R	R	1
31	BOL_LSU-M-7_2022-05	31-May-22	—	Tissue	R	R	R	R	R	R	1
32	BOL_LSU-M-8_2022-05	31-May-22	—	Tissue	R	R	R	R	R	R	1
33	BOL_LSU-O-1_2022-05	30-May-22	—	Tissue	R	R	R	R	R	R	1
34	BOL_LSU-O-2_2022-05	30-May-22	—	Tissue	R	R	R	R	R	R	1
35	BOL_LSU-O-3_2022-05	30-May-22	—	Tissue	R	R	R	R	R	R	1
36	BOL_LSU-O-4_2022-05	30 May-22	—	Tissue	R	R	R	R	R	R	1

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ ☐

Are samples for human drinking water use? ☐ ☐

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

If sample insufficient for routine digestion and analysis, contact kbatchelar@minnow.ca to discuss analysis options (e.g., microdigestion and HR-ICPMS). Internal PO 22-29 Task 3

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice Packs ☐ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C		FINAL COOLER TEMPERATURES °C	
		8	8

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by:	Date:	Time:	Received by:	Date:	Time:	Received by:	Date:	Time:
Katharina Batchelar	7-June-22	12:00				IT	Jun 8/22	10:32 AM

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

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Chain of Custody (COC) / Analytical Request Form

ALS Environmental

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Affix ALS barcode label here (lab use only)

COC Number:

Page 10 of 12

Report To	Contact and company name below will appear on the final report
Company:	Mount Polley Mining Corporation
Contact:	Gabriel Holmes
Phone:	236-317-4946
	Company address below will appear on the final report
Street:	PO Box 12
City/Province:	Likely, BC
Postal Code:	V0L 1N0
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☐ NO
Company:	
Contact:	

Report Format / Distribution	
Select Report Format:	☑ EXCEL ☐ EDD (DIGITAL)
Quality Control (QC) Report with Report	☑ ☐ NO
☐ Compare Results to Criteria on Report - provide details below if box	
Select Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	gabriel.holmes@mountpolley.com
Email 2	kala.ivens@mountpolley.com
Email 3	pstecko@minnow.ca; kbatchelar@minnow.ca
Invoice Distribution	
Select Invoice Distribution:	☑ EMAIL ☑ MAIL ☐ FAX
Email 1 or Fax	gabriel.holmes@mountpolley.com
Email 2	kivens@mountpolley.com

Project Information		Oil and Gas Required Fields (client use)	
ALS Account # / Quote #:	VA22-MPMC100-002	AFE/Cost Center:	PO#
Job #:		Major/Minor Code:	Routing Code:
PO / AFE:		Requisitioner:	
LSD:		Location:	
ALS Lab Work Order # (lab use only)		ALS Contact: Can Dang	Sampler: LBo

Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply

Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days)		EMERGENCY	
4 day [P4]	☐	1 Business day [E1]	☐
3 day [P3]	☐	Same Day, Weekend or Statutory holiday [E0]	☐
2 day [P2]	☐		

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm

For tests that can not be performed according to the service level selected, you will be contacted.

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Moisture Content by Gravimetry (E144)	Mercury in Biota by CVAAS (DRY units, Routine) (E510)	Mercury in Biota by CVAAS (WET units, Routine) (E510A)	Metals in Biota by CRC ICPMS (DRY units, Routine) (E440)	Silver in Biota by CRC ICPMS (DRY units, Routine) (E440.Ag)	Titanium in Biota by CRC ICPMS (DRY units, Routine) (E440.Ti)	Number of Containers
37	BOL_LSU-O-5_2022-05	31-May-22	—	Tissue	R	R	R	R	R	R	1
38	BOL_LSU-O-6_2022-05	31-May-22	—	Tissue	R	R	R	R	R	R	1
39	BOL_LSU-O-7_2022-05	31-May-22	—	Tissue	R	R	R	R	R	R	1
40	BOL_LSU-O-8_2022-05	31-May-22	—	Tissue	R	R	R	R	R	R	1
41	BOL_LSU-Li-1_2022-05	30-May-22	—	Tissue	R	R	R	R	R	R	1
42	BOL_LSU-Li-2_2022-05	30-May-22	—	Tissue	R	R	R	R	R	R	1
43	BOL_LSU-Li-3_2022-05	30-May-22	—	Tissue	R	R	R	R	R	R	1
44	BOL_LSU-Li-4_2022-05	30-May-22	—	Tissue	R	R	R	R	R	R	1
45	BOL_LSU-Li-5_2022-05	31-May-22	—	Tissue	R	R	R	R	R	R	1
46	BOL_LSU-Li-6_2022-05	31-May-22	—	Tissue	R	R	R	R	R	R	1
47	BOL_LSU-Li-7_2022-05	31-May-22	—	Tissue	R	R	R	R	R	R	1
48	BOL_LSU-Li-8_2022-05	31-May-22	—	Tissue	R	R	R	R	R	R	1

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ ☐

Are samples for human drinking water use? ☐ ☐

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

If sample insufficient for routine digestion and analysis, contact kbatchelar@minnow.ca to discuss analysis options (e.g., microdigestion and HR-ICPMS). Internal PO 22-29 Task 3

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice Packs ☐ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
			8	8	

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by:	Date:	Time:	Received by:	Date:	Time:	Received by:	Date:	Time:
Katharina Batchelar	7-June-22	12:00				JT	Jun 8/22	10:32AM

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

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OCTOBER 2015 FRONT

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1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form.**

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Affix ALS barcode label here (lab use only)

COC Number:

Page 11 of 12

Report To	Contact and company name below will appear on the final report
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Contact:	Gabriel Holmes
Phone:	236-317-4946
	Company address below will appear on the final report
Street:	PO Box 12
City/Province:	Likely, BC
Postal Code:	V0L 1N0
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☐ NO
Company:	
Contact:	

Report Format / Distribution

Select Report Format: ☑ ☑ EXCEL ☐ EDD (DIGITAL)

Quality Control (QC) Report with Report ☑ ☐ NO

☐ Compare Results to Criteria on Report - provide details below if box

Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: gabriel.holmes@mountpolley.com

Email 2: kala.ivens@mountpolley.com

Email 3: pstecko@minnow.ca; kbatchelar@minnow.ca

Invoice Distribution

Select Invoice Distribution: ☑ EMAIL ☑ MAIL ☐ FAX

Email 1 or Fax: gabriel.holmes@mountpolley.com

Email 2: kivens@mountpolley.com

Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply

Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days)			EMERGENCY	
	4 day [P4]	☐		1 Business day [E1] ☐
	3 day [P3]	☐		Same Day, Weekend or Statutory holiday [E0] ☐
	2 day [P2]	☐		

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm

For tests that can not be performed according to the service level selected, you will be contacted.

Project Information

ALS Account # / Quote #: VA22-MPMC100-002

Job #:

PO / AFE:

LSD:

Oil and Gas Required Fields (client use)

AFE/Cost Center: PO#

Major/Minor Code: Routing Code:

Requisitioner:

Location:

ALS Lab Work Order # (lab use only):

ALS Contact: Can Dang Sampler: LBO

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Moisture Content by Gravimetry (E144)	Mercury in Biota by CVAAS (DRY units, Routine) (E510)	Mercury in Biota by CVAAS (WET units, Routine) (E510A)	Metals in Biota by CRC ICPMS (DRY units, Routine) (E440)	Silver in Biota by CRC ICPMS (DRY units, Routine) (E440.Ag)	Titanium in Biota by CRC ICPMS (DRY units, Routine) (E440.Ti)	Number of Containers
49	BOL_LSU-Ki-1_2022-05	30-May-22	—	Tissue	R	R	R	R	R	R	1
50	BOL_LSU-Ki-2_2022-05	30-May-22	—	Tissue	R	R	R	R	R	R	1
51	BOL_LSU-Ki-3_2022-05	30-May-22	—	Tissue	R	R	R	R	R	R	1
52	BOL_LSU-Ki-4_2022-05	30-May-22	—	Tissue	R	R	R	R	R	R	1
53	BOL_LSU-Ki-5_2022-05	31-May-22	—	Tissue	R	R	R	R	R	R	1
54	BOL_LSU-Ki-6_2022-05	31-May-22	—	Tissue	R	R	R	R	R	R	1
55	BOL_LSU-Ki-7_2022-05	31-May-22	—	Tissue	R	R	R	R	R	R	1
56	BOL_LSU-Ki-8_2022-05	31-May-22	—	Tissue	R	R	R	R	R	R	1
57	POL_BB-M-2 X_2022-05	29-May-22	—	Tissue	R	R	R	R	R	R	1
58	POL_LG-M-5 X_2022-05	28-May-22	—	Tissue	R	R	R	R	R	R	1
59	BOL_BB-M-7 X_2022-05	30-May-22	—	Tissue	R	R	R	R	R	R	1
60	POL_BB-O-4 X_2022-05	29-May-22	—	Tissue	R	R	R	R	R	R	1

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ ☐

Are samples for human drinking water use? ☐ ☐

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

If sample insufficient for routine digestion and analysis, contact kbatchelar@minnow.ca to discuss analysis options (e.g., microdigestion and HR-ICPMS). Internal PO 22-29 Task 3

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice Packs ☐ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
			8	8	

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Katharina Batchelar	Date: 7-June-22	Time: 12:00	Received by:	Date:	Time:	Received by: TT	Date: Tue 8/22	Time: 10:30 AM

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

OCTOBER 2015 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form**.

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Affix ALS barcode label here (lab use only)

COC Number:

Page 12 of 12

Report To	Contact and company name below will appear on the final report
Company:	Mount Polley Mining Corporation
Contact:	Gabriel Holmes
Phone:	236-317-4946
	Company address below will appear on the final report
Street:	PO Box 12
City/Province:	Likely, BC
Postal Code:	V0L 1N0
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☐ NO
Company:	
Contact:	

Report Format / Distribution

Select Report Format: ☑ ☑ EXCEL ☐ EDD (DIGITAL)

Quality Control (QC) Report with Report ☑ ☐ NO

☐ Compare Results to Criteria on Report - provide details below if box

Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: gabriel.holmes@mountpolley.com

Email 2: kala.ivens@mountpolley.com

Email 3: pstecko@minnow.ca; kbatchelar@minnow.ca

Invoice Distribution

Select Invoice Distribution: ☑ EMAIL ☑ MAIL ☐ FAX

Email 1 or Fax: gabriel.holmes@mountpolley.com

Email 2: kivens@mountpolley.com

Project Information

ALS Account # / Quote #:	VA22-MPMC100-002
Job #:	
PO / AFE:	
LSD:	

Oil and Gas Required Fields (client use)

AFE/Cost Center:	PO#
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Lab Work Order # (lab use only):

ALS Contact: Can Dang

Sampler: LBo

Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply

Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days): 4 day [P4] ☐ | 3 day [P3] ☐ | 2 day [P2] ☐

EMERGENCY: 1 Business day [E1] ☐ | Same Day, Weekend or Statutory holiday [E0] ☐

Date and Time Required for all E&P TATs: ____ (dd-mmm-yy hh:mm)

For tests that can not be performed according to the service level selected, you will be contacted.

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Moisture Content by Gravimetry (E144)	Mercury in Biota by CVAAS (DRY units, Routine) (E510)	Mercury in Biota by CVAAS (WET units, Routine) (E510A)	Metals in Biota by CRC ICPMS (DRY units, Routine) (E440)	Silver in Biota by CRC ICPMS (DRY units, Routine) (E440.Ag)	Titanium in Biota by CRC ICPMS (DRY units, Routine) (E440.Ti)	Number of Containers
61	POL_BB-Q7 X_2022-05	29-May-22	—	Tissue	R	R	R	R	R	R	1
62	BOL_BB-Q8 X_2022-05	30-May-22	—	Tissue	R	R	R	R	R	R	1
63	POL_ISA-Li3 X_2022-05	28-May-22	—	Tissue	R	R	R	R	R	R	1
64	POL_BB-Li6 X_2022-05	29-May-22	—	Tissue	R	R	R	R	R	R	1
65	BOL_ISA-Li2 X_2022-05	30-May-22	—	Tissue	R	R	R	R	R	R	1
66	POL_BB-Ki4 X_2022-05	28-May-22	—	Tissue	R	R	R	R	R	R	1
67	POL_ISA-Ki3 X_2022-05	29-May-22	—	Tissue	R	R	R	R	R	R	1
68	BOL_ISA-Ki6 X_2022-05	31-May-22	—	Tissue	R	R	R	R	R	R	1

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ ☐

Are samples for human drinking water use? ☐ ☐

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

If sample insufficient for routine digestion and analysis, contact kbatchelar@minnow.ca to discuss analysis options (e.g., microdigestion and HR-ICPMS). Internal PO 22-29 Task 3

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice Packs ☐ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
			8	8	

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by:	Date:	Time:	Received by:	Date:	Time:	Received by:	Date:	Time:
Katharina Batchelar	7-June-22	12:00				JT	Jun 8/22	10:30AM

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

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1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

FISH TISSUE CHEMISTRY

ALS Laboratory Report VA22C4917

(Finalized January 30, 2023)

ALS Canada Ltd.

right solutions. right partner.

CERTIFICATE OF ANALYSIS

Work Order	: **VA22C4917**	Page	: 1 of 74
Client	: **Mount Polley Mining Corporation**	Laboratory	: Vancouver - Environmental
Contact	: Kala Ivens	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: 250-790-2215 Ext 2112	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 12-Oct-2022 10:40
PO	: 5590008044 Q2 2022	Date Analysis Commenced	: 04-Jan-2023
C-O-C number	: ----	Issue Date	: 30-Jan-2023 17:53
Sampler	: ABA, HQA, PLE, SLA		
Site	: ----		
Quote number	: VA22-MPMC100-002		
No. of samples received	: 147		
No. of samples analysed	: 147		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Alex Thornton	Analyst	Metals, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Kinny Wu	Lab Analyst	Metals, Burnaby, British Columbia
Owen Cheng		Metals, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Metals, Burnaby, British Columbia
Salimah Khimani	Lab Assistant	Metals, Burnaby, British Columbia
Sam Silveira	Lab Assistant	Metals, Burnaby, British Columbia

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances

LOR: Limit of Reporting (detection limit).

Unit	*Description*
%	percent
mg/kg	milligrams per kilogram
mg/kg wwt	milligrams per kilogram wet weight

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Qualifiers

Qualifier	*Description*
DLB	*Detection Limit Raised. Analyte detected at comparable level in Method Blank.*
DLIS	*Detection Limit Adjusted due to insufficient sample.*

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	QUL-NHC_NSC-WB-1_2022-10	QUL-NHC_NSC-WB-2_2022-10	QUL-NHC_NSC-WB-3_2022-10	QUL-NHC_NSC-WB-4_2022-10	QUL-NHC_NSC-WB-5_2022-10
					Client sampling date / time	04-Oct-2022	04-Oct-2022	04-Oct-2022	04-Oct-2022	04-Oct-2022
						VA22C4917-001	VA22C4917-002	VA22C4917-003	VA22C4917-004	VA22C4917-005
						Result	Result	Result	Result	Result
Physical Tests										
Moisture	----	E144	0.50	%		72.8	69.6	75.3	71.3	70.0
Metals										
Aluminum	7429-90-5	E440	2.0	mg/kg		<2.0	<2.0	<2.0	<2.0	<2.0
Antimony	7440-36-0	E440	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	<0.010
Arsenic	7440-38-2	E440	0.020	mg/kg		0.108	0.130	0.050	0.246	0.187
Barium	7440-39-3	E440	0.050	mg/kg		0.610	1.15	1.44	1.03	0.646
Beryllium	7440-41-7	E440	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	<0.010
Bismuth	7440-69-9	E440	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	<0.010
Boron	7440-42-8	E440	1.0	mg/kg		<1.0	<1.0	<1.0	<1.0	<1.0
Cadmium	7440-43-9	E440	0.0050	mg/kg		0.0487	0.0940	0.0545	0.0583	0.0388
Calcium	7440-70-2	E440	20	mg/kg		13700	15400	41800	22400	18400
Cesium	7440-46-2	E440	0.0050	mg/kg		0.0866	0.0770	0.103	0.0366	0.0806
Chromium	7440-47-3	E440	0.050	mg/kg		<0.050	<0.050	<0.050	<0.050	0.064
Cobalt	7440-48-4	E440	0.020	mg/kg		0.038	0.024	0.049	<0.020	<0.020
Copper	7440-50-8	E440	0.10	mg/kg		2.19	2.14	2.47	2.34	1.90
Iron	7439-89-6	E440	3.0	mg/kg		29.2	19.4	20.7	27.1	17.3
Lead	7439-92-1	E440	0.020	mg/kg		<0.020	<0.020	<0.020	<0.020	<0.020
Lithium	7439-93-2	E440	0.50	mg/kg		<0.50	<0.50	<0.50	<0.50	<0.50
Magnesium	7439-95-4	E440	2.0	mg/kg		1650	1290	2050	1340	1310
Manganese	7439-96-5	E440	0.050	mg/kg		3.30	3.51	7.39	4.04	3.98
Mercury	7439-97-6	E510	0.0050	mg/kg		0.509	0.282	0.398	0.376	0.308
Mercury	7439-97-6	E510A	0.0010	mg/kg wwt		0.138	0.0856	0.0980	0.108	0.0927
Molybdenum	7439-98-7	E440	0.020	mg/kg		0.028	<0.020	0.034	0.024	<0.020
Nickel	7440-02-0	E440	0.20	mg/kg		<0.20	<0.20	<0.20	<0.20	<0.20
Phosphorus	7723-14-0	E440	10	mg/kg		17500	16800	35200	21600	18600
Potassium	7440-09-7	E440	20	mg/kg		14100	13800	15700	14800	12600
Rubidium	7440-17-7	E440	0.050	mg/kg		29.2	18.0	27.7	16.3	26.7
Selenium	7782-49-2	E440	0.050	mg/kg		3.30	5.37	3.38	5.99	2.37
Silver	7440-22-4	E440.Ag	0.0050	mg/kg		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Sodium	7440-23-5	E440	20	mg/kg		2060	1980	2310	2190	1770

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	QUL-NHC_NSC-WB-1_2022-10	QUL-NHC_NSC-WB-2_2022-10	QUL-NHC_NSC-WB-3_2022-10	QUL-NHC_NSC-WB-4_2022-10	QUL-NHC_NSC-WB-5_2022-10
					Client sampling date / time	04-Oct-2022	04-Oct-2022	04-Oct-2022	04-Oct-2022	04-Oct-2022
						VA22C4917-001	VA22C4917-002	VA22C4917-003	VA22C4917-004	VA22C4917-005
						Result	Result	Result	Result	Result
Metals										
Strontium	7440-24-6	E440	0.050	mg/kg		18.8	21.5	51.9	24.7	25.6
Tellurium	13494-80-9	E440	0.020	mg/kg		<0.020	<0.020	<0.020	<0.020	<0.020
Thallium	7440-28-0	E440	0.0020	mg/kg		0.0044	0.0040	0.0126	0.0048	0.0058
Tin	7440-31-5	E440	0.10	mg/kg		0.23	0.13	0.31	0.33	0.22
Titanium	7440-32-6	E440.Ti	0.25	mg/kg		<0.25	<0.25	<0.25	<0.25	<0.25
Uranium	7440-61-1	E440	0.0020	mg/kg		0.0023	<0.0020	0.0032	<0.0020	<0.0020
Vanadium	7440-62-2	E440	0.10	mg/kg		<0.10	<0.10	<0.10	<0.10	<0.10
Zinc	7440-66-6	E440	0.50	mg/kg		70.2	82.9	98.2	80.3	72.2
Zirconium	7440-67-7	E440	0.20	mg/kg		<0.20	<0.20	<0.20	<0.20	<0.20

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	QUL-NHC_NSC-WB-6_2022-10	QUL-NHC_NSC-WB-7_2022-10	QUL-NHC_NSC-WB-8_2022-10	QUL-NGC_NSC-WB-1_2022-10	QUL-NGC_NSC-WB-2_2022-10
					Client sampling date / time	04-Oct-2022	04-Oct-2022	04-Oct-2022	06-Oct-2022	06-Oct-2022
						VA22C4917-006	VA22C4917-007	VA22C4917-008	VA22C4917-009	VA22C4917-010
						Result	Result	Result	Result	Result
Physical Tests										
Moisture	----	E144	0.50	%		74.6	77.0	74.0	68.3	70.1
Metals										
Aluminum	7429-90-5	E440	2.0	mg/kg		<2.0	333	<2.0	<2.0	<2.0
Antimony	7440-36-0	E440	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	<0.010
Arsenic	7440-38-2	E440	0.020	mg/kg		0.082	0.358	0.082	0.036	0.043
Barium	7440-39-3	E440	0.050	mg/kg		0.918	4.30	0.905	0.497	1.07
Beryllium	7440-41-7	E440	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	<0.010
Bismuth	7440-69-9	E440	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	<0.010
Boron	7440-42-8	E440	1.0	mg/kg		<1.0	<1.0	<1.0	<1.0	<1.0
Cadmium	7440-43-9	E440	0.0050	mg/kg		0.0321	0.200	0.0307	0.0173	0.0312
Calcium	7440-70-2	E440	20	mg/kg		20600	25200	20800	18800	30700
Cesium	7440-46-2	E440	0.0050	mg/kg		0.0668	0.102	0.0761	0.190	0.0770
Chromium	7440-47-3	E440	0.050	mg/kg		0.059	0.714	0.052	<0.050	<0.050
Cobalt	7440-48-4	E440	0.020	mg/kg		0.037	0.474	0.022	0.046	0.134
Copper	7440-50-8	E440	0.10	mg/kg		2.03	7.11	2.42	2.23	2.45
Iron	7439-89-6	E440	3.0	mg/kg		37.4	567	20.8	21.7	24.3
Lead	7439-92-1	E440	0.020	mg/kg		<0.020	0.164	<0.020	0.025	0.024
Lithium	7439-93-2	E440	0.50	mg/kg		<0.50	<0.50	<0.50	<0.50	<0.50
Magnesium	7439-95-4	E440	2.0	mg/kg		1400	1800	1390	1420	2290
Manganese	7439-96-5	E440	0.050	mg/kg		7.95	24.6	4.26	5.23	7.39
Mercury	7439-97-6	E510	0.0050	mg/kg		0.272	0.423	0.352	0.372	0.202
Mercury	7439-97-6	E510A	0.0010	mg/kg wwt		0.0691	0.0972	0.0915	0.118	0.0606
Molybdenum	7439-98-7	E440	0.020	mg/kg		0.025	0.081	<0.020	0.033	0.022
Nickel	7440-02-0	E440	0.20	mg/kg		<0.20	0.81	<0.20	<0.20	<0.20
Phosphorus	7723-14-0	E440	10	mg/kg		20900	23600	19600	19000	25300
Potassium	7440-09-7	E440	20	mg/kg		15300	14500	11900	12100	11400
Rubidium	7440-17-7	E440	0.050	mg/kg		22.4	21.1	20.6	32.0	16.7
Selenium	7782-49-2	E440	0.050	mg/kg		3.05	3.09	2.41	1.41	2.31
Silver	7440-22-4	E440.Ag	0.0050	mg/kg		<0.0050	0.0114	<0.0050	<0.0050	0.0093
Sodium	7440-23-5	E440	20	mg/kg		1970	2070	1480	1620	2040

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	QUL-NHC_NSC-WB-6_2022-10	QUL-NHC_NSC-WB-7_2022-10	QUL-NHC_NSC-WB-8_2022-10	QUL-NGC_NSC-WB-1_2022-10	QUL-NGC_NSC-WB-2_2022-10
					Client sampling date / time	04-Oct-2022	04-Oct-2022	04-Oct-2022	06-Oct-2022	06-Oct-2022
						VA22C4917-006	VA22C4917-007	VA22C4917-008	VA22C4917-009	VA22C4917-010
						Result	Result	Result	Result	Result
Metals										
Strontium	7440-24-6	E440	0.050	mg/kg		25.6	50.1	31.1	33.8	56.6
Tellurium	13494-80-9	E440	0.020	mg/kg		<0.020	<0.020	<0.020	<0.020	<0.020
Thallium	7440-28-0	E440	0.0020	mg/kg		0.0031	0.0199	0.0064	0.0077	0.0063
Tin	7440-31-5	E440	0.10	mg/kg		0.34	0.35	0.46	0.28	0.52
Titanium	7440-32-6	E440.Ti	0.25	mg/kg		<0.25	17.6	<0.25	<0.25	<0.25
Uranium	7440-61-1	E440	0.0020	mg/kg		0.0052	0.0321	0.0046	<0.0020	0.0039
Vanadium	7440-62-2	E440	0.10	mg/kg		<0.10	1.12	<0.10	<0.10	<0.10
Zinc	7440-66-6	E440	0.50	mg/kg		70.7	97.7	96.4	88.7	111
Zirconium	7440-67-7	E440	0.20	mg/kg		<0.20	0.21	<0.20	<0.20	<0.20

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	QUL-NGC_NSC-WB-3_2022-10	QUL-NGC_NSC-WB-4_2022-10	QUL-NGC_NSC-WB-5_2022-10	QUL-NGC_NSC-WB-6_2022-10	QUL-NGC_NSC-WB-7_2022-10
					Client sampling date / time	06-Oct-2022	06-Oct-2022	06-Oct-2022	06-Oct-2022	06-Oct-2022
						VA22C4917-011	VA22C4917-012	VA22C4917-013	VA22C4917-014	VA22C4917-015
						Result	Result	Result	Result	Result
Physical Tests										
Moisture	----	E144	0.50	%		73.0	77.3	73.1	74.3	74.2
Metals										
Aluminum	7429-90-5	E440	2.0	mg/kg		<2.0	<2.0	<2.0	<2.0	<2.0
Antimony	7440-36-0	E440	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	<0.010
Arsenic	7440-38-2	E440	0.020	mg/kg		0.031	0.335	0.105	0.076	0.079
Barium	7440-39-3	E440	0.050	mg/kg		0.211	0.882	0.723	0.504	0.925
Beryllium	7440-41-7	E440	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	<0.010
Bismuth	7440-69-9	E440	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	<0.010
Boron	7440-42-8	E440	1.0	mg/kg		<1.0	<1.0	<1.0	<1.0	<1.0
Cadmium	7440-43-9	E440	0.0050	mg/kg		0.0098	0.0314	0.0441	0.0217	0.0240
Calcium	7440-70-2	E440	20	mg/kg		5620	22800	27300	18200	32900
Cesium	7440-46-2	E440	0.0050	mg/kg		0.118	0.0867	0.271	0.163	0.158
Chromium	7440-47-3	E440	0.050	mg/kg		<0.050	<0.050	<0.050	<0.050	<0.050
Cobalt	7440-48-4	E440	0.020	mg/kg		0.146	0.049	0.045	0.043	0.055
Copper	7440-50-8	E440	0.10	mg/kg		2.67	2.26	2.20	2.23	2.14
Iron	7439-89-6	E440	3.0	mg/kg		27.1	43.1	18.2	25.0	28.1
Lead	7439-92-1	E440	0.020	mg/kg		<0.020	0.021	0.027	<0.020	0.021
Lithium	7439-93-2	E440	0.50	mg/kg		<0.50	<0.50	<0.50	<0.50	<0.50
Magnesium	7439-95-4	E440	2.0	mg/kg		1990	1590	1640	1370	1770
Manganese	7439-96-5	E440	0.050	mg/kg		3.40	7.57	3.98	3.87	9.32
Mercury	7439-97-6	E510	0.0050	mg/kg		0.380	0.594	0.517	0.606	0.299
Mercury	7439-97-6	E510A	0.0010	mg/kg wwt		0.103	0.135	0.139	0.156	0.0770
Molybdenum	7439-98-7	E440	0.020	mg/kg		0.026	0.037	0.021	0.024	0.031
Nickel	7440-02-0	E440	0.20	mg/kg		<0.20	<0.20	<0.20	<0.20	<0.20
Phosphorus	7723-14-0	E440	10	mg/kg		11000	22400	25200	19600	29400
Potassium	7440-09-7	E440	20	mg/kg		13000	16800	14100	15600	15100
Rubidium	7440-17-7	E440	0.050	mg/kg		26.7	21.0	38.0	30.8	29.8
Selenium	7782-49-2	E440	0.050	mg/kg		1.52	2.33	1.64	1.78	1.86
Silver	7440-22-4	E440.Ag	0.0050	mg/kg		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Sodium	7440-23-5	E440	20	mg/kg		2350	2610	2280	2360	2450

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	QUL-NGC_NSC-WB-3_2022-10	QUL-NGC_NSC-WB-4_2022-10	QUL-NGC_NSC-WB-5_2022-10	QUL-NGC_NSC-WB-6_2022-10	QUL-NGC_NSC-WB-7_2022-10
					Client sampling date / time	06-Oct-2022	06-Oct-2022	06-Oct-2022	06-Oct-2022	06-Oct-2022
						VA22C4917-011	VA22C4917-012	VA22C4917-013	VA22C4917-014	VA22C4917-015
						Result	Result	Result	Result	Result
Metals										
Strontium	7440-24-6	E440	0.050	mg/kg		9.20	37.7	42.0	32.9	55.3
Tellurium	13494-80-9	E440	0.020	mg/kg		<0.020	<0.020	<0.020	<0.020	<0.020
Thallium	7440-28-0	E440	0.0020	mg/kg		0.0067	0.0053	0.0067	0.0038	0.0075
Tin	7440-31-5	E440	0.10	mg/kg		0.58	0.30	0.33	0.28	0.22
Titanium	7440-32-6	E440.Ti	0.25	mg/kg		<0.25	<0.25	<0.25	<0.25	<0.25
Uranium	7440-61-1	E440	0.0020	mg/kg		<0.0020	0.0091	0.0035	0.0025	0.0062
Vanadium	7440-62-2	E440	0.10	mg/kg		<0.10	<0.10	<0.10	<0.10	<0.10
Zinc	7440-66-6	E440	0.50	mg/kg		64.8	103	86.0	67.4	80.5
Zirconium	7440-67-7	E440	0.20	mg/kg		<0.20	<0.20	<0.20	<0.20	<0.20

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	QUL-NGC_NSC-WB-8_2022-10	QUL-NHC_PCC-M-1_2022-10	QUL-NHC_PCC-M-2_2022-10	QUL-NHC_PCC-M-3_2022-10	QUL-NHC_PCC-M-4_2022-10
					Client sampling date / time	06-Oct-2022	04-Oct-2022	04-Oct-2022	04-Oct-2022	04-Oct-2022
						VA22C4917-016	VA22C4917-017	VA22C4917-018	VA22C4917-019	VA22C4917-020
						Result	Result	Result	Result	Result
Physical Tests										
Moisture	----	E144	0.50	%		74.7	76.5	76.7	75.7	73.5
Metals										
Aluminum	7429-90-5	E440	2.0	mg/kg		2.6	4.5	2.3	<2.0	<2.0
Antimony	7440-36-0	E440	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	<0.010
Arsenic	7440-38-2	E440	0.020	mg/kg		0.038	0.433	0.379	0.194	0.208
Barium	7440-39-3	E440	0.050	mg/kg		0.331	0.935	0.888	0.583	0.686
Beryllium	7440-41-7	E440	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	<0.010
Bismuth	7440-69-9	E440	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	<0.010
Boron	7440-42-8	E440	1.0	mg/kg		<1.0	<1.0	<1.0	<1.0	<1.0
Cadmium	7440-43-9	E440	0.0050	mg/kg		0.0170	0.0124	0.0176	0.0322	0.0125
Calcium	7440-70-2	E440	20	mg/kg		12800	3390	4000	4800	1880
Cesium	7440-46-2	E440	0.0050	mg/kg		0.148	0.0881	0.0860	0.108	0.0825
Chromium	7440-47-3	E440	0.050	mg/kg		0.070	0.914	0.182	0.087	0.055
Cobalt	7440-48-4	E440	0.020	mg/kg		0.096	0.033	0.027	0.030	0.032
Copper	7440-50-8	E440	0.10	mg/kg		3.39	2.38	1.57	1.12	1.60
Iron	7439-89-6	E440	3.0	mg/kg		70.7	33.6	23.4	13.5	15.9
Lead	7439-92-1	E440	0.020	mg/kg		0.024	0.022	<0.020	<0.020	<0.020
Lithium	7439-93-2	E440	0.50	mg/kg		<0.50	<0.50	<0.50	<0.50	<0.50
Magnesium	7439-95-4	E440	2.0	mg/kg		1050	1790	1570	1670	1480
Manganese	7439-96-5	E440	0.050	mg/kg		2.69	2.20	1.95	1.96	1.14
Mercury	7439-97-6	E510	0.0050	mg/kg		0.342	0.963	1.33	0.893	0.515
Mercury	7439-97-6	E510A	0.0010	mg/kg wwt		0.0865	0.226	0.310	0.217	0.136
Molybdenum	7439-98-7	E440	0.020	mg/kg		0.060	<0.020	<0.020	<0.020	<0.020
Nickel	7440-02-0	E440	0.20	mg/kg		<0.20	<0.20	<0.20	<0.20	<0.20
Phosphorus	7723-14-0	E440	10	mg/kg		15500	13900	13600	13400	11300
Potassium	7440-09-7	E440	20	mg/kg		15700	21800	21900	19700	18500
Rubidium	7440-17-7	E440	0.050	mg/kg		26.4	28.0	35.2	22.2	22.8
Selenium	7782-49-2	E440	0.050	mg/kg		1.82	4.06	3.23	3.36	2.94
Silver	7440-22-4	E440.Ag	0.0050	mg/kg		0.0067	<0.0050	<0.0050	<0.0050	<0.0050
Sodium	7440-23-5	E440	20	mg/kg		2520	1140	1490	1250	1050

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	QUL-NGC_NSC-WB-8_2022-10	QUL-NHC_PCC-M-1_2022-10	QUL-NHC_PCC-M-2_2022-10	QUL-NHC_PCC-M-3_2022-10	QUL-NHC_PCC-M-4_2022-10
					Client sampling date / time	06-Oct-2022	04-Oct-2022	04-Oct-2022	04-Oct-2022	04-Oct-2022
						VA22C4917-016	VA22C4917-017	VA22C4917-018	VA22C4917-019	VA22C4917-020
						Result	Result	Result	Result	Result
Metals										
Strontium	7440-24-6	E440	0.050	mg/kg		19.5	6.26	7.40	9.15	3.45
Tellurium	13494-80-9	E440	0.020	mg/kg		<0.020	<0.020	<0.020	<0.020	<0.020
Thallium	7440-28-0	E440	0.0020	mg/kg		0.0056	0.0133	0.0101	<0.0020	0.0049
Tin	7440-31-5	E440	0.10	mg/kg		0.41	0.70	1.02	1.78	0.74
Titanium	7440-32-6	E440.Ti	0.25	mg/kg		<0.25	0.36	0.25	<0.25	<0.25
Uranium	7440-61-1	E440	0.0020	mg/kg		0.0036	0.0060	0.0052	0.0043	<0.0020
Vanadium	7440-62-2	E440	0.10	mg/kg		<0.10	<0.10	<0.10	<0.10	<0.10
Zinc	7440-66-6	E440	0.50	mg/kg		63.1	19.0	29.7	20.4	27.5
Zirconium	7440-67-7	E440	0.20	mg/kg		<0.20	<0.20	<0.20	<0.20	<0.20

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	QUL-NHC_PCC-M-5_2022-10	QUL-NHC_PCC-M-6_2022-10	QUL-NHC_PCC-M-7_2022-10	QUL-NHC_PCC-M-8_2022-10	QUL-NHC_PCC-Li-1_2022-10
					Client sampling date / time	04-Oct-2022	04-Oct-2022	04-Oct-2022	04-Oct-2022	04-Oct-2022
						VA22C4917-021	VA22C4917-022	VA22C4917-023	VA22C4917-024	VA22C4917-025
						Result	Result	Result	Result	Result
Physical Tests										
Moisture	----	E144	0.50	%		77.2	80.5	78.2	77.2	----
Moisture	----	E144-H	2.0	%		----	----	----	----	53.3
Metals										
Aluminum	7429-90-5	E440	2.0	mg/kg		<2.0	<2.0	<2.0	<2.0	----
Aluminum	7429-90-5	E472	5.0	mg/kg		----	----	----	----	11.0
Antimony	7440-36-0	E472	0.010	mg/kg		----	----	----	----	<0.010
Antimony	7440-36-0	E440	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	----
Arsenic	7440-38-2	E440	0.020	mg/kg		0.365	0.384	0.775	0.352	----
Arsenic	7440-38-2	E472	0.030	mg/kg		----	----	----	----	0.367
Barium	7440-39-3	E472	0.050	mg/kg		----	----	----	----	0.577
Barium	7440-39-3	E440	0.050	mg/kg		1.49	1.06	0.622	0.979	----
Beryllium	7440-41-7	E472	0.010	mg/kg		----	----	----	----	<0.010
Beryllium	7440-41-7	E440	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	----
Bismuth	7440-69-9	E472	0.010	mg/kg		----	----	----	----	<0.010
Bismuth	7440-69-9	E440	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	----
Boron	7440-42-8	E472	1.0	mg/kg		----	----	----	----	<1.0
Boron	7440-42-8	E440	1.0	mg/kg		<1.0	<1.0	<1.0	<1.0	----
Cadmium	7440-43-9	E440	0.0050	mg/kg		0.0091	0.0210	0.0062	0.0119	----
Cadmium	7440-43-9	E472	0.010	mg/kg		----	----	----	----	0.722
Calcium	7440-70-2	E472	20	mg/kg		----	----	----	----	148
Calcium	7440-70-2	E440	20	mg/kg		5720	3400	3880	3860	----
Cesium	7440-46-2	E472	0.0050	mg/kg		----	----	----	----	0.0159
Cesium	7440-46-2	E440	0.0050	mg/kg		0.0821	0.103	0.0932	0.0794	----
Chromium	7440-47-3	E440	0.050	mg/kg		0.486	0.129	0.074	0.087	----
Chromium	7440-47-3	E472	0.20	mg/kg		----	----	----	----	0.24
Cobalt	7440-48-4	E472	0.020	mg/kg		----	----	----	----	0.152
Cobalt	7440-48-4	E440	0.020	mg/kg		0.030	0.046	0.030	0.026	----
Copper	7440-50-8	E440	0.10	mg/kg		2.57	2.75	1.76	2.20	----
Copper	7440-50-8	E472	0.20	mg/kg		----	----	----	----	7.97
Iron	7439-89-6	E440	3.0	mg/kg		30.4	31.5	19.2	23.3	----

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	QUL-NHC_PCC-M-5_2022-10	QUL-NHC_PCC-M-6_2022-10	QUL-NHC_PCC-M-7_2022-10	QUL-NHC_PCC-M-8_2022-10	QUL-NHC_PCC-Li-1_2022-10
					Client sampling date / time	04-Oct-2022	04-Oct-2022	04-Oct-2022	04-Oct-2022	04-Oct-2022
						VA22C4917-021	VA22C4917-022	VA22C4917-023	VA22C4917-024	VA22C4917-025
						Result	Result	Result	Result	Result
Metals										
Iron	7439-89-6	E472	5.0	mg/kg		----	----	----	----	558
Lead	7439-92-1	E440	0.020	mg/kg		<0.020	0.024	0.022	<0.020	----
Lead	7439-92-1	E472	0.050	mg/kg		----	----	----	----	<0.050
Lithium	7439-93-2	E472	0.50	mg/kg		----	----	----	----	<0.50
Lithium	7439-93-2	E440	0.50	mg/kg		<0.50	<0.50	<0.50	<0.50	----
Magnesium	7439-95-4	E472	2.0	mg/kg		----	----	----	----	432
Magnesium	7439-95-4	E440	2.0	mg/kg		1610	2100	1420	1640	----
Manganese	7439-96-5	E472	0.050	mg/kg		----	----	----	----	2.77
Manganese	7439-96-5	E440	0.050	mg/kg		2.12	1.76	2.04	1.82	----
Mercury	7439-97-6	E511	0.0050	mg/kg		----	----	----	----	0.286
Mercury	7439-97-6	E510	0.0050	mg/kg		0.730	0.856	0.758	1.15	----
Mercury	7439-97-6	E511A	0.0010	mg/kg wwt		----	----	----	----	0.133
Mercury	7439-97-6	E510A	0.0010	mg/kg wwt		0.167	0.167	0.165	0.263	----
Molybdenum	7439-98-7	E440	0.020	mg/kg		<0.020	<0.020	<0.020	<0.020	----
Molybdenum	7439-98-7	E472	0.040	mg/kg		----	----	----	----	0.403
Nickel	7440-02-0	E472	0.20	mg/kg		----	----	----	----	<0.20
Nickel	7440-02-0	E440	0.20	mg/kg		<0.20	<0.20	<0.20	<0.20	----
Phosphorus	7723-14-0	E472	10	mg/kg		----	----	----	----	6950
Phosphorus	7723-14-0	E440	10	mg/kg		13200	16400	14300	14100	----
Potassium	7440-09-7	E472	20	mg/kg		----	----	----	----	5530
Potassium	7440-09-7	E440	20	mg/kg		21400	25600	22500	21100	----
Rubidium	7440-17-7	E472	0.050	mg/kg		----	----	----	----	7.63
Rubidium	7440-17-7	E440	0.050	mg/kg		18.3	28.7	29.4	24.9	----
Selenium	7782-49-2	E440	0.050	mg/kg		5.00	5.24	4.73	5.88	----
Selenium	7782-49-2	E472	0.10	mg/kg		----	----	----	----	6.35
Silver	7440-22-4	E472.Ag	0.0050	mg/kg		----	----	----	----	0.0172
Silver	7440-22-4	E440.Ag	0.0050	mg/kg		<0.0050	<0.0050	<0.0050	<0.0050	----
Sodium	7440-23-5	E472	20	mg/kg		----	----	----	----	2600
Sodium	7440-23-5	E440	20	mg/kg		1260	1400	1100	1380	----
Strontium	7440-24-6	E440	0.050	mg/kg		10.9	5.79	7.25	7.14	----

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	QUL-NHC_PCC-M-5_2022-10	QUL-NHC_PCC-M-6_2022-10	QUL-NHC_PCC-M-7_2022-10	QUL-NHC_PCC-M-8_2022-10	QUL-NHC_PCC-Li-1_2022-10
					Client sampling date / time	04-Oct-2022	04-Oct-2022	04-Oct-2022	04-Oct-2022	04-Oct-2022
						VA22C4917-021	VA22C4917-022	VA22C4917-023	VA22C4917-024	VA22C4917-025
						Result	Result	Result	Result	Result
Metals										
Strontium	7440-24-6	E472	0.10	mg/kg		----	----	----	----	0.37
Tellurium	13494-80-9	E472	0.020	mg/kg		----	----	----	----	<0.020
Tellurium	13494-80-9	E440	0.020	mg/kg		<0.020	<0.020	<0.020	<0.020	----
Thallium	7440-28-0	E472	0.0020	mg/kg		----	----	----	----	0.0190
Thallium	7440-28-0	E440	0.0020	mg/kg		0.0040	0.0104	0.0086	0.0164	----
Tin	7440-31-5	E472	0.10	mg/kg		----	----	----	----	0.22
Tin	7440-31-5	E440	0.10	mg/kg		2.98	1.52	0.41	0.88	----
Titanium	7440-32-6	E440.Ti	0.25	mg/kg		<0.25	0.25	<0.25	<0.25	----
Titanium	7440-32-6	E472.Ti	0.50	mg/kg		----	----	----	----	<0.50
Uranium	7440-61-1	E472	0.0020	mg/kg		----	----	----	----	0.0240
Uranium	7440-61-1	E440	0.0020	mg/kg		<0.0020	0.0054	0.0024	0.0036	----
Vanadium	7440-62-2	E472	0.10	mg/kg		----	----	----	----	0.49
Vanadium	7440-62-2	E440	0.10	mg/kg		<0.10	<0.10	<0.10	<0.10	----
Zinc	7440-66-6	E440	0.50	mg/kg		28.4	29.8	30.7	27.3	----
Zinc	7440-66-6	E472	1.0	mg/kg		----	----	----	----	47.9
Zirconium	7440-67-7	E472	0.20	mg/kg		----	----	----	----	<0.20
Zirconium	7440-67-7	E440	0.20	mg/kg		<0.20	<0.20	<0.20	<0.20	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	QUL-NHC_PCC-Li-2_2022-10	QUL-NHC_PCC-Li-3_2022-10	QUL-NHC_PCC-Li-4_2022-10	QUL-NHC_PCC-Li-5_2022-10	QUL-NHC_PCC-Li-6_2022-10
					Client sampling date / time	04-Oct-2022	04-Oct-2022	04-Oct-2022	04-Oct-2022	04-Oct-2022
						VA22C4917-026	VA22C4917-027	VA22C4917-028	VA22C4917-029	VA22C4917-030
						Result	Result	Result	Result	Result
Physical Tests										
Moisture	----	E144-H	2.0	%		69.9	61.2	55.8	62.6	61.0
Metals										
Aluminum	7429-90-5	E472	5.0	mg/kg		29.5	11.3	7.7	<5.0	15.4
Antimony	7440-36-0	E472	0.010	mg/kg		0.019	0.011	<0.010	0.016	0.016
Arsenic	7440-38-2	E472	0.030	mg/kg		0.374	0.231	0.232	0.144	0.299
Barium	7440-39-3	E472	0.050	mg/kg		0.379	0.155	0.349	0.149	0.212
Beryllium	7440-41-7	E472	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	<0.010
Bismuth	7440-69-9	E472	0.010	mg/kg		0.012	0.055	0.029	0.030	0.033
Boron	7440-42-8	E472	1.0	mg/kg		<1.0	<1.0	<1.0	<1.0	<1.0
Cadmium	7440-43-9	E472	0.010	mg/kg		1.06	1.29	0.939	0.519	1.59
Calcium	7440-70-2	E472	20	mg/kg		223	170	210	156	170
Cesium	7440-46-2	E472	0.0050	mg/kg		0.0307	0.0411	0.0232	0.0266	0.0224
Chromium	7440-47-3	E472	0.20	mg/kg		0.49	0.26	<0.20	<0.20	0.37
Cobalt	7440-48-4	E472	0.020	mg/kg		0.297	0.217	0.232	0.136	0.250
Copper	7440-50-8	E472	0.20	mg/kg		17.3	18.0	13.1	10.6	24.7
Iron	7439-89-6	E472	5.0	mg/kg		2770	1050	823	793	1240
Lead	7439-92-1	E472	0.050	mg/kg		0.066	<0.050	<0.050	<0.050	0.060
Lithium	7439-93-2	E472	0.50	mg/kg		<0.50	<0.50	<0.50	<0.50	<0.50
Magnesium	7439-95-4	E472	2.0	mg/kg		649	698	593	615	585
Manganese	7439-96-5	E472	0.050	mg/kg		5.44	4.25	4.66	3.85	5.15
Mercury	7439-97-6	E511	0.0050	mg/kg		0.804	0.436	0.265	0.346	0.407
Mercury	7439-97-6	E511A	0.0010	mg/kg wwt		0.242	0.169	0.117	0.129	0.159
Molybdenum	7439-98-7	E472	0.040	mg/kg		1.05	0.690	0.829	0.488	1.04
Nickel	7440-02-0	E472	0.20	mg/kg		0.38	<0.20	<0.20	<0.20	<0.20
Phosphorus	7723-14-0	E472	10	mg/kg		11800	12300	10700	10700	11000
Potassium	7440-09-7	E472	20	mg/kg		11400	9620	7430	8900	8390
Rubidium	7440-17-7	E472	0.050	mg/kg		18.6	12.2	10.2	8.56	9.62
Selenium	7782-49-2	E472	0.10	mg/kg		12.8	9.61	6.45	11.6	9.62
Silver	7440-22-4	E472.Ag	0.0050	mg/kg		0.0703	0.0422	0.0694	0.0106	0.118
Sodium	7440-23-5	E472	20	mg/kg		4550	3080	2720	3310	3290

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	QUL-NHC_PCC-Li-2_2022-10	QUL-NHC_PCC-Li-3_2022-10	QUL-NHC_PCC-Li-4_2022-10	QUL-NHC_PCC-Li-5_2022-10	QUL-NHC_PCC-Li-6_2022-10
					Client sampling date / time	04-Oct-2022	04-Oct-2022	04-Oct-2022	04-Oct-2022	04-Oct-2022
						VA22C4917-026	VA22C4917-027	VA22C4917-028	VA22C4917-029	VA22C4917-030
						Result	Result	Result	Result	Result
Metals										
Strontium	7440-24-6	E472	0.10	mg/kg		0.57	0.46	0.49	0.38	0.45
Tellurium	13494-80-9	E472	0.020	mg/kg		<0.020	<0.020	<0.020	<0.020	<0.020
Thallium	7440-28-0	E472	0.0020	mg/kg		0.0673	0.0124	0.0201	0.0111	0.0276
Tin	7440-31-5	E472	0.10	mg/kg		1.70	0.33	0.40	0.23	0.27
Titanium	7440-32-6	E472.Ti	0.50	mg/kg		<0.50	<0.50	<0.50	<0.50	<0.50
Uranium	7440-61-1	E472	0.0020	mg/kg		0.104	0.0264	0.0174	0.0263	0.0605
Vanadium	7440-62-2	E472	0.10	mg/kg		1.64	0.48	0.44	0.45	1.13
Zinc	7440-66-6	E472	1.0	mg/kg		88.2	84.6	67.8	72.1	85.0
Zirconium	7440-67-7	E472	0.20	mg/kg		<0.20	<0.20	<0.20	<0.20	<0.20

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	QUL-NHC_PCC-Li-7_2022-10	QUL-NHC_PCC-Li-8_2022-10	QUL-NHC_PCC-O-1_2022-10	QUL-NHC_PCC-O-2_2022-10	QUL-NHC_PCC-O-3_2022-10
					Client sampling date / time	04-Oct-2022	04-Oct-2022	04-Oct-2022	04-Oct-2022	04-Oct-2022
						VA22C4917-031	VA22C4917-032	VA22C4917-033	VA22C4917-034	VA22C4917-035
						Result	Result	Result	Result	Result
Physical Tests										
Moisture	----	E144	0.50	%		----	----	62.1	76.3	66.4
Moisture	----	E144-H	2.0	%		57.3	60.0	----	----	----
Metals										
Aluminum	7429-90-5	E440	2.0	mg/kg		----	----	3.0	9.1	<2.0
Aluminum	7429-90-5	E472	5.0	mg/kg		<5.0	15.6	----	----	----
Antimony	7440-36-0	E472	0.010	mg/kg		<0.010	0.018	----	----	----
Antimony	7440-36-0	E440	0.010	mg/kg		----	----	<0.010	<0.010	<0.010
Arsenic	7440-38-2	E440	0.020	mg/kg		----	----	0.282	0.289	0.151
Arsenic	7440-38-2	E472	0.030	mg/kg		0.217	0.622	----	----	----
Barium	7440-39-3	E472	0.050	mg/kg		0.174	0.292	----	----	----
Barium	7440-39-3	E440	0.050	mg/kg		----	----	1.05	1.58	0.445
Beryllium	7440-41-7	E472	0.010	mg/kg		<0.010	<0.010	----	----	----
Beryllium	7440-41-7	E440	0.010	mg/kg		----	----	<0.010	<0.010	<0.010
Bismuth	7440-69-9	E472	0.010	mg/kg		0.020	0.013	----	----	----
Bismuth	7440-69-9	E440	0.010	mg/kg		----	----	<0.010	<0.010	<0.010
Boron	7440-42-8	E472	1.0	mg/kg		<1.0	<1.0	----	----	----
Boron	7440-42-8	E440	1.0	mg/kg		----	----	<1.0	<1.0	<1.0
Cadmium	7440-43-9	E440	0.0050	mg/kg		----	----	0.140	0.176	0.0553
Cadmium	7440-43-9	E472	0.010	mg/kg		0.870	0.872	----	----	----
Calcium	7440-70-2	E472	20	mg/kg		138	166	----	----	----
Calcium	7440-70-2	E440	20	mg/kg		----	----	384	616	372
Cesium	7440-46-2	E472	0.0050	mg/kg		0.0305	0.0205	----	----	----
Cesium	7440-46-2	E440	0.0050	mg/kg		----	----	0.0303	0.0502	0.0508
Chromium	7440-47-3	E440	0.050	mg/kg		----	----	0.210	0.263	<0.050
Chromium	7440-47-3	E472	0.20	mg/kg		<0.20	0.28	----	----	----
Cobalt	7440-48-4	E472	0.020	mg/kg		0.168	0.169	----	----	----
Cobalt	7440-48-4	E440	0.020	mg/kg		----	----	0.117	0.210	0.126
Copper	7440-50-8	E440	0.10	mg/kg		----	----	5.02	6.80	5.35
Copper	7440-50-8	E472	0.20	mg/kg		20.9	18.7	----	----	----
Iron	7439-89-6	E440	3.0	mg/kg		----	----	84.6	250	67.8

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	QUL-NHC_PCC-Li-7_2022-10	QUL-NHC_PCC-Li-8_2022-10	QUL-NHC_PCC-O-1_2022-10	QUL-NHC_PCC-O-2_2022-10	QUL-NHC_PCC-O-3_2022-10
					Client sampling date / time	04-Oct-2022	04-Oct-2022	04-Oct-2022	04-Oct-2022	04-Oct-2022
						VA22C4917-031	VA22C4917-032	VA22C4917-033	VA22C4917-034	VA22C4917-035
						Result	Result	Result	Result	Result
Metals										
Iron	7439-89-6	E472	5.0	mg/kg		599	546	----	----	----
Lead	7439-92-1	E440	0.020	mg/kg		----	----	<0.020	0.038	<0.020
Lead	7439-92-1	E472	0.050	mg/kg		<0.050	0.067	----	----	----
Lithium	7439-93-2	E472	0.50	mg/kg		<0.50	<0.50	----	----	----
Lithium	7439-93-2	E440	0.50	mg/kg		----	----	<0.50	<0.50	<0.50
Magnesium	7439-95-4	E472	2.0	mg/kg		616	525	----	----	----
Magnesium	7439-95-4	E440	2.0	mg/kg		----	----	635	864	715
Manganese	7439-96-5	E472	0.050	mg/kg		4.08	4.05	----	----	----
Manganese	7439-96-5	E440	0.050	mg/kg		----	----	9.57	5.64	11.0
Mercury	7439-97-6	E511	0.0050	mg/kg		0.282	0.556	----	----	----
Mercury	7439-97-6	E510	0.0050	mg/kg		----	----	0.0548	0.168	0.0448
Mercury	7439-97-6	E511A	0.0010	mg/kg wwt		0.120	0.222	----	----	----
Mercury	7439-97-6	E510A	0.0010	mg/kg wwt		----	----	0.0207	0.0398	0.0150
Molybdenum	7439-98-7	E440	0.020	mg/kg		----	----	0.122	0.230	0.126
Molybdenum	7439-98-7	E472	0.040	mg/kg		0.620	0.889	----	----	----
Nickel	7440-02-0	E472	0.20	mg/kg		<0.20	<0.20	----	----	----
Nickel	7440-02-0	E440	0.20	mg/kg		----	----	<0.20	0.30	<0.20
Phosphorus	7723-14-0	E472	10	mg/kg		10600	8320	----	----	----
Phosphorus	7723-14-0	E440	10	mg/kg		----	----	10000	12600	13200
Potassium	7440-09-7	E472	20	mg/kg		7580	7290	----	----	----
Potassium	7440-09-7	E440	20	mg/kg		----	----	8020	14100	9530
Rubidium	7440-17-7	E472	0.050	mg/kg		10.5	8.94	----	----	----
Rubidium	7440-17-7	E440	0.050	mg/kg		----	----	12.3	26.2	13.4
Selenium	7782-49-2	E440	0.050	mg/kg		----	----	19.7	11.1	20.4
Selenium	7782-49-2	E472	0.10	mg/kg		11.7	17.6	----	----	----
Silver	7440-22-4	E472.Ag	0.0050	mg/kg		0.0514	0.122	----	----	----
Silver	7440-22-4	E440.Ag	0.0050	mg/kg		----	----	0.0154	0.0176	0.0138
Sodium	7440-23-5	E472	20	mg/kg		2650	3280	----	----	----
Sodium	7440-23-5	E440	20	mg/kg		----	----	1750	6580	1720
Strontium	7440-24-6	E440	0.050	mg/kg		----	----	0.514	0.972	0.492

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	QUL-NHC_PCC-Li-7_2022-10	QUL-NHC_PCC-Li-8_2022-10	QUL-NHC_PCC-O-1_2022-10	QUL-NHC_PCC-O-2_2022-10	QUL-NHC_PCC-O-3_2022-10
					Client sampling date / time	04-Oct-2022	04-Oct-2022	04-Oct-2022	04-Oct-2022	04-Oct-2022
						VA22C4917-031	VA22C4917-032	VA22C4917-033	VA22C4917-034	VA22C4917-035
						Result	Result	Result	Result	Result
Metals										
Strontium	7440-24-6	E472	0.10	mg/kg		0.38	0.42	----	----	----
Tellurium	13494-80-9	E472	0.020	mg/kg		<0.020	<0.020	----	----	----
Tellurium	13494-80-9	E440	0.020	mg/kg		----	----	<0.020	<0.020	<0.020
Thallium	7440-28-0	E472	0.0020	mg/kg		0.0150	0.0367	----	----	----
Thallium	7440-28-0	E440	0.0020	mg/kg		----	----	0.0104	0.0215	0.0035
Tin	7440-31-5	E472	0.10	mg/kg		0.51	0.31	----	----	----
Tin	7440-31-5	E440	0.10	mg/kg		----	----	0.16	3.50	<0.10
Titanium	7440-32-6	E440.Ti	0.25	mg/kg		----	----	<0.25	0.52	<0.25
Titanium	7440-32-6	E472.Ti	0.50	mg/kg		<0.50	<0.50	----	----	----
Uranium	7440-61-1	E472	0.0020	mg/kg		0.0104	0.0145	----	----	----
Uranium	7440-61-1	E440	0.0020	mg/kg		----	----	0.0112	0.0182	0.0048
Vanadium	7440-62-2	E472	0.10	mg/kg		0.32	0.66	----	----	----
Vanadium	7440-62-2	E440	0.10	mg/kg		----	----	<0.10	0.21	<0.10
Zinc	7440-66-6	E440	0.50	mg/kg		----	----	93.3	220	116
Zinc	7440-66-6	E472	1.0	mg/kg		71.8	64.4	----	----	----
Zirconium	7440-67-7	E472	0.20	mg/kg		<0.20	<0.20	----	----	----
Zirconium	7440-67-7	E440	0.20	mg/kg		----	----	<0.20	<0.20	<0.20

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	QUL-NHC_PCC-O-4_2022-10	QUL-NHC_PCC-O-5_2022-10	QUL-NHC_PCC-O-6_2022-10	QUL-NHC_PCC-O-7_2022-10	QUL-NHC_PCC-Ki-1_2022-10
					Client sampling date / time	04-Oct-2022	04-Oct-2022	04-Oct-2022	04-Oct-2022	04-Oct-2022
						VA22C4917-036	VA22C4917-037	VA22C4917-038	VA22C4917-039	VA22C4917-040
						Result	Result	Result	Result	Result
Physical Tests										
Moisture	----	E144	0.50	%		62.5	64.9	61.0	59.3	----
Moisture	----	E144A	2.0	%		----	----	----	----	31.6
Metals										
Aluminum	7429-90-5	E440	2.0	mg/kg		<2.0	<2.0	<2.0	<2.0	----
Aluminum	7429-90-5	E475	5.0	mg/kg		----	----	----	----	6.6
Antimony	7440-36-0	E440	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	----
Antimony	7440-36-0	E475	0.020	mg/kg		----	----	----	----	<0.020
Arsenic	7440-38-2	E440	0.020	mg/kg		0.159	0.050	0.166	0.126	----
Arsenic	7440-38-2	E475	0.050	mg/kg		----	----	----	----	0.458
Barium	7440-39-3	E475	0.050	mg/kg		----	----	----	----	2.71
Barium	7440-39-3	E440	0.050	mg/kg		0.362	0.158	0.511	0.321	----
Beryllium	7440-41-7	E475	0.010	mg/kg		----	----	----	----	<0.010
Beryllium	7440-41-7	E440	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	----
Bismuth	7440-69-9	E475	0.010	mg/kg		----	----	----	----	0.011
Bismuth	7440-69-9	E440	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	----
Boron	7440-42-8	E475	1.0	mg/kg		----	----	----	----	<1.0
Boron	7440-42-8	E440	1.0	mg/kg		<1.0	<1.0	<1.0	<1.0	----
Cadmium	7440-43-9	E440	0.0050	mg/kg		0.0175	0.0237	0.0270	0.0151	----
Cadmium	7440-43-9	E475	0.010	mg/kg		----	----	----	----	8.14
Calcium	7440-70-2	E475	20	mg/kg		----	----	----	----	256
Calcium	7440-70-2	E440	20	mg/kg		277	470	272	305	----
Cesium	7440-46-2	E475	0.0050	mg/kg		----	----	----	----	0.0276
Cesium	7440-46-2	E440	0.0050	mg/kg		0.0290	0.0363	0.0298	0.0394	----
Chromium	7440-47-3	E440	0.050	mg/kg		<0.050	0.071	0.082	<0.050	----
Chromium	7440-47-3	E475	0.20	mg/kg		----	----	----	----	0.36
Cobalt	7440-48-4	E475	0.020	mg/kg		----	----	----	----	0.941
Cobalt	7440-48-4	E440	0.020	mg/kg		0.097	0.101	0.106	0.089	----
Copper	7440-50-8	E440	0.10	mg/kg		4.11	4.52	4.33	3.74	----
Copper	7440-50-8	E475	0.20	mg/kg		----	----	----	----	3.88
Iron	7439-89-6	E440	3.0	mg/kg		60.5	78.3	47.1	41.6	----

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	QUL-NHC_PCC-O-4_2022-10	QUL-NHC_PCC-O-5_2022-10	QUL-NHC_PCC-O-6_2022-10	QUL-NHC_PCC-O-7_2022-10	QUL-NHC_PCC-Ki-1_2022-10
					Client sampling date / time	04-Oct-2022	04-Oct-2022	04-Oct-2022	04-Oct-2022	04-Oct-2022
						VA22C4917-036	VA22C4917-037	VA22C4917-038	VA22C4917-039	VA22C4917-040
						Result	Result	Result	Result	Result
Metals										
Iron	7439-89-6	E475	5.0	mg/kg		----	----	----	----	324
Lead	7439-92-1	E440	0.020	mg/kg		<0.020	<0.020	<0.020	<0.020	----
Lead	7439-92-1	E475	0.050	mg/kg		----	----	----	----	0.066
Lithium	7439-93-2	E475	0.50	mg/kg		----	----	----	----	<0.50
Lithium	7439-93-2	E440	0.50	mg/kg		<0.50	<0.50	<0.50	<0.50	----
Magnesium	7439-95-4	E475	2.0	mg/kg		----	----	----	----	412
Magnesium	7439-95-4	E440	2.0	mg/kg		547	706	641	540	----
Manganese	7439-96-5	E475	0.050	mg/kg		----	----	----	----	1.85
Manganese	7439-96-5	E440	0.050	mg/kg		9.67	13.2	10.1	9.76	----
Mercury	7439-97-6	E510	0.0050	mg/kg		0.0230	0.0398	0.0249	0.0281	----
Mercury	7439-97-6	E512	0.010	mg/kg		----	----	----	----	0.265
Mercury	7439-97-6	E510A	0.0010	mg/kg wwt		0.0086	0.0140	0.0097	0.0114	----
Mercury	7439-97-6	E512A	0.0020	mg/kg wwt		----	----	----	----	0.181
Molybdenum	7439-98-7	E440	0.020	mg/kg		0.106	0.125	0.088	0.086	----
Molybdenum	7439-98-7	E475	0.040	mg/kg		----	----	----	----	0.337
Nickel	7440-02-0	E475	0.20	mg/kg		----	----	----	----	<1.00 DLB
Nickel	7440-02-0	E440	0.20	mg/kg		<0.20	<0.20	<0.20	<0.20	----
Phosphorus	7723-14-0	E440	10	mg/kg		9790	10800	10600	9610	----
Phosphorus	7723-14-0	E475	20	mg/kg		----	----	----	----	6310
Potassium	7440-09-7	E475	20	mg/kg		----	----	----	----	6360
Potassium	7440-09-7	E440	20	mg/kg		6770	8670	7940	7470	----
Rubidium	7440-17-7	E475	0.050	mg/kg		----	----	----	----	9.48
Rubidium	7440-17-7	E440	0.050	mg/kg		10.5	8.88	10.4	12.6	----
Selenium	7782-49-2	E440	0.050	mg/kg		7.47	28.3	16.6	20.3	----
Selenium	7782-49-2	E475	0.10	mg/kg		----	----	----	----	5.52
Silver	7440-22-4	E475.Ag	0.0050	mg/kg		----	----	----	----	<0.0050
Silver	7440-22-4	E440.Ag	0.0050	mg/kg		0.0152	0.0165	0.0180	0.0097	----
Sodium	7440-23-5	E475	20	mg/kg		----	----	----	----	2820
Sodium	7440-23-5	E440	20	mg/kg		1340	1770	1580	1500	----
Strontium	7440-24-6	E440	0.050	mg/kg		0.326	0.528	0.317	0.459	----

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	QUL-NHC_PCC-O-4_2022-10	QUL-NHC_PCC-O-5_2022-10	QUL-NHC_PCC-O-6_2022-10	QUL-NHC_PCC-O-7_2022-10	QUL-NHC_PCC-Ki-1_2022-10
					Client sampling date / time	04-Oct-2022	04-Oct-2022	04-Oct-2022	04-Oct-2022	04-Oct-2022
						VA22C4917-036	VA22C4917-037	VA22C4917-038	VA22C4917-039	VA22C4917-040
						Result	Result	Result	Result	Result
Metals										
Strontium	7440-24-6	E475	0.10	mg/kg		----	----	----	----	0.59
Tellurium	13494-80-9	E475	0.020	mg/kg		----	----	----	----	<0.020
Tellurium	13494-80-9	E440	0.020	mg/kg		<0.020	<0.020	<0.020	<0.020	----
Thallium	7440-28-0	E475	0.0020	mg/kg		----	----	----	----	0.0207
Thallium	7440-28-0	E440	0.0020	mg/kg		0.0045	0.0032	0.0054	0.0053	----
Tin	7440-31-5	E475	0.10	mg/kg		----	----	----	----	0.49
Tin	7440-31-5	E440	0.10	mg/kg		0.21	0.22	0.22	0.37	----
Titanium	7440-32-6	E440.Ti	0.25	mg/kg		<0.25	<0.25	<0.25	<0.25	----
Titanium	7440-32-6	E475.Ti	0.50	mg/kg		----	----	----	----	<0.50
Uranium	7440-61-1	E475	0.0020	mg/kg		----	----	----	----	0.0429
Uranium	7440-61-1	E440	0.0020	mg/kg		0.0034	0.0061	0.0103	0.0026	----
Vanadium	7440-62-2	E475	0.10	mg/kg		----	----	----	----	0.43
Vanadium	7440-62-2	E440	0.10	mg/kg		<0.10	<0.10	<0.10	<0.10	----
Zinc	7440-66-6	E440	0.50	mg/kg		82.8	98.0	93.0	88.2	----
Zinc	7440-66-6	E475	1.0	mg/kg		----	----	----	----	73.5
Zirconium	7440-67-7	E475	0.20	mg/kg		----	----	----	----	<0.20
Zirconium	7440-67-7	E440	0.20	mg/kg		<0.20	<0.20	<0.20	<0.20	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	QUL-NHC_PCC-Ki-2_2022-10	QUL-NHC_PCC-Ki-3_2022-10	QUL-NHC_PCC-Ki-4_2022-10	QUL-NHC_PCC-Ki-5_2022-10	QUL-NHC_PCC-Ki-6_2022-10
					Client sampling date / time	04-Oct-2022	04-Oct-2022	04-Oct-2022	04-Oct-2022	04-Oct-2022
						VA22C4917-041	VA22C4917-042	VA22C4917-043	VA22C4917-044	VA22C4917-045
						Result	Result	Result	Result	Result
Physical Tests										
Moisture	----	E144A	2.0	%		69.0	48.2	53.9	57.0	50.0
Metals										
Aluminum	7429-90-5	E475	5.0	mg/kg		6.8	<5.0	<5.0	<5.0	7.1
Antimony	7440-36-0	E475	0.020	mg/kg		<0.020	<0.020	<0.020	<0.020	<0.020
Arsenic	7440-38-2	E475	0.050	mg/kg		0.416	0.282	0.276	0.199	0.419
Barium	7440-39-3	E475	0.050	mg/kg		1.96	1.40	1.31	1.29	2.29
Beryllium	7440-41-7	E475	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	<0.010
Bismuth	7440-69-9	E475	0.010	mg/kg		0.013	0.037	0.021	0.024	0.038
Boron	7440-42-8	E475	1.0	mg/kg		1.5	<1.0	2.0	<1.0	1.2
Cadmium	7440-43-9	E475	0.010	mg/kg		19.0	12.9	8.14	6.12	24.6
Calcium	7440-70-2	E475	20	mg/kg		434	277	363	310	958
Cesium	7440-46-2	E475	0.0050	mg/kg		0.0508	0.0529	0.0470	0.0470	0.0462
Chromium	7440-47-3	E475	0.20	mg/kg		0.36	0.24	<0.20	0.28	0.48
Cobalt	7440-48-4	E475	0.020	mg/kg		1.17	2.88	2.90	1.64	4.00
Copper	7440-50-8	E475	0.20	mg/kg		8.54	5.42	5.01	4.29	7.00
Iron	7439-89-6	E475	5.0	mg/kg		534	250	477	286	336
Lead	7439-92-1	E475	0.050	mg/kg		0.052	0.107	0.065	<0.050	0.181
Lithium	7439-93-2	E475	0.50	mg/kg		<0.50	<0.50	<0.50	<0.50	<0.50
Magnesium	7439-95-4	E475	2.0	mg/kg		615	488	563	515	673
Manganese	7439-96-5	E475	0.050	mg/kg		3.25	3.14	4.22	3.18	6.54
Mercury	7439-97-6	E512	0.010	mg/kg		0.336	0.263	0.196	0.197	0.347
Mercury	7439-97-6	E512A	0.0020	mg/kg wwt		0.104	0.136	0.0901	0.0848	0.173
Molybdenum	7439-98-7	E475	0.040	mg/kg		0.741	1.38	0.483	0.311	0.742
Nickel	7440-02-0	E475	0.20	mg/kg		2.29	<1.90 DLB	0.83	0.76	<2.40 DLB
Phosphorus	7723-14-0	E475	20	mg/kg		11100	9730	10900	10100	12800
Potassium	7440-09-7	E475	20	mg/kg		11300	8740	10100	10000	10800
Rubidium	7440-17-7	E475	0.050	mg/kg		21.3	12.2	15.2	10.6	14.9
Selenium	7782-49-2	E475	0.10	mg/kg		7.22	7.49	5.77	7.23	8.99
Silver	7440-22-4	E475.Ag	0.0050	mg/kg		0.0168	<0.0050	<0.0050	<0.0050	0.0118
Sodium	7440-23-5	E475	20	mg/kg		5960	3310	4420	4310	4950

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	QUL-NHC_PCC-Ki-2_2022-10	QUL-NHC_PCC-Ki-3_2022-10	QUL-NHC_PCC-Ki-4_2022-10	QUL-NHC_PCC-Ki-5_2022-10	QUL-NHC_PCC-Ki-6_2022-10
					Client sampling date / time	04-Oct-2022	04-Oct-2022	04-Oct-2022	04-Oct-2022	04-Oct-2022
						VA22C4917-041	VA22C4917-042	VA22C4917-043	VA22C4917-044	VA22C4917-045
						Result	Result	Result	Result	Result
Metals										
Strontium	7440-24-6	E475	0.10	mg/kg		0.98	0.65	0.73	0.64	2.16
Tellurium	13494-80-9	E475	0.020	mg/kg		0.021	0.036	<0.020	0.031	0.045
Thallium	7440-28-0	E475	0.0020	mg/kg		0.0365	0.0325	0.0284	0.0167	0.0488
Tin	7440-31-5	E475	0.10	mg/kg		1.67	0.34	1.14	0.54	0.52
Titanium	7440-32-6	E475.Ti	0.50	mg/kg		0.53	<0.50	<0.50	<0.50	0.55
Uranium	7440-61-1	E475	0.0020	mg/kg		0.119	0.0597	0.0241	0.0290	0.144
Vanadium	7440-62-2	E475	0.10	mg/kg		0.80	0.53	0.30	0.37	1.23
Zinc	7440-66-6	E475	1.0	mg/kg		160	147	120	97.7	156
Zirconium	7440-67-7	E475	0.20	mg/kg		<0.20	<0.20	<0.20	<0.20	<0.20

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	QUL-NHC_PCC-Ki-7_2022-10	QUL-NHC_PCC-Ki-8_2022-10	QUL-NGC_PCC-M-1_2022-10	QUL-NGC_PCC-M-2_2022-10	QUL-NGC_PCC-M-3_2022-10
					Client sampling date / time	04-Oct-2022	04-Oct-2022	06-Oct-2022	06-Oct-2022	06-Oct-2022
						VA22C4917-046	VA22C4917-047	VA22C4917-048	VA22C4917-049	VA22C4917-050
						Result	Result	Result	Result	Result
Physical Tests										
Moisture	----	E144	0.50	%		----	----	77.4	76.5	75.9
Moisture	----	E144A	2.0	%		50.0	56.0	----	----	----
Metals										
Aluminum	7429-90-5	E440	2.0	mg/kg		----	----	7.5	3.3	3.0
Aluminum	7429-90-5	E475	5.0	mg/kg		9.6	6.1	----	----	----
Antimony	7440-36-0	E440	0.010	mg/kg		----	----	<0.010	<0.010	<0.010
Antimony	7440-36-0	E475	0.020	mg/kg		<0.020	<0.020	----	----	----
Arsenic	7440-38-2	E440	0.020	mg/kg		----	----	0.175	0.266	0.425
Arsenic	7440-38-2	E475	0.050	mg/kg		0.313	0.477	----	----	----
Barium	7440-39-3	E475	0.050	mg/kg		1.39	2.34	----	----	----
Barium	7440-39-3	E440	0.050	mg/kg		----	----	0.340	0.501	0.558
Beryllium	7440-41-7	E475	0.010	mg/kg		<0.010	<0.010	----	----	----
Beryllium	7440-41-7	E440	0.010	mg/kg		----	----	<0.010	<0.010	<0.010
Bismuth	7440-69-9	E475	0.010	mg/kg		0.018	0.018	----	----	----
Bismuth	7440-69-9	E440	0.010	mg/kg		----	----	<0.010	<0.010	<0.010
Boron	7440-42-8	E475	1.0	mg/kg		1.9	2.1	----	----	----
Boron	7440-42-8	E440	1.0	mg/kg		----	----	<1.0	<1.0	<1.0
Cadmium	7440-43-9	E440	0.0050	mg/kg		----	----	<0.0050	0.0078	0.0058
Cadmium	7440-43-9	E475	0.010	mg/kg		8.61	15.5	----	----	----
Calcium	7440-70-2	E475	20	mg/kg		412	340	----	----	----
Calcium	7440-70-2	E440	20	mg/kg		----	----	1660	1760	3270
Cesium	7440-46-2	E475	0.0050	mg/kg		0.0572	0.0401	----	----	----
Cesium	7440-46-2	E440	0.0050	mg/kg		----	----	0.158	0.154	0.148
Chromium	7440-47-3	E440	0.050	mg/kg		----	----	0.079	0.103	<0.050
Chromium	7440-47-3	E475	0.20	mg/kg		<0.20	0.31	----	----	----
Cobalt	7440-48-4	E475	0.020	mg/kg		2.16	2.13	----	----	----
Cobalt	7440-48-4	E440	0.020	mg/kg		----	----	0.033	<0.020	0.032
Copper	7440-50-8	E440	0.10	mg/kg		----	----	1.57	2.24	1.59
Copper	7440-50-8	E475	0.20	mg/kg		5.61	5.78	----	----	----
Iron	7439-89-6	E440	3.0	mg/kg		----	----	20.2	27.2	18.1

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	QUL-NHC_PCC-Ki-7_2022-10	QUL-NHC_PCC-Ki-8_2022-10	QUL-NGC_PCC-M-1_2022-10	QUL-NGC_PCC-M-2_2022-10	QUL-NGC_PCC-M-3_2022-10
					Client sampling date / time	04-Oct-2022	04-Oct-2022	06-Oct-2022	06-Oct-2022	06-Oct-2022
						VA22C4917-046	VA22C4917-047	VA22C4917-048	VA22C4917-049	VA22C4917-050
						Result	Result	Result	Result	Result
Metals										
Iron	7439-89-6	E475	5.0	mg/kg		353	455	----	----	----
Lead	7439-92-1	E440	0.020	mg/kg		----	----	<0.020	<0.020	<0.020
Lead	7439-92-1	E475	0.050	mg/kg		0.088	0.078	----	----	----
Lithium	7439-93-2	E475	0.50	mg/kg		<0.50	<0.50	----	----	----
Lithium	7439-93-2	E440	0.50	mg/kg		----	----	<0.50	<0.50	<0.50
Magnesium	7439-95-4	E475	2.0	mg/kg		556	569	----	----	----
Magnesium	7439-95-4	E440	2.0	mg/kg		----	----	1750	1240	1480
Manganese	7439-96-5	E475	0.050	mg/kg		3.25	3.52	----	----	----
Manganese	7439-96-5	E440	0.050	mg/kg		----	----	0.985	0.731	1.57
Mercury	7439-97-6	E510	0.0050	mg/kg		----	----	0.428	0.716	0.508
Mercury	7439-97-6	E512	0.010	mg/kg		0.195	0.405	----	----	----
Mercury	7439-97-6	E510A	0.0010	mg/kg wwt		----	----	0.0966	0.168	0.122
Mercury	7439-97-6	E512A	0.0020	mg/kg wwt		0.0974	0.178	----	----	----
Molybdenum	7439-98-7	E440	0.020	mg/kg		----	----	<0.020	<0.020	<0.020
Molybdenum	7439-98-7	E475	0.040	mg/kg		0.576	0.828	----	----	----
Nickel	7440-02-0	E475	0.20	mg/kg		<1.60 DLB	<3.60 DLB	----	----	----
Nickel	7440-02-0	E440	0.20	mg/kg		----	----	<0.20	<0.20	<0.20
Phosphorus	7723-14-0	E440	10	mg/kg		----	----	11500	11800	13300
Phosphorus	7723-14-0	E475	20	mg/kg		10800	10700	----	----	----
Potassium	7440-09-7	E475	20	mg/kg		9100	9990	----	----	----
Potassium	7440-09-7	E440	20	mg/kg		----	----	18400	20200	20200
Rubidium	7440-17-7	E475	0.050	mg/kg		15.0	14.4	----	----	----
Rubidium	7440-17-7	E440	0.050	mg/kg		----	----	22.2	23.8	26.4
Selenium	7782-49-2	E440	0.050	mg/kg		----	----	2.14	2.80	2.94
Selenium	7782-49-2	E475	0.10	mg/kg		9.04	13.0	----	----	----
Silver	7440-22-4	E475.Ag	0.0050	mg/kg		<0.0050	<0.0050	----	----	----
Silver	7440-22-4	E440.Ag	0.0050	mg/kg		----	----	<0.0050	<0.0050	<0.0050
Sodium	7440-23-5	E475	20	mg/kg		4710	5000	----	----	----
Sodium	7440-23-5	E440	20	mg/kg		----	----	1030	1170	1090
Strontium	7440-24-6	E440	0.050	mg/kg		----	----	2.77	2.93	6.98

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	QUL-NHC_PCC-Ki-7_2022-10	QUL-NHC_PCC-Ki-8_2022-10	QUL-NGC_PCC-M-1_2022-10	QUL-NGC_PCC-M-2_2022-10	QUL-NGC_PCC-M-3_2022-10
					Client sampling date / time	04-Oct-2022	04-Oct-2022	06-Oct-2022	06-Oct-2022	06-Oct-2022
						VA22C4917-046	VA22C4917-047	VA22C4917-048	VA22C4917-049	VA22C4917-050
						Result	Result	Result	Result	Result
Metals										
Strontium	7440-24-6	E475	0.10	mg/kg		0.92	0.70	----	----	----
Tellurium	13494-80-9	E475	0.020	mg/kg		<0.020	0.052	----	----	----
Tellurium	13494-80-9	E440	0.020	mg/kg		----	----	<0.020	<0.020	<0.020
Thallium	7440-28-0	E475	0.0020	mg/kg		0.0319	0.0395	----	----	----
Thallium	7440-28-0	E440	0.0020	mg/kg		----	----	0.0075	0.0041	0.0042
Tin	7440-31-5	E475	0.10	mg/kg		1.12	1.31	----	----	----
Tin	7440-31-5	E440	0.10	mg/kg		----	----	1.45	0.76	0.45
Titanium	7440-32-6	E440.Ti	0.25	mg/kg		----	----	0.46	0.27	<0.25
Titanium	7440-32-6	E475.Ti	0.50	mg/kg		0.69	<0.50	----	----	----
Uranium	7440-61-1	E475	0.0020	mg/kg		0.0224	0.0431	----	----	----
Uranium	7440-61-1	E440	0.0020	mg/kg		----	----	<0.0020	0.0024	0.0027
Vanadium	7440-62-2	E475	0.10	mg/kg		0.42	1.01	----	----	----
Vanadium	7440-62-2	E440	0.10	mg/kg		----	----	<0.10	<0.10	<0.10
Zinc	7440-66-6	E440	0.50	mg/kg		----	----	24.1	27.6	23.0
Zinc	7440-66-6	E475	1.0	mg/kg		155	138	----	----	----
Zirconium	7440-67-7	E475	0.20	mg/kg		<0.20	<0.20	----	----	----
Zirconium	7440-67-7	E440	0.20	mg/kg		----	----	<0.20	<0.20	<0.20

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	QUL-NGC_PCC-M-4_2022-10	QUL-NGC_PCC-M-5_2022-10	QUL-NGC_PCC-M-6_2022-10	QUL-NGC_PCC-M-7_2022-10	QUL-NGC_PCC-M-8_2022-10
					Client sampling date / time	06-Oct-2022	06-Oct-2022	06-Oct-2022	06-Oct-2022	06-Oct-2022
						VA22C4917-051	VA22C4917-052	VA22C4917-053	VA22C4917-054	VA22C4917-055
						Result	Result	Result	Result	Result
Physical Tests										
Moisture	----	E144	0.50	%		78.0	76.7	78.2	78.8	76.9
Metals										
Aluminum	7429-90-5	E440	2.0	mg/kg		3.0	2.7	2.8	2.8	4.4
Antimony	7440-36-0	E440	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	<0.010
Arsenic	7440-38-2	E440	0.020	mg/kg		0.304	0.260	0.496	0.532	0.155
Barium	7440-39-3	E440	0.050	mg/kg		0.832	0.918	0.245	0.625	0.670
Beryllium	7440-41-7	E440	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	<0.010
Bismuth	7440-69-9	E440	0.010	mg/kg		<0.010	<0.010	<0.010	0.014	0.012
Boron	7440-42-8	E440	1.0	mg/kg		<1.0	<1.0	<1.0	<1.0	<1.0
Cadmium	7440-43-9	E440	0.0050	mg/kg		0.0110	0.0108	<0.0050	0.0076	<0.0050
Calcium	7440-70-2	E440	20	mg/kg		2120	2160	2440	5190	3060
Cesium	7440-46-2	E440	0.0050	mg/kg		0.155	0.136	0.212	0.230	0.179
Chromium	7440-47-3	E440	0.050	mg/kg		0.164	0.194	<0.050	0.081	0.090
Cobalt	7440-48-4	E440	0.020	mg/kg		0.023	0.030	<0.020	0.026	0.038
Copper	7440-50-8	E440	0.10	mg/kg		2.27	1.09	1.19	1.44	1.67
Iron	7439-89-6	E440	3.0	mg/kg		23.8	14.0	12.4	17.8	19.2
Lead	7439-92-1	E440	0.020	mg/kg		0.020	<0.020	<0.020	<0.020	0.023
Lithium	7439-93-2	E440	0.50	mg/kg		<0.50	<0.50	<0.50	<0.50	<0.50
Magnesium	7439-95-4	E440	2.0	mg/kg		1850	1630	1800	2270	1790
Manganese	7439-96-5	E440	0.050	mg/kg		1.15	0.837	1.24	1.79	1.69
Mercury	7439-97-6	E510	0.0050	mg/kg		0.492	1.03	0.838	1.15	0.629
Mercury	7439-97-6	E510A	0.0010	mg/kg wwt		0.108	0.240	0.183	0.245	0.145
Molybdenum	7439-98-7	E440	0.020	mg/kg		<0.020	<0.020	<0.020	<0.020	<0.020
Nickel	7440-02-0	E440	0.20	mg/kg		<0.20	<0.20	<0.20	<0.20	<0.20
Phosphorus	7723-14-0	E440	10	mg/kg		14000	12300	13800	16100	13300
Potassium	7440-09-7	E440	20	mg/kg		23600	22200	24000	24000	21800
Rubidium	7440-17-7	E440	0.050	mg/kg		25.8	32.5	37.2	34.0	31.9
Selenium	7782-49-2	E440	0.050	mg/kg		3.72	1.66	1.88	2.14	1.58
Silver	7440-22-4	E440.Ag	0.0050	mg/kg		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Sodium	7440-23-5	E440	20	mg/kg		1280	1160	1180	1430	1370

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	QUL-NGC_PCC-M-4_2022-10	QUL-NGC_PCC-M-5_2022-10	QUL-NGC_PCC-M-6_2022-10	QUL-NGC_PCC-M-7_2022-10	QUL-NGC_PCC-M-8_2022-10
					Client sampling date / time	06-Oct-2022	06-Oct-2022	06-Oct-2022	06-Oct-2022	06-Oct-2022
						VA22C4917-051	VA22C4917-052	VA22C4917-053	VA22C4917-054	VA22C4917-055
						Result	Result	Result	Result	Result
Metals										
Strontium	7440-24-6	E440	0.050	mg/kg		3.70	3.66	5.16	10.7	6.55
Tellurium	13494-80-9	E440	0.020	mg/kg		<0.020	<0.020	<0.020	<0.020	<0.020
Thallium	7440-28-0	E440	0.0020	mg/kg		0.0064	0.0049	0.0044	0.0106	0.0087
Tin	7440-31-5	E440	0.10	mg/kg		1.99	0.74	0.91	1.22	1.36
Titanium	7440-32-6	E440.Ti	0.25	mg/kg		0.31	1.06	0.28	0.26	0.40
Uranium	7440-61-1	E440	0.0020	mg/kg		<0.0020	0.0035	0.0023	0.0035	<0.0020
Vanadium	7440-62-2	E440	0.10	mg/kg		<0.10	<0.10	<0.10	<0.10	<0.10
Zinc	7440-66-6	E440	0.50	mg/kg		39.9	20.2	24.3	30.3	31.2
Zirconium	7440-67-7	E440	0.20	mg/kg		<0.20	<0.20	<0.20	<0.20	<0.20

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	QUL-NGC_PCC-Li-1_2022-10	QUL-NGC_PCC-Li-2_2022-10	QUL-NGC_PCC-Li-3_2022-10	QUL-NGC_PCC-Li-4_2022-10	QUL-NGC_PCC-Li-5_2022-10
					Client sampling date / time	06-Oct-2022	06-Oct-2022	06-Oct-2022	06-Oct-2022	06-Oct-2022
						VA22C4917-056	VA22C4917-057	VA22C4917-058	VA22C4917-059	VA22C4917-060
						Result	Result	Result	Result	Result
Physical Tests										
Moisture	----	E144-H	2.0	%		57.0	68.2	56.0	59.0	62.2
Metals										
Aluminum	7429-90-5	E472	5.0	mg/kg		29.2	18.0	5.2	67.2	13.5
Antimony	7440-36-0	E472	0.010	mg/kg		<0.010	0.016	<0.010	<0.010	0.011
Arsenic	7440-38-2	E472	0.030	mg/kg		0.184	1.82	0.455	0.358	1.29
Barium	7440-39-3	E472	0.050	mg/kg		0.462	0.201	0.136	0.308	0.099
Beryllium	7440-41-7	E472	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	<0.010
Bismuth	7440-69-9	E472	0.010	mg/kg		0.033	0.112	0.020	0.029	0.031
Boron	7440-42-8	E472	1.0	mg/kg		<1.0	<1.0	<1.0	<1.0	<1.0
Cadmium	7440-43-9	E472	0.010	mg/kg		0.226	0.441	0.271	0.442	1.19
Calcium	7440-70-2	E472	20	mg/kg		530	233	118	154	121
Cesium	7440-46-2	E472	0.0050	mg/kg		0.0416	0.0418	0.0180	0.0326	0.0259
Chromium	7440-47-3	E472	0.20	mg/kg		<0.20	0.30	<0.20	<0.20	0.28
Cobalt	7440-48-4	E472	0.020	mg/kg		0.194	0.202	0.182	0.117	0.236
Copper	7440-50-8	E472	0.20	mg/kg		16.2	10.9	13.1	8.81	13.9
Iron	7439-89-6	E472	5.0	mg/kg		258	914	410	483	421
Lead	7439-92-1	E472	0.050	mg/kg		0.050	<0.050	<0.050	0.092	<0.050
Lithium	7439-93-2	E472	0.50	mg/kg		<0.50	<0.50	<0.50	<0.50	<0.50
Magnesium	7439-95-4	E472	2.0	mg/kg		408	811	446	438	532
Manganese	7439-96-5	E472	0.050	mg/kg		3.37	5.26	2.55	2.88	3.40
Mercury	7439-97-6	E511	0.0050	mg/kg		0.156	0.469	0.153	0.178	0.317
Mercury	7439-97-6	E511A	0.0010	mg/kg wwt		0.0672	0.149	0.0673	0.0730	0.120
Molybdenum	7439-98-7	E472	0.040	mg/kg		0.406	0.686	0.410	0.406	0.715
Nickel	7440-02-0	E472	0.20	mg/kg		<0.20	<0.20	<0.20	0.34	<0.20
Phosphorus	7723-14-0	E472	10	mg/kg		6470	12500	6940	6750	9360
Potassium	7440-09-7	E472	20	mg/kg		4880	10100	5060	6000	7090
Rubidium	7440-17-7	E472	0.050	mg/kg		6.60	12.4	6.85	6.51	11.5
Selenium	7782-49-2	E472	0.10	mg/kg		4.65	7.45	6.06	8.83	6.01
Silver	7440-22-4	E472.Ag	0.0050	mg/kg		0.0928	0.0252	0.0524	0.0248	0.0372
Sodium	7440-23-5	E472	20	mg/kg		2160	3790	1920	2210	2450

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	QUL-NGC_PCC-Li-1_2022-10	QUL-NGC_PCC-Li-2_2022-10	QUL-NGC_PCC-Li-3_2022-10	QUL-NGC_PCC-Li-4_2022-10	QUL-NGC_PCC-Li-5_2022-10
					Client sampling date / time	06-Oct-2022	06-Oct-2022	06-Oct-2022	06-Oct-2022	06-Oct-2022
						VA22C4917-056	VA22C4917-057	VA22C4917-058	VA22C4917-059	VA22C4917-060
						Result	Result	Result	Result	Result
Metals										
Strontium	7440-24-6	E472	0.10	mg/kg		1.79	0.66	0.32	0.50	0.31
Tellurium	13494-80-9	E472	0.020	mg/kg		<0.020	<0.020	<0.020	<0.020	<0.020
Thallium	7440-28-0	E472	0.0020	mg/kg		0.0138	0.0151	0.0128	0.0153	0.0165
Tin	7440-31-5	E472	0.10	mg/kg		<0.10	1.06	<0.10	<0.10	<0.10
Titanium	7440-32-6	E472.Ti	0.50	mg/kg		1.48	<0.50	<0.50	0.75	<0.50
Uranium	7440-61-1	E472	0.0020	mg/kg		0.0055	0.0781	0.0104	0.0260	0.0511
Vanadium	7440-62-2	E472	0.10	mg/kg		0.10	0.43	0.18	0.34	0.31
Zinc	7440-66-6	E472	1.0	mg/kg		57.5	79.6	58.2	54.6	70.7
Zirconium	7440-67-7	E472	0.20	mg/kg		<0.20	<0.20	<0.20	<0.20	<0.20

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	QUL-NGC_PCC-Li-6_2022-10	QUL-NGC_PCC-Li-7_2022-10	QUL-NGC_PCC-Li-8_2022-10	QUL-NGC_PCC-O-2_2022-10	QUL-NGC_PCC-O-3_2022-10
					Client sampling date / time	06-Oct-2022	06-Oct-2022	06-Oct-2022	06-Oct-2022	06-Oct-2022
						VA22C4917-061	VA22C4917-062	VA22C4917-063	VA22C4917-064	VA22C4917-065
						Result	Result	Result	Result	Result
Physical Tests										
Moisture	----	E144	0.50	%		----	----	----	66.2	65.1
Moisture	----	E144A	2.0	%		----	----	64.9	----	----
Moisture	----	E144-H	2.0	%		64.4	72.3	----	----	----
Metals										
Aluminum	7429-90-5	E440	2.0	mg/kg		----	----	----	<2.0	<2.0
Aluminum	7429-90-5	E475	5.0	mg/kg		----	----	5.2	----	----
Aluminum	7429-90-5	E472	5.0	mg/kg		5.6	9.0	----	----	----
Antimony	7440-36-0	E472	0.010	mg/kg		<0.010	0.011	----	----	----
Antimony	7440-36-0	E440	0.010	mg/kg		----	----	----	<0.010	<0.010
Antimony	7440-36-0	E475	0.020	mg/kg		----	----	<0.020	----	----
Arsenic	7440-38-2	E440	0.020	mg/kg		----	----	----	0.085	0.196
Arsenic	7440-38-2	E472	0.030	mg/kg		4.86	5.64	----	----	----
Arsenic	7440-38-2	E475	0.050	mg/kg		----	----	0.139	----	----
Barium	7440-39-3	E475	0.050	mg/kg		----	----	0.073	----	----
Barium	7440-39-3	E472	0.050	mg/kg		0.247	0.160	----	----	----
Barium	7440-39-3	E440	0.050	mg/kg		----	----	----	0.323	0.331
Beryllium	7440-41-7	E475	0.010	mg/kg		----	----	<0.010	----	----
Beryllium	7440-41-7	E472	0.010	mg/kg		<0.010	<0.010	----	----	----
Beryllium	7440-41-7	E440	0.010	mg/kg		----	----	----	<0.010	<0.010
Bismuth	7440-69-9	E475	0.010	mg/kg		----	----	0.067	----	----
Bismuth	7440-69-9	E472	0.010	mg/kg		0.017	0.082	----	----	----
Bismuth	7440-69-9	E440	0.010	mg/kg		----	----	----	<0.010	<0.010
Boron	7440-42-8	E475	1.0	mg/kg		----	----	<1.0	----	----
Boron	7440-42-8	E472	1.0	mg/kg		<1.0	<1.0	----	----	----
Boron	7440-42-8	E440	1.0	mg/kg		----	----	----	<1.0	<1.0
Cadmium	7440-43-9	E440	0.0050	mg/kg		----	----	----	0.0121	0.0292
Cadmium	7440-43-9	E475	0.010	mg/kg		----	----	0.233	----	----
Cadmium	7440-43-9	E472	0.010	mg/kg		0.351	1.03	----	----	----
Calcium	7440-70-2	E475	20	mg/kg		----	----	131	----	----
Calcium	7440-70-2	E472	20	mg/kg		321	186	----	----	----

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	QUL-NGC_PCC-Li-6_2022-10	QUL-NGC_PCC-Li-7_2022-10	QUL-NGC_PCC-Li-8_2022-10	QUL-NGC_PCC-O-2_2022-10	QUL-NGC_PCC-O-3_2022-10
					Client sampling date / time	06-Oct-2022	06-Oct-2022	06-Oct-2022	06-Oct-2022	06-Oct-2022
						VA22C4917-061	VA22C4917-062	VA22C4917-063	VA22C4917-064	VA22C4917-065
						Result	Result	Result	Result	Result
Metals										
Calcium	7440-70-2	E440	20	mg/kg		----	----	----	412	386
Cesium	7440-46-2	E475	0.0050	mg/kg		----	----	0.0483	----	----
Cesium	7440-46-2	E472	0.0050	mg/kg		0.0446	0.0482	----	----	----
Cesium	7440-46-2	E440	0.0050	mg/kg		----	----	----	0.0562	0.0504
Chromium	7440-47-3	E440	0.050	mg/kg		----	----	----	<0.050	0.050
Chromium	7440-47-3	E475	0.20	mg/kg		----	----	<0.20	----	----
Chromium	7440-47-3	E472	0.20	mg/kg		<0.20	0.37	----	----	----
Cobalt	7440-48-4	E475	0.020	mg/kg		----	----	0.204	----	----
Cobalt	7440-48-4	E472	0.020	mg/kg		0.149	0.293	----	----	----
Cobalt	7440-48-4	E440	0.020	mg/kg		----	----	----	0.072	0.144
Copper	7440-50-8	E440	0.10	mg/kg		----	----	----	4.26	5.15
Copper	7440-50-8	E475	0.20	mg/kg		----	----	15.7	----	----
Copper	7440-50-8	E472	0.20	mg/kg		7.36	24.3	----	----	----
Iron	7439-89-6	E440	3.0	mg/kg		----	----	----	57.5	61.2
Iron	7439-89-6	E475	5.0	mg/kg		----	----	572	----	----
Iron	7439-89-6	E472	5.0	mg/kg		650	947	----	----	----
Lead	7439-92-1	E440	0.020	mg/kg		----	----	----	<0.020	<0.020
Lead	7439-92-1	E475	0.050	mg/kg		----	----	<0.050	----	----
Lead	7439-92-1	E472	0.050	mg/kg		<0.050	<0.050	----	----	----
Lithium	7439-93-2	E475	0.50	mg/kg		----	----	<0.50	----	----
Lithium	7439-93-2	E472	0.50	mg/kg		<0.50	<0.50	----	----	----
Lithium	7439-93-2	E440	0.50	mg/kg		----	----	----	<0.50	<0.50
Magnesium	7439-95-4	E475	2.0	mg/kg		----	----	454	----	----
Magnesium	7439-95-4	E472	2.0	mg/kg		534	887	----	----	----
Magnesium	7439-95-4	E440	2.0	mg/kg		----	----	----	694	761
Manganese	7439-96-5	E475	0.050	mg/kg		----	----	3.35	----	----
Manganese	7439-96-5	E472	0.050	mg/kg		3.56	6.29	----	----	----
Manganese	7439-96-5	E440	0.050	mg/kg		----	----	----	8.87	8.72
Mercury	7439-97-6	E511	0.0050	mg/kg		0.184	0.572	----	----	----
Mercury	7439-97-6	E510	0.0050	mg/kg		----	----	----	0.0454	0.0252

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	QUL-NGC_PCC-Li-6_2022-10	QUL-NGC_PCC-Li-7_2022-10	QUL-NGC_PCC-Li-8_2022-10	QUL-NGC_PCC-O-2_2022-10	QUL-NGC_PCC-O-3_2022-10
					Client sampling date / time	06-Oct-2022	06-Oct-2022	06-Oct-2022	06-Oct-2022	06-Oct-2022
						VA22C4917-061	VA22C4917-062	VA22C4917-063	VA22C4917-064	VA22C4917-065
						Result	Result	Result	Result	Result
Metals										
Mercury	7439-97-6	E512	0.010	mg/kg		----	----	0.232	----	----
Mercury	7439-97-6	E511A	0.0010	mg/kg wwt		0.0654	0.159	----	----	----
Mercury	7439-97-6	E510A	0.0010	mg/kg wwt		----	----	----	0.0154	0.0088
Mercury	7439-97-6	E512A	0.0020	mg/kg wwt		----	----	0.0815	----	----
Molybdenum	7439-98-7	E440	0.020	mg/kg		----	----	----	0.120	0.108
Molybdenum	7439-98-7	E475	0.040	mg/kg		----	----	0.492	----	----
Molybdenum	7439-98-7	E472	0.040	mg/kg		0.545	0.858	----	----	----
Nickel	7440-02-0	E475	0.20	mg/kg		----	----	<0.20	----	----
Nickel	7440-02-0	E472	0.20	mg/kg		<0.20	0.23	----	----	----
Nickel	7440-02-0	E440	0.20	mg/kg		----	----	----	<0.20	<0.20
Phosphorus	7723-14-0	E472	10	mg/kg		9050	14100	----	----	----
Phosphorus	7723-14-0	E440	10	mg/kg		----	----	----	10800	12600
Phosphorus	7723-14-0	E475	20	mg/kg		----	----	8560	----	----
Potassium	7440-09-7	E475	20	mg/kg		----	----	7260	----	----
Potassium	7440-09-7	E472	20	mg/kg		7360	11300	----	----	----
Potassium	7440-09-7	E440	20	mg/kg		----	----	----	8890	9400
Rubidium	7440-17-7	E475	0.050	mg/kg		----	----	12.3	----	----
Rubidium	7440-17-7	E472	0.050	mg/kg		12.6	16.4	----	----	----
Rubidium	7440-17-7	E440	0.050	mg/kg		----	----	----	12.5	14.4
Selenium	7782-49-2	E440	0.050	mg/kg		----	----	----	12.8	14.8
Selenium	7782-49-2	E475	0.10	mg/kg		----	----	5.79	----	----
Selenium	7782-49-2	E472	0.10	mg/kg		4.41	8.79	----	----	----
Silver	7440-22-4	E475.Ag	0.0050	mg/kg		----	----	0.0632	----	----
Silver	7440-22-4	E472.Ag	0.0050	mg/kg		0.0227	0.130	----	----	----
Silver	7440-22-4	E440.Ag	0.0050	mg/kg		----	----	----	0.0171	0.0164
Sodium	7440-23-5	E475	20	mg/kg		----	----	2070	----	----
Sodium	7440-23-5	E472	20	mg/kg		2400	3720	----	----	----
Sodium	7440-23-5	E440	20	mg/kg		----	----	----	1950	1610
Strontium	7440-24-6	E440	0.050	mg/kg		----	----	----	0.461	0.579
Strontium	7440-24-6	E475	0.10	mg/kg		----	----	0.29	----	----

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	QUL-NGC_PCC-Li-6_2022-10	QUL-NGC_PCC-Li-7_2022-10	QUL-NGC_PCC-Li-8_2022-10	QUL-NGC_PCC-O-2_2022-10	QUL-NGC_PCC-O-3_2022-10
					Client sampling date / time	06-Oct-2022	06-Oct-2022	06-Oct-2022	06-Oct-2022	06-Oct-2022
						VA22C4917-061	VA22C4917-062	VA22C4917-063	VA22C4917-064	VA22C4917-065
						Result	Result	Result	Result	Result
Metals										
Strontium	7440-24-6	E472	0.10	mg/kg		0.96	0.50	----	----	----
Tellurium	13494-80-9	E475	0.020	mg/kg		----	----	<0.020	----	----
Tellurium	13494-80-9	E472	0.020	mg/kg		<0.020	<0.020	----	----	----
Tellurium	13494-80-9	E440	0.020	mg/kg		----	----	----	<0.020	<0.020
Thallium	7440-28-0	E475	0.0020	mg/kg		----	----	0.0233	----	----
Thallium	7440-28-0	E472	0.0020	mg/kg		0.0210	0.0264	----	----	----
Thallium	7440-28-0	E440	0.0020	mg/kg		----	----	----	0.0036	0.0044
Tin	7440-31-5	E475	0.10	mg/kg		----	----	<0.10	----	----
Tin	7440-31-5	E472	0.10	mg/kg		<0.10	<0.10	----	----	----
Tin	7440-31-5	E440	0.10	mg/kg		----	----	----	0.24	0.32
Titanium	7440-32-6	E440.Ti	0.25	mg/kg		----	----	----	<0.25	0.32
Titanium	7440-32-6	E475.Ti	0.50	mg/kg		----	----	0.52	----	----
Titanium	7440-32-6	E472.Ti	0.50	mg/kg		<0.50	<0.50	----	----	----
Uranium	7440-61-1	E475	0.0020	mg/kg		----	----	0.0050	----	----
Uranium	7440-61-1	E472	0.0020	mg/kg		0.0199	0.0217	----	----	----
Uranium	7440-61-1	E440	0.0020	mg/kg		----	----	----	0.0082	0.0079
Vanadium	7440-62-2	E475	0.10	mg/kg		----	----	<0.10	----	----
Vanadium	7440-62-2	E472	0.10	mg/kg		<0.10	0.42	----	----	----
Vanadium	7440-62-2	E440	0.10	mg/kg		----	----	----	<0.10	<0.10
Zinc	7440-66-6	E440	0.50	mg/kg		----	----	----	111	114
Zinc	7440-66-6	E475	1.0	mg/kg		----	----	74.7	----	----
Zinc	7440-66-6	E472	1.0	mg/kg		68.4	92.7	----	----	----
Zirconium	7440-67-7	E475	0.20	mg/kg		----	----	<0.20	----	----
Zirconium	7440-67-7	E472	0.20	mg/kg		<0.20	<0.20	----	----	----
Zirconium	7440-67-7	E440	0.20	mg/kg		----	----	----	<0.20	<0.20

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	QUL-NGC_PCC-O-5_2022-10	QUL-NGC_PCC-O-6_2022-10	QUL-NGC_PCC-O-7_2022-10	QUL-NGC_PCC-O-8_2022-10	QUL-NGC_PCC-Ki-1_2022-10
					Client sampling date / time	06-Oct-2022	06-Oct-2022	06-Oct-2022	06-Oct-2022	06-Oct-2022
						VA22C4917-066	VA22C4917-067	VA22C4917-068	VA22C4917-069	VA22C4917-070
						Result	Result	Result	Result	Result
Physical Tests										
Moisture	----	E144	0.50	%		69.0	68.8	65.8	65.8	----
Moisture	----	E144A	2.0	%		----	----	----	----	60.0
Metals										
Aluminum	7429-90-5	E440	2.0	mg/kg		<2.0	3.5	<2.0	<2.0	----
Aluminum	7429-90-5	E475	5.0	mg/kg		----	----	----	----	8.3
Antimony	7440-36-0	E440	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	----
Antimony	7440-36-0	E475	0.020	mg/kg		----	----	----	----	<0.026 DLIS
Arsenic	7440-38-2	E440	0.020	mg/kg		0.106	0.277	0.202	0.120	----
Arsenic	7440-38-2	E475	0.050	mg/kg		----	----	----	----	0.201
Barium	7440-39-3	E475	0.050	mg/kg		----	----	----	----	1.42
Barium	7440-39-3	E440	0.050	mg/kg		0.415	0.320	0.311	0.249	----
Beryllium	7440-41-7	E475	0.010	mg/kg		----	----	----	----	<0.013 DLIS
Beryllium	7440-41-7	E440	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	----
Bismuth	7440-69-9	E475	0.010	mg/kg		----	----	----	----	0.029
Bismuth	7440-69-9	E440	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	----
Boron	7440-42-8	E475	1.0	mg/kg		----	----	----	----	2.9
Boron	7440-42-8	E440	1.0	mg/kg		<1.0	<1.0	<1.0	<1.0	----
Cadmium	7440-43-9	E440	0.0050	mg/kg		0.0310	0.0354	0.0315	0.0451	----
Cadmium	7440-43-9	E475	0.010	mg/kg		----	----	----	----	2.84
Calcium	7440-70-2	E475	20	mg/kg		----	----	----	----	290
Calcium	7440-70-2	E440	20	mg/kg		662	622	365	507	----
Cesium	7440-46-2	E475	0.0050	mg/kg		----	----	----	----	0.0678
Cesium	7440-46-2	E440	0.0050	mg/kg		0.0670	0.0879	0.0626	0.0993	----
Chromium	7440-47-3	E440	0.050	mg/kg		<0.050	<0.050	<0.050	0.148	----
Chromium	7440-47-3	E475	0.20	mg/kg		----	----	----	----	0.26
Cobalt	7440-48-4	E475	0.020	mg/kg		----	----	----	----	3.55
Cobalt	7440-48-4	E440	0.020	mg/kg		0.186	0.093	0.118	0.172	----
Copper	7440-50-8	E440	0.10	mg/kg		4.61	5.04	4.96	5.18	----
Copper	7440-50-8	E475	0.20	mg/kg		----	----	----	----	4.35
Iron	7439-89-6	E440	3.0	mg/kg		70.4	67.2	56.0	86.1	----

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	QUL-NGC_PCC-O-5_2022-10	QUL-NGC_PCC-O-6_2022-10	QUL-NGC_PCC-O-7_2022-10	QUL-NGC_PCC-O-8_2022-10	QUL-NGC_PCC-Ki-1_2022-10
					Client sampling date / time	06-Oct-2022	06-Oct-2022	06-Oct-2022	06-Oct-2022	06-Oct-2022
						VA22C4917-066	VA22C4917-067	VA22C4917-068	VA22C4917-069	VA22C4917-070
						Result	Result	Result	Result	Result
Metals										
Iron	7439-89-6	E475	5.0	mg/kg		----	----	----	----	238
Lead	7439-92-1	E440	0.020	mg/kg		<0.020	<0.020	<0.020	0.021	----
Lead	7439-92-1	E475	0.050	mg/kg		----	----	----	----	<0.064 DLIS
Lithium	7439-93-2	E475	0.50	mg/kg		----	----	----	----	<0.64 DLIS
Lithium	7439-93-2	E440	0.50	mg/kg		<0.50	<0.50	<0.50	<0.50	----
Magnesium	7439-95-4	E475	2.0	mg/kg		----	----	----	----	478
Magnesium	7439-95-4	E440	2.0	mg/kg		927	854	681	929	----
Manganese	7439-96-5	E475	0.050	mg/kg		----	----	----	----	3.33
Manganese	7439-96-5	E440	0.050	mg/kg		15.1	15.8	10.2	17.3	----
Mercury	7439-97-6	E510	0.0050	mg/kg		0.0512	0.0417	0.0568	0.0284	----
Mercury	7439-97-6	E512	0.010	mg/kg		----	----	----	----	0.157
Mercury	7439-97-6	E510A	0.0010	mg/kg wwt		0.0158	0.0130	0.0194	0.0097	----
Mercury	7439-97-6	E512A	0.0020	mg/kg wwt		----	----	----	----	0.0630
Molybdenum	7439-98-7	E440	0.020	mg/kg		0.154	0.193	0.123	0.180	----
Molybdenum	7439-98-7	E475	0.040	mg/kg		----	----	----	----	0.407
Nickel	7440-02-0	E475	0.20	mg/kg		----	----	----	----	<0.80 DLB
Nickel	7440-02-0	E440	0.20	mg/kg		<0.20	<0.20	<0.20	<0.20	----
Phosphorus	7723-14-0	E440	10	mg/kg		10700	10300	12000	11100	----
Phosphorus	7723-14-0	E475	20	mg/kg		----	----	----	----	8710
Potassium	7440-09-7	E475	20	mg/kg		----	----	----	----	7800
Potassium	7440-09-7	E440	20	mg/kg		10900	10600	8920	10700	----
Rubidium	7440-17-7	E475	0.050	mg/kg		----	----	----	----	10.4
Rubidium	7440-17-7	E440	0.050	mg/kg		19.4	19.4	14.4	18.9	----
Selenium	7782-49-2	E440	0.050	mg/kg		9.08	7.62	10.5	12.7	----
Selenium	7782-49-2	E475	0.10	mg/kg		----	----	----	----	4.06
Silver	7440-22-4	E475.Ag	0.0050	mg/kg		----	----	----	----	<0.0064 DLIS
Silver	7440-22-4	E440.Ag	0.0050	mg/kg		0.0205	0.0267	0.0191	0.0250	----
Sodium	7440-23-5	E475	20	mg/kg		----	----	----	----	2360
Sodium	7440-23-5	E440	20	mg/kg		2240	1880	1700	1640	----
Strontium	7440-24-6	E440	0.050	mg/kg		0.716	0.697	0.474	0.677	----

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	QUL-NGC_PCC-O-5_2022-10	QUL-NGC_PCC-O-6_2022-10	QUL-NGC_PCC-O-7_2022-10	QUL-NGC_PCC-O-8_2022-10	QUL-NGC_PCC-Ki-1_2022-10
					Client sampling date / time	06-Oct-2022	06-Oct-2022	06-Oct-2022	06-Oct-2022	06-Oct-2022
						VA22C4917-066	VA22C4917-067	VA22C4917-068	VA22C4917-069	VA22C4917-070
						Result	Result	Result	Result	Result
Metals										
Strontium	7440-24-6	E475	0.10	mg/kg		----	----	----	----	0.64
Tellurium	13494-80-9	E475	0.020	mg/kg		----	----	----	----	<0.026 DLIS
Tellurium	13494-80-9	E440	0.020	mg/kg		<0.020	<0.020	<0.020	<0.020	----
Thallium	7440-28-0	E475	0.0020	mg/kg		----	----	----	----	0.0496
Thallium	7440-28-0	E440	0.0020	mg/kg		0.0059	0.0060	0.0047	0.0108	----
Tin	7440-31-5	E475	0.10	mg/kg		----	----	----	----	<0.13 DLIS
Tin	7440-31-5	E440	0.10	mg/kg		0.52	0.38	0.12	0.44	----
Titanium	7440-32-6	E440.Ti	0.25	mg/kg		<0.25	0.30	<0.25	<0.25	----
Titanium	7440-32-6	E475.Ti	0.50	mg/kg		----	----	----	----	0.96
Uranium	7440-61-1	E475	0.0020	mg/kg		----	----	----	----	0.0149
Uranium	7440-61-1	E440	0.0020	mg/kg		0.0104	0.0084	0.0119	<0.0020	----
Vanadium	7440-62-2	E475	0.10	mg/kg		----	----	----	----	0.21
Vanadium	7440-62-2	E440	0.10	mg/kg		<0.10	<0.10	<0.10	<0.10	----
Zinc	7440-66-6	E440	0.50	mg/kg		140	139	116	148	----
Zinc	7440-66-6	E475	1.0	mg/kg		----	----	----	----	164
Zirconium	7440-67-7	E475	0.20	mg/kg		----	----	----	----	<0.26 DLIS
Zirconium	7440-67-7	E440	0.20	mg/kg		<0.20	<0.20	<0.20	<0.20	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	QUL-NGC_PCC-Ki-2_2022-10	QUL-NGC_PCC-Ki-3_2022-10	QUL-NGC_PCC-Ki-4_2022-10	QUL-NGC_PCC-Ki-5_2022-10	QUL-NGC_PCC-Ki-6_2022-10
					Client sampling date / time	06-Oct-2022	06-Oct-2022	06-Oct-2022	06-Oct-2022	06-Oct-2022
						VA22C4917-071	VA22C4917-072	VA22C4917-073	VA22C4917-074	VA22C4917-075
						Result	Result	Result	Result	Result
Physical Tests										
Moisture	----	E144A	2.0	%		----	64.7	60.2	56.0	69.6
Moisture	----	E144-H	2.0	%		66.9	----	----	----	----
Metals										
Aluminum	7429-90-5	E475	5.0	mg/kg		----	<5.0	<5.0	6.0	5.2
Aluminum	7429-90-5	E472	5.0	mg/kg		<5.0	----	----	----	----
Antimony	7440-36-0	E472	0.010	mg/kg		<0.010	----	----	----	----
Antimony	7440-36-0	E475	0.020	mg/kg		----	<0.020	<0.020	<0.020	<0.020
Arsenic	7440-38-2	E472	0.030	mg/kg		0.229	----	----	----	----
Arsenic	7440-38-2	E475	0.050	mg/kg		----	0.357	0.303	0.208	0.638
Barium	7440-39-3	E475	0.050	mg/kg		----	1.41	1.08	0.899	1.21
Barium	7440-39-3	E472	0.050	mg/kg		0.805	----	----	----	----
Beryllium	7440-41-7	E475	0.010	mg/kg		----	<0.010	<0.010	<0.010	<0.010
Beryllium	7440-41-7	E472	0.010	mg/kg		<0.010	----	----	----	----
Bismuth	7440-69-9	E475	0.010	mg/kg		----	0.022	0.015	0.025	0.032
Bismuth	7440-69-9	E472	0.010	mg/kg		0.033	----	----	----	----
Boron	7440-42-8	E475	1.0	mg/kg		----	<1.0	<1.0	1.9	1.2
Boron	7440-42-8	E472	1.0	mg/kg		<1.0	----	----	----	----
Cadmium	7440-43-9	E475	0.010	mg/kg		----	9.26	3.63	6.82	4.56
Cadmium	7440-43-9	E472	0.010	mg/kg		4.29	----	----	----	----
Calcium	7440-70-2	E475	20	mg/kg		----	290	225	275	404
Calcium	7440-70-2	E472	20	mg/kg		412	----	----	----	----
Cesium	7440-46-2	E475	0.0050	mg/kg		----	0.0480	0.0362	0.0436	0.0698
Cesium	7440-46-2	E472	0.0050	mg/kg		0.0473	----	----	----	----
Chromium	7440-47-3	E475	0.20	mg/kg		----	0.22	<0.20	0.26	0.22
Chromium	7440-47-3	E472	0.20	mg/kg		<0.20	----	----	----	----
Cobalt	7440-48-4	E475	0.020	mg/kg		----	1.86	0.754	1.36	1.42
Cobalt	7440-48-4	E472	0.020	mg/kg		1.25	----	----	----	----
Copper	7440-50-8	E475	0.20	mg/kg		----	4.46	2.70	3.49	4.74
Copper	7440-50-8	E472	0.20	mg/kg		3.34	----	----	----	----
Iron	7439-89-6	E475	5.0	mg/kg		----	444	269	262	207

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	QUL-NGC_PCC-Ki-2_2022-10	QUL-NGC_PCC-Ki-3_2022-10	QUL-NGC_PCC-Ki-4_2022-10	QUL-NGC_PCC-Ki-5_2022-10	QUL-NGC_PCC-Ki-6_2022-10
					Client sampling date / time	06-Oct-2022	06-Oct-2022	06-Oct-2022	06-Oct-2022	06-Oct-2022
						VA22C4917-071	VA22C4917-072	VA22C4917-073	VA22C4917-074	VA22C4917-075
						Result	Result	Result	Result	Result
Metals										
Iron	7439-89-6	E472	5.0	mg/kg		390	----	----	----	----
Lead	7439-92-1	E475	0.050	mg/kg		----	<0.050	<0.050	<0.050	0.059
Lead	7439-92-1	E472	0.050	mg/kg		<0.050	----	----	----	----
Lithium	7439-93-2	E475	0.50	mg/kg		----	<0.50	<0.50	<0.50	<0.50
Lithium	7439-93-2	E472	0.50	mg/kg		<0.50	----	----	----	----
Magnesium	7439-95-4	E475	2.0	mg/kg		----	459	352	407	519
Magnesium	7439-95-4	E472	2.0	mg/kg		422	----	----	----	----
Manganese	7439-96-5	E475	0.050	mg/kg		----	2.56	1.53	2.43	4.84
Manganese	7439-96-5	E472	0.050	mg/kg		1.95	----	----	----	----
Mercury	7439-97-6	E511	0.0050	mg/kg		0.162	----	----	----	----
Mercury	7439-97-6	E512	0.010	mg/kg		----	0.170	0.078	0.191	0.215
Mercury	7439-97-6	E511A	0.0010	mg/kg wwt		0.0538	----	----	----	----
Mercury	7439-97-6	E512A	0.0020	mg/kg wwt		----	0.0599	0.0311	0.0839	0.0654
Molybdenum	7439-98-7	E475	0.040	mg/kg		----	0.391	0.234	0.337	0.488
Molybdenum	7439-98-7	E472	0.040	mg/kg		0.266	----	----	----	----
Nickel	7440-02-0	E475	0.20	mg/kg		----	<0.90 DLB	0.37	<1.60 DLB	<1.30 DLB
Nickel	7440-02-0	E472	0.20	mg/kg		0.53	----	----	----	----
Phosphorus	7723-14-0	E472	10	mg/kg		7420	----	----	----	----
Phosphorus	7723-14-0	E475	20	mg/kg		----	8960	6530	7400	10000
Potassium	7440-09-7	E475	20	mg/kg		----	8180	6540	7220	9150
Potassium	7440-09-7	E472	20	mg/kg		7050	----	----	----	----
Rubidium	7440-17-7	E475	0.050	mg/kg		----	12.6	8.11	12.5	16.3
Rubidium	7440-17-7	E472	0.050	mg/kg		9.79	----	----	----	----
Selenium	7782-49-2	E475	0.10	mg/kg		----	6.29	4.86	3.36	4.21
Selenium	7782-49-2	E472	0.10	mg/kg		4.41	----	----	----	----
Silver	7440-22-4	E475.Ag	0.0050	mg/kg		----	<0.0050	<0.0050	<0.0050	<0.0050
Silver	7440-22-4	E472.Ag	0.0050	mg/kg		<0.0050	----	----	----	----
Sodium	7440-23-5	E475	20	mg/kg		----	3650	2530	3290	4040
Sodium	7440-23-5	E472	20	mg/kg		3560	----	----	----	----
Strontium	7440-24-6	E475	0.10	mg/kg		----	0.64	0.49	0.73	1.03

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	QUL-NGC_PCC-Ki-2_2022-10	QUL-NGC_PCC-Ki-3_2022-10	QUL-NGC_PCC-Ki-4_2022-10	QUL-NGC_PCC-Ki-5_2022-10	QUL-NGC_PCC-Ki-6_2022-10
					Client sampling date / time	06-Oct-2022	06-Oct-2022	06-Oct-2022	06-Oct-2022	06-Oct-2022
						VA22C4917-071	VA22C4917-072	VA22C4917-073	VA22C4917-074	VA22C4917-075
						Result	Result	Result	Result	Result
Metals										
Strontium	7440-24-6	E472	0.10	mg/kg		1.08	----	----	----	----
Tellurium	13494-80-9	E475	0.020	mg/kg		----	0.025	<0.020	<0.020	0.035
Tellurium	13494-80-9	E472	0.020	mg/kg		<0.020	----	----	----	----
Thallium	7440-28-0	E475	0.0020	mg/kg		----	0.0237	0.0136	0.0218	0.0334
Thallium	7440-28-0	E472	0.0020	mg/kg		0.0118	----	----	----	----
Tin	7440-31-5	E475	0.10	mg/kg		----	<0.10	<0.10	1.49	<0.10
Tin	7440-31-5	E472	0.10	mg/kg		0.13	----	----	----	----
Titanium	7440-32-6	E475.Ti	0.50	mg/kg		----	<0.50	0.56	0.63	0.71
Titanium	7440-32-6	E472.Ti	0.50	mg/kg		<0.50	----	----	----	----
Uranium	7440-61-1	E475	0.0020	mg/kg		----	0.0274	0.0108	0.0677	0.0423
Uranium	7440-61-1	E472	0.0020	mg/kg		0.0514	----	----	----	----
Vanadium	7440-62-2	E475	0.10	mg/kg		----	0.28	0.15	0.26	0.17
Vanadium	7440-62-2	E472	0.10	mg/kg		0.17	----	----	----	----
Zinc	7440-66-6	E475	1.0	mg/kg		----	113	86.9	103	182
Zinc	7440-66-6	E472	1.0	mg/kg		87.0	----	----	----	----
Zirconium	7440-67-7	E475	0.20	mg/kg		----	<0.20	<0.20	<0.20	<0.20
Zirconium	7440-67-7	E472	0.20	mg/kg		<0.20	----	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	QUL-NGC_PCC-Ki-7_2022-10	QUL-NGC_PCC-Ki-8_2022-10	QUL-NCP_LT-M-1_2022-10	QUL-NCP_LT-M-2_2022-10	QUL-NCP_LT-M-3_2022-10
					Client sampling date / time	06-Oct-2022	06-Oct-2022	03-Oct-2022	03-Oct-2022	03-Oct-2022
						VA22C4917-076	VA22C4917-077	VA22C4917-078	VA22C4917-079	VA22C4917-080
						Result	Result	Result	Result	Result
Physical Tests										
Moisture	----	E144	0.50	%		----	----	76.9	76.4	76.4
Moisture	----	E144A	2.0	%		60.8	70.6	----	----	----
Metals										
Aluminum	7429-90-5	E440	2.0	mg/kg		----	----	<2.0	3.2	<2.0
Aluminum	7429-90-5	E475	5.0	mg/kg		<5.0	5.1	----	----	----
Antimony	7440-36-0	E440	0.010	mg/kg		----	----	<0.010	<0.010	<0.010
Antimony	7440-36-0	E475	0.020	mg/kg		<0.020	<0.020	----	----	----
Arsenic	7440-38-2	E440	0.020	mg/kg		----	----	0.090	0.589	0.108
Arsenic	7440-38-2	E475	0.050	mg/kg		0.351	0.186	----	----	----
Barium	7440-39-3	E475	0.050	mg/kg		0.927	1.02	----	----	----
Barium	7440-39-3	E440	0.050	mg/kg		----	----	<0.050	0.101	<0.050
Beryllium	7440-41-7	E475	0.010	mg/kg		<0.010	<0.010	----	----	----
Beryllium	7440-41-7	E440	0.010	mg/kg		----	----	<0.010	<0.010	<0.010
Bismuth	7440-69-9	E475	0.010	mg/kg		0.059	0.055	----	----	----
Bismuth	7440-69-9	E440	0.010	mg/kg		----	----	<0.010	<0.010	<0.010
Boron	7440-42-8	E475	1.0	mg/kg		<1.0	1.2	----	----	----
Boron	7440-42-8	E440	1.0	mg/kg		----	----	<1.0	<1.0	<1.0
Cadmium	7440-43-9	E440	0.0050	mg/kg		----	----	<0.0050	<0.0050	<0.0050
Cadmium	7440-43-9	E475	0.010	mg/kg		6.21	2.97	----	----	----
Calcium	7440-70-2	E475	20	mg/kg		269	627	----	----	----
Calcium	7440-70-2	E440	20	mg/kg		----	----	826	415	220
Cesium	7440-46-2	E475	0.0050	mg/kg		0.0443	0.0972	----	----	----
Cesium	7440-46-2	E440	0.0050	mg/kg		----	----	0.309	0.182	0.270
Chromium	7440-47-3	E440	0.050	mg/kg		----	----	<0.050	0.053	0.053
Chromium	7440-47-3	E475	0.20	mg/kg		0.25	0.22	----	----	----
Cobalt	7440-48-4	E475	0.020	mg/kg		1.49	2.98	----	----	----
Cobalt	7440-48-4	E440	0.020	mg/kg		----	----	<0.020	<0.020	<0.020
Copper	7440-50-8	E440	0.10	mg/kg		----	----	0.71	2.92	1.14
Copper	7440-50-8	E475	0.20	mg/kg		3.70	7.44	----	----	----
Iron	7439-89-6	E440	3.0	mg/kg		----	----	8.6	32.4	8.8

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	QUL-NGC_PCC-Ki-7_2022-10	QUL-NGC_PCC-Ki-8_2022-10	QUL-NCP_LT-M-1_2022-10	QUL-NCP_LT-M-2_2022-10	QUL-NCP_LT-M-3_2022-10
					Client sampling date / time	06-Oct-2022	06-Oct-2022	03-Oct-2022	03-Oct-2022	03-Oct-2022
						VA22C4917-076	VA22C4917-077	VA22C4917-078	VA22C4917-079	VA22C4917-080
						Result	Result	Result	Result	Result
Metals										
Iron	7439-89-6	E475	5.0	mg/kg		314	265	----	----	----
Lead	7439-92-1	E440	0.020	mg/kg		----	----	<0.020	0.022	<0.020
Lead	7439-92-1	E475	0.050	mg/kg		<0.050	0.059	----	----	----
Lithium	7439-93-2	E475	0.50	mg/kg		<0.50	<0.50	----	----	----
Lithium	7439-93-2	E440	0.50	mg/kg		----	----	<0.50	<0.50	<0.50
Magnesium	7439-95-4	E475	2.0	mg/kg		342	624	----	----	----
Magnesium	7439-95-4	E440	2.0	mg/kg		----	----	1110	1080	1110
Manganese	7439-96-5	E475	0.050	mg/kg		1.73	5.92	----	----	----
Manganese	7439-96-5	E440	0.050	mg/kg		----	----	0.272	0.448	0.284
Mercury	7439-97-6	E510	0.0050	mg/kg		----	----	2.23	0.672	2.40
Mercury	7439-97-6	E512	0.010	mg/kg		0.279	0.207	----	----	----
Mercury	7439-97-6	E510A	0.0010	mg/kg wwt		----	----	0.515	0.159	0.568
Mercury	7439-97-6	E512A	0.0020	mg/kg wwt		0.109	0.0609	----	----	----
Molybdenum	7439-98-7	E440	0.020	mg/kg		----	----	<0.020	<0.020	<0.020
Molybdenum	7439-98-7	E475	0.040	mg/kg		0.500	0.395	----	----	----
Nickel	7440-02-0	E475	0.20	mg/kg		<1.00 DLB	<0.60 DLB	----	----	----
Nickel	7440-02-0	E440	0.20	mg/kg		----	----	<0.20	<0.20	<0.20
Phosphorus	7723-14-0	E440	10	mg/kg		----	----	11100	11500	11600
Phosphorus	7723-14-0	E475	20	mg/kg		6930	11900	----	----	----
Potassium	7440-09-7	E475	20	mg/kg		6160	10800	----	----	----
Potassium	7440-09-7	E440	20	mg/kg		----	----	19600	17200	19900
Rubidium	7440-17-7	E475	0.050	mg/kg		9.61	19.6	----	----	----
Rubidium	7440-17-7	E440	0.050	mg/kg		----	----	40.5	33.1	36.0
Selenium	7782-49-2	E440	0.050	mg/kg		----	----	1.88	2.04	2.04
Selenium	7782-49-2	E475	0.10	mg/kg		4.33	5.30	----	----	----
Silver	7440-22-4	E475.Ag	0.0050	mg/kg		<0.0050	0.0050	----	----	----
Silver	7440-22-4	E440.Ag	0.0050	mg/kg		----	----	<0.0050	<0.0050	<0.0050
Sodium	7440-23-5	E475	20	mg/kg		2910	4100	----	----	----
Sodium	7440-23-5	E440	20	mg/kg		----	----	1090	1060	1030
Strontium	7440-24-6	E440	0.050	mg/kg		----	----	1.02	0.461	0.153

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	QUL-NGC_PCC-Ki-7_2022-10	QUL-NGC_PCC-Ki-8_2022-10	QUL-NCP_LT-M-1_2022-10	QUL-NCP_LT-M-2_2022-10	QUL-NCP_LT-M-3_2022-10
					Client sampling date / time	06-Oct-2022	06-Oct-2022	03-Oct-2022	03-Oct-2022	03-Oct-2022
						VA22C4917-076	VA22C4917-077	VA22C4917-078	VA22C4917-079	VA22C4917-080
						Result	Result	Result	Result	Result
Metals										
Strontium	7440-24-6	E475	0.10	mg/kg		0.60	1.54	----	----	----
Tellurium	13494-80-9	E475	0.020	mg/kg		0.040	0.024	----	----	----
Tellurium	13494-80-9	E440	0.020	mg/kg		----	----	<0.020	<0.020	<0.020
Thallium	7440-28-0	E475	0.0020	mg/kg		0.0268	0.0472	----	----	----
Thallium	7440-28-0	E440	0.0020	mg/kg		----	----	0.0254	0.0493	0.0293
Tin	7440-31-5	E475	0.10	mg/kg		<0.10	<0.10	----	----	----
Tin	7440-31-5	E440	0.10	mg/kg		----	----	0.22	0.22	0.49
Titanium	7440-32-6	E440.Ti	0.25	mg/kg		----	----	<0.25	<0.25	<0.25
Titanium	7440-32-6	E475.Ti	0.50	mg/kg		0.65	0.91	----	----	----
Uranium	7440-61-1	E475	0.0020	mg/kg		0.0303	0.0120	----	----	----
Uranium	7440-61-1	E440	0.0020	mg/kg		----	----	<0.0020	<0.0020	<0.0020
Vanadium	7440-62-2	E475	0.10	mg/kg		0.28	0.19	----	----	----
Vanadium	7440-62-2	E440	0.10	mg/kg		----	----	<0.10	<0.10	<0.10
Zinc	7440-66-6	E440	0.50	mg/kg		----	----	11.5	20.9	11.8
Zinc	7440-66-6	E475	1.0	mg/kg		103	172	----	----	----
Zirconium	7440-67-7	E475	0.20	mg/kg		<0.20	<0.20	----	----	----
Zirconium	7440-67-7	E440	0.20	mg/kg		----	----	<0.20	<0.20	<0.20

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	QUL-NCP_LT-M-4_2022-10	QUL-NCP_LT-M-5_2022-10	QUL-NCP_LT-M-6_2022-10	QUL-NCP_LT-M-7_2022-10	QUL-NCP_LT-M-8_2022-10
					Client sampling date / time	03-Oct-2022	04-Oct-2022	05-Oct-2022	06-Oct-2022	06-Oct-2022
						VA22C4917-081	VA22C4917-082	VA22C4917-083	VA22C4917-084	VA22C4917-085
						Result	Result	Result	Result	Result
Physical Tests										
Moisture	----	E144	0.50	%		79.8	75.0	78.4	74.9	76.4
Metals										
Aluminum	7429-90-5	E440	2.0	mg/kg		<2.0	9.0	<2.0	<2.0	2.3
Antimony	7440-36-0	E440	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	<0.010
Arsenic	7440-38-2	E440	0.020	mg/kg		0.144	0.120	0.074	0.054	0.431
Barium	7440-39-3	E440	0.050	mg/kg		0.206	0.199	<0.050	<0.050	0.085
Beryllium	7440-41-7	E440	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	<0.010
Bismuth	7440-69-9	E440	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	<0.010
Boron	7440-42-8	E440	1.0	mg/kg		<1.0	<1.0	<1.0	<1.0	<1.0
Cadmium	7440-43-9	E440	0.0050	mg/kg		<0.0050	<0.0050	<0.0050	0.0051	<0.0050
Calcium	7440-70-2	E440	20	mg/kg		741	374	248	210	290
Cesium	7440-46-2	E440	0.0050	mg/kg		0.257	0.198	0.314	0.281	0.217
Chromium	7440-47-3	E440	0.050	mg/kg		0.264	0.066	<0.050	<0.050	0.057
Cobalt	7440-48-4	E440	0.020	mg/kg		<0.020	<0.020	<0.020	<0.020	<0.020
Copper	7440-50-8	E440	0.10	mg/kg		0.95	1.67	1.06	1.23	1.41
Iron	7439-89-6	E440	3.0	mg/kg		11.3	30.4	11.6	10.6	12.5
Lead	7439-92-1	E440	0.020	mg/kg		<0.020	<0.020	<0.020	<0.020	<0.020
Lithium	7439-93-2	E440	0.50	mg/kg		<0.50	<0.50	<0.50	<0.50	<0.50
Magnesium	7439-95-4	E440	2.0	mg/kg		1690	1320	1240	1160	1420
Manganese	7439-96-5	E440	0.050	mg/kg		0.435	0.573	0.287	0.268	0.397
Mercury	7439-97-6	E510	0.0050	mg/kg		0.987	0.734	1.82	1.17	0.929
Mercury	7439-97-6	E510A	0.0010	mg/kg wwt		0.199	0.183	0.394	0.293	0.219
Molybdenum	7439-98-7	E440	0.020	mg/kg		<0.020	<0.020	<0.020	<0.020	<0.020
Nickel	7440-02-0	E440	0.20	mg/kg		<0.20	<0.20	<0.20	<0.20	<0.20
Phosphorus	7723-14-0	E440	10	mg/kg		14200	12500	12700	10500	13000
Potassium	7440-09-7	E440	20	mg/kg		24900	21600	24000	18900	22500
Rubidium	7440-17-7	E440	0.050	mg/kg		46.5	40.8	39.3	33.7	41.2
Selenium	7782-49-2	E440	0.050	mg/kg		2.46	2.14	2.15	1.84	2.21
Silver	7440-22-4	E440.Ag	0.0050	mg/kg		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Sodium	7440-23-5	E440	20	mg/kg		1660	1140	1330	992	976

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	QUL-NCP_LT-M-4_2022-10	QUL-NCP_LT-M-5_2022-10	QUL-NCP_LT-M-6_2022-10	QUL-NCP_LT-M-7_2022-10	QUL-NCP_LT-M-8_2022-10
					Client sampling date / time	03-Oct-2022	04-Oct-2022	05-Oct-2022	06-Oct-2022	06-Oct-2022
						VA22C4917-081	VA22C4917-082	VA22C4917-083	VA22C4917-084	VA22C4917-085
						Result	Result	Result	Result	Result
Metals										
Strontium	7440-24-6	E440	0.050	mg/kg		0.855	0.354	0.150	0.141	0.194
Tellurium	13494-80-9	E440	0.020	mg/kg		<0.020	<0.020	<0.020	<0.020	<0.020
Thallium	7440-28-0	E440	0.0020	mg/kg		0.0436	0.0403	0.0283	0.0288	0.0270
Tin	7440-31-5	E440	0.10	mg/kg		0.71	0.24	0.24	0.37	0.28
Titanium	7440-32-6	E440.Ti	0.25	mg/kg		<0.25	0.91	<0.25	<0.25	<0.25
Uranium	7440-61-1	E440	0.0020	mg/kg		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
Vanadium	7440-62-2	E440	0.10	mg/kg		<0.10	<0.10	<0.10	<0.10	<0.10
Zinc	7440-66-6	E440	0.50	mg/kg		14.7	13.6	13.4	11.9	13.2
Zirconium	7440-67-7	E440	0.20	mg/kg		<0.20	<0.20	<0.20	<0.20	<0.20

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	QUL-NCP_LT-Li-1_2022-10	QUL-NCP_LT-Li-2_2022-10	QUL-NCP_LT-Li-3_2022-10	QUL-NCP_LT-Li-4_2022-10	QUL-NCP_LT-Li-5_2022-10
					Client sampling date / time	03-Oct-2022	03-Oct-2022	03-Oct-2022	03-Oct-2022	04-Oct-2022
						VA22C4917-086	VA22C4917-087	VA22C4917-088	VA22C4917-089	VA22C4917-090
						Result	Result	Result	Result	Result
Physical Tests										
Moisture	----	E144	0.50	%		79.7	68.1	80.1	74.8	67.0
Metals										
Aluminum	7429-90-5	E440	2.0	mg/kg		3.3	<2.0	3.6	<2.0	5.6
Antimony	7440-36-0	E440	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	<0.010
Arsenic	7440-38-2	E440	0.020	mg/kg		0.265	0.630	0.452	0.298	0.329
Barium	7440-39-3	E440	0.050	mg/kg		<0.050	0.061	0.058	<0.050	0.136
Beryllium	7440-41-7	E440	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	<0.010
Bismuth	7440-69-9	E440	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	<0.010
Boron	7440-42-8	E440	1.0	mg/kg		<1.0	<1.0	<1.0	<1.0	<1.0
Cadmium	7440-43-9	E440	0.0050	mg/kg		0.519	0.167	0.459	0.179	0.216
Calcium	7440-70-2	E440	20	mg/kg		345	198	448	324	180
Cesium	7440-46-2	E440	0.0050	mg/kg		0.296	0.0526	0.195	0.0873	0.0440
Chromium	7440-47-3	E440	0.050	mg/kg		0.280	0.078	0.325	0.106	0.097
Cobalt	7440-48-4	E440	0.020	mg/kg		0.098	0.098	0.121	0.117	0.220
Copper	7440-50-8	E440	0.10	mg/kg		12.6	107	17.5	55.2	38.8
Iron	7439-89-6	E440	3.0	mg/kg		354	569	369	409	209
Lead	7439-92-1	E440	0.020	mg/kg		<0.020	<0.020	<0.020	<0.020	<0.020
Lithium	7439-93-2	E440	0.50	mg/kg		<0.50	<0.50	<0.50	<0.50	<0.50
Magnesium	7439-95-4	E440	2.0	mg/kg		1070	434	981	550	435
Manganese	7439-96-5	E440	0.050	mg/kg		6.53	3.41	9.00	4.48	3.48
Mercury	7439-97-6	E510	0.0050	mg/kg		3.08	0.689	2.39	1.05	0.488
Mercury	7439-97-6	E510A	0.0010	mg/kg wwt		0.624	0.220	0.477	0.265	0.161
Molybdenum	7439-98-7	E440	0.020	mg/kg		0.336	0.463	0.360	0.550	0.376
Nickel	7440-02-0	E440	0.20	mg/kg		<0.20	<0.20	<0.20	<0.20	<0.20
Phosphorus	7723-14-0	E440	10	mg/kg		21400	9860	20000	12300	10100
Potassium	7440-09-7	E440	20	mg/kg		21300	8320	19200	10300	8670
Rubidium	7440-17-7	E440	0.050	mg/kg		89.8	19.8	62.6	22.8	21.0
Selenium	7782-49-2	E440	0.050	mg/kg		6.12	6.56	6.33	9.21	5.57
Silver	7440-22-4	E440.Ag	0.0050	mg/kg		0.0718	0.791	0.0912	0.331	0.274
Sodium	7440-23-5	E440	20	mg/kg		5570	4740	7540	6450	4370

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	QUL-NCP_LT-Li-1_2022-10	QUL-NCP_LT-Li-2_2022-10	QUL-NCP_LT-Li-3_2022-10	QUL-NCP_LT-Li-4_2022-10	QUL-NCP_LT-Li-5_2022-10
					Client sampling date / time	03-Oct-2022	03-Oct-2022	03-Oct-2022	03-Oct-2022	04-Oct-2022
						VA22C4917-086	VA22C4917-087	VA22C4917-088	VA22C4917-089	VA22C4917-090
						Result	Result	Result	Result	Result
Metals										
Strontium	7440-24-6	E440	0.050	mg/kg		0.366	0.345	0.560	0.624	0.341
Tellurium	13494-80-9	E440	0.020	mg/kg		<0.020	<0.020	<0.020	<0.020	<0.020
Thallium	7440-28-0	E440	0.0020	mg/kg		0.695	0.234	0.327	0.205	0.116
Tin	7440-31-5	E440	0.10	mg/kg		0.22	0.27	0.43	0.46	0.29
Titanium	7440-32-6	E440.Ti	0.25	mg/kg		<0.25	<0.25	<0.25	<0.25	0.48
Uranium	7440-61-1	E440	0.0020	mg/kg		<0.0020	<0.0020	0.0020	<0.0020	<0.0020
Vanadium	7440-62-2	E440	0.10	mg/kg		0.10	<0.10	0.35	<0.10	<0.10
Zinc	7440-66-6	E440	0.50	mg/kg		110	114	106	126	78.8
Zirconium	7440-67-7	E440	0.20	mg/kg		<0.20	<0.20	<0.20	<0.20	<0.20

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	QUL-NCP_LT-Li-6_2022-10	QUL-NCP_LT-Li-7_2022-10	QUL-NCP_LT-Li-8_2022-10	QUL-NCP_LT-O-1_2022-10	QUL-NCP_LT-O-3_2022-10
					Client sampling date / time	05-Oct-2022	06-Oct-2022	06-Oct-2022	03-Oct-2022	03-Oct-2022
						VA22C4917-091	VA22C4917-092	VA22C4917-093	VA22C4917-094	VA22C4917-095
						Result	Result	Result	Result	Result
Physical Tests										
Moisture	----	E144	0.50	%		76.7	63.6	65.8	64.8	70.0
Metals										
Aluminum	7429-90-5	E440	2.0	mg/kg		4.0	<2.0	<2.0	<2.0	<2.0
Antimony	7440-36-0	E440	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	<0.010
Arsenic	7440-38-2	E440	0.020	mg/kg		0.485	0.233	0.281	0.046	0.075
Barium	7440-39-3	E440	0.050	mg/kg		<0.050	<0.050	<0.050	<0.050	<0.050
Beryllium	7440-41-7	E440	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	<0.010
Bismuth	7440-69-9	E440	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	<0.010
Boron	7440-42-8	E440	1.0	mg/kg		<1.0	<1.0	<1.0	<1.0	<1.0
Cadmium	7440-43-9	E440	0.0050	mg/kg		0.589	0.126	0.193	<0.0050	<0.0050
Calcium	7440-70-2	E440	20	mg/kg		212	137	110	1060	958
Cesium	7440-46-2	E440	0.0050	mg/kg		0.193	0.0736	0.0589	0.0725	0.0805
Chromium	7440-47-3	E440	0.050	mg/kg		0.223	0.053	0.082	0.053	<0.050
Cobalt	7440-48-4	E440	0.020	mg/kg		0.140	0.207	0.194	0.045	0.064
Copper	7440-50-8	E440	0.10	mg/kg		131	61.6	38.9	12.8	11.5
Iron	7439-89-6	E440	3.0	mg/kg		1010	379	210	53.7	81.7
Lead	7439-92-1	E440	0.020	mg/kg		<0.020	<0.020	<0.020	<0.020	<0.020
Lithium	7439-93-2	E440	0.50	mg/kg		<0.50	<0.50	<0.50	<0.50	<0.50
Magnesium	7439-95-4	E440	2.0	mg/kg		597	398	452	1330	1260
Manganese	7439-96-5	E440	0.050	mg/kg		5.62	3.60	3.53	0.799	2.39
Mercury	7439-97-6	E510	0.0050	mg/kg		2.34	0.661	0.580	0.271	0.247
Mercury	7439-97-6	E510A	0.0010	mg/kg wwt		0.546	0.241	0.198	0.0955	0.0742
Molybdenum	7439-98-7	E440	0.020	mg/kg		0.650	0.382	0.485	<0.020	0.020
Nickel	7440-02-0	E440	0.20	mg/kg		<0.20	<0.20	<0.20	<0.20	<0.20
Phosphorus	7723-14-0	E440	10	mg/kg		13300	8880	10400	11200	11300
Potassium	7440-09-7	E440	20	mg/kg		12300	7310	8440	6430	6830
Rubidium	7440-17-7	E440	0.050	mg/kg		35.3	15.4	19.3	11.9	13.7
Selenium	7782-49-2	E440	0.050	mg/kg		16.2	5.89	6.09	4.21	4.57
Silver	7440-22-4	E440.Ag	0.0050	mg/kg		1.21	0.347	0.232	0.0400	0.0214
Sodium	7440-23-5	E440	20	mg/kg		6730	3350	2900	3320	5230

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	QUL-NCP_LT-Li-6_2022-10	QUL-NCP_LT-Li-7_2022-10	QUL-NCP_LT-Li-8_2022-10	QUL-NCP_LT-O-1_2022-10	QUL-NCP_LT-O-3_2022-10
					Client sampling date / time	05-Oct-2022	06-Oct-2022	06-Oct-2022	03-Oct-2022	03-Oct-2022
						VA22C4917-091	VA22C4917-092	VA22C4917-093	VA22C4917-094	VA22C4917-095
						Result	Result	Result	Result	Result
Metals										
Strontium	7440-24-6	E440	0.050	mg/kg		0.308	0.261	0.190	2.56	1.95
Tellurium	13494-80-9	E440	0.020	mg/kg		<0.020	<0.020	<0.020	<0.020	<0.020
Thallium	7440-28-0	E440	0.0020	mg/kg		0.204	0.138	0.151	0.0202	0.0194
Tin	7440-31-5	E440	0.10	mg/kg		0.23	0.22	0.21	0.11	0.10
Titanium	7440-32-6	E440.Ti	0.25	mg/kg		<0.25	<0.25	<0.25	<0.25	<0.25
Uranium	7440-61-1	E440	0.0020	mg/kg		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
Vanadium	7440-62-2	E440	0.10	mg/kg		0.14	<0.10	<0.10	<0.10	<0.10
Zinc	7440-66-6	E440	0.50	mg/kg		136	90.9	104	75.4	98.7
Zirconium	7440-67-7	E440	0.20	mg/kg		<0.20	<0.20	<0.20	<0.20	<0.20

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	QUL-NCP_LT-O-4_2022-10	QUL-NCP_LT-O-5_2022-10	QUL-NCP_LT-O-8_2022-10	QUL-NCP_LT-Ki-1_2022-10	QUL-NCP_LT-Ki-2_2022-10
					Client sampling date / time	03-Oct-2022	04-Oct-2022	06-Oct-2022	03-Oct-2022	03-Oct-2022
						VA22C4917-096	VA22C4917-097	VA22C4917-098	VA22C4917-099	VA22C4917-100
						Result	Result	Result	Result	Result
Physical Tests										
Moisture	----	E144	0.50	%		78.5	79.4	79.4	84.1	81.0
Metals										
Aluminum	7429-90-5	E440	2.0	mg/kg		<2.0	2.7	3.2	15.9	13.6
Antimony	7440-36-0	E440	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	<0.010
Arsenic	7440-38-2	E440	0.020	mg/kg		0.105	0.143	0.169	0.239	0.339
Barium	7440-39-3	E440	0.050	mg/kg		0.095	0.156	0.088	0.195	0.291
Beryllium	7440-41-7	E440	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	<0.010
Bismuth	7440-69-9	E440	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	<0.010
Boron	7440-42-8	E440	1.0	mg/kg		<1.0	<1.0	<1.0	<1.0	<1.0
Cadmium	7440-43-9	E440	0.0050	mg/kg		0.0108	0.0116	0.0118	3.54	0.964
Calcium	7440-70-2	E440	20	mg/kg		1150	1480	1410	830	881
Cesium	7440-46-2	E440	0.0050	mg/kg		0.192	0.195	0.206	0.246	0.142
Chromium	7440-47-3	E440	0.050	mg/kg		0.085	0.194	0.072	1.16	0.363
Cobalt	7440-48-4	E440	0.020	mg/kg		0.341	0.518	0.321	0.217	0.739
Copper	7440-50-8	E440	0.10	mg/kg		48.8	63.5	58.3	3.56	5.34
Iron	7439-89-6	E440	3.0	mg/kg		321	375	264	718	787
Lead	7439-92-1	E440	0.020	mg/kg		<0.020	<0.020	<0.020	0.032	0.043
Lithium	7439-93-2	E440	0.50	mg/kg		<0.50	<0.50	<0.50	<0.50	<0.50
Magnesium	7439-95-4	E440	2.0	mg/kg		543	645	718	719	679
Manganese	7439-96-5	E440	0.050	mg/kg		7.66	9.72	10.3	1.39	2.40
Mercury	7439-97-6	E510	0.0050	mg/kg		0.243	0.256	0.225	7.89	1.95
Mercury	7439-97-6	E510A	0.0010	mg/kg wwt		0.0523	0.0529	0.0462	1.26	0.369
Molybdenum	7439-98-7	E440	0.020	mg/kg		0.068	0.087	0.089	0.276	0.203
Nickel	7440-02-0	E440	0.20	mg/kg		<0.20	<0.20	<0.20	0.70	0.36
Phosphorus	7723-14-0	E440	10	mg/kg		8660	11300	12000	15100	14800
Potassium	7440-09-7	E440	20	mg/kg		12800	15100	15400	14200	14200
Rubidium	7440-17-7	E440	0.050	mg/kg		33.4	39.8	43.3	36.9	34.9
Selenium	7782-49-2	E440	0.050	mg/kg		5.91	9.38	8.06	13.1	7.07
Silver	7440-22-4	E440.Ag	0.0050	mg/kg		0.0487	0.0746	0.0451	0.0179	0.0074
Sodium	7440-23-5	E440	20	mg/kg		9160	8060	8400	14900	11200

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	QUL-NCP_LT-O-4_2022-10	QUL-NCP_LT-O-5_2022-10	QUL-NCP_LT-O-8_2022-10	QUL-NCP_LT-Ki-1_2022-10	QUL-NCP_LT-Ki-2_2022-10
					Client sampling date / time	03-Oct-2022	04-Oct-2022	06-Oct-2022	03-Oct-2022	03-Oct-2022
						VA22C4917-096	VA22C4917-097	VA22C4917-098	VA22C4917-099	VA22C4917-100
						Result	Result	Result	Result	Result
Metals										
Strontium	7440-24-6	E440	0.050	mg/kg		1.44	1.20	1.26	1.90	1.55
Tellurium	13494-80-9	E440	0.020	mg/kg		<0.020	<0.020	<0.020	<0.020	<0.020
Thallium	7440-28-0	E440	0.0020	mg/kg		0.0494	0.0995	0.0574	0.120	0.136
Tin	7440-31-5	E440	0.10	mg/kg		0.40	0.58	0.70	1.30	0.92
Titanium	7440-32-6	E440.Ti	0.25	mg/kg		<0.25	0.27	<0.25	0.84	0.92
Uranium	7440-61-1	E440	0.0020	mg/kg		<0.0020	<0.0020	<0.0020	0.0105	<0.0020
Vanadium	7440-62-2	E440	0.10	mg/kg		<0.10	<0.10	<0.10	0.22	<0.10
Zinc	7440-66-6	E440	0.50	mg/kg		183	215	225	98.4	102
Zirconium	7440-67-7	E440	0.20	mg/kg		<0.20	<0.20	<0.20	<0.20	<0.20

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	QUL-NCP_LT-Ki-3_2022-10	QUL-NCP_LT-Ki-4_2022-10	QUL-NCP_LT-Ki-5_2022-10	QUL-NCP_LT-Ki-6_2022-10	QUL-NCP_LT-Ki-7_2022-10
					Client sampling date / time	03-Oct-2022	03-Oct-2022	04-Oct-2022	05-Oct-2022	06-Oct-2022
						VA22C4917-101	VA22C4917-102	VA22C4917-103	VA22C4917-104	VA22C4917-105
						Result	Result	Result	Result	Result
Physical Tests										
Moisture	----	E144	0.50	%		82.5	84.2	80.4	83.5	79.2
Metals										
Aluminum	7429-90-5	E440	2.0	mg/kg		31.2	7.9	14.0	55.6	4.0
Antimony	7440-36-0	E440	0.010	mg/kg		<0.010	<0.010	<0.010	0.010	<0.010
Arsenic	7440-38-2	E440	0.020	mg/kg		0.294	0.198	0.381	0.260	0.130
Barium	7440-39-3	E440	0.050	mg/kg		0.203	0.171	0.236	0.300	0.231
Beryllium	7440-41-7	E440	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	<0.010
Bismuth	7440-69-9	E440	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	<0.010
Boron	7440-42-8	E440	1.0	mg/kg		<1.0	<1.0	<1.0	<1.0	<1.0
Cadmium	7440-43-9	E440	0.0050	mg/kg		2.10	0.624	1.36	2.22	0.512
Calcium	7440-70-2	E440	20	mg/kg		668	799	561	655	442
Cesium	7440-46-2	E440	0.0050	mg/kg		0.142	0.164	0.141	0.175	0.164
Chromium	7440-47-3	E440	0.050	mg/kg		0.966	0.490	0.371	0.620	0.135
Cobalt	7440-48-4	E440	0.020	mg/kg		0.202	0.309	0.349	0.447	0.358
Copper	7440-50-8	E440	0.10	mg/kg		3.75	4.65	5.13	4.89	3.00
Iron	7439-89-6	E440	3.0	mg/kg		1000	829	537	1380	693
Lead	7439-92-1	E440	0.020	mg/kg		0.022	0.024	0.031	0.027	<0.020
Lithium	7439-93-2	E440	0.50	mg/kg		<0.50	<0.50	<0.50	<0.50	<0.50
Magnesium	7439-95-4	E440	2.0	mg/kg		648	744	556	745	611
Manganese	7439-96-5	E440	0.050	mg/kg		1.75	1.91	1.68	1.70	1.19
Mercury	7439-97-6	E510	0.0050	mg/kg		6.27	1.58	1.72	5.39	1.94
Mercury	7439-97-6	E510A	0.0010	mg/kg wwt		1.10	0.249	0.338	0.889	0.403
Molybdenum	7439-98-7	E440	0.020	mg/kg		0.171	0.158	0.252	0.223	0.129
Nickel	7440-02-0	E440	0.20	mg/kg		0.51	0.42	0.25	0.64	<0.20
Phosphorus	7723-14-0	E440	10	mg/kg		12800	14600	14800	14100	12500
Potassium	7440-09-7	E440	20	mg/kg		12600	15100	14900	13500	12200
Rubidium	7440-17-7	E440	0.050	mg/kg		28.5	33.0	35.3	27.1	28.0
Selenium	7782-49-2	E440	0.050	mg/kg		10.6	7.63	7.71	14.1	5.36
Silver	7440-22-4	E440.Ag	0.0050	mg/kg		0.0307	0.0072	0.0051	0.0141	<0.0050
Sodium	7440-23-5	E440	20	mg/kg		13100	13700	9380	13700	11000

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	QUL-NCP_LT-Ki-3_2022-10	QUL-NCP_LT-Ki-4_2022-10	QUL-NCP_LT-Ki-5_2022-10	QUL-NCP_LT-Ki-6_2022-10	QUL-NCP_LT-Ki-7_2022-10
					Client sampling date / time	03-Oct-2022	03-Oct-2022	04-Oct-2022	05-Oct-2022	06-Oct-2022
						VA22C4917-101	VA22C4917-102	VA22C4917-103	VA22C4917-104	VA22C4917-105
						Result	Result	Result	Result	Result
Metals										
Strontium	7440-24-6	E440	0.050	mg/kg		1.26	2.15	1.08	1.91	1.01
Tellurium	13494-80-9	E440	0.020	mg/kg		<0.020	<0.020	<0.020	<0.020	<0.020
Thallium	7440-28-0	E440	0.0020	mg/kg		0.0866	0.0833	0.149	0.0967	0.0792
Tin	7440-31-5	E440	0.10	mg/kg		0.22	1.02	1.95	0.26	0.32
Titanium	7440-32-6	E440.Ti	0.25	mg/kg		1.64	0.49	0.83	2.47	0.34
Uranium	7440-61-1	E440	0.0020	mg/kg		0.0124	0.0021	0.0021	0.0080	<0.0020
Vanadium	7440-62-2	E440	0.10	mg/kg		0.50	<0.10	<0.10	0.20	<0.10
Zinc	7440-66-6	E440	0.50	mg/kg		81.4	111	110	114	94.5
Zirconium	7440-67-7	E440	0.20	mg/kg		<0.20	<0.20	<0.20	<0.20	<0.20

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	QUL-NCP_LT-Ki-8_2022-10	QUL-EAA_LT-M-1_2022-10	QUL-EAA_LT-M-2_2022-10	QUL-EAA_LT-M-3_2022-10	QUL-EAA_LT-M-4_2022-10
					Client sampling date / time	06-Oct-2022	04-Oct-2022	04-Oct-2022	04-Oct-2022	04-Oct-2022
						VA22C4917-106	VA22C4917-107	VA22C4917-108	VA22C4917-109	VA22C4917-110
						Result	Result	Result	Result	Result
Physical Tests										
Moisture	----	E144	0.50	%		81.1	70.9	76.1	74.5	72.2
Metals										
Aluminum	7429-90-5	E440	2.0	mg/kg		4.3	<2.0	<2.0	<2.0	<2.0
Antimony	7440-36-0	E440	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	<0.010
Arsenic	7440-38-2	E440	0.020	mg/kg		0.185	0.121	0.093	0.225	0.168
Barium	7440-39-3	E440	0.050	mg/kg		0.140	<0.050	<0.050	<0.050	<0.050
Beryllium	7440-41-7	E440	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	<0.010
Bismuth	7440-69-9	E440	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	<0.010
Boron	7440-42-8	E440	1.0	mg/kg		<1.0	<1.0	<1.0	<1.0	<1.0
Cadmium	7440-43-9	E440	0.0050	mg/kg		1.19	<0.0050	<0.0050	<0.0050	<0.0050
Calcium	7440-70-2	E440	20	mg/kg		515	371	478	544	462
Cesium	7440-46-2	E440	0.0050	mg/kg		0.156	0.295	0.283	0.317	0.289
Chromium	7440-47-3	E440	0.050	mg/kg		0.247	<0.050	<0.050	<0.050	0.058
Cobalt	7440-48-4	E440	0.020	mg/kg		0.558	<0.020	<0.020	<0.020	<0.020
Copper	7440-50-8	E440	0.10	mg/kg		3.86	0.87	0.97	0.86	1.13
Iron	7439-89-6	E440	3.0	mg/kg		550	13.7	11.0	9.3	16.5
Lead	7439-92-1	E440	0.020	mg/kg		<0.020	<0.020	<0.020	<0.020	<0.020
Lithium	7439-93-2	E440	0.50	mg/kg		<0.50	<0.50	<0.50	<0.50	<0.50
Magnesium	7439-95-4	E440	2.0	mg/kg		762	957	1080	1120	902
Manganese	7439-96-5	E440	0.050	mg/kg		1.96	0.266	0.219	0.316	0.311
Mercury	7439-97-6	E510	0.0050	mg/kg		1.75	1.66	2.62	1.29	1.24
Mercury	7439-97-6	E510A	0.0010	mg/kg wwt		0.330	0.483	0.628	0.329	0.346
Molybdenum	7439-98-7	E440	0.020	mg/kg		0.216	<0.020	<0.020	<0.020	<0.020
Nickel	7440-02-0	E440	0.20	mg/kg		0.24	<0.20	<0.20	<0.20	<0.20
Phosphorus	7723-14-0	E440	10	mg/kg		16100	8620	9110	9350	8130
Potassium	7440-09-7	E440	20	mg/kg		15000	16000	16600	17300	14900
Rubidium	7440-17-7	E440	0.050	mg/kg		37.4	32.1	30.2	33.8	35.0
Selenium	7782-49-2	E440	0.050	mg/kg		7.13	1.47	2.04	1.76	1.37
Silver	7440-22-4	E440.Ag	0.0050	mg/kg		0.0052	<0.0050	<0.0050	<0.0050	<0.0050
Sodium	7440-23-5	E440	20	mg/kg		10600	941	1010	962	1090

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	QUL-NCP_LT-Ki-8_2022-10	QUL-EAA_LT-M-1_2022-10	QUL-EAA_LT-M-2_2022-10	QUL-EAA_LT-M-3_2022-10	QUL-EAA_LT-M-4_2022-10
					Client sampling date / time	06-Oct-2022	04-Oct-2022	04-Oct-2022	04-Oct-2022	04-Oct-2022
						VA22C4917-106	VA22C4917-107	VA22C4917-108	VA22C4917-109	VA22C4917-110
						Result	Result	Result	Result	Result
Metals										
Strontium	7440-24-6	E440	0.050	mg/kg		0.994	0.254	0.526	0.550	0.448
Tellurium	13494-80-9	E440	0.020	mg/kg		<0.020	<0.020	<0.020	<0.020	<0.020
Thallium	7440-28-0	E440	0.0020	mg/kg		0.110	0.0233	0.0229	0.0203	0.0288
Tin	7440-31-5	E440	0.10	mg/kg		1.67	0.11	0.17	0.18	0.16
Titanium	7440-32-6	E440.Ti	0.25	mg/kg		<0.25	<0.25	<0.25	<0.25	<0.25
Uranium	7440-61-1	E440	0.0020	mg/kg		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
Vanadium	7440-62-2	E440	0.10	mg/kg		<0.10	<0.10	<0.10	<0.10	<0.10
Zinc	7440-66-6	E440	0.50	mg/kg		110	9.30	12.2	10.6	9.88
Zirconium	7440-67-7	E440	0.20	mg/kg		<0.20	<0.20	<0.20	<0.20	<0.20

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	QUL-EAA_LT-M-5_2022-10	QUL-EAA_LT-M-6_2022-10	QUL-EAA_LT-M-7_2022-10	QUL-EAA_LT-M-8_2022-10	QUL-EAA_LT-Li-1_2022-10
					Client sampling date / time	04-Oct-2022	04-Oct-2022	04-Oct-2022	04-Oct-2022	04-Oct-2022
						VA22C4917-111	VA22C4917-112	VA22C4917-113	VA22C4917-114	VA22C4917-115
						Result	Result	Result	Result	Result
Physical Tests										
Moisture	----	E144	0.50	%		76.1	76.5	72.4	79.5	70.7
Metals										
Aluminum	7429-90-5	E440	2.0	mg/kg		<2.0	<2.0	<2.0	<2.0	<2.0
Antimony	7440-36-0	E440	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	<0.010
Arsenic	7440-38-2	E440	0.020	mg/kg		0.063	0.297	0.155	0.286	0.384
Barium	7440-39-3	E440	0.050	mg/kg		<0.050	0.087	<0.050	<0.050	<0.050
Beryllium	7440-41-7	E440	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	<0.010
Bismuth	7440-69-9	E440	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	<0.010
Boron	7440-42-8	E440	1.0	mg/kg		<1.0	<1.0	<1.0	<1.0	<1.0
Cadmium	7440-43-9	E440	0.0050	mg/kg		<0.0050	<0.0050	<0.0050	<0.0050	0.219
Calcium	7440-70-2	E440	20	mg/kg		196	1390	313	263	213
Cesium	7440-46-2	E440	0.0050	mg/kg		0.276	0.273	0.249	0.264	0.120
Chromium	7440-47-3	E440	0.050	mg/kg		0.073	0.071	<0.050	<0.050	0.165
Cobalt	7440-48-4	E440	0.020	mg/kg		<0.020	<0.020	<0.020	<0.020	0.165
Copper	7440-50-8	E440	0.10	mg/kg		1.18	2.62	0.88	0.68	244
Iron	7439-89-6	E440	3.0	mg/kg		14.9	43.8	9.0	21.9	947
Lead	7439-92-1	E440	0.020	mg/kg		<0.020	<0.020	<0.020	<0.020	<0.020
Lithium	7439-93-2	E440	0.50	mg/kg		<0.50	<0.50	<0.50	<0.50	<0.50
Magnesium	7439-95-4	E440	2.0	mg/kg		1080	1030	1000	1160	483
Manganese	7439-96-5	E440	0.050	mg/kg		0.216	0.256	0.225	0.152	4.41
Mercury	7439-97-6	E510	0.0050	mg/kg		2.05	2.12	1.04	4.35	3.07
Mercury	7439-97-6	E510A	0.0010	mg/kg wwt		0.490	0.498	0.289	0.893	0.898
Molybdenum	7439-98-7	E440	0.020	mg/kg		<0.020	<0.020	<0.020	<0.020	0.423
Nickel	7440-02-0	E440	0.20	mg/kg		<0.20	<0.20	<0.20	<0.20	<0.20
Phosphorus	7723-14-0	E440	10	mg/kg		9840	9980	8350	11500	10100
Potassium	7440-09-7	E440	20	mg/kg		18100	16900	15400	20100	7540
Rubidium	7440-17-7	E440	0.050	mg/kg		31.9	32.5	30.9	25.7	18.3
Selenium	7782-49-2	E440	0.050	mg/kg		1.81	2.33	1.48	2.97	14.7
Silver	7440-22-4	E440.Ag	0.0050	mg/kg		<0.0050	<0.0050	<0.0050	<0.0050	1.43
Sodium	7440-23-5	E440	20	mg/kg		1220	1570	826	2140	5370

Analytical Results

Sub-Matrix: Tissue (Matrix: Biota)					Client sample ID	QUL-EAA_LT-M-5_2022-10	QUL-EAA_LT-M-6_2022-10	QUL-EAA_LT-M-7_2022-10	QUL-EAA_LT-M-8_2022-10	QUL-EAA_LT-Li-1_2022-10
					Client sampling date / time	04-Oct-2022	04-Oct-2022	04-Oct-2022	04-Oct-2022	04-Oct-2022
Analyte	CAS Number	Method	LOR	Unit		VA22C4917-111	VA22C4917-112	VA22C4917-113	VA22C4917-114	VA22C4917-115
						Result	Result	Result	Result	Result
Metals										
Strontium	7440-24-6	E440	0.050	mg/kg		0.115	1.68	0.196	0.148	0.346
Tellurium	13494-80-9	E440	0.020	mg/kg		<0.020	<0.020	<0.020	<0.020	<0.020
Thallium	7440-28-0	E440	0.0020	mg/kg		0.0221	0.0275	0.0235	0.0263	0.307
Tin	7440-31-5	E440	0.10	mg/kg		0.31	0.18	0.17	0.37	0.31
Titanium	7440-32-6	E440.Ti	0.25	mg/kg		<0.25	<0.25	<0.25	<0.25	<0.25
Uranium	7440-61-1	E440	0.0020	mg/kg		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
Vanadium	7440-62-2	E440	0.10	mg/kg		<0.10	<0.10	<0.10	<0.10	<0.10
Zinc	7440-66-6	E440	0.50	mg/kg		11.3	17.9	9.17	17.7	160
Zirconium	7440-67-7	E440	0.20	mg/kg		<0.20	<0.20	<0.20	<0.20	<0.20

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	QUL-EAA_LT-Li-2_2022-10	QUL-EAA_LT-Li-3_2022-10	QUL-EAA_LT-Li-4_2022-10	QUL-EAA_LT-Li-5_2022-10	QUL-EAA_LT-Li-6_2022-10
					Client sampling date / time	04-Oct-2022	04-Oct-2022	04-Oct-2022	04-Oct-2022	04-Oct-2022
						VA22C4917-116	VA22C4917-117	VA22C4917-118	VA22C4917-119	VA22C4917-120
						Result	Result	Result	Result	Result
Physical Tests										
Moisture	----	E144	0.50	%		74.3	71.6	80.2	68.2	79.9
Metals										
Aluminum	7429-90-5	E440	2.0	mg/kg		<2.0	<2.0	<2.0	<2.0	3.6
Antimony	7440-36-0	E440	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	<0.010
Arsenic	7440-38-2	E440	0.020	mg/kg		0.387	0.955	0.360	0.352	0.663
Barium	7440-39-3	E440	0.050	mg/kg		<0.050	<0.050	<0.050	<0.050	<0.050
Beryllium	7440-41-7	E440	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	<0.010
Bismuth	7440-69-9	E440	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	<0.010
Boron	7440-42-8	E440	1.0	mg/kg		<1.0	<1.0	<1.0	<1.0	<1.0
Cadmium	7440-43-9	E440	0.0050	mg/kg		0.245	0.168	0.251	0.146	0.438
Calcium	7440-70-2	E440	20	mg/kg		381	257	537	217	506
Cesium	7440-46-2	E440	0.0050	mg/kg		0.100	0.118	0.203	0.0866	0.148
Chromium	7440-47-3	E440	0.050	mg/kg		0.266	0.119	0.291	0.127	0.429
Cobalt	7440-48-4	E440	0.020	mg/kg		0.158	0.130	0.132	0.124	0.134
Copper	7440-50-8	E440	0.10	mg/kg		223	151	144	80.2	93.9
Iron	7439-89-6	E440	3.0	mg/kg		978	760	609	860	1860
Lead	7439-92-1	E440	0.020	mg/kg		<0.020	<0.020	<0.020	<0.020	<0.020
Lithium	7439-93-2	E440	0.50	mg/kg		<0.50	<0.50	<0.50	<0.50	<0.50
Magnesium	7439-95-4	E440	2.0	mg/kg		491	562	795	403	581
Manganese	7439-96-5	E440	0.050	mg/kg		3.48	5.84	3.51	3.84	4.55
Mercury	7439-97-6	E510	0.0050	mg/kg		3.55	1.56	3.37	2.22	4.90
Mercury	7439-97-6	E510A	0.0010	mg/kg wwt		0.912	0.444	0.668	0.707	0.984
Molybdenum	7439-98-7	E440	0.020	mg/kg		0.570	0.403	0.276	0.472	0.568
Nickel	7440-02-0	E440	0.20	mg/kg		<0.20	<0.20	<0.20	<0.20	<0.20
Phosphorus	7723-14-0	E440	10	mg/kg		9570	12900	14600	8360	11600
Potassium	7440-09-7	E440	20	mg/kg		7470	7750	12100	6150	8770
Rubidium	7440-17-7	E440	0.050	mg/kg		15.3	18.4	30.8	13.1	20.5
Selenium	7782-49-2	E440	0.050	mg/kg		7.56	9.16	6.12	5.70	11.8
Silver	7440-22-4	E440.Ag	0.0050	mg/kg		1.16	1.33	1.36	0.504	0.950
Sodium	7440-23-5	E440	20	mg/kg		7900	5750	9480	4910	9000

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	QUL-EAA_LT-Li-2_2022-10	QUL-EAA_LT-Li-3_2022-10	QUL-EAA_LT-Li-4_2022-10	QUL-EAA_LT-Li-5_2022-10	QUL-EAA_LT-Li-6_2022-10
					Client sampling date / time	04-Oct-2022	04-Oct-2022	04-Oct-2022	04-Oct-2022	04-Oct-2022
						VA22C4917-116	VA22C4917-117	VA22C4917-118	VA22C4917-119	VA22C4917-120
						Result	Result	Result	Result	Result
Metals										
Strontium	7440-24-6	E440	0.050	mg/kg		0.710	0.441	0.774	0.362	0.985
Tellurium	13494-80-9	E440	0.020	mg/kg		<0.020	<0.020	<0.020	<0.020	<0.020
Thallium	7440-28-0	E440	0.0020	mg/kg		0.168	0.316	0.401	0.212	0.326
Tin	7440-31-5	E440	0.10	mg/kg		0.24	0.57	0.67	0.13	0.19
Titanium	7440-32-6	E440.Ti	0.25	mg/kg		<0.25	<0.25	<0.25	<0.25	<0.25
Uranium	7440-61-1	E440	0.0020	mg/kg		<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
Vanadium	7440-62-2	E440	0.10	mg/kg		<0.10	<0.10	<0.10	<0.10	0.12
Zinc	7440-66-6	E440	0.50	mg/kg		148	145	157	106	152
Zirconium	7440-67-7	E440	0.20	mg/kg		<0.20	<0.20	<0.20	<0.20	<0.20

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	QUL-EAA_LT-Li-7_2022-10	QUL-EAA_LT-Li-8_2022-10	QUL-EAA_LT-O-4_2022-10	QUL-EAA_LT-Ki-1_2022-10	QUL-EAA_LT-Ki-2_2022-10
					Client sampling date / time	04-Oct-2022	04-Oct-2022	04-Oct-2022	04-Oct-2022	04-Oct-2022
						VA22C4917-121	VA22C4917-122	VA22C4917-123	VA22C4917-124	VA22C4917-125
						Result	Result	Result	Result	Result
Physical Tests										
Moisture	----	E144	0.50	%		63.4	75.4	87.2	77.0	67.0
Metals										
Aluminum	7429-90-5	E440	2.0	mg/kg		<2.0	2.4	<2.0	6.6	3.1
Antimony	7440-36-0	E440	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	<0.010
Arsenic	7440-38-2	E440	0.020	mg/kg		0.242	0.220	0.092	0.250	0.214
Barium	7440-39-3	E440	0.050	mg/kg		<0.050	<0.050	0.104	0.100	0.054
Beryllium	7440-41-7	E440	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	<0.010
Bismuth	7440-69-9	E440	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	<0.010
Boron	7440-42-8	E440	1.0	mg/kg		<1.0	<1.0	<1.0	<1.0	<1.0
Cadmium	7440-43-9	E440	0.0050	mg/kg		0.0920	0.223	0.0132	0.706	0.346
Calcium	7440-70-2	E440	20	mg/kg		182	1130	1130	484	259
Cesium	7440-46-2	E440	0.0050	mg/kg		0.0819	0.0663	0.381	0.209	0.0764
Chromium	7440-47-3	E440	0.050	mg/kg		0.075	0.316	0.084	0.240	0.175
Cobalt	7440-48-4	E440	0.020	mg/kg		0.085	0.234	0.096	0.385	0.155
Copper	7440-50-8	E440	0.10	mg/kg		132	46.5	9.22	3.07	1.44
Iron	7439-89-6	E440	3.0	mg/kg		312	2270	276	994	722
Lead	7439-92-1	E440	0.020	mg/kg		<0.020	<0.020	<0.020	<0.020	<0.020
Lithium	7439-93-2	E440	0.50	mg/kg		<0.50	<0.50	<0.50	<0.50	<0.50
Magnesium	7439-95-4	E440	2.0	mg/kg		350	511	835	516	272
Manganese	7439-96-5	E440	0.050	mg/kg		3.27	2.82	5.04	0.772	0.412
Mercury	7439-97-6	E510	0.0050	mg/kg		0.928	6.35	1.44	4.26	2.65
Mercury	7439-97-6	E510A	0.0010	mg/kg wwt		0.339	1.56	0.184	0.980	0.874
Molybdenum	7439-98-7	E440	0.020	mg/kg		0.297	0.665	0.083	0.202	0.083
Nickel	7440-02-0	E440	0.20	mg/kg		<0.20	<0.20	<0.20	0.41	<0.20
Phosphorus	7723-14-0	E440	10	mg/kg		7250	10100	12500	8690	4990
Potassium	7440-09-7	E440	20	mg/kg		5310	9250	15300	8560	5310
Rubidium	7440-17-7	E440	0.050	mg/kg		13.8	14.5	47.1	26.5	12.3
Selenium	7782-49-2	E440	0.050	mg/kg		5.36	13.6	4.16	10.4	4.05
Silver	7440-22-4	E440.Ag	0.0050	mg/kg		0.749	0.373	0.0156	<0.0050	<0.0050
Sodium	7440-23-5	E440	20	mg/kg		3700	5990	16300	9660	5330

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	QUL-EAA_LT-Li-7_2022-10	QUL-EAA_LT-Li-8_2022-10	QUL-EAA_LT-O-4_2022-10	QUL-EAA_LT-Ki-1_2022-10	QUL-EAA_LT-Ki-2_2022-10
					Client sampling date / time	04-Oct-2022	04-Oct-2022	04-Oct-2022	04-Oct-2022	04-Oct-2022
						VA22C4917-121	VA22C4917-122	VA22C4917-123	VA22C4917-124	VA22C4917-125
						Result	Result	Result	Result	Result
Metals										
Strontium	7440-24-6	E440	0.050	mg/kg		0.328	1.59	1.36	1.80	0.745
Tellurium	13494-80-9	E440	0.020	mg/kg		<0.020	<0.020	<0.020	<0.020	<0.020
Thallium	7440-28-0	E440	0.0020	mg/kg		0.187	0.102	0.0966	0.101	0.0341
Tin	7440-31-5	E440	0.10	mg/kg		0.16	0.16	0.32	0.23	<0.10
Titanium	7440-32-6	E440.Ti	0.25	mg/kg		<0.25	<0.25	<0.25	<0.25	<0.25
Uranium	7440-61-1	E440	0.0020	mg/kg		<0.0020	<0.0020	<0.0020	0.0021	<0.0020
Vanadium	7440-62-2	E440	0.10	mg/kg		<0.10	0.14	<0.10	<0.10	<0.10
Zinc	7440-66-6	E440	0.50	mg/kg		108	106	152	93.7	42.4
Zirconium	7440-67-7	E440	0.20	mg/kg		<0.20	<0.20	<0.20	<0.20	<0.20

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	QUL-EAA_LT-Ki-3_2022-10	QUL-EAA_LT-Ki-4_2022-10	QUL-EAA_LT-Ki-5_2022-10	QUL-EAA_LT-Ki-6_2022-10	QUL-EAA_LT-Ki-7_2022-10
					Client sampling date / time	04-Oct-2022	04-Oct-2022	04-Oct-2022	04-Oct-2022	04-Oct-2022
						VA22C4917-126	VA22C4917-127	VA22C4917-128	VA22C4917-129	VA22C4917-130
						Result	Result	Result	Result	Result
Physical Tests										
Moisture	----	E144	0.50	%		77.1	71.5	69.6	82.2	78.3
Metals										
Aluminum	7429-90-5	E440	2.0	mg/kg		6.5	3.7	3.7	12.5	3.5
Antimony	7440-36-0	E440	0.010	mg/kg		<0.010	<0.010	<0.010	0.014	<0.010
Arsenic	7440-38-2	E440	0.020	mg/kg		0.370	0.168	0.181	0.207	0.124
Barium	7440-39-3	E440	0.050	mg/kg		0.127	0.069	0.076	0.144	0.096
Beryllium	7440-41-7	E440	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	<0.010
Bismuth	7440-69-9	E440	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	<0.010
Boron	7440-42-8	E440	1.0	mg/kg		<1.0	<1.0	<1.0	<1.0	<1.0
Cadmium	7440-43-9	E440	0.0050	mg/kg		0.685	0.398	0.424	1.56	0.605
Calcium	7440-70-2	E440	20	mg/kg		457	417	292	787	315
Cesium	7440-46-2	E440	0.0050	mg/kg		0.198	0.137	0.111	0.208	0.206
Chromium	7440-47-3	E440	0.050	mg/kg		0.174	0.193	0.205	0.739	0.147
Cobalt	7440-48-4	E440	0.020	mg/kg		0.529	0.074	0.267	0.370	0.553
Copper	7440-50-8	E440	0.10	mg/kg		3.26	4.56	2.05	3.94	3.26
Iron	7439-89-6	E440	3.0	mg/kg		542	513	751	1230	611
Lead	7439-92-1	E440	0.020	mg/kg		<0.020	<0.020	<0.020	0.043	<0.020
Lithium	7439-93-2	E440	0.50	mg/kg		<0.50	<0.50	<0.50	<0.50	<0.50
Magnesium	7439-95-4	E440	2.0	mg/kg		561	469	389	703	649
Manganese	7439-96-5	E440	0.050	mg/kg		1.03	0.906	0.584	0.946	1.20
Mercury	7439-97-6	E510	0.0050	mg/kg		1.77	2.45	2.31	5.23	1.78
Mercury	7439-97-6	E510A	0.0010	mg/kg wwt		0.405	0.698	0.703	0.928	0.385
Molybdenum	7439-98-7	E440	0.020	mg/kg		0.157	0.097	0.115	0.214	0.208
Nickel	7440-02-0	E440	0.20	mg/kg		0.25	<0.20	<0.20	0.68	0.23
Phosphorus	7723-14-0	E440	10	mg/kg		10100	6970	6970	12100	11700
Potassium	7440-09-7	E440	20	mg/kg		9270	6390	7080	12300	11500
Rubidium	7440-17-7	E440	0.050	mg/kg		23.9	18.3	16.7	29.6	32.0
Selenium	7782-49-2	E440	0.050	mg/kg		7.13	3.95	5.78	14.1	5.40
Silver	7440-22-4	E440.Ag	0.0050	mg/kg		<0.0050	0.0164	<0.0050	0.0086	<0.0050
Sodium	7440-23-5	E440	20	mg/kg		9440	7120	6770	11100	9500

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	QUL-EAA_LT-Ki-3_2022-10	QUL-EAA_LT-Ki-4_2022-10	QUL-EAA_LT-Ki-5_2022-10	QUL-EAA_LT-Ki-6_2022-10	QUL-EAA_LT-Ki-7_2022-10
					Client sampling date / time	04-Oct-2022	04-Oct-2022	04-Oct-2022	04-Oct-2022	04-Oct-2022
						VA22C4917-126	VA22C4917-127	VA22C4917-128	VA22C4917-129	VA22C4917-130
						Result	Result	Result	Result	Result
Metals										
Strontium	7440-24-6	E440	0.050	mg/kg		1.51	1.13	1.15	1.90	0.844
Tellurium	13494-80-9	E440	0.020	mg/kg		<0.020	<0.020	<0.020	<0.020	<0.020
Thallium	7440-28-0	E440	0.0020	mg/kg		0.0803	0.0617	0.0572	0.106	0.0925
Tin	7440-31-5	E440	0.10	mg/kg		0.47	0.33	0.13	0.62	0.73
Titanium	7440-32-6	E440.Ti	0.25	mg/kg		0.46	0.38	<0.25	0.50	0.28
Uranium	7440-61-1	E440	0.0020	mg/kg		<0.0020	<0.0020	<0.0020	0.0033	<0.0020
Vanadium	7440-62-2	E440	0.10	mg/kg		<0.10	<0.10	<0.10	<0.10	<0.10
Zinc	7440-66-6	E440	0.50	mg/kg		84.2	48.2	58.6	119	88.7
Zirconium	7440-67-7	E440	0.20	mg/kg		<0.20	<0.20	<0.20	<0.20	<0.20

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	QUL-EAA_LT-Ki-8_2022-10	QUL-NGC_PCC-M-5X_2022-10	QUL-NGC_PCC-Li-5X_2022-10	QUL-NGC_PCC-O-5X_2022-10	QUL-NGC_PCC-Ki-7X_2022-10
					Client sampling date / time	04-Oct-2022	06-Oct-2022	06-Oct-2022	06-Oct-2022	06-Oct-2022
						VA22C4917-131	VA22C4917-132	VA22C4917-133	VA22C4917-134	VA22C4917-135
						Result	Result	Result	Result	Result
Physical Tests										
Moisture	----	E144	0.50	%		83.8	78.3	----	68.4	----
Moisture	----	E144A	2.0	%		----	----	57.0	----	69.9
Metals										
Aluminum	7429-90-5	E440	2.0	mg/kg		16.4	<2.0	----	<2.0	----
Aluminum	7429-90-5	E475	5.0	mg/kg		----	----	15.6	----	<5.0
Antimony	7440-36-0	E440	0.010	mg/kg		0.014	<0.010	----	<0.010	----
Antimony	7440-36-0	E475	0.020	mg/kg		----	----	<0.020	----	<0.020
Arsenic	7440-38-2	E440	0.020	mg/kg		0.217	0.274	----	0.114	----
Arsenic	7440-38-2	E475	0.050	mg/kg		----	----	1.11	----	0.505
Barium	7440-39-3	E475	0.050	mg/kg		----	----	0.149	----	0.931
Barium	7440-39-3	E440	0.050	mg/kg		0.112	0.336	----	0.483	----
Beryllium	7440-41-7	E475	0.010	mg/kg		----	----	<0.010	----	<0.010
Beryllium	7440-41-7	E440	0.010	mg/kg		<0.010	<0.010	----	<0.010	----
Bismuth	7440-69-9	E475	0.010	mg/kg		----	----	0.032	----	0.094
Bismuth	7440-69-9	E440	0.010	mg/kg		<0.010	<0.010	----	<0.010	----
Boron	7440-42-8	E475	1.0	mg/kg		----	----	<1.0	----	1.3
Boron	7440-42-8	E440	1.0	mg/kg		<1.0	<1.0	----	<1.0	----
Cadmium	7440-43-9	E440	0.0050	mg/kg		1.59	<0.0050	----	0.0298	----
Cadmium	7440-43-9	E475	0.010	mg/kg		----	----	1.11	----	10.9
Calcium	7440-70-2	E475	20	mg/kg		----	----	126	----	275
Calcium	7440-70-2	E440	20	mg/kg		1090	2190	----	687	----
Cesium	7440-46-2	E475	0.0050	mg/kg		----	----	0.0199	----	0.0746
Cesium	7440-46-2	E440	0.0050	mg/kg		0.139	0.143	----	0.0675	----
Chromium	7440-47-3	E440	0.050	mg/kg		1.25	<0.050	----	<0.050	----
Chromium	7440-47-3	E475	0.20	mg/kg		----	----	0.33	----	0.42
Cobalt	7440-48-4	E475	0.020	mg/kg		----	----	0.228	----	2.47
Cobalt	7440-48-4	E440	0.020	mg/kg		0.394	0.037	----	0.185	----
Copper	7440-50-8	E440	0.10	mg/kg		3.92	1.85	----	4.62	----
Copper	7440-50-8	E475	0.20	mg/kg		----	----	11.2	----	5.60
Iron	7439-89-6	E440	3.0	mg/kg		2650	19.4	----	70.7	----

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	QUL-EAA_LT-Ki-8_2022-10	QUL-NGC_PCC-M-5X_2022-10	QUL-NGC_PCC-Li-5X_2022-10	QUL-NGC_PCC-O-5X_2022-10	QUL-NGC_PCC-Ki-7X_2022-10
					Client sampling date / time	04-Oct-2022	06-Oct-2022	06-Oct-2022	06-Oct-2022	06-Oct-2022
						VA22C4917-131	VA22C4917-132	VA22C4917-133	VA22C4917-134	VA22C4917-135
						Result	Result	Result	Result	Result
Metals										
Iron	7439-89-6	E475	5.0	mg/kg		----	----	518	----	334
Lead	7439-92-1	E440	0.020	mg/kg		0.025	<0.020	----	<0.020	----
Lead	7439-92-1	E475	0.050	mg/kg		----	----	<0.050	----	<0.050
Lithium	7439-93-2	E475	0.50	mg/kg		----	----	<0.50	----	<0.50
Lithium	7439-93-2	E440	0.50	mg/kg		<0.50	<0.50	----	<0.50	----
Magnesium	7439-95-4	E475	2.0	mg/kg		----	----	425	----	603
Magnesium	7439-95-4	E440	2.0	mg/kg		728	1660	----	960	----
Manganese	7439-96-5	E475	0.050	mg/kg		----	----	3.03	----	3.18
Manganese	7439-96-5	E440	0.050	mg/kg		1.41	0.917	----	14.2	----
Mercury	7439-97-6	E510	0.0050	mg/kg		10.9	1.09	----	0.0532	----
Mercury	7439-97-6	E512	0.010	mg/kg		----	----	0.315	----	0.517
Mercury	7439-97-6	E510A	0.0010	mg/kg wwt		1.76	0.237	----	0.0168	----
Mercury	7439-97-6	E512A	0.0020	mg/kg wwt		----	----	0.135	----	0.156
Molybdenum	7439-98-7	E440	0.020	mg/kg		0.464	<0.020	----	0.155	----
Molybdenum	7439-98-7	E475	0.040	mg/kg		----	----	0.579	----	0.845
Nickel	7440-02-0	E475	0.20	mg/kg		----	----	<0.20	----	<3.50 DLB
Nickel	7440-02-0	E440	0.20	mg/kg		0.67	<0.20	----	<0.20	----
Phosphorus	7723-14-0	E440	10	mg/kg		11500	12400	----	9500	----
Phosphorus	7723-14-0	E475	20	mg/kg		----	----	8340	----	11700
Potassium	7440-09-7	E475	20	mg/kg		----	----	6180	----	10700
Potassium	7440-09-7	E440	20	mg/kg		12100	21100	----	9450	----
Rubidium	7440-17-7	E475	0.050	mg/kg		----	----	10.2	----	16.8
Rubidium	7440-17-7	E440	0.050	mg/kg		17.5	31.9	----	17.1	----
Selenium	7782-49-2	E440	0.050	mg/kg		21.8	1.74	----	8.98	----
Selenium	7782-49-2	E475	0.10	mg/kg		----	----	5.90	----	6.71
Silver	7440-22-4	E475.Ag	0.0050	mg/kg		----	----	0.0234	----	0.0060
Silver	7440-22-4	E440.Ag	0.0050	mg/kg		0.0127	<0.0050	----	0.0205	----
Sodium	7440-23-5	E475	20	mg/kg		----	----	2110	----	4260
Sodium	7440-23-5	E440	20	mg/kg		14500	1230	----	2120	----
Strontium	7440-24-6	E440	0.050	mg/kg		4.06	4.01	----	0.753	----

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	QUL-EAA_LT-Ki-8_2022-10	QUL-NGC_PCC-M-5X_2022-10	QUL-NGC_PCC-Li-5X_2022-10	QUL-NGC_PCC-O-5X_2022-10	QUL-NGC_PCC-Ki-7X_2022-10
					Client sampling date / time	04-Oct-2022	06-Oct-2022	06-Oct-2022	06-Oct-2022	06-Oct-2022
						VA22C4917-131	VA22C4917-132	VA22C4917-133	VA22C4917-134	VA22C4917-135
						Result	Result	Result	Result	Result
Metals										
Strontium	7440-24-6	E475	0.10	mg/kg		----	----	0.29	----	0.63
Tellurium	13494-80-9	E475	0.020	mg/kg		----	----	<0.020	----	0.070
Tellurium	13494-80-9	E440	0.020	mg/kg		<0.020	<0.020	----	<0.020	----
Thallium	7440-28-0	E475	0.0020	mg/kg		----	----	0.0165	----	0.0393
Thallium	7440-28-0	E440	0.0020	mg/kg		0.0965	0.0069	----	0.0058	----
Tin	7440-31-5	E475	0.10	mg/kg		----	----	<0.10	----	<0.10
Tin	7440-31-5	E440	0.10	mg/kg		0.23	0.26	----	0.53	----
Titanium	7440-32-6	E440.Ti	0.25	mg/kg		0.39	0.29	----	0.27	----
Titanium	7440-32-6	E475.Ti	0.50	mg/kg		----	----	<0.50	----	1.04
Uranium	7440-61-1	E475	0.0020	mg/kg		----	----	0.0580	----	0.0513
Uranium	7440-61-1	E440	0.0020	mg/kg		0.0103	0.0030	----	0.0100	----
Vanadium	7440-62-2	E475	0.10	mg/kg		----	----	0.36	----	0.48
Vanadium	7440-62-2	E440	0.10	mg/kg		0.17	<0.10	----	<0.10	----
Zinc	7440-66-6	E440	0.50	mg/kg		101	28.1	----	151	----
Zinc	7440-66-6	E475	1.0	mg/kg		----	----	69.9	----	135
Zirconium	7440-67-7	E475	0.20	mg/kg		----	----	<0.20	----	<0.20
Zirconium	7440-67-7	E440	0.20	mg/kg		<0.20	<0.20	----	<0.20	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	QUL-NCP_LT-M-1X_2022-10	QUL-NCP_LT-Li-1X_2022-10	QUL-NCP_LT-O-1X_2022-10	QUL-NCP_LT-Ki-1X_2022-10	QUL-NHC_PCC-M-6X_2022-10
					Client sampling date / time	03-Oct-2022	03-Oct-2022	03-Oct-2022	03-Oct-2022	04-Oct-2022
						VA22C4917-136	VA22C4917-137	VA22C4917-138	VA22C4917-139	VA22C4917-140
						Result	Result	Result	Result	Result
Physical Tests										
Moisture	----	E144	0.50	%		76.2	78.8	64.4	82.3	77.6
Metals										
Aluminum	7429-90-5	E440	2.0	mg/kg		<2.0	3.1	<2.0	11.8	<2.0
Antimony	7440-36-0	E440	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	<0.010
Arsenic	7440-38-2	E440	0.020	mg/kg		0.092	0.222	0.042	0.190	0.276
Barium	7440-39-3	E440	0.050	mg/kg		<0.050	0.052	<0.050	0.161	0.730
Beryllium	7440-41-7	E440	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	<0.010
Bismuth	7440-69-9	E440	0.010	mg/kg		<0.010	<0.010	<0.010	<0.010	<0.010
Boron	7440-42-8	E440	1.0	mg/kg		<1.0	<1.0	<1.0	<1.0	<1.0
Cadmium	7440-43-9	E440	0.0050	mg/kg		<0.0050	0.422	<0.0050	2.52	0.0417
Calcium	7440-70-2	E440	20	mg/kg		428	337	978	729	4350
Cesium	7440-46-2	E440	0.0050	mg/kg		0.297	0.308	0.0694	0.224	0.0852
Chromium	7440-47-3	E440	0.050	mg/kg		<0.050	0.228	<0.050	0.859	<0.050
Cobalt	7440-48-4	E440	0.020	mg/kg		<0.020	0.090	0.042	0.174	0.038
Copper	7440-50-8	E440	0.10	mg/kg		0.74	11.1	12.4	3.18	1.42
Iron	7439-89-6	E440	3.0	mg/kg		8.6	347	47.7	635	17.6
Lead	7439-92-1	E440	0.020	mg/kg		<0.020	<0.020	<0.020	0.028	0.027
Lithium	7439-93-2	E440	0.50	mg/kg		<0.50	<0.50	<0.50	<0.50	<0.50
Magnesium	7439-95-4	E440	2.0	mg/kg		1060	1070	1350	632	1730
Manganese	7439-96-5	E440	0.050	mg/kg		0.280	5.94	0.747	0.901	1.62
Mercury	7439-97-6	E510	0.0050	mg/kg		2.09	2.58	0.269	6.57	0.760
Mercury	7439-97-6	E510A	0.0010	mg/kg wwt		0.498	0.547	0.0957	1.16	0.170
Molybdenum	7439-98-7	E440	0.020	mg/kg		<0.020	0.338	<0.020	0.227	<0.020
Nickel	7440-02-0	E440	0.20	mg/kg		<0.20	<0.20	<0.20	0.51	<0.20
Phosphorus	7723-14-0	E440	10	mg/kg		10300	18200	9800	11400	12600
Potassium	7440-09-7	E440	20	mg/kg		18700	17300	5250	10100	18800
Rubidium	7440-17-7	E440	0.050	mg/kg		38.7	83.7	10.1	27.0	20.7
Selenium	7782-49-2	E440	0.050	mg/kg		1.58	5.35	3.96	10.2	4.23
Silver	7440-22-4	E440.Ag	0.0050	mg/kg		<0.0050	0.0569	0.0355	0.0151	<0.0050
Sodium	7440-23-5	E440	20	mg/kg		1050	5270	3040	12800	1150

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	QUL-NCP_LT-M-1X_2022-10	QUL-NCP_LT-Li-1X_2022-10	QUL-NCP_LT-O-1X_2022-10	QUL-NCP_LT-Ki-1X_2022-10	QUL-NHC_PCC-M-6X_2022-10
					Client sampling date / time	03-Oct-2022	03-Oct-2022	03-Oct-2022	03-Oct-2022	04-Oct-2022
						VA22C4917-136	VA22C4917-137	VA22C4917-138	VA22C4917-139	VA22C4917-140
						Result	Result	Result	Result	Result
Metals										
Strontium	7440-24-6	E440	0.050	mg/kg		0.385	0.387	2.53	1.76	7.48
Tellurium	13494-80-9	E440	0.020	mg/kg		<0.020	<0.020	<0.020	<0.020	<0.020
Thallium	7440-28-0	E440	0.0020	mg/kg		0.0246	0.646	0.0183	0.0929	0.0062
Tin	7440-31-5	E440	0.10	mg/kg		0.26	0.21	0.10	0.73	1.47
Titanium	7440-32-6	E440.Ti	0.25	mg/kg		<0.25	0.29	<0.25	0.84	0.28
Uranium	7440-61-1	E440	0.0020	mg/kg		<0.0020	<0.0020	<0.0020	0.0074	0.0056
Vanadium	7440-62-2	E440	0.10	mg/kg		<0.10	<0.10	<0.10	0.14	<0.10
Zinc	7440-66-6	E440	0.50	mg/kg		9.99	97.2	69.7	71.1	21.0
Zirconium	7440-67-7	E440	0.20	mg/kg		<0.20	<0.20	<0.20	<0.20	<0.20

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	QUL-NHC_PCC-Li-6X_2022-10	QUL-NHC_PCC-O-6X_2022-10	QUL-NHC_PCC-Ki-6X_2022-10	QUL-EAA_LT-M-4X_2022-10	QUL-EAA_LT-Li-4X_2022-10
					Client sampling date / time	04-Oct-2022	04-Oct-2022	04-Oct-2022	04-Oct-2022	04-Oct-2022
						VA22C4917-141	VA22C4917-142	VA22C4917-143	VA22C4917-144	VA22C4917-145
						Result	Result	Result	Result	Result
Physical Tests										
Moisture	----	E144	0.50	%		----	64.2	----	71.0	80.2
Moisture	----	E144A	2.0	%		----	----	59.1	----	----
Moisture	----	E144-H	2.0	%		71.0	----	----	----	----
Metals										
Aluminum	7429-90-5	E440	2.0	mg/kg		----	<2.0	----	<2.0	<2.0
Aluminum	7429-90-5	E475	5.0	mg/kg		----	----	8.2	----	----
Aluminum	7429-90-5	E472	5.0	mg/kg		16.7	----	----	----	----
Antimony	7440-36-0	E472	0.010	mg/kg		0.016	----	----	----	----
Antimony	7440-36-0	E440	0.010	mg/kg		----	<0.010	----	<0.010	<0.010
Antimony	7440-36-0	E475	0.020	mg/kg		----	----	<0.020	----	----
Arsenic	7440-38-2	E440	0.020	mg/kg		----	0.159	----	0.207	0.348
Arsenic	7440-38-2	E472	0.030	mg/kg		0.340	----	----	----	----
Arsenic	7440-38-2	E475	0.050	mg/kg		----	----	0.289	----	----
Barium	7440-39-3	E475	0.050	mg/kg		----	----	1.57	----	----
Barium	7440-39-3	E472	0.050	mg/kg		0.199	----	----	----	----
Barium	7440-39-3	E440	0.050	mg/kg		----	0.367	----	0.056	<0.050
Beryllium	7440-41-7	E475	0.010	mg/kg		----	----	<0.010	----	----
Beryllium	7440-41-7	E472	0.010	mg/kg		<0.010	----	----	----	----
Beryllium	7440-41-7	E440	0.010	mg/kg		----	<0.010	----	<0.010	<0.010
Bismuth	7440-69-9	E475	0.010	mg/kg		----	----	0.029	----	----
Bismuth	7440-69-9	E472	0.010	mg/kg		0.037	----	----	----	----
Bismuth	7440-69-9	E440	0.010	mg/kg		----	<0.010	----	<0.010	<0.010
Boron	7440-42-8	E475	1.0	mg/kg		----	----	<1.0	----	----
Boron	7440-42-8	E472	1.0	mg/kg		<1.0	----	----	----	----
Boron	7440-42-8	E440	1.0	mg/kg		----	<1.0	----	<1.0	<1.0
Cadmium	7440-43-9	E440	0.0050	mg/kg		----	0.0544	----	<0.0050	0.226
Cadmium	7440-43-9	E475	0.010	mg/kg		----	----	18.9	----	----
Cadmium	7440-43-9	E472	0.010	mg/kg		2.02	----	----	----	----
Calcium	7440-70-2	E475	20	mg/kg		----	----	2720	----	----
Calcium	7440-70-2	E472	20	mg/kg		199	----	----	----	----

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	QUL-NHC_PCC-Li-6X_2022-10	QUL-NHC_PCC-O-6X_2022-10	QUL-NHC_PCC-Ki-6X_2022-10	QUL-EAA_LT-M-4X_2022-10	QUL-EAA_LT-Li-4X_2022-10
					Client sampling date / time	04-Oct-2022	04-Oct-2022	04-Oct-2022	04-Oct-2022	04-Oct-2022
						VA22C4917-141	VA22C4917-142	VA22C4917-143	VA22C4917-144	VA22C4917-145
						Result	Result	Result	Result	Result
Metals										
Calcium	7440-70-2	E440	20	mg/kg		----	270	----	4670	629
Cesium	7440-46-2	E475	0.0050	mg/kg		----	----	0.0315	----	----
Cesium	7440-46-2	E472	0.0050	mg/kg		0.0331	----	----	----	----
Cesium	7440-46-2	E440	0.0050	mg/kg		----	0.0330	----	0.262	0.207
Chromium	7440-47-3	E440	0.050	mg/kg		----	<0.050	----	0.055	0.257
Chromium	7440-47-3	E475	0.20	mg/kg		----	----	0.41	----	----
Chromium	7440-47-3	E472	0.20	mg/kg		0.40	----	----	----	----
Cobalt	7440-48-4	E475	0.020	mg/kg		----	----	3.14	----	----
Cobalt	7440-48-4	E472	0.020	mg/kg		0.330	----	----	----	----
Cobalt	7440-48-4	E440	0.020	mg/kg		----	0.124	----	<0.020	0.134
Copper	7440-50-8	E440	0.10	mg/kg		----	5.54	----	1.19	135
Copper	7440-50-8	E475	0.20	mg/kg		----	----	4.69	----	----
Copper	7440-50-8	E472	0.20	mg/kg		26.6	----	----	----	----
Iron	7439-89-6	E440	3.0	mg/kg		----	74.8	----	20.8	799
Iron	7439-89-6	E475	5.0	mg/kg		----	----	236	----	----
Iron	7439-89-6	E472	5.0	mg/kg		1380	----	----	----	----
Lead	7439-92-1	E440	0.020	mg/kg		----	<0.020	----	<0.020	<0.020
Lead	7439-92-1	E475	0.050	mg/kg		----	----	0.149	----	----
Lead	7439-92-1	E472	0.050	mg/kg		0.054	----	----	----	----
Lithium	7439-93-2	E475	0.50	mg/kg		----	----	<0.50	----	----
Lithium	7439-93-2	E472	0.50	mg/kg		<0.50	----	----	----	----
Lithium	7439-93-2	E440	0.50	mg/kg		----	<0.50	----	<0.50	<0.50
Magnesium	7439-95-4	E475	2.0	mg/kg		----	----	498	----	----
Magnesium	7439-95-4	E472	2.0	mg/kg		850	----	----	----	----
Magnesium	7439-95-4	E440	2.0	mg/kg		----	670	----	916	782
Manganese	7439-96-5	E475	0.050	mg/kg		----	----	5.42	----	----
Manganese	7439-96-5	E472	0.050	mg/kg		6.36	----	----	----	----
Manganese	7439-96-5	E440	0.050	mg/kg		----	9.91	----	0.482	3.25
Mercury	7439-97-6	E511	0.0050	mg/kg		0.432	----	----	----	----
Mercury	7439-97-6	E510	0.0050	mg/kg		----	0.0340	----	1.10	3.38

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	QUL-NHC_PCC-Li-6X_2022-10	QUL-NHC_PCC-O-6X_2022-10	QUL-NHC_PCC-Ki-6X_2022-10	QUL-EAA_LT-M-4X_2022-10	QUL-EAA_LT-Li-4X_2022-10
					Client sampling date / time	04-Oct-2022	04-Oct-2022	04-Oct-2022	04-Oct-2022	04-Oct-2022
						VA22C4917-141	VA22C4917-142	VA22C4917-143	VA22C4917-144	VA22C4917-145
						Result	Result	Result	Result	Result
Metals										
Mercury	7439-97-6	E512	0.010	mg/kg		----	----	0.266	----	----
Mercury	7439-97-6	E511A	0.0010	mg/kg wwt		0.125	----	----	----	----
Mercury	7439-97-6	E510A	0.0010	mg/kg wwt		----	0.0122	----	0.318	0.669
Mercury	7439-97-6	E512A	0.0020	mg/kg wwt		----	----	0.109	----	----
Molybdenum	7439-98-7	E440	0.020	mg/kg		----	0.108	----	<0.020	0.268
Molybdenum	7439-98-7	E475	0.040	mg/kg		----	----	0.569	----	----
Molybdenum	7439-98-7	E472	0.040	mg/kg		1.10	----	----	----	----
Nickel	7440-02-0	E475	0.20	mg/kg		----	----	<1.80 DLB	----	----
Nickel	7440-02-0	E472	0.20	mg/kg		0.39	----	----	----	----
Nickel	7440-02-0	E440	0.20	mg/kg		----	<0.20	----	<0.20	<0.20
Phosphorus	7723-14-0	E472	10	mg/kg		14000	----	----	----	----
Phosphorus	7723-14-0	E440	10	mg/kg		----	10600	----	9290	14600
Phosphorus	7723-14-0	E475	20	mg/kg		----	----	9900	----	----
Potassium	7440-09-7	E475	20	mg/kg		----	----	7630	----	----
Potassium	7440-09-7	E472	20	mg/kg		10900	----	----	----	----
Potassium	7440-09-7	E440	20	mg/kg		----	7650	----	11200	12100
Rubidium	7440-17-7	E475	0.050	mg/kg		----	----	10.6	----	----
Rubidium	7440-17-7	E472	0.050	mg/kg		13.0	----	----	----	----
Rubidium	7440-17-7	E440	0.050	mg/kg		----	9.92	----	25.2	31.6
Selenium	7782-49-2	E440	0.050	mg/kg		----	18.6	----	1.22	5.96
Selenium	7782-49-2	E475	0.10	mg/kg		----	----	6.60	----	----
Selenium	7782-49-2	E472	0.10	mg/kg		10.9	----	----	----	----
Silver	7440-22-4	E475.Ag	0.0050	mg/kg		----	----	0.0073	----	----
Silver	7440-22-4	E472.Ag	0.0050	mg/kg		0.101	----	----	----	----
Silver	7440-22-4	E440.Ag	0.0050	mg/kg		----	0.0238	----	<0.0050	1.16
Sodium	7440-23-5	E475	20	mg/kg		----	----	3270	----	----
Sodium	7440-23-5	E472	20	mg/kg		3920	----	----	----	----
Sodium	7440-23-5	E440	20	mg/kg		----	1700	----	1060	9600
Strontium	7440-24-6	E440	0.050	mg/kg		----	0.378	----	6.85	2.15
Strontium	7440-24-6	E475	0.10	mg/kg		----	----	7.12	----	----

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	QUL-NHC_PCC-Li-6X_2022-10	QUL-NHC_PCC-O-6X_2022-10	QUL-NHC_PCC-Ki-6X_2022-10	QUL-EAA_LT-M-4X_2022-10	QUL-EAA_LT-Li-4X_2022-10
					Client sampling date / time	04-Oct-2022	04-Oct-2022	04-Oct-2022	04-Oct-2022	04-Oct-2022
						VA22C4917-141	VA22C4917-142	VA22C4917-143	VA22C4917-144	VA22C4917-145
						Result	Result	Result	Result	Result
Metals										
Strontium	7440-24-6	E472	0.10	mg/kg		0.50	----	----	----	----
Tellurium	13494-80-9	E475	0.020	mg/kg		----	----	0.036	----	----
Tellurium	13494-80-9	E472	0.020	mg/kg		<0.020	----	----	----	----
Tellurium	13494-80-9	E440	0.020	mg/kg		----	<0.020	----	<0.020	<0.020
Thallium	7440-28-0	E475	0.0020	mg/kg		----	----	0.0352	----	----
Thallium	7440-28-0	E472	0.0020	mg/kg		0.0282	----	----	----	----
Thallium	7440-28-0	E440	0.0020	mg/kg		----	0.0058	----	0.0325	0.368
Tin	7440-31-5	E475	0.10	mg/kg		----	----	<0.10	----	----
Tin	7440-31-5	E472	0.10	mg/kg		1.91	----	----	----	----
Tin	7440-31-5	E440	0.10	mg/kg		----	0.31	----	0.16	0.66
Titanium	7440-32-6	E440.Ti	0.25	mg/kg		----	<0.25	----	0.26	<0.25
Titanium	7440-32-6	E475.Ti	0.50	mg/kg		----	----	0.87	----	----
Titanium	7440-32-6	E472.Ti	0.50	mg/kg		<0.50	----	----	----	----
Uranium	7440-61-1	E475	0.0020	mg/kg		----	----	0.112	----	----
Uranium	7440-61-1	E472	0.0020	mg/kg		0.0770	----	----	----	----
Uranium	7440-61-1	E440	0.0020	mg/kg		----	0.0126	----	<0.0020	<0.0020
Vanadium	7440-62-2	E475	0.10	mg/kg		----	----	0.92	----	----
Vanadium	7440-62-2	E472	0.10	mg/kg		1.30	----	----	----	----
Vanadium	7440-62-2	E440	0.10	mg/kg		----	<0.10	----	<0.10	<0.10
Zinc	7440-66-6	E440	0.50	mg/kg		----	101	----	11.9	151
Zinc	7440-66-6	E475	1.0	mg/kg		----	----	102	----	----
Zinc	7440-66-6	E472	1.0	mg/kg		105	----	----	----	----
Zirconium	7440-67-7	E475	0.20	mg/kg		----	----	<0.20	----	----
Zirconium	7440-67-7	E472	0.20	mg/kg		<0.20	----	----	----	----
Zirconium	7440-67-7	E440	0.20	mg/kg		----	<0.20	----	<0.20	<0.20

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	QUL-EAA_LT-O-4X_2022-10	QUL-EAA_LT-Ki-4X_2022-10	----	----	----
					Client sampling date / time	04-Oct-2022	04-Oct-2022	----	----	----
						VA22C4917-146	VA22C4917-147	--------	--------	--------
						Result	Result	----	----	----
Physical Tests										
Moisture	----	E144	0.50	%		84.4	77.3	----	----	----
Metals										
Aluminum	7429-90-5	E440	2.0	mg/kg		<2.0	6.2	----	----	----
Antimony	7440-36-0	E440	0.010	mg/kg		<0.010	<0.010	----	----	----
Arsenic	7440-38-2	E440	0.020	mg/kg		0.059	0.314	----	----	----
Barium	7440-39-3	E440	0.050	mg/kg		<0.050	0.181	----	----	----
Beryllium	7440-41-7	E440	0.010	mg/kg		<0.010	<0.010	----	----	----
Bismuth	7440-69-9	E440	0.010	mg/kg		<0.010	<0.010	----	----	----
Boron	7440-42-8	E440	1.0	mg/kg		<1.0	<1.0	----	----	----
Cadmium	7440-43-9	E440	0.0050	mg/kg		0.0169	0.553	----	----	----
Calcium	7440-70-2	E440	20	mg/kg		985	545	----	----	----
Cesium	7440-46-2	E440	0.0050	mg/kg		0.296	0.170	----	----	----
Chromium	7440-47-3	E440	0.050	mg/kg		0.057	0.503	----	----	----
Cobalt	7440-48-4	E440	0.020	mg/kg		0.082	0.095	----	----	----
Copper	7440-50-8	E440	0.10	mg/kg		9.38	5.73	----	----	----
Iron	7439-89-6	E440	3.0	mg/kg		216	446	----	----	----
Lead	7439-92-1	E440	0.020	mg/kg		0.020	0.023	----	----	----
Lithium	7439-93-2	E440	0.50	mg/kg		<0.50	<0.50	----	----	----
Magnesium	7439-95-4	E440	2.0	mg/kg		896	457	----	----	----
Manganese	7439-96-5	E440	0.050	mg/kg		3.90	1.07	----	----	----
Mercury	7439-97-6	E510	0.0050	mg/kg		1.09	2.90	----	----	----
Mercury	7439-97-6	E510A	0.0010	mg/kg wwt		0.170	0.658	----	----	----
Molybdenum	7439-98-7	E440	0.020	mg/kg		0.063	0.140	----	----	----
Nickel	7440-02-0	E440	0.20	mg/kg		<0.20	0.24	----	----	----
Phosphorus	7723-14-0	E440	10	mg/kg		11600	8060	----	----	----
Potassium	7440-09-7	E440	20	mg/kg		12600	7120	----	----	----
Rubidium	7440-17-7	E440	0.050	mg/kg		35.8	20.5	----	----	----
Selenium	7782-49-2	E440	0.050	mg/kg		3.80	6.67	----	----	----
Silver	7440-22-4	E440.Ag	0.0050	mg/kg		0.0164	0.0206	----	----	----
Sodium	7440-23-5	E440	20	mg/kg		13000	8240	----	----	----

Analytical Results

Sub-Matrix: **Tissue**
(Matrix: **Biota**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	QUL-EAA_LT-O-4X_2022-10	QUL-EAA_LT-Ki-4X_2022-10	----	----	----
					Client sampling date / time	04-Oct-2022	04-Oct-2022	----	----	----
						VA22C4917-146	VA22C4917-147	--------	--------	--------
						Result	Result	----	----	----
Metals										
Strontium	7440-24-6	E440	0.050	mg/kg		1.68	1.31	----	----	----
Tellurium	13494-80-9	E440	0.020	mg/kg		<0.020	<0.020	----	----	----
Thallium	7440-28-0	E440	0.0020	mg/kg		0.0838	0.0768	----	----	----
Tin	7440-31-5	E440	0.10	mg/kg		0.28	0.70	----	----	----
Titanium	7440-32-6	E440.Ti	0.25	mg/kg		0.29	0.51	----	----	----
Uranium	7440-61-1	E440	0.0020	mg/kg		<0.0020	0.0024	----	----	----
Vanadium	7440-62-2	E440	0.10	mg/kg		<0.10	<0.10	----	----	----
Zinc	7440-66-6	E440	0.50	mg/kg		122	66.0	----	----	----
Zirconium	7440-67-7	E440	0.20	mg/kg		<0.20	<0.20	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

ALS Canada Ltd.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA22C4917**	Page	: 1 of 107
Client	: **Mount Polley Mining Corporation**	Laboratory	: Vancouver - Environmental
Contact	: Kala Ivens	Account Manager	: Can Dang
Address	: PO Box 12 Likely BC Canada V0L 1N0	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: 250-790-2215 Ext 2112	Telephone	: +1 604 253 4188
Project	: ----	Date Samples Received	: 12-Oct-2022 10:40
PO	: 5590008044 Q2 2022	Issue Date	: 30-Jan-2023 17:53
C-O-C number	: ----		
Sampler	: ABA, HQA, PLE, SLA		
Site	: ----		
Quote number	: VA22-MPMC100-002		
No. of samples received	: 147		
No. of samples analysed	: 147		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- Duplicate outliers occur - please see following pages for full details.
- Laboratory Control Sample (LCS) outliers occur - please see following pages for full details.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **Biota**

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment
Duplicate (DUP) RPDs								
Metals	VA22C4917-001	QUL-NHC_NSC-WB-1_2022-10	Barium	7440-39-3	E440	60.9 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22C4917-001	QUL-NHC_NSC-WB-1_2022-10	Calcium	7440-70-2	E440	71.3 % DUP-H	60%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22C4917-021	QUL-NHC_PCC-M-5_2022-10	Chromium	7440-47-3	E440	55.9 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22C4917-001	QUL-NHC_NSC-WB-1_2022-10	Manganese	7439-96-5	E440	53.2 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22C4917-001	QUL-NHC_NSC-WB-1_2022-10	Phosphorus	7723-14-0	E440	43.6 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22C4917-001	QUL-NHC_NSC-WB-1_2022-10	Strontium	7440-24-6	E440	69.9 % DUP-H	60%	Duplicate RPD does not meet the DQO for this test.

Result Qualifiers

Qualifier	*Description*
DUP-H	*Duplicate results outside ALS DQO, due to sample heterogeneity.*

Laboratory Control Sample (LCS) Recoveries								
Metals	QC-MRG5-7976180 02	----	Iron	7439-89-6	E440	122 % MES	80.0-120%	Recovery greater than upper control limit

Result Qualifiers

Qualifier	*Description*
MES	*Data Quality Objective was marginally exceeded (by < 10% absolute) for < 10% of analytes in a Multi-Element Scan / Multi-Parameter Scan (considered acceptable as per OMOE & CCME).*

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Biota by CVAAS (DRY units, Biopsy)										
LDPE bag QUL-NGC_PCC-Ki-1_2022-10	E512	06-Oct-2022	19-Jan-2023	----	----		20-Jan-2023	365 days	106 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Biopsy)										
LDPE bag QUL-NGC_PCC-Ki-3_2022-10	E512	06-Oct-2022	19-Jan-2023	----	----		20-Jan-2023	365 days	106 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Biopsy)										
LDPE bag QUL-NGC_PCC-Ki-4_2022-10	E512	06-Oct-2022	19-Jan-2023	----	----		20-Jan-2023	365 days	106 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Biopsy)										
LDPE bag QUL-NGC_PCC-Ki-5_2022-10	E512	06-Oct-2022	19-Jan-2023	----	----		20-Jan-2023	365 days	106 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Biopsy)										
LDPE bag QUL-NGC_PCC-Ki-6_2022-10	E512	06-Oct-2022	19-Jan-2023	----	----		20-Jan-2023	365 days	106 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Biopsy)										
LDPE bag QUL-NGC_PCC-Ki-7_2022-10	E512	06-Oct-2022	19-Jan-2023	----	----		20-Jan-2023	365 days	106 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Biopsy)										
LDPE bag QUL-NGC_PCC-Ki-7X_2022-10	E512	06-Oct-2022	19-Jan-2023	----	----		20-Jan-2023	365 days	106 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Biota by CVAAS (DRY units, Biopsy)										
LDPE bag QUL-NGC_PCC-Ki-8_2022-10	E512	06-Oct-2022	19-Jan-2023	----	----		20-Jan-2023	365 days	106 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Biopsy)										
LDPE bag QUL-NGC_PCC-Li-5X_2022-10	E512	06-Oct-2022	19-Jan-2023	----	----		20-Jan-2023	365 days	106 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Biopsy)										
LDPE bag QUL-NGC_PCC-Li-8_2022-10	E512	06-Oct-2022	19-Jan-2023	----	----		20-Jan-2023	365 days	106 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Biopsy)										
LDPE bag QUL-NHC_PCC-Ki-1_2022-10	E512	04-Oct-2022	19-Jan-2023	----	----		20-Jan-2023	365 days	108 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Biopsy)										
LDPE bag QUL-NHC_PCC-Ki-2_2022-10	E512	04-Oct-2022	19-Jan-2023	----	----		20-Jan-2023	365 days	108 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Biopsy)										
LDPE bag QUL-NHC_PCC-Ki-3_2022-10	E512	04-Oct-2022	19-Jan-2023	----	----		20-Jan-2023	365 days	108 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Biopsy)										
LDPE bag QUL-NHC_PCC-Ki-4_2022-10	E512	04-Oct-2022	19-Jan-2023	----	----		20-Jan-2023	365 days	108 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Biopsy)										
LDPE bag QUL-NHC_PCC-Ki-5_2022-10	E512	04-Oct-2022	19-Jan-2023	----	----		20-Jan-2023	365 days	108 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Biopsy)										
LDPE bag QUL-NHC_PCC-Ki-6_2022-10	E512	04-Oct-2022	19-Jan-2023	----	----		20-Jan-2023	365 days	108 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Biota by CVAAS (DRY units, Biopsy)										
LDPE bag QUL-NHC_PCC-Ki-6X_2022-10	E512	04-Oct-2022	19-Jan-2023	----	----		20-Jan-2023	365 days	108 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Biopsy)										
LDPE bag QUL-NHC_PCC-Ki-7_2022-10	E512	04-Oct-2022	19-Jan-2023	----	----		20-Jan-2023	365 days	108 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Biopsy)										
LDPE bag QUL-NHC_PCC-Ki-8_2022-10	E512	04-Oct-2022	19-Jan-2023	----	----		20-Jan-2023	365 days	108 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag QUL-NGC_PCC-Ki-2_2022-10	E511	06-Oct-2022	18-Jan-2023	----	----		19-Jan-2023	365 days	105 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag QUL-NGC_PCC-Li-1_2022-10	E511	06-Oct-2022	18-Jan-2023	----	----		19-Jan-2023	365 days	105 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag QUL-NGC_PCC-Li-2_2022-10	E511	06-Oct-2022	18-Jan-2023	----	----		19-Jan-2023	365 days	105 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag QUL-NGC_PCC-Li-3_2022-10	E511	06-Oct-2022	18-Jan-2023	----	----		19-Jan-2023	365 days	105 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag QUL-NGC_PCC-Li-4_2022-10	E511	06-Oct-2022	18-Jan-2023	----	----		19-Jan-2023	365 days	105 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag QUL-NGC_PCC-Li-5_2022-10	E511	06-Oct-2022	18-Jan-2023	----	----		19-Jan-2023	365 days	105 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag QUL-NGC_PCC-Li-6_2022-10	E511	06-Oct-2022	18-Jan-2023	----	----		19-Jan-2023	365 days	105 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag QUL-NGC_PCC-Li-7_2022-10	E511	06-Oct-2022	18-Jan-2023	----	----		19-Jan-2023	365 days	105 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag QUL-NHC_PCC-Li-1_2022-10	E511	04-Oct-2022	18-Jan-2023	----	----		19-Jan-2023	365 days	107 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag QUL-NHC_PCC-Li-2_2022-10	E511	04-Oct-2022	18-Jan-2023	----	----		19-Jan-2023	365 days	107 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag QUL-NHC_PCC-Li-3_2022-10	E511	04-Oct-2022	18-Jan-2023	----	----		19-Jan-2023	365 days	107 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag QUL-NHC_PCC-Li-4_2022-10	E511	04-Oct-2022	18-Jan-2023	----	----		19-Jan-2023	365 days	107 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag QUL-NHC_PCC-Li-5_2022-10	E511	04-Oct-2022	18-Jan-2023	----	----		19-Jan-2023	365 days	107 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag QUL-NHC_PCC-Li-6_2022-10	E511	04-Oct-2022	18-Jan-2023	----	----		19-Jan-2023	365 days	107 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag QUL-NHC_PCC-Li-6X_2022-10	E511	04-Oct-2022	18-Jan-2023	----	----		19-Jan-2023	365 days	107 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag QUL-NHC_PCC-Li-7_2022-10	E511	04-Oct-2022	18-Jan-2023	----	----		19-Jan-2023	365 days	107 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Micro)										
LDPE bag QUL-NHC_PCC-Li-8_2022-10	E511	04-Oct-2022	18-Jan-2023	----	----		19-Jan-2023	365 days	107 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-Ki-1X_2022-10	E510	03-Oct-2022	10-Jan-2023	----	----		11-Jan-2023	365 days	100 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-Li-1X_2022-10	E510	03-Oct-2022	10-Jan-2023	----	----		11-Jan-2023	365 days	100 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-O-1X_2022-10	E510	03-Oct-2022	10-Jan-2023	----	----		11-Jan-2023	365 days	100 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-Ki-4_2022-10	E510	03-Oct-2022	17-Jan-2023	----	----		17-Jan-2023	365 days	107 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-M-1X_2022-10	E510	03-Oct-2022	17-Jan-2023	----	----		17-Jan-2023	365 days	107 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-Ki-7_2022-10	E510	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	96 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-Ki-8_2022-10	E510	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	96 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-Li-7_2022-10	E510	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	96 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-Li-8_2022-10	E510	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	96 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-M-7_2022-10	E510	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	96 days	✓
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LDPE bag QUL-NCP_LT-M-8_2022-10	E510	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	96 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-O-8_2022-10	E510	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	96 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-NGC_PCC-O-3_2022-10	E510	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	96 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-NGC_PCC-O-5_2022-10	E510	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	96 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-NGC_PCC-O-6_2022-10	E510	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	96 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-NGC_PCC-O-7_2022-10	E510	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	96 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-NGC_PCC-O-8_2022-10	E510	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	96 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-Ki-6_2022-10	E510	05-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	97 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-Li-6_2022-10	E510	05-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	97 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-M-6_2022-10	E510	05-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	97 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-NGC_NSC-WB-1_2022-10	E510	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	97 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-NGC_NSC-WB-2_2022-10	E510	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	97 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-NGC_NSC-WB-3_2022-10	E510	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	97 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-NGC_NSC-WB-4_2022-10	E510	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	97 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-NGC_NSC-WB-5_2022-10	E510	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	97 days	✓

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Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-NGC_NSC-WB-6_2022-10	E510	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	97 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-NGC_NSC-WB-7_2022-10	E510	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	97 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-NGC_NSC-WB-8_2022-10	E510	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	97 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-NGC_PCC-M-1_2022-10	E510	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	97 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-NGC_PCC-M-2_2022-10	E510	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	97 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-NGC_PCC-M-3_2022-10	E510	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	97 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-NGC_PCC-M-4_2022-10	E510	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	97 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-NGC_PCC-M-5_2022-10	E510	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	97 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-NGC_PCC-M-5X_2022-10	E510	06-Oct-2022	10-Jan-2023	----	----		11-Jan-2023	365 days	97 days	✓

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			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-NGC_PCC-M-6_2022-10	E510	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	97 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-NGC_PCC-M-7_2022-10	E510	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	97 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-NGC_PCC-M-8_2022-10	E510	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	97 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-NGC_PCC-O-2_2022-10	E510	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	97 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-NGC_PCC-O-5X_2022-10	E510	06-Oct-2022	10-Jan-2023	----	----		11-Jan-2023	365 days	97 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-EAA_LT-M-1_2022-10	E510	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	98 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-EAA_LT-M-2_2022-10	E510	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	98 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-EAA_LT-M-3_2022-10	E510	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	98 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-EAA_LT-M-4_2022-10	E510	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	98 days	✓

Matrix: **Biota**

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Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-EAA_LT-M-5_2022-10	E510	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	98 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-EAA_LT-M-6_2022-10	E510	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	98 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-EAA_LT-M-7_2022-10	E510	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	98 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-Ki-5_2022-10	E510	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	98 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-Li-5_2022-10	E510	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	98 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-M-5_2022-10	E510	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	98 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-O-5_2022-10	E510	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	98 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-EAA_LT-Ki-1_2022-10	E510	04-Oct-2022	10-Jan-2023	----	----		11-Jan-2023	365 days	99 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-EAA_LT-Ki-2_2022-10	E510	04-Oct-2022	10-Jan-2023	----	----		11-Jan-2023	365 days	99 days	✓

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Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-EAA_LT-Ki-3_2022-10	E510	04-Oct-2022	10-Jan-2023	----	----		11-Jan-2023	365 days	99 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-EAA_LT-Ki-4_2022-10	E510	04-Oct-2022	10-Jan-2023	----	----		11-Jan-2023	365 days	99 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-EAA_LT-Ki-4X_2022-10	E510	04-Oct-2022	10-Jan-2023	----	----		11-Jan-2023	365 days	99 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-EAA_LT-Ki-5_2022-10	E510	04-Oct-2022	10-Jan-2023	----	----		11-Jan-2023	365 days	99 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-EAA_LT-Ki-6_2022-10	E510	04-Oct-2022	10-Jan-2023	----	----		11-Jan-2023	365 days	99 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
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Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-EAA_LT-Ki-8_2022-10	E510	04-Oct-2022	10-Jan-2023	----	----		11-Jan-2023	365 days	99 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-EAA_LT-Li-1_2022-10	E510	04-Oct-2022	10-Jan-2023	----	----		11-Jan-2023	365 days	99 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-EAA_LT-Li-2_2022-10	E510	04-Oct-2022	10-Jan-2023	----	----		11-Jan-2023	365 days	99 days	✓

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Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-EAA_LT-Li-3_2022-10	E510	04-Oct-2022	10-Jan-2023	----	----		11-Jan-2023	365 days	99 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-EAA_LT-Li-4_2022-10	E510	04-Oct-2022	10-Jan-2023	----	----		11-Jan-2023	365 days	99 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-EAA_LT-Li-4X_2022-10	E510	04-Oct-2022	10-Jan-2023	----	----		11-Jan-2023	365 days	99 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-EAA_LT-Li-5_2022-10	E510	04-Oct-2022	10-Jan-2023	----	----		11-Jan-2023	365 days	99 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-EAA_LT-Li-6_2022-10	E510	04-Oct-2022	10-Jan-2023	----	----		11-Jan-2023	365 days	99 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-EAA_LT-Li-7_2022-10	E510	04-Oct-2022	10-Jan-2023	----	----		11-Jan-2023	365 days	99 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-EAA_LT-Li-8_2022-10	E510	04-Oct-2022	10-Jan-2023	----	----		11-Jan-2023	365 days	99 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-EAA_LT-M-4X_2022-10	E510	04-Oct-2022	10-Jan-2023	----	----		11-Jan-2023	365 days	99 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-EAA_LT-M-8_2022-10	E510	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	99 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-EAA_LT-O-4_2022-10	E510	04-Oct-2022	10-Jan-2023	----	----		11-Jan-2023	365 days	99 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-EAA_LT-O-4X_2022-10	E510	04-Oct-2022	10-Jan-2023	----	----		11-Jan-2023	365 days	99 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-Ki-1_2022-10	E510	03-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	99 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-Ki-2_2022-10	E510	03-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	99 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-Ki-3_2022-10	E510	03-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	99 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-Li-1_2022-10	E510	03-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	99 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-Li-2_2022-10	E510	03-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	99 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-Li-3_2022-10	E510	03-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	99 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-Li-4_2022-10	E510	03-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	99 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-M-1_2022-10	E510	03-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	99 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-M-2_2022-10	E510	03-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	99 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-M-3_2022-10	E510	03-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	99 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-M-4_2022-10	E510	03-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	99 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-O-1_2022-10	E510	03-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	99 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-O-3_2022-10	E510	03-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	99 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-O-4_2022-10	E510	03-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	99 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-NHC_NSC-WB-1_2022-10	E510	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	99 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-NHC_NSC-WB-2_2022-10	E510	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	99 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-NHC_NSC-WB-3_2022-10	E510	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	99 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-NHC_NSC-WB-4_2022-10	E510	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	99 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-NHC_NSC-WB-5_2022-10	E510	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	99 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-NHC_NSC-WB-6_2022-10	E510	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	99 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-NHC_NSC-WB-7_2022-10	E510	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	99 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-NHC_NSC-WB-8_2022-10	E510	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	99 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-NHC_PCC-M-1_2022-10	E510	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	99 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-NHC_PCC-M-2_2022-10	E510	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	99 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-NHC_PCC-M-3_2022-10	E510	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	99 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-NHC_PCC-M-4_2022-10	E510	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	99 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-NHC_PCC-M-5_2022-10	E510	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	99 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-NHC_PCC-M-6_2022-10	E510	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	99 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-NHC_PCC-M-6X_2022-10	E510	04-Oct-2022	10-Jan-2023	----	----		11-Jan-2023	365 days	99 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-NHC_PCC-M-7_2022-10	E510	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	99 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-NHC_PCC-M-8_2022-10	E510	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	99 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-NHC_PCC-O-1_2022-10	E510	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	99 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-NHC_PCC-O-2_2022-10	E510	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	99 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-NHC_PCC-O-3_2022-10	E510	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	99 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-NHC_PCC-O-4_2022-10	E510	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	99 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-NHC_PCC-O-5_2022-10	E510	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	99 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-NHC_PCC-O-6_2022-10	E510	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	99 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-NHC_PCC-O-6X_2022-10	E510	04-Oct-2022	10-Jan-2023	----	----		11-Jan-2023	365 days	99 days	✓
Metals : Mercury in Biota by CVAAS (DRY units, Routine)										
LDPE bag QUL-NHC_PCC-O-7_2022-10	E510	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	99 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Biopsy)										
LDPE bag QUL-NGC_PCC-Ki-1_2022-10	E512A	06-Oct-2022	19-Jan-2023	----	----		20-Jan-2023	365 days	106 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Biopsy)										
LDPE bag QUL-NGC_PCC-Ki-3_2022-10	E512A	06-Oct-2022	19-Jan-2023	----	----		20-Jan-2023	365 days	106 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Biopsy)										
LDPE bag QUL-NGC_PCC-Ki-4_2022-10	E512A	06-Oct-2022	19-Jan-2023	----	----		20-Jan-2023	365 days	106 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Biopsy)										
LDPE bag QUL-NGC_PCC-Ki-5_2022-10	E512A	06-Oct-2022	19-Jan-2023	----	----		20-Jan-2023	365 days	106 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Biota by CVAAS (WET units, Biopsy)										
LDPE bag QUL-NGC_PCC-Ki-6_2022-10	E512A	06-Oct-2022	19-Jan-2023	----	----		20-Jan-2023	365 days	106 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Biopsy)										
LDPE bag QUL-NGC_PCC-Ki-7_2022-10	E512A	06-Oct-2022	19-Jan-2023	----	----		20-Jan-2023	365 days	106 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Biopsy)										
LDPE bag QUL-NGC_PCC-Ki-7X_2022-10	E512A	06-Oct-2022	19-Jan-2023	----	----		20-Jan-2023	365 days	106 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Biopsy)										
LDPE bag QUL-NGC_PCC-Ki-8_2022-10	E512A	06-Oct-2022	19-Jan-2023	----	----		20-Jan-2023	365 days	106 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Biopsy)										
LDPE bag QUL-NGC_PCC-Li-5X_2022-10	E512A	06-Oct-2022	19-Jan-2023	----	----		20-Jan-2023	365 days	106 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Biopsy)										
LDPE bag QUL-NGC_PCC-Li-8_2022-10	E512A	06-Oct-2022	19-Jan-2023	----	----		20-Jan-2023	365 days	106 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Biopsy)										
LDPE bag QUL-NHC_PCC-Ki-1_2022-10	E512A	04-Oct-2022	19-Jan-2023	----	----		20-Jan-2023	365 days	108 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Biopsy)										
LDPE bag QUL-NHC_PCC-Ki-2_2022-10	E512A	04-Oct-2022	19-Jan-2023	----	----		20-Jan-2023	365 days	108 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Biopsy)										
LDPE bag QUL-NHC_PCC-Ki-3_2022-10	E512A	04-Oct-2022	19-Jan-2023	----	----		20-Jan-2023	365 days	108 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Biota by CVAAS (WET units, Biopsy)										
LDPE bag QUL-NHC_PCC-Ki-4_2022-10	E512A	04-Oct-2022	19-Jan-2023	----	----		20-Jan-2023	365 days	108 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Biopsy)										
LDPE bag QUL-NHC_PCC-Ki-5_2022-10	E512A	04-Oct-2022	19-Jan-2023	----	----		20-Jan-2023	365 days	108 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Biopsy)										
LDPE bag QUL-NHC_PCC-Ki-6_2022-10	E512A	04-Oct-2022	19-Jan-2023	----	----		20-Jan-2023	365 days	108 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Biopsy)										
LDPE bag QUL-NHC_PCC-Ki-6X_2022-10	E512A	04-Oct-2022	19-Jan-2023	----	----		20-Jan-2023	365 days	108 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Biopsy)										
LDPE bag QUL-NHC_PCC-Ki-7_2022-10	E512A	04-Oct-2022	19-Jan-2023	----	----		20-Jan-2023	365 days	108 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Biopsy)										
LDPE bag QUL-NHC_PCC-Ki-8_2022-10	E512A	04-Oct-2022	19-Jan-2023	----	----		20-Jan-2023	365 days	108 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Micro)										
LDPE bag QUL-NGC_PCC-Ki-2_2022-10	E511A	06-Oct-2022	18-Jan-2023	----	----		19-Jan-2023	365 days	105 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Micro)										
LDPE bag QUL-NGC_PCC-Li-1_2022-10	E511A	06-Oct-2022	18-Jan-2023	----	----		19-Jan-2023	365 days	105 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Micro)										
LDPE bag QUL-NGC_PCC-Li-2_2022-10	E511A	06-Oct-2022	18-Jan-2023	----	----		19-Jan-2023	365 days	105 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Biota by CVAAS (WET units, Micro)										
LDPE bag QUL-NGC_PCC-Li-3_2022-10	E511A	06-Oct-2022	18-Jan-2023	----	----		19-Jan-2023	365 days	105 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Micro)										
LDPE bag QUL-NGC_PCC-Li-4_2022-10	E511A	06-Oct-2022	18-Jan-2023	----	----		19-Jan-2023	365 days	105 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Micro)										
LDPE bag QUL-NGC_PCC-Li-5_2022-10	E511A	06-Oct-2022	18-Jan-2023	----	----		19-Jan-2023	365 days	105 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Micro)										
LDPE bag QUL-NGC_PCC-Li-6_2022-10	E511A	06-Oct-2022	18-Jan-2023	----	----		19-Jan-2023	365 days	105 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Micro)										
LDPE bag QUL-NGC_PCC-Li-7_2022-10	E511A	06-Oct-2022	18-Jan-2023	----	----		19-Jan-2023	365 days	105 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Micro)										
LDPE bag QUL-NHC_PCC-Li-1_2022-10	E511A	04-Oct-2022	18-Jan-2023	----	----		19-Jan-2023	365 days	107 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Micro)										
LDPE bag QUL-NHC_PCC-Li-2_2022-10	E511A	04-Oct-2022	18-Jan-2023	----	----		19-Jan-2023	365 days	107 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Micro)										
LDPE bag QUL-NHC_PCC-Li-3_2022-10	E511A	04-Oct-2022	18-Jan-2023	----	----		19-Jan-2023	365 days	107 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Micro)										
LDPE bag QUL-NHC_PCC-Li-4_2022-10	E511A	04-Oct-2022	18-Jan-2023	----	----		19-Jan-2023	365 days	107 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Biota by CVAAS (WET units, Micro)										
LDPE bag QUL-NHC_PCC-Li-5_2022-10	E511A	04-Oct-2022	18-Jan-2023	----	----		19-Jan-2023	365 days	107 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Micro)										
LDPE bag QUL-NHC_PCC-Li-6_2022-10	E511A	04-Oct-2022	18-Jan-2023	----	----		19-Jan-2023	365 days	107 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Micro)										
LDPE bag QUL-NHC_PCC-Li-6X_2022-10	E511A	04-Oct-2022	18-Jan-2023	----	----		19-Jan-2023	365 days	107 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Micro)										
LDPE bag QUL-NHC_PCC-Li-7_2022-10	E511A	04-Oct-2022	18-Jan-2023	----	----		19-Jan-2023	365 days	107 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Micro)										
LDPE bag QUL-NHC_PCC-Li-8_2022-10	E511A	04-Oct-2022	18-Jan-2023	----	----		19-Jan-2023	365 days	107 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag QUL-NCP_LT-Ki-1X_2022-10	E510A	03-Oct-2022	10-Jan-2023	----	----		11-Jan-2023	365 days	100 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag QUL-NCP_LT-Li-1X_2022-10	E510A	03-Oct-2022	10-Jan-2023	----	----		11-Jan-2023	365 days	100 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag QUL-NCP_LT-O-1X_2022-10	E510A	03-Oct-2022	10-Jan-2023	----	----		11-Jan-2023	365 days	100 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag QUL-NCP_LT-Ki-4_2022-10	E510A	03-Oct-2022	17-Jan-2023	----	----		17-Jan-2023	365 days	107 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag QUL-NCP_LT-M-1X_2022-10	E510A	03-Oct-2022	17-Jan-2023	----	----		17-Jan-2023	365 days	107 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag QUL-NCP_LT-Ki-7_2022-10	E510A	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	96 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag QUL-NCP_LT-Ki-8_2022-10	E510A	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	96 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag QUL-NCP_LT-Li-7_2022-10	E510A	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	96 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag QUL-NCP_LT-Li-8_2022-10	E510A	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	96 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag QUL-NCP_LT-M-7_2022-10	E510A	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	96 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag QUL-NCP_LT-M-8_2022-10	E510A	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	96 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag QUL-NCP_LT-O-8_2022-10	E510A	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	96 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag QUL-NGC_PCC-O-3_2022-10	E510A	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	96 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag QUL-NGC_PCC-O-5_2022-10	E510A	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	96 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag QUL-NGC_PCC-O-6_2022-10	E510A	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	96 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag QUL-NGC_PCC-O-7_2022-10	E510A	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	96 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag QUL-NGC_PCC-O-8_2022-10	E510A	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	96 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag QUL-NCP_LT-Ki-6_2022-10	E510A	05-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	97 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag QUL-NCP_LT-Li-6_2022-10	E510A	05-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	97 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag QUL-NCP_LT-M-6_2022-10	E510A	05-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	97 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag QUL-NGC_NSC-WB-1_2022-10	E510A	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	97 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag QUL-NGC_NSC-WB-2_2022-10	E510A	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	97 days	✓

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			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag QUL-NGC_NSC-WB-3_2022-10	E510A	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	97 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag QUL-NGC_NSC-WB-4_2022-10	E510A	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	97 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag QUL-NGC_NSC-WB-5_2022-10	E510A	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	97 days	✓
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LDPE bag QUL-NGC_NSC-WB-6_2022-10	E510A	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	97 days	✓
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LDPE bag QUL-NGC_NSC-WB-7_2022-10	E510A	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	97 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag QUL-NGC_NSC-WB-8_2022-10	E510A	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	97 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag QUL-NGC_PCC-M-1_2022-10	E510A	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	97 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag QUL-NGC_PCC-M-2_2022-10	E510A	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	97 days	✓
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LDPE bag QUL-NGC_PCC-M-3_2022-10	E510A	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	97 days	✓

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Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag QUL-NGC_PCC-M-4_2022-10	E510A	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	97 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag QUL-NGC_PCC-M-5_2022-10	E510A	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	97 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag QUL-NGC_PCC-M-5X_2022-10	E510A	06-Oct-2022	10-Jan-2023	----	----		11-Jan-2023	365 days	97 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag QUL-NGC_PCC-M-6_2022-10	E510A	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	97 days	✓
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LDPE bag QUL-NGC_PCC-O-2_2022-10	E510A	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	97 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag QUL-NGC_PCC-O-5X_2022-10	E510A	06-Oct-2022	10-Jan-2023	----	----		11-Jan-2023	365 days	97 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag QUL-EAA_LT-M-1_2022-10	E510A	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	98 days	✓

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Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag QUL-EAA_LT-M-2_2022-10	E510A	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	98 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag QUL-EAA_LT-M-3_2022-10	E510A	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	98 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag QUL-EAA_LT-M-4_2022-10	E510A	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	98 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag QUL-EAA_LT-M-5_2022-10	E510A	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	98 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag QUL-EAA_LT-M-6_2022-10	E510A	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	98 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag QUL-EAA_LT-M-7_2022-10	E510A	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	98 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag QUL-NCP_LT-Ki-5_2022-10	E510A	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	98 days	✓
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LDPE bag QUL-EAA_LT-Ki-1_2022-10	E510A	04-Oct-2022	10-Jan-2023	----	----		11-Jan-2023	365 days	99 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag QUL-EAA_LT-Ki-2_2022-10	E510A	04-Oct-2022	10-Jan-2023	----	----		11-Jan-2023	365 days	99 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag QUL-EAA_LT-Ki-3_2022-10	E510A	04-Oct-2022	10-Jan-2023	----	----		11-Jan-2023	365 days	99 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag QUL-EAA_LT-Ki-4_2022-10	E510A	04-Oct-2022	10-Jan-2023	----	----		11-Jan-2023	365 days	99 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag QUL-EAA_LT-Ki-4X_2022-10	E510A	04-Oct-2022	10-Jan-2023	----	----		11-Jan-2023	365 days	99 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag QUL-EAA_LT-Ki-5_2022-10	E510A	04-Oct-2022	10-Jan-2023	----	----		11-Jan-2023	365 days	99 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag QUL-EAA_LT-Ki-6_2022-10	E510A	04-Oct-2022	10-Jan-2023	----	----		11-Jan-2023	365 days	99 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag QUL-EAA_LT-Ki-7_2022-10	E510A	04-Oct-2022	10-Jan-2023	----	----		11-Jan-2023	365 days	99 days	✓

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LDPE bag QUL-NHC_PCC-M-2_2022-10	E510A	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	99 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag QUL-NHC_PCC-M-3_2022-10	E510A	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	99 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag QUL-NHC_PCC-M-4_2022-10	E510A	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	99 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag QUL-NHC_PCC-M-5_2022-10	E510A	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	99 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag QUL-NHC_PCC-M-6_2022-10	E510A	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	99 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag QUL-NHC_PCC-M-6X_2022-10	E510A	04-Oct-2022	10-Jan-2023	----	----		11-Jan-2023	365 days	99 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag QUL-NHC_PCC-M-7_2022-10	E510A	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	99 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag QUL-NHC_PCC-M-8_2022-10	E510A	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	99 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag QUL-NHC_PCC-O-1_2022-10	E510A	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	99 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag QUL-NHC_PCC-O-2_2022-10	E510A	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	99 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag QUL-NHC_PCC-O-3_2022-10	E510A	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	99 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag QUL-NHC_PCC-O-4_2022-10	E510A	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	99 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag QUL-NHC_PCC-O-5_2022-10	E510A	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	99 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag QUL-NHC_PCC-O-6_2022-10	E510A	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	99 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag QUL-NHC_PCC-O-6X_2022-10	E510A	04-Oct-2022	10-Jan-2023	----	----		11-Jan-2023	365 days	99 days	✓
Metals : Mercury in Biota by CVAAS (WET units, Routine)										
LDPE bag QUL-NHC_PCC-O-7_2022-10	E510A	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	365 days	99 days	✓
Metals : Metals by CRC ICPMS (DRY units, Biopsy)										
LDPE bag QUL-NGC_PCC-Ki-1_2022-10	E475	06-Oct-2022	19-Jan-2023	----	----		20-Jan-2023	730 days	106 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Metals by CRC ICPMS (DRY units, Biopsy)										
LDPE bag QUL-NGC_PCC-Ki-3_2022-10	E475	06-Oct-2022	19-Jan-2023	----	----		20-Jan-2023	730 days	106 days	✓
Metals : Metals by CRC ICPMS (DRY units, Biopsy)										
LDPE bag QUL-NGC_PCC-Ki-4_2022-10	E475	06-Oct-2022	19-Jan-2023	----	----		20-Jan-2023	730 days	106 days	✓
Metals : Metals by CRC ICPMS (DRY units, Biopsy)										
LDPE bag QUL-NGC_PCC-Ki-5_2022-10	E475	06-Oct-2022	19-Jan-2023	----	----		20-Jan-2023	730 days	106 days	✓
Metals : Metals by CRC ICPMS (DRY units, Biopsy)										
LDPE bag QUL-NGC_PCC-Ki-6_2022-10	E475	06-Oct-2022	19-Jan-2023	----	----		20-Jan-2023	730 days	106 days	✓
Metals : Metals by CRC ICPMS (DRY units, Biopsy)										
LDPE bag QUL-NGC_PCC-Ki-7_2022-10	E475	06-Oct-2022	19-Jan-2023	----	----		20-Jan-2023	730 days	106 days	✓
Metals : Metals by CRC ICPMS (DRY units, Biopsy)										
LDPE bag QUL-NGC_PCC-Ki-7X_2022-10	E475	06-Oct-2022	19-Jan-2023	----	----		20-Jan-2023	730 days	106 days	✓
Metals : Metals by CRC ICPMS (DRY units, Biopsy)										
LDPE bag QUL-NGC_PCC-Ki-8_2022-10	E475	06-Oct-2022	19-Jan-2023	----	----		20-Jan-2023	730 days	106 days	✓
Metals : Metals by CRC ICPMS (DRY units, Biopsy)										
LDPE bag QUL-NGC_PCC-Li-5X_2022-10	E475	06-Oct-2022	19-Jan-2023	----	----		20-Jan-2023	730 days	106 days	✓
Metals : Metals by CRC ICPMS (DRY units, Biopsy)										
LDPE bag QUL-NGC_PCC-Li-8_2022-10	E475	06-Oct-2022	19-Jan-2023	----	----		20-Jan-2023	730 days	106 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Metals by CRC ICPMS (DRY units, Biopsy)										
LDPE bag QUL-NHC_PCC-Ki-1_2022-10	E475	04-Oct-2022	19-Jan-2023	----	----		20-Jan-2023	730 days	108 days	✓
Metals : Metals by CRC ICPMS (DRY units, Biopsy)										
LDPE bag QUL-NHC_PCC-Ki-2_2022-10	E475	04-Oct-2022	19-Jan-2023	----	----		20-Jan-2023	730 days	108 days	✓
Metals : Metals by CRC ICPMS (DRY units, Biopsy)										
LDPE bag QUL-NHC_PCC-Ki-3_2022-10	E475	04-Oct-2022	19-Jan-2023	----	----		20-Jan-2023	730 days	108 days	✓
Metals : Metals by CRC ICPMS (DRY units, Biopsy)										
LDPE bag QUL-NHC_PCC-Ki-4_2022-10	E475	04-Oct-2022	19-Jan-2023	----	----		20-Jan-2023	730 days	108 days	✓
Metals : Metals by CRC ICPMS (DRY units, Biopsy)										
LDPE bag QUL-NHC_PCC-Ki-5_2022-10	E475	04-Oct-2022	19-Jan-2023	----	----		20-Jan-2023	730 days	108 days	✓
Metals : Metals by CRC ICPMS (DRY units, Biopsy)										
LDPE bag QUL-NHC_PCC-Ki-6_2022-10	E475	04-Oct-2022	19-Jan-2023	----	----		20-Jan-2023	730 days	108 days	✓
Metals : Metals by CRC ICPMS (DRY units, Biopsy)										
LDPE bag QUL-NHC_PCC-Ki-6X_2022-10	E475	04-Oct-2022	19-Jan-2023	----	----		20-Jan-2023	730 days	108 days	✓
Metals : Metals by CRC ICPMS (DRY units, Biopsy)										
LDPE bag QUL-NHC_PCC-Ki-7_2022-10	E475	04-Oct-2022	19-Jan-2023	----	----		20-Jan-2023	730 days	108 days	✓
Metals : Metals by CRC ICPMS (DRY units, Biopsy)										
LDPE bag QUL-NHC_PCC-Ki-8_2022-10	E475	04-Oct-2022	19-Jan-2023	----	----		20-Jan-2023	730 days	108 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag QUL-NGC_PCC-Ki-2_2022-10	E472	06-Oct-2022	18-Jan-2023	----	----		19-Jan-2023	730 days	105 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag QUL-NGC_PCC-Li-1_2022-10	E472	06-Oct-2022	18-Jan-2023	----	----		19-Jan-2023	730 days	105 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag QUL-NGC_PCC-Li-2_2022-10	E472	06-Oct-2022	18-Jan-2023	----	----		19-Jan-2023	730 days	105 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag QUL-NGC_PCC-Li-3_2022-10	E472	06-Oct-2022	18-Jan-2023	----	----		19-Jan-2023	730 days	105 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag QUL-NGC_PCC-Li-4_2022-10	E472	06-Oct-2022	18-Jan-2023	----	----		19-Jan-2023	730 days	105 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag QUL-NGC_PCC-Li-5_2022-10	E472	06-Oct-2022	18-Jan-2023	----	----		19-Jan-2023	730 days	105 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag QUL-NGC_PCC-Li-6_2022-10	E472	06-Oct-2022	18-Jan-2023	----	----		19-Jan-2023	730 days	105 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag QUL-NGC_PCC-Li-7_2022-10	E472	06-Oct-2022	18-Jan-2023	----	----		19-Jan-2023	730 days	105 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag QUL-NHC_PCC-Li-1_2022-10	E472	04-Oct-2022	18-Jan-2023	----	----		19-Jan-2023	730 days	107 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag QUL-NHC_PCC-Li-2_2022-10	E472	04-Oct-2022	18-Jan-2023	----	----		19-Jan-2023	730 days	107 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag QUL-NHC_PCC-Li-3_2022-10	E472	04-Oct-2022	18-Jan-2023	----	----		19-Jan-2023	730 days	107 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag QUL-NHC_PCC-Li-4_2022-10	E472	04-Oct-2022	18-Jan-2023	----	----		19-Jan-2023	730 days	107 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag QUL-NHC_PCC-Li-5_2022-10	E472	04-Oct-2022	18-Jan-2023	----	----		19-Jan-2023	730 days	107 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag QUL-NHC_PCC-Li-6_2022-10	E472	04-Oct-2022	18-Jan-2023	----	----		19-Jan-2023	730 days	107 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag QUL-NHC_PCC-Li-6X_2022-10	E472	04-Oct-2022	18-Jan-2023	----	----		19-Jan-2023	730 days	107 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag QUL-NHC_PCC-Li-7_2022-10	E472	04-Oct-2022	18-Jan-2023	----	----		19-Jan-2023	730 days	107 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag QUL-NHC_PCC-Li-8_2022-10	E472	04-Oct-2022	18-Jan-2023	----	----		19-Jan-2023	730 days	107 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-Ki-4_2022-10	E440	03-Oct-2022	17-Jan-2023	----	----		17-Jan-2023	730 days	107 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-M-1X_2022-10	E440	03-Oct-2022	17-Jan-2023	----	----		17-Jan-2023	730 days	107 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-Ki-7_2022-10	E440	06-Oct-2022	09-Jan-2023	----	----		09-Jan-2023	730 days	96 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-Ki-8_2022-10	E440	06-Oct-2022	09-Jan-2023	----	----		09-Jan-2023	730 days	96 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-Li-7_2022-10	E440	06-Oct-2022	09-Jan-2023	----	----		09-Jan-2023	730 days	96 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-Li-8_2022-10	E440	06-Oct-2022	09-Jan-2023	----	----		09-Jan-2023	730 days	96 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-M-7_2022-10	E440	06-Oct-2022	09-Jan-2023	----	----		09-Jan-2023	730 days	96 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-M-8_2022-10	E440	06-Oct-2022	09-Jan-2023	----	----		09-Jan-2023	730 days	96 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-O-8_2022-10	E440	06-Oct-2022	09-Jan-2023	----	----		09-Jan-2023	730 days	96 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NGC_PCC-M-5X_2022-10	E440	06-Oct-2022	10-Jan-2023	----	----		10-Jan-2023	730 days	96 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NGC_PCC-O-3_2022-10	E440	06-Oct-2022	09-Jan-2023	----	----		09-Jan-2023	730 days	96 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NGC_PCC-O-5_2022-10	E440	06-Oct-2022	09-Jan-2023	----	----		09-Jan-2023	730 days	96 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NGC_PCC-O-5X_2022-10	E440	06-Oct-2022	10-Jan-2023	----	----		10-Jan-2023	730 days	96 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NGC_PCC-O-6_2022-10	E440	06-Oct-2022	09-Jan-2023	----	----		09-Jan-2023	730 days	96 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NGC_PCC-O-7_2022-10	E440	06-Oct-2022	09-Jan-2023	----	----		09-Jan-2023	730 days	96 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NGC_PCC-O-8_2022-10	E440	06-Oct-2022	09-Jan-2023	----	----		09-Jan-2023	730 days	96 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-Ki-6_2022-10	E440	05-Oct-2022	09-Jan-2023	----	----		09-Jan-2023	730 days	97 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-Li-6_2022-10	E440	05-Oct-2022	09-Jan-2023	----	----		09-Jan-2023	730 days	97 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-M-6_2022-10	E440	05-Oct-2022	09-Jan-2023	----	----		09-Jan-2023	730 days	97 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NGC_NSC-WB-1_2022-10	E440	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	97 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NGC_NSC-WB-2_2022-10	E440	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	97 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NGC_NSC-WB-3_2022-10	E440	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	97 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NGC_NSC-WB-4_2022-10	E440	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	97 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NGC_NSC-WB-5_2022-10	E440	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	97 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NGC_NSC-WB-6_2022-10	E440	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	97 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NGC_NSC-WB-7_2022-10	E440	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	97 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NGC_NSC-WB-8_2022-10	E440	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	97 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NGC_PCC-M-1_2022-10	E440	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	97 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NGC_PCC-M-2_2022-10	E440	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	97 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NGC_PCC-M-3_2022-10	E440	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	97 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NGC_PCC-M-4_2022-10	E440	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	97 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NGC_PCC-M-5_2022-10	E440	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	97 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NGC_PCC-M-6_2022-10	E440	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	97 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NGC_PCC-M-7_2022-10	E440	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	97 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NGC_PCC-M-8_2022-10	E440	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	97 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NGC_PCC-O-2_2022-10	E440	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	97 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-EAA_LT-Ki-1_2022-10	E440	04-Oct-2022	10-Jan-2023	----	----		10-Jan-2023	730 days	98 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-EAA_LT-Ki-2_2022-10	E440	04-Oct-2022	10-Jan-2023	----	----		10-Jan-2023	730 days	98 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-EAA_LT-Ki-3_2022-10	E440	04-Oct-2022	10-Jan-2023	----	----		10-Jan-2023	730 days	98 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-EAA_LT-Ki-4_2022-10	E440	04-Oct-2022	10-Jan-2023	----	----		10-Jan-2023	730 days	98 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-EAA_LT-Ki-4X_2022-10	E440	04-Oct-2022	10-Jan-2023	----	----		10-Jan-2023	730 days	98 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-EAA_LT-Ki-5_2022-10	E440	04-Oct-2022	10-Jan-2023	----	----		10-Jan-2023	730 days	98 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-EAA_LT-Ki-6_2022-10	E440	04-Oct-2022	10-Jan-2023	----	----		10-Jan-2023	730 days	98 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-EAA_LT-Ki-7_2022-10	E440	04-Oct-2022	10-Jan-2023	----	----		10-Jan-2023	730 days	98 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-EAA_LT-Ki-8_2022-10	E440	04-Oct-2022	10-Jan-2023	----	----		10-Jan-2023	730 days	98 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-EAA_LT-Li-1_2022-10	E440	04-Oct-2022	10-Jan-2023	----	----		10-Jan-2023	730 days	98 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

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			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
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LDPE bag QUL-EAA_LT-Li-2_2022-10	E440	04-Oct-2022	10-Jan-2023	----	----		10-Jan-2023	730 days	98 days	✓
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LDPE bag QUL-EAA_LT-Li-3_2022-10	E440	04-Oct-2022	10-Jan-2023	----	----		10-Jan-2023	730 days	98 days	✓
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LDPE bag QUL-EAA_LT-Li-4_2022-10	E440	04-Oct-2022	10-Jan-2023	----	----		10-Jan-2023	730 days	98 days	✓
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LDPE bag QUL-EAA_LT-Li-4X_2022-10	E440	04-Oct-2022	10-Jan-2023	----	----		10-Jan-2023	730 days	98 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-EAA_LT-Li-5_2022-10	E440	04-Oct-2022	10-Jan-2023	----	----		10-Jan-2023	730 days	98 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-EAA_LT-Li-6_2022-10	E440	04-Oct-2022	10-Jan-2023	----	----		10-Jan-2023	730 days	98 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-EAA_LT-Li-7_2022-10	E440	04-Oct-2022	10-Jan-2023	----	----		10-Jan-2023	730 days	98 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-EAA_LT-Li-8_2022-10	E440	04-Oct-2022	10-Jan-2023	----	----		10-Jan-2023	730 days	98 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-EAA_LT-M-1_2022-10	E440	04-Oct-2022	09-Jan-2023	----	----		09-Jan-2023	730 days	98 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-EAA_LT-M-2_2022-10	E440	04-Oct-2022	09-Jan-2023	----	----		09-Jan-2023	730 days	98 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-EAA_LT-M-3_2022-10	E440	04-Oct-2022	09-Jan-2023	----	----		09-Jan-2023	730 days	98 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-EAA_LT-M-4_2022-10	E440	04-Oct-2022	09-Jan-2023	----	----		09-Jan-2023	730 days	98 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-EAA_LT-M-4X_2022-10	E440	04-Oct-2022	10-Jan-2023	----	----		10-Jan-2023	730 days	98 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-EAA_LT-M-5_2022-10	E440	04-Oct-2022	09-Jan-2023	----	----		09-Jan-2023	730 days	98 days	✓
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LDPE bag QUL-EAA_LT-M-6_2022-10	E440	04-Oct-2022	09-Jan-2023	----	----		09-Jan-2023	730 days	98 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-EAA_LT-M-7_2022-10	E440	04-Oct-2022	09-Jan-2023	----	----		09-Jan-2023	730 days	98 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-EAA_LT-M-8_2022-10	E440	04-Oct-2022	09-Jan-2023	----	----		09-Jan-2023	730 days	98 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-EAA_LT-O-4_2022-10	E440	04-Oct-2022	10-Jan-2023	----	----		10-Jan-2023	730 days	98 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-EAA_LT-O-4X_2022-10	E440	04-Oct-2022	10-Jan-2023	----	----		10-Jan-2023	730 days	98 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-Ki-5_2022-10	E440	04-Oct-2022	09-Jan-2023	----	----		09-Jan-2023	730 days	98 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-Li-5_2022-10	E440	04-Oct-2022	09-Jan-2023	----	----		09-Jan-2023	730 days	98 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-M-5_2022-10	E440	04-Oct-2022	09-Jan-2023	----	----		09-Jan-2023	730 days	98 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-O-5_2022-10	E440	04-Oct-2022	09-Jan-2023	----	----		09-Jan-2023	730 days	98 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NHC_PCC-M-6X_2022-10	E440	04-Oct-2022	10-Jan-2023	----	----		10-Jan-2023	730 days	98 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NHC_PCC-O-6X_2022-10	E440	04-Oct-2022	10-Jan-2023	----	----		10-Jan-2023	730 days	98 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-Ki-1_2022-10	E440	03-Oct-2022	09-Jan-2023	----	----		09-Jan-2023	730 days	99 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-Ki-1X_2022-10	E440	03-Oct-2022	10-Jan-2023	----	----		10-Jan-2023	730 days	99 days	✓

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Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

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			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-Ki-2_2022-10	E440	03-Oct-2022	09-Jan-2023	----	----		09-Jan-2023	730 days	99 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-Ki-3_2022-10	E440	03-Oct-2022	09-Jan-2023	----	----		09-Jan-2023	730 days	99 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-Li-1_2022-10	E440	03-Oct-2022	09-Jan-2023	----	----		09-Jan-2023	730 days	99 days	✓
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LDPE bag QUL-NCP_LT-Li-1X_2022-10	E440	03-Oct-2022	10-Jan-2023	----	----		10-Jan-2023	730 days	99 days	✓
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LDPE bag QUL-NCP_LT-Li-3_2022-10	E440	03-Oct-2022	09-Jan-2023	----	----		09-Jan-2023	730 days	99 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-Li-4_2022-10	E440	03-Oct-2022	09-Jan-2023	----	----		09-Jan-2023	730 days	99 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-M-1_2022-10	E440	03-Oct-2022	09-Jan-2023	----	----		09-Jan-2023	730 days	99 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-M-2_2022-10	E440	03-Oct-2022	09-Jan-2023	----	----		09-Jan-2023	730 days	99 days	✓

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LDPE bag QUL-NCP_LT-M-3_2022-10	E440	03-Oct-2022	09-Jan-2023	----	----		09-Jan-2023	730 days	99 days	✓
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LDPE bag QUL-NCP_LT-M-4_2022-10	E440	03-Oct-2022	09-Jan-2023	----	----		09-Jan-2023	730 days	99 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-O-1_2022-10	E440	03-Oct-2022	09-Jan-2023	----	----		09-Jan-2023	730 days	99 days	✓
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LDPE bag QUL-NCP_LT-O-3_2022-10	E440	03-Oct-2022	09-Jan-2023	----	----		09-Jan-2023	730 days	99 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-O-4_2022-10	E440	03-Oct-2022	09-Jan-2023	----	----		09-Jan-2023	730 days	99 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NHC_NSC-WB-1_2022-10	E440	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	99 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NHC_NSC-WB-2_2022-10	E440	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	99 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NHC_NSC-WB-3_2022-10	E440	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	99 days	✓

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Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NHC_NSC-WB-4_2022-10	E440	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	99 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NHC_NSC-WB-5_2022-10	E440	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	99 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NHC_NSC-WB-6_2022-10	E440	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	99 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NHC_NSC-WB-7_2022-10	E440	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	99 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NHC_NSC-WB-8_2022-10	E440	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	99 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NHC_PCC-M-1_2022-10	E440	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	99 days	✓
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LDPE bag QUL-NHC_PCC-M-2_2022-10	E440	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	99 days	✓
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LDPE bag QUL-NHC_PCC-M-3_2022-10	E440	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	99 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NHC_PCC-M-4_2022-10	E440	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	99 days	✓

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LDPE bag QUL-NHC_PCC-M-7_2022-10	E440	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	99 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NHC_PCC-M-8_2022-10	E440	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	99 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NHC_PCC-O-1_2022-10	E440	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	99 days	✓
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LDPE bag QUL-NHC_PCC-O-3_2022-10	E440	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	99 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NHC_PCC-O-4_2022-10	E440	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	99 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NHC_PCC-O-5_2022-10	E440	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	99 days	✓

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LDPE bag QUL-NHC_PCC-O-6_2022-10	E440	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	99 days	✓
Metals : Metals in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NHC_PCC-O-7_2022-10	E440	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	99 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag QUL-NGC_PCC-Ki-1_2022-10	E475.Ag	06-Oct-2022	19-Jan-2023	----	----		20-Jan-2023	730 days	106 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag QUL-NGC_PCC-Ki-3_2022-10	E475.Ag	06-Oct-2022	19-Jan-2023	----	----		20-Jan-2023	730 days	106 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag QUL-NGC_PCC-Ki-4_2022-10	E475.Ag	06-Oct-2022	19-Jan-2023	----	----		20-Jan-2023	730 days	106 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag QUL-NGC_PCC-Ki-5_2022-10	E475.Ag	06-Oct-2022	19-Jan-2023	----	----		20-Jan-2023	730 days	106 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag QUL-NGC_PCC-Ki-6_2022-10	E475.Ag	06-Oct-2022	19-Jan-2023	----	----		20-Jan-2023	730 days	106 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag QUL-NGC_PCC-Ki-7_2022-10	E475.Ag	06-Oct-2022	19-Jan-2023	----	----		20-Jan-2023	730 days	106 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag QUL-NGC_PCC-Ki-7X_2022-10	E475.Ag	06-Oct-2022	19-Jan-2023	----	----		20-Jan-2023	730 days	106 days	✓

Matrix: **Biota**

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Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Silver in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag QUL-NGC_PCC-Ki-8_2022-10	E475.Ag	06-Oct-2022	19-Jan-2023	----	----		20-Jan-2023	730 days	106 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag QUL-NGC_PCC-Li-5X_2022-10	E475.Ag	06-Oct-2022	19-Jan-2023	----	----		20-Jan-2023	730 days	106 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag QUL-NGC_PCC-Li-8_2022-10	E475.Ag	06-Oct-2022	19-Jan-2023	----	----		20-Jan-2023	730 days	106 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag QUL-NHC_PCC-Ki-1_2022-10	E475.Ag	04-Oct-2022	19-Jan-2023	----	----		20-Jan-2023	730 days	108 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag QUL-NHC_PCC-Ki-2_2022-10	E475.Ag	04-Oct-2022	19-Jan-2023	----	----		20-Jan-2023	730 days	108 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag QUL-NHC_PCC-Ki-3_2022-10	E475.Ag	04-Oct-2022	19-Jan-2023	----	----		20-Jan-2023	730 days	108 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag QUL-NHC_PCC-Ki-4_2022-10	E475.Ag	04-Oct-2022	19-Jan-2023	----	----		20-Jan-2023	730 days	108 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag QUL-NHC_PCC-Ki-5_2022-10	E475.Ag	04-Oct-2022	19-Jan-2023	----	----		20-Jan-2023	730 days	108 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag QUL-NHC_PCC-Ki-6_2022-10	E475.Ag	04-Oct-2022	19-Jan-2023	----	----		20-Jan-2023	730 days	108 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Silver in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag QUL-NHC_PCC-Ki-6X_2022-10	E475.Ag	04-Oct-2022	19-Jan-2023	----	----		20-Jan-2023	730 days	108 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag QUL-NHC_PCC-Ki-7_2022-10	E475.Ag	04-Oct-2022	19-Jan-2023	----	----		20-Jan-2023	730 days	108 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag QUL-NHC_PCC-Ki-8_2022-10	E475.Ag	04-Oct-2022	19-Jan-2023	----	----		20-Jan-2023	730 days	108 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag QUL-NGC_PCC-Ki-2_2022-10	E472.Ag	06-Oct-2022	18-Jan-2023	----	----		19-Jan-2023	730 days	105 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag QUL-NGC_PCC-Li-1_2022-10	E472.Ag	06-Oct-2022	18-Jan-2023	----	----		19-Jan-2023	730 days	105 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag QUL-NGC_PCC-Li-2_2022-10	E472.Ag	06-Oct-2022	18-Jan-2023	----	----		19-Jan-2023	730 days	105 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag QUL-NGC_PCC-Li-3_2022-10	E472.Ag	06-Oct-2022	18-Jan-2023	----	----		19-Jan-2023	730 days	105 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag QUL-NGC_PCC-Li-4_2022-10	E472.Ag	06-Oct-2022	18-Jan-2023	----	----		19-Jan-2023	730 days	105 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag QUL-NGC_PCC-Li-5_2022-10	E472.Ag	06-Oct-2022	18-Jan-2023	----	----		19-Jan-2023	730 days	105 days	✓

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Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag QUL-NGC_PCC-Li-6_2022-10	E472.Ag	06-Oct-2022	18-Jan-2023	----	----		19-Jan-2023	730 days	105 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag QUL-NGC_PCC-Li-7_2022-10	E472.Ag	06-Oct-2022	18-Jan-2023	----	----		19-Jan-2023	730 days	105 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag QUL-NHC_PCC-Li-1_2022-10	E472.Ag	04-Oct-2022	18-Jan-2023	----	----		19-Jan-2023	730 days	107 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag QUL-NHC_PCC-Li-2_2022-10	E472.Ag	04-Oct-2022	18-Jan-2023	----	----		19-Jan-2023	730 days	107 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag QUL-NHC_PCC-Li-3_2022-10	E472.Ag	04-Oct-2022	18-Jan-2023	----	----		19-Jan-2023	730 days	107 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag QUL-NHC_PCC-Li-4_2022-10	E472.Ag	04-Oct-2022	18-Jan-2023	----	----		19-Jan-2023	730 days	107 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag QUL-NHC_PCC-Li-5_2022-10	E472.Ag	04-Oct-2022	18-Jan-2023	----	----		19-Jan-2023	730 days	107 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag QUL-NHC_PCC-Li-6_2022-10	E472.Ag	04-Oct-2022	18-Jan-2023	----	----		19-Jan-2023	730 days	107 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag QUL-NHC_PCC-Li-6X_2022-10	E472.Ag	04-Oct-2022	18-Jan-2023	----	----		19-Jan-2023	730 days	107 days	✓

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Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag QUL-NHC_PCC-Li-7_2022-10	E472.Ag	04-Oct-2022	18-Jan-2023	----	----		19-Jan-2023	730 days	107 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag QUL-NHC_PCC-Li-8_2022-10	E472.Ag	04-Oct-2022	18-Jan-2023	----	----		19-Jan-2023	730 days	107 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-Ki-4_2022-10	E440.Ag	03-Oct-2022	17-Jan-2023	----	----		17-Jan-2023	730 days	107 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-M-1X_2022-10	E440.Ag	03-Oct-2022	17-Jan-2023	----	----		17-Jan-2023	730 days	107 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-Ki-7_2022-10	E440.Ag	06-Oct-2022	09-Jan-2023	----	----		09-Jan-2023	730 days	96 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-Ki-8_2022-10	E440.Ag	06-Oct-2022	09-Jan-2023	----	----		09-Jan-2023	730 days	96 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-Li-7_2022-10	E440.Ag	06-Oct-2022	09-Jan-2023	----	----		09-Jan-2023	730 days	96 days	✓
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LDPE bag QUL-NCP_LT-Li-8_2022-10	E440.Ag	06-Oct-2022	09-Jan-2023	----	----		09-Jan-2023	730 days	96 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-M-7_2022-10	E440.Ag	06-Oct-2022	09-Jan-2023	----	----		09-Jan-2023	730 days	96 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-M-8_2022-10	E440.Ag	06-Oct-2022	09-Jan-2023	----	----		09-Jan-2023	730 days	96 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-O-8_2022-10	E440.Ag	06-Oct-2022	09-Jan-2023	----	----		09-Jan-2023	730 days	96 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NGC_PCC-M-5X_2022-10	E440.Ag	06-Oct-2022	10-Jan-2023	----	----		10-Jan-2023	730 days	96 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NGC_PCC-O-3_2022-10	E440.Ag	06-Oct-2022	09-Jan-2023	----	----		09-Jan-2023	730 days	96 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NGC_PCC-O-5_2022-10	E440.Ag	06-Oct-2022	09-Jan-2023	----	----		09-Jan-2023	730 days	96 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NGC_PCC-O-5X_2022-10	E440.Ag	06-Oct-2022	10-Jan-2023	----	----		10-Jan-2023	730 days	96 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NGC_PCC-O-6_2022-10	E440.Ag	06-Oct-2022	09-Jan-2023	----	----		09-Jan-2023	730 days	96 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NGC_PCC-O-7_2022-10	E440.Ag	06-Oct-2022	09-Jan-2023	----	----		09-Jan-2023	730 days	96 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NGC_PCC-O-8_2022-10	E440.Ag	06-Oct-2022	09-Jan-2023	----	----		09-Jan-2023	730 days	96 days	✓

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Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-Ki-6_2022-10	E440.Ag	05-Oct-2022	09-Jan-2023	----	----		09-Jan-2023	730 days	97 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-Li-6_2022-10	E440.Ag	05-Oct-2022	09-Jan-2023	----	----		09-Jan-2023	730 days	97 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-M-6_2022-10	E440.Ag	05-Oct-2022	09-Jan-2023	----	----		09-Jan-2023	730 days	97 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NGC_NSC-WB-1_2022-10	E440.Ag	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	97 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NGC_NSC-WB-2_2022-10	E440.Ag	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	97 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NGC_NSC-WB-3_2022-10	E440.Ag	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	97 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NGC_NSC-WB-4_2022-10	E440.Ag	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	97 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NGC_NSC-WB-5_2022-10	E440.Ag	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	97 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NGC_NSC-WB-6_2022-10	E440.Ag	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	97 days	✓

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			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
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LDPE bag QUL-NGC_NSC-WB-7_2022-10	E440.Ag	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	97 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NGC_NSC-WB-8_2022-10	E440.Ag	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	97 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NGC_PCC-M-1_2022-10	E440.Ag	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	97 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NGC_PCC-M-2_2022-10	E440.Ag	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	97 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NGC_PCC-M-3_2022-10	E440.Ag	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	97 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NGC_PCC-M-4_2022-10	E440.Ag	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	97 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NGC_PCC-M-5_2022-10	E440.Ag	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	97 days	✓
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LDPE bag QUL-NGC_PCC-M-6_2022-10	E440.Ag	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	97 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NGC_PCC-M-7_2022-10	E440.Ag	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	97 days	✓

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Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

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			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NGC_PCC-M-8_2022-10	E440.Ag	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	97 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NGC_PCC-O-2_2022-10	E440.Ag	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	97 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-EAA_LT-Ki-1_2022-10	E440.Ag	04-Oct-2022	10-Jan-2023	----	----		10-Jan-2023	730 days	98 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-EAA_LT-Ki-2_2022-10	E440.Ag	04-Oct-2022	10-Jan-2023	----	----		10-Jan-2023	730 days	98 days	✓
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Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-EAA_LT-Ki-4_2022-10	E440.Ag	04-Oct-2022	10-Jan-2023	----	----		10-Jan-2023	730 days	98 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-EAA_LT-Ki-4X_2022-10	E440.Ag	04-Oct-2022	10-Jan-2023	----	----		10-Jan-2023	730 days	98 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-EAA_LT-Ki-5_2022-10	E440.Ag	04-Oct-2022	10-Jan-2023	----	----		10-Jan-2023	730 days	98 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-EAA_LT-Ki-6_2022-10	E440.Ag	04-Oct-2022	10-Jan-2023	----	----		10-Jan-2023	730 days	98 days	✓

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Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-EAA_LT-Ki-8_2022-10	E440.Ag	04-Oct-2022	10-Jan-2023	----	----		10-Jan-2023	730 days	98 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-EAA_LT-Li-1_2022-10	E440.Ag	04-Oct-2022	10-Jan-2023	----	----		10-Jan-2023	730 days	98 days	✓
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Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-EAA_LT-M-8_2022-10	E440.Ag	04-Oct-2022	09-Jan-2023	----	----		09-Jan-2023	730 days	98 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-EAA_LT-O-4_2022-10	E440.Ag	04-Oct-2022	10-Jan-2023	----	----		10-Jan-2023	730 days	98 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-EAA_LT-O-4X_2022-10	E440.Ag	04-Oct-2022	10-Jan-2023	----	----		10-Jan-2023	730 days	98 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-Ki-5_2022-10	E440.Ag	04-Oct-2022	09-Jan-2023	----	----		09-Jan-2023	730 days	98 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-Li-5_2022-10	E440.Ag	04-Oct-2022	09-Jan-2023	----	----		09-Jan-2023	730 days	98 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-M-5_2022-10	E440.Ag	04-Oct-2022	09-Jan-2023	----	----		09-Jan-2023	730 days	98 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-O-5_2022-10	E440.Ag	04-Oct-2022	09-Jan-2023	----	----		09-Jan-2023	730 days	98 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NHC_PCC-M-6X_2022-10	E440.Ag	04-Oct-2022	10-Jan-2023	----	----		10-Jan-2023	730 days	98 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NHC_PCC-O-6X_2022-10	E440.Ag	04-Oct-2022	10-Jan-2023	----	----		10-Jan-2023	730 days	98 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-Ki-1_2022-10	E440.Ag	03-Oct-2022	09-Jan-2023	----	----		09-Jan-2023	730 days	99 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-Ki-1X_2022-10	E440.Ag	03-Oct-2022	10-Jan-2023	----	----		10-Jan-2023	730 days	99 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-Ki-2_2022-10	E440.Ag	03-Oct-2022	09-Jan-2023	----	----		09-Jan-2023	730 days	99 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-Ki-3_2022-10	E440.Ag	03-Oct-2022	09-Jan-2023	----	----		09-Jan-2023	730 days	99 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-Li-1_2022-10	E440.Ag	03-Oct-2022	09-Jan-2023	----	----		09-Jan-2023	730 days	99 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-Li-1X_2022-10	E440.Ag	03-Oct-2022	10-Jan-2023	----	----		10-Jan-2023	730 days	99 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-Li-2_2022-10	E440.Ag	03-Oct-2022	09-Jan-2023	----	----		09-Jan-2023	730 days	99 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-Li-3_2022-10	E440.Ag	03-Oct-2022	09-Jan-2023	----	----		09-Jan-2023	730 days	99 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-Li-4_2022-10	E440.Ag	03-Oct-2022	09-Jan-2023	----	----		09-Jan-2023	730 days	99 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-M-1_2022-10	E440.Ag	03-Oct-2022	09-Jan-2023	----	----		09-Jan-2023	730 days	99 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-M-2_2022-10	E440.Ag	03-Oct-2022	09-Jan-2023	----	----		09-Jan-2023	730 days	99 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-M-3_2022-10	E440.Ag	03-Oct-2022	09-Jan-2023	----	----		09-Jan-2023	730 days	99 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-M-4_2022-10	E440.Ag	03-Oct-2022	09-Jan-2023	----	----		09-Jan-2023	730 days	99 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-O-1_2022-10	E440.Ag	03-Oct-2022	09-Jan-2023	----	----		09-Jan-2023	730 days	99 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-O-1X_2022-10	E440.Ag	03-Oct-2022	10-Jan-2023	----	----		10-Jan-2023	730 days	99 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-O-3_2022-10	E440.Ag	03-Oct-2022	09-Jan-2023	----	----		09-Jan-2023	730 days	99 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-O-4_2022-10	E440.Ag	03-Oct-2022	09-Jan-2023	----	----		09-Jan-2023	730 days	99 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NHC_NSC-WB-1_2022-10	E440.Ag	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	99 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NHC_NSC-WB-2_2022-10	E440.Ag	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	99 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NHC_NSC-WB-3_2022-10	E440.Ag	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	99 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NHC_NSC-WB-4_2022-10	E440.Ag	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	99 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NHC_NSC-WB-5_2022-10	E440.Ag	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	99 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NHC_NSC-WB-6_2022-10	E440.Ag	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	99 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NHC_NSC-WB-7_2022-10	E440.Ag	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	99 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NHC_NSC-WB-8_2022-10	E440.Ag	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	99 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NHC_PCC-M-1_2022-10	E440.Ag	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	99 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NHC_PCC-M-2_2022-10	E440.Ag	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	99 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NHC_PCC-M-3_2022-10	E440.Ag	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	99 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NHC_PCC-M-4_2022-10	E440.Ag	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	99 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NHC_PCC-M-5_2022-10	E440.Ag	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	99 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NHC_PCC-M-6_2022-10	E440.Ag	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	99 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NHC_PCC-M-7_2022-10	E440.Ag	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	99 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NHC_PCC-M-8_2022-10	E440.Ag	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	99 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NHC_PCC-O-1_2022-10	E440.Ag	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	99 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NHC_PCC-O-2_2022-10	E440.Ag	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	99 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NHC_PCC-O-3_2022-10	E440.Ag	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	99 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NHC_PCC-O-4_2022-10	E440.Ag	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	99 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NHC_PCC-O-5_2022-10	E440.Ag	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	99 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NHC_PCC-O-6_2022-10	E440.Ag	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	99 days	✓
Metals : Silver in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NHC_PCC-O-7_2022-10	E440.Ag	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	99 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag QUL-NGC_PCC-Ki-1_2022-10	E475.Ti	06-Oct-2022	19-Jan-2023	----	----		20-Jan-2023	730 days	106 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag QUL-NGC_PCC-Ki-3_2022-10	E475.Ti	06-Oct-2022	19-Jan-2023	----	----		20-Jan-2023	730 days	106 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag QUL-NGC_PCC-Ki-4_2022-10	E475.Ti	06-Oct-2022	19-Jan-2023	----	----		20-Jan-2023	730 days	106 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag QUL-NGC_PCC-Ki-5_2022-10	E475.Ti	06-Oct-2022	19-Jan-2023	----	----		20-Jan-2023	730 days	106 days	✓

Matrix: **Biota**

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Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Titanium in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag QUL-NGC_PCC-Ki-6_2022-10	E475.Ti	06-Oct-2022	19-Jan-2023	----	----		20-Jan-2023	730 days	106 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag QUL-NGC_PCC-Ki-7_2022-10	E475.Ti	06-Oct-2022	19-Jan-2023	----	----		20-Jan-2023	730 days	106 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag QUL-NGC_PCC-Ki-7X_2022-10	E475.Ti	06-Oct-2022	19-Jan-2023	----	----		20-Jan-2023	730 days	106 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag QUL-NGC_PCC-Ki-8_2022-10	E475.Ti	06-Oct-2022	19-Jan-2023	----	----		20-Jan-2023	730 days	106 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag QUL-NGC_PCC-Li-5X_2022-10	E475.Ti	06-Oct-2022	19-Jan-2023	----	----		20-Jan-2023	730 days	106 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag QUL-NGC_PCC-Li-8_2022-10	E475.Ti	06-Oct-2022	19-Jan-2023	----	----		20-Jan-2023	730 days	106 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag QUL-NHC_PCC-Ki-1_2022-10	E475.Ti	04-Oct-2022	19-Jan-2023	----	----		20-Jan-2023	730 days	108 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag QUL-NHC_PCC-Ki-2_2022-10	E475.Ti	04-Oct-2022	19-Jan-2023	----	----		20-Jan-2023	730 days	108 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag QUL-NHC_PCC-Ki-3_2022-10	E475.Ti	04-Oct-2022	19-Jan-2023	----	----		20-Jan-2023	730 days	108 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Titanium in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag QUL-NHC_PCC-Ki-4_2022-10	E475.Ti	04-Oct-2022	19-Jan-2023	----	----		20-Jan-2023	730 days	108 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag QUL-NHC_PCC-Ki-5_2022-10	E475.Ti	04-Oct-2022	19-Jan-2023	----	----		20-Jan-2023	730 days	108 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag QUL-NHC_PCC-Ki-6_2022-10	E475.Ti	04-Oct-2022	19-Jan-2023	----	----		20-Jan-2023	730 days	108 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag QUL-NHC_PCC-Ki-6X_2022-10	E475.Ti	04-Oct-2022	19-Jan-2023	----	----		20-Jan-2023	730 days	108 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag QUL-NHC_PCC-Ki-7_2022-10	E475.Ti	04-Oct-2022	19-Jan-2023	----	----		20-Jan-2023	730 days	108 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Biopsy)										
LDPE bag QUL-NHC_PCC-Ki-8_2022-10	E475.Ti	04-Oct-2022	19-Jan-2023	----	----		20-Jan-2023	730 days	108 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag QUL-NGC_PCC-Ki-2_2022-10	E472.Ti	06-Oct-2022	18-Jan-2023	----	----		19-Jan-2023	730 days	105 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag QUL-NGC_PCC-Li-1_2022-10	E472.Ti	06-Oct-2022	18-Jan-2023	----	----		19-Jan-2023	730 days	105 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag QUL-NGC_PCC-Li-2_2022-10	E472.Ti	06-Oct-2022	18-Jan-2023	----	----		19-Jan-2023	730 days	105 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag QUL-NGC_PCC-Li-3_2022-10	E472.Ti	06-Oct-2022	18-Jan-2023	----	----		19-Jan-2023	730 days	105 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag QUL-NGC_PCC-Li-4_2022-10	E472.Ti	06-Oct-2022	18-Jan-2023	----	----		19-Jan-2023	730 days	105 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag QUL-NGC_PCC-Li-5_2022-10	E472.Ti	06-Oct-2022	18-Jan-2023	----	----		19-Jan-2023	730 days	105 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag QUL-NGC_PCC-Li-6_2022-10	E472.Ti	06-Oct-2022	18-Jan-2023	----	----		19-Jan-2023	730 days	105 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag QUL-NGC_PCC-Li-7_2022-10	E472.Ti	06-Oct-2022	18-Jan-2023	----	----		19-Jan-2023	730 days	105 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag QUL-NHC_PCC-Li-1_2022-10	E472.Ti	04-Oct-2022	18-Jan-2023	----	----		19-Jan-2023	730 days	107 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag QUL-NHC_PCC-Li-2_2022-10	E472.Ti	04-Oct-2022	18-Jan-2023	----	----		19-Jan-2023	730 days	107 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag QUL-NHC_PCC-Li-3_2022-10	E472.Ti	04-Oct-2022	18-Jan-2023	----	----		19-Jan-2023	730 days	107 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag QUL-NHC_PCC-Li-4_2022-10	E472.Ti	04-Oct-2022	18-Jan-2023	----	----		19-Jan-2023	730 days	107 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag QUL-NHC_PCC-Li-5_2022-10	E472.Ti	04-Oct-2022	18-Jan-2023	----	----		19-Jan-2023	730 days	107 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag QUL-NHC_PCC-Li-6_2022-10	E472.Ti	04-Oct-2022	18-Jan-2023	----	----		19-Jan-2023	730 days	107 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag QUL-NHC_PCC-Li-6X_2022-10	E472.Ti	04-Oct-2022	18-Jan-2023	----	----		19-Jan-2023	730 days	107 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag QUL-NHC_PCC-Li-7_2022-10	E472.Ti	04-Oct-2022	18-Jan-2023	----	----		19-Jan-2023	730 days	107 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Micro)										
LDPE bag QUL-NHC_PCC-Li-8_2022-10	E472.Ti	04-Oct-2022	18-Jan-2023	----	----		19-Jan-2023	730 days	107 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-Ki-4_2022-10	E440.Ti	03-Oct-2022	17-Jan-2023	----	----		17-Jan-2023	730 days	107 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-M-1X_2022-10	E440.Ti	03-Oct-2022	17-Jan-2023	----	----		17-Jan-2023	730 days	107 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-Ki-7_2022-10	E440.Ti	06-Oct-2022	09-Jan-2023	----	----		09-Jan-2023	730 days	96 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-Ki-8_2022-10	E440.Ti	06-Oct-2022	09-Jan-2023	----	----		09-Jan-2023	730 days	96 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-Li-7_2022-10	E440.Ti	06-Oct-2022	09-Jan-2023	----	----		09-Jan-2023	730 days	96 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-Li-8_2022-10	E440.Ti	06-Oct-2022	09-Jan-2023	----	----		09-Jan-2023	730 days	96 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-M-7_2022-10	E440.Ti	06-Oct-2022	09-Jan-2023	----	----		09-Jan-2023	730 days	96 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-M-8_2022-10	E440.Ti	06-Oct-2022	09-Jan-2023	----	----		09-Jan-2023	730 days	96 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-O-8_2022-10	E440.Ti	06-Oct-2022	09-Jan-2023	----	----		09-Jan-2023	730 days	96 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NGC_PCC-M-5X_2022-10	E440.Ti	06-Oct-2022	10-Jan-2023	----	----		10-Jan-2023	730 days	96 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NGC_PCC-O-3_2022-10	E440.Ti	06-Oct-2022	09-Jan-2023	----	----		09-Jan-2023	730 days	96 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NGC_PCC-O-5_2022-10	E440.Ti	06-Oct-2022	09-Jan-2023	----	----		09-Jan-2023	730 days	96 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NGC_PCC-O-5X_2022-10	E440.Ti	06-Oct-2022	10-Jan-2023	----	----		10-Jan-2023	730 days	96 days	✓

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Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NGC_PCC-O-6_2022-10	E440.Ti	06-Oct-2022	09-Jan-2023	----	----		09-Jan-2023	730 days	96 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NGC_PCC-O-7_2022-10	E440.Ti	06-Oct-2022	09-Jan-2023	----	----		09-Jan-2023	730 days	96 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NGC_PCC-O-8_2022-10	E440.Ti	06-Oct-2022	09-Jan-2023	----	----		09-Jan-2023	730 days	96 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-Ki-6_2022-10	E440.Ti	05-Oct-2022	09-Jan-2023	----	----		09-Jan-2023	730 days	97 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-Li-6_2022-10	E440.Ti	05-Oct-2022	09-Jan-2023	----	----		09-Jan-2023	730 days	97 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-M-6_2022-10	E440.Ti	05-Oct-2022	09-Jan-2023	----	----		09-Jan-2023	730 days	97 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NGC_NSC-WB-1_2022-10	E440.Ti	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	97 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NGC_NSC-WB-2_2022-10	E440.Ti	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	97 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NGC_NSC-WB-3_2022-10	E440.Ti	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	97 days	✓

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Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NGC_NSC-WB-4_2022-10	E440.Ti	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	97 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NGC_NSC-WB-5_2022-10	E440.Ti	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	97 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NGC_NSC-WB-6_2022-10	E440.Ti	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	97 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NGC_NSC-WB-7_2022-10	E440.Ti	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	97 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NGC_NSC-WB-8_2022-10	E440.Ti	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	97 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NGC_PCC-M-1_2022-10	E440.Ti	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	97 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NGC_PCC-M-2_2022-10	E440.Ti	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	97 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NGC_PCC-M-3_2022-10	E440.Ti	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	97 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NGC_PCC-M-4_2022-10	E440.Ti	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	97 days	✓

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LDPE bag QUL-NGC_PCC-M-8_2022-10	E440.Ti	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	97 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NGC_PCC-O-2_2022-10	E440.Ti	06-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	97 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-EAA_LT-Ki-1_2022-10	E440.Ti	04-Oct-2022	10-Jan-2023	----	----		10-Jan-2023	730 days	98 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-EAA_LT-Ki-2_2022-10	E440.Ti	04-Oct-2022	10-Jan-2023	----	----		10-Jan-2023	730 days	98 days	✓
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LDPE bag QUL-EAA_LT-Ki-6_2022-10	E440.Ti	04-Oct-2022	10-Jan-2023	----	----		10-Jan-2023	730 days	98 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-EAA_LT-Ki-7_2022-10	E440.Ti	04-Oct-2022	10-Jan-2023	----	----		10-Jan-2023	730 days	98 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-EAA_LT-Ki-8_2022-10	E440.Ti	04-Oct-2022	10-Jan-2023	----	----		10-Jan-2023	730 days	98 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-EAA_LT-Li-1_2022-10	E440.Ti	04-Oct-2022	10-Jan-2023	----	----		10-Jan-2023	730 days	98 days	✓
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Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NHC_PCC-M-6X_2022-10	E440.Ti	04-Oct-2022	10-Jan-2023	----	----		10-Jan-2023	730 days	98 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NHC_PCC-O-6X_2022-10	E440.Ti	04-Oct-2022	10-Jan-2023	----	----		10-Jan-2023	730 days	98 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-Ki-1_2022-10	E440.Ti	03-Oct-2022	09-Jan-2023	----	----		09-Jan-2023	730 days	99 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-Ki-1X_2022-10	E440.Ti	03-Oct-2022	10-Jan-2023	----	----		10-Jan-2023	730 days	99 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-Ki-2_2022-10	E440.Ti	03-Oct-2022	09-Jan-2023	----	----		09-Jan-2023	730 days	99 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
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Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-Li-4_2022-10	E440.Ti	03-Oct-2022	09-Jan-2023	----	----		09-Jan-2023	730 days	99 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
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LDPE bag QUL-NCP_LT-O-1X_2022-10	E440.Ti	03-Oct-2022	10-Jan-2023	----	----		10-Jan-2023	730 days	99 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-O-3_2022-10	E440.Ti	03-Oct-2022	09-Jan-2023	----	----		09-Jan-2023	730 days	99 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NCP_LT-O-4_2022-10	E440.Ti	03-Oct-2022	09-Jan-2023	----	----		09-Jan-2023	730 days	99 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NHC_NSC-WB-1_2022-10	E440.Ti	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	99 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NHC_NSC-WB-2_2022-10	E440.Ti	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	99 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NHC_NSC-WB-3_2022-10	E440.Ti	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	99 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NHC_NSC-WB-4_2022-10	E440.Ti	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	99 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NHC_NSC-WB-5_2022-10	E440.Ti	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	99 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NHC_NSC-WB-6_2022-10	E440.Ti	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	99 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NHC_NSC-WB-7_2022-10	E440.Ti	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	99 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NHC_NSC-WB-8_2022-10	E440.Ti	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	99 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NHC_PCC-M-1_2022-10	E440.Ti	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	99 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NHC_PCC-M-2_2022-10	E440.Ti	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	99 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NHC_PCC-M-3_2022-10	E440.Ti	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	99 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NHC_PCC-M-4_2022-10	E440.Ti	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	99 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NHC_PCC-M-5_2022-10	E440.Ti	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	99 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NHC_PCC-M-6_2022-10	E440.Ti	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	99 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NHC_PCC-M-7_2022-10	E440.Ti	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	99 days	✓

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NHC_PCC-M-8_2022-10	E440.Ti	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	99 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NHC_PCC-O-1_2022-10	E440.Ti	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	99 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NHC_PCC-O-2_2022-10	E440.Ti	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	99 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NHC_PCC-O-3_2022-10	E440.Ti	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	99 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NHC_PCC-O-4_2022-10	E440.Ti	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	99 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NHC_PCC-O-5_2022-10	E440.Ti	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	99 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NHC_PCC-O-6_2022-10	E440.Ti	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	99 days	✓
Metals : Titanium in Biota by CRC ICPMS (DRY units, Routine)										
LDPE bag QUL-NHC_PCC-O-7_2022-10	E440.Ti	04-Oct-2022	09-Jan-2023	----	----		10-Jan-2023	730 days	99 days	✓
Physical Tests : Moisture Content by Gravimetry (Biopsy)										
LDPE bag QUL-NGC_PCC-Ki-1_2022-10	E144A	06-Oct-2022	----	----	----		19-Jan-2023	----	----	

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Moisture Content by Gravimetry (Biopsy)										
LDPE bag QUL-NGC_PCC-Ki-3_2022-10	E144A	06-Oct-2022	----	----	----		19-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry (Biopsy)										
LDPE bag QUL-NGC_PCC-Ki-4_2022-10	E144A	06-Oct-2022	----	----	----		19-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry (Biopsy)										
LDPE bag QUL-NGC_PCC-Ki-5_2022-10	E144A	06-Oct-2022	----	----	----		19-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry (Biopsy)										
LDPE bag QUL-NGC_PCC-Ki-6_2022-10	E144A	06-Oct-2022	----	----	----		19-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry (Biopsy)										
LDPE bag QUL-NGC_PCC-Ki-7_2022-10	E144A	06-Oct-2022	----	----	----		19-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry (Biopsy)										
LDPE bag QUL-NGC_PCC-Ki-7X_2022-10	E144A	06-Oct-2022	----	----	----		19-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry (Biopsy)										
LDPE bag QUL-NGC_PCC-Ki-8_2022-10	E144A	06-Oct-2022	----	----	----		19-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry (Biopsy)										
LDPE bag QUL-NGC_PCC-Li-5X_2022-10	E144A	06-Oct-2022	----	----	----		19-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry (Biopsy)										
LDPE bag QUL-NGC_PCC-Li-8_2022-10	E144A	06-Oct-2022	----	----	----		19-Jan-2023	----	----	

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Moisture Content by Gravimetry (Biopsy)										
LDPE bag QUL-NHC_PCC-Ki-1_2022-10	E144A	04-Oct-2022	----	----	----		19-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry (Biopsy)										
LDPE bag QUL-NHC_PCC-Ki-2_2022-10	E144A	04-Oct-2022	----	----	----		19-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry (Biopsy)										
LDPE bag QUL-NHC_PCC-Ki-3_2022-10	E144A	04-Oct-2022	----	----	----		19-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry (Biopsy)										
LDPE bag QUL-NHC_PCC-Ki-4_2022-10	E144A	04-Oct-2022	----	----	----		19-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry (Biopsy)										
LDPE bag QUL-NHC_PCC-Ki-5_2022-10	E144A	04-Oct-2022	----	----	----		19-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry (Biopsy)										
LDPE bag QUL-NHC_PCC-Ki-6_2022-10	E144A	04-Oct-2022	----	----	----		19-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry (Biopsy)										
LDPE bag QUL-NHC_PCC-Ki-6X_2022-10	E144A	04-Oct-2022	----	----	----		19-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry (Biopsy)										
LDPE bag QUL-NHC_PCC-Ki-7_2022-10	E144A	04-Oct-2022	----	----	----		19-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry (Biopsy)										
LDPE bag QUL-NHC_PCC-Ki-8_2022-10	E144A	04-Oct-2022	----	----	----		19-Jan-2023	----	----	

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag QUL-NGC_PCC-Ki-2_2022-10	E144-H	06-Oct-2022	----	----	----		18-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag QUL-NGC_PCC-Li-1_2022-10	E144-H	06-Oct-2022	----	----	----		18-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag QUL-NGC_PCC-Li-2_2022-10	E144-H	06-Oct-2022	----	----	----		18-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag QUL-NGC_PCC-Li-3_2022-10	E144-H	06-Oct-2022	----	----	----		18-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag QUL-NGC_PCC-Li-4_2022-10	E144-H	06-Oct-2022	----	----	----		18-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag QUL-NGC_PCC-Li-5_2022-10	E144-H	06-Oct-2022	----	----	----		18-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag QUL-NGC_PCC-Li-6_2022-10	E144-H	06-Oct-2022	----	----	----		18-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag QUL-NGC_PCC-Li-7_2022-10	E144-H	06-Oct-2022	----	----	----		18-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag QUL-NHC_PCC-Li-1_2022-10	E144-H	04-Oct-2022	----	----	----		18-Jan-2023	----	----	

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag QUL-NHC_PCC-Li-2_2022-10	E144-H	04-Oct-2022	----	----	----		18-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag QUL-NHC_PCC-Li-3_2022-10	E144-H	04-Oct-2022	----	----	----		18-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag QUL-NHC_PCC-Li-4_2022-10	E144-H	04-Oct-2022	----	----	----		18-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag QUL-NHC_PCC-Li-5_2022-10	E144-H	04-Oct-2022	----	----	----		18-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag QUL-NHC_PCC-Li-6_2022-10	E144-H	04-Oct-2022	----	----	----		18-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag QUL-NHC_PCC-Li-6X_2022-10	E144-H	04-Oct-2022	----	----	----		18-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag QUL-NHC_PCC-Li-7_2022-10	E144-H	04-Oct-2022	----	----	----		18-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry (Micro)										
LDPE bag QUL-NHC_PCC-Li-8_2022-10	E144-H	04-Oct-2022	----	----	----		18-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag QUL-EAA_LT-Ki-1_2022-10	E144	04-Oct-2022	----	----	----		05-Jan-2023	----	----	

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Moisture Content by Gravimetry										
LDPE bag QUL-EAA_LT-Ki-2_2022-10	E144	04-Oct-2022	----	----	----		05-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag QUL-EAA_LT-Ki-3_2022-10	E144	04-Oct-2022	----	----	----		05-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag QUL-EAA_LT-Ki-4_2022-10	E144	04-Oct-2022	----	----	----		05-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag QUL-EAA_LT-Ki-4X_2022-10	E144	04-Oct-2022	----	----	----		05-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag QUL-EAA_LT-Ki-5_2022-10	E144	04-Oct-2022	----	----	----		05-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag QUL-EAA_LT-Ki-6_2022-10	E144	04-Oct-2022	----	----	----		05-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag QUL-EAA_LT-Ki-7_2022-10	E144	04-Oct-2022	----	----	----		05-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag QUL-EAA_LT-Ki-8_2022-10	E144	04-Oct-2022	----	----	----		05-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag QUL-EAA_LT-Li-1_2022-10	E144	04-Oct-2022	----	----	----		05-Jan-2023	----	----	

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Moisture Content by Gravimetry										
LDPE bag QUL-EAA_LT-Li-2_2022-10	E144	04-Oct-2022	----	----	----		05-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag QUL-EAA_LT-Li-3_2022-10	E144	04-Oct-2022	----	----	----		05-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag QUL-EAA_LT-Li-4_2022-10	E144	04-Oct-2022	----	----	----		05-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag QUL-EAA_LT-Li-4X_2022-10	E144	04-Oct-2022	----	----	----		05-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag QUL-EAA_LT-Li-5_2022-10	E144	04-Oct-2022	----	----	----		05-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag QUL-EAA_LT-Li-6_2022-10	E144	04-Oct-2022	----	----	----		05-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag QUL-EAA_LT-Li-7_2022-10	E144	04-Oct-2022	----	----	----		05-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag QUL-EAA_LT-Li-8_2022-10	E144	04-Oct-2022	----	----	----		05-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag QUL-EAA_LT-M-1_2022-10	E144	04-Oct-2022	----	----	----		04-Jan-2023	----	----	

Matrix: **Biota**

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Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Moisture Content by Gravimetry										
LDPE bag QUL-EAA_LT-M-2_2022-10	E144	04-Oct-2022	----	----	----		04-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag QUL-EAA_LT-M-3_2022-10	E144	04-Oct-2022	----	----	----		04-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag QUL-EAA_LT-M-4_2022-10	E144	04-Oct-2022	----	----	----		04-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag QUL-EAA_LT-M-4X_2022-10	E144	04-Oct-2022	----	----	----		05-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag QUL-EAA_LT-M-5_2022-10	E144	04-Oct-2022	----	----	----		04-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag QUL-EAA_LT-M-6_2022-10	E144	04-Oct-2022	----	----	----		04-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag QUL-EAA_LT-M-7_2022-10	E144	04-Oct-2022	----	----	----		04-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag QUL-EAA_LT-M-8_2022-10	E144	04-Oct-2022	----	----	----		04-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag QUL-EAA_LT-O-4_2022-10	E144	04-Oct-2022	----	----	----		05-Jan-2023	----	----	

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Moisture Content by Gravimetry										
LDPE bag QUL-EAA_LT-O-4X_2022-10	E144	04-Oct-2022	----	----	----		05-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag QUL-NCP_LT-Ki-1_2022-10	E144	03-Oct-2022	----	----	----		04-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag QUL-NCP_LT-Ki-1X_2022-10	E144	03-Oct-2022	----	----	----		05-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag QUL-NCP_LT-Ki-2_2022-10	E144	03-Oct-2022	----	----	----		04-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag QUL-NCP_LT-Ki-3_2022-10	E144	03-Oct-2022	----	----	----		04-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag QUL-NCP_LT-Ki-4_2022-10	E144	03-Oct-2022	----	----	----		16-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag QUL-NCP_LT-Ki-5_2022-10	E144	04-Oct-2022	----	----	----		04-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag QUL-NCP_LT-Ki-6_2022-10	E144	05-Oct-2022	----	----	----		04-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag QUL-NCP_LT-Ki-7_2022-10	E144	06-Oct-2022	----	----	----		04-Jan-2023	----	----	

Matrix: **Biota**

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Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Moisture Content by Gravimetry										
LDPE bag QUL-NCP_LT-Ki-8_2022-10	E144	06-Oct-2022	----	----	----		04-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag QUL-NCP_LT-Li-1_2022-10	E144	03-Oct-2022	----	----	----		04-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag QUL-NCP_LT-Li-1X_2022-10	E144	03-Oct-2022	----	----	----		05-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag QUL-NCP_LT-Li-2_2022-10	E144	03-Oct-2022	----	----	----		04-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag QUL-NCP_LT-Li-3_2022-10	E144	03-Oct-2022	----	----	----		04-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag QUL-NCP_LT-Li-4_2022-10	E144	03-Oct-2022	----	----	----		04-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag QUL-NCP_LT-Li-5_2022-10	E144	04-Oct-2022	----	----	----		04-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag QUL-NCP_LT-Li-6_2022-10	E144	05-Oct-2022	----	----	----		04-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag QUL-NCP_LT-Li-7_2022-10	E144	06-Oct-2022	----	----	----		04-Jan-2023	----	----	

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Moisture Content by Gravimetry										
LDPE bag QUL-NCP_LT-Li-8_2022-10	E144	06-Oct-2022	----	----	----		04-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag QUL-NCP_LT-M-1_2022-10	E144	03-Oct-2022	----	----	----		04-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag QUL-NCP_LT-M-1X_2022-10	E144	03-Oct-2022	----	----	----		05-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag QUL-NCP_LT-M-2_2022-10	E144	03-Oct-2022	----	----	----		04-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag QUL-NCP_LT-M-3_2022-10	E144	03-Oct-2022	----	----	----		04-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag QUL-NCP_LT-M-4_2022-10	E144	03-Oct-2022	----	----	----		04-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag QUL-NCP_LT-M-5_2022-10	E144	04-Oct-2022	----	----	----		04-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag QUL-NCP_LT-M-6_2022-10	E144	05-Oct-2022	----	----	----		04-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag QUL-NCP_LT-M-7_2022-10	E144	06-Oct-2022	----	----	----		04-Jan-2023	----	----	

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Moisture Content by Gravimetry										
LDPE bag QUL-NCP_LT-M-8_2022-10	E144	06-Oct-2022	----	----	----		04-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag QUL-NCP_LT-O-1_2022-10	E144	03-Oct-2022	----	----	----		04-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag QUL-NCP_LT-O-1X_2022-10	E144	03-Oct-2022	----	----	----		05-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag QUL-NCP_LT-O-3_2022-10	E144	03-Oct-2022	----	----	----		04-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag QUL-NCP_LT-O-4_2022-10	E144	03-Oct-2022	----	----	----		04-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag QUL-NCP_LT-O-5_2022-10	E144	04-Oct-2022	----	----	----		04-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag QUL-NCP_LT-O-8_2022-10	E144	06-Oct-2022	----	----	----		04-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag QUL-NGC_NSC-WB-1_2022-10	E144	06-Oct-2022	----	----	----		04-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag QUL-NGC_NSC-WB-2_2022-10	E144	06-Oct-2022	----	----	----		04-Jan-2023	----	----	

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Moisture Content by Gravimetry										
LDPE bag QUL-NGC_NSC-WB-3_2022-10	E144	06-Oct-2022	----	----	----		04-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag QUL-NGC_NSC-WB-4_2022-10	E144	06-Oct-2022	----	----	----		04-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag QUL-NGC_NSC-WB-5_2022-10	E144	06-Oct-2022	----	----	----		04-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag QUL-NGC_NSC-WB-6_2022-10	E144	06-Oct-2022	----	----	----		04-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag QUL-NGC_NSC-WB-7_2022-10	E144	06-Oct-2022	----	----	----		04-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag QUL-NGC_NSC-WB-8_2022-10	E144	06-Oct-2022	----	----	----		04-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag QUL-NGC_PCC-M-1_2022-10	E144	06-Oct-2022	----	----	----		04-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag QUL-NGC_PCC-M-2_2022-10	E144	06-Oct-2022	----	----	----		04-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag QUL-NGC_PCC-M-3_2022-10	E144	06-Oct-2022	----	----	----		04-Jan-2023	----	----	

Matrix: **Biota**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Moisture Content by Gravimetry										
LDPE bag QUL-NGC_PCC-M-4_2022-10	E144	06-Oct-2022	----	----	----		04-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag QUL-NGC_PCC-M-5_2022-10	E144	06-Oct-2022	----	----	----		04-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag QUL-NGC_PCC-M-5X_2022-10	E144	06-Oct-2022	----	----	----		05-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag QUL-NGC_PCC-M-6_2022-10	E144	06-Oct-2022	----	----	----		04-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag QUL-NGC_PCC-M-7_2022-10	E144	06-Oct-2022	----	----	----		04-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag QUL-NGC_PCC-M-8_2022-10	E144	06-Oct-2022	----	----	----		04-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag QUL-NGC_PCC-O-2_2022-10	E144	06-Oct-2022	----	----	----		04-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag QUL-NGC_PCC-O-3_2022-10	E144	06-Oct-2022	----	----	----		04-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag QUL-NGC_PCC-O-5_2022-10	E144	06-Oct-2022	----	----	----		04-Jan-2023	----	----	