Mary River Project 2023
Core Receiving Environment Monitoring Program Report

Part 2 of 3
(Appendices A to E)

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APPENDIX A

APPENDIX A DATA QUALITY REVIEW

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A1 INTRODUCTION

A1.1 Background

A variety of factors can influence the physical, chemical, and biological measurements made in an environmental study and thus affect the accuracy and/or precision of the data. Depending on their magnitude, inaccuracy and/or imprecision have the potential to affect the reliability of conclusions made from data; therefore, it is important to ensure that programs incorporate appropriate steps to control non-natural sources of data variability (i.e., minimize variability that does not reflect authentic spatial and temporal variability in the environment) and thus assure the quality of the data. Data quality as a concept is meaningful only when it relates to the intended use of the data. That is, one must know the context in which the data will be interpreted in order to establish a relevant basis for judging whether or not the data set is adequate. A data quality review (DQR) involves the comparison of field and laboratory measurement performance to Data Quality Objectives (DQOs) established for a particular study, such as evaluation of Laboratory Reporting Limits (LRL), blank sample data, data precision (based on field and laboratory duplicate samples), and data accuracy (based on matrix spike recoveries and/or analysis of standards or certified reference materials). Trusted analytical laboratories certified by the Canadian Association for Laboratory Accreditation (CALA) or the National Environmental Laboratory Accreditation Program (NELAP), with a rigorous internal quality assurance program, were selected to ensure the highest possible data quality. Data quality objectives were established a priori to reflect reasonable and achievable performance expectations. Programs involving many samples and analytes may sometimes yield results that exceed DQOs, which is particularly true for multi-element scans, as the analytical conditions are not necessarily optimal for every element included in the scan. Generally, scan results may be considered acceptable if no more than 20% of the parameters fail to meet DQOs. Overall, the intent of a DQR is not to reject any measurement that did not meet a DQO, but to ensure that any questionable data received more scrutiny to determine what effect, if any, this had on interpretation of results within the context of the project.

A1.2 Quality Control Samples

A DQR was conducted on all laboratory data collected as part of the Mary River Project Core Receiving Environment Monitoring Program (CREMP) 2023 and involves the examination of analytical results associated with several types of Quality Control (QC) samples collected (or prepared) in the field and laboratory. General QC samples collected for this project, and a description of each, include the following:

- **Blanks** are samples of deionized water and/or appropriate reagent(s) that are handled and analyzed the same way as regular samples. These samples reflect contamination that occurred from the equipment (in the case of equipment blanks), in the field (in the case of trip or field blanks), or in the laboratory (in the case of laboratory or method blanks). Analyte concentrations should be non-detectable, although a data quality objective of five times the laboratory reporting limit (LRL) allowed for slight "noise" around the detection limit.
- **Trip Blanks** are meant to detect any widespread contamination resulting from the container (including caps) and preservative during transport and storage. A trip blank is a bottle set to which deionized water has been added in a laboratory prior to the field sample collections, which is transported with the regular sample bottles in the field, and remains unopened throughout the trip.
- **Field Blanks** mimic the sampling and preservative process but do not come in contact with ambient water. Field blanks are exposed to the sampling environment at the sample site. Consequently, they provide information on contamination resulting from the handling technique and through exposure to the atmosphere. They are processed in the same manner as the associated field samples (i.e., they are exposed to all the same potential sources of contamination as the field sample), including handling and, in some cases, filtration and/or preservation.
- **Equipment Blanks** are samples of deionized water collected from the sampling equipment following decontamination (i.e., rinsing of the sampling device using deionized water) in the field between sampling stations and/or events. These blanks are useful in identifying cross contamination of samples in the field as a result of the sampling device.
- **Field Duplicates** are sub-sample pairs collected from randomly selected field stations using identical collection and handling methods that are then analyzed separately in the laboratory. The duplicate samples are handled and analyzed in an identical manner in the laboratory. The data from field duplicate samples reflect natural variability, as well as the variability associated with sample collection methods, and therefore provide a measure of field precision.
- **Taxonomic Quality Control Samples** are a randomly selected portion of a benthic invertebrate community field sample to be assessed by the laboratory using an internal quality control audit. A blind re-enumeration and re-identification of random samples is performed by an analyst uninvolved in the original sample processing. This assessment quantifies taxonomic misidentification among laboratory analysts and ensures accurate organism identities are reported.

- **Laboratory Subsamples** are community samples prepared by the laboratory to ensure that the fraction of the total sample examined was an accurate representation of the total number of organisms. By comparing the amount recovered between at least two sub-samples, one can assess the analytical precision. In addition, comparisons of the sub-samples from the whole community sample allows for an evaluation of sub-sampling accuracy.

A2 WATER CHEMISTRY AND PHYTOPLANKTON

A2.1 Laboratory and Field Blanks

Water chemistry samples were taken in the spring, summer, and fall and included phytoplankton for chlorophyll-a analysis. A total of nine trip blank and field blanks samples were taken during the 2023 CREMP, including two each during the winter lake monitoring event (April), one each during the spring stream monitoring event (July), three each during the summer lake/stream monitoring event (late July/early August), and three each during the fall lake/stream monitoring event (late August/early September). Of the 783 total trip blank analyte results, 59 (7.2%) resulted in analyte detection above the trip blank DQO of less than the laboratory reporting limit (LRL; Appendix Table A.1). Of the 783 individual field blank results, 72 (9.1%) resulted in analyte detections above the DQO of less than the LRL (Appendix Table A.2). Since only 7.2% of trip and 9.1% of field blank results were above the LRL indicating negligible contamination, field precision and accuracy were considered acceptable for this study.

A total of six equipment blank samples were collected during the 2023 CREMP, including two during the winter lake monitoring event, two during the summer lake monitoring event, and two during the fall lake monitoring event. Of the 522 individual analyte results, 89 (17%) resulted in analyte detection above the LRL (Appendix Table A.3). As only 17.0% of the equipment blank results did not meet the DQO, equipment contamination of water samples was considered of little concern and laboratory precision was acceptable for this study (Appendix Table A.3).

A2.2 Field Precision

In total, nine field duplicates were collected over the course of the 2023 CREMP water quality monitoring, including two during the winter lake monitoring event, three during the summer stream/lake monitoring event, and three during the fall stream/lake monitoring event. In general, close agreement in parameter concentrations was observed between duplicate samples, with 95% of field duplicate analyte pairs meeting the water quality field duplicate DQO of ≤25% Relative Percent Difference (RPD) in parameter concentrations of the 774 duplicate analyses conducted (Appendix Table A.4). Of the cases in which DQO was not met, most of the measured concentrations in one or both duplicate samples were close to the LRL (i.e., two- to three-times the LRL) such that small differences in concentrations between duplicate samples resulted in relatively high RPD. After accounting for samples close to the LRL, there were no consistent exceedances of any analytes. No seasonal patterns were suggested for those duplicate samples in which concentrations in duplicate samples failed to

achieve the DQO, suggesting no consistent methodological issues. Overall, in most cases, and for key parameters of concern, the RPD in analyte concentrations was sufficiently low as to not affect interpretation of the data.

A3 BENTHIC INVERTEBRATE COMMUNITY SAMPLES

A3.1 Lentic (Lake) Samples

A3.1.1 Subsampling Accuracy

Of the 49 benthic invertebrate community samples collected from four lakes, 20 samples were subsampled by Zeas Incorporated (Zeas). The proportions of subsampling material ranged from 25 to 50% of total sample material (Appendix Table A.5). Of the 20 that were subsampled, three were assessed for precision and accuracy. All assessed samples met the laboratory DQO of ≤ 20% for both precision and accuracy (Appendix Table A.6). Thus, the precision and accuracy for sub-sampling of the benthic invertebrate community samples was considered acceptable for this study.

A3.1.2 Organism Recovery

Sorting efficiency (i.e., percent recovery) of benthic invertebrate samples was high, averaging 98% for lentic samples (six samples; Appendix Tables A.7). Sorting efficiency for these samples achieved the DQO of ≥ 95% recovery, and therefore the benthic invertebrate community sample recovery was considered acceptable.

A3.1.3 Other Concerns

In a total of 12 samples, the laboratory indicated preservative issues where benthic invertebrates appeared to be in various stages of decomposition that may potentially compromise total density calculations (Appendix Table A.5). All samples were preserved in the same manner, therefore the exact cause of this is unknown. However, longer preservative saturation time due to large sample volume in jars may cause some invertebrates at the bottom of the jar to partially decompose. In the future, extra caution will be taken during sample preservation to ensure that the sample is separated in multiple jars with sufficient preservative to prevent decomposition. Overall, this is unlikely to have major impact on data analysis, but extra caution will be given during interpretation of results.

A3.2 Lotic (Stream) Samples

A3.2.1 Subsampling Accuracy

Of the 65 benthic invertebrate community samples collected from 13 stream reaches, 12 samples were subsampled by Zeas. The proportions of subsampling material ranged from 25 to 50% of total sample material (Appendix Table A.8). Of the 12 that were subsampled, five were assessed for precision and accuracy. All assessed samples met the laboratory DQO

of ≤ 20% for both precision and accuracy (Appendix Table A.9). Thus, the precision and accuracy for sub-sampling of the benthic invertebrate community samples was considered acceptable for this study.

A3.2.2 Organism Recovery

Sorting efficiency (i.e., percent recovery) of benthic invertebrate samples was high, averaging 96.3% for lotic samples (nine samples; Appendix Tables A.7). Sorting efficiency for these samples achieved the DQO of ≥ 95% recovery, and therefore the benthic invertebrate community sample recovery was considered acceptable.

A4 FISH AGING

A4.1 Subsampling Accuracy

Analytical reports of fish age estimates from North South Consulting Group (NSCG) were examined to evaluate data accuracy. To determine the accuracy of arctic charr age, 10% of aging structures that were analyzed by NSCG were reprocessed by a second analyst (n = 5; Appendix Table A.11). The original and second analyst assigned a confidence index to each age estimate and check. The original and reassessed age estimates agreed in all samples.

A5 DATA QUALITY STATEMENT

The DQR results generally indicated that the water and lake benthic invertebrate community data were of acceptable quality. Few water quality parameters did not meet their respective DQO. In general, most of these parameters showed low margins of error relative to respective criteria and/or were observed at low concentrations most often near the LRL. The benthic invertebrate community data quality was also acceptable for this study, meeting all precision, accuracy, and percent recovery benchmarks. A few samples with some decomposing invertebrates may have resulted in inaccurate density calculations, however, these samples will be considered with greater scrutiny during interpretation of results. Overall, the data associated with the 2023 CREMP were considered defensible and acceptable for interpretation and derivation of conclusions with a good level of confidence.

Table A.1: Water Sample Trip Blank Results with Reference to Data Quality Objectives, Mary River Project CREMP 2023

Constituent	Units	Water Quality Guideline (WQG)[a]	Range of LRLs	No. Sample Results > LRL
Physical Tests				
Conductivity	umhos/cm	-	1	4 (44%)
Hardness (as CaCO3)	mg/L	-	0.5	1 (11%)
Total Dissolved Solids	mg/L	-	10	3 (33%)
Turbidity	NTU	-	0.1	5 (56%)
Anions and Nutrients (Water)				
Ammonia, Total (as N)	mg/L	-	0.005	1 (11%)
Nitrate (as N)	mg/L	3	0.02	1 (11%)
Total Kjeldahl Nitrogen	mg/L	-	0.05	1 (11%)
Phosphorus, Total	mg/L	0.020 or 0.030	0.002	1 (11%)
Organic / Inorganic Carbon (Water)				
Dissolved Organic Carbon	mg/L	-	0.5	1 (11%)
Total Metals (Water)				
Aluminum (Al)	mg/L	0.1	0.003	2 (22%)
Boron (B)	mg/L	1.5	0.01	3 (33%)
Calcium (Ca)	mg/L	-	0.05	1 (11%)
Magnesium (Mg)	mg/L	-	0.005	4 (44%)
Manganese (Mn)	mg/L	0.935	0.0001	1 (11%)
Silicon (Si)	mg/L	-	0.1	5 (56%)
Sodium (Na)	mg/L	-	0.05	2 (22%)
Uranium (U)	mg/L	0.015	0.00001	1 (11%)
Dissolved Metals (Water)				
Aluminum (Al)	mg/L	-	0.001	2 (22%)
Boron (B)	mg/L	-	0.01	3 (33%)
Calcium (Ca)	mg/L	-	0.05	1 (11%)
Silicon (Si)	mg/L	-	0.05	6 (67%)
Sodium (Na)	mg/L	-	0.05	2 (22%)
Plant Pigments (Water)				
Chlorophyll-a	µg/L	-	0.01	4 (44%)
Phaeophytin a	µg/L	-	0.01	4 (44%)
			Total	59 (7.2%)

Notes: LRL = Laboratory Reporting Limit, " - " indicates no data available.

[a] Canadian Water Quality Guideline (CWQG) for the protection of aquatic life (CCME 2024) was selected where a CCME guideline exists. Where no CCME guideline exists, the selected guideline is the lowest of either the Ontario Provincial Water Quality Objective (PWQO; OMOE 1994) or the British Columbia Water Quality Guideline (BCWQG; BCMOE 2021), as available.

Table A.2: Water Sample Field Blank Results with Reference to Data Quality Objectives, Mary River Project CREMP 2023

Constituent	Units	Water Quality Guideline (WQG)[a]	Range of LRLs	No. Sample Results > LRL
Physical Tests				
Conductivity	umhos/cm	-	1	5 (56%)
Total Dissolved Solids	mg/L	-	10	4 (44%)
Turbidity	NTU	-	0.1	2 (22%)
Anions and Nutrients (Water)				
Ammonia, Total (as N)	mg/L	-	0.005	4 (44%)
Phosphorus, Total	mg/L	0.020 or 0.030	0.002	1 (11%)
Total Metals (Water)				
Aluminum (Al)	mg/L	0.1	0.003	4 (44%)
Barium (Ba)	mg/L	-	0.0001	1 (11%)
Boron (B)	mg/L	1.5	0.01	3 (33%)
Iron (Fe)	mg/L	0.3	0.01	2 (22%)
Magnesium (Mg)	mg/L	-	0.005	1 (11%)
Manganese (Mn)	mg/L	0.935	0.0001	2 (22%)
Silicon (Si)	mg/L	-	0.1	5 (56%)
Sodium (Na)	mg/L	-	0.05	1 (11%)
Titanium (Ti)	mg/L	-	0.0003	2 (22%)
Dissolved Metals (Water)				
Aluminum (Al)	mg/L	-	0.001	3 (33%)
Boron (B)	mg/L	-	0.01	3 (33%)
Silicon (Si)	mg/L	-	0.05	9 (100%)
Sodium (Na)	mg/L	-	0.05	2 (22%)
Titanium (Ti)	mg/L	-	0.0003	1 (11%)
Plant Pigments (Water)				
Chlorophyll-a	µg/L	-	0.01	4 (44%)
Phaeophytin a	µg/L	-	0.01	4 (44%)
			Total	72 (9.1%)

Notes: LRL = Laboratory Reporting Limit, " - " indicates no data available.

[a] Canadian Water Quality Guideline (CWQG) for the protection of aquatic life (CCME 2024) was selected where a CCME guideline exists. Where no CCME guideline exists, the selected guideline is the lowest of either the Ontario Provincial Water Quality Objective (PWQO; OMOE 1994) or the British Columbia Water Quality Guideline (BCWQG; BCMOE 2021), as available.

Table A.3: Water Sample Equipment Blank Results with Reference to Data Quality Objectives, Mary River Project CREMP 2023

Client Sample ID	Units	Water Quality Guideline (WQG)[a]	Range of LRLs	No. Sample Results > LRL
Physical Tests				
Conductivity	umhos/cm	-	1	6 (100%)
Total Dissolved Solids	mg/L	-	10	1 (16.7%)
Turbidity	NTU	-	0.1	6 (100%)
Anions and Nutrients (Water)				
Ammonia, Total (as N)	mg/L	-	0.005	2 (33.3%)
Total Kjeldahl Nitrogen	mg/L	-	0.05	1 (16.7%)
Phosphorus, Total	mg/L	0.020 or 0.030	0.002	2 (33.3%)
Organic / Inorganic Carbon (Water)				
Dissolved Organic Carbon	mg/L	-	0.5	1 (16.7%)
Total Organic Carbon	mg/L	-	0.5	1 (16.7%)
Total Metals (Water)				
Aluminum (Al)	mg/L	0.1	0.003	5 (83.3%)
Barium (Ba)	mg/L	-	0.0001	4 (66.7%)
Boron (B)	mg/L	1.5	0.01	1 (16.7%)
Calcium (Ca)	mg/L	-	0.05	1 (16.7%)
Iron (Fe)	mg/L	0.3	0.01	2 (33.3%)
Magnesium (Mg)	mg/L	-	0.005	6 (100%)
Manganese (Mn)	mg/L	0.935	0.0001	4 (66.7%)
Silicon (Si)	mg/L	-	0.1	3 (50%)
Sodium (Na)	mg/L	-	0.05	2 (33.3%)
Titanium (Ti)	mg/L	-	0.0003	2 (33.3%)
Zinc (Zn)	mg/L	0.03	0.003	1 (16.7%)
Dissolved Metals (Water)				
Aluminum (Al)	mg/L	-	0.001	4 (66.7%)
Barium (Ba)	mg/L	-	0.0001	3 (50%)
Boron (B)	mg/L	-	0.01	1 (16.7%)
Calcium (Ca)	mg/L	-	0.05	5 (83.3%)
Copper (Cu)	mg/L	-	0.0002	1 (16.7%)
Magnesium (Mg)	mg/L	-	0.005	5 (83.3%)
Manganese (Mn)	mg/L	-	0.0001	3 (50%)
Silicon (Si)	mg/L	-	0.05	5 (83.3%)
Sodium (Na)	mg/L	-	0.05	2 (33.3%)
Zinc (Zn)	mg/L	-	0.001	3 (50%)
Plant Pigments (Water)				
Chlorophyll a	µg/L	-	0.01	3 (50%)
Phaeophytin a	µg/L	-	0.01	3 (50%)
			Total	89 (17.0%)

Notes: LRL = Laboratory Reporting Limit, " - " indicates no data available.

[a] Canadian Water Quality Guideline (CWQG) for the protection of aquatic life (CCME 2024) was selected where a CCME guideline exists. Where no CCME guideline exists, the selected guideline is the lowest of either the Ontario Provincial Water Quality Objective (PWQO; OMOE 1994) or the British Columbia Water Quality Guideline (BCWQG; BCMOE 2021), as available.

Table A.4: Water Quality Field Duplicate Results with Reference to Relative Percent Differences, Mary River Project CREMP 2023

Client Sample ID	Units	Lowest LRL[a]	BL0-01-A_B_2023-04-08	QD-CC1_B_2023-04-08	RPD (%)	DL0-02-7_S_2023-04-09	QD-CC2_S_2023-04-09	RPD (%)	J0-01_2023-07-17	QD-CC3_2023-07-17	RPD (%)
Date Sampled			08-Apr-23	08-Apr-23		09-Apr-23	09-Apr-23		17-Jul-23	17-Jul-23	
Time Sampled			14:00	14:00		15:30	15:30		10:30	10:30	
ALS Sample ID			BF2300011-002	BF2300011-003		BF2300013-008	BF2300013-009		BF2300155-026	BF2300155-027	
Physical Tests											
Conductivity	umhos/cm	1	234	233	0.43	191	192	0.52	137	137	0
Hardness (as CaCO3)	mg/L	0.5	112	110	1.80	85.4	84.2	1.42	64.4	64.3	0.16
pH	pH units	0.1	7.51	7.44	0.94	7.72	7.68	0.52	7.69	7.71	0.26
Total Suspended Solids	mg/L	1	<1.0	<1.0	0	<1.0	<1.0	0	2.10	2.50	17.4
Total Dissolved Solids	mg/L	10	131	136	3.75	105	105	0	86.0	78.0	9.76
Turbidity	NTU	0.1	0.73	0.59	21.2	0.37	0.14	90.2	2.58	3.64	34.1
Anions and Nutrients (Water)											
Alkalinity, Total (as CaCO3)	mg/L	2	109	110	0.91	73.7	74.3	0.81	73.5	69.0	6.32
Ammonia, Total (as N)	mg/L	0.005	0.02	0.02	10.2	<0.0050	<0.0050	0	<0.0050	<0.0050	0
Bromide (Br)	mg/L	0.1	<0.10	<0.10	0	<0.10	<0.10	0	<0.10	<0.10	0
Chloride (Cl)	mg/L	0.5	8.24	8.14	1.22	5.81	6.05	4.05	3.93	3.92	0.25
Nitrate (as N)	mg/L	0.02	0.14	0.13	3.66	0.30	0.31	2.32	0.03	0.03	3.92
Nitrite (as N)	mg/L	0.01	<0.010	<0.010	0	<0.010	<0.010	0	<0.010	<0.010	0
Total Kjeldahl Nitrogen	mg/L	0.05	0.10	0.12	16.9	0.12	0.14	9.23	0.09	0.10	10.8
Phosphorus, Total	mg/L	0.002	0.0030	<0.0020	40.0	0.0026	0.01	96.0	0.0052	0.0148	96.0
Sulfate (SO4)	mg/L	0.3	2.45	2.35	4.17	13.8	14.5	4.95	3.73	3.66	1.89
Organic / Inorganic Carbon (Water)											
Dissolved Organic Carbon	mg/L	0.5	1.44	1.50	4.08	1.39	1.46	4.91	1.93	2.02	4.56
Total Organic Carbon	mg/L	0.5	1.45	1.40	3.51	1.39	1.30	6.69	1.69	1.87	10.1
Total Metals (Water)											
Mercury (Hg)-Total	mg/L	0.000005	<0.0000050	<0.0000050	0	<0.0000050	<0.0000050	0	<0.0000050	<0.0000050	0
Total Metals (Water)											
Aluminum (Al)	mg/L	0.003	<0.0030	<0.0030	0	0.02	0.02	3.64	0.05	0.05	3.83
Antimony (Sb)	mg/L	0.0001	<0.00010	<0.00010	0	<0.00010	<0.00010	0	<0.00010	<0.00010	0
Arsenic (As)	mg/L	0.0001	0.00011	<0.00010	9.52	<0.00010	<0.00010	0	0.0002	0.0001	19.4
Barium (Ba)	mg/L	0.0001	0.01	0.01	3.20	0.01	0.01	0.99	0.01	0.01	2.74
Beryllium (Be)	mg/L	0.00002	<0.000020	<0.000020	0	<0.000020	<0.000020	0	<0.000020	<0.000020	0
Bismuth (Bi)	mg/L	0.00005	<0.000050	<0.000050	0	<0.000050	<0.000050	0	<0.000050	<0.000050	0
Boron (B)	mg/L	0.01	<0.010	<0.010	0	0.02	0.02	0	<0.010	<0.010	0
Cadmium (Cd)	mg/L	0.000005	<0.0000050	<0.0000050	0	<0.0000050	<0.0000050	0	<0.0000050	<0.0000050	0
Calcium (Ca)	mg/L	0.05	21.7	21.2	2.33	17.1	18.6	8.40	12.4	12.4	0
Chromium (Cr)	mg/L	0.0005	<0.00050	<0.00050	0	<0.00050	<0.00050	0	<0.00050	<0.00050	0
Cobalt (Co)	mg/L	0.0001	0.0003	0.0003	3.92	<0.00010	<0.00010	0	<0.00010	<0.00010	0
Copper (Cu)	mg/L	0.0005	0.0007	0.0007	2.90	0.0008	0.0011	30.3	0.0009	0.0009	10.1
Iron (Fe)	mg/L	0.01	0.05	0.05	4.26	0.05	0.09	47.9	0.07	0.07	0
Lead (Pb)	mg/L	0.00005	<0.000050	<0.000050	0	<0.000050	<0.000050	0	0.0001	0.0001	22.2
Lithium (Li)	mg/L	0.001	<0.0010	<0.0010	0	0.0014	0.0013	7.41	<0.0010	<0.0010	0
Magnesium (Mg)	mg/L	0.005	13.2	13.8	4.44	11.2	11.1	0.90	7.88	7.82	0.76
Manganese (Mn)	mg/L	0.0001	0.25	0.27	5.43	0.0042	0.0046	9.24	0.0049	0.0047	4.40
Molybdenum (Mo)	mg/L	0.00005	0.0002	0.0003	9.86	0.0009	0.0010	7.53	0.0004	0.0004	0.73
Nickel (Ni)	mg/L	0.0005	0.0007	0.0007	3.03	0.0007	0.0010	38.1	0.0008	0.0007	18.9
Potassium (K)	mg/L	0.05	1.12	1.12	0	1.60	1.59	0.63	1.29	1.28	0.78
Selenium (Se)	mg/L	0.00005	<0.000050	<0.000050	0	<0.000050	<0.000050	0	<0.000050	<0.000050	0
Silicon (Si)	mg/L	0.1	2.18	2.19	0.46	0.54	0.55	1.83	0.50	0.48	4.08
Silver (Ag)	mg/L	0.00001	<0.000010	<0.000010	0	<0.000010	<0.000010	0	<0.000010	<0.000010	0
Sodium (Na)	mg/L	0.05	3.70	3.61	2.46	2.54	2.57	1.17	1.82	1.82	0
Strontium (Sr)	mg/L	0.0002	0.02	0.02	0	0.02	0.02	9.12	0.01	0.01	0.97
Thallium (Tl)	mg/L	0.00001	<0.000010	<0.000010	0	<0.000010	<0.000010	0	<0.000010	<0.000010	0
Tin (Sn)	mg/L	0.0001	<0.00010	<0.00010	0	<0.00010	<0.00010	0	<0.00010	<0.00010	0
Titanium (Ti)	mg/L	0.0003	<0.00030	<0.00030	0	0.0010	0.0013	21.8	0.0020	0.0020	0.4963
Uranium (U)	mg/L	0.00001	0.0024	0.0024	2.49	0.0018	0.0018	0.5540	0.0013	0.0013	1.54
Vanadium (V)	mg/L	0.0005	<0.00050	<0.00050	0	<0.00050	<0.00050	0	<0.00050	<0.00050	0
Zinc (Zn)	mg/L	0.003	<0.0030	<0.0030	0	<0.0030	0.01	75.0	<0.0030	<0.0030	0
Zirconium (Zr)	mg/L	0.0002	<0.00020	<0.00020	0	<0.00020	0.00	102	<0.00020	<0.00020	0
Dissolved Metals (Water)											
Aluminum (Al)	mg/L	0.001	<0.0010	<0.0010	0	0.0015	0.0026	53.7	0.01	0.01	6.67
Antimony (Sb)	mg/L	0.0001	<0.00010	<0.00010	0	<0.00010	<0.00010	0	<0.00010	<0.00010	0
Arsenic (As)	mg/L	0.0001	<0.00010	<0.00010	0	<0.00010	<0.00010	0	<0.00010	<0.00010	0
Barium (Ba)	mg/L	0.0001	0.01	0.01	3.17	0.01	0.01	0.62	0.01	0.01	0.28
Beryllium (Be)	mg/L	0.00002	<0.000020	<0.000020	0	<0.000020	<0.000020	0	<0.000020	<0.000020	0
Bismuth (Bi)	mg/L	0.00005	<0.000050	<0.000050	0	<0.000050	<0.000050	0	<0.000050	<0.000050	0
Boron (B)	mg/L	0.01	<0.010	<0.010	0	0.02	0.02	0	<0.010	<0.010	0
Cadmium (Cd)	mg/L	0.000005	<0.0000050	<0.0000050	0	<0.0000050	<0.0000050	0	<0.0000050	<0.0000050	0
Calcium (Ca)	mg/L	0.05	22.7	21.8	4.04	16.4	16.4	0	12.6	12.6	0
Chromium (Cr)	mg/L	0.0005	<0.00050	<0.00050	0	<0.00050	<0.00050	0	<0.00050	<0.00050	0
Cobalt (Co)	mg/L	0.0001	0.0002	<0.00010	51.9	<0.00010	<0.00010	0	<0.00010	<0.00010	0
Copper (Cu)	mg/L	0.0002	0.0005	0.0005	3.92	0.0008	0.0007	13.0	0.0008	0.0008	6.37
Iron (Fe)	mg/L	0.01	<0.010	<0.010	0	<0.010	<0.010	0	<0.010	<0.010	0
Lead (Pb)	mg/L	0.00005	<0.000050	<0.000050	0	<0.000050	<0.000050	0	<0.000050	<0.000050	0
Lithium (Li)	mg/L	0.001	<0.0010	<0.0010	0	0.0017	0.0017	0	<0.0010	<0.0010	0
Magnesium (Mg)	mg/L	0.005	13.5	13.4	0.74	10.8	10.5	2.82	8.00	7.97	0.38
Manganese (Mn)	mg/L	0.0001	0.22	0.18	21.4	0.0002	0.0003	4.08	0.0024	0.0023	1.72
Mercury (Hg)	mg/L	0.000005	<0.0000050	<0.0000050	0	<0.0000050	<0.0000050	0	<0.0000050	<0.0000050	0
Molybdenum (Mo)	mg/L	0.00005	0.0003	0.0003	8.43	0.0009	0.0009	4.87	0.0004	0.0004	6.65
Nickel (Ni)	mg/L	0.0005	0.0006	0.0006	1.57	0.0006	0.0006	5.04	0.0006	0.0006	1.77
Potassium (K)	mg/L	0.05	1.20	1.17	2.53	1.60	1.55	3.17	1.32	1.29	2.30
Selenium (Se)	mg/L	0.00005	<0.000050	<0.000050	0	<0.000050	<0.000050	0	<0.000050	<0.000050	0
Silicon (Si)	mg/L	0.05	2.22	2.12	4.61	0.49	0.49	1.43	0.37	0.38	2.39
Silver (Ag)	mg/L	0.00001	<0.000010	<0.000010	0	<0.000010	<0.000010	0	<0.000010	<0.000010	0
Sodium (Na)	mg/L	0.05	4.05	3.97	2.00	2.35	2.30	2.15	1.87	1.86	0.54
Strontium (Sr)	mg/L	0.0002	0.02	0.02	2.95	0.02	0.02	0.66	0.01	0.01	0.96
Thallium (Tl)	mg/L	0.00001	<0.000010	<0.000010	0	<0.000010	<0.000010	0	<0.000010	<0.000010	0
Tin (Sn)	mg/L	0.0001	<0.00010	<0.00010	0	<0.00010	<0.00010	0	0.00	<0.00010	9.52
Titanium (Ti)	mg/L	0.0003	<0.00030	<0.00030	0	<0.00030	<0.00030	0	<0.00030	<0.00030	0
Uranium (U)	mg/L	0.00001	0.0024	0.0025	1.23	0.0017	0.0017	1.75	0.0012	0.0012	2.45
Vanadium (V)	mg/L	0.0005	<0.00050	<0.00050	0	<0.00050	<0.00050	0	<0.00050	<0.00050	0
Zinc (Zn)	mg/L	0.001	<0.0010	<0.0010	0	<0.0010	<0.0010	0	<0.0010	<0.0010	0
Zirconium (Zr)	mg/L	0.0003	<0.00030	<0.00030	0	<0.00030	<0.00030	0	<0.00030	<0.00030	0
Aggregate Organics (Water)											
Phenols (4AAP)	mg/L	0.001	<0.0010	<0.0010	0	<0.0010	<0.0010	0	<0.0010	<0.0010	0
Plant Pigments (Water)											
Chlorophyll a	µg/L	0.01	0.06	0.06	1.71	0.55	0.58	6.22	0.97	0.94	2.83
Phaeophytin a	µg/L	0.01	0.04	0.04	7.06	0.10	0.10	6.12	0.94	1.07	12.9

Parameter concentration did not meet the data quality objective of ≤ 25% RPD.

Notes: LRL = Laboratory Reporting Limit, " - " indicates no data available.

[a] For some analytes, a range of LRLs were achieved in different laboratory reports. Each blank was compared to the LRL applicable to that sample.

Table A.4: Water Quality Field Duplicate Results with Reference to Relative Percent Differences, Mary River Project CREMP 2023

Client Sample ID	Units	Lowest LRL[a]	JL0-07_B_2023-08-01	QD-CC2_B_2023-08-01	RPD (%)	QD-CC1_2023-08_02_B	BL0-01-A_B_2023-08-02	RPD (%)	MRY-REF2_2023-08-24	QD-CC3_2023-08-24	RPD (%)
Date Sampled			01-Aug-23	01-Aug-23		02-Aug-23	02-Aug-23		24-Aug-23	24-Aug-23	
Time Sampled			12:20	12:20		10:45	10:45		9:10	9:10	
ALS Sample ID			BF2300188-004	BF2300188-005		BF2300194-001	BF2300192-002		BF2300238-002	BF2300238-003	
Physical Tests											
Conductivity	umhos/cm	1	151	151	0	54.7	53.9	1.47	120	121	0.83
Hardness (as CaCO3)	mg/L	0.5	71.0	70.8	0.28	25.1	25.5	1.58	57.2	57.7	0.87
pH	pH units	0.1	7.93	7.92	0.13	7.45	7.84	5.10	7.64	7.73	1.17
Total Suspended Solids	mg/L	1	<1.0	<1.3	26.1	<1.3	<1.4	7.41	<1.0	<1.0	0
Total Dissolved Solids	mg/L	10	62.0	73.0	16.3	31.0	44.0	34.7	67.0	69.0	2.94
Turbidity	NTU	0.1	1.20	1.73	36.2	1.72	1.69	1.76	1.78	1.04	52.5
Anions and Nutrients (Water)											
Alkalinity, Total (as CaCO3)	mg/L	2	91.7	86.7	5.61	28.9	40.1	32.5	66.7	66.0	1.06
Ammonia, Total (as N)	mg/L	0.005	<0.0050	<0.0050	0	0.01	0.01	1.02	<0.0050	<0.0050	0
Bromide (Br)	mg/L	0.1	<0.10	<0.10	0	<0.10	<0.10	0	<0.10	<0.10	0
Chloride (Cl)	mg/L	0.5	4.28	4.27	0.23	0.87	0.88	1.14	2.07	2.01	2.94
Nitrate (as N)	mg/L	0.02	0.02	<0.020	0	<0.020	<0.020	0	<0.020	<0.020	0
Nitrite (as N)	mg/L	0.01	<0.010	<0.010	0	<0.010	<0.010	0	<0.010	<0.010	0
Total Kjeldahl Nitrogen	mg/L	0.05	0.09	0.08	9.41	0.09	0.15	47.2	0.07	0.07	2.94
Phosphorus, Total	mg/L	0.002	0.0042	0.0037	12.7	0.0046	0.0044	4.44	<0.0020	<0.0020	0
Sulfate (SO4)	mg/L	0.3	4.20	4.19	0.24	0.44	0.45	2.25	1.61	1.48	8.41
Organic / Inorganic Carbon (Water)											
Dissolved Organic Carbon	mg/L	0.5	1.78	2.38	28.8	1.04	1.38	28.1	2.15	1.77	19.4
Total Organic Carbon	mg/L	0.5	1.87	1.90	1.59	1.35	1.17	14.3	2.15	1.99	7.73
Total Metals (Water)											
Mercury (Hg)-Total	mg/L	0.000005	<0.0000050	<0.0000050	0	<0.0000050	<0.0000050	0	<0.0000050	<0.0000050	0
Total Metals (Water)											
Aluminum (Al)	mg/L	0.003	0.02	0.02	1.50	0.05	0.05	3.45	0.16	0.03	131
Antimony (Sb)	mg/L	0.0001	<0.00010	<0.00010	0	<0.00010	<0.00010	0	<0.00010	<0.00010	0
Arsenic (As)	mg/L	0.0001	<0.00010	<0.00010	0	<0.00010	<0.00010	0	<0.00010	<0.00010	0
Barium (Ba)	mg/L	0.0001	0.01	0.01	2.76	0.0031	0.0031	0.32	0.01	0.01	18.1
Beryllium (Be)	mg/L	0.00002	<0.000020	<0.000020	0	<0.000020	<0.000020	0	<0.000020	<0.000020	0
Bismuth (Bi)	mg/L	0.00005	<0.000050	<0.000050	0	<0.000050	<0.000050	0	<0.000050	<0.000050	0
Boron (B)	mg/L	0.01	<0.010	<0.010	0	<0.010	<0.010	0	<0.010	<0.010	0
Cadmium (Cd)	mg/L	0.000005	0.00001	0.00001	29.5	<0.0000050	<0.0000050	0	<0.0000050	<0.0000050	0
Calcium (Ca)	mg/L	0.05	13.4	13.4	0	4.99	5.00	0.20	11.3	11.2	0.89
Chromium (Cr)	mg/L	0.0005	<0.00050	<0.00050	0	<0.00050	<0.00050	0	<0.00050	<0.00050	0
Cobalt (Co)	mg/L	0.0001	<0.00010	<0.00010	0	<0.00010	<0.00010	0	<0.00010	<0.00010	0
Copper (Cu)	mg/L	0.0005	0.0010	0.0009	1.06	0.0008	0.0007	12.7	0.0008	0.0007	9.66
Iron (Fe)	mg/L	0.01	0.03	0.03	6.25	0.05	0.05	1.98	0.22	0.03	149
Lead (Pb)	mg/L	0.00005	<0.000050	<0.000050	0	0.0001	0.0001	3.77	0.00	<0.000050	66.7
Lithium (Li)	mg/L	0.001	<0.0010	<0.0010	0	<0.0010	<0.0010	0	<0.0010	<0.0010	0
Magnesium (Mg)	mg/L	0.005	8.74	8.62	1.38	3.13	3.15	0.64	7.11	7.18	0.98
Manganese (Mn)	mg/L	0.0001	0.0049	0.0050	1.61	0.0021	0.0021	3.36	0.0035	0.0008	130
Molybdenum (Mo)	mg/L	0.00005	0.0004	0.0004	1.21	0.0001	0.0001	2.74	0.0002	0.0002	1.33
Nickel (Ni)	mg/L	0.0005	0.0008	0.0007	12.6	<0.00050	<0.00050	0	<0.00050	<0.00050	0
Potassium (K)	mg/L	0.05	1.33	1.32	0.75	0.40	0.41	1.24	0.79	0.75	4.16
Selenium (Se)	mg/L	0.00005	<0.000050	<0.000050	0	<0.000050	<0.000050	0	<0.000050	<0.000050	0
Silicon (Si)	mg/L	0.1	0.46	0.47	2.15	0.50	0.50	0	1.10	0.88	22.2
Silver (Ag)	mg/L	0.00001	<0.000010	<0.000010	0	<0.000010	<0.000010	0	<0.000010	<0.000010	0
Sodium (Na)	mg/L	0.05	2.03	2.01	0.99	0.56	0.56	1.07	1.64	1.68	2.41
Strontium (Sr)	mg/L	0.0002	0.01	0.01	0.92	0.0035	0.0036	3.39	0.01	0.01	1.00
Thallium (Tl)	mg/L	0.00001	<0.000010	<0.000010	0	<0.000010	<0.000010	0	<0.000010	<0.000010	0
Tin (Sn)	mg/L	0.0001	<0.00010	<0.00010	0	<0.00010	<0.00010	0	<0.00010	<0.00010	0
Titanium (Ti)	mg/L	0.0003	0.0007	0.0008	11.5	0.0022	0.0021	6.00	0.0104	0.0011	163
Uranium (U)	mg/L	0.00001	0.0013	0.0013	0	0.0002	0.0002	3.05	0.0018	0.0018	0
Vanadium (V)	mg/L	0.0005	<0.00050	<0.00050	0	<0.00050	<0.00050	0	<0.00050	<0.00050	0
Zinc (Zn)	mg/L	0.003	<0.0030	<0.0030	0	<0.0030	<0.0030	0	<0.0030	<0.0030	0
Zirconium (Zr)	mg/L	0.0002	<0.00020	<0.00020	0	<0.00020	<0.00020	0	0.00	0.00	9.52
Dissolved Metals (Water)											
Aluminum (Al)	mg/L	0.001	0.0032	0.0034	6.06	0.01	0.01	37.4	0.01	0.01	12.3
Antimony (Sb)	mg/L	0.0001	<0.00010	<0.00010	0	<0.00010	<0.00010	0	<0.00010	<0.00010	0
Arsenic (As)	mg/L	0.0001	<0.00010	<0.00010	0	<0.00010	<0.00010	0	<0.00010	<0.00010	0
Barium (Ba)	mg/L	0.0001	0.01	0.01	0.84	0.0027	0.0028	1.81	0.01	0.01	4.21
Beryllium (Be)	mg/L	0.00002	<0.000020	<0.000020	0	<0.000020	<0.000020	0	<0.000020	<0.000020	0
Bismuth (Bi)	mg/L	0.00005	<0.000050	<0.000050	0	<0.000050	<0.000050	0	<0.000050	<0.000050	0
Boron (B)	mg/L	0.01	<0.010	<0.010	0	<0.010	<0.010	0	<0.010	<0.010	0
Cadmium (Cd)	mg/L	0.000005	<0.0000050	<0.0000050	0	<0.0000050	<0.0000050	0	<0.0000050	<0.0000050	0
Calcium (Ca)	mg/L	0.05	14.2	14.2	0	5.12	5.19	1.36	11.1	11.0	0.90
Chromium (Cr)	mg/L	0.0005	<0.00050	<0.00050	0	<0.00050	<0.00050	0	<0.00050	<0.00050	0
Cobalt (Co)	mg/L	0.0001	<0.00010	<0.00010	0	<0.00010	<0.00010	0	<0.00010	<0.00010	0
Copper (Cu)	mg/L	0.0002	0.0009	0.0009	6.82	0.0005	0.0004	16.7	0.0006	0.0006	0
Iron (Fe)	mg/L	0.01	<0.010	<0.010	0	<0.010	0.01	18.2	0.01	0.01	0
Lead (Pb)	mg/L	0.00005	<0.000050	<0.000050	0	<0.000050	<0.000050	0	<0.000050	<0.000050	0
Lithium (Li)	mg/L	0.001	0.0013	0.0014	7.41	<0.0010	<0.0010	0	<0.0010	<0.0010	0
Magnesium (Mg)	mg/L	0.005	8.63	8.58	0.58	3.00	3.05	1.65	7.16	7.34	2.48
Manganese (Mn)	mg/L	0.0001	0.0019	0.0018	3.23	0.0009	0.0010	12.4	0.0004	0.0004	2.60
Mercury (Hg)	mg/L	0.000005	<0.0000050	<0.0000050	0	<0.0000050	<0.0000050	0	<0.0000050	<0.0000050	0
Molybdenum (Mo)	mg/L	0.00005	0.0004	0.0004	0.24	0.0001	0.0001	22.5	0.0002	0.0002	7.55
Nickel (Ni)	mg/L	0.0005	0.0006	0.0006	3.45	<0.00050	<0.00050	0	<0.00050	<0.00050	0
Potassium (K)	mg/L	0.05	1.36	1.36	0	0.39	0.40	2.04	0.71	0.71	0.99
Selenium (Se)	mg/L	0.00005	<0.000050	<0.000050	0	<0.000050	<0.000050	0	<0.000050	<0.000050	0
Silicon (Si)	mg/L	0.05	0.44	0.44	0.23	0.41	0.43	5.29	0.86	0.86	0.70
Silver (Ag)	mg/L	0.00001	<0.000010	<0.000010	0	<0.000010	<0.000010	0	<0.000010	<0.000010	0
Sodium (Na)	mg/L	0.05	2.04	2.04	0	0.55	0.57	3.58	1.72	1.67	2.95
Strontium (Sr)	mg/L	0.0002	0.01	0.01	0.88	0.00	0.00	1.99	0.01	0.01	0.55
Thallium (Tl)	mg/L	0.00001	<0.000010	<0.000010	0	<0.000010	<0.000010	0	<0.000010	<0.000010	0
Tin (Sn)	mg/L	0.0001	0.00	0.00	22.2	<0.00010	<0.00010	0	<0.00010	<0.00010	0
Titanium (Ti)	mg/L	0.0003	<0.00030	<0.00030	0	<0.00030	0.00	28.6	<0.00030	0.00	0
Uranium (U)	mg/L	0.00001	0.0013	0.0013	0.77	0.0002	0.0002	1.11	0.0016	0.0017	0.61
Vanadium (V)	mg/L	0.0005	<0.00050	<0.00050	0	<0.00050	<0.00050	0	<0.00050	<0.00050	0
Zinc (Zn)	mg/L	0.001	<0.0010	<0.0010	0	<0.0010	<0.0010	0	<0.0010	<0.0010	0
Zirconium (Zr)	mg/L	0.0003	<0.00030	<0.00030	0	<0.00030	<0.00030	0	<0.00030	<0.00030	0
Aggregate Organics (Water)											
Phenols (4AAP)	mg/L	0.001	<0.0010	<0.0010	0	<0.0010	<0.0010	0	<0.0010	<0.0010	0
Plant Pigments (Water)											
Chlorophyll a	µg/L	0.01	0.91	0.85	7.16	0.49	0.65	28.9	0.28	0.29	5.27
Phaeophytin a	µg/L	0.01	0.86	0.92	6.74	0.44	0.52	16.7	0.39	0.41	5.00

Parameter concentration did not meet the data quality objective of ≤ 25% RPD.

Notes: LRL = Laboratory Reporting Limit, " - " indicates no data available.

[a] For some analytes, a range of LRLs were achieved in different laboratory reports. Each blank was compared to the LRL applicable to that sample.

Table A.4: Water Quality Field Duplicate Results with Reference to Relative Percent Differences, Mary River Project CREMP 2023

Client Sample ID	Units	Lowest LRL[a]	DL0-02-3_S_2023-09-10	QD-CC2_S_2023-09-10	RPD (%)	BL0-05_B_2023-09-15	QD-CC1_B_2023-09-15	RPD (%)	I0-01_2023-09-17	QD-CC3_2023-09-17	RPD (%)
Date Sampled			10-Sep-23	10-Sep-23		15-Sep-23	15-Sep-23		17-Sep-23	17-Sep-23	
Time Sampled			13:30	13:30		16:45	16:45		15:00	15:00	
ALS Sample ID			BF2300275-005	BF2300275-006		BF2300293-015	BF2300293-016		BF2300294-010	BF2300294-011	
Physical Tests											
Conductivity	umhos/cm	1	142	142	0	93.4	100	6.83	242	242	0
Hardness (as CaCO3)	mg/L	0.5	66.5	66.5	0	42.1	48.9	14.9	118	113	4.33
pH	pH units	0.1	7.55	7.55	0	7.74	7.80	0.77	8.02	8.06	0.50
Total Suspended Solids	mg/L	1	<1.0	<1.0	0	1.30	2.00	42.4	<1.0	<1.0	0
Total Dissolved Solids	mg/L	10	86.0	78.0	9.76	62.0	72.0	14.9	133	134	0.75
Turbidity	NTU	0.1	1.31	1.25	4.69	1.01	2.17	73.0	0.20	0.17	16.2
Anions and Nutrients (Water)											
Alkalinity, Total (as CaCO3)	mg/L	2	53.9	69.6	25.4	35.0	72.2	69.4	114	111	2.67
Ammonia, Total (as N)	mg/L	0.005	<0.0050	<0.0050	0	<0.0050	<0.0050	0	<0.0050	<0.0050	0
Bromide (Br)	mg/L	0.1	<0.10	<0.10	0	<0.10	<0.10	0	<0.10	<0.10	0
Chloride (Cl)	mg/L	0.5	4.62	4.64	0.43	2.39	2.69	11.8	9.87	9.82	0.51
Nitrate (as N)	mg/L	0.02	0.24	0.24	1.69	0.04	0.05	13.3	0.04	0.04	5.56
Nitrite (as N)	mg/L	0.01	<0.010	<0.010	0	<0.010	<0.010	0	<0.010	<0.010	0
Total Kjeldahl Nitrogen	mg/L	0.05	0.10	0.12	16.1	0.06	0.06	11.8	0.07	0.07	1.40
Phosphorus, Total	mg/L	0.002	0.0119	0.0022	138	0.00	0.00	15.4	<0.0020	<0.0020	0
Sulfate (SO4)	mg/L	0.3	11.2	11.3	0.89	2.39	2.88	18.6	3.43	3.41	0.58
Organic / Inorganic Carbon (Water)											
Dissolved Organic Carbon	mg/L	0.5	1.53	1.56	1.94	1.77	1.53	14.5	2.18	2.33	6.65
Total Organic Carbon	mg/L	0.5	1.89	1.65	13.6	1.39	1.44	3.53	2.01	1.84	8.83
Total Metals (Water)											
Mercury (Hg)-Total	mg/L	0.000005	<0.0000050	<0.0000050	0	<0.0000050	<0.0000050	0	<0.0000050	<0.0000050	0
Total Metals (Water)											
Aluminum (Al)	mg/L	0.003	0.03	0.02	13.3	0.03	0.03	5.22	0.01	0.01	14.1
Antimony (Sb)	mg/L	0.0001	<0.00010	<0.00010	0	<0.00010	<0.00010	0	<0.00010	<0.00010	0
Arsenic (As)	mg/L	0.0001	<0.00010	<0.00010	0	<0.00010	<0.00010	0	<0.00010	<0.00010	0
Barium (Ba)	mg/L	0.0001	0.01	0.01	0.92	0.01	0.01	9.51	0.01	0.01	2.60
Beryllium (Be)	mg/L	0.00002	<0.000020	<0.000020	0	<0.000020	<0.000020	0	<0.000020	<0.000020	0
Bismuth (Bi)	mg/L	0.00005	<0.000050	<0.000050	0	<0.000050	<0.000050	0	<0.000050	<0.000050	0
Boron (B)	mg/L	0.01	0.02	0.02	6.45	<0.010	<0.010	0	<0.010	<0.010	0
Cadmium (Cd)	mg/L	0.000005	<0.0000050	<0.0000050	0	<0.0000050	<0.0000050	0	<0.0000050	<0.0000050	0
Calcium (Ca)	mg/L	0.05	13.0	13.0	0	8.35	9.30	10.8	23.8	23.8	0
Chromium (Cr)	mg/L	0.0005	<0.00050	<0.00050	0	<0.00050	<0.00050	0	<0.00050	<0.00050	0
Cobalt (Co)	mg/L	0.0001	<0.00010	<0.00010	0	<0.00010	<0.00010	0	<0.00010	<0.00010	0
Copper (Cu)	mg/L	0.0005	0.0009	0.0009	1.17	0.0008	0.0008	1.23	0.0012	0.0011	6.78
Iron (Fe)	mg/L	0.01	0.03	0.03	3.39	0.04	0.04	10.3	0.01	0.01	16.7
Lead (Pb)	mg/L	0.00005	<0.000050	<0.000050	0	<0.000050	<0.000050	0	<0.000050	<0.000050	0
Lithium (Li)	mg/L	0.001	0.0016	0.0016	0	<0.0010	<0.0010	0	0.0012	<0.0010	18.2
Magnesium (Mg)	mg/L	0.005	8.67	8.62	0.58	5.52	6.01	8.50	15.4	15.2	1.31
Manganese (Mn)	mg/L	0.0001	0.0017	0.0018	4.03	0.0016	0.0017	4.88	0.0013	0.0006	73.5
Molybdenum (Mo)	mg/L	0.00005	0.0010	0.0010	0.5013	0.0002	0.0003	20.0	0.0004	0.0004	3.37
Nickel (Ni)	mg/L	0.0005	0.0006	0.0006	5.31	<0.00050	<0.00050	0	<0.00050	<0.00050	0
Potassium (K)	mg/L	0.05	1.31	1.28	2.32	0.66	0.69	3.56	1.11	1.10	0.90
Selenium (Se)	mg/L	0.00005	<0.000050	0.00	1.98	<0.000050	<0.000050	0	<0.000050	<0.000050	0
Silicon (Si)	mg/L	0.1	0.57	0.56	1.77	0.59	0.64	8.13	1.06	1.04	1.90
Silver (Ag)	mg/L	0.00001	<0.000010	<0.000010	0	<0.000010	<0.000010	0	<0.000010	<0.000010	0
Sodium (Na)	mg/L	0.05	1.80	1.76	2.25	1.44	1.54	6.71	4.71	4.70	0.21
Strontium (Sr)	mg/L	0.0002	0.01	0.01	0	0.01	0.01	14.2	0.02	0.02	1.09
Thallium (Tl)	mg/L	0.00001	<0.000010	<0.000010	0	<0.000010	<0.000010	0	<0.000010	<0.000010	0
Tin (Sn)	mg/L	0.0001	<0.00010	<0.00010	0	<0.00010	<0.00010	0	<0.00010	<0.00010	0
Titanium (Ti)	mg/L	0.0003	0.0011	0.0009	16.2	0.0014	0.0015	6.80	0.0003	0.0004	33.3
Uranium (U)	mg/L	0.00001	0.0015	0.0015	2.70	0.0011	0.0014	25.3	0.0047	0.0046	2.38
Vanadium (V)	mg/L	0.0005	<0.00050	<0.00050	0	<0.00050	<0.00050	0	<0.00050	<0.00050	0
Zinc (Zn)	mg/L	0.003	<0.0030	<0.0030	0	<0.0030	<0.0030	0	<0.0030	<0.0030	0
Zirconium (Zr)	mg/L	0.0002	<0.00020	<0.00020	0	<0.00020	<0.00020	0	<0.00020	<0.00020	0
Dissolved Metals (Water)											
Aluminum (Al)	mg/L	0.001	0.01	0.01	28.6	0.0045	0.0042	6.90	0.0036	0.0031	14.9
Antimony (Sb)	mg/L	0.0001	<0.00010	<0.00010	0	<0.00010	<0.00010	0	<0.00010	<0.00010	0
Arsenic (As)	mg/L	0.0001	<0.00010	<0.00010	0	<0.00010	<0.00010	0	<0.00010	<0.00010	0
Barium (Ba)	mg/L	0.0001	0.01	0.01	1.13	0.0049	0.01	17.8	0.01	0.01	3.42
Beryllium (Be)	mg/L	0.00002	<0.000020	<0.000020	0	<0.000020	<0.000020	0	<0.000020	<0.000020	0
Bismuth (Bi)	mg/L	0.00005	<0.000050	<0.000050	0	<0.000050	<0.000050	0	<0.000050	<0.000050	0
Boron (B)	mg/L	0.01	0.02	0.02	0	<0.010	<0.010	0	<0.010	<0.010	0
Cadmium (Cd)	mg/L	0.000005	<0.0000050	<0.0000050	0	<0.0000050	<0.0000050	0	<0.0000050	<0.0000050	0
Calcium (Ca)	mg/L	0.05	12.5	12.6	0.80	8.27	9.58	14.7	23.0	22.2	3.54
Chromium (Cr)	mg/L	0.0005	<0.00050	<0.00050	0	<0.00050	<0.00050	0	<0.00050	<0.00050	0
Cobalt (Co)	mg/L	0.0001	<0.00010	<0.00010	0	<0.00010	<0.00010	0	<0.00010	<0.00010	0
Copper (Cu)	mg/L	0.0002	0.0007	0.0007	7.09	0.0006	0.0007	19.8	0.0011	0.0011	2.79
Iron (Fe)	mg/L	0.01	<0.010	<0.010	0	<0.010	<0.010	0	<0.010	<0.010	0
Lead (Pb)	mg/L	0.00005	<0.000050	<0.000050	0	<0.000050	<0.000050	0	<0.000050	<0.000050	0
Lithium (Li)	mg/L	0.001	0.0015	0.0016	6.45	<0.0010	<0.0010	0	0.00	<0.0010	9.52
Magnesium (Mg)	mg/L	0.005	8.58	8.52	0.70	5.22	6.06	14.9	14.8	14.0	5.56
Manganese (Mn)	mg/L	0.0001	0.0003	0.0003	26.7	0.0004	0.00	40.0	0.0013	0.0014	8.24
Mercury (Hg)	mg/L	0.000005	<0.0000050	<0.0000050	0	<0.0000050	<0.0000050	0	<0.0000050	<0.0000050	0
Molybdenum (Mo)	mg/L	0.00005	0.0010	0.0010	0.51	0.0002	0.0003	21.7	0.0003	0.0003	5.59
Nickel (Ni)	mg/L	0.0005	0.0005	0.0005	3.77	<0.00050	<0.00050	0	<0.00050	<0.00050	0
Potassium (K)	mg/L	0.05	1.42	1.39	2.14	0.59	0.69	15.2	1.09	0.99	9.62
Selenium (Se)	mg/L	0.00005	<0.000050	<0.000050	0	<0.000050	<0.000050	0	<0.000050	<0.000050	0
Silicon (Si)	mg/L	0.05	0.53	0.52	3.25	0.49	0.55	10.9	0.98	0.96	2.58
Silver (Ag)	mg/L	0.00001	<0.000010	<0.000010	0	<0.000010	<0.000010	0	<0.000010	<0.000010	0
Sodium (Na)	mg/L	0.05	1.83	1.82	0.55	1.38	1.49	7.67	4.47	4.22	5.75
Strontium (Sr)	mg/L	0.0002	0.01	0.01	0.69	0.01	0.01	15.9	0.02	0.02	6.90
Thallium (Tl)	mg/L	0.00001	<0.000010	<0.000010	0	<0.000010	<0.000010	0	<0.000010	<0.000010	0
Tin (Sn)	mg/L	0.0001	<0.00010	<0.00010	0	<0.00010	<0.00010	0	<0.00010	<0.00010	0
Titanium (Ti)	mg/L	0.0003	0.00	<0.00030	15.4	<0.00030	<0.00030	0	<0.00030	<0.00030	0
Uranium (U)	mg/L	0.00001	0.0015	0.0015	0	0.0010	0.0011	16.1	0.0039	0.0041	5.54
Vanadium (V)	mg/L	0.0005	<0.00050	<0.00050	0	<0.00050	<0.00050	0	<0.00050	<0.00050	0
Zinc (Zn)	mg/L	0.001	<0.0010	<0.0010	0	<0.0010	<0.0010	0	<0.0010	<0.0010	0
Zirconium (Zr)	mg/L	0.0003	<0.00030	<0.00030	0	<0.00030	<0.00030	0	<0.00030	<0.00030	0
Aggregate Organics (Water)											
Phenols (4AAP)	mg/L	0.001	<0.0010	<0.0010	0	<0.0010	<0.0010	0	<0.0010	<0.0010	0
Plant Pigments (Water)											
Chlorophyll a	µg/L	0.01	1.42	1.45	2.09	0.53	0.49	7.44	0.10	0.09	10.5
Phaeophytin a	µg/L	0.01	1.32	1.28	3.08	0.88	0.79	10.2	0.11	<0.100	4.88

Parameter concentration did not meet the data quality objective of ≤ 25% RPD.

Notes: LRL = Laboratory Reporting Limit, " - " indicates no data available.

[a] For some analytes, a range of LRLs were achieved in different laboratory reports. Each blank was compared to the LRL applicable to that sample.

Table A.5: Proportion of Benthic Invertebrate Lentic Samples Sorted, Mary River Project CREMP 2023

Water Body Type	Station	Fraction Sorted
Lentic (Lake) Samples	REF-03-01	Whole
	REF-03-02	1/4
	REF-03-03[c]	Whole
	REF-03-04c	Whole
	REF-03-05	Whole
	REF-03-06	Whole
	REF-03-07	Whole
	REF-03-08	Whole
	REF-03-09	Whole
	REF-03-10	Whole
	BLO-03	1/2
	BLO-04	Whole
	BLO-05	1/4
	BLO-06	Whole
	BLO-07	Whole
	BLO-11	1/4
	BLO-13	Whole
	BLO-14	Whole
	BLO-15	Whole
	DLO-01-02[c]	Whole
	DLO-01-03[c]	1/4
	DLO-01-04	1/4
	DLO-01-05[c]	Whole
	DLO-01-09	1/4
	DLO-01-10[c]	1/4
	DLO-01-11[c]	1/4
	DLO-01-12[c]	Whole
	DLO-01-14	Whole
	DLO-01-15	Whole
	DLO-02-01[c]	Whole
	DLO-02-02[c]	1/2
	DLO-02-03	1/2
	DLO-02-04[c]	1/2
	DLO-02-08	Whole
	DLO-02-09	1/2
	DLO-02-10[c]	1/2
	DLO-02-11	1/2
	DLO-02-12	1/2
	DLO-02-13	Whole[b]
	JLO-01	Whole
	JLO-02	1/2
	JLO-07	Whole
	JLO-11	1/4
	JLO-12	Whole
	JLO-16	Whole
	JLO-18	1/2
	JLO-19	Whole[a]
	JLO-20	1/4
	JLO-21	Whole[b]

[a] Four quarters sorted for subsampling error.
[b] Two halves sorted for subsampling error.
[c] Preservative issues.

Table A.6: Subsampling Error for Benthic Invertebrate Community Lentic Samples, Mary River Project CREMP 2023

Waterbody Type	Station	Whole Organisms	Number of Organisms in Fraction 1	Number of Organisms in Fraction 2	Number of Organisms in Fraction 3	Number of Organisms in Fraction 4	Actual Density[a]	Precision (%)		Accuracy (%)	
								min	max	min	max
Lentic (Lake) Samples	JLO-19	0	54	55	57	62	228	1.8	12.9	0.0	8.8
	DLO-02-13	0	107	113	-	-	220	5.3	-	2.7	-
	JLO-21	0	89	94	-	-	183	5.3	-	2.7	-

Notes: "-" indicates no data available. min = minimum absolute % error. max = maximum absolute % error. Densities expressed per sampled area.

[a] Whole large organisms excluded in calculations.

Table A.7: Percent Recovery from Benthic Invertebrate Lentic Samples, Mary River Project CREMP, 2023

Waterbody Type	Station	Number of Organisms Recovered (initial sort)	Number of Organisms in Re-sort	Percent Recovery
Lentic (Lake) Samples	REF-03-1	77	77	100.0%
	REF-03-8	27	28	96.4%
	BLO-06	216	219	98.6%
	DLO-02-09	222	225	98.7%
	JLO-19	222	228	97.4%
	JLO-21	176	183	96.2%
			Average % Recovery	**97.9%**

Notes: Pupae were not counted toward total number of taxa unless they were the sole representative of their taxa group. Immature organisms were not counted towards the total number of taxa unless they were the sole representative of that taxon. The exceptions to this rule are immature Tubificidae with and without hairs. Immature oligochaetes are counted as taxa as the probability of the immature being a unique taxa is high. Indeterminates are unique taxa that could not be identified further for whatever reason (e.g., small, damaged).

Table A.8: Proportion of Benthic Invertebrate Lotic Samples Sorted, Mary River Project CREMP 2023

Water Body Type	Station	Fraction Sorted
Lotic (Stream) Samples	CLTI-L2-B1	1/2
	CLTI-L2-B2	Whole
	CLTI-L2-B3	1/2[b]
	CLTI-L2-B4	Whole
	CLTI-L2-B5	1/4
	CLTI-US-B1	Whole[a]
	CLTI-US-B2	Whole
	CLTI-US-B3	Whole
	CLTI-US-B4	Whole
	CLTI-US-B5	Whole
	CLTI-DS-B1	Whole
	CLTI-DS-B2	Whole
	CLTI-DS-B3	Whole
	CLTI-DS-B4	Whole
	CLTI-DS-B5	Whole
	CLT2-US-B1	Whole
	CLT2-US-B2	Whole
	CLT2-US-B3	Whole
	CLT2-US-B4	Whole
	CLT2-US-B5	Whole
	CLT2-DS-B1	Whole
	CLT2-DS-B2	Whole
	CLT2-DS-B3	Whole
	CLT2-DS-B4	Whole
	CLT2-DS-B5	Whole
	REF-CRK-B1	Whole
	REF-CRK-B2	Whole
	REF-CRK-B3	Whole
	REF-CRK-B4	Whole[a]
	REF-CRK-B5	Whole
	SDLT1-R1-B1	1/2
	SDLT1-R1-B2	1/2
	SDLT1-R1-B3	1/2
	SDLT1-R1-B4	1/2
	SDLT1-R1-B5	1/2
	SDLT9-DS-B1	Whole[a, b]
	SDLT9-DS-B2	1/4
	SDLT9-DS-B3	1/4
	SDLT9-DS-B4	1/4
	SDLT9-DS-B5	1/4
	CO-05-B1	Whole
	CO-05-B2	Whole
	CO-05-B3	Whole
	CO-05-B4	Whole
	CO-05-B5	Whole
	EO-01-B1	Whole
	EO-01-B2	Whole
	EO-01-B3	Whole
	EO-01-B4	Whole
	EO-01-B5	Whole
	EO-20-B1	Whole
	EO-20-B2	Whole
	EO-20-B3	Whole
	EO-20-B4	Whole
	EO-20-B5	Whole
	GO-03-B1	Whole
	GO-03-B2	Whole
	GO-03-B3	Whole
	GO-03-B4	Whole
	GO-03-B5	Whole
	GO-9-B1	Whole
	GO-9-B2	Whole
	GO-9-B3	Whole
	GO-9-B4	Whole
	GO-9-B5	Whole

[a] Four quarters sorted for subsampling error.
[b] Two halves sorted for subsampling error.
[c] Preservative issues.

Table A.9: Subsampling Error for Benthic Invertebrate Community Lotic Samples, Mary River Project CREMP 2023

Waterbody Type	Station	Whole Organisms	Number of Organisms in Fraction 1	Number of Organisms in Fraction 2	Number of Organisms in Fraction 3	Number of Organisms in Fraction 4	Actual Density[a]	Precision (%)		Accuracy (%)	
								min	max	min	max
Lotic (Stream) Samples	SDLT9-DS-B1	-	102	104	110	118	434	1.9	13.6	1.4	8.8
	SDLT9-DS-B1	-	214	220	-	-	434	2.7	-	1.4	-
	CLT1-US-B1	-	103	114	-	-	217	9.6	-	5.1	-
	REF-CRK-B4	-	98	100	-	-	198	2.0	-	1.0	-
	CLT1-L2-B3	-	112	128	-	-	-	12.5	-	-	-

Notes: "-" indicates no data available. min = minimum absolute % error. max = maximum absolute % error. Densities expressed per sampled area.

[a] Whole large organisms excluded in calculations.

Table A.10: Percent Recovery from Benthic Invertebrate Lotic Samples, Mary River Project CREMP, 2023

Waterbody Type	Station	Number of Organisms Recovered (initial sort)	Number of Organisms in Re-sort	Percent Recovery
Lotic (Stream) Samples	CLT1-US-B4	106	109	97.2%
	CLT2-US-B1	62	64	96.9%
	REF-CRK-B4	196	198	99.0%
	CO-05-B3	83	89	93.3%
	EO-01-B3	49	53	92.5%
	GO-03-B5	141	145	97.2%
	SDLT1-R1-B1	69	70	98.6%
	SDLT9-DS-B2	276	285	96.8%
	SDLT9-DS-B3	202	213	94.8%
			Average % Recovery	**96.3%**

Notes: Pupae were not counted toward total number of taxa unless they were the sole representative of their taxa group. Immature organisms were not counted towards the total number of taxa unless they were the sole representative of that taxon. The exceptions to this rule are immature Tubificidae with and without hairs. Immature oligochaetes are counted as taxa as the probability of the immature being a unique taxa is high. Indeterminates are unique taxa that could not be identified further for whatever reason (e.g., small, damaged).

Table A.11: Fish Aging Verification Results, Mary River Project CREMP 2023

Sample ID	Date	Species	Initial Age	QA/QC Age	Difference (years)	Final Age Assigned
JL0-23-ACJ-1	16-Aug-23	ARCH	4	4	0	4
DL01-23-ACJ-10	13-Aug-23	ARCH	1	1	0	1
DL02-23-ACJ-5	17-Aug-23	ARCH	2	2	0	2
BL0-23-ACJ-5	12-Aug-23	ARCH	2	2	0	2
REF3-23-ACJ-5	20-Aug-23	ARCH	2	2	0	2

Notes: ARCH = arctic charr. QA/QC = Quality Assurance/Quality Control.

APPENDIX B

APPENDIX B OVERVIEW OF REFERENCE CONDITIONS

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B1 INTRODUCTION

The initial review of background (reference) data collected from lotic (i.e., streams and rivers) and lentic (i.e., lakes) study areas as part of the 2015 Mary River Project CREMP revealed naturally elevated metal concentrations above guidelines and significant differences in benthic community endpoints between reference lake littoral and profundal habitats (Minnow 2016a). Therefore, this overview of reference conditions is included to provide context and perspective regarding water quality, sediment quality, phytoplankton (chlorophyll-a), benthic invertebrate community, and fish population characteristics at the CREMP reference study areas. Key implications of reference area features for the evaluation of potential mine-related effects at mine-exposed waterbodies were also identified as part of this reference area overview.

B2 HABITAT

B2.1 Stream/Tributary Environments

Four reference stream/tributary (reference stream) stations were established among two unnamed tributaries to Angijurjuk[1] Lake (Stations CLT-REF4, MRY-REF2, and MRY-REF3) and one unnamed tributary to Mary River (Station CLT-REF3) during the Mary River Project CREMP in 2014 (see Figure 2.2). These stations were intended to provide reference information for the stream water quality and phytoplankton monitoring components of the CREMP and have been used as such in the nine studies conducted since commercial mine operations commenced at the Mary River Mine (i.e., 2015 to 2023; see Table 2.1). From 2016 to 2023, habitat conditions at the western tributary to Angijurjuk Lake that is used for Baffinland CREMP water quality monitoring (Stations CLT-REF4 and MRY-REF) were deemed comparable to habitat conditions at the Camp Lake and Sheardown Lake tributaries. Therefore, this tributary served as a benthic reference stream (REF-CRK) for comparisons involving the various mine-exposed tributaries as part of the 2016 to 2023 annual CREMP studies (see Figure 2.4), and herein has been referred to as Unnamed Reference Creek.

The reference streams/tributaries are moderate gradient lotic systems characterized predominantly by riffle-run and riffle-rapid stream morphology, with pools occurring rarely reflecting localized topography and associated gradient. The wetted width of the benthic reference tributary averaged 11.1 m (as of sampling conducted in August 2017; Minnow 2018a), and the depth averaged 0.12 to 0.22 m during sampling conducted in August 2023. The corresponding water velocities across a representative riffle area of the benthic reference tributary ranged from 0.29 to 0.54 m/s in August 2023 (average of 0.43 m/s). As for most small lotic systems in the region, surface flow at all of the CREMP reference tributaries is limited to months in which average ambient air temperatures are near or above freezing (i.e., June to September). The substrate at the reference tributaries is composed mainly of cobble and large pebble (i.e., 50 to 256 mm diameter), with surficial areas of sand generally limited to less than 10% of stream area (Minnow 2018a).

[1] Referred to as Angajurjualuk Lake in previous CREMP reporting (i.e., KP 2015; Minnow 2016a,b, 2017, 2018a, 2021a,b, 2022, 2023). The name has been changed in this report based on an updated English translation of the Inuit place name.

In-stream vegetation at the reference tributaries is sparse, and generally includes a relatively thin layer of surficial algae/periphyton attached to relatively stable substrate.

B2.2 River Environments

The area of Mary River located upstream of the mine lease property is only minimally influenced by Mary River mining activity (i.e., low amounts of dust deposition; see Baffinland 2015). Therefore, this area has been considered representative of background (reference) conditions for the mine-exposed stations/study areas situated farther downstream on the Mary River under the CREMP (Baffinland 2015; KP 2014a,b, 2015; NSC 2014). Water quality, phytoplankton productivity, and benthic invertebrate community (benthic) data collected at the Mary River reference area, referred to as G0-09 (including water quality stations G0-09A, G0-09, and G0-09B), have been used in comparisons to areas of the Mary River that are potentially influenced by mine activity.

The Mary River reference area is a moderate gradient erosional environment characterized mainly by riffle and run stream morphology. Depending on flow conditions, average wetted width and average depth of the Mary River reference area has ranged from 30 to 55 m and 0.20 to 0.36 m, respectively, in studies conducted by Minnow (2017, 2018a) during the month of August. On average the water depth ranged from 0.19 to 0.26 m and water velocities ranged from 0.10 to 0.24 m/s at representative riffle areas of the G0-09 benthic study area during the 2023 study. The substrate at the G0-09 reference area is composed mainly of boulder and cobble, with roughly equal proportion of pebble, gravel, and sand composing the surficial substrate at much of the remaining area (Minnow 2018a). In-stream vegetation at the Mary River G0-09 reference area is sparse, and generally includes a relatively thin layer of periphyton and/or scarce bryophytes (moss) growth on the upper surface of physically stable substrate.

B2.3 Lake Environments

A geographically expansive reconnaissance survey of local study area (LSA) lakes was conducted in 2014 to identify a waterbody that could potentially serve as a suitable reference area for the mine-exposed lakes (i.e., Camp, Sheardown NW, Sheardown SE, and Mary lakes; NSC 2015). The key criteria for the selection of the suitable reference lake included a waterbody with similar surface area, maximum water depth, substrate features, and fish species composition as the mine-exposed lakes, in addition to also being uninfluenced by current or past mining activity. Based on the results of this survey, Reference Lake 3 was selected to represent reference conditions for the mine-exposed lakes beginning in 2015 as part of the Mary River Project CREMP studies (Appendix Table B.1).

Reference Lake 3 is an unnamed lake located approximately 62 km south of the Mary River Mine (see Figures 2.1 and 2.3), well outside the area of mine influence. Reference Lake 3 is a headwater lake that is characterized by a relatively complex morphology that includes three basins and connection to a separate lake by a short, shallow channel (see Figure 2.3). The three basins reach approximately 15 m, 30 m, and 36 m in depth with progression from east to west, and the average depth of Reference Lake 3 is approximately 11.8 m (Appendix Table B.1). The outlet of Reference Lake 3, located off the south-central portion of the lake, drains into a large boulder field through which flow can occur largely as sub-surface drainage. Substrate along the shoreline and shallow littoral areas of Reference Lake 3 is composed mainly of large boulder and cobble that is commonly interrupted by areas of bedrock. Substrate of the deeper littoral and profundal areas of Reference Lake 3 is almost exclusively represented by silt loam containing approximately 15 to 35% fine sand (by dry weight) and a moderate organic carbon content of approximately 5%. No substantial aquatic plant beds have been observed at Reference Lake 3, with fish cover provided predominantly by the rocky substrates along the shoreline and shallow littoral zone of the lake.

Table B.1: Physical Characteristics for Mine-Exposed Lakes and Reference Lake 3

Lake Feature	Mine-Exposed Lakes				Reference Lake
	Camp	Sheardown NW	Sheardown SE	Mary	Reference Lake 3
Drainage Basin Area (km^2)	26.5	6.6	8.9	663.4	23.2
Lake Area (km^2)	2.21	0.68	0.25	13.6	2.05
Drainage Basin: Lake Area Ratio	11.98	9.66	35.6	48.8	11.32
Mean Depth (m)	13.0	12.1	7.4	-	11.8
Maximum Depth (m)	35.1	30.1	14.8	40.0	38.3
Volume (1,000,000 m^3)	27.5	8.18	1.8	156.4	22.6
Hydraulic Retention Time (days)	416 ± 184	511 ± 213	83 ± 35	75 ± 29	-

B3 WATER QUALITY

B3.1 Stream/Tributary Environments

Water chemistry at the reference stream stations met most applicable WQG and AEMP benchmarks for lotic environments in 2023, except for elevated concentrations (relative to AEMP benchmarks or WQG) of aluminum at reference stream station MRY-REF3 during spring, summer, and fall and MRY-REF2 in summer monitoring events in 2023 (Appendix Table B.2). Additionally, chromium at MRY-REF3 in summer and in fall at CLT-REF4 and MRY-REF2 exceeded the AEMP benchmark (Appendix Table B.2). Lastly, iron at MRY-REF3 exceeded the WQG and the AEMP benchmark in summer 2023 (Appendix Table B.2). As reported in past studies, the occurrence of elevated concentrations of aluminum and iron at the reference stream stations appeared to be associated with naturally high turbidity at the time that samples were collected (Appendix Table B.2), which suggests that elevated turbidity and a corresponding elevation in aluminum and iron concentrations occur naturally in regional watercourses.

Water chemistry at the reference stream stations showed distinct seasonal changes for some parameters (Appendix Figure B.1; Appendix Table B.2). In general, where seasonal trends were observed, conductivity, hardness, total dissolved solids, and concentrations of chloride, sulphate and metals were lowest in spring, intermediate in the summer, and highest during the fall in 2023 (Appendix Table B.2; Appendix Figure B.1). This pattern almost certainly reflected dilution from snow melt and precipitation-related sources, with the lowest parameter concentrations typically associated with the spring freshet conditions, and highest parameter concentrations generally associated with low precipitation/streamflow conditions later in the open water season. Previous baseline and 2015 to 2022 water quality monitoring conducted at reference stream stations showed similar seasonal patterns (KP 2014b; Minnow 2016a, 2017, 2018a, 2019, 2020, 2021b, 2022, 2023). Temporal comparison of mean water chemistry for the reference stream stations indicated that water chemistry at the reference stream stations was relatively consistent year-to-year taking seasonal sampling timing into account for most parameters (Appendix Figure C.2), with higher parameter concentrations occurring during periods of low flow. Overall, the reference stream stations were deemed to provide a meaningful benchmark for the evaluation of potential mine-related influences on water chemistry at mine-exposed stream/tributary receiving environments taking seasonality into consideration.

B3.2 River Environments

Water chemistry at the Mary River reference stations (G0-09 series) showed elevated concentrations of total aluminum and iron at G0-09-A and total aluminum at G0-09-B during summer 2023 compared to WQG, but not AEMP benchmarks (Appendix Table B.3). As in previous CREMP studies, the WQG for aluminum and iron were generally exceeded at the Mary River reference area under highly turbid conditions (i.e., ≥ 5 NTU), with the magnitude of elevation appearing to correlate closely with higher turbidity (Appendix Table B.3). Comparison of the ratio between dissolved and total concentrations of aluminum indicated that a high proportion of aluminum was in the total (particulate) fraction (Appendix Tables B.3 and C.60), which can be expected for metals associated with suspended particulate matter. Therefore, naturally high turbidity (and specifically, the chemical composition of suspended particulate matter) within the Mary River system can be expected to result in total concentrations of metals such as aluminum and iron (as in previous years, Minnow 2022) being above WQG and/or AEMP benchmarks.

Water chemistry at the Mary River reference stations showed distinct seasonal changes for conservative parameters including conductivity, hardness, total dissolved solids, alkalinity, chloride, sodium, and sulphate (Appendix Figure B.2; Appendix Table B.3). These seasonal changes in parameter concentrations were consistent with those observed at the reference stream stations in 2023, and in previous baseline (2005 to 2013), and 2015 to 2022 water quality monitoring data collected at the Mary River G0-09 series reference stations (KP 2014b; Minnow 2016a, 2017, 2018a, 2019, 2020, 2021b, 2022, 2023). The seasonal changes in the Mary River reference station parameter concentrations likely reflected greater dilution during the spring snowmelt period, and consecutively lower surface runoff inputs during the summer and fall periods. Temporal comparison of the Mary River G0-09 series reference station water chemistry indicated that concentrations of parameters with AEMP benchmarks were similar in 2023 compared to baseline (Appendix Figure C.23). Overall, the Mary River reference stations were deemed to provide a meaningful benchmark for the evaluation of potential mine-related influences on water chemistry at the Mary River mine-exposed study areas taking seasonality into consideration.

B3.3 Lake Environments (Reference Lake 3)

In situ water temperature profiles conducted at Reference Lake 3 indicated thermally stratified conditions in the summer of 2023 (Appendix Figure B.3). The three stations measured at Reference Lake 3 had variable temperatures at each depth during summer 2023 (Appendix Figure B.3), but generally the epilimnion extended to approximately 5 m below surface and the hypolimnion was established at depths greater than approximately 10 m,

whereas in the fall, the temperature was relatively constant throughout the water column (Appendix Figure B.3). Dissolved oxygen concentrations in Reference Lake 3 decreased slightly with depth in the summer but nevertheless, dissolved oxygen saturation remained high (i.e., ≥ 94%) throughout the entire water column in both the summer and fall profiles (Appendix Figure B.3). The pH decreased slightly with depth at the three stations (≤0.5 unit decrease; Appendix Figure B.3). The 2023 water quality profiles also showed no changes in specific conductance among stations and with depth during each of the summer and fall sampling events (Appendix Figure B.3). Overall, the i*n situ* water quality profiles suggested relatively thorough lateral mixing within Reference Lake 3 and despite the development of thermal stratification in the summer, no substantial changes in dissolved oxygen, pH, or conductivity occurred with depth through the water column.

The evaluation of water chemistry at Reference Lake 3 indicated that all monitored parameters were below WQG in summer and fall 2023 (Appendix Table B.4, Appendix Figure B.4). No parameters were observed at concentrations above lentic AEMP benchmarks at Reference Lake 3 (Appendix Table B.4), suggesting that these water quality benchmarks were relevant for comparisons of water quality for the mine-exposed lakes. No substantial differences in water chemistry were observed between the summer and fall at Reference Lake 3 in 2023, which was similar to observations among winter, summer, and fall at local study area lakes during the mine baseline period and in summer and fall at Reference Lake 3 from 2015 to 2022 (KP 2014a; Minnow 2016a, 2017, 2018a, 2019, 2021, 2022, 2023). Temporal comparisons also showed no substantial changes in water quality from 2015 to 2023 at Reference Lake 3 (Appendix Figure C.29).

Water chemistry data collected at Reference Lake 3 showed no consistent differences in parameter concentrations between the surface and the bottom of the water column at each individual station in 2023 (Appendix Figure B.4; Appendix Table B.4). The absence of any appreciable depth-related differences in parameter concentrations at each station was consistent with only minor differences in dissolved oxygen saturation, pH, and/or specific conductance with increased depth from the surface. Because anoxic conditions do not appear to develop in the summer or fall at Reference Lake 3, reducing conditions conducive to metal mobilization from sediment to the overlying water are less likely to occur near the lake bottom, resulting in relatively uniform water chemistry between surface and bottom waters of Reference Lake 3. Accordingly, metal concentrations can naturally be expected to be similar between surface and bottom waters of local study area lakes provided no substantial gradients in dissolved oxygen saturation, pH, and/or specific conductance occur within the water column.

B4 SEDIMENT QUALITY

B4.1 Stream/Tributary Environments

Deposited sediment at Unnamed Reference Creek (REF-CRK) was visually characterized as predominantly sand and gravel in 2023 (Appendix Table D.6). In-stream substrate of the reference stream was described as mainly cobble and pebble material (i.e., substrate diameter 6 to 25 cm, and 2 to 6 cm, respectively; Appendix Table D.6). Deposited sediment suitable for chemical characterization (i.e., sand and finer substrate sizes) was present primarily at shoreline/streambank areas, and not in the main channel. Sediment total organic carbon (TOC) content was very low in 2017, 2020 and 2023 (i.e., <0.1%; Appendix Table D.3) at the reference stream suggesting very limited deposition of fine organic materials (Minnow 2018a and 2021). Metal concentrations in deposited sediment at the reference stream were well below SQG during sampling conducted in 2017 (Minnow 2018a), 2020 (Minnow 2021b) and 2023 (Appendix Table D.3), and therefore the Unnamed Reference Creek data were deemed to provide a meaningful benchmark for the evaluation of potential mine-related influences on chemistry of deposited sediment at the mine-exposed streams.

B4.2 River Environments

Deposited sediment at the Mary River (G0-09) upstream reference area was visually characterized as predominantly sand and gravel in 2023 (Appendix Table D.32). In-stream substrate of the reference stream was composed mainly of cobble and pebble material (i.e., substrate diameter 6 to 25 and 2 to 6 cm, respectively; Appendix Table D.32). Deposited sediment suitable for chemical characterization (i.e., sand and finer substrate sizes) was collected in-stream from quiescent zones immediately downstream of large boulders in 2017 (Minnow 2018a), 2020 (Minnow 2021) and 2023. Sediment total organic carbon (TOC) content was very low (i.e., ≤0.1%) at the G0-09 reference area, suggesting very limited deposition of fine organic materials. Metal concentrations in deposited sediment at the reference stream were shown to be well below SQG in 2017 (Minnow 2018a), 2020 (Minnow 2021b), and 2023 and therefore the G0-09 data were deemed to provide a meaningful benchmark for the evaluation of potential mine-related influences on chemistry of deposited sediment at the Mary River mine-exposed study areas.

B4.3 Lake Environments (Reference Lake 3)

Sediment sampling was conducted at littoral and profundal (i.e., <12 m and >12 m depths, respectively) areas of Reference Lake 3 from 2015 to 2023 for the analysis of particle size, total organic carbon (TOC) content, and total metal concentrations (see Figure 2.3).

Surficial sediment at Reference Lake 3 littoral and profundal areas was composed of silty to sandy loam material with moderate TOC content (mean = 4.73%; Appendix Tables B.5 and B.6). Sediment moisture did not differ significantly between the Reference Lake 3 littoral and profundal habitats in 2023 (Appendix Table B.6). No significant differences in substrate particle size or TOC content occurred between the littoral and profundal stations sampled at the reference lake in 2023 (Appendix Table B.6). A surficial and/or sub-surface layer of oxidized material (likely iron hydroxide or oxy-hydroxides), visible as a brown floc or distinct layer, was occasionally observed in the surficial sediment of Reference Lake 3 (Appendix Tables D.1 and D.2). In addition, sub-surface sediment of Reference Lake 3 was not observed to have physical characteristics suggesting reducing (i.e., anoxic) sediment conditions in 2023 (Appendix Tables D.1 and D.2). The physical properties of sediment observed at Reference Lake 3 in 2023 were consistent with those of the 2015 to 2022 studies (see Minnow 2016a, 2017, 2018a, 2019, 2020, 2021b, 2022, 2023).

Metal concentrations in sediment at Reference Lake 3 were generally similar at the littoral stations compared to profundal stations, and a less than a two-fold difference in concentrations was typically shown for most parameters between the littoral and profundal station depths (Appendix Table B.5; Appendix Figure B.5). Among metals with established SQG, mean concentrations of iron and manganese were elevated above SQG at littoral and profundal stations, and chromium concentrations exceeded the SQG at two profundal stations at Reference Lake 3 in 2023 (Appendix Table B.5). Therefore, compared to SQG, high concentrations of iron and manganese, and to a lesser degree chromium, appear to occur naturally in sediments of Mary River Mine local study area lakes. Arsenic, chromium, copper, iron, manganese, and phosphorus concentrations were above the most stringent (i.e., lowest) AEMP sediment quality benchmarks at Reference Lake 3 at two or more stations for each analyte (Appendix Table B.5). This suggested that the AEMP sediment benchmarks for these metals were conservative. No substantial changes in concentrations of metals were indicated from 2015 to 2023 at littoral or profundal stations of Reference Lake 3 (Appendix Figure B.5).

B5 PHYTOPLANKTON (CHLOROPHYLL-A)

B5.1 Lotic Environments

Chlorophyll-a concentrations, which were used as a surrogate for phytoplankton abundance, ranged from 0.10 to 0.533 µg/L at the reference stream and river stations among spring, summer, and fall sampling events in 2023 (Appendix Table B.7). Therefore, lotic reference station chlorophyll-a concentrations were consistently well below the AEMP benchmark of 3.7 µg/L, and reflected low (i.e., oligotrophic) phytoplankton productivity according to Dodds et al (1998) trophic status classification for stream environments. This trophic status classification was generally consistent with an ultra-oligotrophic to oligotrophic categorization under the CCME Phosphorus Guidance Framework for the Management of Freshwater Systems (CCME 2024) for the stream and river reference stations based on mean aqueous total phosphorus concentrations generally ranging between < 2 and ≤ 10 µg/L during each spring, summer, and fall sampling event in 2023 (only MRY-REF3 had a total phosphorus concentration > 10 µg/L in spring 2023 [13.4 µg/L]; Appendix Tables B.2 and B.3). Chlorophyll-a concentrations were lower in the fall compared to the spring and summer at the reference streams and the Mary River G0-09 series reference stations, in 2023 (Appendix Tables B.7 and E.6).

Chlorophyll-a concentrations at the reference stream and Mary River reference area stations in 2023 were similar to, or lower than, those observed during the baseline period (i.e., 2005 to 2013; Appendix Figure B.6). Like-season chlorophyll-a concentrations from 2015 to 2023 showed no consistent directional changes among years over the spring, summer, and fall sampling events at either the reference stream or the Mary River reference area stations (Appendix Figure B.6). The variability in chlorophyll-a concentrations observed among seasons and years at the lotic reference areas indicated that variation in chlorophyll-a concentrations occurs naturally among years and seasons in watercourses within the Mary River Mine local study area.

B5.2 Lentic Environments (Reference Lake 3)

Chlorophyll-a concentrations at Reference Lake 3 showed no consistent differences between the surface and the bottom of the water column at each individual station during both the summer and fall sampling events in 2023 (Appendix Figure B.7). Reference Lake 3 chlorophyll-a concentrations averaged 1.5 µg/L in summer and 0.51 µg/L fall 2023, and were consistently well below the AEMP benchmark of 3.7 µg/L (Appendix Table E.3; Appendix Figure B.7). Similar to the lotic reference stations, mean chlorophyll-a concentrations observed at Reference Lake 3 in 2023 indicated low (i.e., oligotrophic)

phytoplankton productivity based on the lake trophic status classification presented in Wetzel (2001). This trophic status classification was generally consistent with an ultra-oligotrophic categorization under the CCME Phosphorus Guidance Framework for the Management of Freshwater Systems (CCME 2024) for Reference Lake 3 based on mean aqueous total phosphorus concentrations below 4 µg/L during the summer and fall sampling events in 2023 (Appendix Table B.4). Chlorophyll-a concentrations in Reference Lake 3 were similar from 2015 to 2023 when considered on an annual basis but in 2023 were significantly higher in the summer than in any year from 2015 to 2022, except for 2021 which had a similar concentration to 2023 (Appendix Table E.4). In the fall, though concentrations varied among years, there were no consistent trends (Appendix Table E.4). Chlorophyll-a concentrations were significantly lower in fall compared to summer at Reference Lake 3 in 2023 (Appendix Table E.6), which was similar to the 2016 and 2021 studies, but differed from the 2015 study (chlorophyll-a concentrations did not differ significantly between summer compared to fall) and the 2017, 2018, and 2022 studies (significantly lower chlorophyll-a concentrations in summer compared to fall; Minnow 2016a, 2017, 2018a, 2019, 2020, 2021b, 2022, 2023). Therefore, although chlorophyll-a concentrations were generally comparable from 2015 to 2023 for like-seasons at Reference Lake 3, the relative seasonal changes in chlorophyll-a concentrations among years suggested naturally variable temporal patterns in phytoplankton abundance can be expected at Mary River Mine local study area lakes.

B6 BENTHIC INVERTEBRATE COMMUNITY

B6.1 Stream/Tributary Environments

The original Mary River Project CREMP design had not included/identified a reference stream from which to evaluate potential mine-related effects on benthic invertebrate communities of stream/tributary environments, instead relying solely on a before-after approach to identify potential mine influences on benthic invertebrates over time (see NSC 2014). Stemming from recommendations from the 2015 CREMP (Minnow 2016b), a reference stream was incorporated into the 2016 to 2022 CREMP benthic invertebrate community studies to provide a stronger basis for evaluating potential within-year mine-related effects to biota residing in mine-exposed tributaries of Camp and Sheardown lakes. The benthic invertebrate community (benthic) study area selected for the CREMP was located within at the same unnamed tributary to Angijurjuk Lake that is used for reference water quality sampling (Stations CLT-REF4 and MRY-REF2; Table 2.5; Figure 2.4). Criteria used for the selection of this stream as a reference area for the CREMP, which is herein referred to as Unnamed Reference Creek, included a watercourse exhibiting similar habitat characteristics (e.g., width, water velocity, substrate size) as the mine-exposed tributaries that is not/has not been influenced by mining or adverse anthropogenic disturbances. The acceptance of Unnamed Reference Creek as a reference area for the evaluation of mine-related influences on tributary water chemistry under the original CREMP (KP 2014a) was also considered an important criterion in the selection of this watercourse as a suitable reference area for the benthic invertebrate community survey.

Benthic invertebrate density at Unnamed Reference Creek ranged from 226 to 864 individuals/m^2 in the 2023 study (mean of 505 individuals/m^2; Appendix Table B.8), which is considered moderate for Arctic streams (Craig and McCart 1975). Unnamed Reference Creek showed relatively high richness in 2023, despite the low production that can naturally be expected in Arctic streams as the result of constraints associated with low nutrients and seasonal temperatures, as well as food limitation (Huryn and Wallace 2000). The dominant taxonomic group observed at Unnamed Reference Creek benthic stations in 2023 was Chironomidae (non-biting midges), collectively accounting for approximately 48% of the community (Appendix Table B.8). Collector-gatherers were the dominant benthic invertebrate functional feeding group (FFG) present at Unnamed Creek in 2023 (Appendix Table B.8), suggesting greatest reliance upon deposited fine particulate organic matter as a food source for benthic invertebrates. Shredders constituted a low proportion of the Unnamed Reference Creek benthic invertebrate community in 2023 (Appendix Table B.8), suggesting that live and/or decomposing leaf material was a less important food source. In terms of benthic invertebrate habit preference group (HPG),

sprawlers were the dominant group at Unnamed Reference Creek in 2023 (Appendix Table B.8), suggesting that most invertebrates were associated with substrate surfaces and were not deeply embedded in the substrate (i.e., non-burrowers).

B6.2 River Environments

The area of Mary River located upstream of the mine lease property has been considered representative of reference conditions for the mine-exposed stations/study areas situated farther downstream on the Mary River under the CREMP (Baffinland 2015; KP 2014a,b, 2015; NSC 2014). As in previous CREMP studies, the G0-09 area of Mary River (including water quality stations G0-09A, G0-09, and G0-09B) was used as the benthic reference area for mine-exposed areas of Mary River as part of the 2022 CREMP (see Table 2.5; Figure 2.4).

Benthic invertebrate density at the Mary River reference area in the 2023 study ranged from 208 to 670 individuals/m^2, which is considered moderate for Arctic lotic systems (Craig and McCart 1975). Moderate richness and Simpson's Evenness also characterized the benthic invertebrate community of the Mary River reference area, and reflected naturally low Arctic stream environment productivity as a result of low ambient temperatures and nutrient levels (Huryn and Wallace 2000). Midges of the family Chironomidae were the dominant taxonomic group observed at the Mary River reference area in 2023, with the relative abundance of this group ranging from 41.9 to 69.5% of individuals (mean of 56.3%) and chironomid taxa considered metal-sensitive constituting 3.81% to 35.4% of the community (Appendix Table B.8). Similar to Unnamed Reference Creek, collector-gatherers were the dominant FFG present at the Mary River reference area in 2023 (Appendix Table B.8), suggesting that fine particulate organic matter was the predominant food source for benthic invertebrates at this area. Sprawlers composed the dominant HPG at the Mary River reference area in 2023 (Appendix Table B.8), which suggested that most benthic invertebrates were associated with the surface of rocky substrates.

B6.3 Lentic Environments (Reference Lake 3)

The benthic invertebrate community of Reference Lake 3 differed between littoral (<12 m depth) and profundal (>12 m depth) stations in 2023. As in previous monitoring conducted from 2015 to 2022, significantly higher benthic invertebrate density and richness was observed at littoral stations compared to profundal stations in 2023, and the magnitude of difference was greater than the Critical Effect Size (CES) of ± 2 SD for density and for richness (Appendix Table B.9). In addition, differences in benthic invertebrate community structure occurred between sampling depths as indicated by significantly higher and lower relative

abundance of Ostracoda (seed shrimp) and Chironomidae (non-biting midges), respectively, at littoral stations compared to profundal stations (Appendix Table B.9). No significant differences in the relative abundance of FFG were indicated between littoral and profundal habitats of Reference Lake 3 in 2023 but a significantly lower and higher relative abundance of the sprawler and burrower HPGs, respectively, occurred at littoral stations compared to profundal stations (Appendix Table B.9).

Littoral and profundal habitat benthic invertebrate communities at Reference Lake 3 in 2023 showed density, richness, Simpson's Evenness, and relative abundance of dominant taxonomic groups and FFGs all within the range of those observed from 2015 to 2022 (Appendix Figures F.5 and F.6). This suggested that the benthic invertebrate community at littoral and profundal habitat of Reference Lake 3 showed relatively minor changes from 2015 to 2023.

B7 FISH POPULATION

B7.1 Lotic Environments

Fish population sampling of lotic habitats is not required as part of the Mary River Project CREMP (see NSC 2014). In part, this reflects the fact that fish can only inhabit local study area streams/rivers for a short period each year (i.e., July to September) as a result of complete freezing/desiccation of these lotic habitats over much of the year. In addition, sampling of juvenile arctic charr within a representative lotic habitat is conducted for the federal Environmental Effects Monitoring (EEM) program to meet Metal and Diamond Mining Effluent Regulation requirements (Baffinland 2015; Minnow 2018b, 2021a, 2024).

B7.2 Lentic Environments (Reference Lake 3)

The Reference Lake 3 fish community has historically been composed of arctic charr and ninespine stickleback. In previous studies, relative abundance of both species has been low at Reference Lake 3 based on low electrofishing and gill netting catches and catch-per-unit-effort (CPUE) for each species, although predominantly arctic charr have been captured at the reference lake (Minnow 2018a, 2019, 2020, 2021b, 2022, 2023). Suitable numbers of arctic charr were captured at nearshore habitat of Reference Lake 3 in 2023 (i.e., 104 individuals) to allow evaluation of mine-related effects on survival, growth, and condition of fish collected at the mine-exposed lake shorelines (Appendix Table G.1). For these fish, young-of-the-year (YOY) individuals were generally distinguishable from the 1+ to 5+ age classes at a fork length of 4.5 cm based on the evaluation of length-frequency distributions coupled with supporting age determinations (Appendix Figure G.1; Appendix Table G.4). In 2015 and 2019, YOY arctic charr captured at nearshore habitat were not able to be distinguished from older age classes at Reference Lake 3 (Minnow 2023). However, population comparisons of nearshore arctic charr captured between the mine-exposed and reference lakes from 2016 to 2018, 2020, 2021, 2022 and 2023 were completed separately for YOY and non-YOY data sets. Temporal comparisons of the 2015 to 2023 nearshore arctic charr data indicated that fish lengths in 2023 were generally similar to those captured in previous years, but both fish weight and condition were significantly greater that in most previous years, with magnitude of difference outside the critical effect size (Appendix Table B.10). Overall, the Reference Lake fish population data indicated that some year-to-year differences in nearshore fish population endpoints can be expected naturally at local study area lakes.

Gillnet catches in 2023 were sufficient as a basis for conducting meaningful statistical comparison with the mine-exposed lakes to evaluate mine-related effects on the population of

reproductive-aged arctic charr (Appendix Tables G.8, G.15, G.21, and G.27). Because arctic charr can show differential growth rates between the sexes (females grow faster; Jonsson et al. 1988; Skulason et al. 1996; Gulseth and Nilssen 2001), natural differences in sex ratios between study areas could potentially result in falsely attributing differences in growth and/or condition between mine-exposed and reference areas to mine-related influences. Thus, the inability to definitively determine arctic charr sex using external characteristics when applying a non-lethal sampling approach could confound data interpretation. To determine whether differences in sex ratios could potentially confound the interpretation of the CREMP arctic charr health assessment, growth and condition were compared between male and female Arctic charr collected at Camp, Sheardown and Mary lakes during the baseline period as part of the 2015 CREMP (Minnow 2016a). No significant differences in growth and condition were indicated between males and females based on this analysis, suggesting that a non-lethal study approach is unlikely to bias the evaluation of mine-related effects on fish health as part of the CREMP. Contrary to the published literature, the absence of differences in arctic charr growth and condition between males and females at Mary River Mine local study area lakes may be explained by naturally slow growth rates and low spawning frequency (i.e., once every 2 to 4 years) at high Arctic areas, and also by low gonadosomatic index (GSI) at the time that sampling is normally conducted for the Mary River Project CREMP (i.e., August). Temporal comparisons of arctic charr collected from littoral/profundal habitats from 2015 to 2023 indicated that fish lengths in 2023 were generally similar to those captured in previous years, but both fish weight and condition were significantly higher than in most previous years, and the magnitudes of difference were outside of the critical effect size (Appendix Table B.11). Overall, the Reference Lake fish population data indicated that some year-to-year differences in littoral/profundal fish populations endpoints can be expected naturally at local study area lakes.

B8 CREMP IMPLICATIONS

This overview of reference conditions was included in the CREMP to provide context and perspective regarding key chemical, physical, and biological features of the CREMP reference study areas. Key implications of reference area features that could affect the ability of the CREMP to evaluate mine-related effects at mine-exposed waterbodies that were identified through the 2016 to 2023 reference area overviews include the following:

- **Federal Water Quality Guidelines (WQG) are not applicable for aqueous phenol concentrations**. Aqueous concentrations of phenols were routinely elevated above WQG at the CREMP stream, river and lake reference stations in 2015 and 2016. Correlation analysis indicated a significant, positive relationship between phenol and both nitrate and DOC concentrations in the 2015 and 2016 CREMP, suggesting that high phenol concentrations in waterbodies near the Mary River Mine were associated with influences from natural organic composition. Therefore, phenol concentration comparisons against applicable WQG did not serve as a focus for discussion as part of the 2016 to 2023 CREMP.

- **Greater reliance on the use of dissolved metals concentrations for assessing mine-related influences on aqueous metal concentrations at waterbodies used for the CREMP**. Total aluminum concentrations were routinely elevated, and other metals including (total) iron periodically elevated, above WQG at stream, river, and/or lake reference areas used for the CREMP from 2015 to 2023, and historically in baseline studies. Significant positive correlations between total concentrations of these metals and turbidity were identified using the 2015 to 2022 data sets which suggested that these metals were likely bound to and/or composed the physical make-up of suspended particulate materials in water samples. This was supported by a low ratio of dissolved to total concentrations of metals such as aluminum, iron, and manganese in reference water samples from 2015 to 2022. Accordingly, appropriate benchmarks and guidelines based on dissolved metal concentrations (where available) may be considered for assessment of potential mine-related influences on water quality as part of the CREMP studies.

- **Use of average water chemistry and chlorophyll-a data for lake water quality/phytoplankton monitoring stations**. No consistent differences in water chemistry or chlorophyll-a concentrations were observed between the surface and bottom of the water column at Reference Lake 3 stations from 2015 to 2023. Therefore, the evaluation of water chemistry and phytoplankton productivity among

stations and study areas for the 2016 to 2023 Mary River Project CREMP studies was based on average water chemistry and chlorophyll-a values from the water column surface and bottom for each lake station.

- **Consider updating the AEMP sediment quality benchmarks**. Arsenic, chromium, copper, iron, manganese, and phosphorus have been observed at concentrations above the AEMP sediment quality benchmarks in sediment at Reference Lake 3 in CREMP studies conducted from 2015 to 2023. This suggested that the AEMP benchmarks for these metals may be overly conservative and therefore, to improve the applicability of the AEMP benchmarks for these metals, consideration should be given to incorporating reference lake data into derivation of updated sediment quality AEMP benchmarks.

- **Adopt standard CES for benthic invertebrate community and fish population endpoints into the CREMP**. Year-to-year evaluation of reference stream and lake habitat used for the CREMP has indicated that benthic invertebrate and fish populations differences between years can be expected to vary within the CES set out for use under the federal EEM program (Munkittrick et al. 2009). Therefore, the use of established CES for defining effects appears to be applicable to the Mary River Project CREMP.

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FIGURES

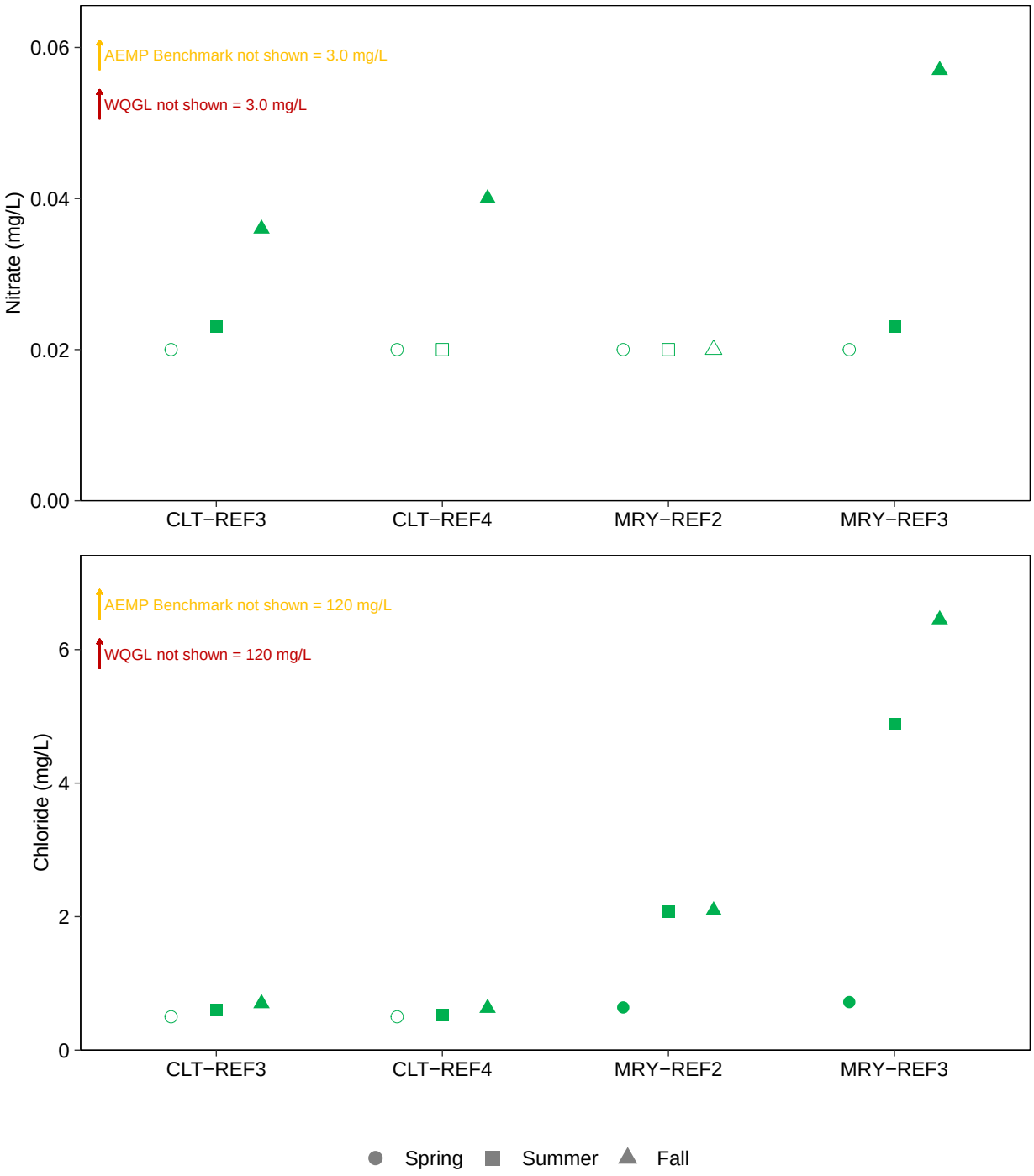
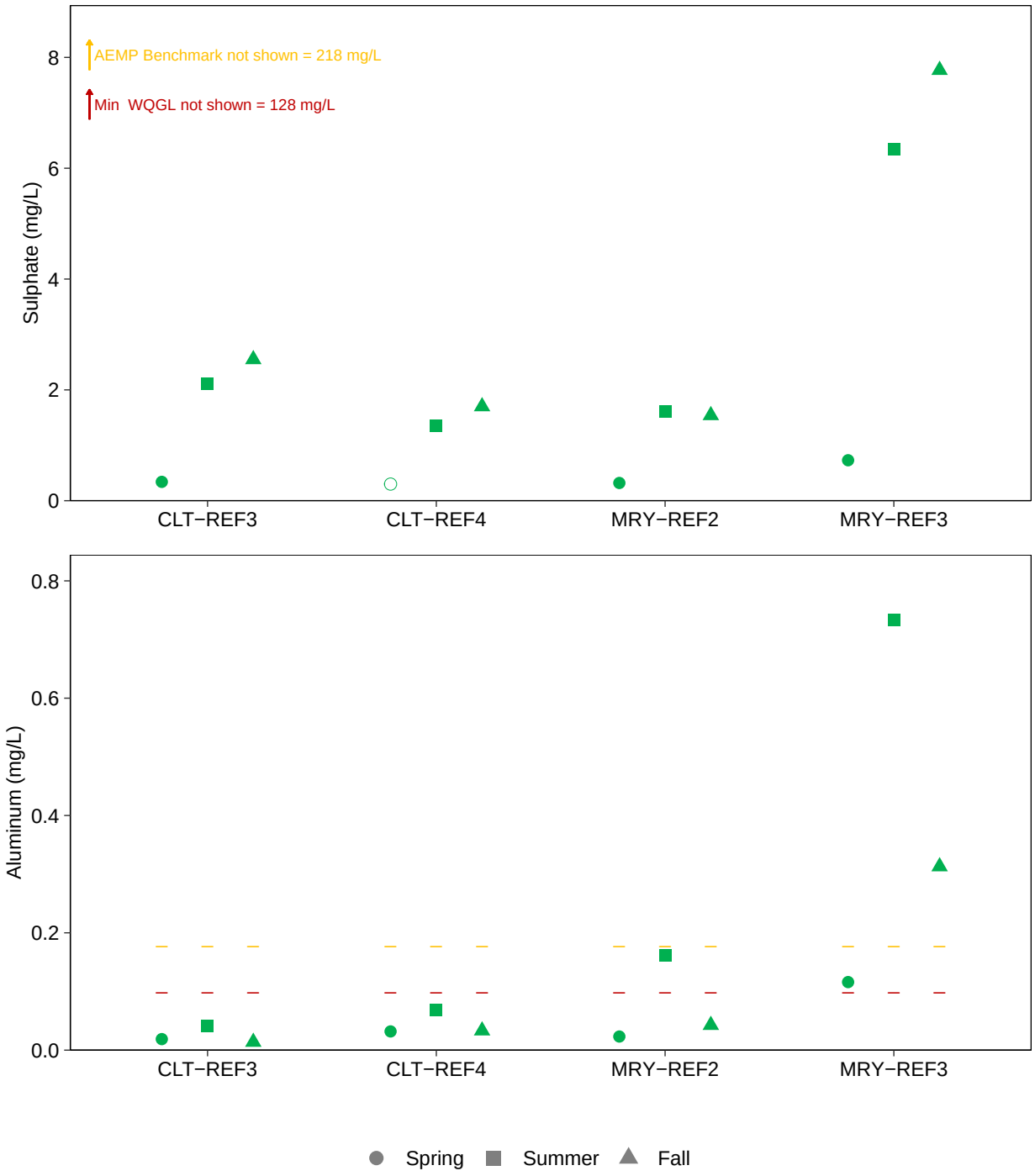


Figure B.1: Seasonal Variation in Water Chemistry at Stream/Tributary Reference Stations, Mary River Project CREMP, 2023

Notes: Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Red dashes indicate Water Quality Guidelines, some of which are dependent on concurrent hardness values. Orange dashes indicate AEMP Benchmark.



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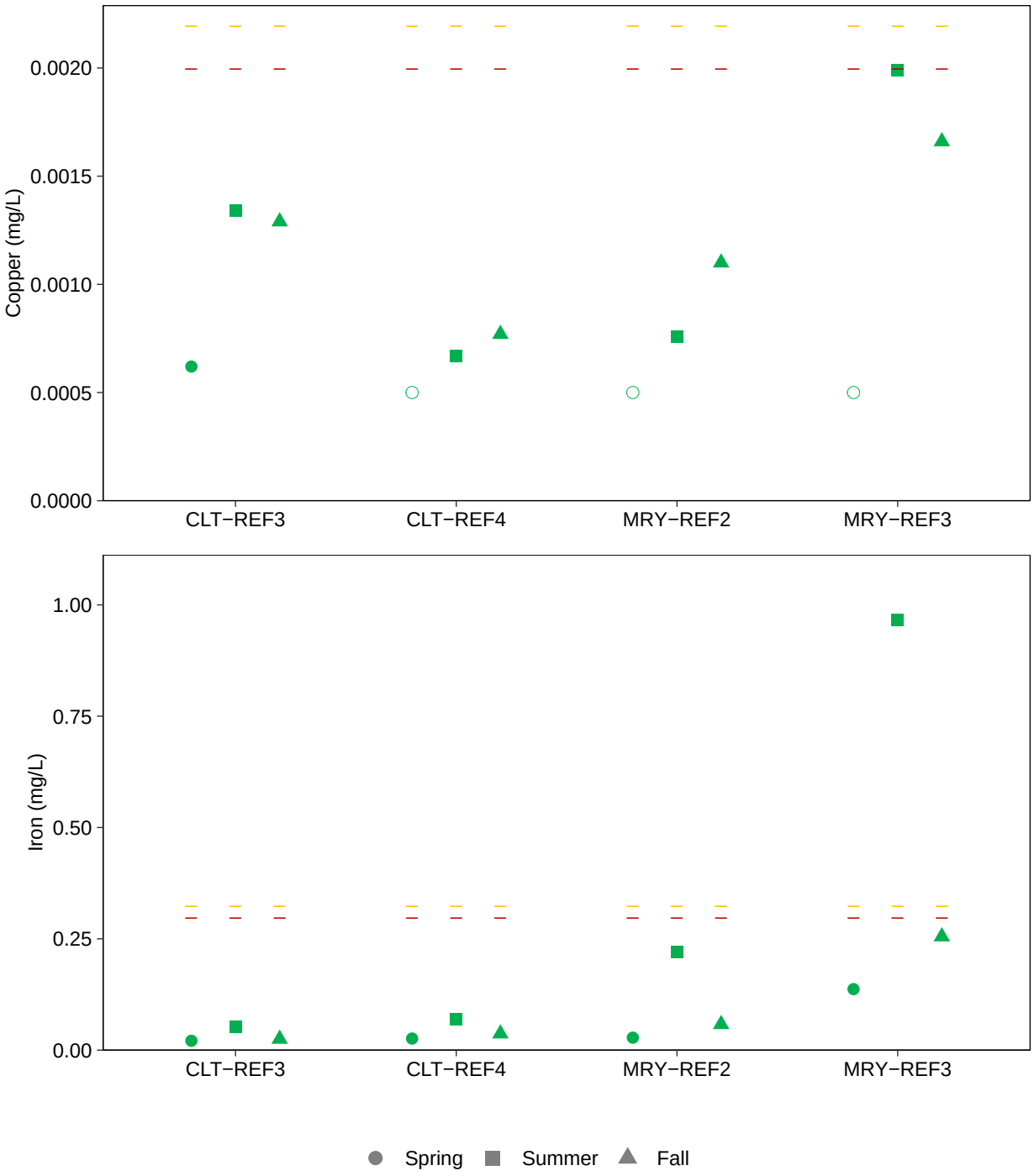

Figure B.1: Seasonal Variation in Water Chemistry at Stream/Tributary Reference Stations, Mary River Project CREMP, 2023

Notes: Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Red dashes indicate Water Quality Guidelines, some of which are dependent on concurrent hardness values. Orange dashes indicate AEMP Benchmark.

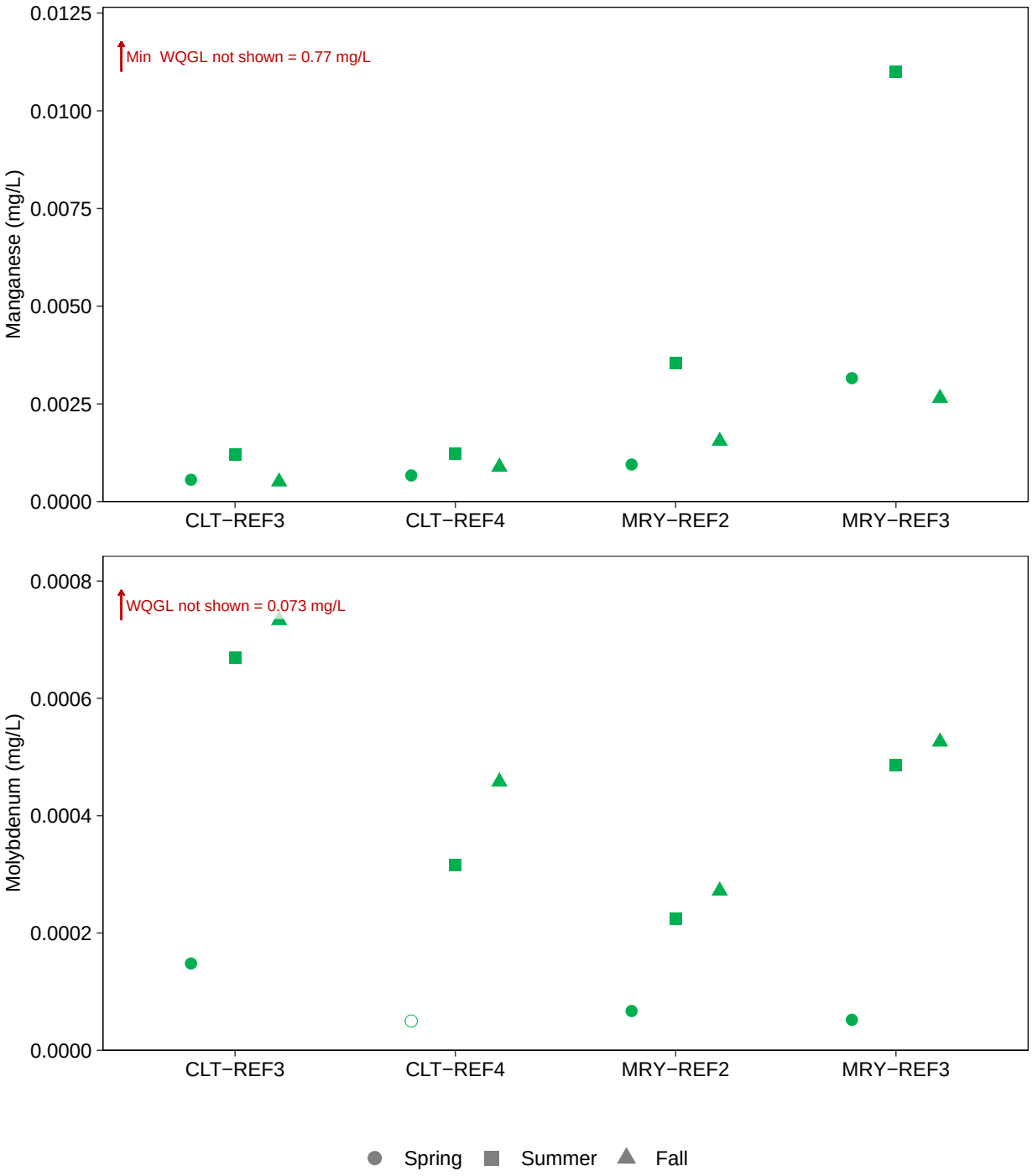

Figure B.1: Seasonal Variation in Water Chemistry at Stream/Tributary Reference Stations, Mary River Project CREMP, 2023

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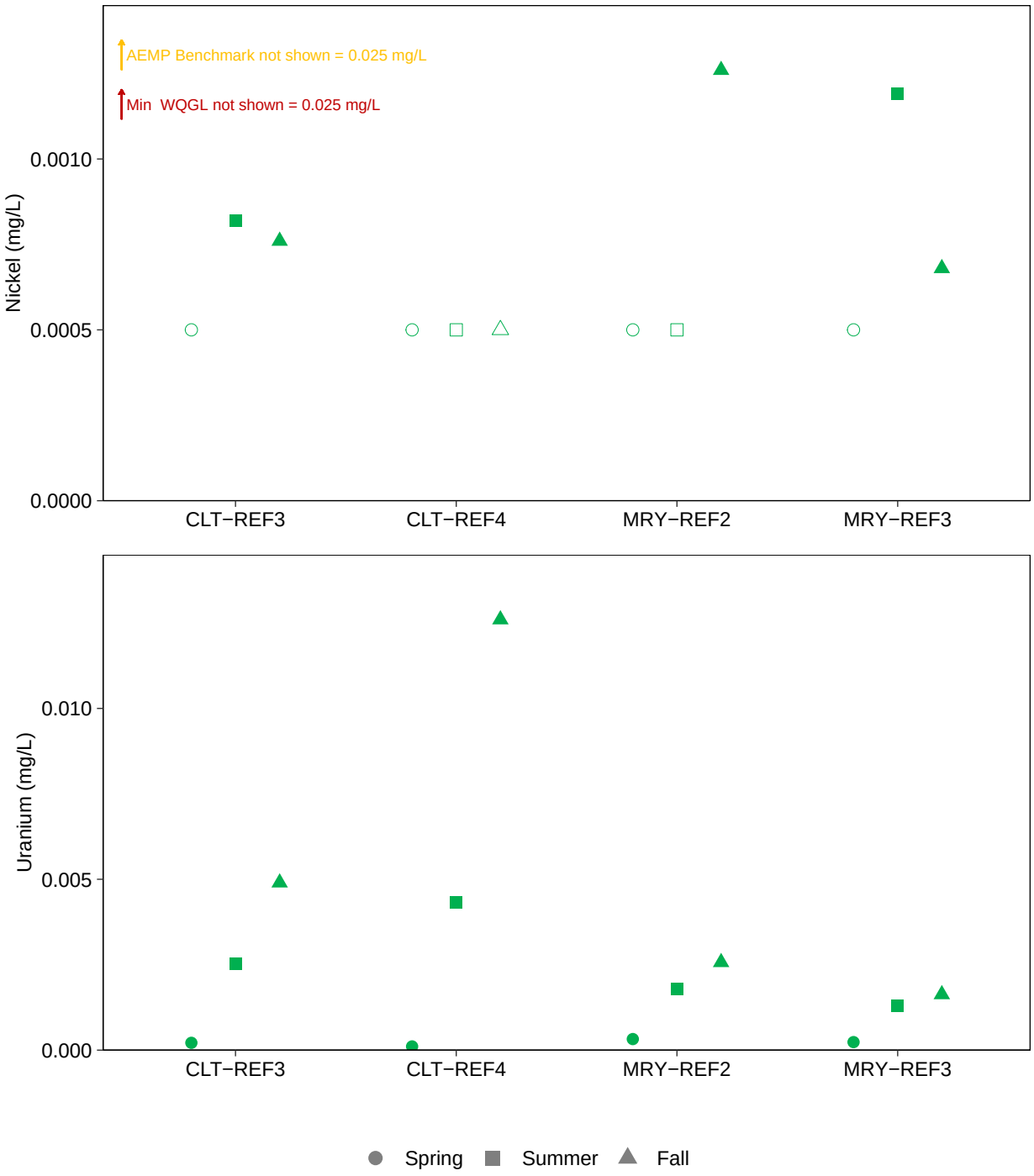

Figure B.1: Seasonal Variation in Water Chemistry at Stream/Tributary Reference Stations, Mary River Project CREMP, 2023

Notes: Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Red dashes indicate Water Quality Guidelines, some of which are dependent on concurrent hardness values. Orange dashes indicate AEMP Benchmark.

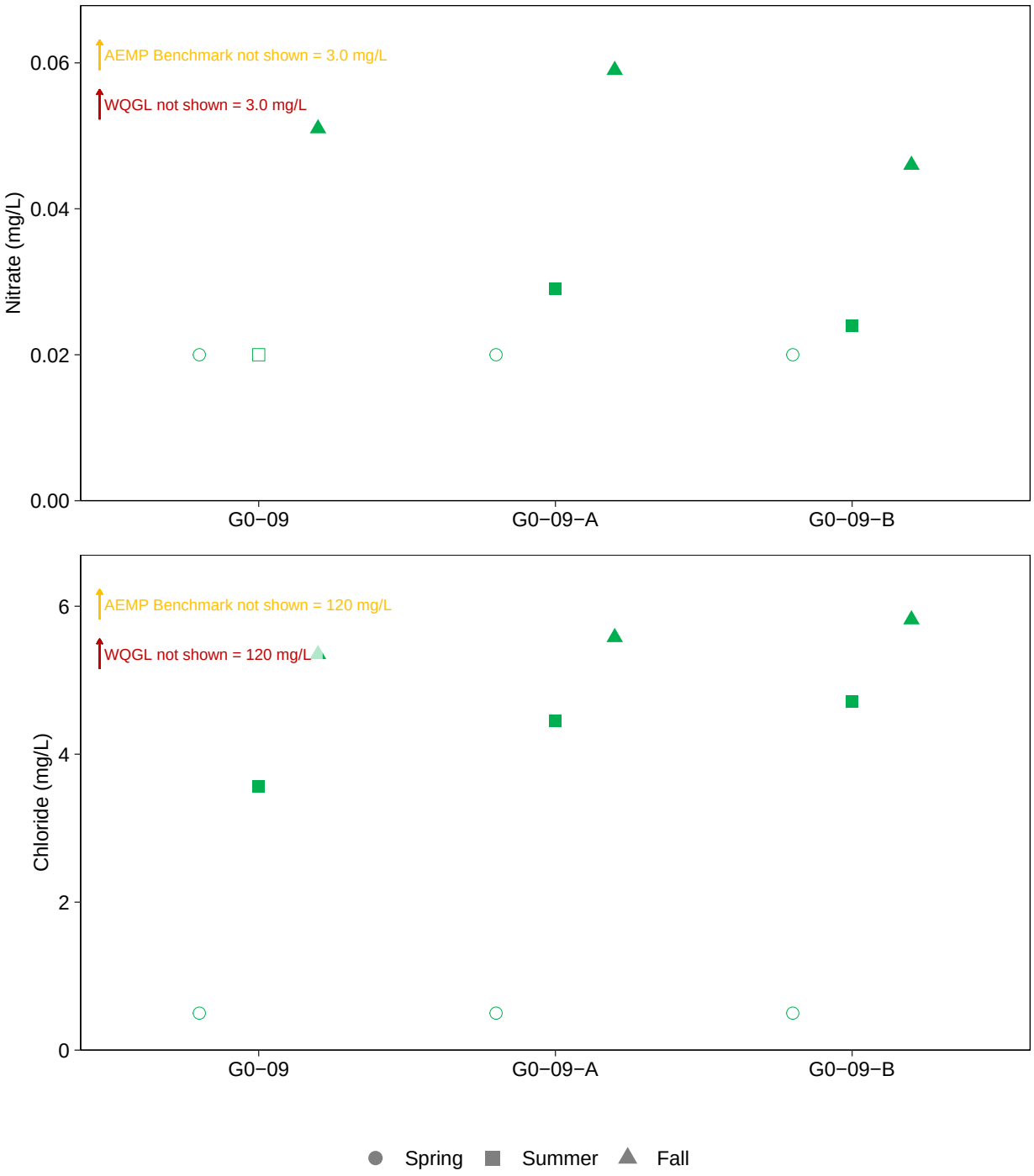

Figure B.2: Seasonal Variation in Water Chemistry at Mary River G0-09 Reference Stations, Mary River Project CREMP, 2023

Notes: Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Red dashes indicate Water Quality Guidelines, some of which are dependent on concurrent hardness values. Orange solid line indicates AEMP Benchmark.

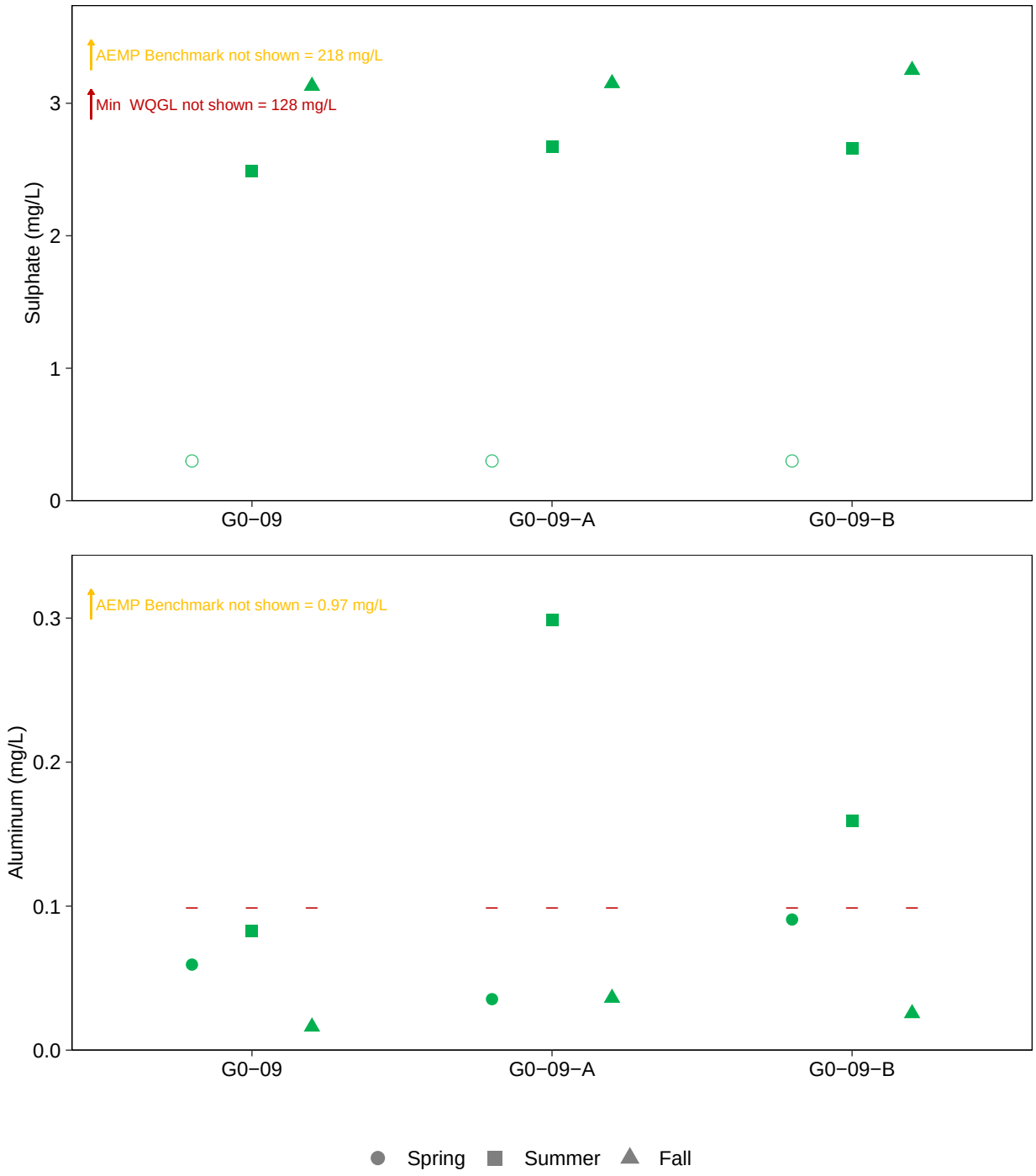

Figure B.2: Seasonal Variation in Water Chemistry at Mary River G0-09 Reference Stations, Mary River Project CREMP, 2023

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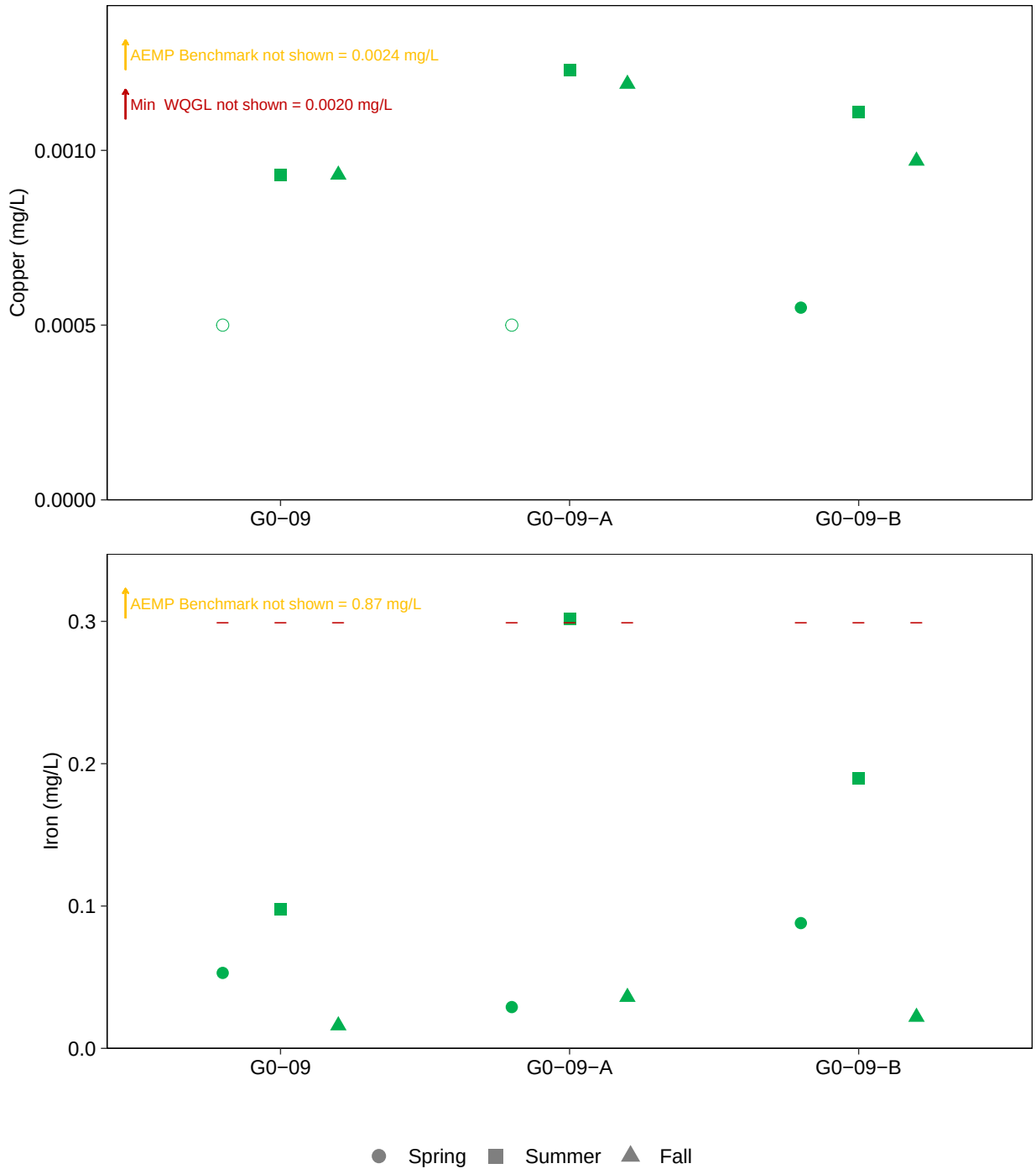

Figure B.2: Seasonal Variation in Water Chemistry at Mary River G0-09 Reference Stations, Mary River Project CREMP, 2023

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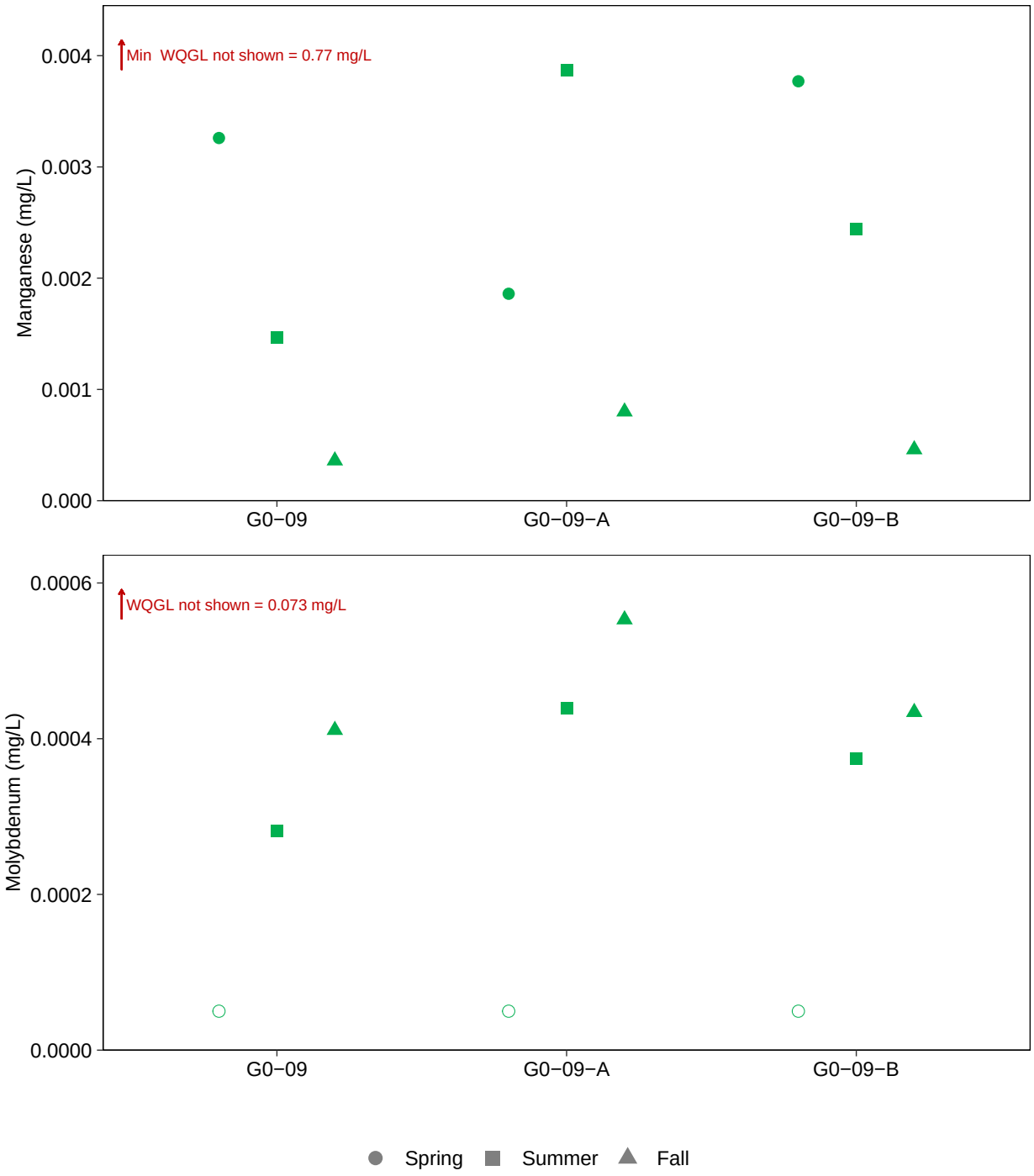

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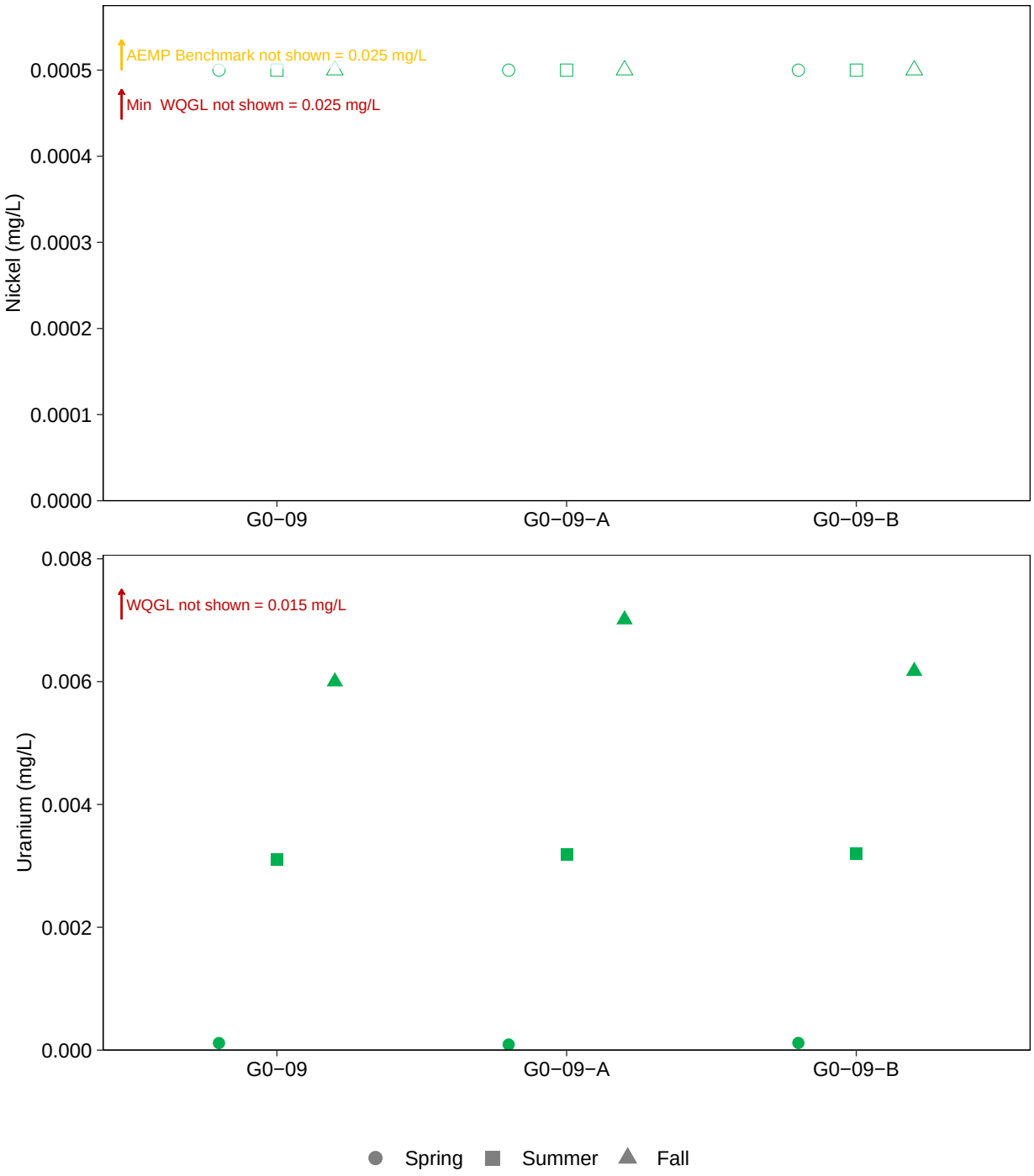

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Notes: Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Red dashes indicate Water Quality Guidelines, some of which are dependent on concurrent hardness values. Orange solid line indicates AEMP Benchmark.

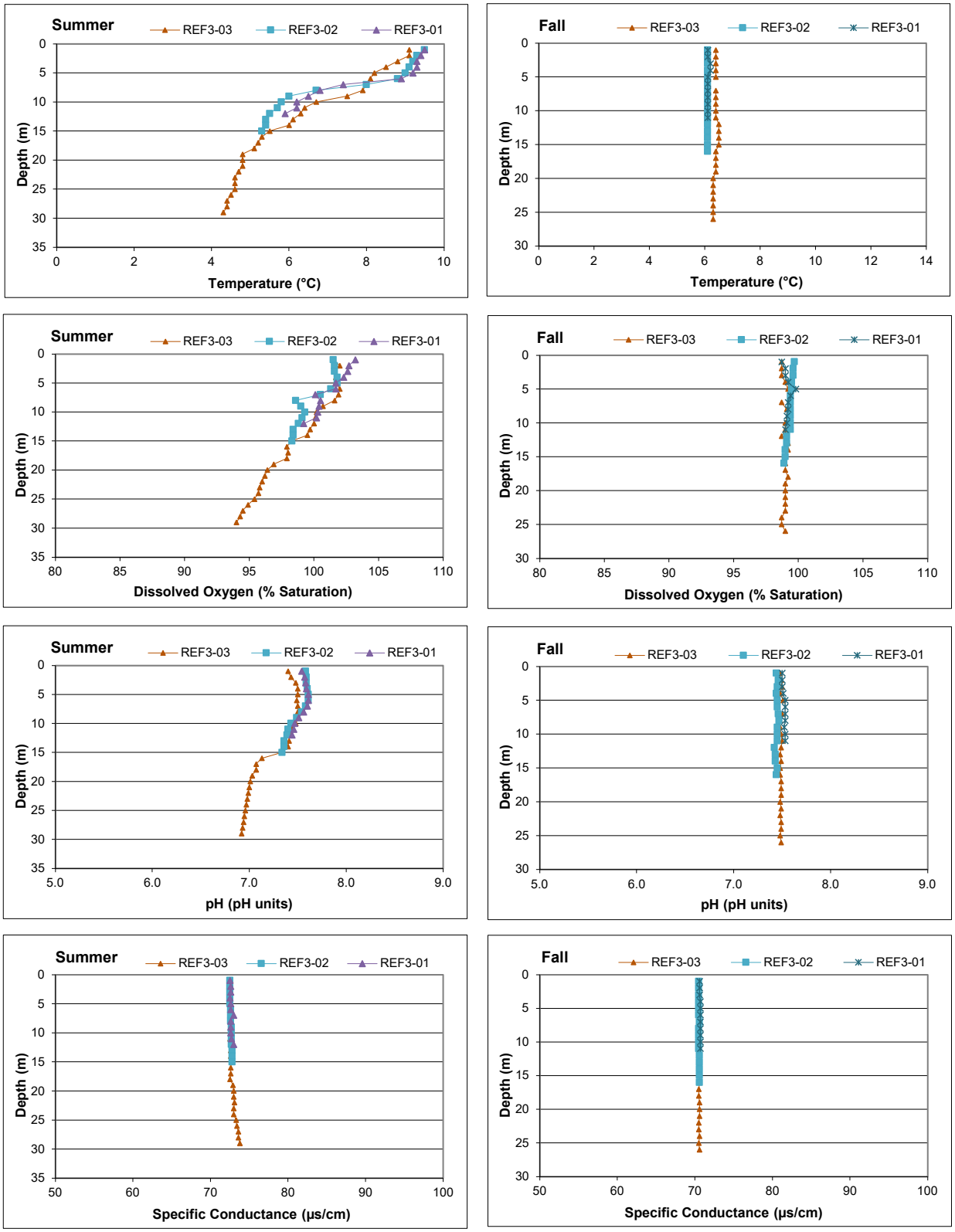

Figure B.3: ***In Situ*** **Water Quality with Depth from Surface at Reference Lake 3 during Summer and Fall Sampling Events, Mary River Project CREMP, 2023**

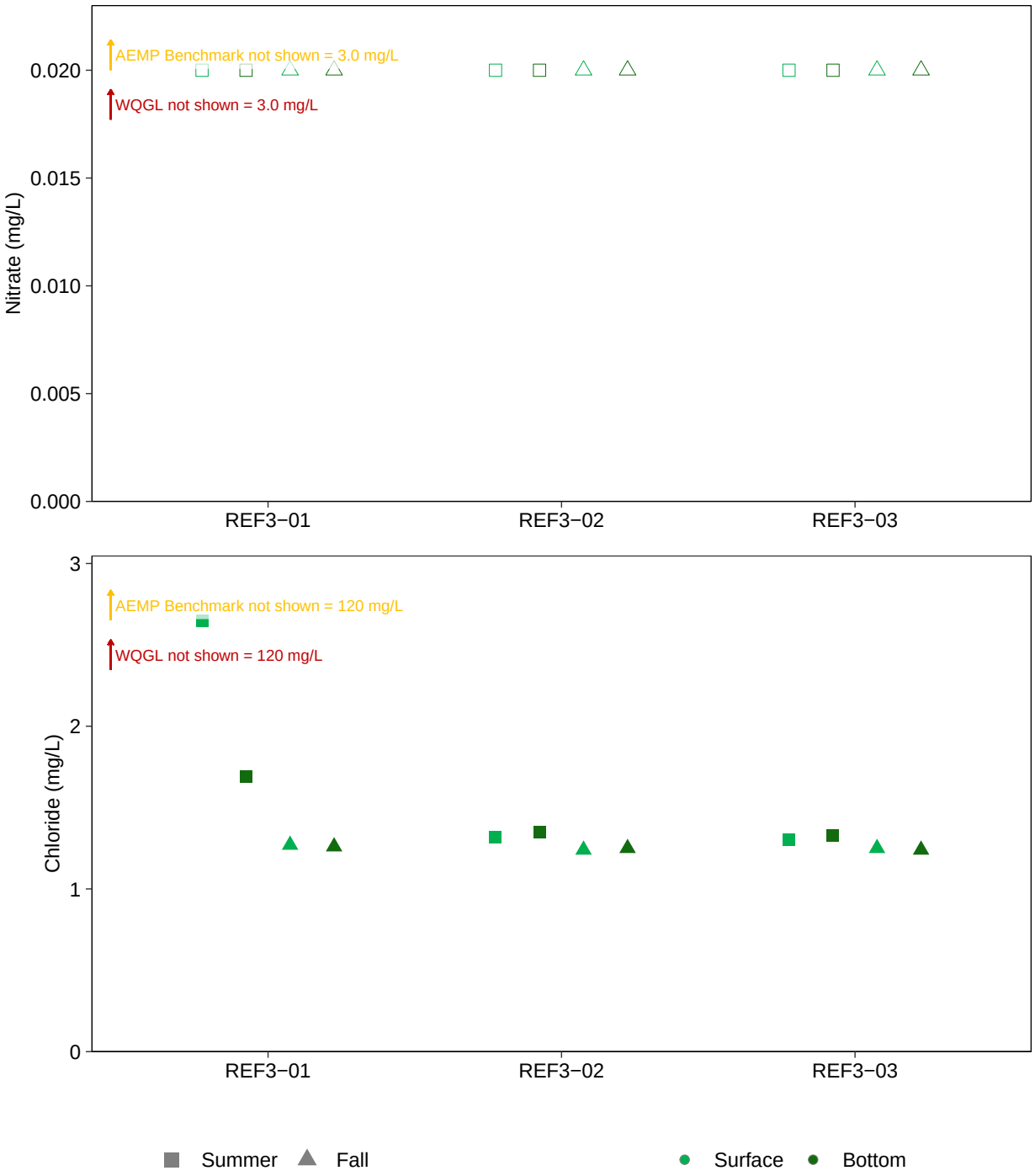

Figure B.4: Water Chemistry Comparison Between the Surface and the Bottom of the Water Column at Reference Lake 3 Routine Monitoring Stations during Summer and Fall, Mary River Project CREMP, 2023

Notes: Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Red dashes indicate Water Quality Guidelines, some of which are dependent on concurrent hardness values. Orange dashes indicate AEMP Benchmark.

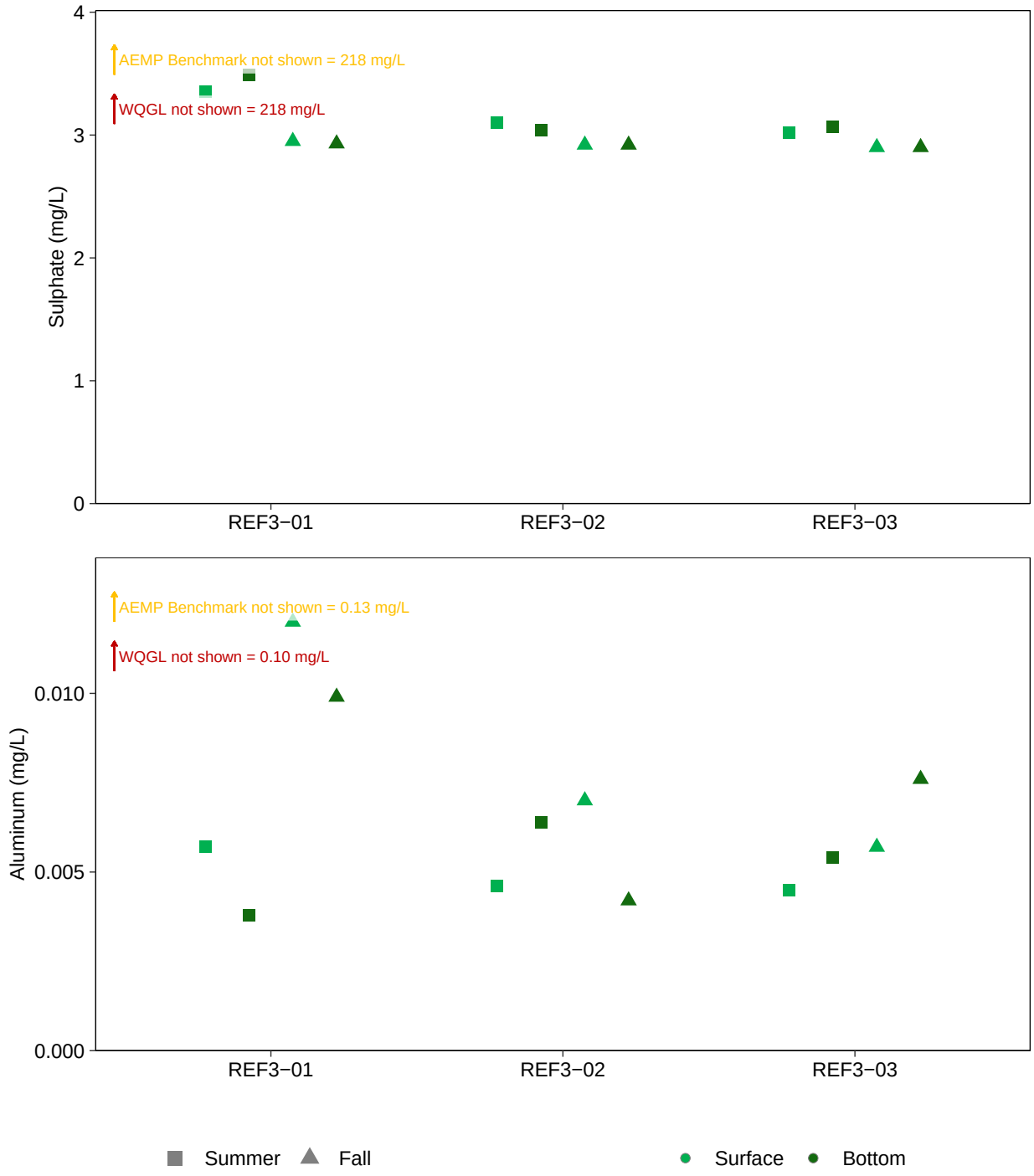

Figure B.4: Water Chemistry Comparison Between the Surface and the Bottom of the Water Column at Reference Lake 3 Routine Monitoring Stations during Summer and Fall, Mary River Project CREMP, 2023

Notes: Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Red dashes indicate Water Quality Guidelines, some of which are dependent on concurrent hardness values. Orange dashes indicate AEMP Benchmark.

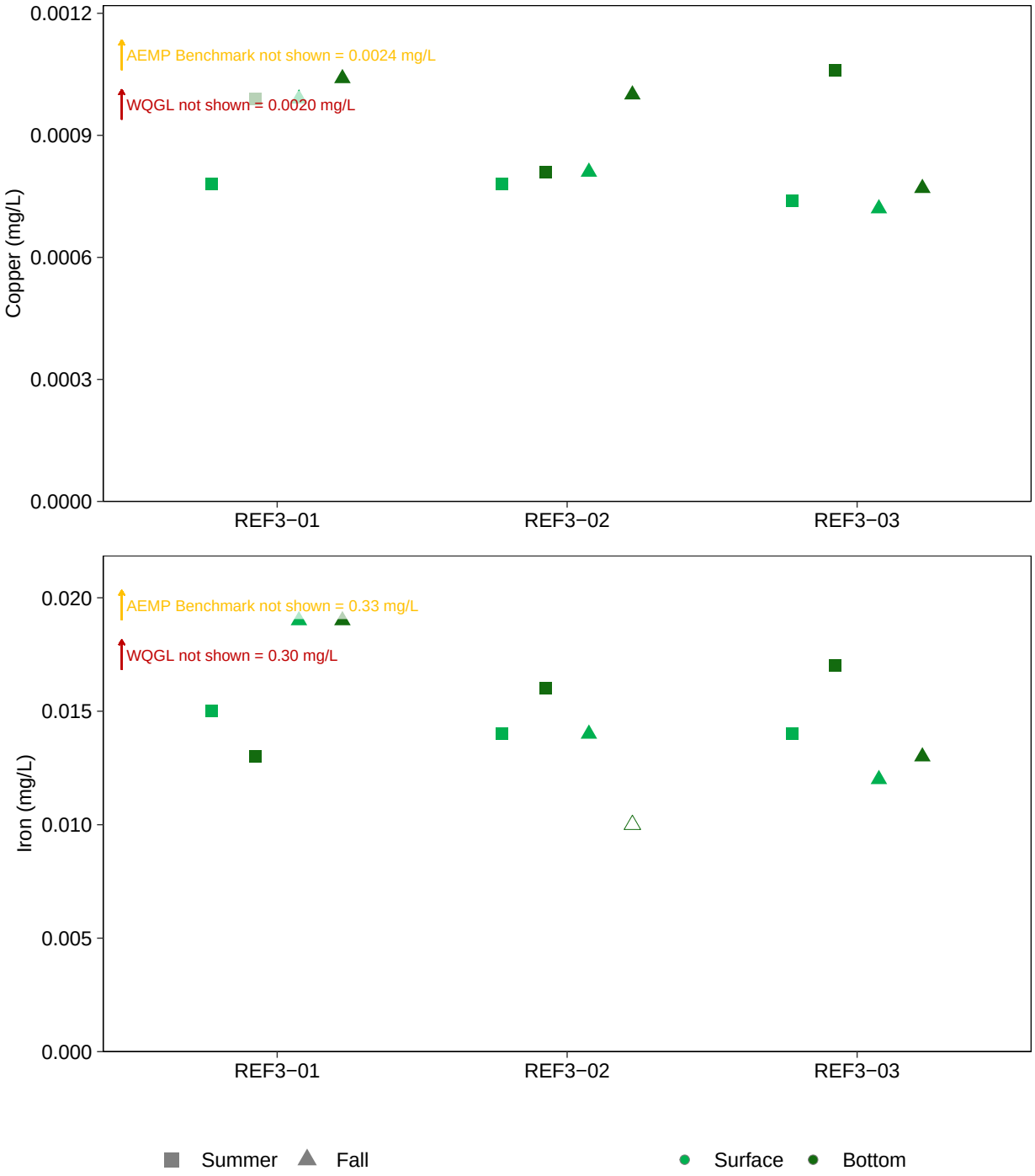

Figure B.4: Water Chemistry Comparison Between the Surface and the Bottom of the Water Column at Reference Lake 3 Routine Monitoring Stations during Summer and Fall, Mary River Project CREMP, 2023

Notes: Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Red dashes indicate Water Quality Guidelines, some of which are dependent on concurrent hardness values. Orange dashes indicate AEMP Benchmark.

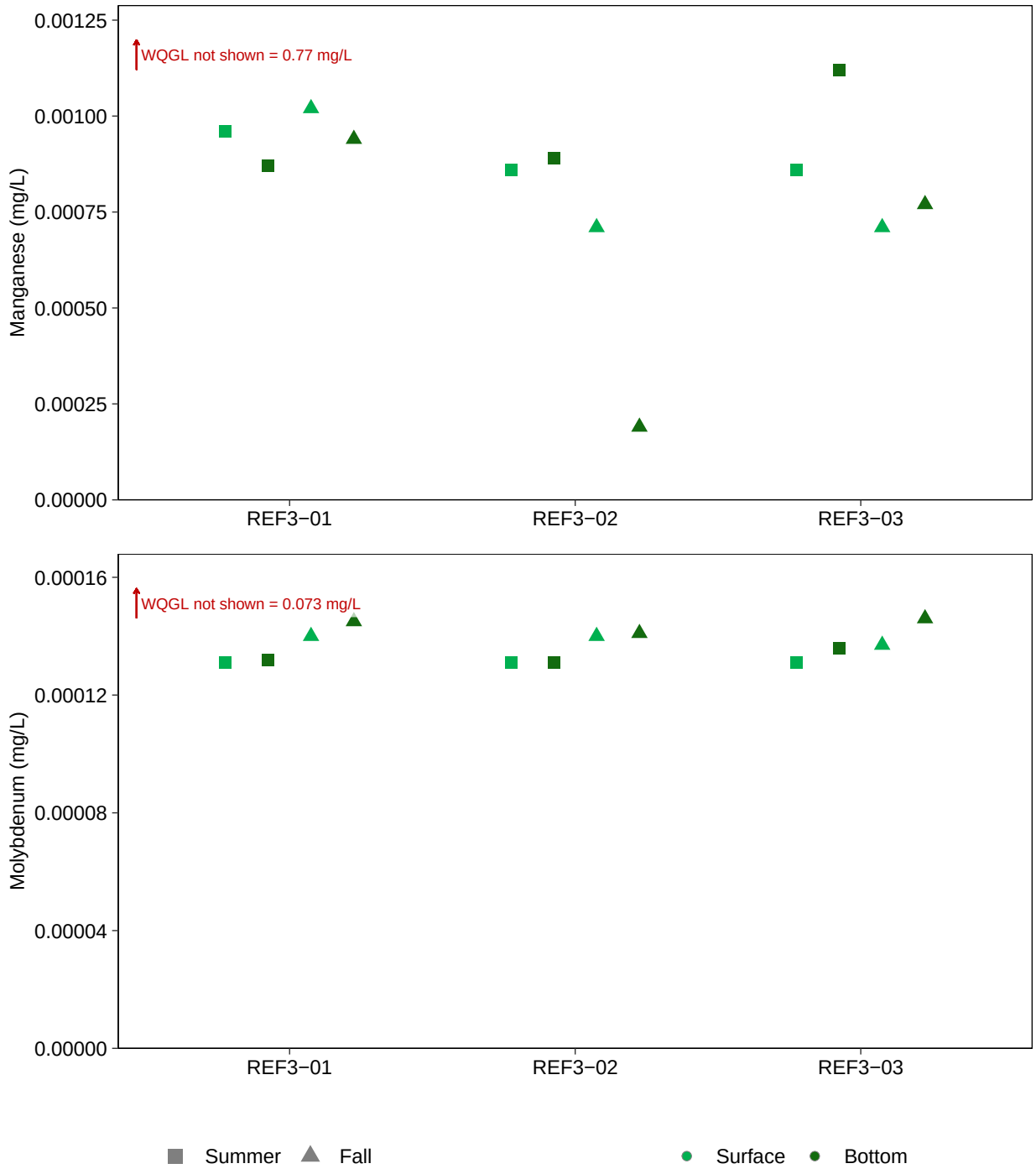

Figure B.4: Water Chemistry Comparison Between the Surface and the Bottom of the Water Column at Reference Lake 3 Routine Monitoring Stations during Summer and Fall, Mary River Project CREMP, 2023

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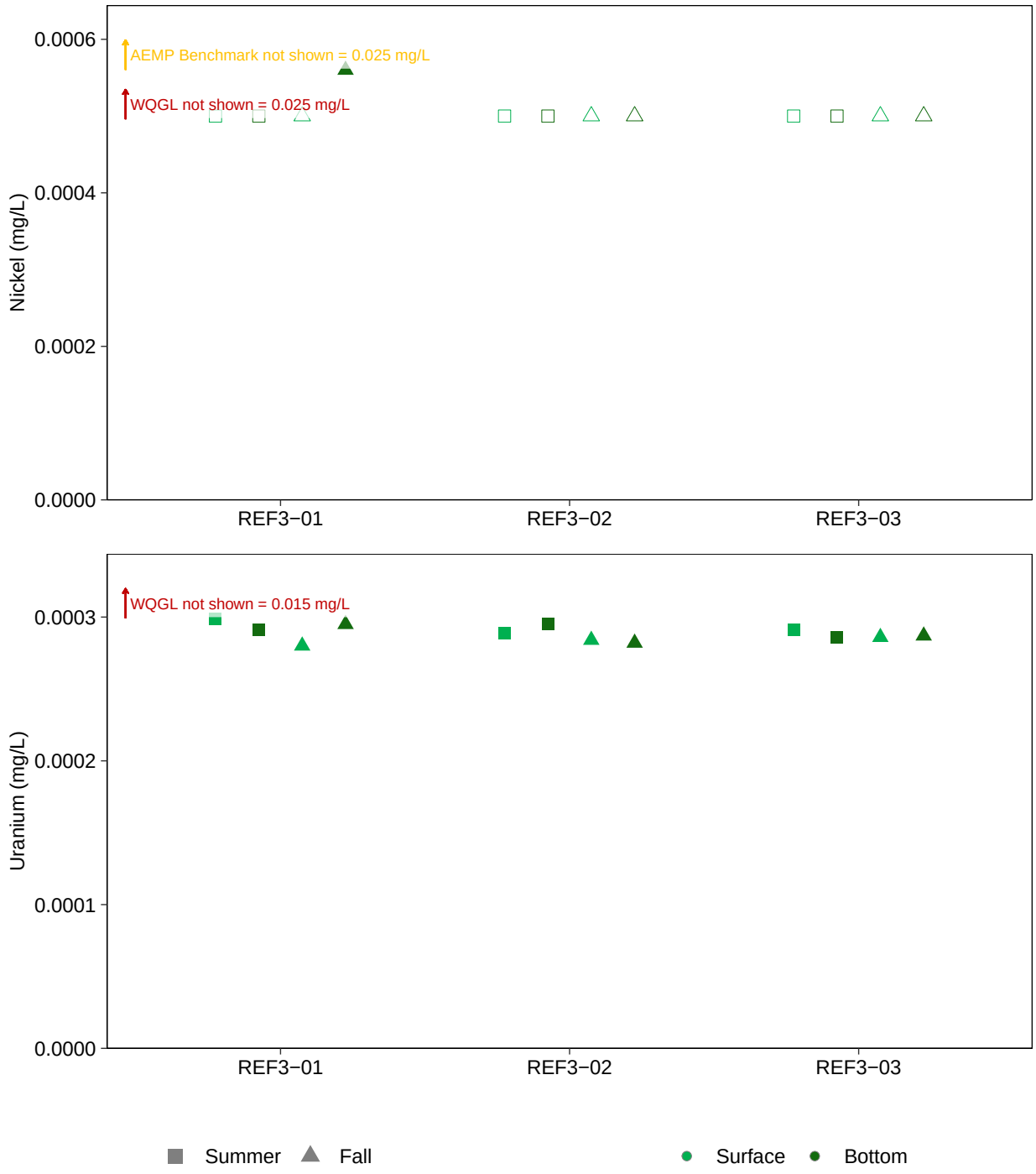

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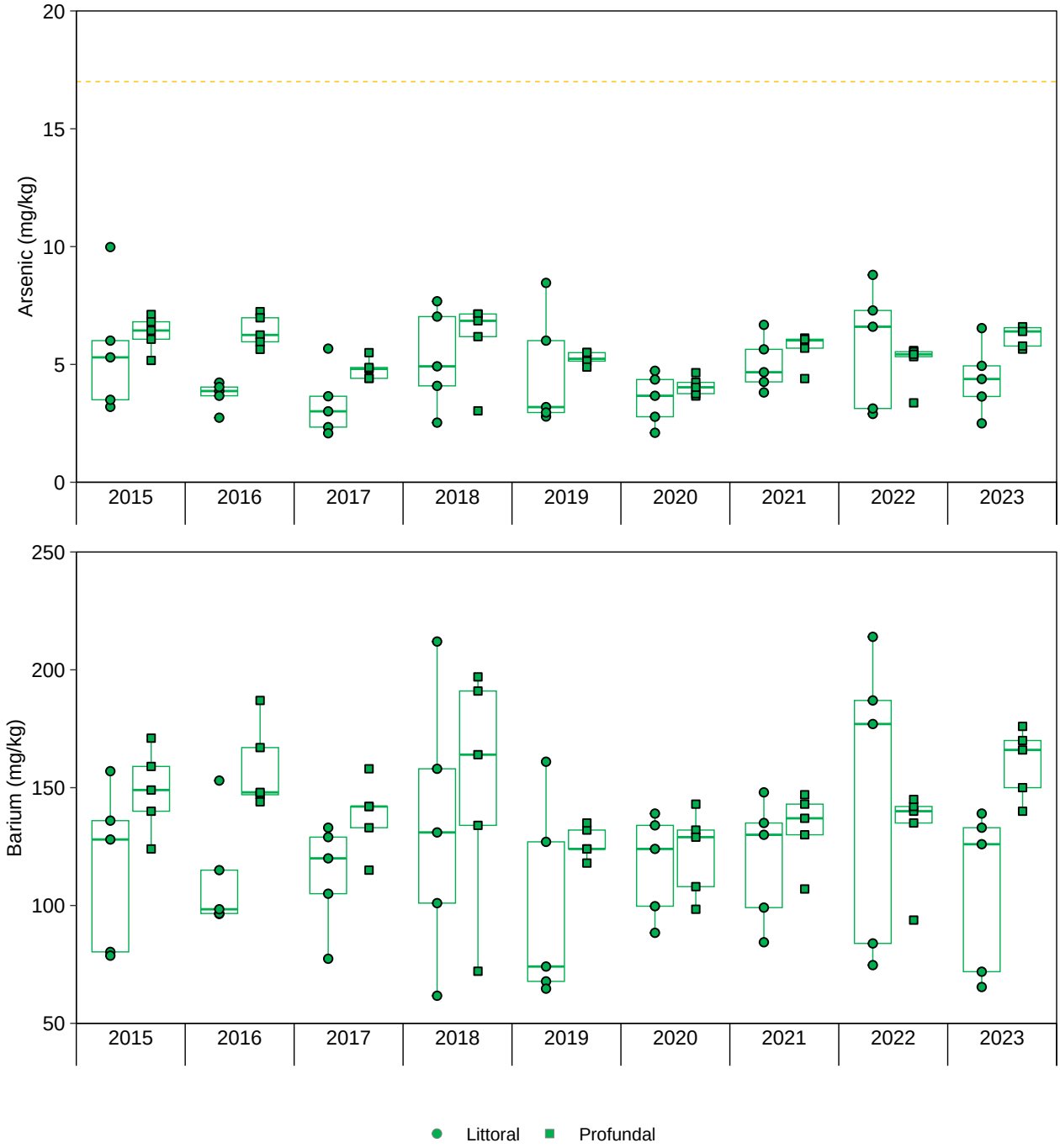
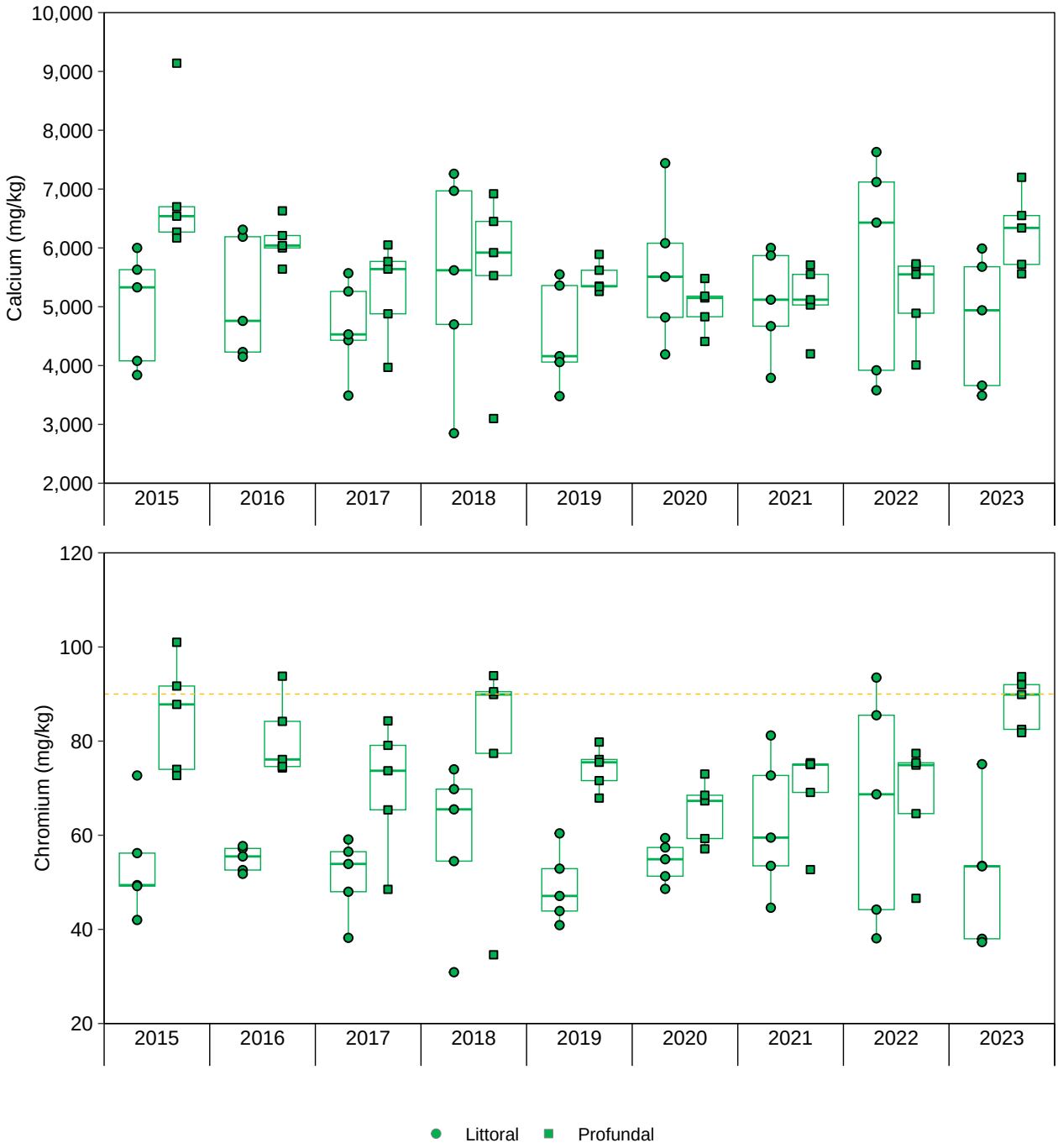


Figure B.5: Sediment Metal Concentrations at Littoral (<12m depth) and Profundal (>12m depth) Monitoring Stations of Reference Lake 3 (REF03), Mary River Project CREMP, 2015 to 2023

Notes: Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Orange dashed line indicates Sediment Quality Guideline. Boxplot lines show the 25th percentile, median, and 75th percentile with the boxplots whiskers showing the minimum and maximum (excluding potential outliers).



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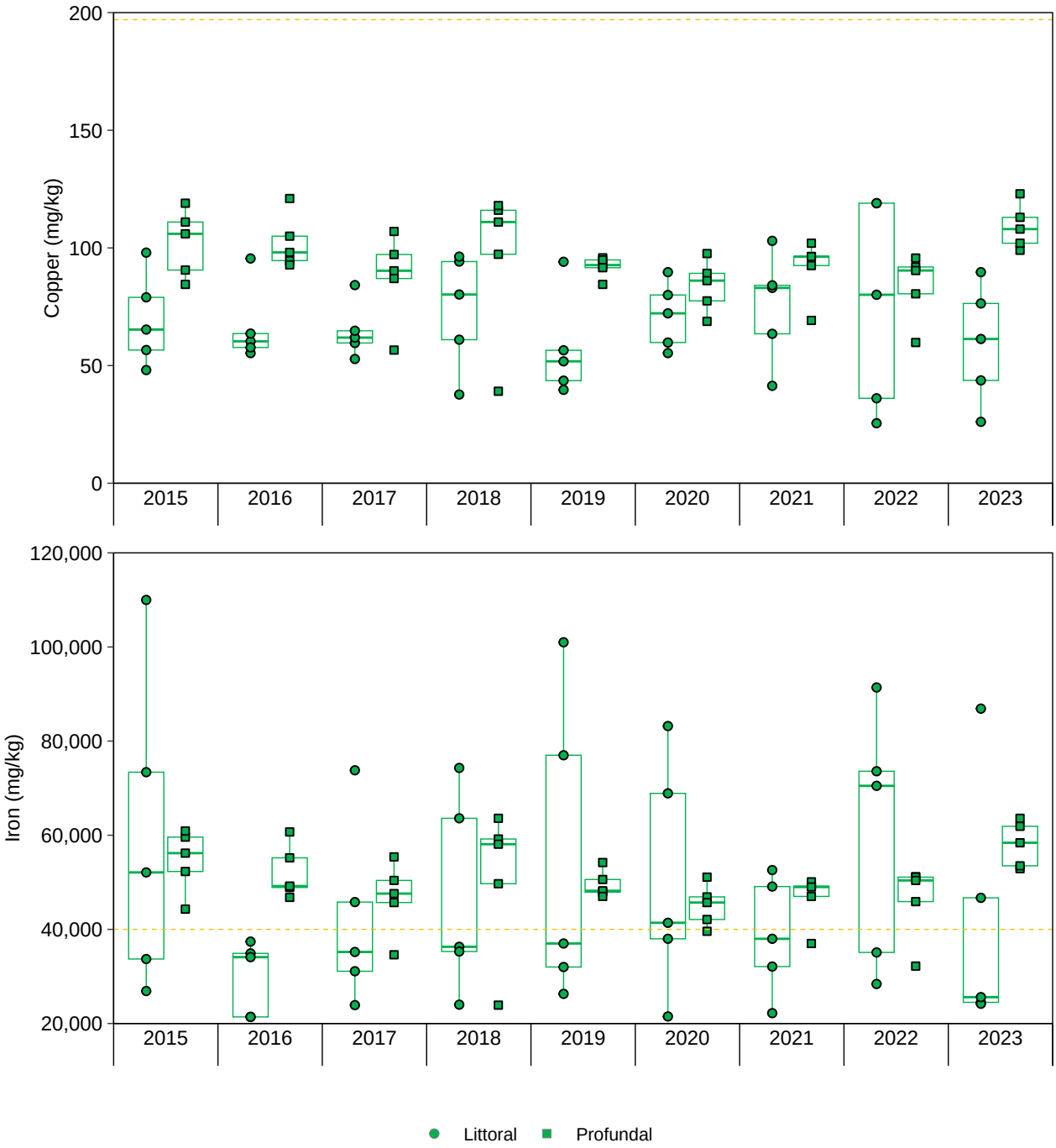

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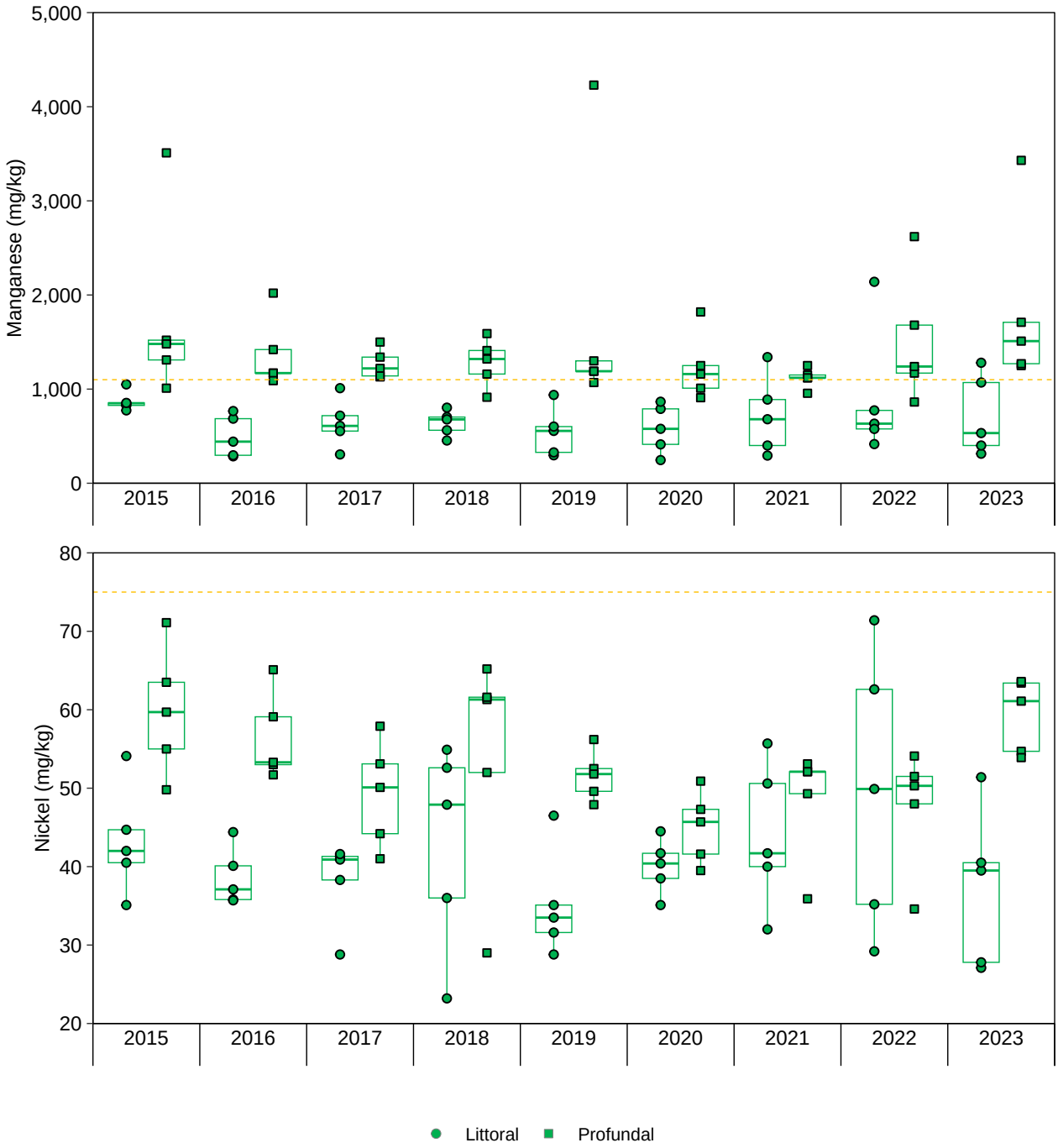

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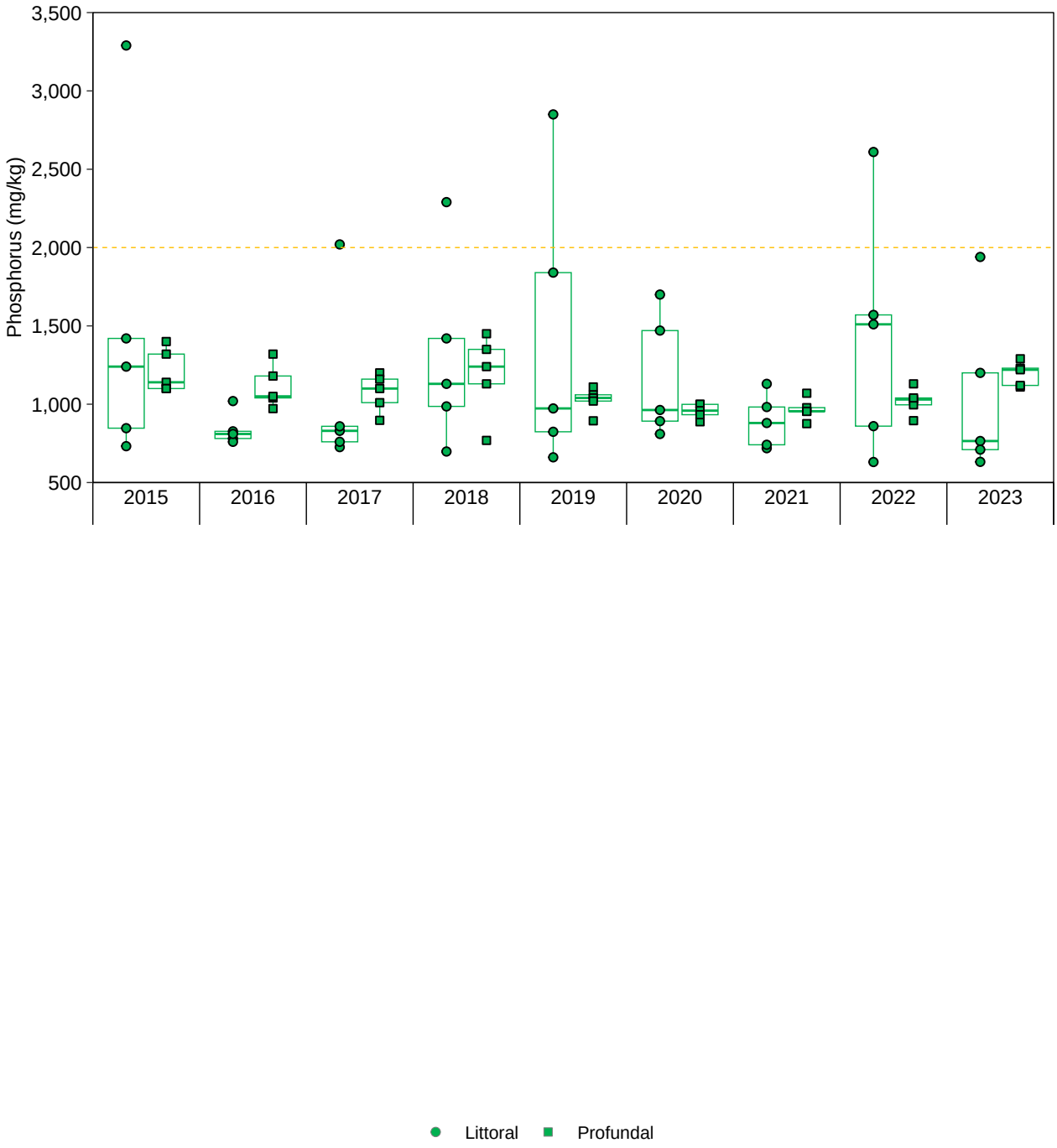

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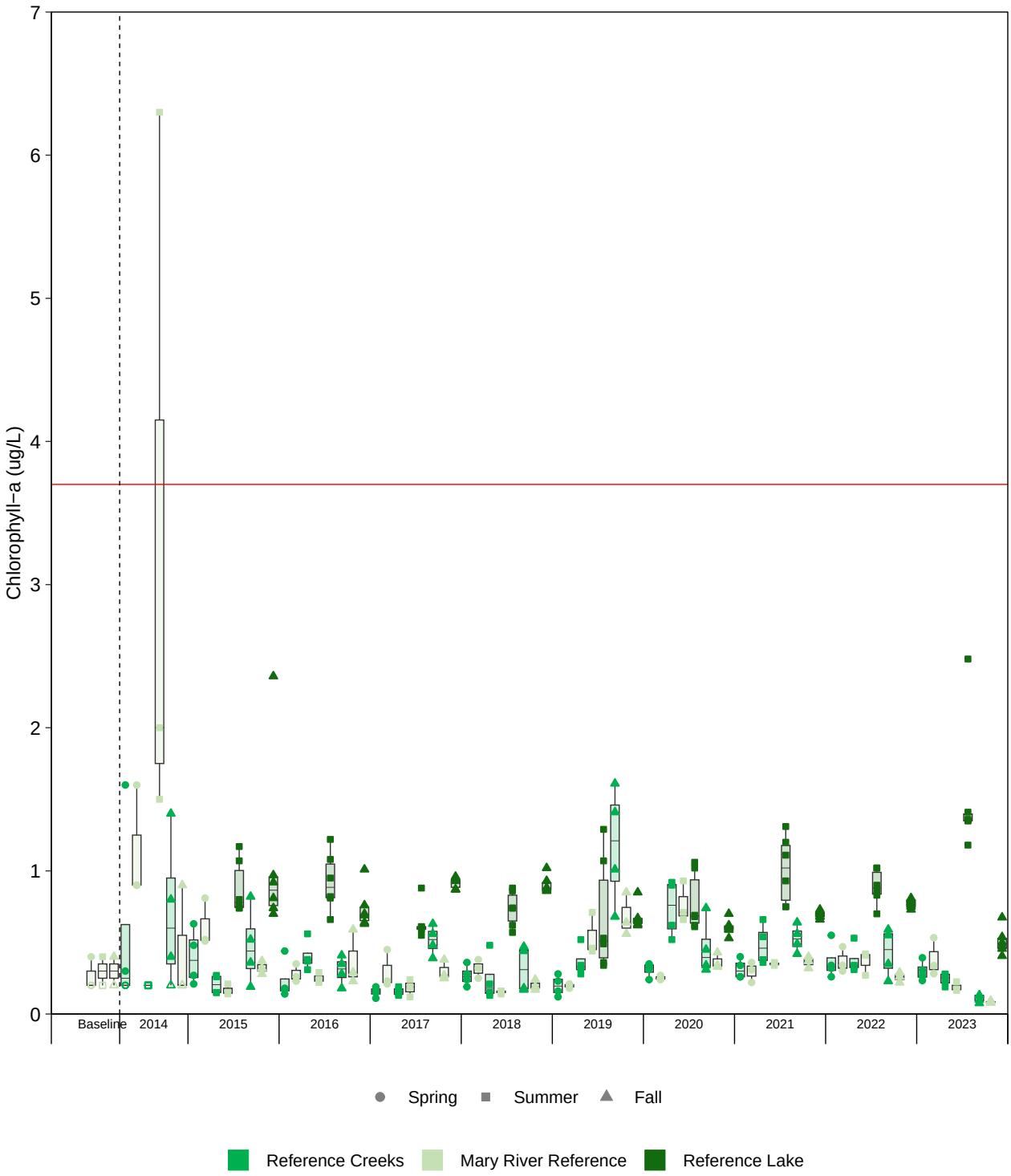


Figure B.6: Chlorophyll−a Concentration Seasonal Comparison from Mine Baseline (2005 to 2013), Construction (2014), and Operational (2015 to 2023) Periods at Stream, River, and Lake Reference Phytoplankton Monitoring Stations, Mary River Project CREMP

Notes: Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Red line indicates AEMP Benchmark. For each station, a chlorophyll−a concentration is provided for each of the bottom and the surface of the water column. Boxplot lines show the 25th percentile, median, and 75th percentile with the boxplots whiskers showing the minimum and maximum (excluding potential outliers).

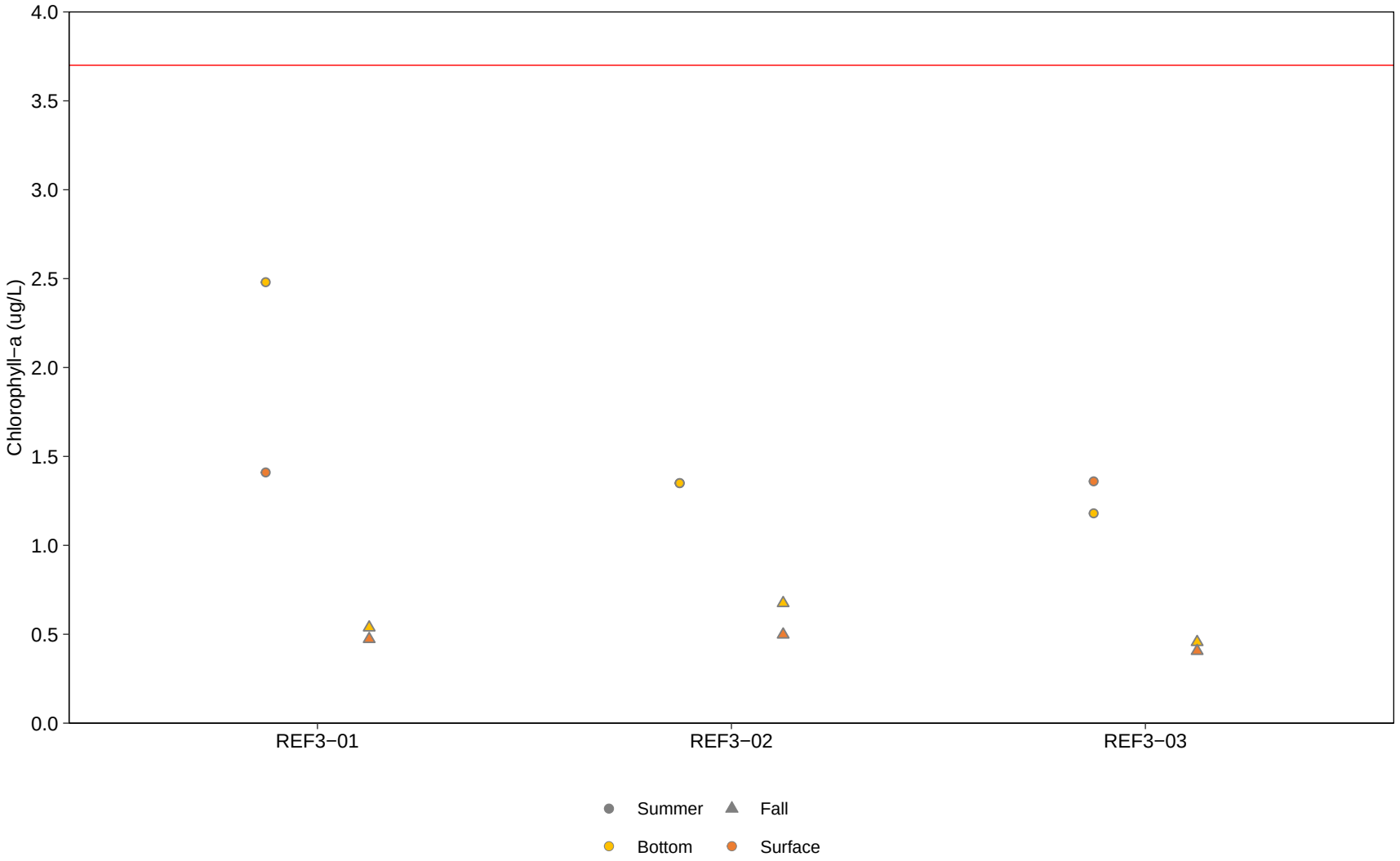


Figure B.7: Chlorophyll−a Concentrations at the Surface and Bottom of the Water Column at Reference Lake 3 Phytoplankton Monitoring Stations during Summer and Fall Sampling Events, Mary River Project CREMP, 2023

Notes: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Red line indicates AEMP Benchmark. Surface and bottom measurements of chlorophyll-a in summer at REF3-02 are identical and overlapping.

TABLES

Table B.2: Water Chemistry at Reference Stream Stations, Mary River Project CREMP, 2023

Parameters		Units	Water Quality Guideline (WQG)[a]	AEMP Benchmark	Spring Sampling Event				Summer Sampling Event				Fall Sampling Event			
					CLT-REF4	CLT-REF3	MRY-REF3	MRY-REF2	CLT-REF4	CLT-REF3	MRY-REF3	MRY-REF2	CLT-REF4	CLT-REF3	MRY-REF3	MRY-REF2
					5-Jul-2022	5-Jul-2022	4-Jul-2022	4-Jul-2022	01-Aug-22	01-Aug-22	01-Aug-22	01-Aug-22	04-Sep-22	04-Sep-22	04-Sep-22	04-Sep-22
Conventionals[b]	Conductivity (lab)	µmho/cm	-	-	23.1	36.1	13.8	42.4	121	106	83.3	120	151	126	97.1	137
	pH (lab)	pH	6.5 - 9.0	-	7.57	7.12	7.21	7.67	7.84	7.77	7.25	7.64	7.84	7.81	7.4	7.73
	Hardness (as $CaCO_3$)	mg/L	-	-	10.6	16.7	4.92	19.8	62.9	52.2	31.5	57.2	74.4	63	36.7	66.3
	Total Suspended Solids (TSS)	mg/L	-	-	<1.0	<1.0	9.4	<1.0	1.7	<1.0	3.5	<1.0	1	<1.0	<1.0	1
	Total Dissolved Solids (TDS)	mg/L	-	-	33	30	45	37	76	68	59	67	72	64	59	60
	Turbidity	NTU	-	-	2.9	0.51	4.6	0.8	2.32	1.3	16	1.78	0.48	1.3	7.86	1.67
	Alkalinity (as $CaCO_3$)	mg/L	-	-	10.7	17.6	4.6	21.7	61.6	53	30.5	66.7	77.9	64.1	29.4	68.4
Nutrients and Organics	Total Ammonia	mg/L	-	0.855	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Nitrate	mg/L	3	3	<0.020	<0.020	<0.020	<0.020	<0.020	0.023	0.023	<0.020	0.04	0.036	0.057	<0.020
	Nitrite	mg/L	0.06	0.06	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Total Kjeldahl Nitrogen (TKN)	mg/L	-	-	0.064	0.061	0.059	0.066	0.055	0.086	0.058	0.069	0.111	0.098	0.093	0.119
	Dissolved Organic Carbon	mg/L	-	-	1.02	2.15	0.67	1.16	1.22	1.73	7.29	2.15	1.39	1.78	1.39	2.24
	Total Organic Carbon	mg/L	-	-	1.19	1.21	0.93	1.13	1.56	2.09	1.56	2.15	1.23	1.56	1.04	1.78
	Total Phosphorus	mg/L	0.030[α]	-	0.0042	0.0041	0.0134	0.0037	0.003	<0.0020	0.0100	<0.0020	0.0054	<0.0020	0.005	0.0021
	Phenols	mg/L	0.004[α]	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Anions	Bromide (Br)	mg/L	-	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
	Chloride (Cl)	mg/L	120	120	<0.50	<0.50	0.72	0.64	0.52	0.6	4.88	2.07	0.63	0.7	6.45	2.09
	Sulphate (SO_4)	mg/L	218[β]	218	<0.30	0.34	0.73	0.32	1.35	2.11	6.35	1.61	1.7	2.55	7.77	1.54
Total Metals	Aluminum (Al)	mg/L	0.100	0.179	0.0319	0.0188	0.116	0.0232	0.0678	0.0411	***0.734***	0.161	0.0332	0.0138	***0.313***	0.0426
	Antimony (Sb)	mg/L	0.020[α]	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)	mg/L	0.005	0.005	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00012	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)	mg/L	-	-	0.00131	0.00215	0.0024	0.00214	0.00519	0.00557	0.0115	0.00741	0.0055	0.00652	0.01	0.0072
	Beryllium (Be)	mg/L	0.011[α]	-	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	0.000026	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
	Bismuth (Bi)	mg/L	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)	mg/L	1.5	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)	mg/L	0.00012	0.00008	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.0000061
	Calcium (Ca)	mg/L	-	-	2.23	3.48	1.08	4.04	11.7	9.97	6.66	11.3	15.4	12.4	8.25	13.6
	Chromium (Cr)	mg/L	0.001	0.003	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	***0.00154***	<0.00050	***0.00221***	<0.00050	0.00072	***0.0022***
	Cobalt (Co)	mg/L	0.0009[α]	0.004	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00035	<0.00010	<0.00010	<0.00010	0.00012	<0.00010
	Copper (Cu)	mg/L	0.002	0.0022	<0.00050	0.00062	<0.00050	<0.00050	0.00067	0.00134	0.00199	0.00076	0.00077	0.00129	0.00166	0.0011
	Iron (Fe)	mg/L	0.30	0.326	0.026	0.021	0.137	0.028	0.069	0.053	***0.967***	0.221	0.037	0.025	0.255	0.058
	Lead (Pb)	mg/L	0.001	0.001	<0.000050	0.000101	0.000153	<0.000050	0.000074	0.000192	0.000607	0.0001	0.000051	0.00006	0.000295	0.000076
	Lithium (Li)	mg/L	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Magnesium (Mg)	mg/L	-	-	1.21	1.92	0.575	2.21	7.09	6.29	3.8	7.11	9.12	7.94	4.46	8.64
	Manganese (Mn)	mg/L	0.935[β]	-	0.00067	0.00056	0.00316	0.00095	0.00123	0.00121	0.011	0.00354	0.00089	0.00051	0.00265	0.00155
	Mercury (Hg)	mg/L	0.000026	-	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)	mg/L	0.073	-	<0.000050	0.000148	0.000052	0.000067	0.000316	0.000669	0.000486	0.000224	0.000458	0.000733	0.000526	0.000272
	Nickel (Ni)	mg/L	0.025	0.025	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00082	0.00119	<0.00050	<0.00050	0.00076	0.00068	0.00126
	Potassium (K)	mg/L	-	-	0.202	0.285	0.221	0.29	0.622	0.694	1.14	0.786	0.679	0.791	1.01	0.791
	Selenium (Se)	mg/L	0.001	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Silicon (Si)	mg/L	-	-	0.33	0.52	0.43	0.37	0.92	1.08	2.45	1.1	0.99	1.17	1.78	1.07
	Silver (Ag)	mg/L	0.00025	0.0001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)	mg/L	-	-	0.166	0.262	0.46	0.49	1.04	1	3.16	1.64	1.44	1.15	3.73	1.87
	Strontium (Sr)	mg/L	-	-	0.00161	0.00223	0.00234	0.00305	0.01	0.00739	0.0159	0.0101	0.0128	0.009	0.0193	0.0117
	Thallium (Tl)	mg/L	0.0008	0.0008	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	0.000027	<0.000010	<0.00020	<0.00020	<0.00020	<0.00020
	Tin (Sn)	mg/L	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)	mg/L	-	-	0.0009	0.00055	0.00867	0.00096	0.00346	0.00144	0.0604	0.0104	0.00116	<0.00030	0.0137	<0.00150
	Uranium (U)	mg/L	0.015	-	0.000108	0.000214	0.000235	0.000324	0.00433	0.00253	0.0013	0.0018	0.0126	0.0049	0.00163	0.00257
	Vanadium (V)	mg/L	0.006[α]	0.006	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00138	<0.00050	<0.00050	<0.00050	0.00053	<0.00050
	Zinc (Zn)	mg/L	0.030	0.030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	0.0072

Indicates parameter concentration above applicable Water Quality Guideline.

BOLD Indicates parameter concentration above AEMP benchmark applicable to the mine lotic receiving environments.

Note: "-" indicates no WQG benchmark applicable.

[a] Canadian Water Quality Guideline for the protection of aquatic life (CCME 1987, 1999) except those indicated by α (Ontario Provincial Water Quality Objective [PWQO]) and β (British Columbia Water Quality Guideline [BCWQG]). See Table 2.2 for information regarding WQG criteria.

[b] AEMP Water Quality Benchmarks developed by Intrinsik (2013) using background water quality data. The values are specific to the Camp Lake system.

Table B.3: Water Chemistry at Mary River G0-09 Series Reference Stations, Mary River Mine CREMP, 2023

Parameters		Units	Water Quality Guideline (WQG)[a]	AEMP Benchmark	Spring Sampling Event			Summer Sampling Event			Fall Sampling Event		
					G0-09-A	G0-09	G0-09-B	G0-09-A	G0-09	G0-09-B	G0-09-A	G0-09	G0-09-B
					16-Jul-23	16-Jul-23	16-Jul-23	24-Aug-23	24-Aug-23	24-Aug-23	12-Sep-23	12-Sep-23	12-Sep-23
Conventionals[b]	Conductivity (lab)	µmho/cm	-	-	26.6	26.3	22.7	126	158	142	185	197	196
	pH (lab)	pH	6.5 - 9.0	-	7.55	7.59	7.31	7.97	8	8.04	7.97	8.03	7.99
	Hardness (as $CaCO_3$)	mg/L	-	-	12.1	11.9	10.2	54.8	73.3	63.7	83.3	91.6	89.7
	Total Suspended Solids (TSS)	mg/L	-	-	1	9	4.2	1.9	1.2	1.9	1.3	<1.0	<1.0
	Total Dissolved Solids (TDS)	mg/L	-	-	45	48	32	92	100	98	78	95	100
	Turbidity	NTU	-	-	2.59	1.78	3.73	9.02	4.06	7.26	3.11	1.21	1.48
	Alkalinity (as $CaCO_3$)	mg/L	-	-	12.7	11.9	10.6	54.4	78.9	67.4	86.1	93.3	91.2
Nutrients and Organics	Total Ammonia	mg/L	-	0.855	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Nitrate	mg/L	3	3	<0.020	<0.020	<0.020	0.029	<0.020	0.024	0.059	0.051	0.046
	Nitrite	mg/L	0.06	0.06	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Total Kjeldahl Nitrogen (TKN)	mg/L	-	-	0.081	0.069	0.071	0.066	0.077	0.056	0.095	0.091	0.097
	Dissolved Organic Carbon	mg/L	-	-	1.57	1.36	1.43	1.58	1.5	1.46	1.92	1.47	1.7
	Total Organic Carbon	mg/L	-	-	1.74	1.56	1.56	1.36	1.42	1.47	1.33	1.44	1.38
	Total Phosphorus	mg/L	0.030[α]	-	0.0078	0.0081	0.0079	0.0071	0.0036	0.0052	0.0024	0.0021	0.0033
	Phenols	mg/L	0.004[α]	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Anions	Bromide (Br)	mg/L	-	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
	Chloride (Cl)	mg/L	120	120	<0.50	<0.50	<0.50	4.45	3.57	4.71	5.58	5.35	5.82
	Sulphate (SO_4)	mg/L	218[β]	218	<0.30	<0.30	<0.30	2.67	2.49	2.66	3.15	3.13	3.25
Total Metals	Aluminum (Al)	mg/L	0.100	0.966	0.0354	0.0594	0.0907	0.299	0.0827	0.159	0.0362	0.0162	0.0255
	Antimony (Sb)	mg/L	0.020[α]	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)	mg/L	0.005	0.005	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)	mg/L	-	-	0.00217	0.00203	0.00261	0.00977	0.00866	0.00914	0.0108	0.0107	0.0106
	Beryllium (Be)	mg/L	0.011[α]	-	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
	Bismuth (Bi)	mg/L	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)	mg/L	1.5	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)	mg/L	0.00012	0.00006	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Calcium (Ca)	mg/L	-	-	2.53	2.67	2.22	10.8	14.7	12.5	17.6	19.3	18.6
	Chromium (Cr)	mg/L	0.001	0.003	<0.00050	<0.00050	<0.00050	0.00068	<0.00050	<0.00050	<0.00050	<0.00050	0.00065
	Cobalt (Co)	mg/L	0.0009[α]	0.004	<0.00010	<0.00010	<0.00010	0.00013	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)	mg/L	0.002	0.0024	<0.00050	<0.00050	0.00055	0.00123	0.00093	0.00111	0.00119	0.00093	0.00097
	Iron (Fe)	mg/L	0.30	0.874	0.029	0.053	0.088	0.302	0.098	0.19	0.036	0.016	0.022
	Lead (Pb)	mg/L	0.001	0.001	<0.000050	0.000077	0.000098	0.000248	0.000087	0.000153	0.000051	<0.000050	<0.000050
	Lithium (Li)	mg/L	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Magnesium (Mg)	mg/L	-	-	1.36	1.31	1.18	6.53	8.7	7.61	10.7	11.6	11.1
	Manganese (Mn)	mg/L	0.935[β]	-	0.00186	0.00326	0.00377	0.00387	0.00147	0.00244	0.0008	0.00036	0.00046
	Mercury (Hg)	mg/L	0.000026	-	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)	mg/L	0.073	-	<0.000050	<0.000050	<0.000050	0.000439	0.000282	0.000374	0.000553	0.000411	0.000434
	Nickel (Ni)	mg/L	0.025	0.025	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Potassium (K)	mg/L	-	-	0.278	0.236	0.274	1.19	1	1.1	1.26	1.15	1.17
	Selenium (Se)	mg/L	0.001	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Silicon (Si)	mg/L	-	-	0.38	0.38	0.5	1.59	1.11	1.23	1.15	1.18	1.18
	Silver (Ag)	mg/L	0.00025	0.0001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)	mg/L	-	-	0.256	0.224	0.25	3.14	2.67	3.17	4.1	3.76	3.88
	Strontium (Sr)	mg/L	-	-	0.00204	0.00189	0.002	0.0156	0.0151	0.0156	0.0212	0.0198	0.0198
	Thallium (Tl)	mg/L	0.0008	0.0008	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Tin (Sn)	mg/L	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)	mg/L	-	-	0.00156	0.00268	<0.00600	0.0181	0.00613	0.0112	0.0017	0.00085	0.00115
	Uranium (U)	mg/L	0.015	-	0.000091	0.000115	0.000117	0.00319	0.0031	0.0032	0.00701	0.006	0.00617
	Vanadium (V)	mg/L	0.006[α]	0.006	<0.00050	<0.00050	<0.00050	0.0007	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)	mg/L	0.030	0.030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030

Indicates parameter concentration above the applicable Water Quality Guideline.

BOLD Indicates parameter concentration above the AEMP benchmark.

[a] Canadian Water Quality Guideline for the protection of aquatic life (CCME 1987, 1999) except those indicated by α (Ontario Provincial Water Quality Objective [PWQO]) and β (British Columbia Water Quality Guideline [BCWQG]). See Table 2.2 for information regarding WQG criteria.

[b] AEMP Water Quality Benchmarks developed by Intrinsik (2013) using background water quality data. The indicated values are specific to the Mary River system.

Table B.4: Water Chemistry at Reference Lake 3, Mary River Project CREMP, 2023

Parameters		Units	Water Quality Guideline (WQG)[a]	AEMP Benchmark[b]	Summer Sampling Event						Fall Sampling Event					
					REF3-01 Bottom	REF3-01 Surface	REF3-02 Bottom	REF3-02 Surface	REF3-03 Bottom	REF3-03 Surface	REF3-01 Bottom	REF3-01 Surface	REF3-02 Bottom	REF3-02 Surface	REF3-03 Bottom	REF3-03 Surface
					07-Aug-23	07-Aug-23	07-Aug-23	07-Aug-23	07-Aug-23	07-Aug-23	05-Sep-23	05-Sep-23	05-Sep-23	05-Sep-23	05-Sep-23	05-Sep-23
Conventionals[b]	Conductivity (lab)	µmho/cm	-	-	74.5	74.8	74.9	74.6	76.4	75.3	74	74.1	74	73.6	73.9	73.7
	pH (lab)	pH	6.5 - 9.0	-	7.48	7.43	7.44	7.59	7.22	7.51	7.66	7.71	7.62	7.64	7.68	7.66
	Hardness (as $CaCO_3$)	mg/L	-	-	34.3	34.5	34.4	34.4	34.6	34.1	35.3	35	34.3	34.9	33.8	34.7
	Total Suspended Solids (TSS)	mg/L	-	-	<1.3	<1.6	<1.3	<1.3	<1.3	<1.3	<1.0	<1.0	1.5	<1.0	<1.0	<1.0
	Total Dissolved Solids (TDS)	mg/L	-	-	49	49	50	44	58	48	45	39	60	60	58	57
	Turbidity	NTU	-	-	0.58	0.3	1.2	0.24	1.03	0.79	1.73	0.29	0.29	1.87	0.39	0.2
	Alkalinity (as $CaCO_3$)	mg/L	-	-	45.8	49.9	41.2	46.2	37.7	39	58.7	45.1	38.4	38.1	48.7	49.5
Nutrients and Organics	Total Ammonia	mg/L	-	0.855	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Nitrate	mg/L	3	3	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
	Nitrite	mg/L	0.06	0.06	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Total Kjeldahl Nitrogen (TKN)	mg/L	-	-	0.149	0.142	0.153	0.14	0.148	0.145	0.156	0.141	0.148	0.154	0.113	0.118
	Dissolved Organic Carbon	mg/L	-	-	2.99	3.24	2.72	3.04	2.37	3.13	3.18	2.83	3.05	3.22	3	2.92
	Total Organic Carbon	mg/L	-	-	3.02	3.03	2.74	2.95	2.83	2.75	2.88	2.87	2.71	2.82	2.74	2.76
	Total Phosphorus	mg/L	0.020[α]	-	0.0033	0.0036	<0.0020	0.0051	0.0026	<0.0020	0.0021	<0.0020	0.0033	0.0029	0.0027	0.0173
	Phenols	mg/L	0.004[α]	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Anions	Bromide (Br)	mg/L	-	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
	Chloride (Cl)	mg/L	120	120	1.69	2.65	1.35	1.32	1.33	1.3	1.26	1.27	1.25	1.24	1.24	1.25
	Sulphate (SO_4)	mg/L	218[β]	218	3.49	3.35	3.04	3.1	3.07	3.02	2.93	2.95	2.92	2.92	2.9	2.9
Total Metals	Aluminum (Al)	mg/L	0.100	0.1	0.0038	0.0057	0.0064	0.0046	0.0054	0.0045	0.0099	0.012	0.0042	0.007	0.0076	0.0057
	Antimony (Sb)	mg/L	0.020[α]	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)	mg/L	0.005	0.005	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)	mg/L	-	-	0.00604	0.00602	0.00599	0.00586	0.00619	0.00589	0.00632	0.00637	0.00613	0.00595	0.00595	0.00608
	Beryllium (Be)	mg/L	0.011[α]	-	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
	Bismuth (Bi)	mg/L	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)	mg/L	1.5	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)	mg/L	0.00012	0.00006	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Calcium (Ca)	mg/L	-	-	6.75	6.8	6.7	6.65	6.84	6.75	7.01	7.06	6.89	6.97	6.83	6.96
	Chromium (Cr)	mg/L	0.001	0.003	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Cobalt (Co)	mg/L	0.0009[α]	0.004	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)	mg/L	0.002	0.0024	0.00099	0.00078	0.00081	0.00078	0.00106	0.00074	0.00104	0.00099	0.001	0.00081	0.00077	0.00072
	Iron (Fe)	mg/L	0.30	0.30	0.013	0.015	0.016	0.014	0.017	0.014	0.019	0.019	<0.010	0.014	0.013	0.012
	Lead (Pb)	mg/L	0.001	0.001	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)	mg/L	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Magnesium (Mg)	mg/L	-	-	4.06	4.24	4.27	4.18	4.01	4.12	4.52	4.53	4.54	4.55	4.35	4.38
	Manganese (Mn)	mg/L	0.935[β]	-	0.00087	0.00096	0.00089	0.00086	0.00112	0.00086	0.00094	0.00102	0.00019	0.00071	0.00077	0.00071
	Mercury (Hg)	mg/L	0.000026	-	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)	mg/L	0.073	-	0.000132	0.000131	0.000131	0.000131	0.000136	0.000131	0.000145	0.00014	0.000141	0.00014	0.000146	0.000137
	Nickel (Ni)	mg/L	0.025	0.025	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00056	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Potassium (K)	mg/L	-	-	0.753	0.764	0.767	0.749	0.77	0.743	0.841	0.834	0.82	0.812	0.828	0.815
	Selenium (Se)	mg/L	0.001	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Silicon (Si)	mg/L	-	-	0.49	0.47	0.47	0.47	0.52	0.48	0.48	0.48	0.46	0.46	0.46	0.47
	Silver (Ag)	mg/L	0.00025	0.0001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)	mg/L	-	-	0.832	0.83	0.835	0.838	0.818	0.823	0.896	0.898	0.882	0.868	0.875	0.866
	Strontium (Sr)	mg/L	-	-	0.00784	0.00785	0.00778	0.00775	0.00778	0.00741	0.00808	0.00802	0.00767	0.00779	0.00754	0.00793
	Thallium (Tl)	mg/L	0.0008	0.0008	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Tin (Sn)	mg/L	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.0001	<0.00010
	Titanium (Ti)	mg/L	-	-	<0.00030	<0.00030	0.00032	<0.00030	<0.00030	<0.00030	0.00034	0.00047	<0.00030	<0.00030	<0.00030	<0.00030
	Uranium (U)	mg/L	0.015	-	0.000291	0.000299	0.000295	0.000289	0.000286	0.000291	0.000295	0.00028	0.000282	0.000284	0.000287	0.000286
	Vanadium (V)	mg/L	0.006[α]	0.006	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)	mg/L	0.030	0.03	<0.0030	<0.0030	0.0045	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	0.0077	<0.0030	<0.0030

Indicates parameter concentration above applicable Water Quality Guideline.

[a] Canadian Water Quality Guideline for the protection of aquatic life (CCME 1987, 1999) except those indicated by α (Ontario Provincial Water Quality Objective [PWQO]) and β (British Columbia Water Quality Guideline [BCWQG]). See Table 2.2 for information regarding WQG.

[b] AEMP Water Quality Benchmarks developed by Intrinsik (2013) using background water quality data. These are the lowest values from the lake systems.

Table B.5: Sediment Particle Size, Total Organic Carbon, and Metal Concentrations at Reference Lake 3 (REF-03) Sediment Stations, Mary River Mine CREMP, August 2023

	Analyte	Units	Sediment Quality Guideline (SQG)[a]	Most Stringent AEMP Benchmark	Reference Lake 3 Station										Summary Statistics		
					REF-03-1 (littoral)	REF-03-6 (profundal)	REF-03-2 (littoral)	REF-03-7 (profundal)	REF-03-3 (littoral)	REF-03-8 (profundal)	REF-03-4 (littoral)	REF-03-9 (profundal)	REF-03-5 (littoral)	REF-03-10 (profundal)	Mean	Standard Deviation	Standard Error
Non-metals	Sand	%	-	-	37.9	54.5	48.0	54.1	40.0	37.9	63.1	46.8	40.2	40.1	46.3	8.6	2.73
	Silt	%	-	-	48.7	34.7	39.9	34.1	47.2	49.1	32.4	41.6	48.7	45.8	42.2	6.61	2.09
	Clay	%	-	-	13.4	10.8	12.1	11.8	12.8	13.0	4.5	11.7	11.1	14.1	11.5	2.68	0.846
	Moisture	%	-	-	88.2	46.8	88.4	46.1	37.1	58.2	70.6	64.0	78.7	45.3	62.3	18.67	5.90
	Total Organic Carbon	%	10[α]	-	5.10	4.69	8.56	4.34	1.75	4.15	4.00	4.21	6.36	4.11	4.73	1.76	0.558
Metals	Aluminum (Al)	mg/kg	-	-	22,600	27,400	15,600	28,300	13,600	27,100	11,800	25,000	13,600	25,600	21,060	6,620	2,094
	Antimony (Sb)	mg/kg	-	-	<0.10	0.12	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0	0
	Arsenic (As)	mg/kg	17	5.9	4.94	***6.56***	3.64	***6.60***	4.38	***6.40***	2.50	5.65	***6.54***	5.78	5.30	1.41	0.447
	Barium (Ba)	mg/kg	-	-	133	176.0	126	166	71.9	170	65.4	140	139	150	134	38.0	12.03
	Beryllium (Be)	mg/kg	-	-	0.91	1.21	0.75	1.21	0.62	1.13	0.54	0.95	0.58	1.02	0.89	0.26	0.081
	Bismuth (Bi)	mg/kg	-	-	<0.20	0.23	<0.20	0.22	<0.20	0.2	<0.20	<0.20	<0.20	<0.20	<0.20	0	0
	Boron (B)	mg/kg	-	-	19.4	23.6	15.6	21.9	11.1	21.1	10.3	18.4	13.1	18.9	17.3	4.61	1.458
	Cadmium (Cd)	mg/kg	3.5	1.5	0.157	0.214	0.176	0.210	0.063	0.194	0.079	0.172	0.202	0.165	0.163	0.0523	0.0165
	Calcium (Ca)	mg/kg	-	-	5,680	7,200	5,990	6,550	3,660	6,340	3,490	5,560	4,940	5,720	5,513	1,191	377
	Chromium (Cr)	mg/kg	90	79	75.1	***89.9***	53.5	***93.7***	38.0	***92.0***	37.3	***82.5***	53.4	***81.8***	69.7	22.12	6.99
	Cobalt (Co)	mg/kg	-	-	16.4	20.6	8.26	20.9	10.2	20.0	9.0	17.5	14.50	17.8	15.5	4.83	1.53
	Copper (Cu)	mg/kg	197	50	***90***	***108.0***	***76***	***123.0***	26.1	***113.0***	43.7	***99.0***	***61.3***	***102.0***	***84.2***	31.7	10.04
	Iron (Fe)	mg/kg	40,000[α]	34,400	***46,700***	***63,600***	24,500	***61,900***	**24,200**	***58,400***	25,600	***52,900***	***86,900***	***53,500***	***49,820***	20,279	6,413
	Lead (Pb)	mg/kg	91.3	35	17.1	26.0	14.4	23.8	12.7	22.4	11.0	19.4	14.0	20.1	18.1	5.06	1.60
	Lithium (Li)	mg/kg	-	-	37.5	50.1	29.5	48.8	29.7	44.3	24.3	39.0	24.3	41.6	36.9	9.55	3.02
	Magnesium (Mg)	mg/kg	-	-	15,600	18,800	10,800	19,000	9,660	18,700	8,340	16,900	10,500	17,000	14,530	4,225	1,336
	Manganese (Mn)	mg/kg	1,100[α,β]	657	***1,280***	***3,430***	314	***1,510***	401	***1,710***	533	***1,250***	***1,070***	***1,270***	***1,277***	***893***	282
	Mercury (Hg)	mg/kg	0.486	0.17	0.0646	0.1030	0.0539	0.0885	0.0061	0.0673	0.0154	0.0852	0.0710	0.0688	0.0624	0.0306	0.0097
	Molybdenum (Mo)	mg/kg	-	-	2.95	5.52	2.35	3.45	3.02	2.83	2.07	2.48	9.23	2.64	3.65	2.18	0.690
	Nickel (Ni)	mg/kg	75[α,β]	66	51.4	63.4	39.5	63.6	27.1	61.1	27.8	54.7	40.5	53.9	48.3	13.81	4.37
	Phosphorus (P)	mg/kg	2,000[α]	1,278	1,200	***1,290***	765	1,230	710	1,220	632	1,110	***1,940***	1,120	1,122	374	118
	Potassium (K)	mg/kg	-	-	5,650	6,650	3,910	6,920	4,000	6,670	3,310	6,110	3,730	6,100	5,305	1,406	445
	Selenium (Se)	mg/kg	-	-	0.87	1.51	0.71	0.91	<0.20	0.92	0.28	1.06	0.90	0.76	0.81	0.37	0.118
	Silver (Ag)	mg/kg	-	-	0.21	0.32	0.17	0.33	<0.10	0.29	<0.10	0.27	0.14	0.25	0.22	0.087	0.028
	Sodium (Na)	mg/kg	-	-	404	513	336	517	303	525	234	478	331	462	410	104	33
	Strontium (Sr)	mg/kg	-	-	13.7	19.0	13.3	18.0	10.3	16.8	9.1	14.8	12.6	14.9	14.2	3.17	1.002
	Sulphur (S)	mg/kg	-	-	1,700	2,700	2,000	1,800	<1000	1,800	<1000	1,800	1,600	1600	1,700	485	153
	Thallium (Tl)	mg/kg	-	-	0.634	1.000	0.394	0.900	0.271	0.869	0.270	0.734	0.416	0.734	0.622	0.268	0.0848
	Tin (Sn)	mg/kg	-	-	<2.0	2.2	<2.0	2.2	<2.0	2.2	<2.0	<2.0	<2.0	<2.0	<2.0	0	0
	Titanium (Ti)	mg/kg	-	-	1,170	1,510	909	1,470	1,300	1,540	990	1,420	1,010	1,380	1,270	234	74
	Uranium (U)	mg/kg	-	-	24.5	31.9	9.5	33.4	10.7	30.4	12.90	23.6	13.4	27.6	21.8	9.30	2.94
	Vanadium (V)	mg/kg	-	-	66.0	80.5	50.9	84.6	45.2	82.5	40.0	72.2	47.1	73.7	64.3	16.96	5.36
	Zinc (Zn)	mg/kg	315	123	90.3	113.0	74.6	120.0	51.1	117.0	52.6	101.0	68.4	103.0	89.1	25.94	8.20
	Zirconium (Zr)	mg/kg	-	-	3.1	4.1	5.8	5.1	13.3	4.5	5.0	4.2	4.0	4.0	5.3	2.90	0.92

Indicates parameter concentration above Sediment Quality Guideline (SQG).

BOLD Indicates parameter concentration above the most stringent AEMP Benchmark.

Note: '-' indicates no SQG applicable, or that Standard Deviation and Standard Error could not be calculated.

[a] Canadian Sediment Quality Guideline for the protection of aquatic life, probable effects level (PEL; CCME 2015) except those indicated by α (Ontario Provincial Sediment Quality Objective [PSQO], severe effect level (SEL); OMOE 1993) and β (British Columbia Working Sediment Quality Guideline [BCSQG], probable effects level (PEL; BCMOE 2015)).

Table B.6: Statistical Comparison of Physical Sediment Quality Between Littoral and Profundal Stations of Reference Lake 3, Mary River Project CREMP, August 2023

Habitat Variable	Statistical Test Results					Summary Statistics						
	Statistical Analysis[a]	Transformation	Significant Difference Between Areas?	P-value	MOD[b]	Station Type	Sample Size (n)	Mean	Standard Deviation	Standard Error	Minimum	Maximum
Sand-Sized Particles (% by weight)	tequal	None	NO	0.888	ns	Littoral	5	45.8	10.4	2.08	37.9	63.1
						Profundal	5	46.7	7.69	1.54	37.9	54.5
Silt-Sized Particles (% by weight)	tequal	None	NO	0.609	ns	Littoral	5	43.4	7.14	1.43	32.4	48.7
						Profundal	5	41.1	6.64	1.33	34.1	49.1
Clay-Sized Particles (% by weight)	M-W	Rank	NO	0.841	ns	Littoral	5	10.8	3.61	0.723	4.50	13.4
						Profundal	5	12.3	1.28	0.257	10.8	14.1
Moisture (% by weight)	tequal	None	NO	0.079	ns	Littoral	5	72.6	21.2	4.24	37.1	88.4
						Profundal	5	52.1	8.50	1.70	45.3	64.0
Total Organic Carbon (%)	tunequal	None	NO	0.496	ns	Littoral	5	5.15	2.55	0.510	1.75	8.56
						Profundal	5	4.30	0.235	0.0469	4.11	4.69

Indicates negative MOD (profundal concentration significantly lower than littoral).
Indicates positive MOD (littoral concentration significantly lower than profundal).
Highlighted values indicate significant difference between study areas based on ANOVA p-value less than 0.05.

[a] Statistical tests included tequal (t-test assuming equal variance), tunequal (t-test assuming unequal variance), and M-W (Mann-Whitney U-test).

[b] MOD is calculated as $(MCT_{profundal} - MCT_{littoral})/MCT_{littoral}*100$.

Table B.7: Phytoplankton Monitoring Data Collected at Lotic Reference Stations, Mary River Mine CREMP, 2023

		Reference Creek Stations				Mary River Reference Stations		
	Station	CLT-REF3	CLT-REF4	MRY-REF2	MRY-REF3	G0-09-A	G0-09	G0-09-B
Sample Collection Date	Spring	16-Jul-23	16-Jul-23	16-Jul-23	16-Jul-23	16-Jul-23	16-Jul-23	16-Jul-23
	Summer	24-Aug-23	24-Aug-23	24-Aug-23	24-Aug-23	24-Aug-23	24-Aug-23	24-Aug-23
	Fall	12-Sep-23	12-Sep-23	12-Sep-23	12-Sep-23	12-Sep-23	12-Sep-23	12-Sep-23
Chlorophyll-a (µg/L)	Spring	0.266	0.307	0.393	0.234	0.282	0.533	0.338
	Summer	0.189	0.28	0.277	0.227	0.226	0.175	0.165
	Fall	0.099	0.13	0.131	0.076	0.093	0.08	0.08
	Average	0.18	0.46	0.48	0.33	0.30	0.38	0.31
	Standard Deviation	0.08	0.10	0.13	0.09	0.10	0.24	0.13
	Standard Error	0.05	0.06	0.08	0.05	0.06	0.14	0.08
Phaeophytin-a (µg/L)	Spring	0.60	0.65	0.70	0.59	0.62	0.81	0.62
	Summer	0.28	0.33	0.39	0.33	0.3	0.24	<0.200
	Fall	0.145	0.195	0.19	0.15	0.1	0.105	<0.100
	Average	0.34	0.46	0.48	0.33	0.30	0.38	0.31
	Standard Deviation	0.23	0.23	0.26	0.22	0.26	0.37	0.28
	Standard Error	0.13	0.13	0.15	0.13	0.15	0.22	0.16

Table B.8: Benthic Invertebrate Community Summary Statistics for Unnamed Reference Creek and Mary River (G0-09) Reference Areas, Mary River Mine CREMP, August 2023

Metric	Area	Mean	Standard Deviation	Standard Error	Minimum	Median	Maximum
Density (no. organisms / m^2)	Unnamed Reference Creek	505	275	123	226	448	864
	Mary River G0-09 Reference	434	212	94.7	208	387	670
Richness (Number of Taxa)	Unnamed Reference Creek	16.4	3.51	1.57	13.0	16.0	22.0
	Mary River G0-09 Reference	9.00	3.16	1.41	5.00	9.00	13.0
Simpson's Evenness	Unnamed Reference Creek	0.930	0.0363	0.0163	0.874	0.942	0.962
	Mary River G0-09 Reference	0.727	0.0740	0.0331	0.650	0.734	0.831
Nemata (% of community)	Unnamed Reference Creek	2.45	2.19	0.978	0	2.56	5.56
	Mary River G0-09 Reference	0.292	0.423	0.189	0	0	0.926
% Hydracarina (% of community)	Unnamed Reference Creek	10.4	7.41	3.31	2.53	6.64	19.2
	Mary River G0-09 Reference	0.404	0.400	0.179	0	0.535	0.926
% Oligochaeta (% of community)	Unnamed Reference Creek	1.72	2.11	0.942	0	0.800	4.76
	Mary River G0-09 Reference	-	-	-	-	-	-
% Ostracoda (% of community)	Unnamed Reference Creek	7.37	6.38	2.85	0.505	8.00	14.3
	Mary River G0-09 Reference	-	-	-	-	-	-
Chironomidae (% of community)	Unnamed Reference Creek	48.0	19.7	8.82	20.6	45.6	70.1
	Mary River G0-09 Reference	56.3	10.9	4.90	41.9	59.3	69.5
Metal Sensitive Chironomidae (% of community)	Unnamed Reference Creek	12.1	9.29	4.15	0	13.7	22.3
	Mary River G0-09 Reference	12.5	13.0	5.82	3.81	8.83	35.4
% Simuliidae (% of community)	Unnamed Reference Creek	7.11	7.75	3.46	1.59	5.60	20.5
	Mary River G0-09 Reference	-	-	-	-	-	-
Tipulidae (% of community)	Unnamed Reference Creek	3.91	2.09	0.934	0.830	4.04	6.35
	Mary River G0-09 Reference	0.517	0.517	0.231	0	0.535	1.12
Collector-Gatherer FFG (% of community)	Unnamed Reference Creek	53.1	14.3	6.39	36.5	49.4	73.8
	Mary River G0-09 Reference	54.8	9.15	4.09	41.9	58.9	64.5
Filterer FFG (% of community)	Unnamed Reference Creek	8.09	7.67	3.43	1.52	5.60	19.2
	Mary River G0-09 Reference	0	0	0	0	0	0
Shredder FFG (% of community)	Unnamed Reference Creek	16.8	12.6	5.64	6.50	10.9	38.1
	Mary River G0-09 Reference	1.03	1.28	0.570	0	0.926	3.12
Clinger HPG (% of community)	Unnamed Reference Creek	37.3	18.0	8.04	14.5	32.1	62.7
	Mary River G0-09 Reference	43.4	10.5	4.69	32.0	38.9	58.1
Sprawler HPG (% of community)	Unnamed Reference Creek	49.6	13.0	5.81	33.2	47.8	66.8
	Mary River G0-09 Reference	54.5	8.91	3.99	41.9	58.0	63.9
Burrower HPG (% of community)	Unnamed Reference Creek	13.1	8.91	3.98	4.15	10.4	25.5
	Mary River G0-09 Reference	2.16	1.61	0.721	0	2.48	4.07

Notes: "-" indicates no available data. Sample size equals five for both study areas.

Table B.9: Benthic Invertebrate Community Statistical Comparison Results between Littoral and Profundal Stations at Reference Lake 3, Mary River Project CREMP, August 2023

Metric	Statistical Test Results					Summary Statistics						
	Statistical Test	Data Transform-ation	Significant Difference Between Areas?	p-value	Magnitude of Difference [a] (No. of SD)	Study Lake Littoral Habitat	Mean (n = 5)	Standard Deviation	Standard Error	Minimum	Median	Maximum
Density (Individuals/m^2)	tequal	log10	YES	<0.001	-3.0	littoral	880	415	186	534	663	1,533
						profundal	222	51.1	22.9	172	207	301
Richness (Number of Taxa)	tequal	log10	YES	0.005	-2.3	littoral	9.20	2.59	1.16	5.00	10.0	12.0
						profundal	4.20	1.30	0.583	3.00	4.00	6.00
Simpson's Evenness (E)	tequal	none	NO	0.155	-0.75	littoral	0.659	0.216	0.0968	0.422	0.782	0.874
						profundal	0.497	0.0804	0.0359	0.377	0.508	0.602
Shannon's Diversity	tequal	none	YES	0.023	-1.4	littoral	1.92	0.610	0.273	1.38	1.72	2.58
						profundal	1.09	0.274	0.123	0.695	1.21	1.37
Hydracarina (%)	tequal	none	NO	0.249	1.2	littoral	2.86	1.87	0.837	0	3.23	4.92
						profundal	5.17	3.72	1.66	0	4.55	10.0
Ostracoda (%)	M-W	rank	YES	0.059	-0.97	littoral	52.3	29.9	13.4	5.19	50.0	78.7
						profundal	9.60	5.63	2.52	4.17	10.0	17.9
Chironomidae (%)	tunequal	log10	YES	0.028	1.5	littoral	37.3	23.5	10.5	15.7	37.1	72.7
						profundal	84.5	8.66	3.87	71.4	88.6	91.7
Metal Sensitive Chironomidae (%)	tequal	log10(x+1)	NO	0.283	-0.56	littoral	13.7	15.9	7.13	0	6.56	40.3
						profundal	4.97	5.92	2.65	0	2.86	13.6
Collector Gatherers (%)	tequal	none	NO	0.394	0.44	littoral	84.0	14.8	6.60	58.4	88.5	94.4
						profundal	90.5	6.41	2.87	83.3	90.0	100
Filterers (%)	M-W	rank	NO	0.236	-0.98	littoral	11.0	14.6	6.53	0	5.74	36.4
						profundal	2.65	4.03	1.80	0	0	9.09
Shredders (%)	M-W	rank	NO	0.480	-0.67	littoral	1.66	2.29	1.02	0	1.12	5.56
						profundal	1.67	3.73	1.67	0	0	8.33
Clingers (%)	tequal	log10(x+1)	NO	0.451	-0.38	littoral	13.9	15.6	6.96	0	10.7	40.3
						profundal	7.82	5.01	2.24	0	8.33	13.6
Sprawlers (%)	M-W	rank	YES	0.016	0.80	littoral	74.0	20.4	9.10	39.0	82.8	88.9
						profundal	90.9	3.99	1.78	86.4	90.0	97.1
Burrowers (%)	tequal	log10(x+1)	YES	0.002	-2.1	littoral	12.1	5.42	2.42	6.56	11.1	20.8
						profundal	1.29	1.78	0.795	0	0	3.57

P-value < 0.1.

Blue shaded values indicate significant difference (ANOVA p-value ≤ 0.10) that was also outside of a Critical Effect Size of ±2 SD_{REF}, indicating that the difference was ecologically meaningful.

Notes: "-" = no data.

[a] Magnitude of Difference = $(MCT_{Exp} - MCT_{Ref})/SD_{Ref}$. MCT = Measure of Central Tendency; SD = Standard Deviation. MCT and SD reported as median and MAD (Median Absolute Deviation) for rank-transformed data, as transformed means and SD for log transformed data, and as untransformed means and SD for untransformed data.

Table B.10: Statistical Comparisons For Length, Weight, and Condition Endpoints For Arctic Charr Captured by Electrofishing from Reference Lake 3, 2015 to 2023

Group	Indicator	Endpoint	Variables		Sample Size (n)									Test[a]	Year P-Value	Year 1	Year 2	Pairwise Comparisons[b]	
			Response	Covariate	2015	2016	2017	2018	2019	2020	2021	2022	2023					P-value	Magnitude of Difference (%)[c]
Non-YOY	Body Size	Fork Length	Fork Length (cm)	-	94	68	74	92	97	79	92	85	89	K-W	<0.001	2015	2016	0.024	5.8
																	2017	0.624	-4.3
																	2018	0.006	-16
																	2019	<0.001	45
																	2020	0.002	12
																	2021	0.003	-20
																	2022	0.043	-14
																	2023	0.393	1.4
																2016	2017	0.092	-9.6
																	2018	<0.001	-20
																	2019	<0.001	37
																	2020	0.483	5.5
																	2021	<0.001	-24
																	2022	<0.001	-19
																	2023	0.148	-4.1
																2017	2018	0.002	-12
																	2019	<0.001	52
																	2020	0.014	17
																	2021	<0.001	-16
																	2022	0.017	-11
																	2023	0.750	6.1
																2018	2019	<0.001	72
																	2020	<0.001	33
																	2021	0.772	-4.3
																	2022	0.519	1.7
																	2023	<0.001	21
																2019	2020	<0.001	-23
																	2021	<0.001	-44
																	2022	<0.001	-41
																	2023	<0.001	-30
																2020	2021	<0.001	-28
																	2022	<0.001	-23
																	2023	0.024	-9.1
																2021	2022	0.353	6.3
																	2023	<0.001	26
																2022	2023	0.005	19
	Body Size	Body Weight	Body Weight (g)	-	94	68	74	92	97	79	92	85	89	K-W	<0.001	2015	2016	0.020	23
																	2017	0.591	-8.4
																	2018	0.088	-32
																	2019	<0.001	211
																	2020	0.005	31
																	2021	0.005	-46
																	2022	0.029	-24
																	2023	0.019	36
																2016	2017	0.088	-26
																	2018	<0.001	-45
																	2019	<0.001	153
																	2020	0.708	6.1
																	2021	<0.001	-56
																	2022	<0.001	-38
																	2023	0.888	10
																2017	2018	0.033	-26
																	2019	<0.001	240
																	2020	0.031	43
																	2021	0.002	-41
																	2022	0.010	-17
																	2023	0.094	49
																2018	2019	<0.001	362
																	2020	<0.001	94
																	2021	0.273	-20
																	2022	0.613	13
																	2023	<0.001	102
																2019	2020	<0.001	-58
																	2021	<0.001	-83
																	2022	<0.001	-76
																	2023	<0.001	-56
																2020	2021	<0.001	-58
																	2022	<0.001	-42
																	2023	0.585	4.2
																2021	2022	0.570	40
																	2023	<0.001	151
																2022	2023	<0.001	78

Area P-value < 0.1 or Interaction P-value < 0.05.

Magnitude of Difference significant and greater than absolute Effect Size of 25% for length and weight endpoints, or 10% for condition endpoint.

[a] Statistical tests included the Kruskal Wallis H-test (K-W), ANOVA, and ANCOVA.

[b] Calculated as the difference in measure of central tendency (MCT) between areas (mine-exposed minus reference), expressed as a percentage of the reference area MCT.

[c] The magnitude of difference calculated as: [(Year 2 mean - Year 1 mean) / Year 1 mean] x 100. When there is a significant interaction in the ANCOVA, the magnitude of difference is calculated at the minimum and maximum values of overlap in covariate values as : [(Year 2 predicted mean - Year 1 area predicted mean) / Year 1 predicted mean] x 100.

[d] Three outliers (REF3-23-ACJ-08, Stdnt resid: 4.326; REF3-23-ACJ-61, Stdnt resid: 4.393; REF3-23-ACJ-38, Stdnt resid: 4.314) was removed from analysis.

[e] One outlier (REF3-17-ACJ-25, Stdnt resid: 4.163) was removed from analysis.

[f] Three outliers (REF3-23-ACJ-30, Stdnt resid: 4.593; REF3-23-ACJ-39, Stdnt resid: -4.931; REF3-23-ACJ-60, Stdnt resid: 8.413) was removed from analysis.

Table B.10: Statistical Comparisons For Length, Weight, and Condition Endpoints For Arctic Charr Captured by Electrofishing from Reference Lake 3, 2015 to 2023

Group	Indicator	Endpoint	Variables		Sample Size (n)									Test[a]	Year P-Value	Year 1	Year 2	Pairwise Comparisons[b]	
			Response	Covariate	2015	2016	2017	2018	2019	2020	2021	2022	2023					P-value	Magnitude of Difference (%)[c]
Non-YOY	Energy Storage	Condition	log10[Body Weight (g)]	log10[Fork Length (cm)]	94	68	74	92	97	79	92	85	86[d]	ANCOVA	<0.001	2015	2016	0.959	2.0
																	2017	1.000	0.070
																	2018	<0.001	12
																	2019	0.695	-2.8
																	2020	0.437	-3.4
																	2021	0.727	2.7
																	2022	0.712	-2.7
																	2023	<0.001	15
																2016	2017	0.976	-1.9
																	2018	<0.001	9.3
																	2019	0.103	-4.7
																	2020	0.045	-5.3
																	2021	1.000	0.69
																	2022	0.131	-4.6
																	2023	<0.001	13
																2017	2018	<0.001	11
																	2019	0.730	-2.9
																	2020	0.489	-3.5
																	2021	0.814	2.6
																	2022	0.750	-2.8
																	2023	<0.001	15
																2018	2019	<0.001	-13
																	2020	<0.001	-13
																	2021	<0.001	-7.9
																	2022	<0.001	-13
																	2023	0.412	3.5
																2019	2020	1.000	-0.60
																	2021	0.027	5.7
																	2022	1.000	0.10
																	2023	<0.001	19
																2020	2021	0.006	6.3
																	2022	1.000	0.71
																	2023	<0.001	20
																2021	2022	0.017	-5.3
																	2023	<0.001	12
																2022	2023	<0.001	19

Area P-value < 0.1 or Interaction P-value < 0.05.

Magnitude of Difference significant and greater than absolute Effect Size of 25% for length and weight endpoints, or 10% for condition endpoint.

[a] Statistical tests included the Kruskal Wallis H-test (K-W), ANOVA, and ANCOVA.

[b] Calculated as the difference in measure of central tendency (MCT) between areas (mine-exposed minus reference), expressed as a percentage of the reference area MCT.

[c] The magnitude of difference calculated as: [(Year 2 mean - Year 1 mean) / Year 1 mean] x 100. When there is a significant interaction in the ANCOVA, the magnitude of difference is calculated at the minimum and maximum values of overlap in covariate values as : [(Year 2 predicted mean - Year 1 area predicted mean) / Year 1 predicted mean] x 100.

[d] Three outliers (REF3-23-ACJ-08, Stdnt resid: 4.326; REF3-23-ACJ-61, Stdnt resid: 4.393; REF3-23-ACJ-38, Stdnt resid: 4.314) was removed from analysis.

[e] One outlier (REF3-17-ACJ-25, Stdnt resid: 4.163) was removed from analysis.

[f] Three outliers (REF3-23-ACJ-30, Stdnt resid: 4.593; REF3-23-ACJ-39, Stdnt resid: -4.931; REF3-23-ACJ-60, Stdnt resid: 8.413) was removed from analysis.

Table B.10: Statistical Comparisons For Length, Weight, and Condition Endpoints For Arctic Charr Captured by Electrofishing from Reference Lake 3, 2015 to 2023

Group	Indicator	Endpoint	Variables		Sample Size (n)									Test[a]	Year P-Value	Year 1	Year 2	Pairwise Comparisons[b]	
			Response	Covariate	2015	2016	2017	2018	2019	2020	2021	2022	2023					P-value	Magnitude of Difference (%)[c]
YOY	Body Size	Fork Length	Fork Length (cm)	-	-	31	26	8	-	21	11	15	11	K-W	<0.001	2016	2017	0.008	-6.4
																	2018	<0.001	-18
																	2020	0.005	-7.7
																	2021	<0.001	-18
																	2022	0.004	-7.7
																	2023	<0.001	-10
																2017	2018	0.065	-12
																	2020	0.733	-1.4
																	2021	0.024	-12
																	2022	0.537	-1.4
																	2023	0.140	-4.1
																2018	2020	0.121	12
																	2021	0.884	0
																	2022	0.213	12
																	2023	0.644	9.4
																2020	2021	0.056	-11
																	2022	0.767	0
																	2023	0.248	-2.8
																2021	2022	0.123	12
																	2023	0.508	9.4
																2022	2023	0.406	-2.8
	Body Size	Body Weight	Body Weight (g)	-	-	31	26	8	-	21	11	15	11	ANOVA	<0.001	2016	2017	0.964	-8.8
																	2018	0.031	-37
																	2020	0.109	-24
																	2021	<0.001	-46
																	2022	0.006	-34
																	2023	1.000	2.2
																2017	2018	0.172	-31
																	2020	0.591	-17
																	2021	0.003	-40
																	2022	0.086	-28
																	2023	0.978	12
																2018	2020	0.895	20
																	2021	0.978	-14
																	2022	1.000	3.8
																	2023	0.078	62
																2020	2021	0.207	-28
																	2022	0.904	-14
																	2023	0.302	35
																2021	2022	0.870	20
																	2023	0.002	87
																2022	2023	0.042	56
	Energy Storage	Condition	log10[Body Weight (g)]	log10[Fork Length (cm)]	-	31	25[e]	8	-	21	11	15	8[f]	ANCOVA	<0.001	2016	2017	0.065	12
																	2018	1.000	1.2
																	2020	0.997	-2.5
																	2021	0.982	-4.6
																	2022	0.176	-11
																	2023	0.003	26
																2017	2018	0.591	-9.9
																	2020	0.020	-13
																	2021	0.052	-15
																	2022	<0.001	-21
																	2023	0.436	12
																2018	2020	0.996	-3.7
																	2021	0.975	-5.7
																	2022	0.392	-12
																	2023	0.045	25
																2020	2021	1.000	-2.1
																	2022	0.493	-8.8
																	2023	<0.001	29
																2021	2022	0.886	-6.9
																	2023	0.001	32
																2022	2023	<0.001	42

Area P-value < 0.1 or Interaction P-value < 0.05.

Magnitude of Difference significant and greater than absolute Effect Size of 25% for length and weight endpoints, or 10% for condition endpoint.

[a] Statistical tests included the Kruskal Wallis H-test (K-W), ANOVA, and ANCOVA.

[b] Calculated as the difference in measure of central tendency (MCT) between areas (mine-exposed minus reference), expressed as a percentage of the reference area MCT.

[c] The magnitude of difference calculated as: [(Year 2 mean - Year 1 mean) / Year 1 mean] x 100. When there is a significant interaction in the ANCOVA, the magnitude of difference is calculated at the minimum and maximum values of overlap in covariate values as : [(Year 2 predicted mean - Year 1 area predicted mean) / Year 1 predicted mean] x 100.

[d] Three outliers (REF3-23-ACJ-08, Stdnt resid: 4.326; REF3-23-ACJ-61, Stdnt resid: 4.393; REF3-23-ACJ-38, Stdnt resid: 4.314) was removed from analysis.

[e] One outlier (REF3-17-ACJ-25, Stdnt resid: 4.163) was removed from analysis.

[f] Three outliers (REF3-23-ACJ-30, Stdnt resid: 4.593; REF3-23-ACJ-39, Stdnt resid: -4.931; REF3-23-ACJ-60, Stdnt resid: 8.413) was removed from analysis.

Table B.11: Statistical Comparisons For Length, Weight, and Condition Endpoints For Arctic Charr Captured by Gillnetting from Reference Lake 3, 2018 to 2023

Indicator	Endpoint	Variables		Sample Size (n)						Test[a]	Year P-Value	Year 1	Year 2	Pairwise Comparisons[b]	
		Response	Covariate	2018	2019	2020	2021	2022	2023					P-value	Magnitude of Difference (%)[c]
Body Size	Fork Length	Fork Length (cm)	-	34	27	138	56	93	11	K-W	<0.001	2018	2019	<0.001	-14
													2020	<0.001	-11
													2021	<0.001	-15
													2022	<0.001	-12
													2023	0.039	-12
												2019	2020	0.140	4.0
													2021	0.290	-1.5
													2022	0.716	2.0
													2023	0.191	2.4
												2020	2021	<0.001	-5.3
													2022	0.085	-1.9
													2023	0.617	-1.6
												2021	2022	0.053	3.6
													2023	0.030	3.9
												2022	2023	0.224	0.33
Body Size	Body Weight	Body Weight (g)	-	34	27	138	56	92	11	K-W	<0.001	2018	2019	<0.001	-34
													2020	<0.001	-32
													2021	<0.001	-43
													2022	<0.001	-38
													2023	0.359	-3.5
												2019	2020	0.334	2.3
													2021	0.148	-14
													2022	0.543	-7.0
													2023	0.016	46
												2020	2021	<0.001	-16
													2022	0.012	-9.1
													2023	0.036	42
												2021	2022	0.225	7.6
													2023	<0.001	68
												2022	2023	0.002	56
Energy Storage	Condition	log10[Body Weight (g)]	log10[Fork Length (cm)]	34	27	138	56	90[d]	11	ANCOVA	<0.001	2018	2019	1.000	0.055
													2020	0.081	-6.6
													2021	0.522	-5.0
													2022	<0.001	-10
													2023	0.006	17
												2019	2020	0.131	-6.6
													2021	0.537	-5.0
													2022	0.002	-10
													2023	0.131	-6.6
												2020	2021	0.967	1.7
													2022	0.153	-4.2
													2023	<0.001	26
												2021	2022	0.080	-5.8
													2023	<0.001	23
												2022	2023	<0.001	31

Area P-value < 0.1 or Interaction P-value < 0.05.

Magnitude of Difference significant and greater than absolute Effect Size of 25% for length and weight endpoints, or 10% for condition endpoint.

[a] Statistical tests included the Kruskal Wallis H-test (K-W), ANOVA, and ANCOVA.

[b] Calculated as the difference in measure of central tendency (MCT) between areas (mine-exposed minus reference), expressed as a percentage of the reference area MCT.

[c] The magnitude of difference calculated as: [(Year 2 mean - Year 1 mean) / Year 1 mean] x 100. When there is a significant interaction in the ANCOVA, the magnitude of difference is calculated at the minimum and maximum values of overlap in covariate values as : [(Year 2 predicted mean - Year 1 area predicted mean) / Year 1 predicted mean] x 100.

[d] Two outliers (REF3-22-AC-01, Stdnt resid:-6.094; REF3-22-AC-09, Stdnt resid:-4.009) was removed from analysis.

APPENDIX C

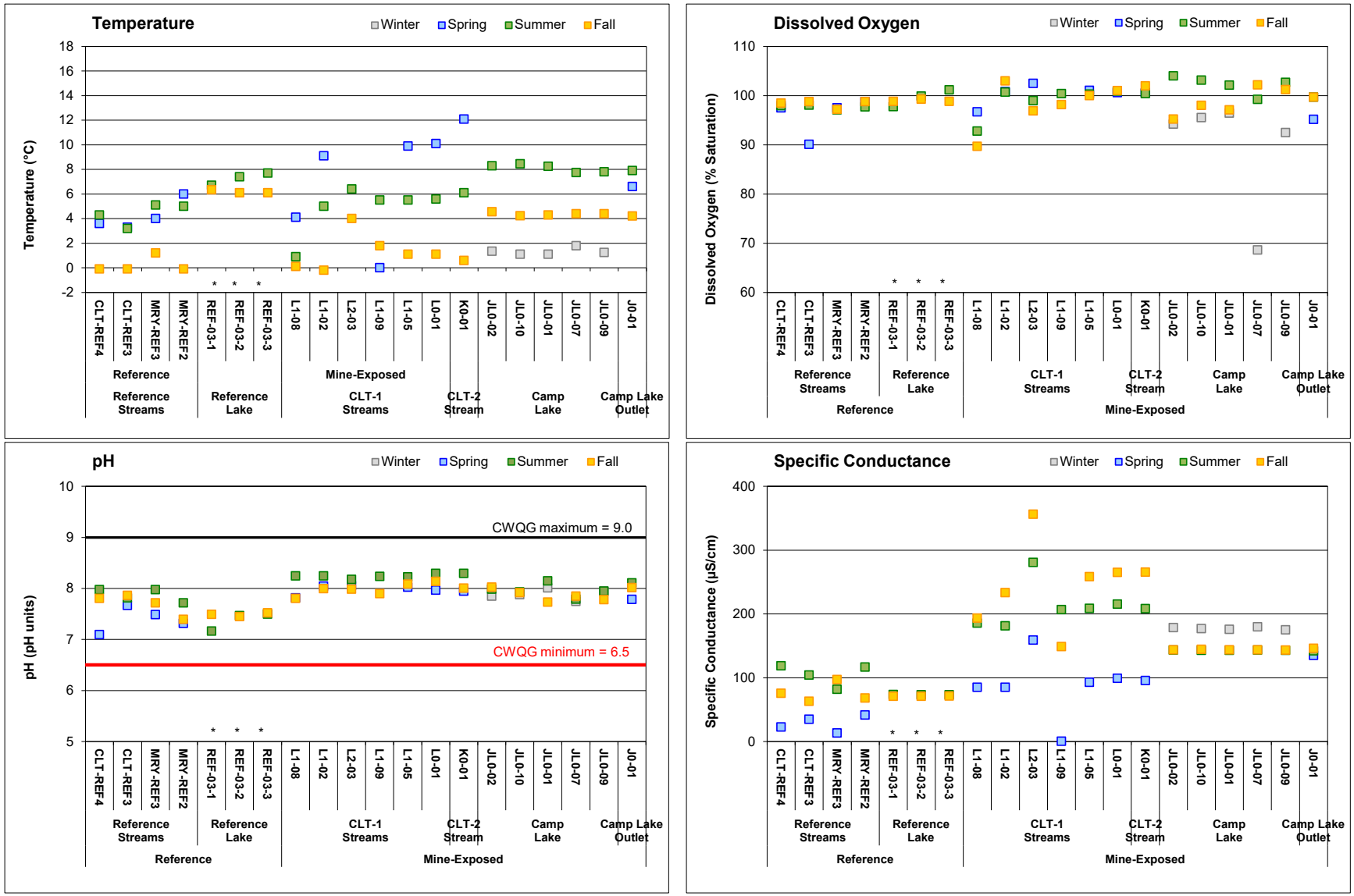


Figure C.1: Comparison of *In Situ* Water Quality Measured at Camp Lake System Water Quality Monitoring Stations in Winter, Spring, Summer, and Fall 2023, Mary River Project CREMP

Notes: Lake values represent mean of surface and bottom *in situ* water quality measurements. Streams were not sampled in winter. Lakes were not sampled in spring.
* Reference Lake 3 (REF-03) was not sampled in winter.

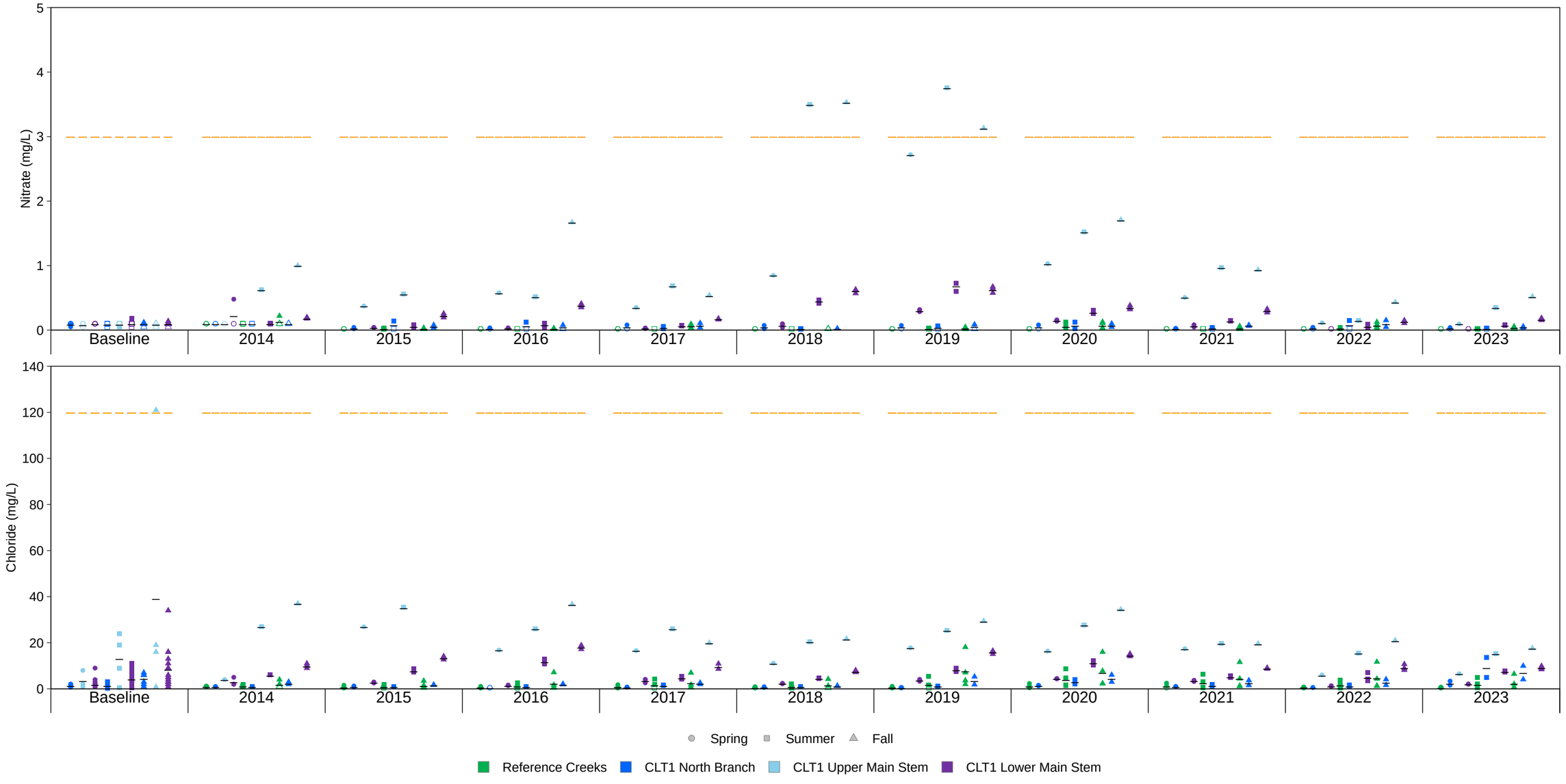
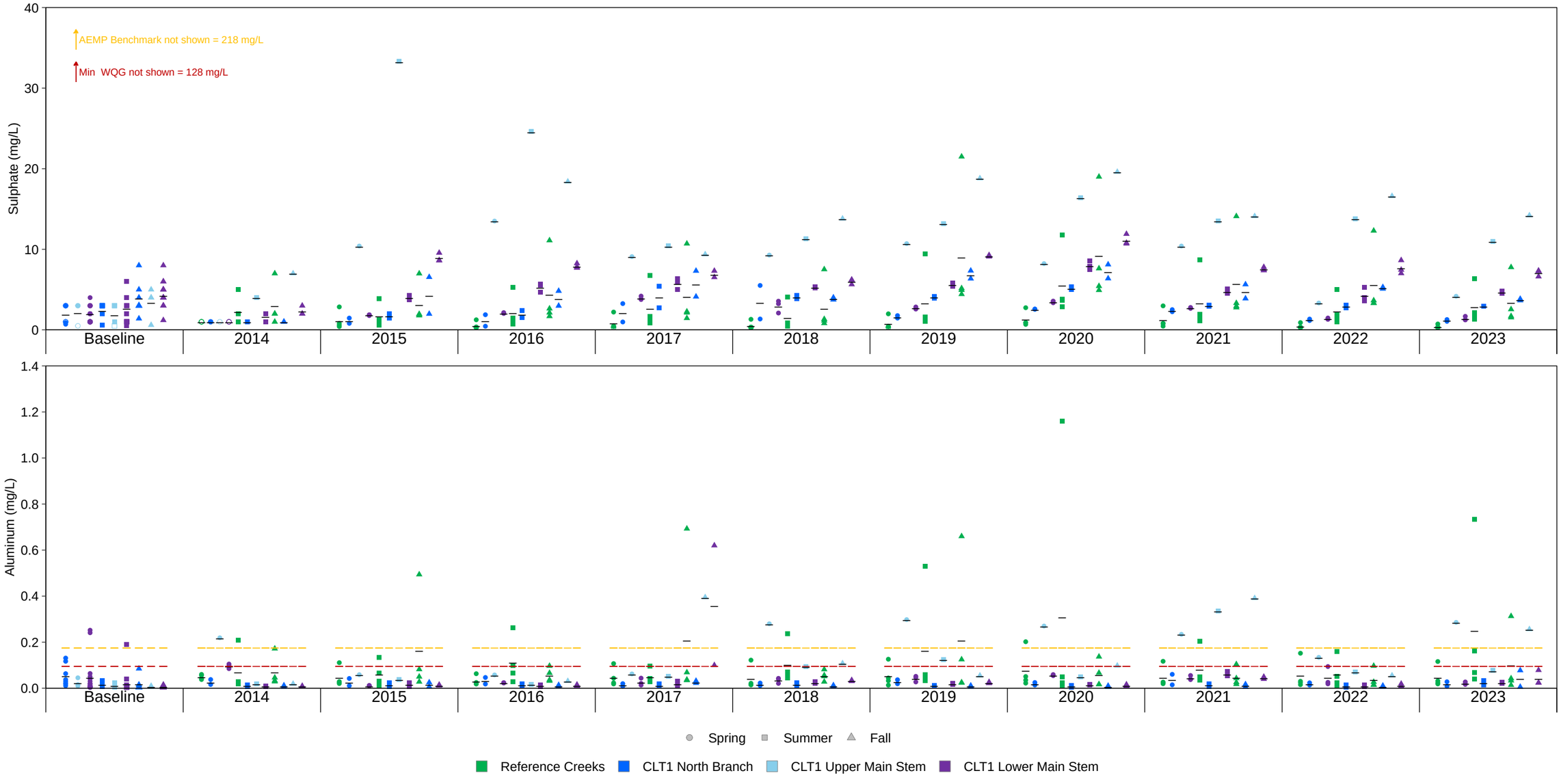


Figure C.2: Temporal Comparison of Water Chemistry at Camp Lake Tributary 1 (CLT1) Over Mine Baseline (2006 to 2013), Construction (2014), and Operations (2015 to 2023) Periods, Mary River Project CREMP

Notes: Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Red lines indicate Water Quality Guidelines, some of which are dependent on concurrent hardness values; orange lines indicate AEMP Benchmarks. Black bars indicate average of samples.



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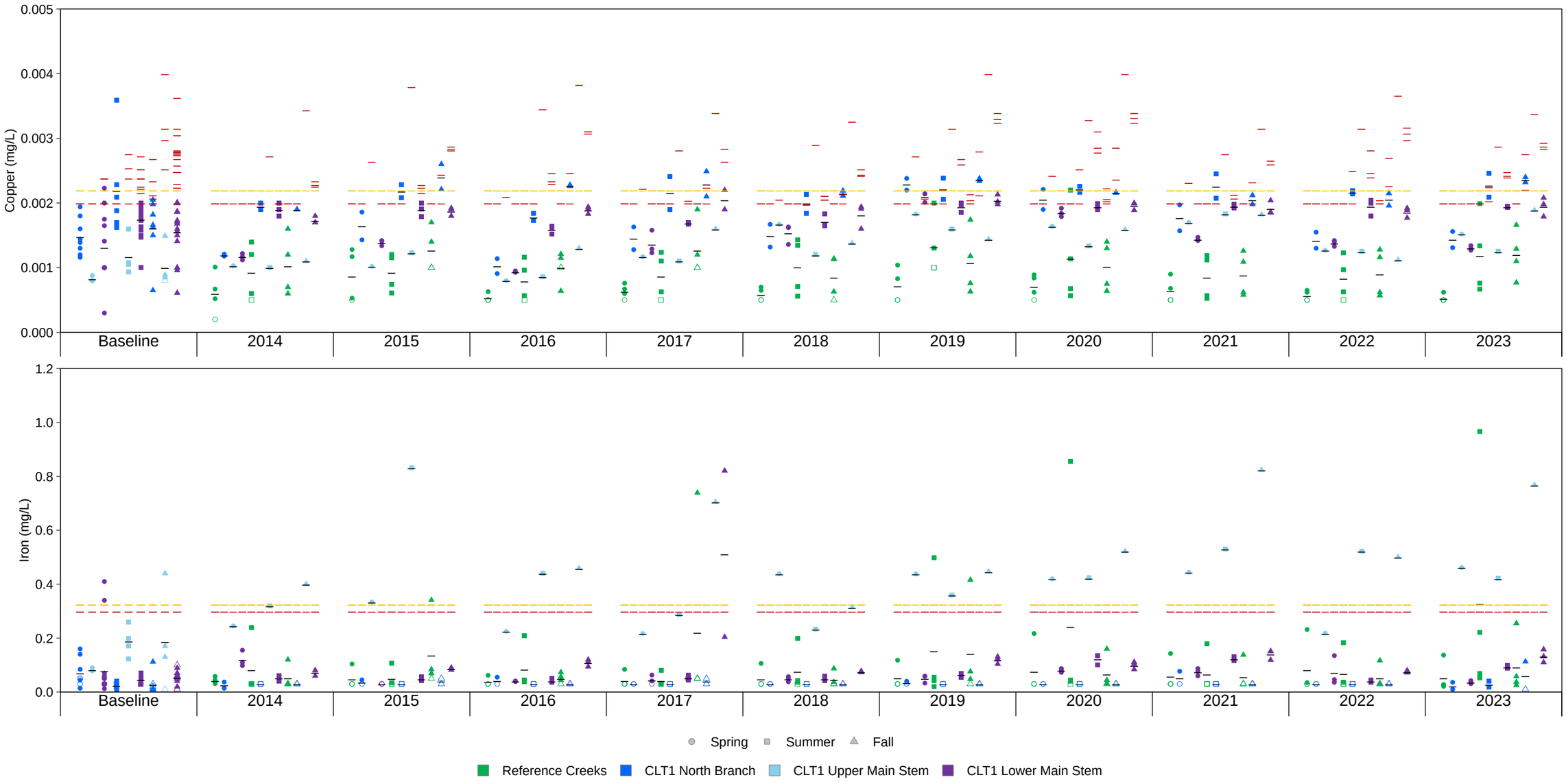

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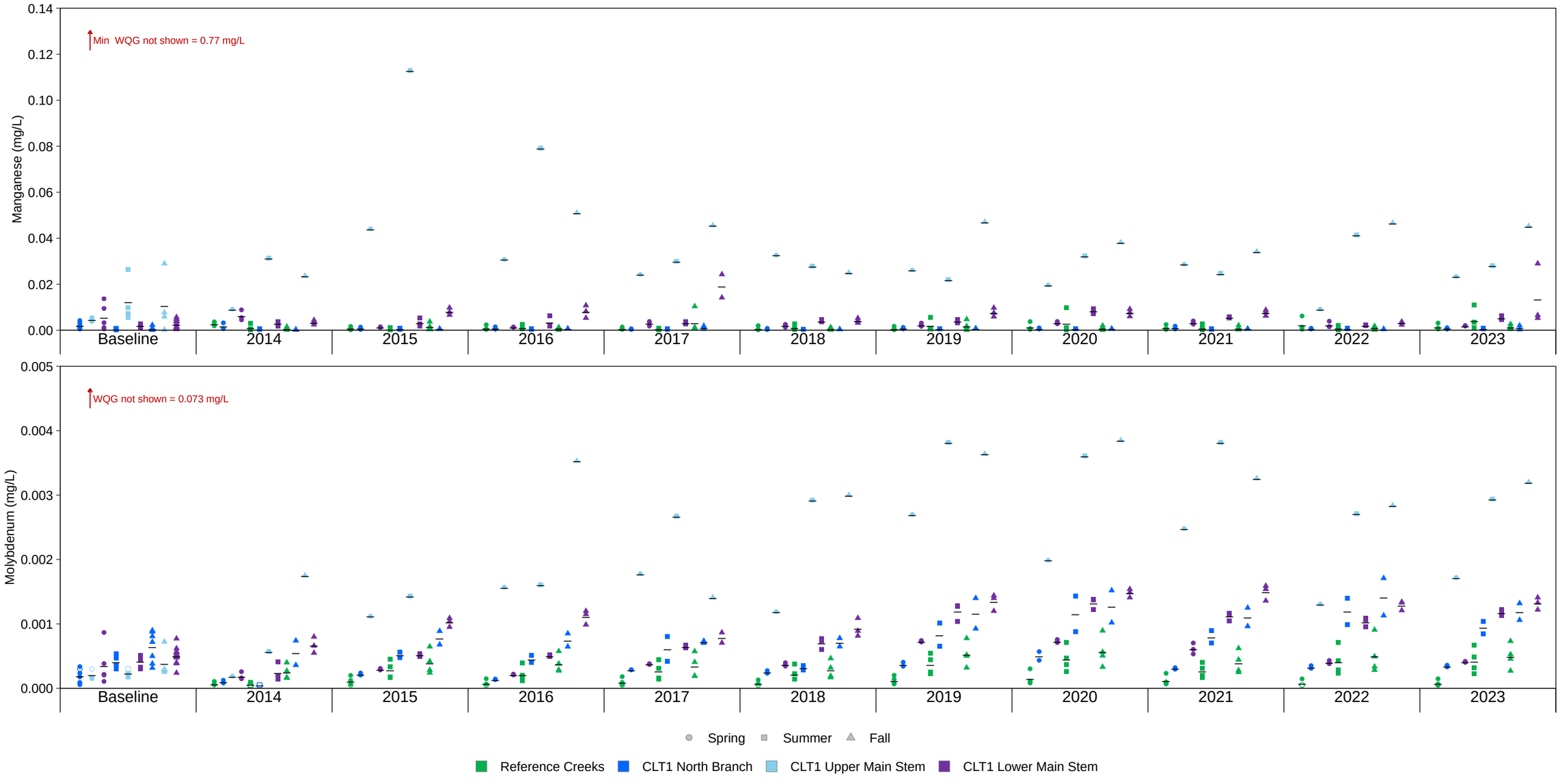

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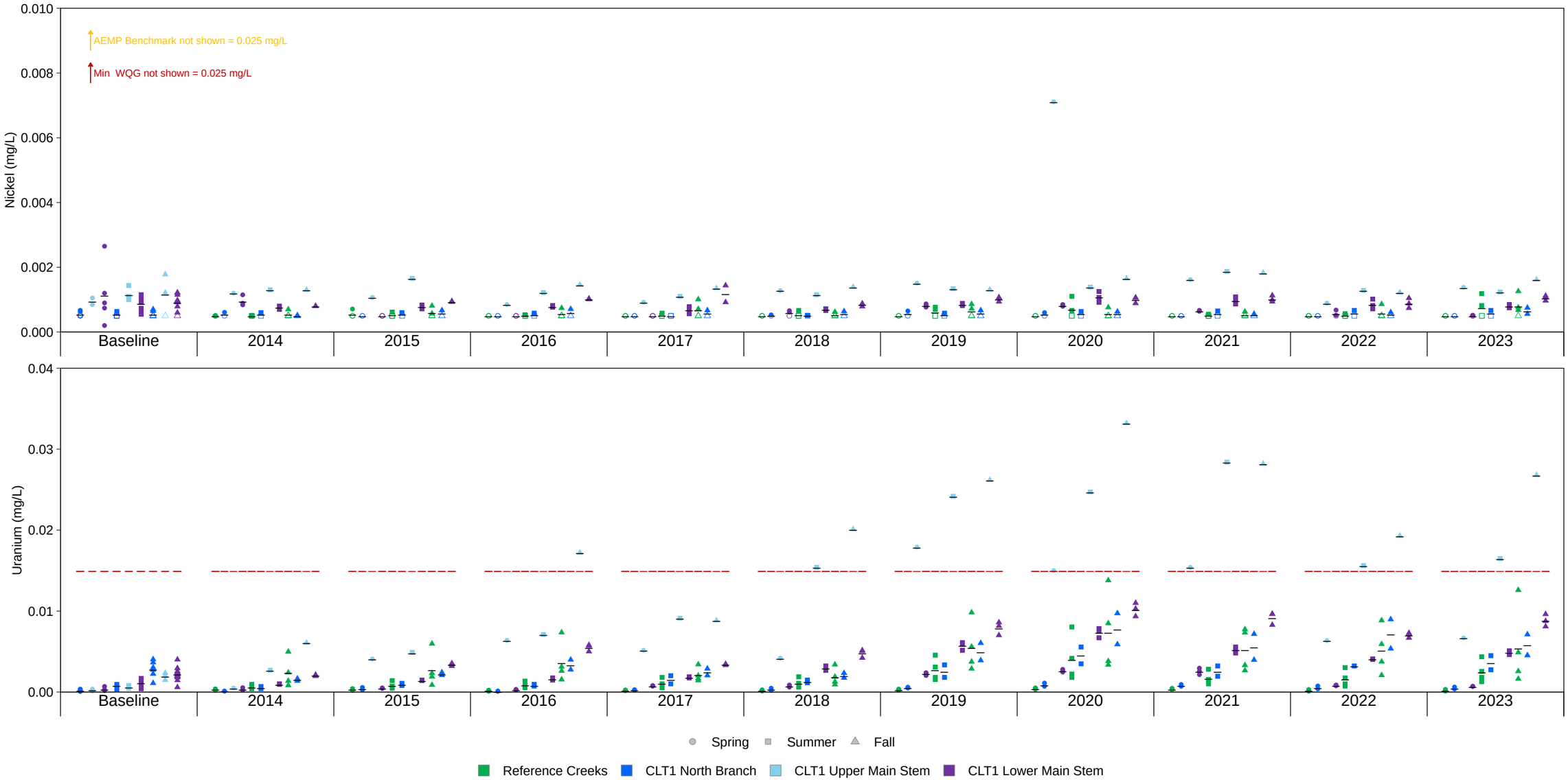

Figure C.2: Temporal Comparison of Water Chemistry at Camp Lake Tributary 1 (CLT1) Over Mine Baseline (2006 to 2013), Construction (2014), and Operations (2015 to 2023) Periods, Mary River Project CREMP

Notes: Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Red lines indicate Water Quality Guidelines, some of which are dependent on concurrent hardness values; orange lines indicate AEMP Benchmarks. Black bars indicate average of samples.

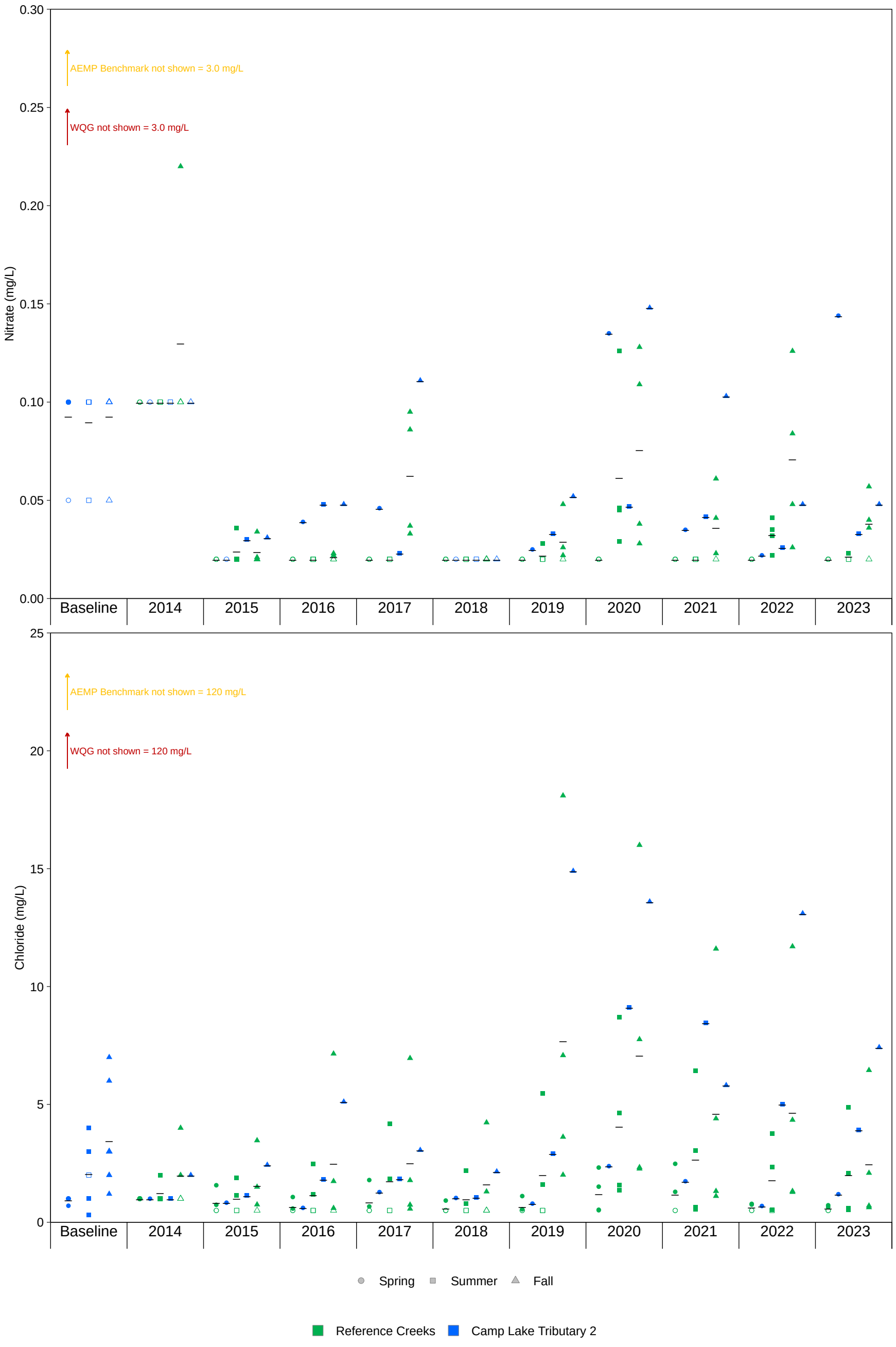

Figure C.3: Temporal Comparison of Water Chemistry at Camp Lake Tributary 2 (CLT2) Over Mine Baseline (2006 to 2013), Construction (2014), and Operations (2015 to 2023) Periods, Mary River Project CREMP

Notes: Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Red lines indicate Water Quality Guidelines, some of which are dependent on concurrent hardness values; orange lines indicate AEMP Benchmarks.

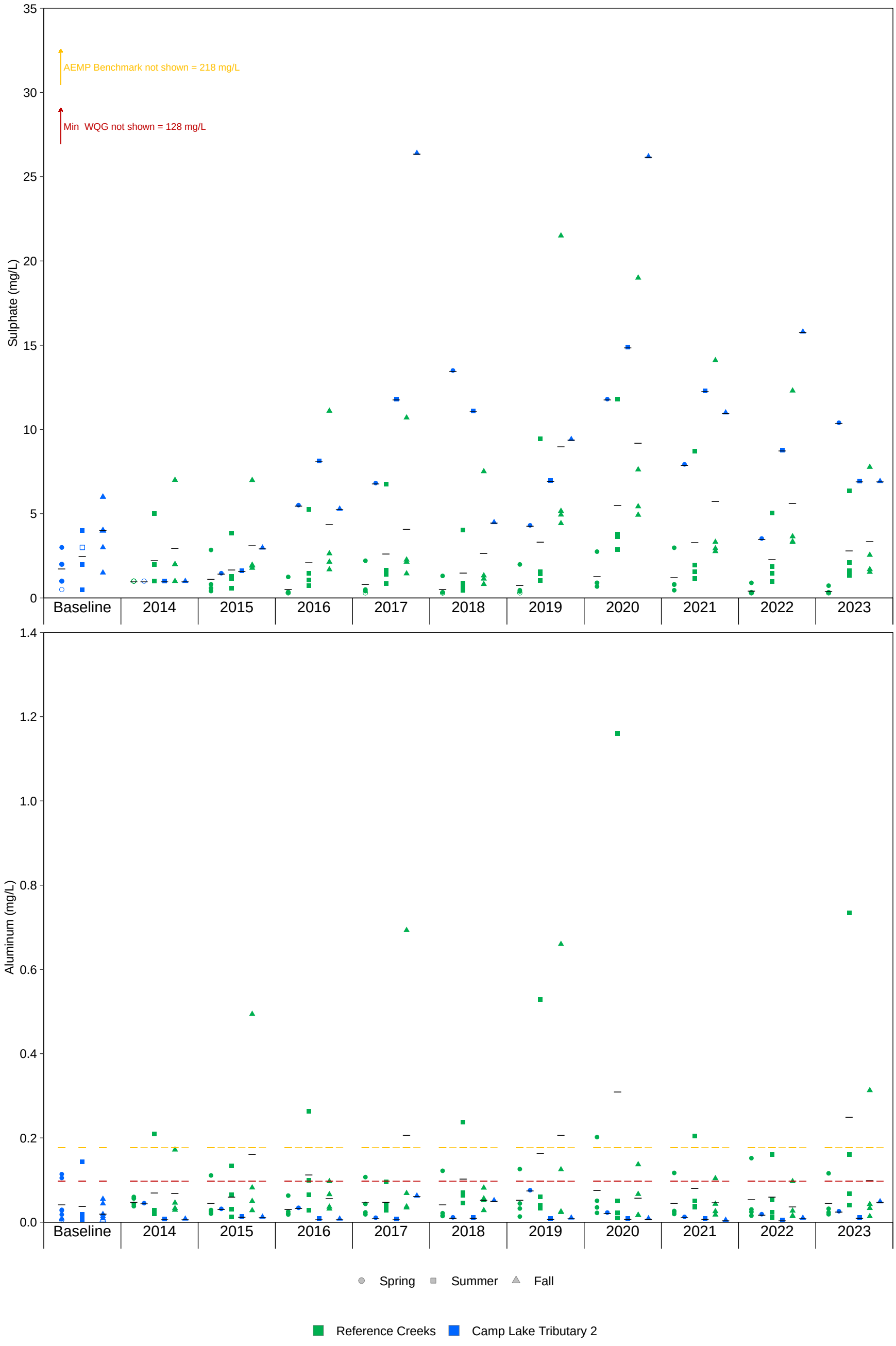

Figure C.3: Temporal Comparison of Water Chemistry at Camp Lake Tributary 2 (CLT2) Over Mine Baseline (2006 to 2013), Construction (2014), and Operations (2015 to 2023) Periods, Mary River Project CREMP

Notes: Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Red lines indicate Water Quality Guidelines, some of which are dependent on concurrent hardness values; orange lines indicate AEMP Benchmarks.

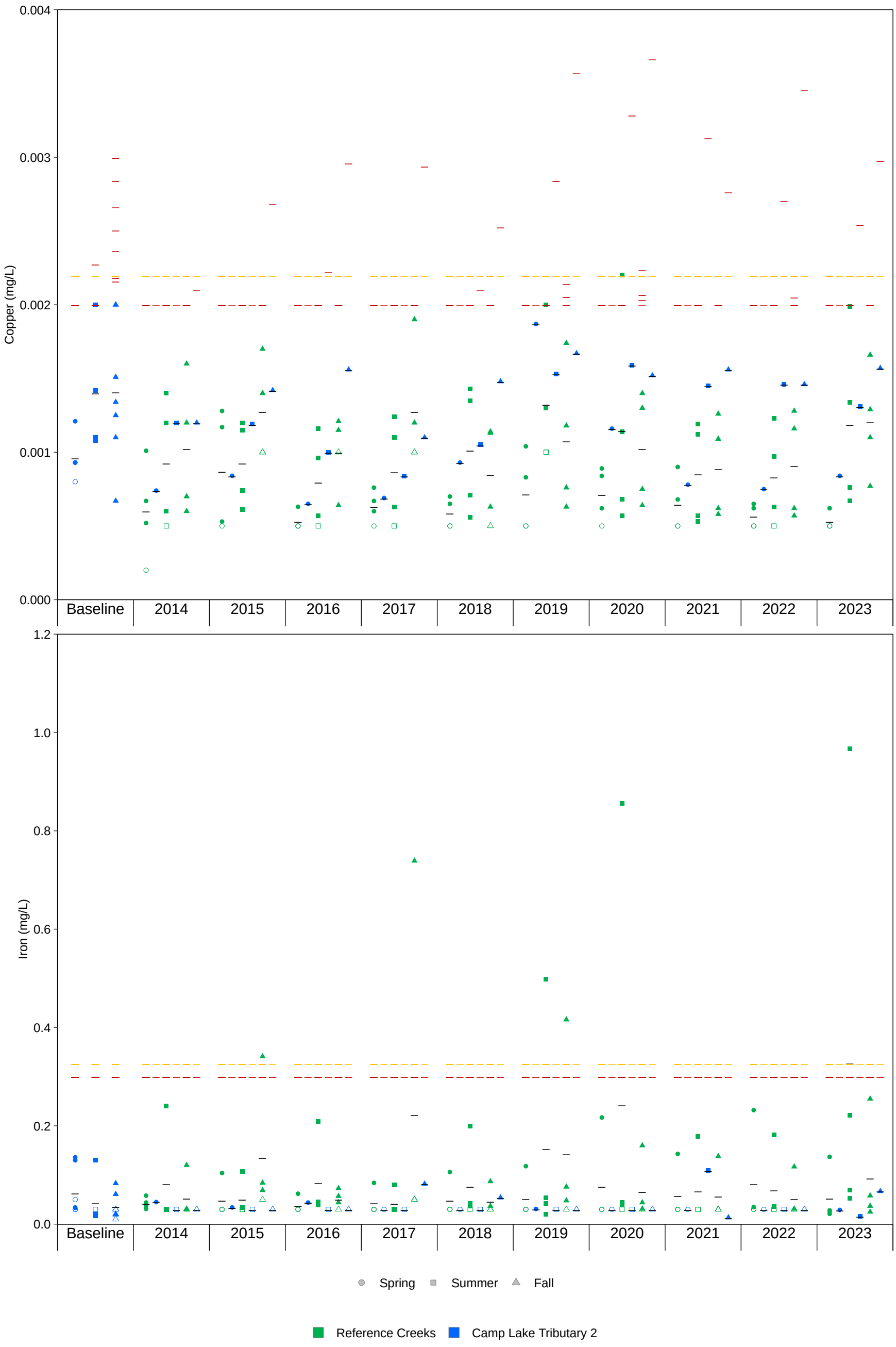

Figure C.3: Temporal Comparison of Water Chemistry at Camp Lake Tributary 2 (CLT2) Over Mine Baseline (2006 to 2013), Construction (2014), and Operations (2015 to 2023) Periods, Mary River Project CREMP

Notes: Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Red lines indicate Water Quality Guidelines, some of which are dependent on concurrent hardness values; orange lines indicate AEMP Benchmarks.

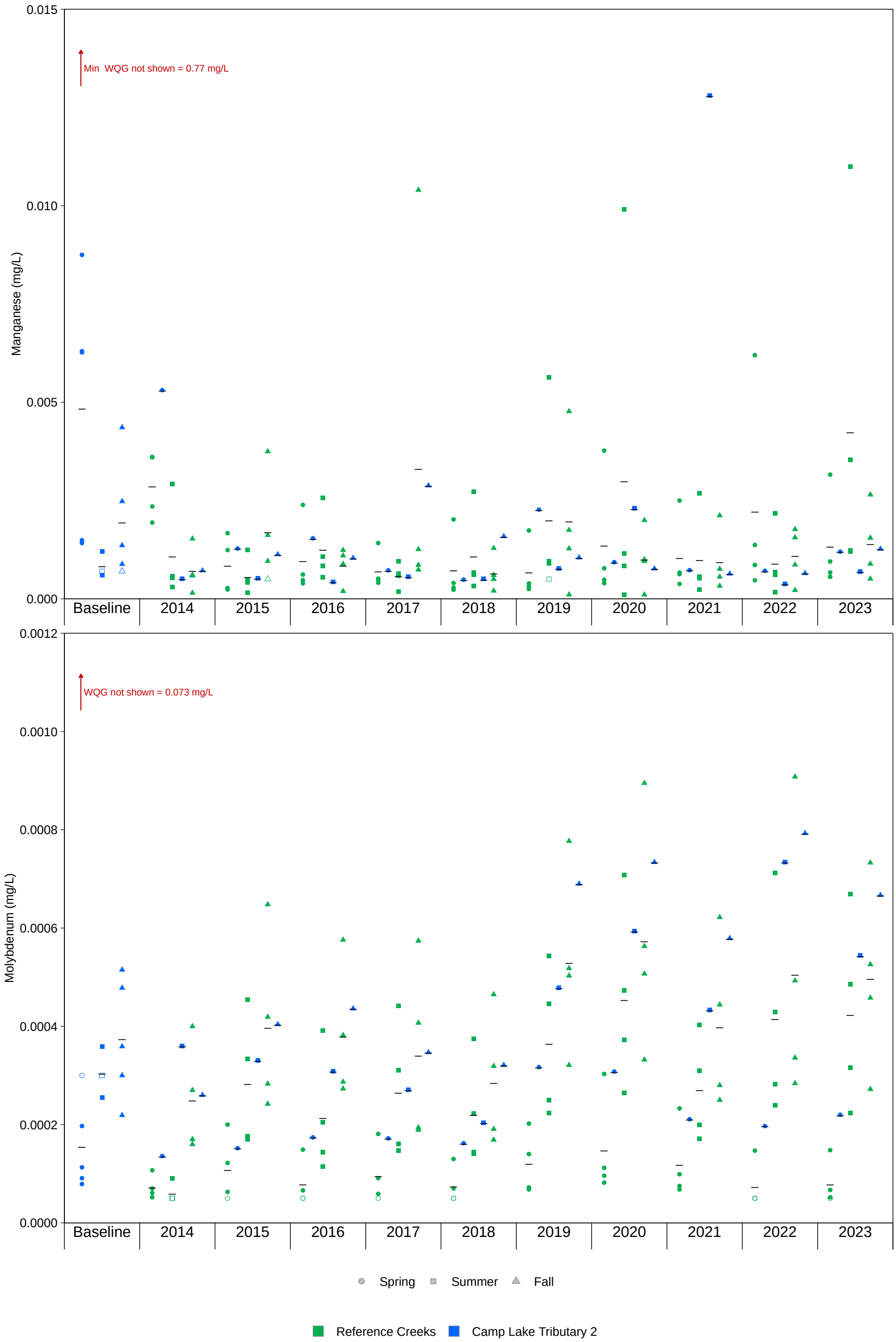

Figure C.3: Temporal Comparison of Water Chemistry at Camp Lake Tributary 2 (CLT2) Over Mine Baseline (2006 to 2013), Construction (2014), and Operations (2015 to 2023) Periods, Mary River Project CREMP

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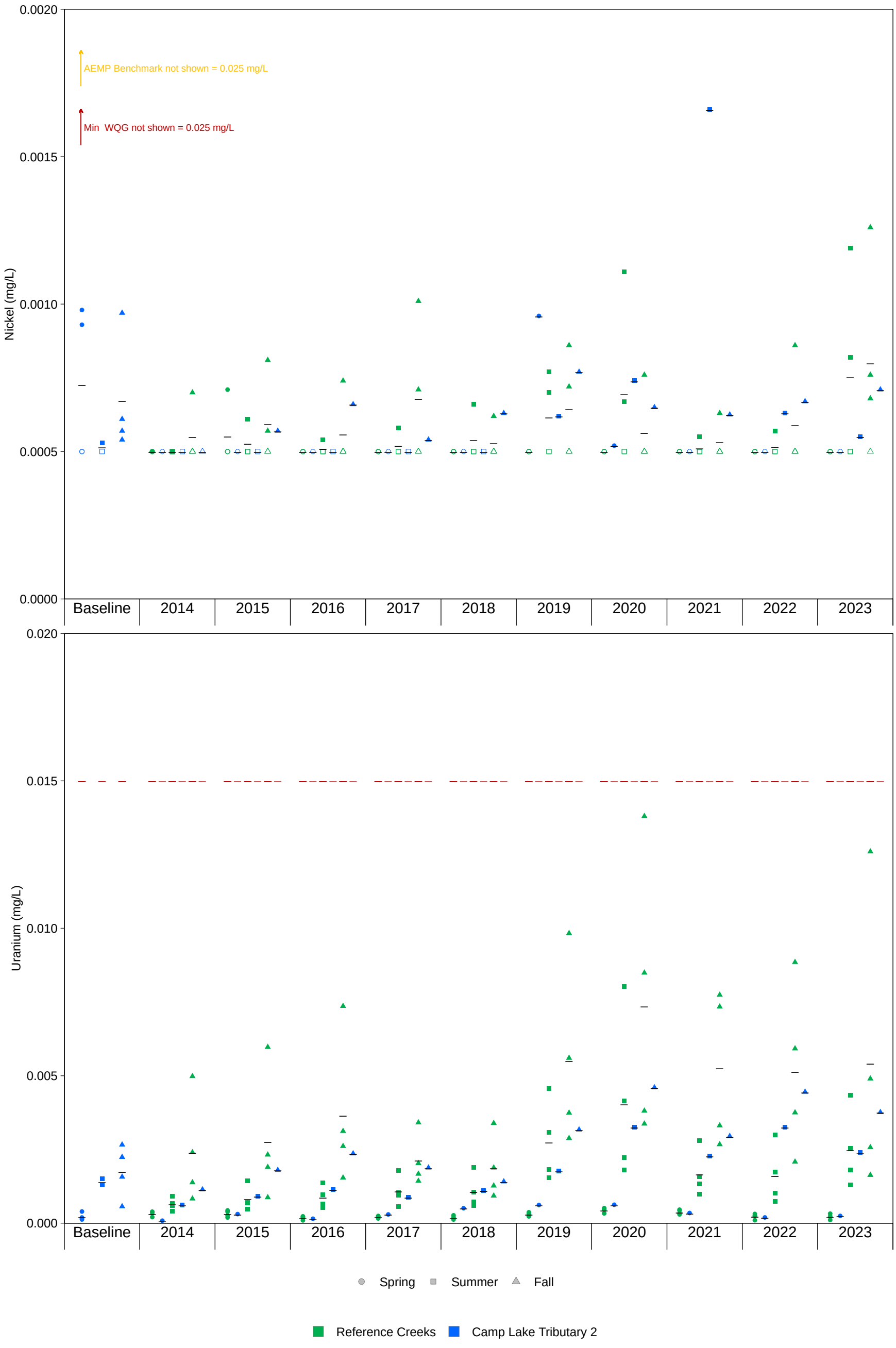


Figure C.3: Temporal Comparison of Water Chemistry at Camp Lake Tributary 2 (CLT2) Over Mine Baseline (2006 to 2013), Construction (2014), and Operations (2015 to 2023) Periods, Mary River Project CREMP

Notes: Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Red lines indicate Water Quality Guidelines, some of which are dependent on concurrent hardness values; orange lines indicate AEMP Benchmarks.

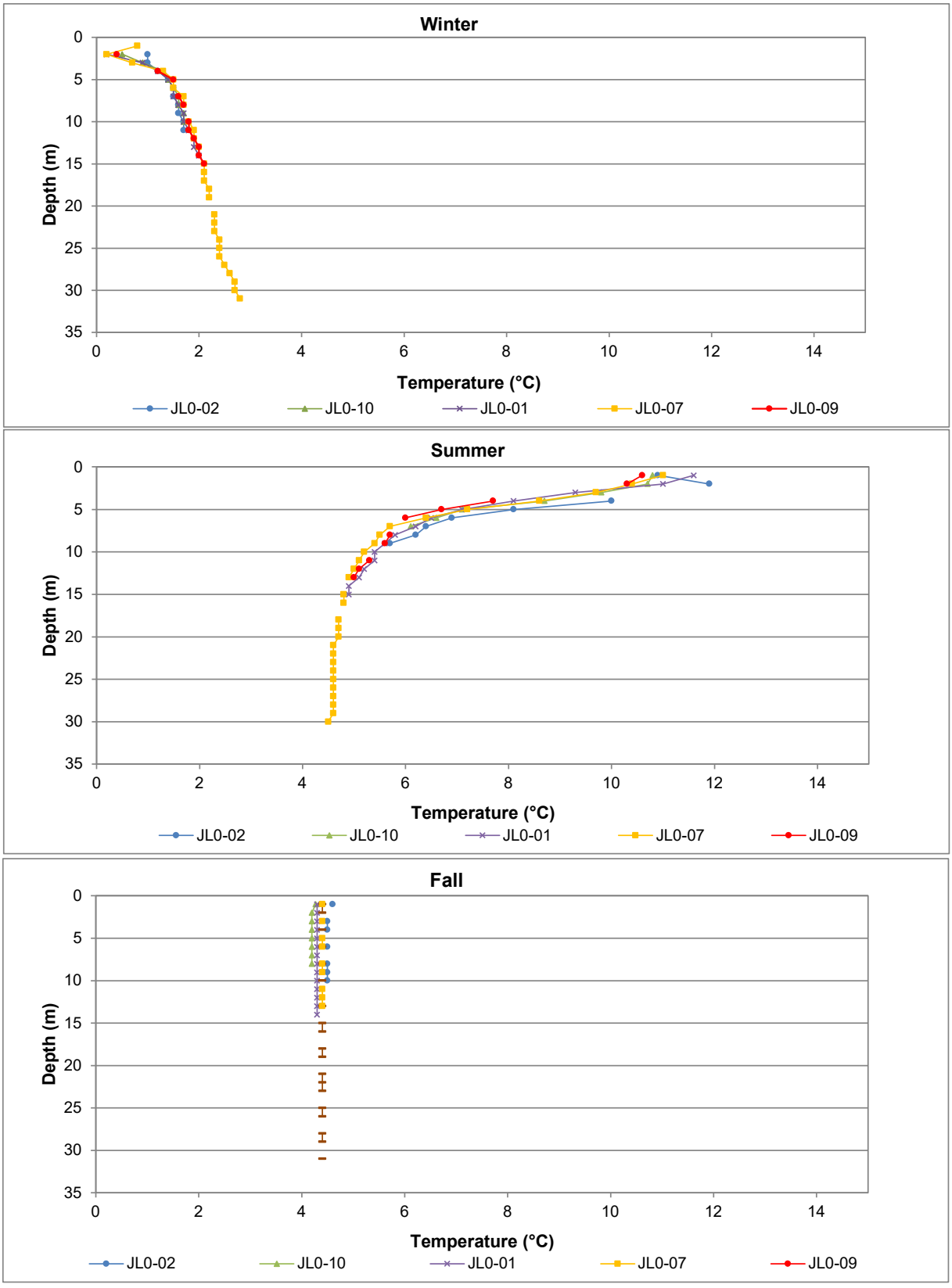
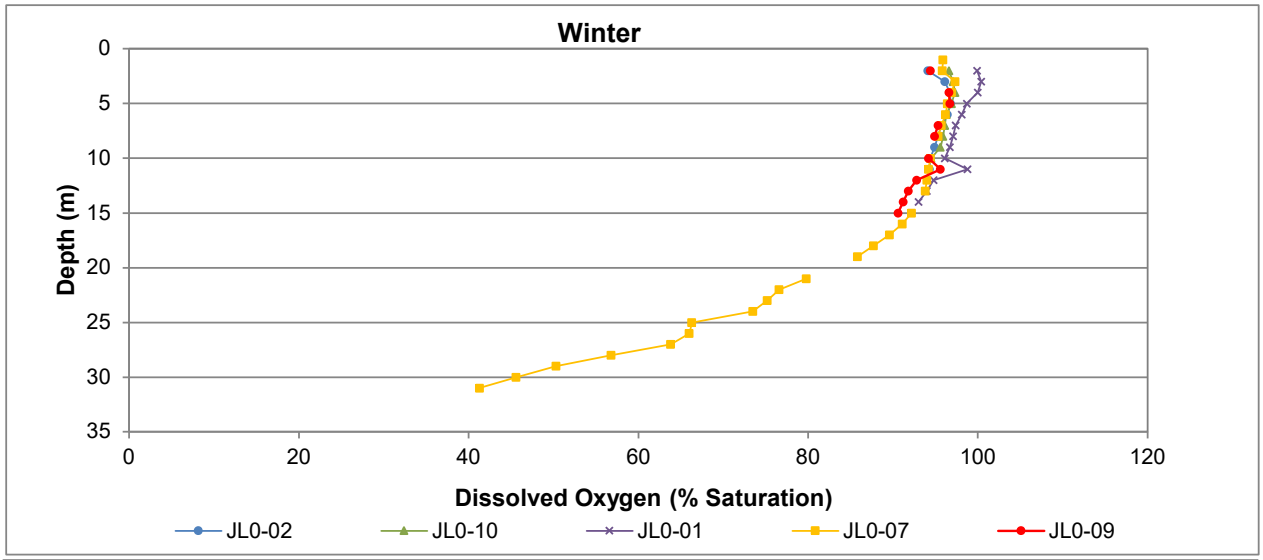
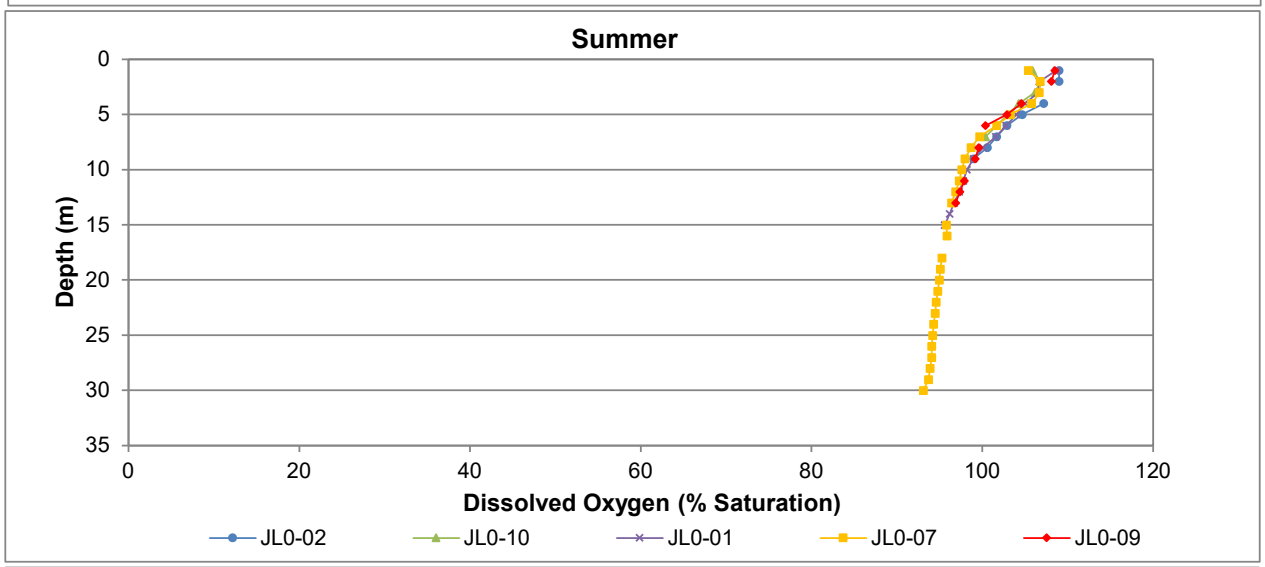


Figure C.4: Vertical Profiles of Temperature Measured at Camp Lake (JL0) in Winter, Summer, and Fall, Mary River Project CREMP, 2023





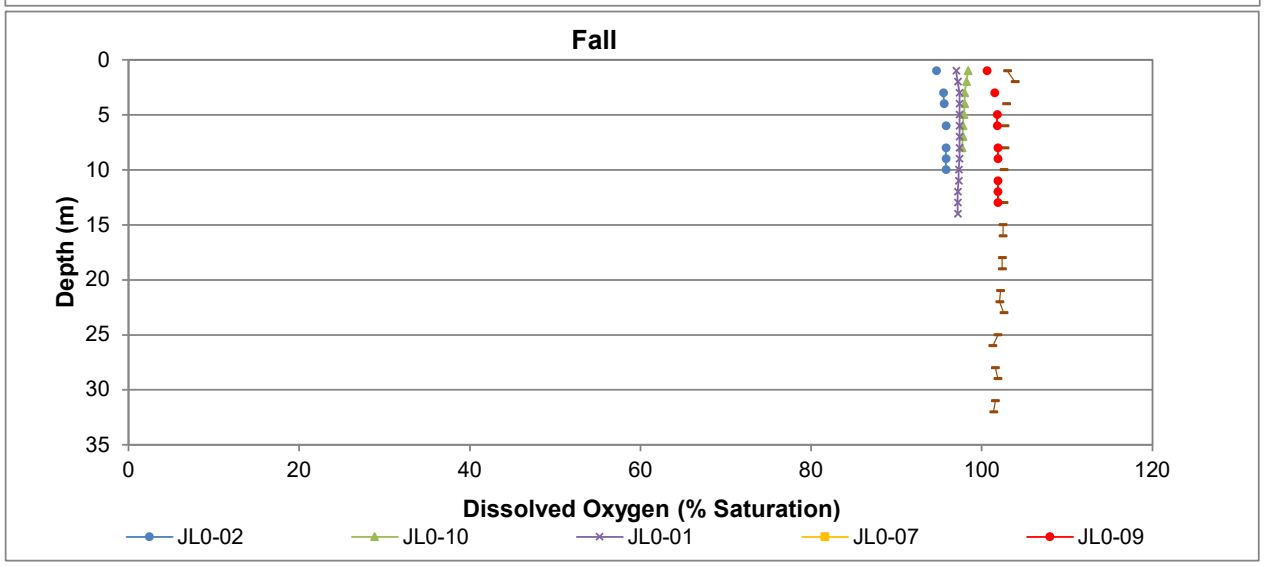


Figure C.5: Vertical Profiles of Dissolved Oxygen Measured at Camp Lake (JL0) in Winter, Summer, and Fall, Mary River Project CREMP, 2023

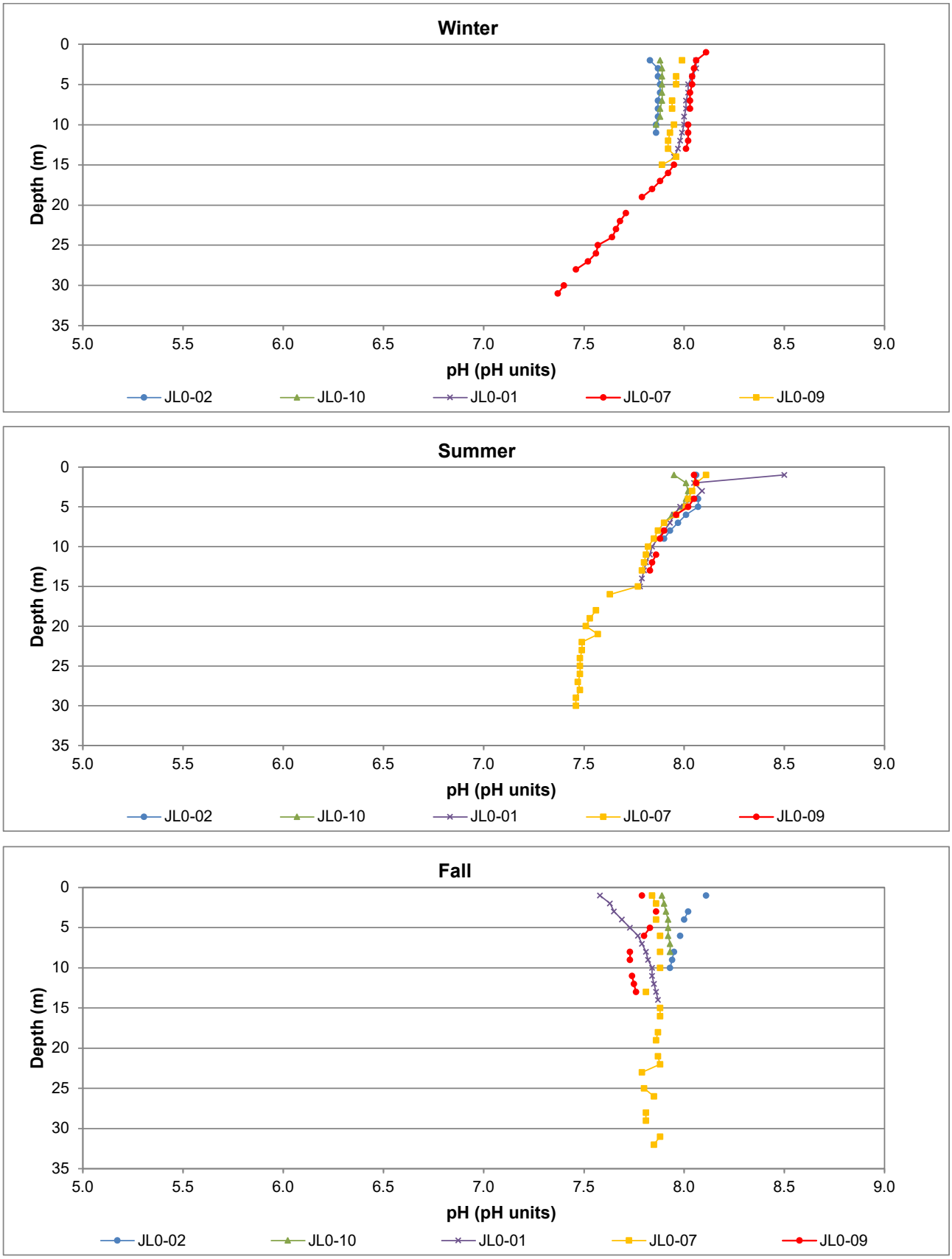


Figure C.6: Vertical Profiles of pH Measured at Camp Lake (JL0) in Winter, Summer, and Fall, Mary River Project CREMP, 2023

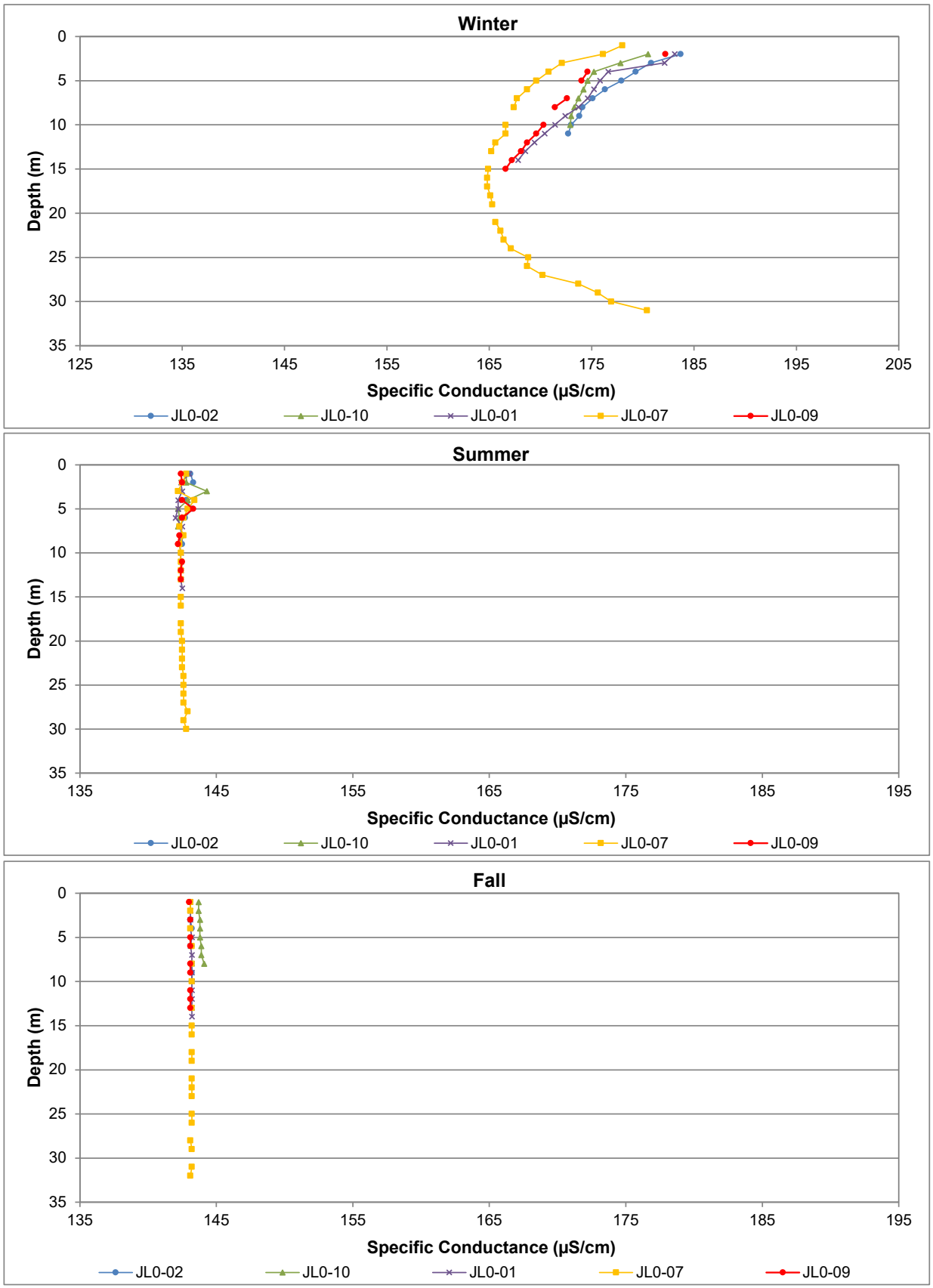


Figure C.7: Vertical Profiles of Specific Conductance Measured at Camp Lake (JL0) in Winter, Summer, and Fall, Mary River Project CREMP, 2023

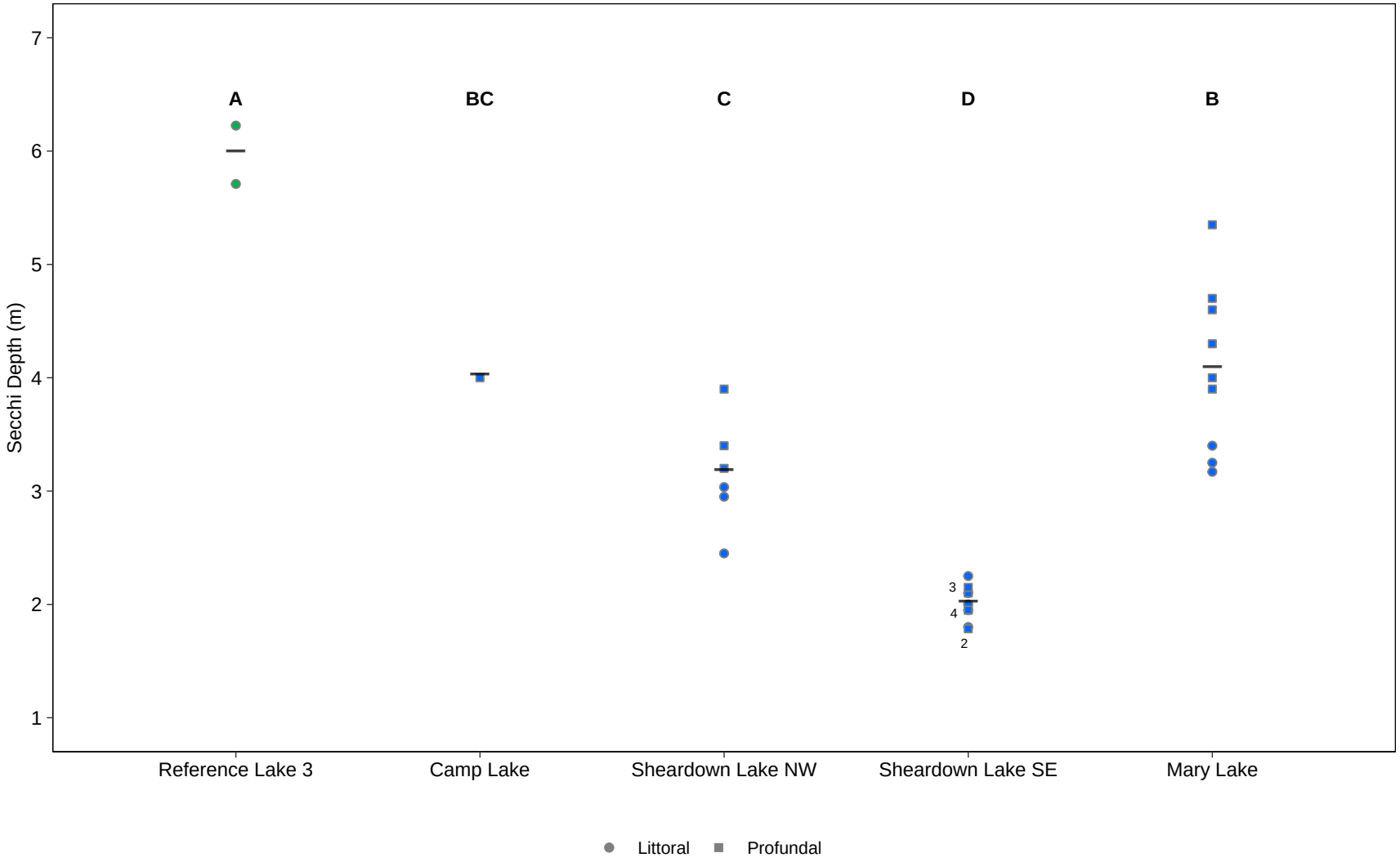


Figure C.8: Comparison of Secchi Depth Measured at Lake Benthic Invertebrate Community Stations, Mary River Project CREMP, August 2023

Notes: Green represents reference stations and blue represents mine−exposed stations. Areas that share a letter do not significantly differ (p−value = 0.05). Bars indicate measures of central tendency of the statistical tests. Numbers indicate the number of overlapping points.

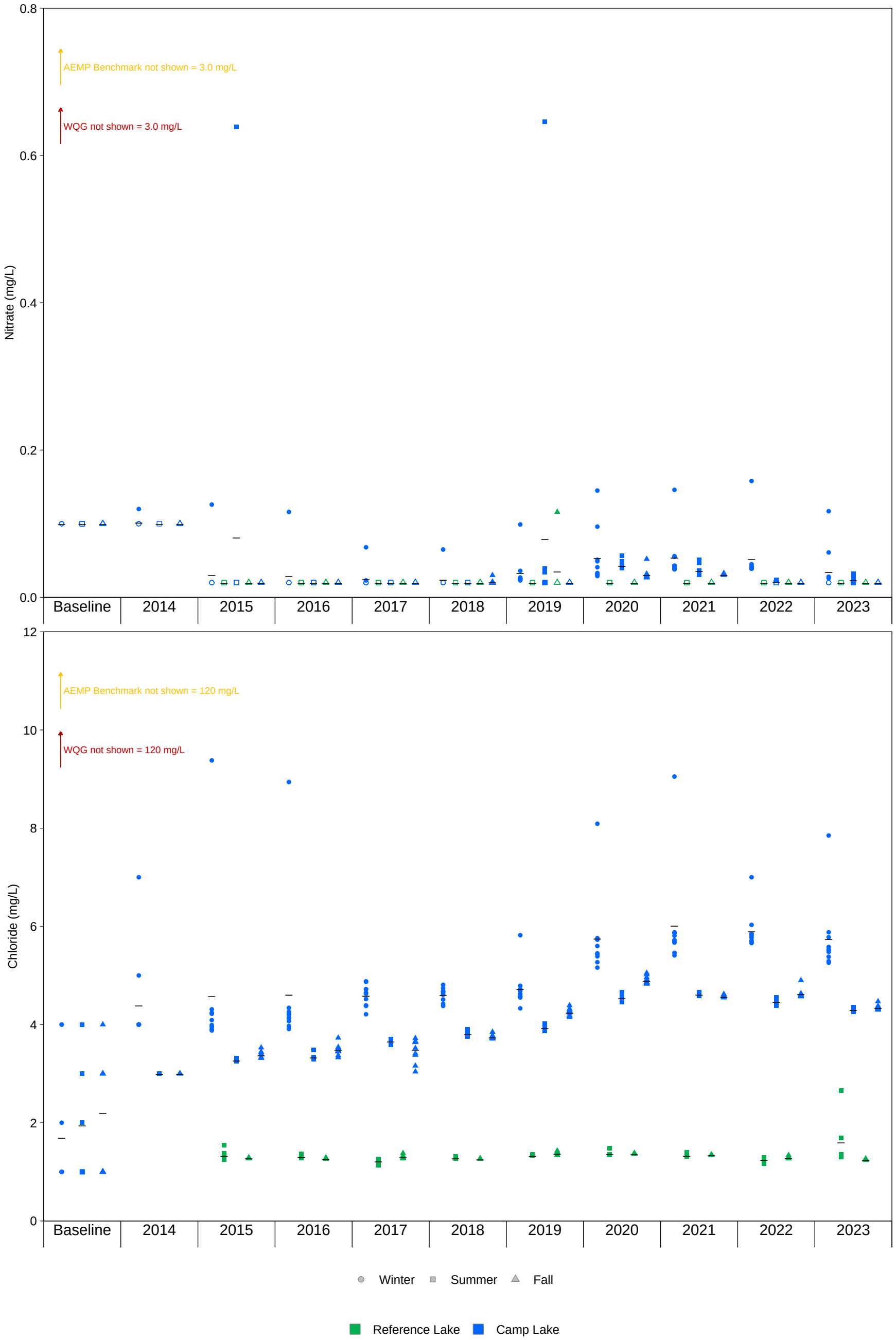


Figure C.9: Temporal Comparison of Water Chemistry at Camp Lake (JL0) Over Mine Baseline (2006 to 2013), Construction (2014), and Operations (2015 to 2023) Periods, Mary River Project CREMP

Notes: Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Red lines indicate Water Quality Guidelines, some of which are dependent on concurrent hardness values; orange lines indicate AEMP Benchmarks. For each station, a concentration is provided for each of the bottom and the surface of the water column.

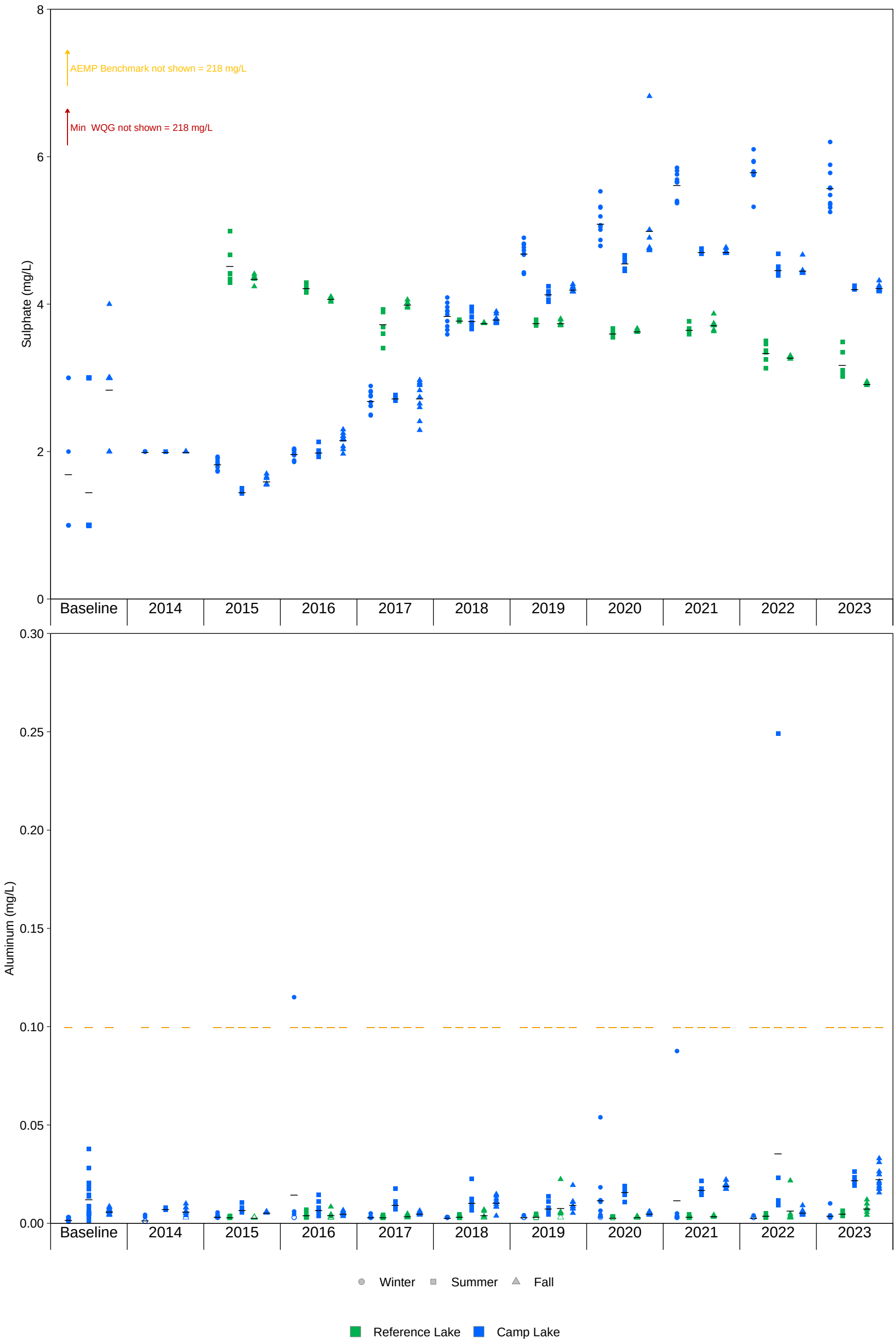


Figure C.9: Temporal Comparison of Water Chemistry at Camp Lake (JL0) Over Mine Baseline (2006 to 2013), Construction (2014), and Operations (2015 to 2023) Periods, Mary River Project CREMP

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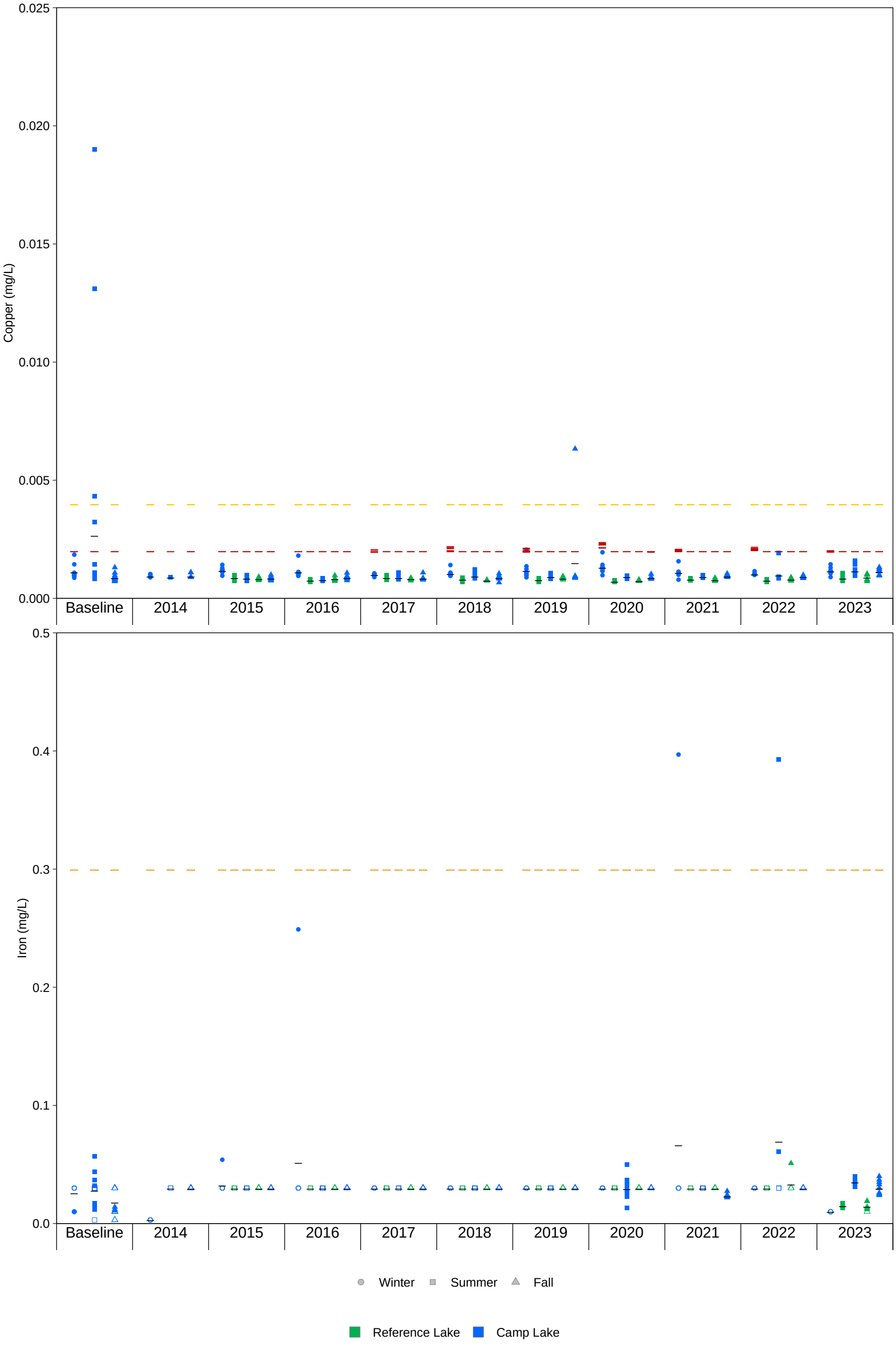

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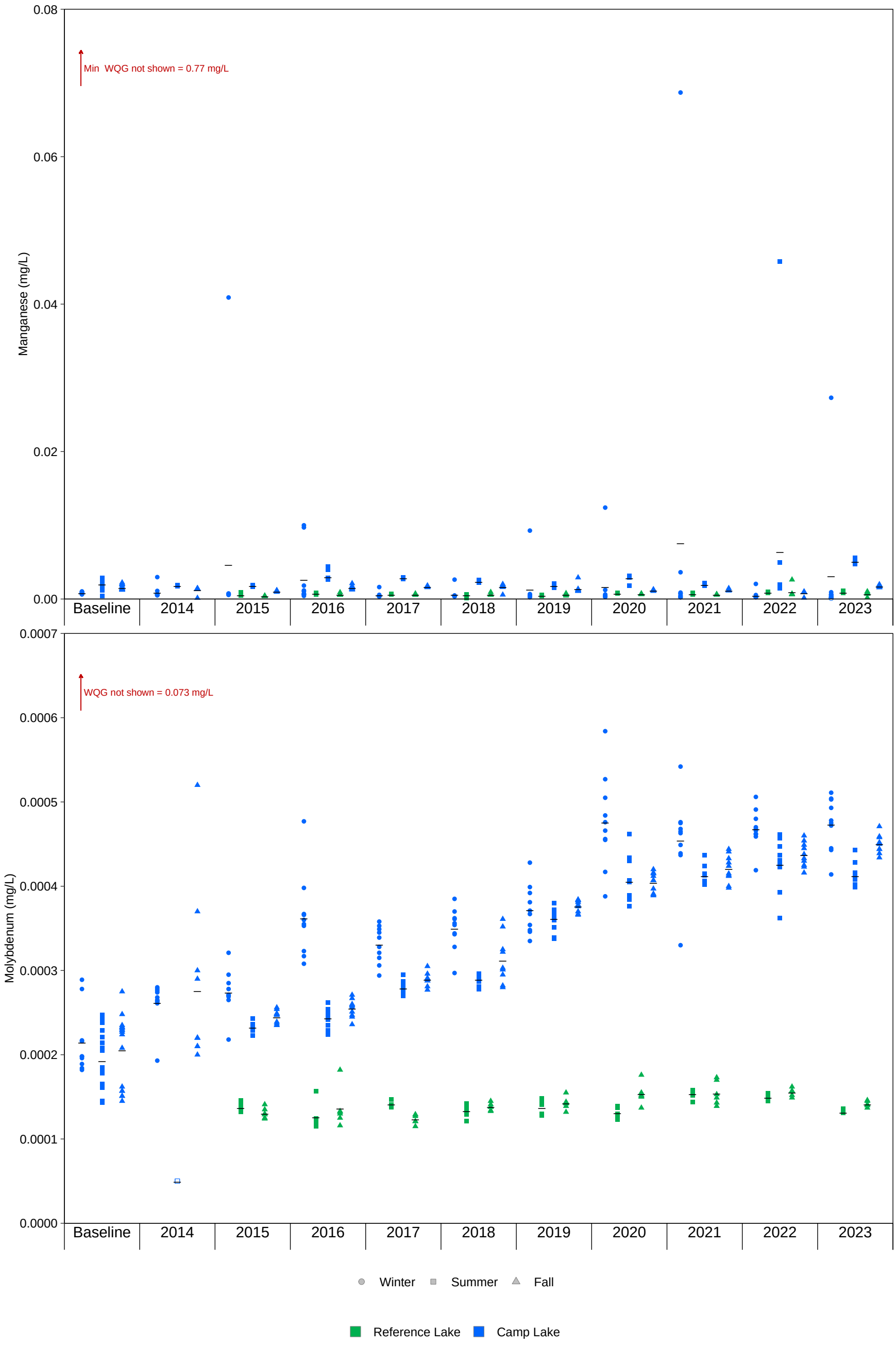

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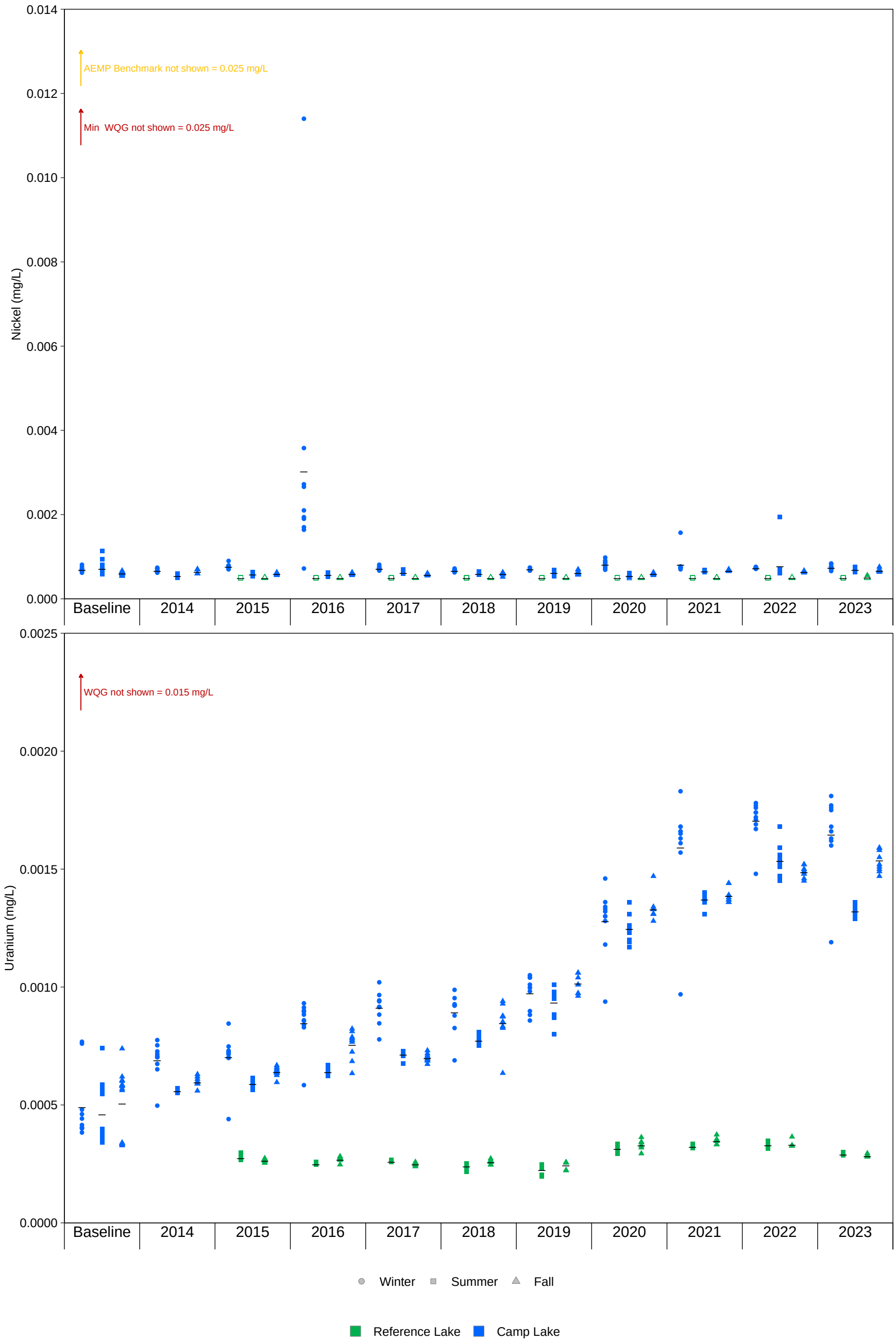

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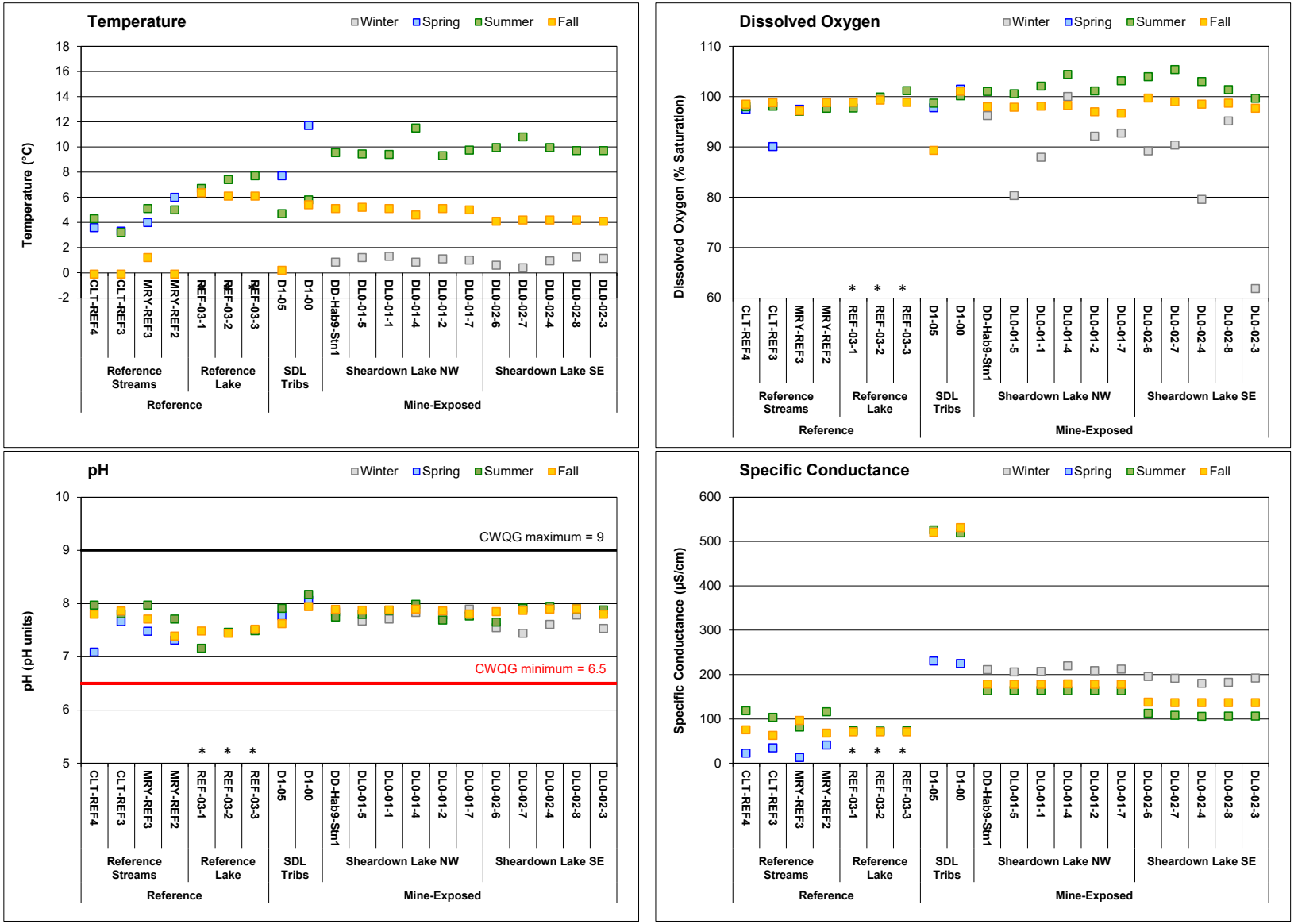


Figure C.10: Comparison of *In Situ* Water Quality Variables Measured at Sheardown Lake System Water Quality Monitoring Stations in Winter, Spring, Summer, and Fall 2023, Mary River Project CREMP

Notes: Lake values represent mean of surface and bottom *in situ* water quality measurements. Streams were not sampled in winter. Lakes were not sampled in spring.

* Reference Lake 3 (REF-03) was not sampled in winter.

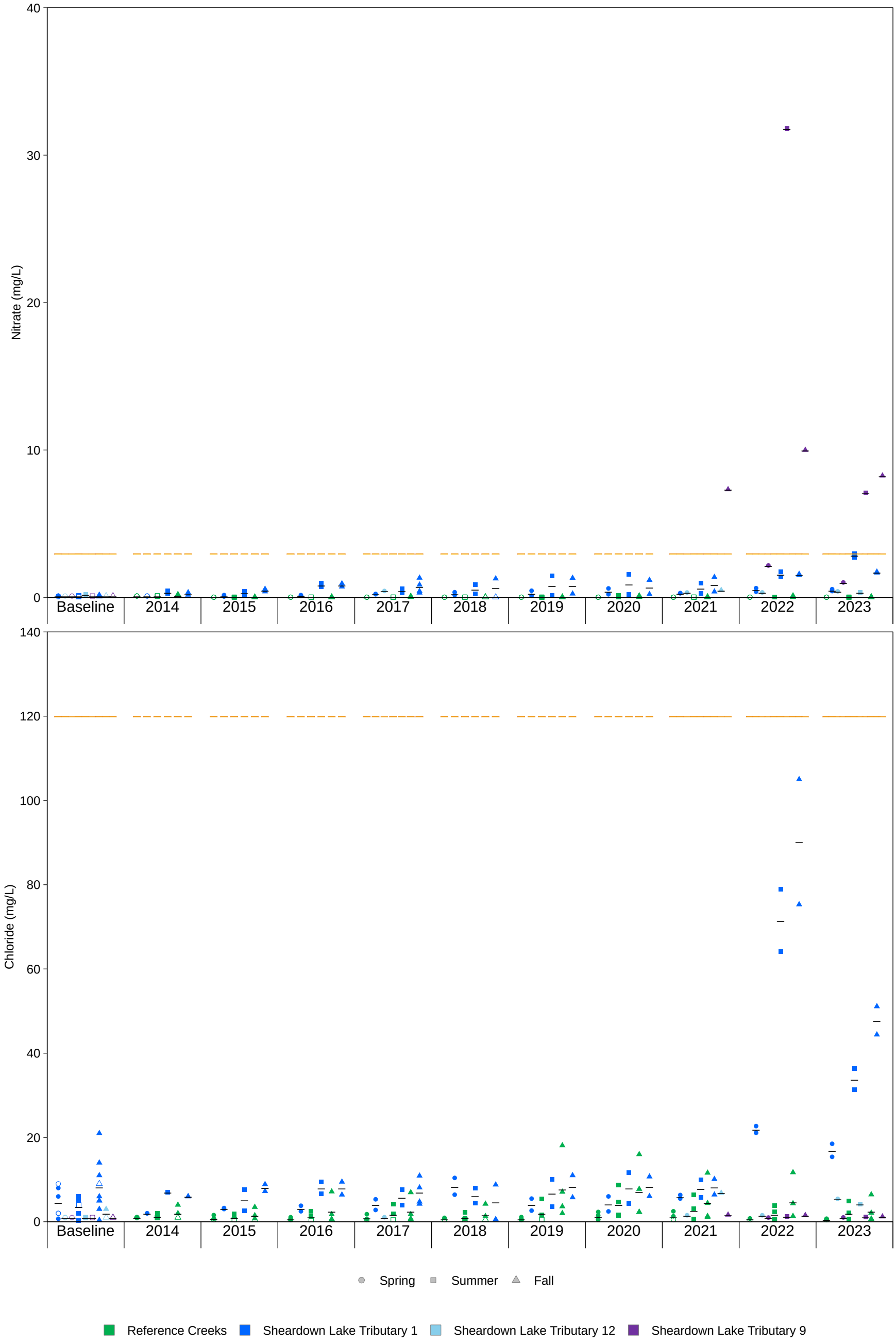
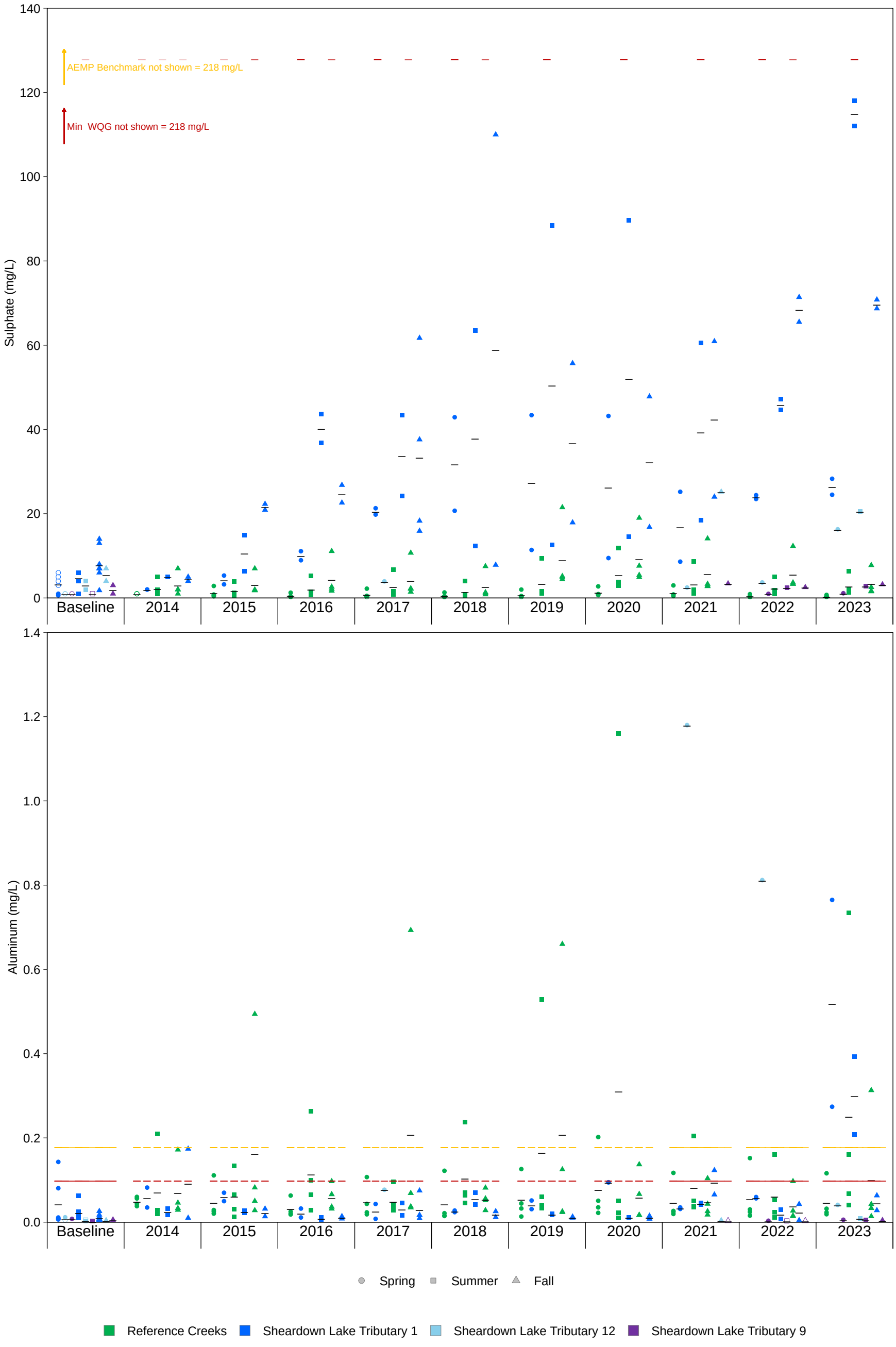


Figure C.11: Temporal Comparison of Water Chemistry at the Sheardown Lake Tributaries (SDLT1, SDLT12, SDLT9) Over Mine Baseline (2006 to 2013) and Operations (2015 to 2023) Periods

Notes: Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Red lines indicate Water Quality Guidelines, some of which are dependent on concurrent hardness values; orange lines indicate AEMP Benchmarks. Sheardown Lake Tributary 12 (SDLT12/ LDFG−OUT) and Sheardown Lake Tributary 9 (SDLT9/MS−C−G) stations were added to the CREMP in fall 2021.



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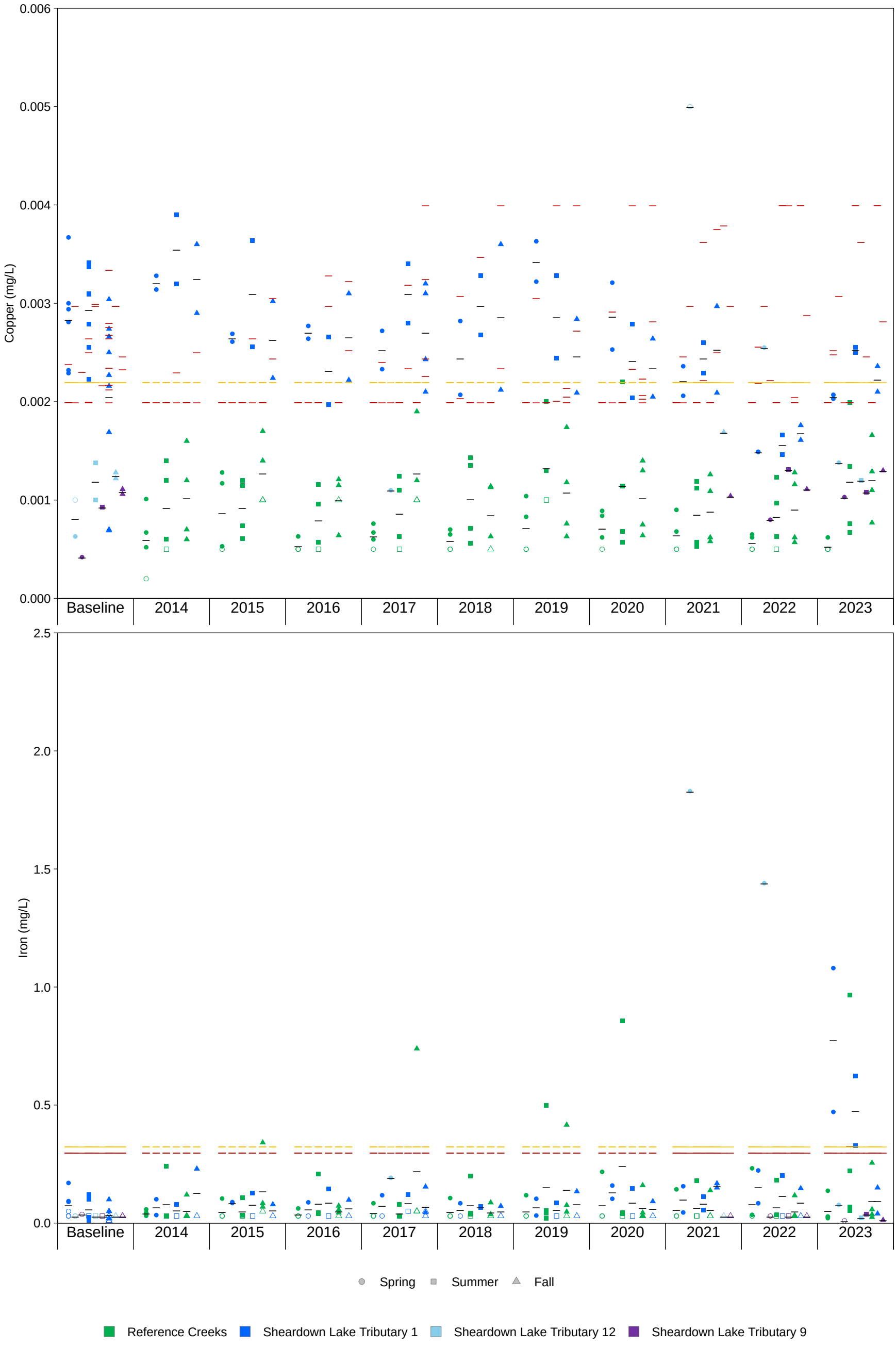

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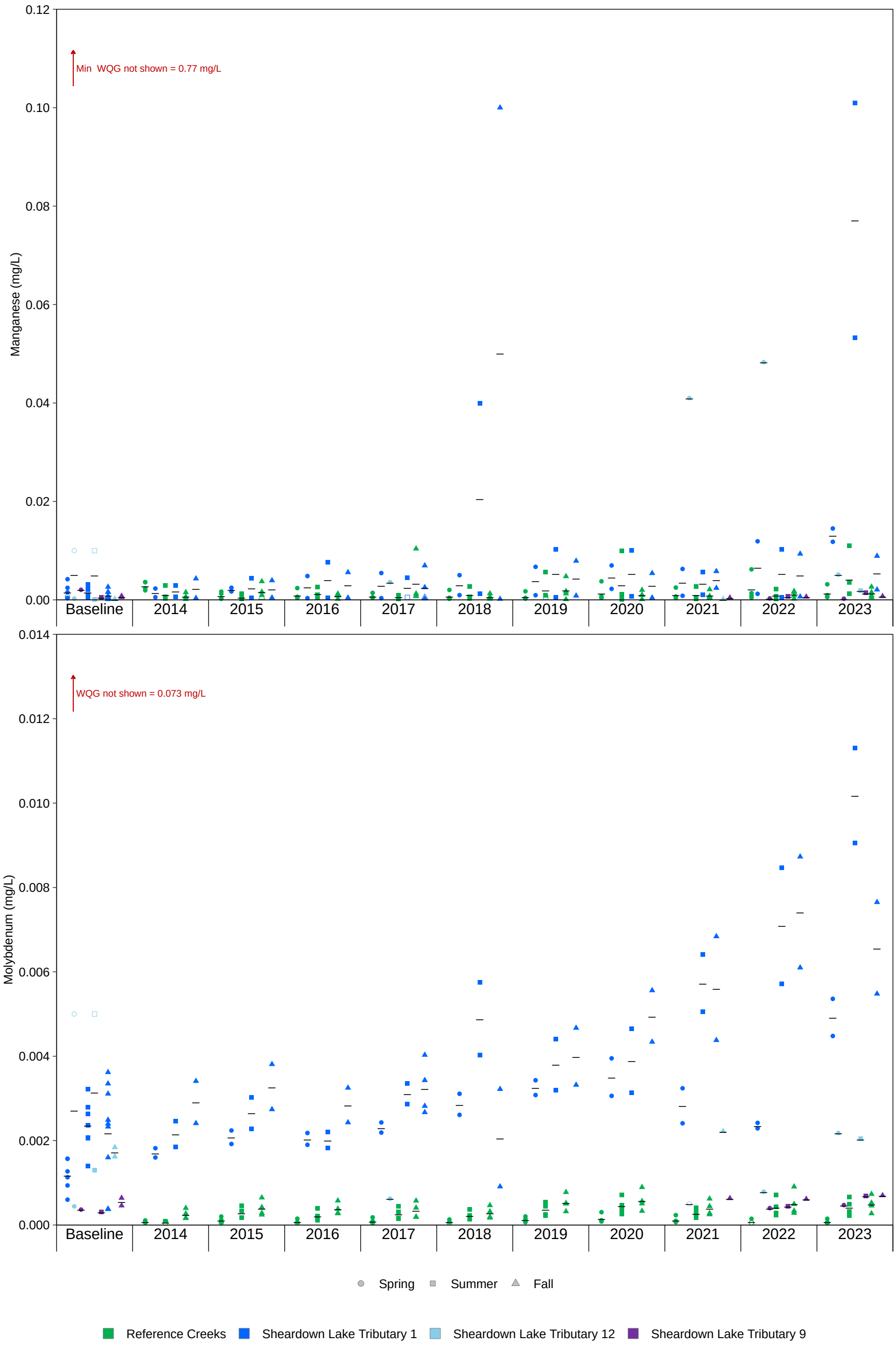

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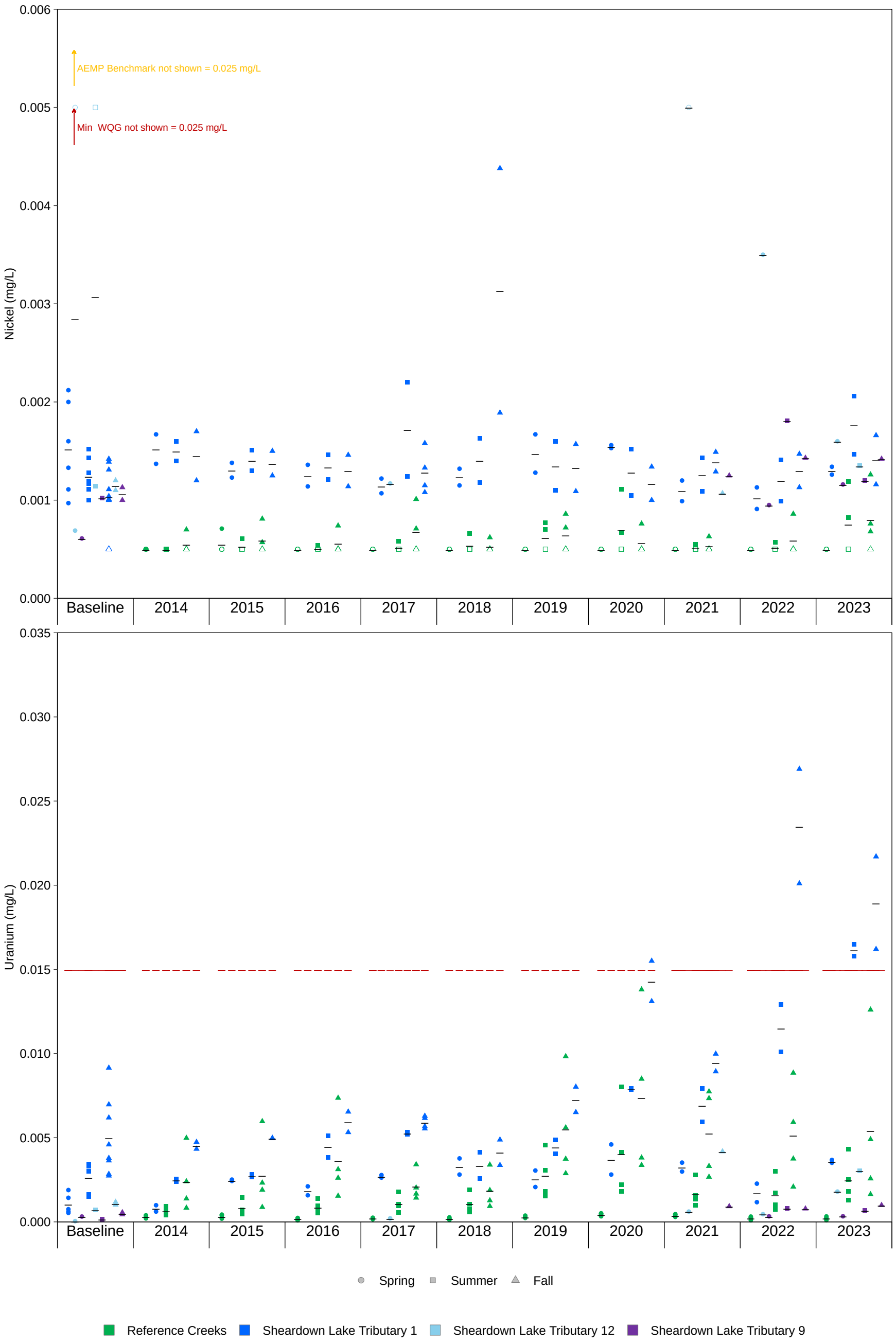

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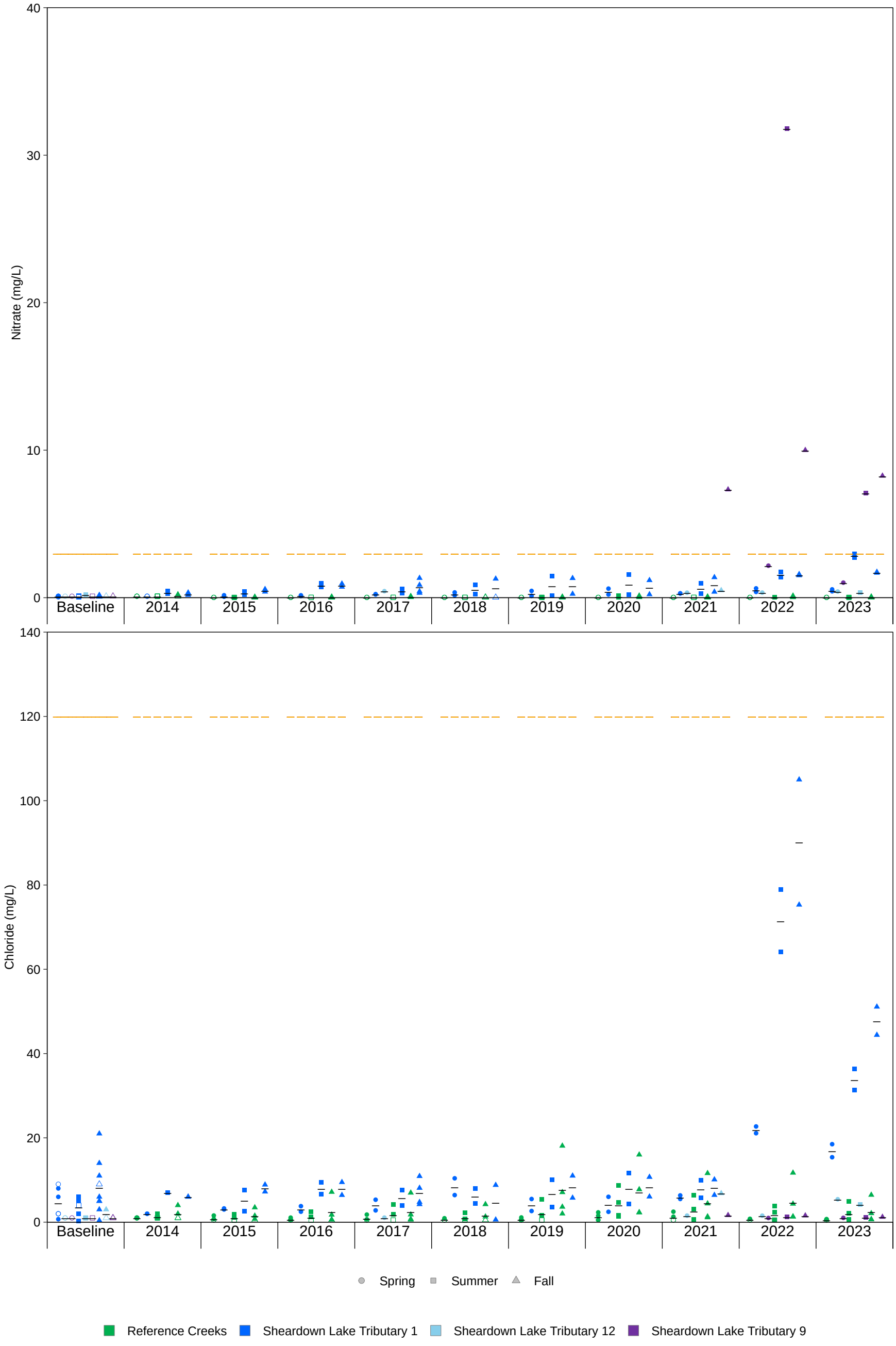

Figure C.11: Temporal Comparison of Water Chemistry at the Sheardown Lake Tributaries (SDLT1, SDLT12, SDLT9) Over Mine Baseline (2006 to 2013) and Operations (2015 to 2023) Periods

Notes: Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Red dashes indicate Water Quality Guidelines, some of which are dependent on concurrent hardness values; orange solid line indicates AEMP Benchmark. Sheardown Lake Tributary 12 (SDLT12/ LDFG−OUT) and Sheardown Lake Tributary 9 (SDLT9/MS−C−G) stations were added to the CREMP in fall 2021.

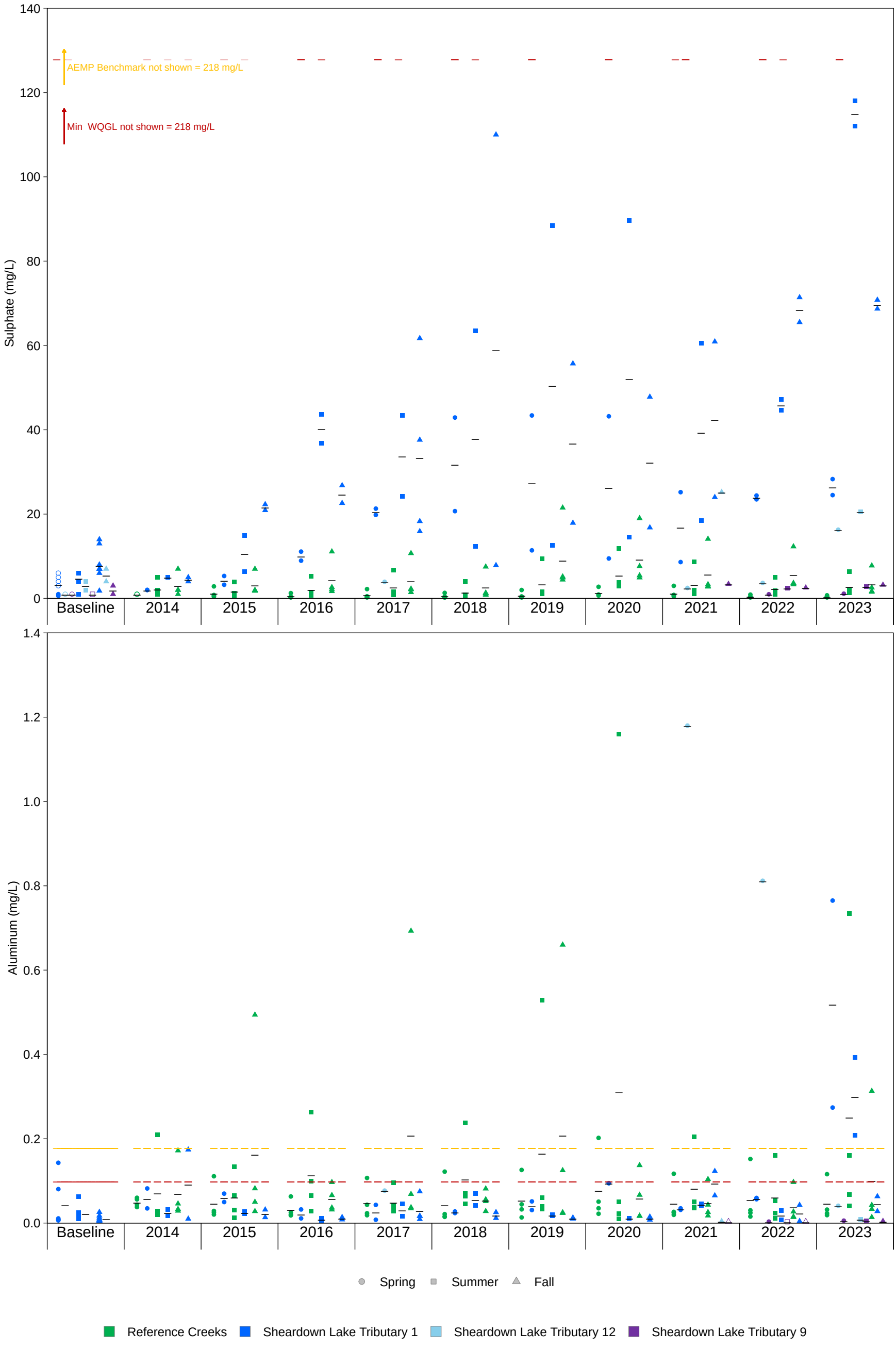

Figure C.11: Temporal Comparison of Water Chemistry at the Sheardown Lake Tributaries (SDLT1, SDLT12, SDLT9) Over Mine Baseline (2006 to 2013) and Operations (2015 to 2023) Periods

Notes: Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Red dashes indicate Water Quality Guidelines, some of which are dependent on concurrent hardness values; orange solid line indicates AEMP Benchmark. Sheardown Lake Tributary 12 (SDLT12/ LDFG−OUT) and Sheardown Lake Tributary 9 (SDLT9/MS−C−G) stations were added to the CREMP in fall 2021.

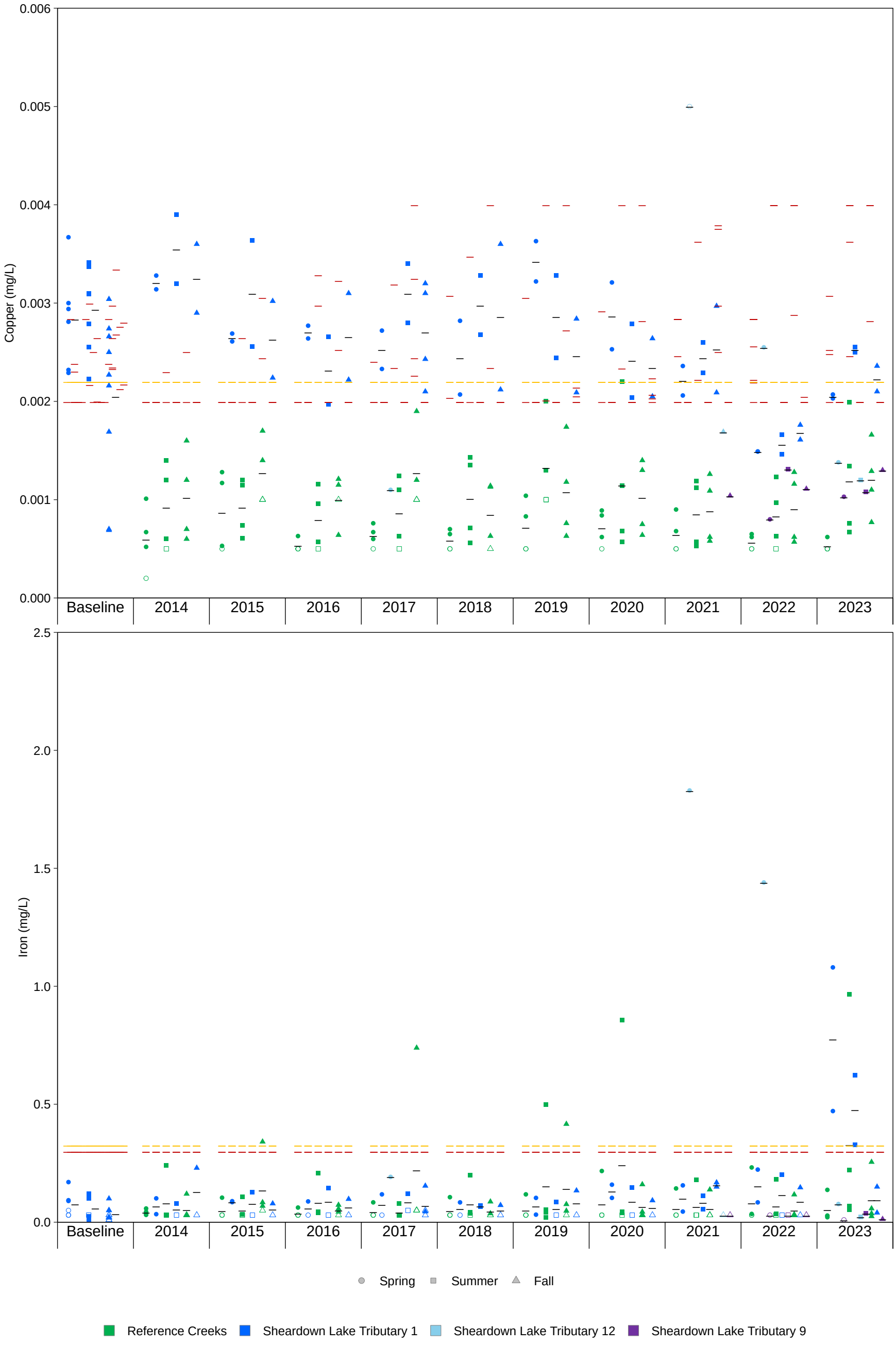

Figure C.11: Temporal Comparison of Water Chemistry at the Sheardown Lake Tributaries (SDLT1, SDLT12, SDLT9) Over Mine Baseline (2006 to 2013) and Operations (2015 to 2023) Periods

Notes: Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Red dashes indicate Water Quality Guidelines, some of which are dependent on concurrent hardness values; orange solid line indicates AEMP Benchmark. Sheardown Lake Tributary 12 (SDLT12/ LDFG−OUT) and Sheardown Lake Tributary 9 (SDLT9/MS−C−G) stations were added to the CREMP in fall 2021.

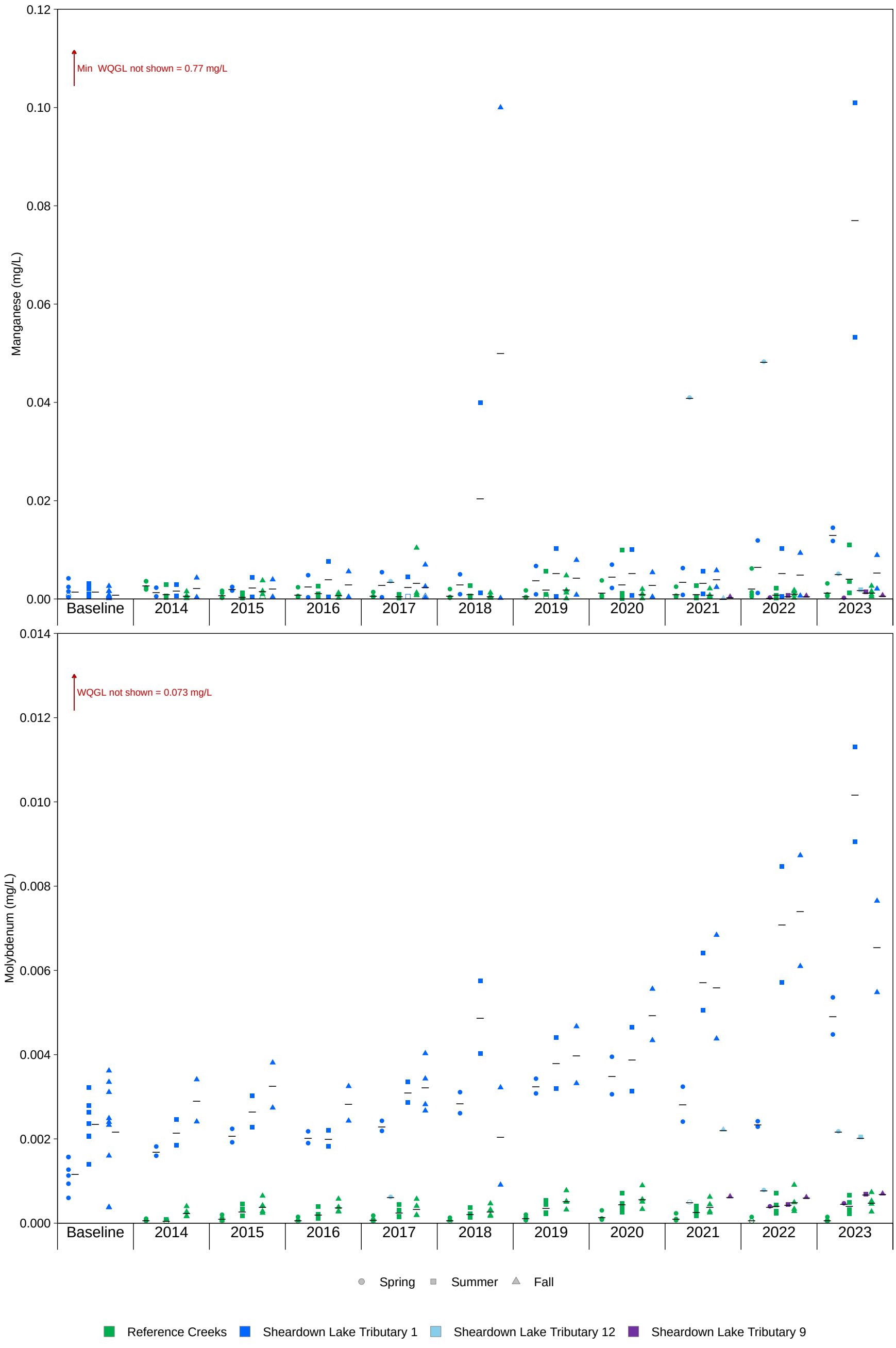

Figure C.11: Temporal Comparison of Water Chemistry at the Sheardown Lake Tributaries (SDLT1, SDLT12, SDLT9) Over Mine Baseline (2006 to 2013) and Operations (2015 to 2023) Periods

Notes: Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Red dashes indicate Water Quality Guidelines, some of which are dependent on concurrent hardness values; orange solid line indicates AEMP Benchmark. Sheardown Lake Tributary 12 (SDLT12/ LDFG−OUT) and Sheardown Lake Tributary 9 (SDLT9/MS−C−G) stations were added to the CREMP in fall 2021.

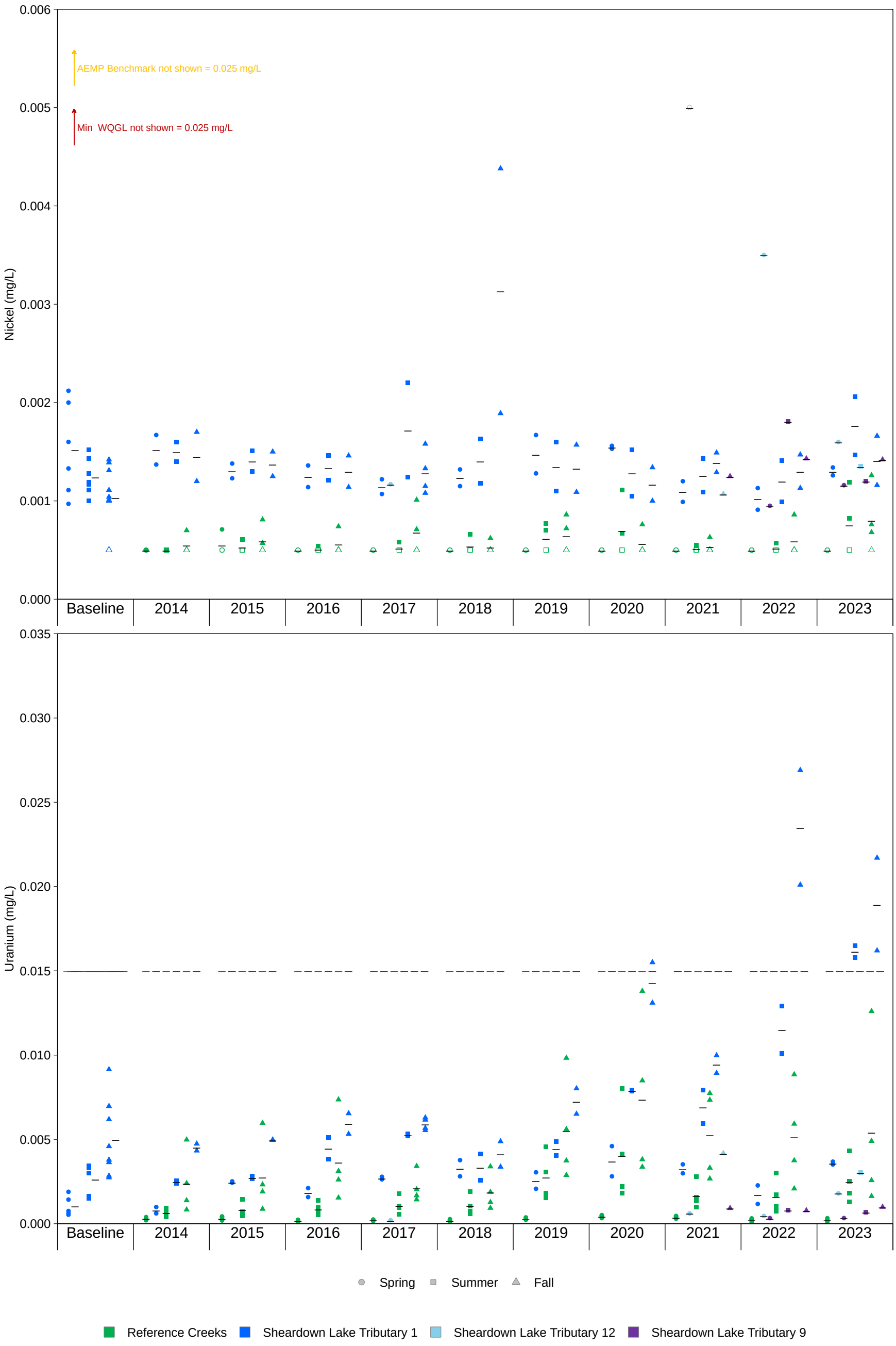

Figure C.11: Temporal Comparison of Water Chemistry at the Sheardown Lake Tributaries (SDLT1, SDLT12, SDLT9) Over Mine Baseline (2006 to 2013) and Operations (2015 to 2023) Periods

Notes: Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Red dashes indicate Water Quality Guidelines, some of which are dependent on concurrent hardness values; orange solid line indicates AEMP Benchmark. Sheardown Lake Tributary 12 (SDLT12/ LDFG−OUT) and Sheardown Lake Tributary 9 (SDLT9/MS−C−G) stations were added to the CREMP in fall 2021.

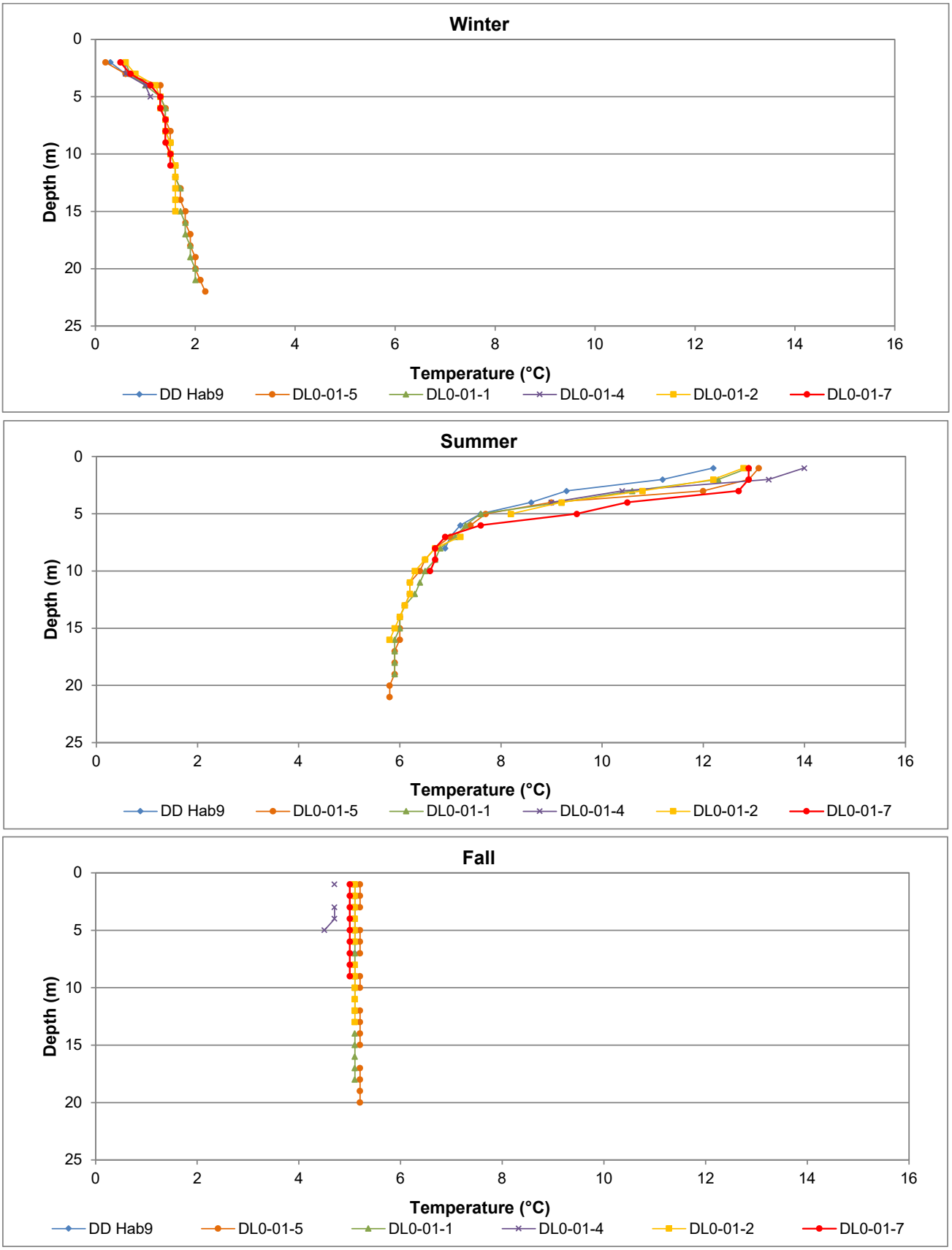

Figure C.12: Vertical Profiles of Temperature Measured at Sheardown Lake NW (DL0-01) in Winter, Summer, and Fall, Mary River Project CREMP, 2023

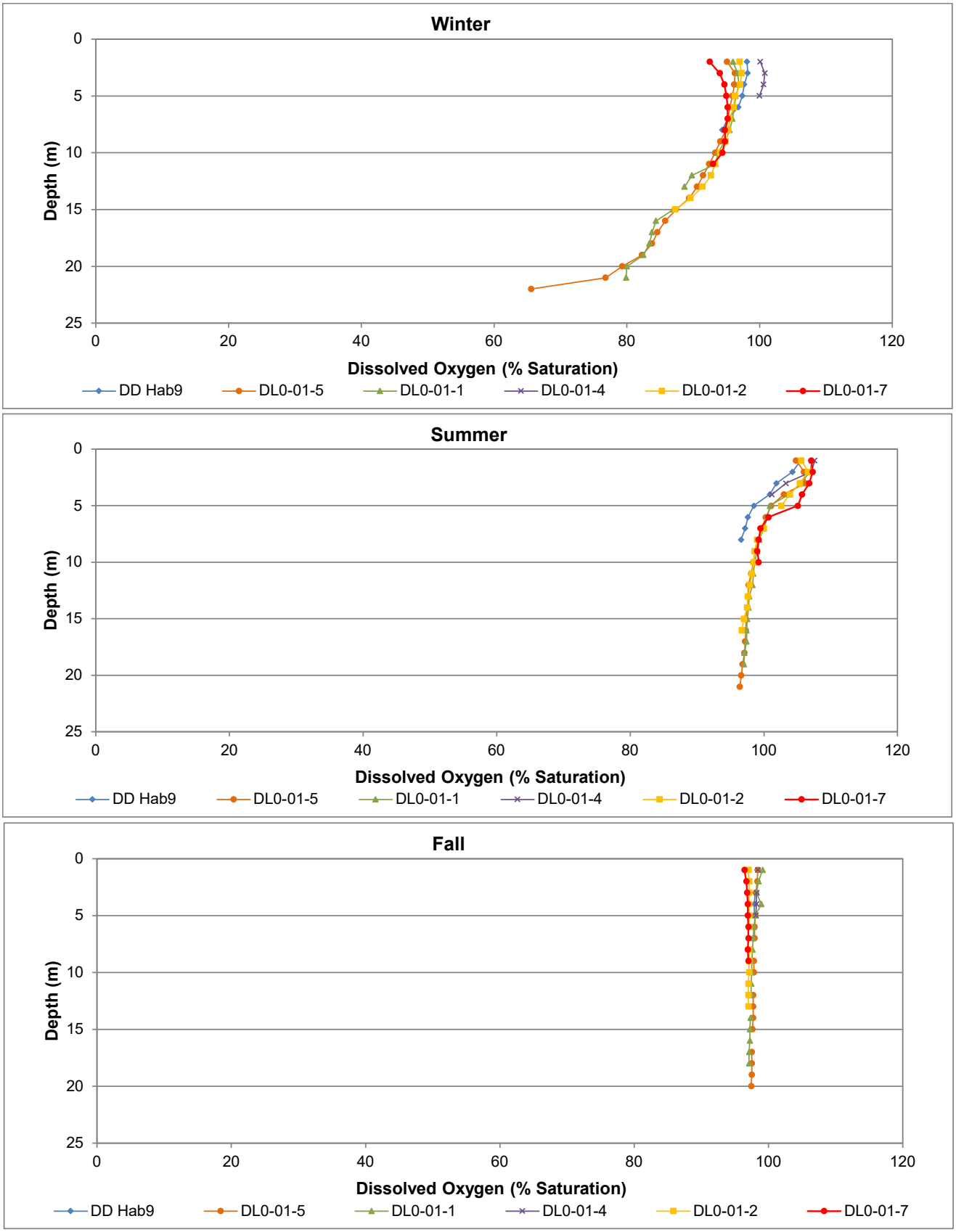

Figure C.13: Vertical Profiles of Dissolved Oxygen Measured at Sheardown Lake NW (DL0-01) in Winter, Summer, and Fall, Mary River Project CREMP, 2023

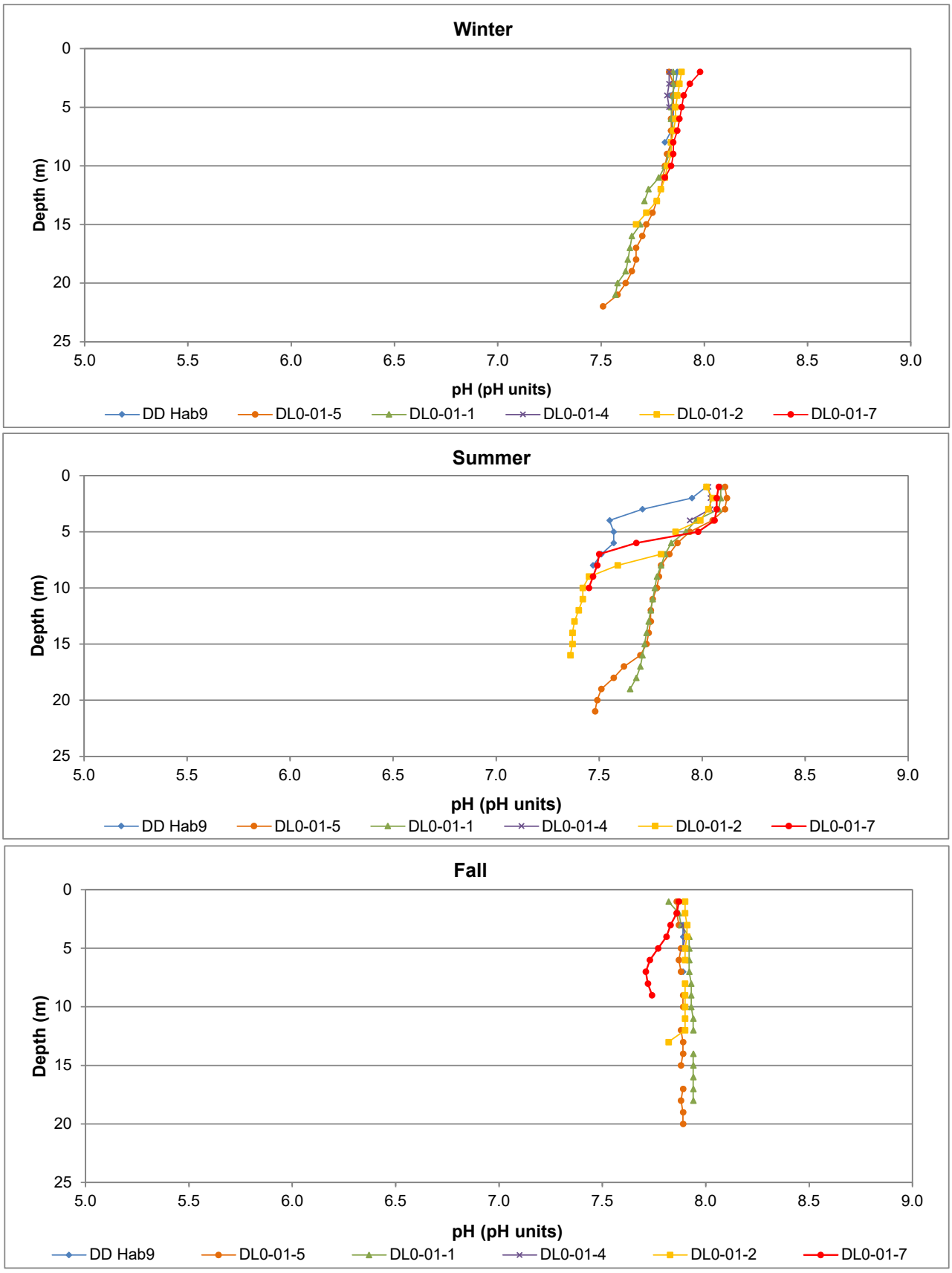

Figure C.14: Vertical Profiles of pH Measured at Sheardown Lake NW (DL0-01) in Winter, Summer, and Fall, Mary River Project CREMP, 2023

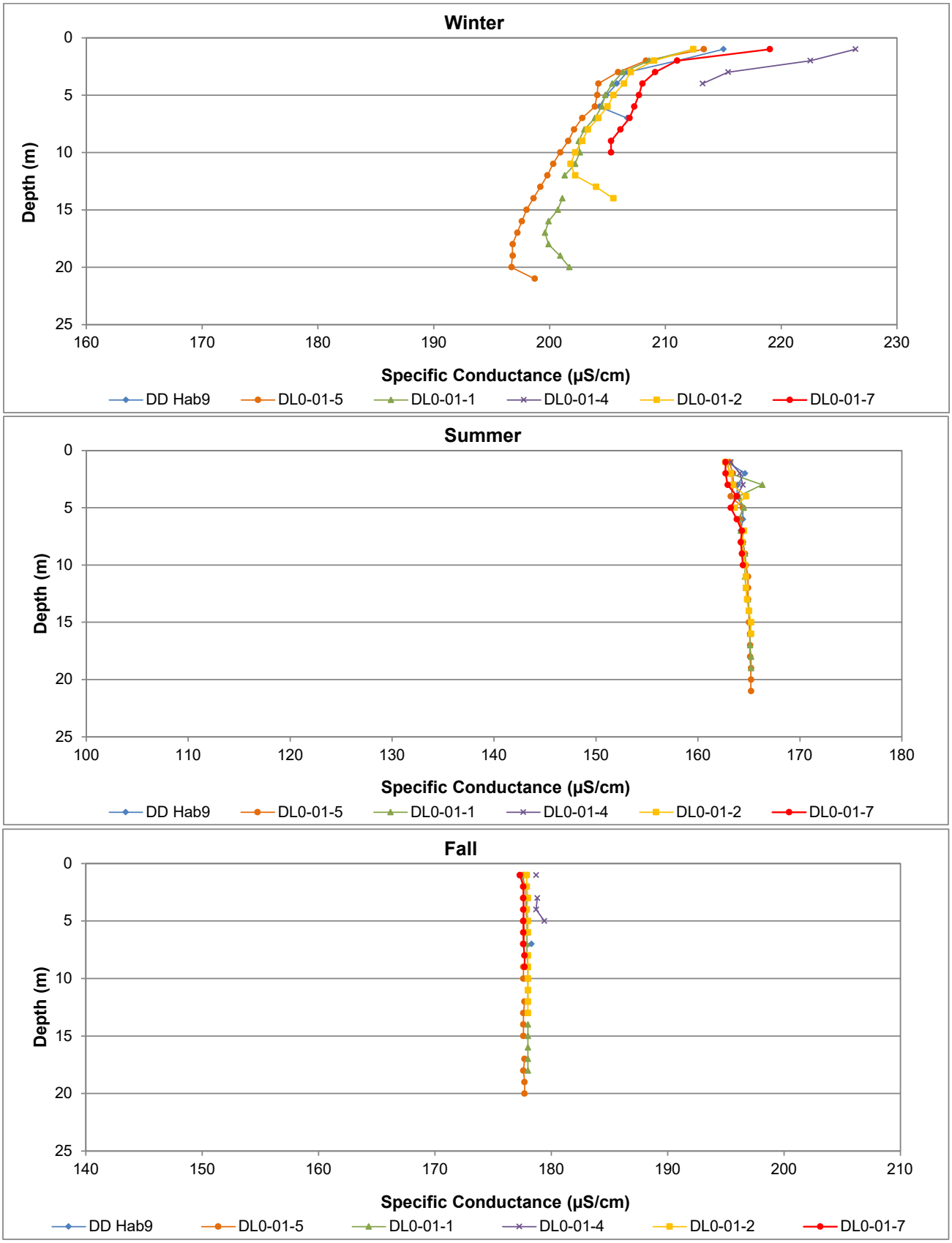

Figure C.15: Vertical Profiles of Specific Conductance Measured at Sheardown Lake NW (DL0-01) in Winter, Summer, and Fall, Mary River Project CREMP, 2023

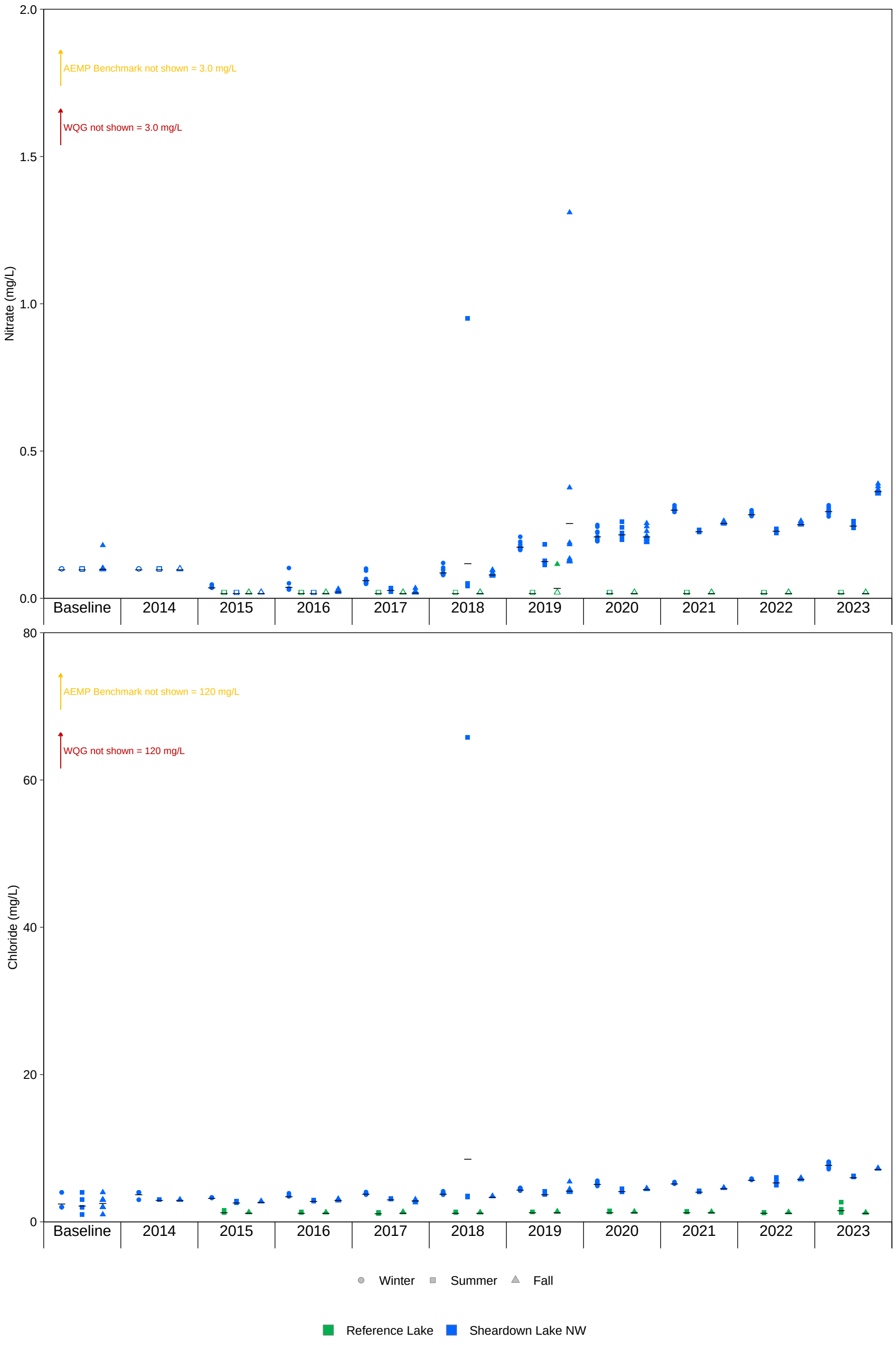

Figure C.16: Temporal Comparison of Water Chemistry at Sheardown Lake NW (DL0−01) Over Mine Baseline (2006 to 2013), Construction (2014), and Operations (2015 to 2023) Periods

Notes: Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Red lines indicate Water Quality Guidelines, some of which are dependent on concurrent hardness values; orange lines indicate AEMP Benchmarks. For each station, a concentration is provided for each of the bottom and the surface of the water column.

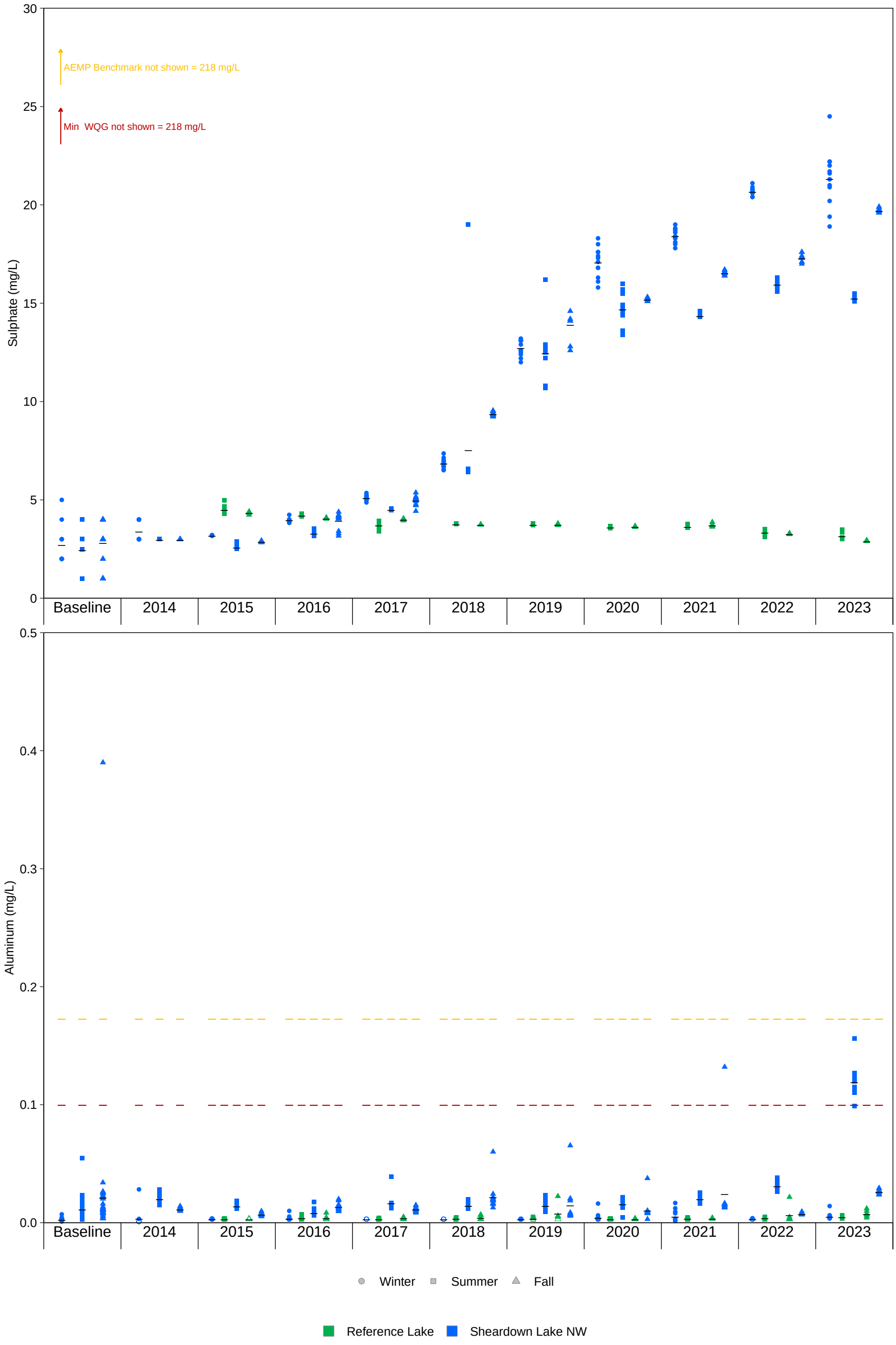

Figure C.16: Temporal Comparison of Water Chemistry at Sheardown Lake NW (DL0−01) Over Mine Baseline (2006 to 2013), Construction (2014), and Operations (2015 to 2023) Periods

Notes: Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Red lines indicate Water Quality Guidelines, some of which are dependent on concurrent hardness values; orange lines indicate AEMP Benchmarks. For each station, a concentration is provided for each of the bottom and the surface of the water column.

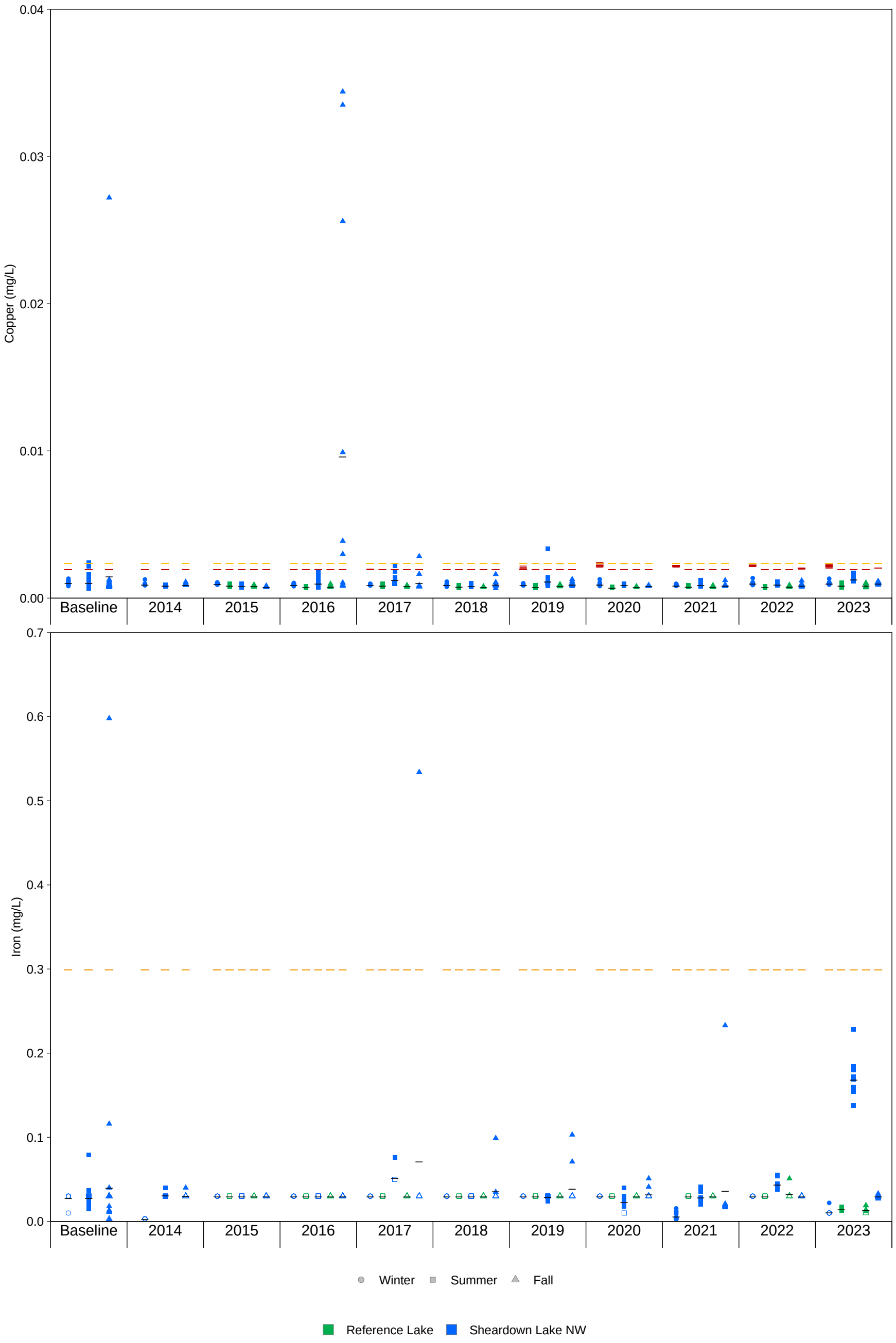

Figure C.16: Temporal Comparison of Water Chemistry at Sheardown Lake NW (DL0−01) Over Mine Baseline (2006 to 2013), Construction (2014), and Operations (2015 to 2023) Periods

Notes: Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Red lines indicate Water Quality Guidelines, some of which are dependent on concurrent hardness values; orange lines indicate AEMP Benchmarks. For each station, a concentration is provided for each of the bottom and the surface of the water column.

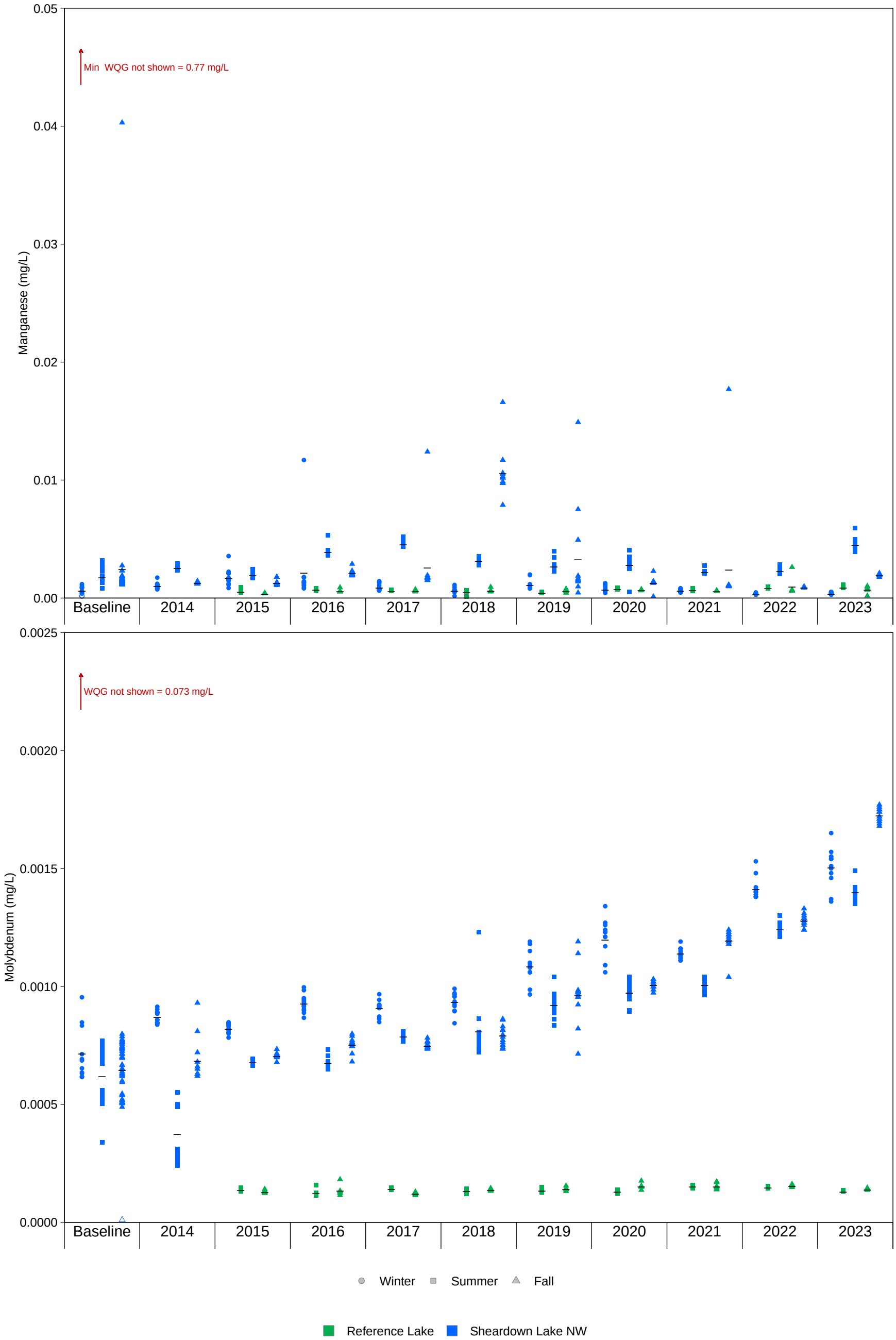

Figure C.16: Temporal Comparison of Water Chemistry at Sheardown Lake NW (DL0−01) Over Mine Baseline (2006 to 2013), Construction (2014), and Operations (2015 to 2023) Periods

Notes: Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Red lines indicate Water Quality Guidelines, some of which are dependent on concurrent hardness values; orange lines indicate AEMP Benchmarks. For each station, a concentration is provided for each of the bottom and the surface of the water column.

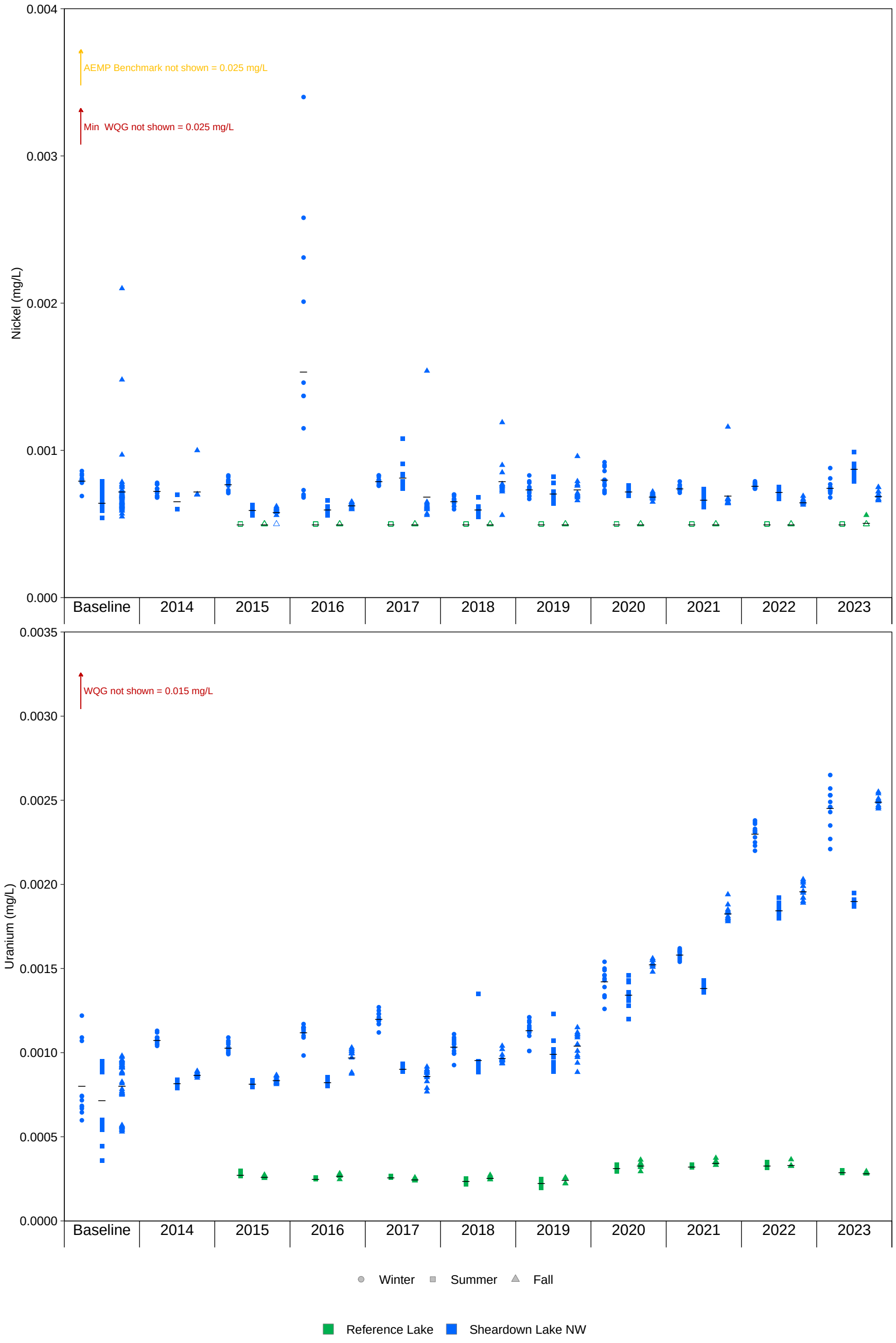

Figure C.16: Temporal Comparison of Water Chemistry at Sheardown Lake NW (DL0−01) Over Mine Baseline (2006 to 2013), Construction (2014), and Operations (2015 to 2023) Periods

Notes: Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Red lines indicate Water Quality Guidelines, some of which are dependent on concurrent hardness values; orange lines indicate AEMP Benchmarks. For each station, a concentration is provided for each of the bottom and the surface of the water column.

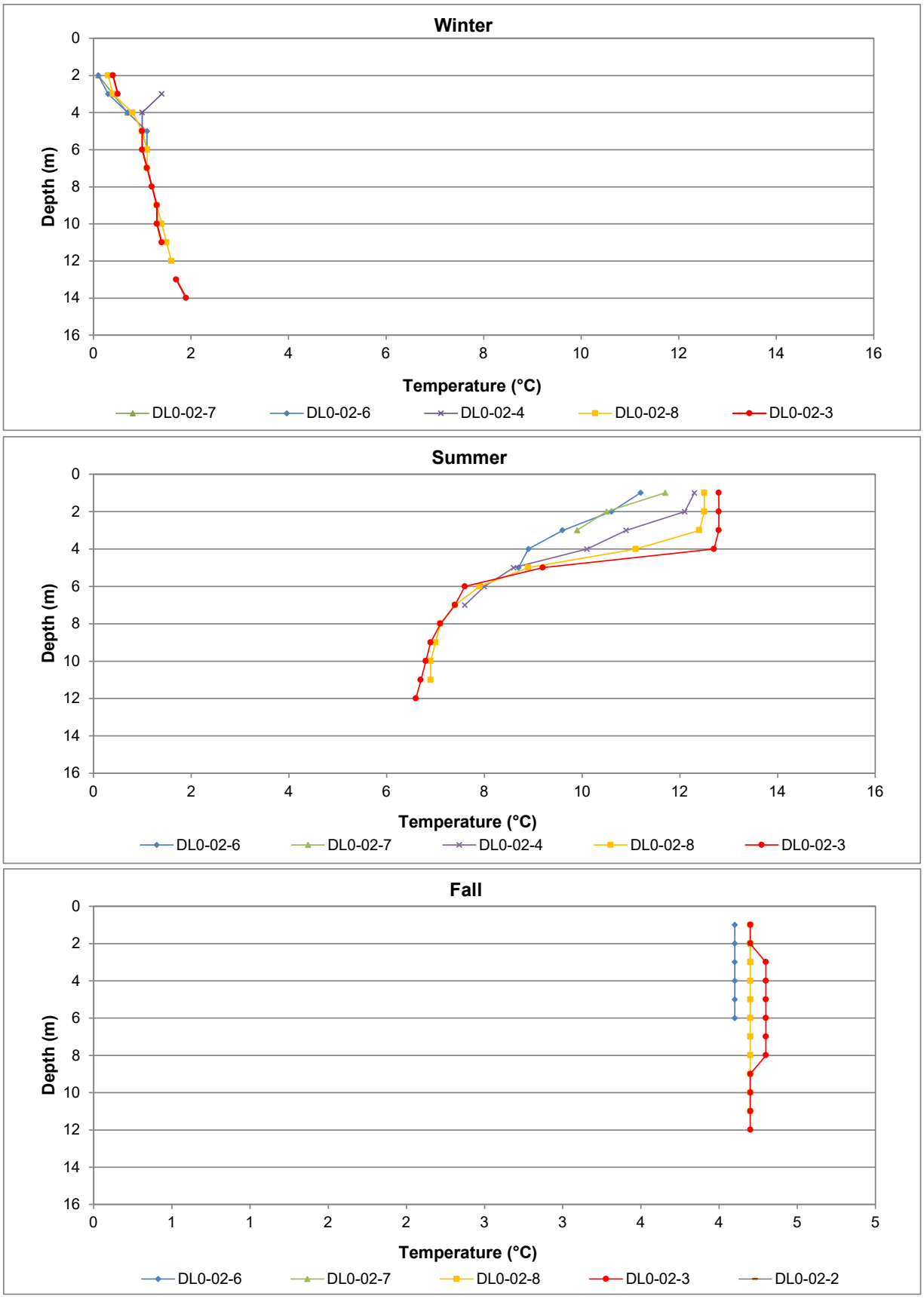

Figure C.17: Vertical Profiles of Temperature Measured at Sheardown Lake SE (DL0-02) in Winter, Summer, and Fall, Mary River Project CREMP, 2023

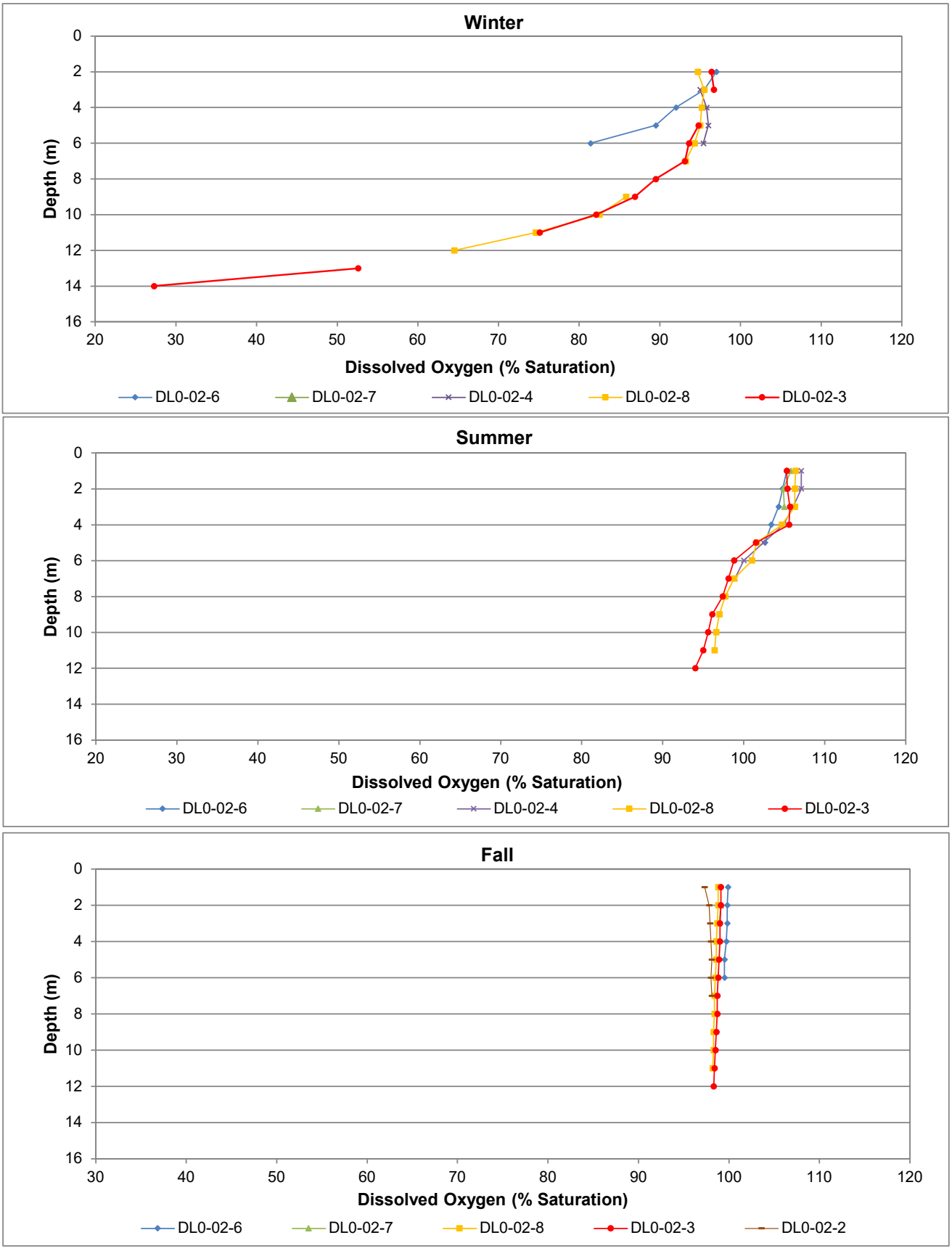

Figure C.18: Vertical Profiles of Dissolved Oxygen Measured at Sheardown Lake SE (DL0-02) in Winter, Summer, and Fall, Mary River Project CREMP, 2023

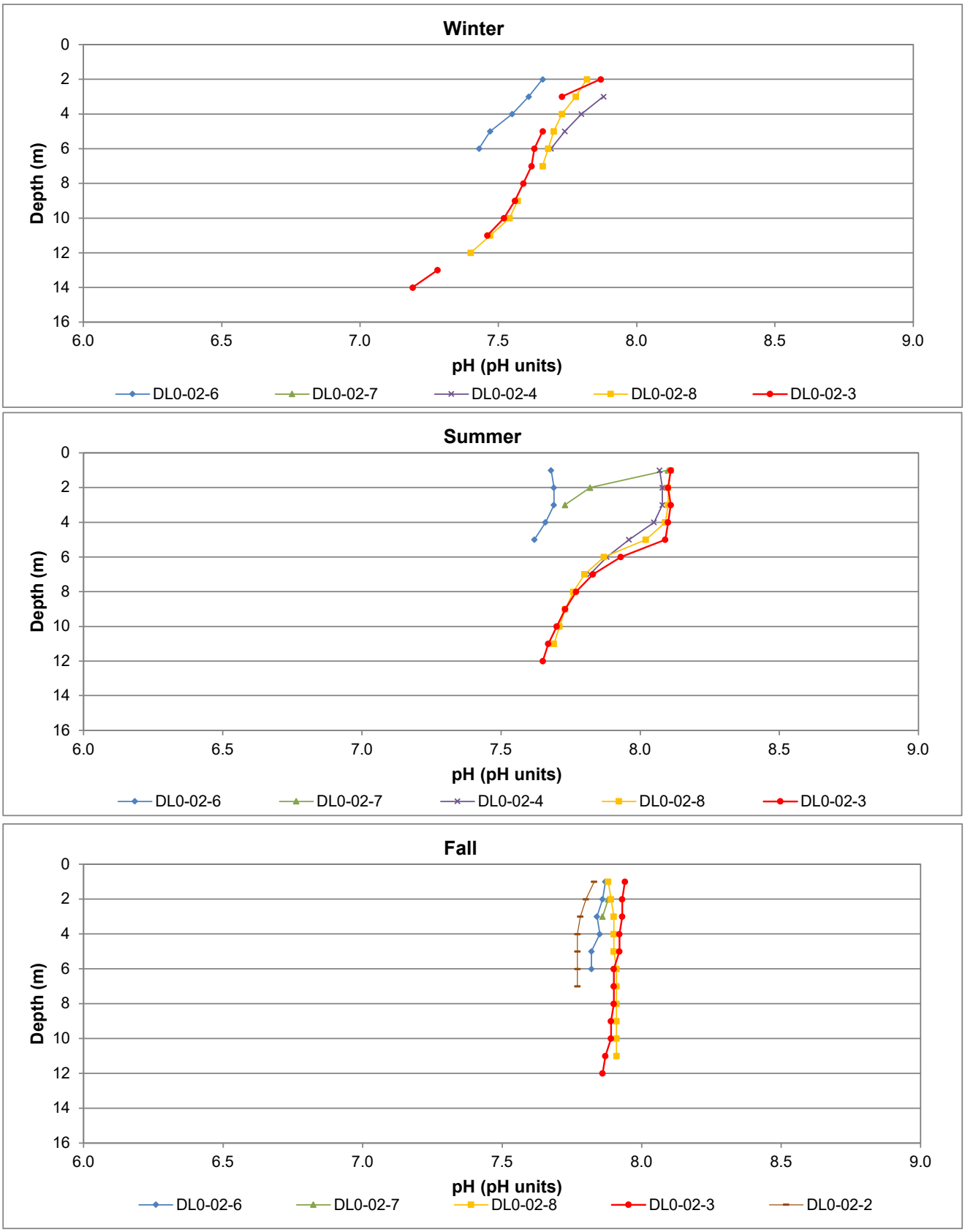

Figure C.19: Vertical Profiles of pH Measured at Sheardown Lake SE (DL0-02) in Winter, Summer, and Fall, Mary River Project CREMP, 2023

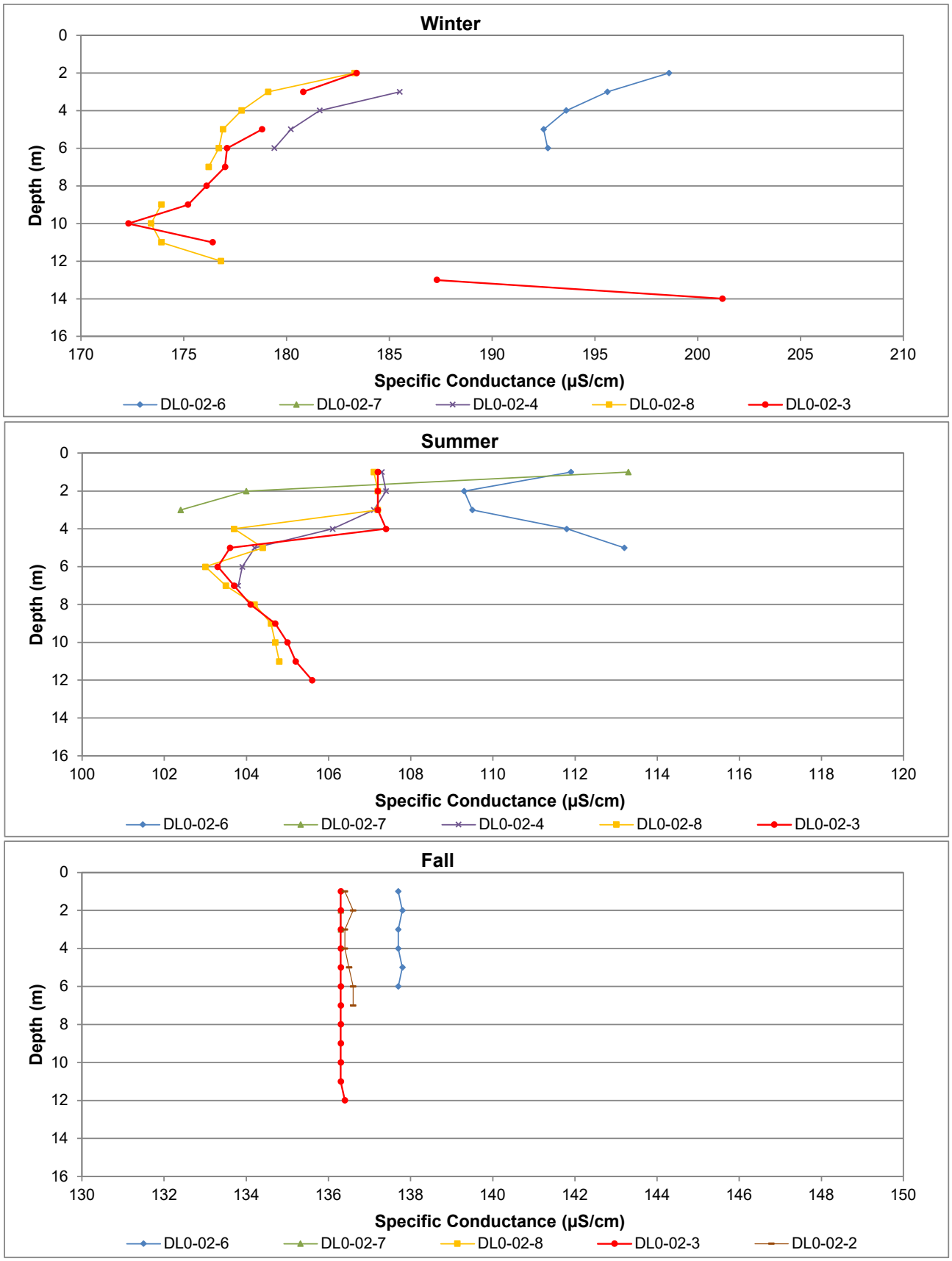

Figure C.20: Vertical Profiles of Conductivity Measured at Sheardown Lake SE (DL0-02) in Winter, Summer, and Fall, Mary River Project CREMP, 2023

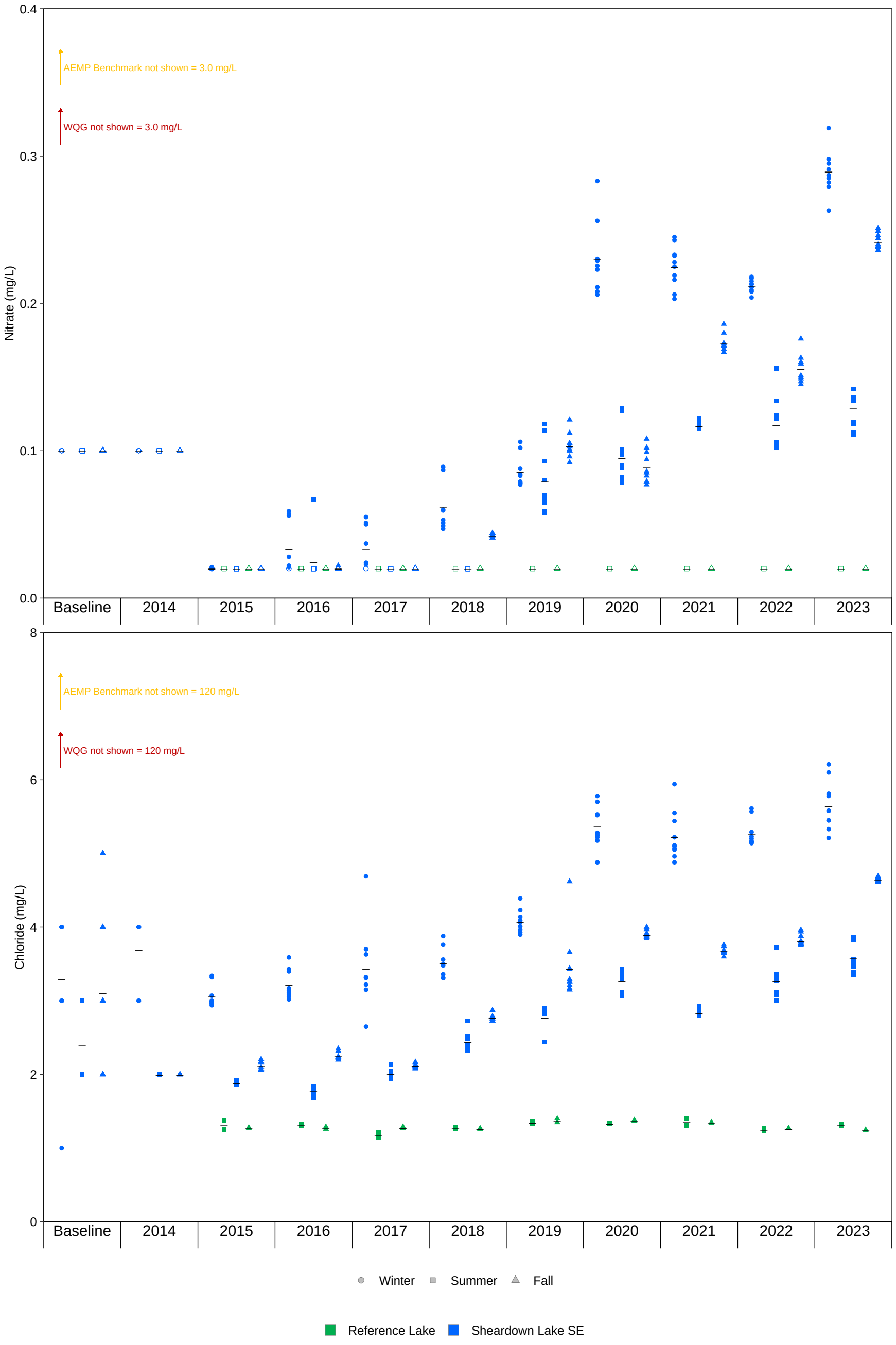

Figure C.21: Temporal Comparison of Water Chemistry at Sheardown Lake SE (DL0−02) Over Mine Baseline (2006 to 2013), Construction (2014), and Operations (2015 to 2023) Periods

Notes: Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Red lines indicate Water Quality Guidelines, some of which are dependent on concurrent hardness values; orange lines indicate AEMP Benchmarks. For each station, a concentration is provided for each of the bottom and the surface of the water column.

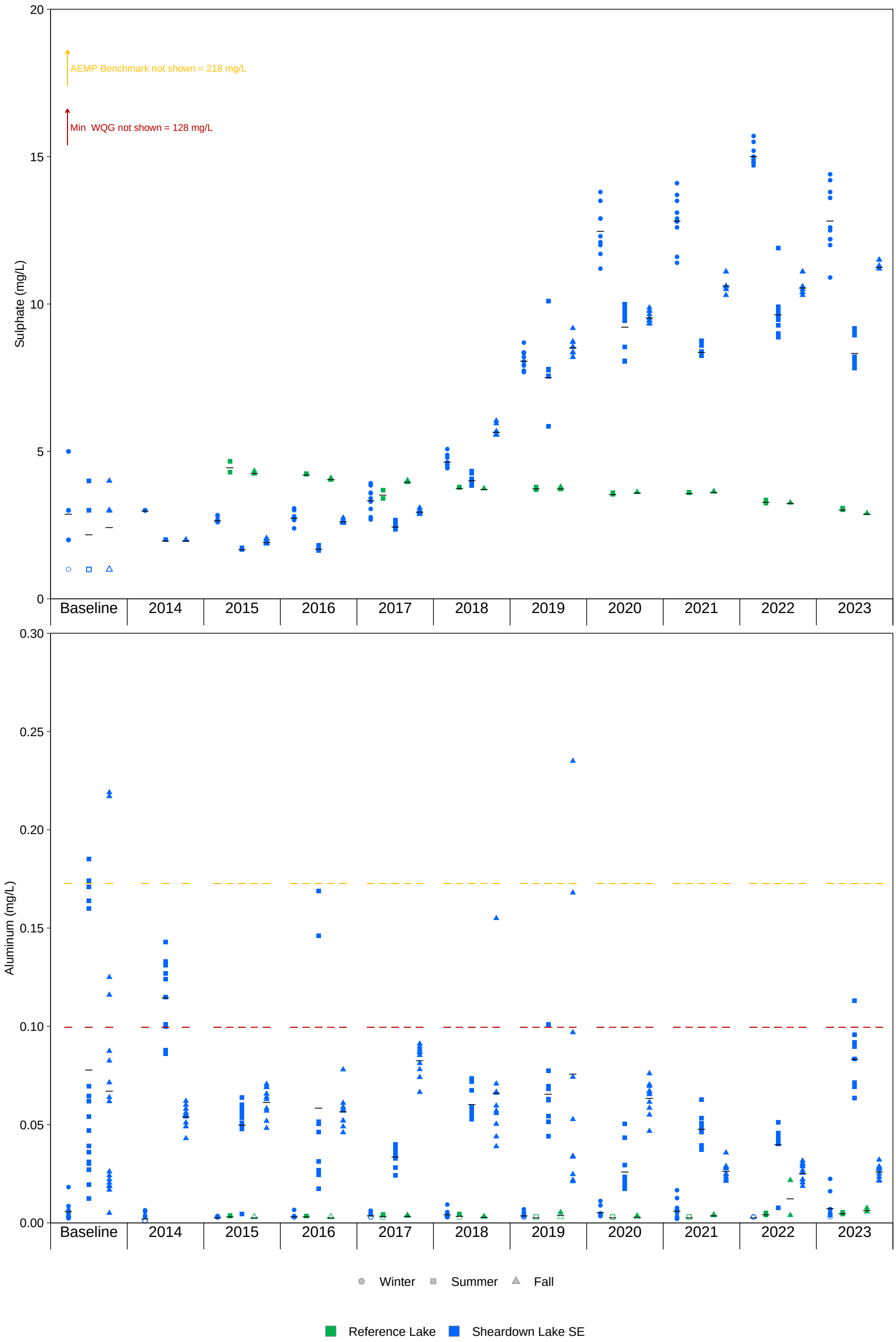

Figure C.21: Temporal Comparison of Water Chemistry at Sheardown Lake SE (DL0−02) Over Mine Baseline (2006 to 2013), Construction (2014), and Operations (2015 to 2023) Periods

Notes: Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Red lines indicate Water Quality Guidelines, some of which are dependent on concurrent hardness values; orange lines indicate AEMP Benchmarks. For each station, a concentration is provided for each of the bottom and the surface of the water column.

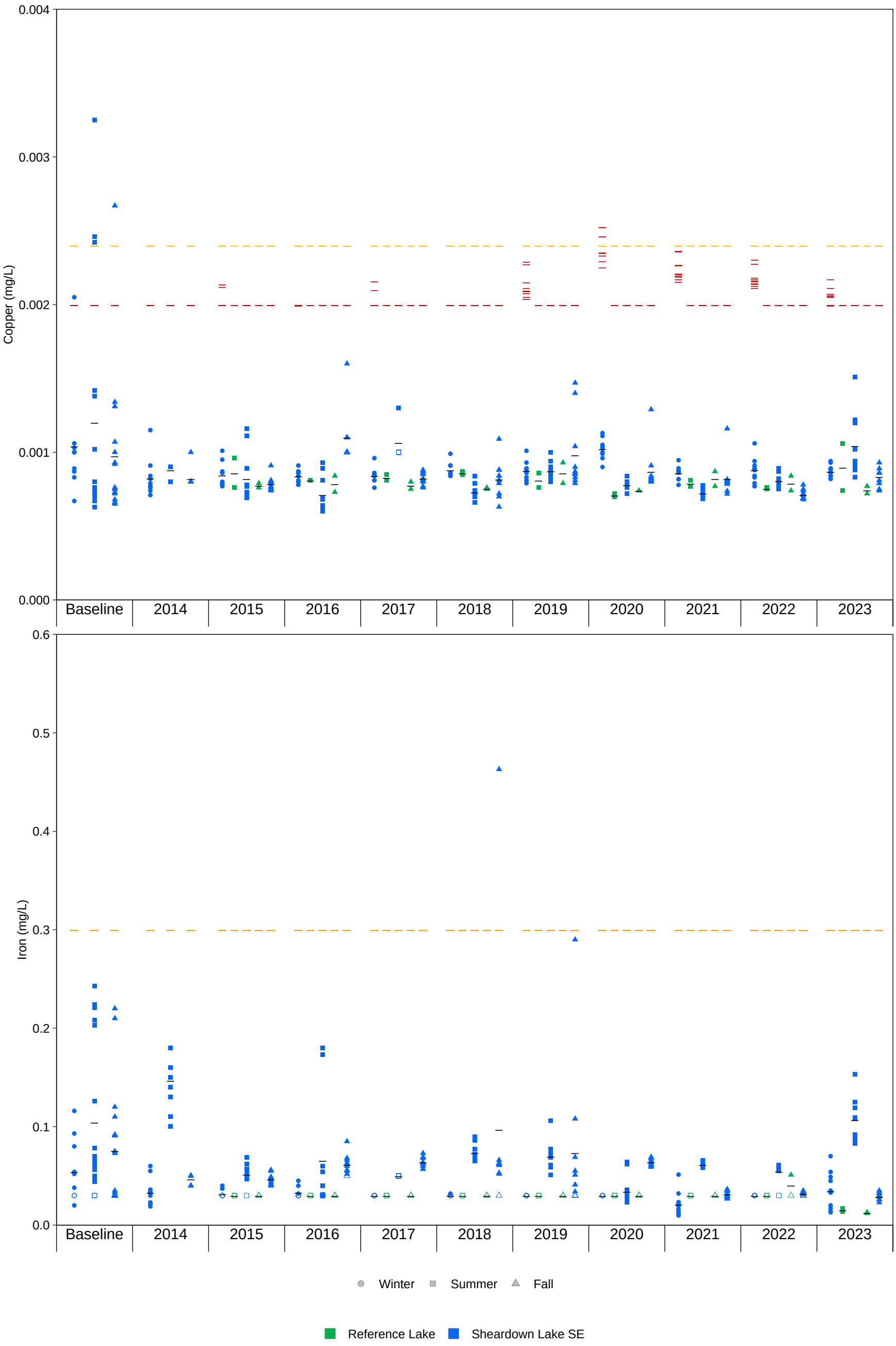

Figure C.21: Temporal Comparison of Water Chemistry at Sheardown Lake SE (DL0−02) Over Mine Baseline (2006 to 2013), Construction (2014), and Operations (2015 to 2023) Periods

Notes: Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Red lines indicate Water Quality Guidelines, some of which are dependent on concurrent hardness values; orange lines indicate AEMP Benchmarks. For each station, a concentration is provided for each of the bottom and the surface of the water column.

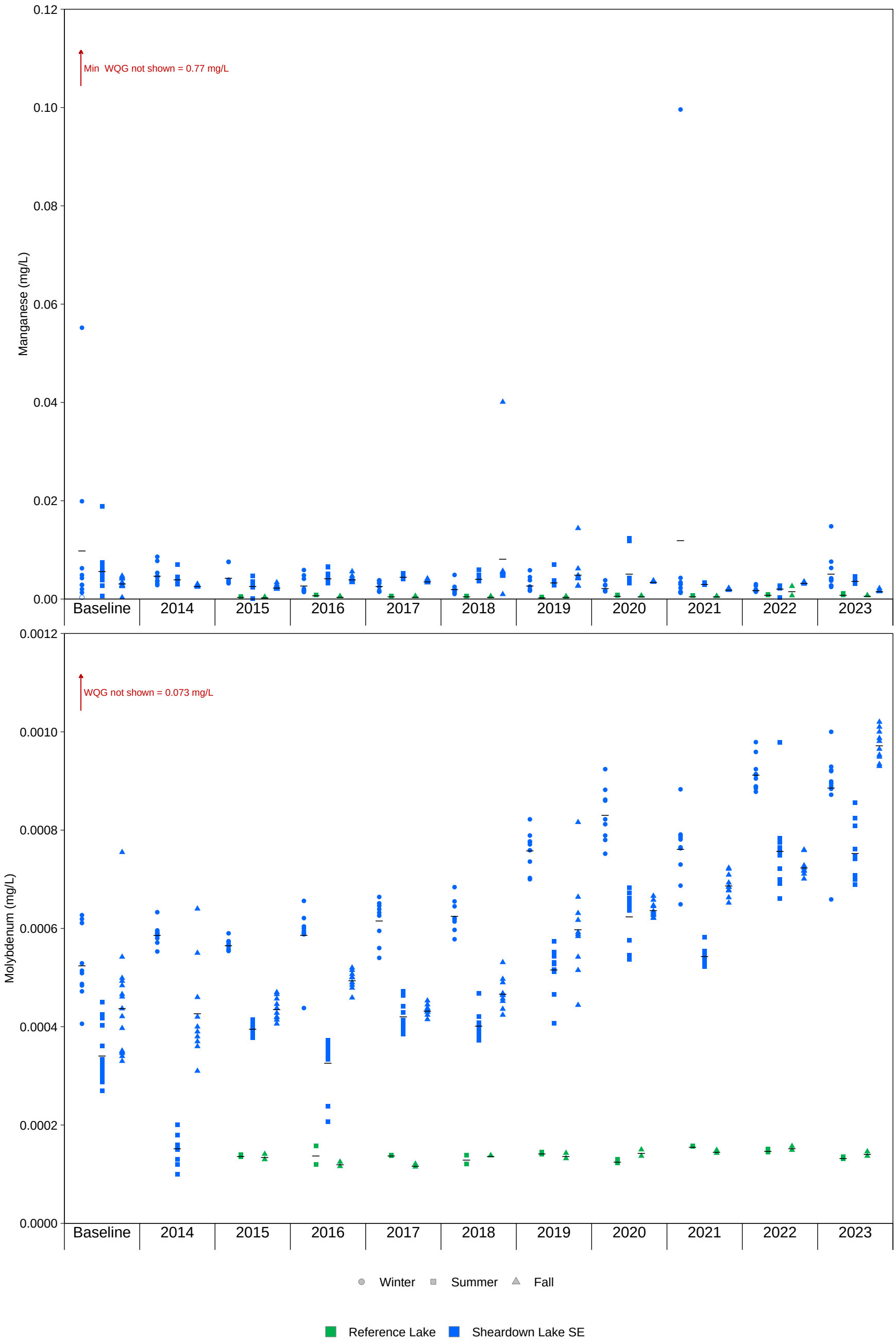

Figure C.21: Temporal Comparison of Water Chemistry at Sheardown Lake SE (DL0−02) Over Mine Baseline (2006 to 2013), Construction (2014), and Operations (2015 to 2023) Periods

Notes: Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Red lines indicate Water Quality Guidelines, some of which are dependent on concurrent hardness values; orange lines indicate AEMP Benchmarks. For each station, a concentration is provided for each of the bottom and the surface of the water column.

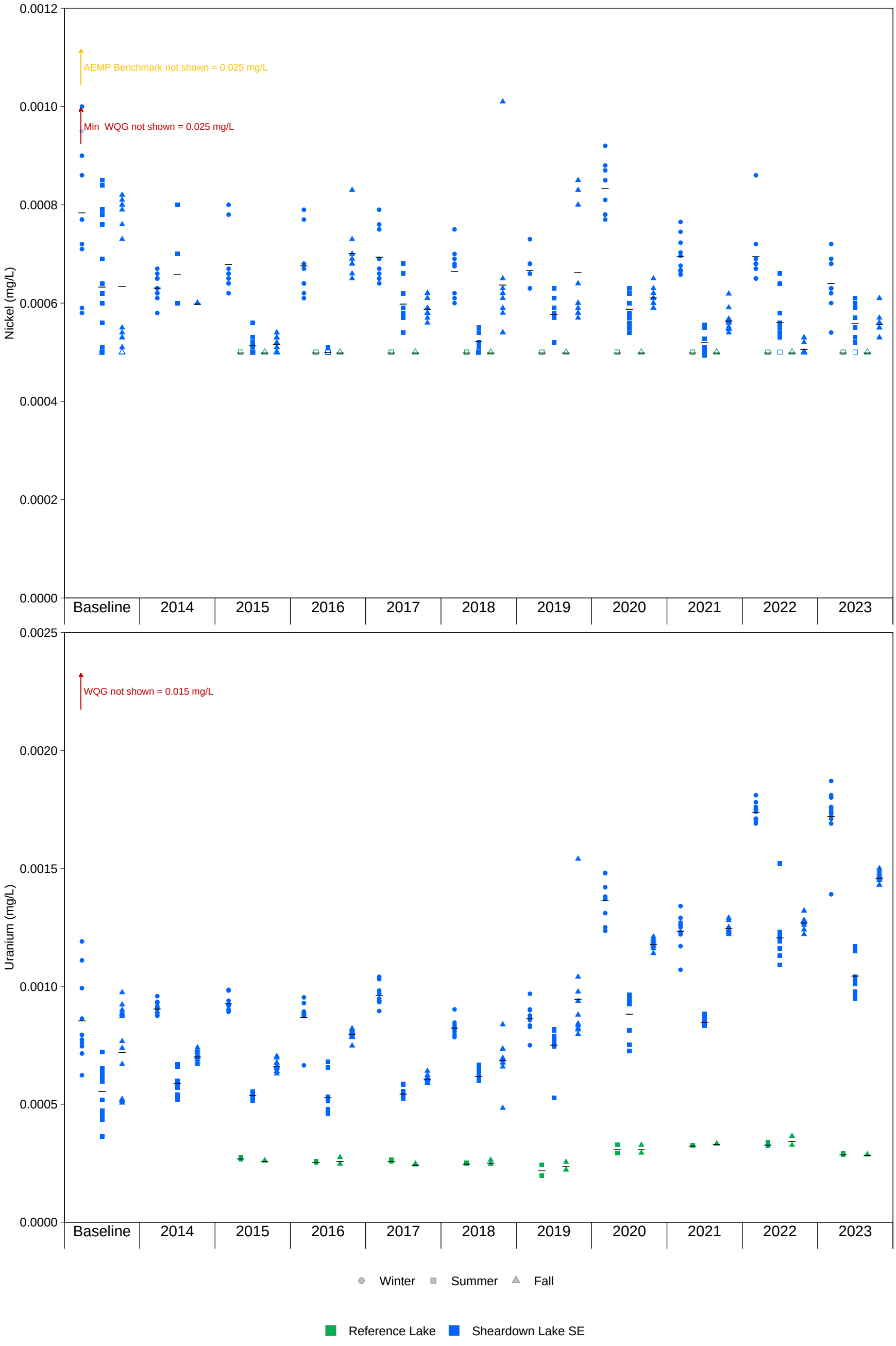

Figure C.21: Temporal Comparison of Water Chemistry at Sheardown Lake SE (DL0−02) Over Mine Baseline (2006 to 2013), Construction (2014), and Operations (2015 to 2023) Periods

Notes: Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Red lines indicate Water Quality Guidelines, some of which are dependent on concurrent hardness values; orange lines indicate AEMP Benchmarks. For each station, a concentration is provided for each of the bottom and the surface of the water column.

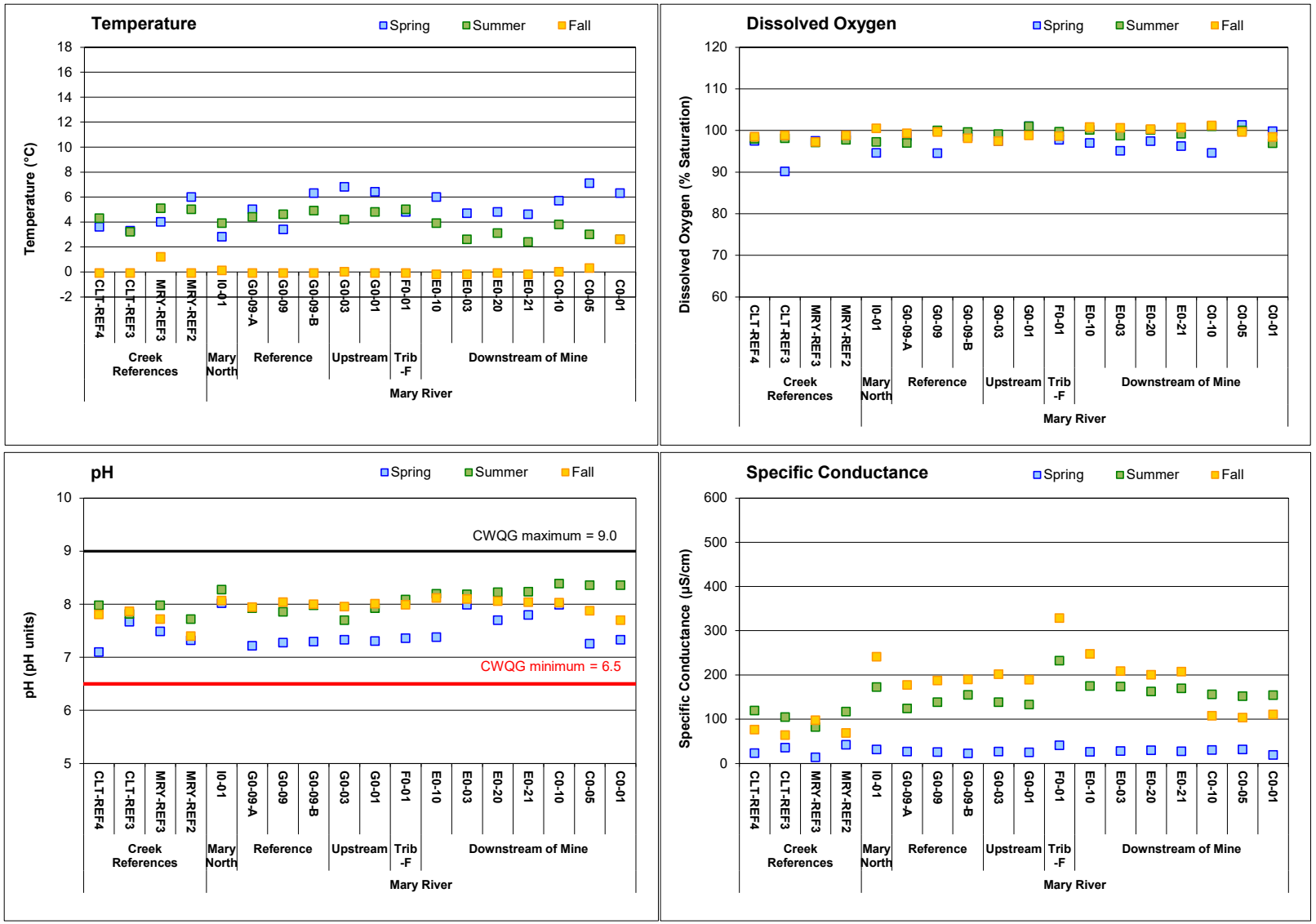

Figure C.22: Comparison of *In Situ* Water Quality Measured at Mary River Water Quality Monitoring Stations in Spring, Summer, and Fall 2023, Mary River Project CREMP

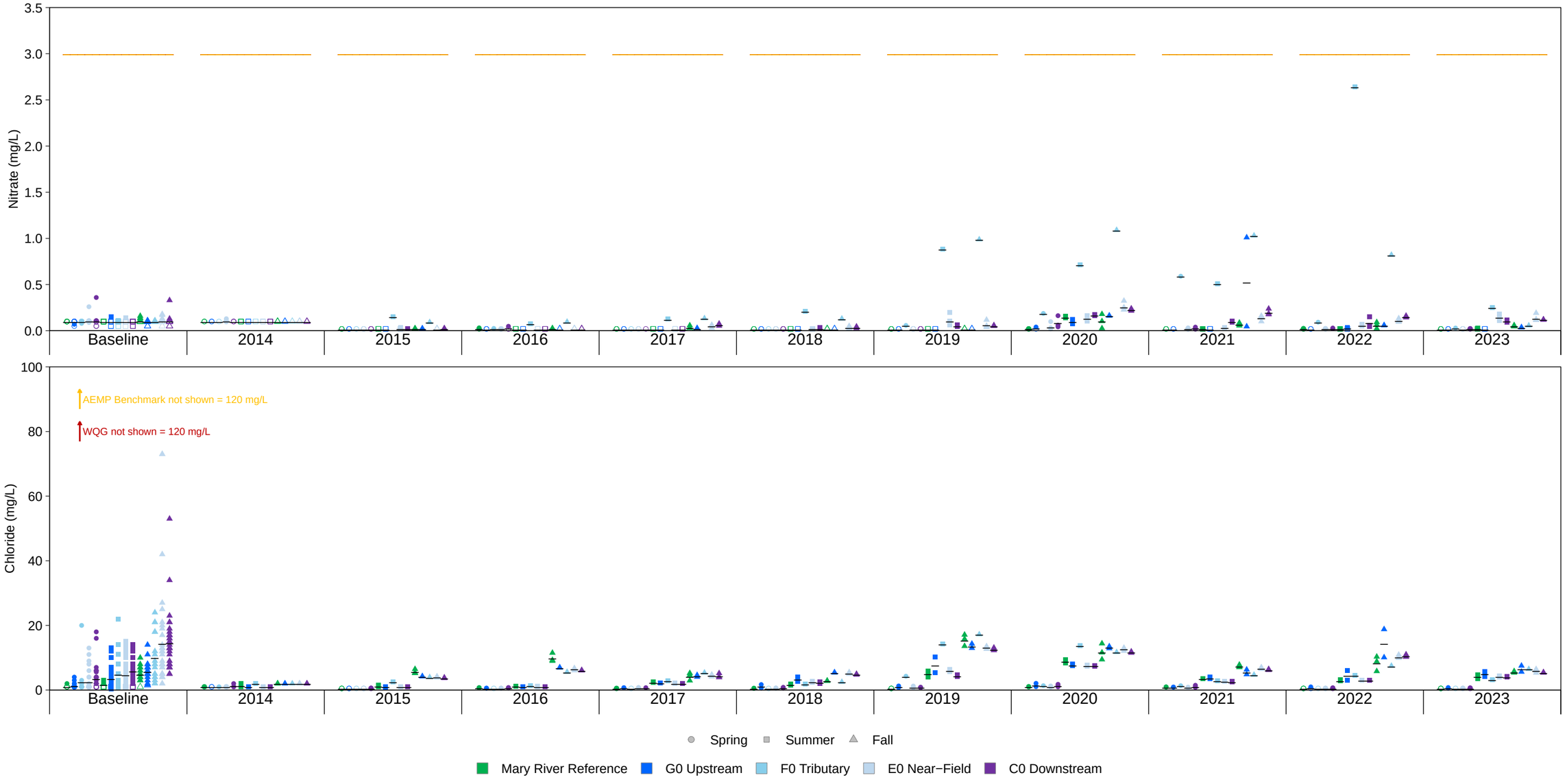

Figure C.23: Temporal Comparison of Water Chemistry at Mary River (G0, F0, E0, and C0) Over Mine Baseline (2006 to 2013), Construction (2014), and Operations (2015 to 2023) Periods

Notes: Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Red lines indicate Water Quality Guidelines, some of which are dependent on concurrent hardness values; orange lines indicate AEMP Benchmarks. Black bars indicate average of samples. An outlier Nickel value of 0.28 mg/L was removed for station C0?10 in 2012.

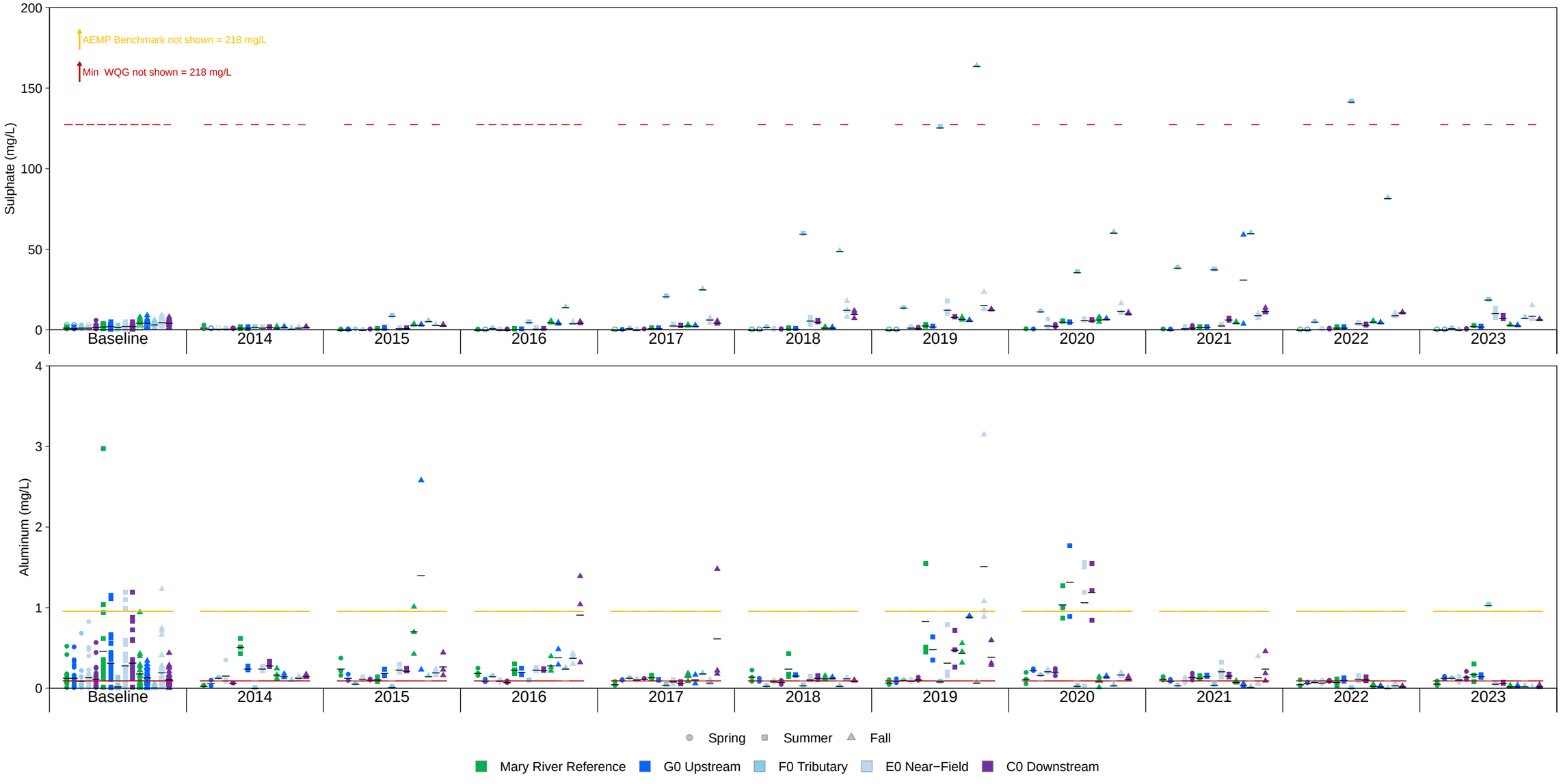

Figure C.23: Temporal Comparison of Water Chemistry at Mary River (G0, F0, E0, and C0) Over Mine Baseline (2006 to 2013), Construction (2014), and Operations (2015 to 2023) Periods

Notes: Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Red lines indicate Water Quality Guidelines, some of which are dependent on concurrent hardness values; orange lines indicate AEMP Benchmarks. Black bars indicate average of samples. An outlier Nickel value of 0.28 mg/L was removed for station C0?10 in 2012.

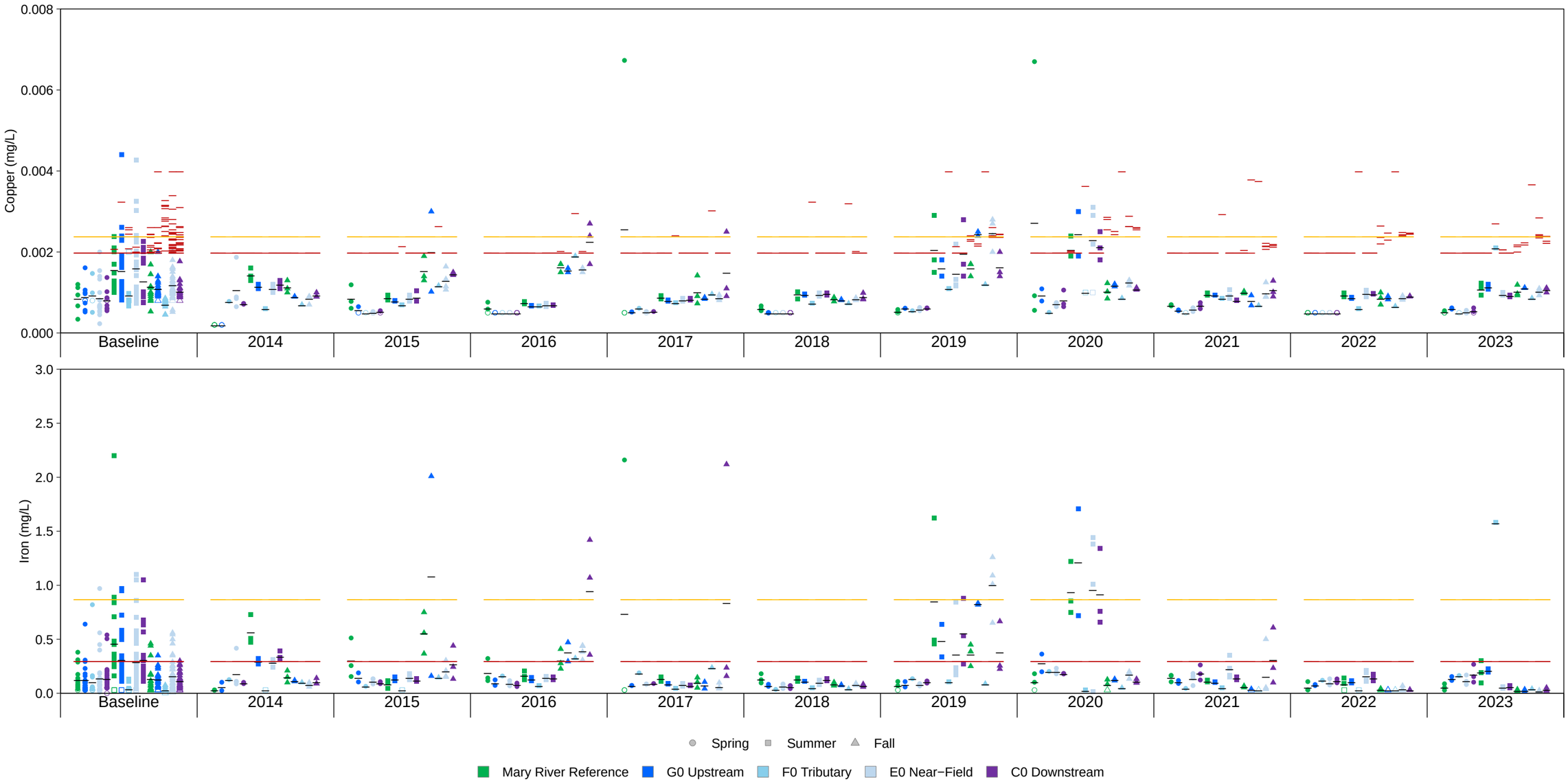

Figure C.23: Temporal Comparison of Water Chemistry at Mary River (G0, F0, E0, and C0) Over Mine Baseline (2006 to 2013), Construction (2014), and Operations (2015 to 2023) Periods

Notes: Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Red lines indicate Water Quality Guidelines, some of which are dependent on concurrent hardness values; orange lines indicate AEMP Benchmarks. Black bars indicate average of samples. An outlier Nickel value of 0.28 mg/L was removed for station C0?10 in 2012.

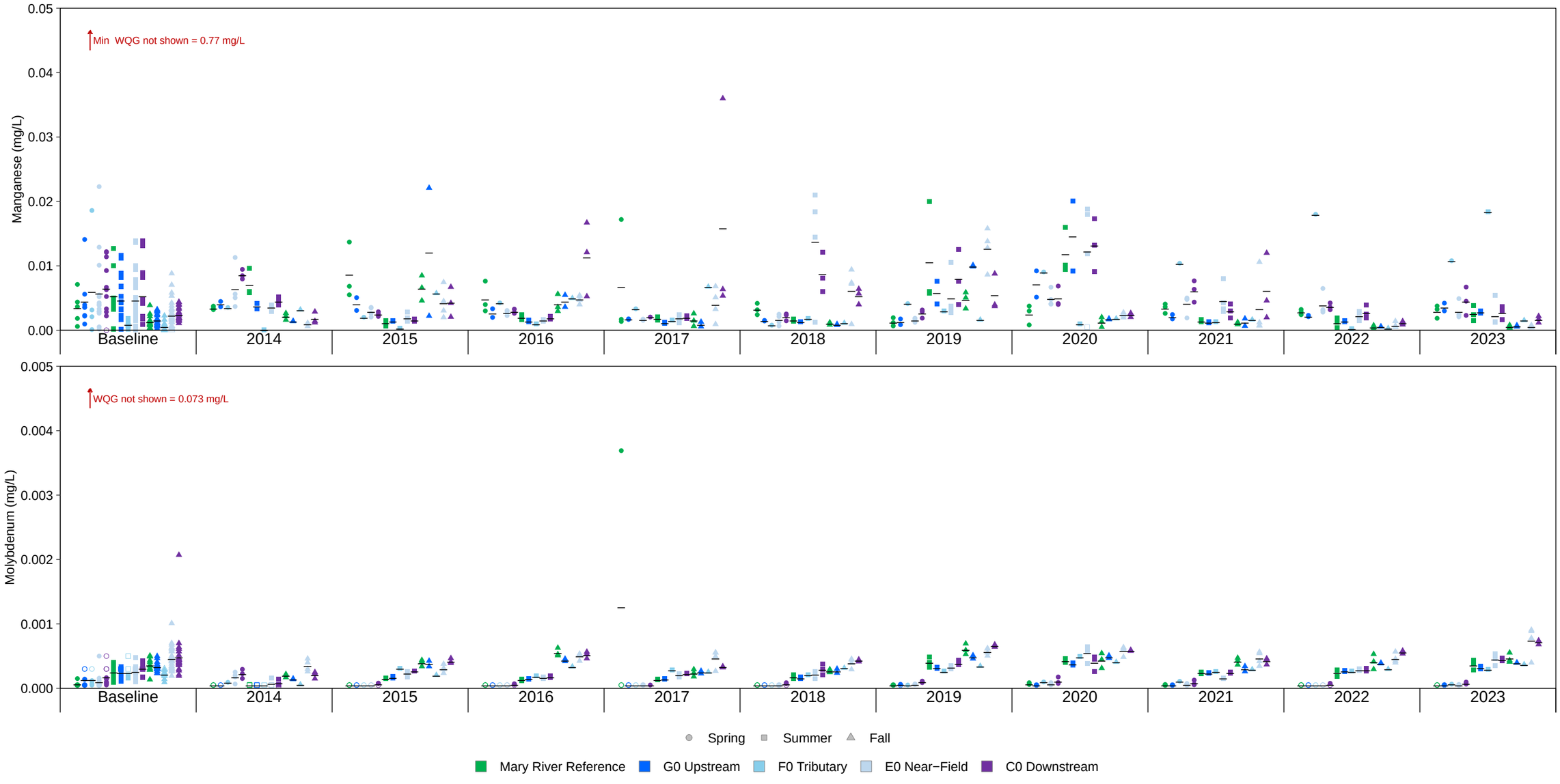

Figure C.23: Temporal Comparison of Water Chemistry at Mary River (G0, F0, E0, and C0) Over Mine Baseline (2006 to 2013), Construction (2014), and Operations (2015 to 2023) Periods

Notes: Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Red lines indicate Water Quality Guidelines, some of which are dependent on concurrent hardness values; orange lines indicate AEMP Benchmarks. Black bars indicate average of samples. An outlier Nickel value of 0.28 mg/L was removed for station C0?10 in 2012.

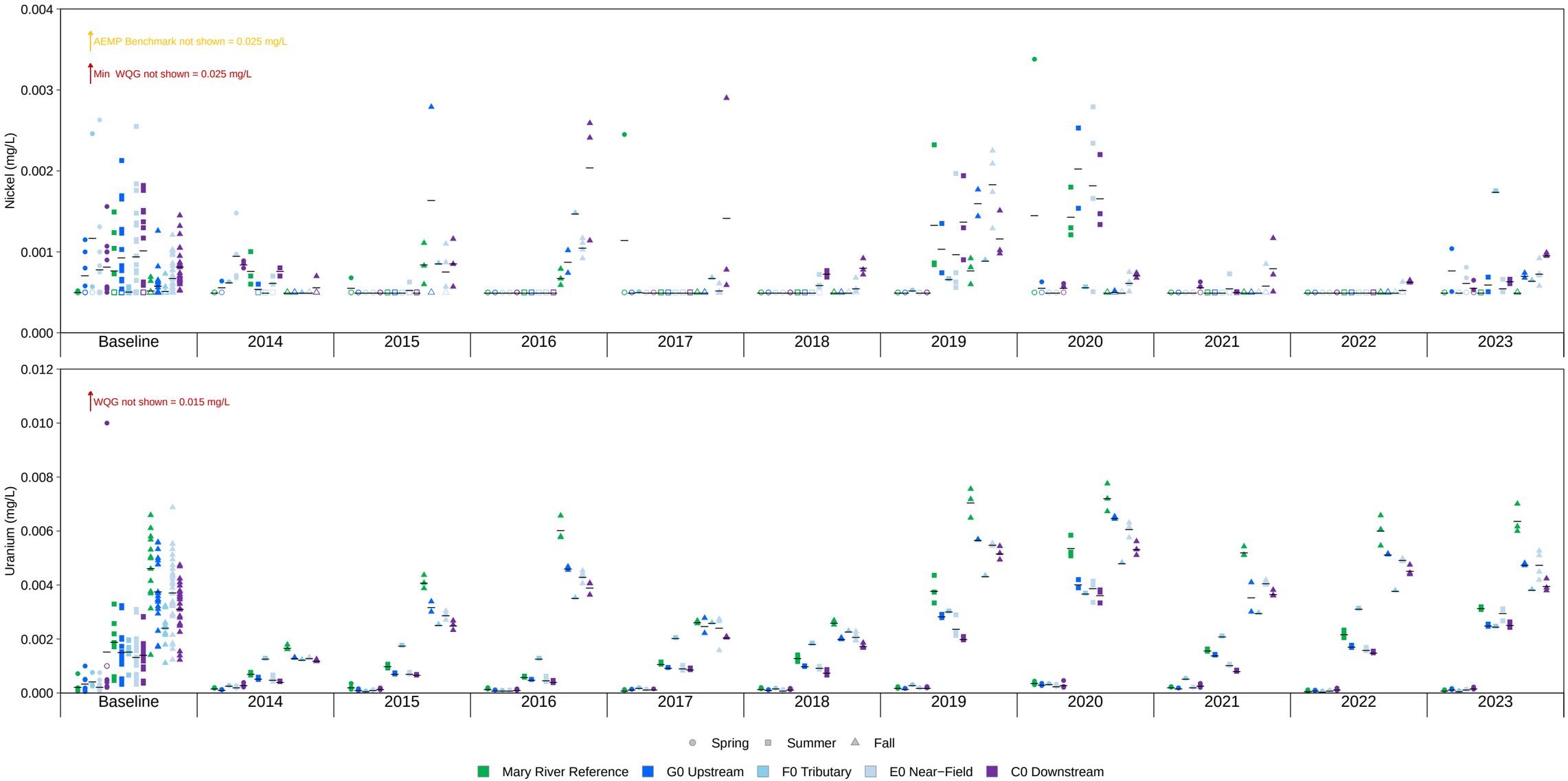

Figure C.23: Temporal Comparison of Water Chemistry at Mary River (G0, F0, E0, and C0) Over Mine Baseline (2006 to 2013), Construction (2014), and Operations (2015 to 2023) Periods

Notes: Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Red lines indicate Water Quality Guidelines, some of which are dependent on concurrent hardness values; orange lines indicate AEMP Benchmarks. Black bars indicate average of samples. An outlier Nickel value of 0.28 mg/L was removed for station C0?10 in 2012.

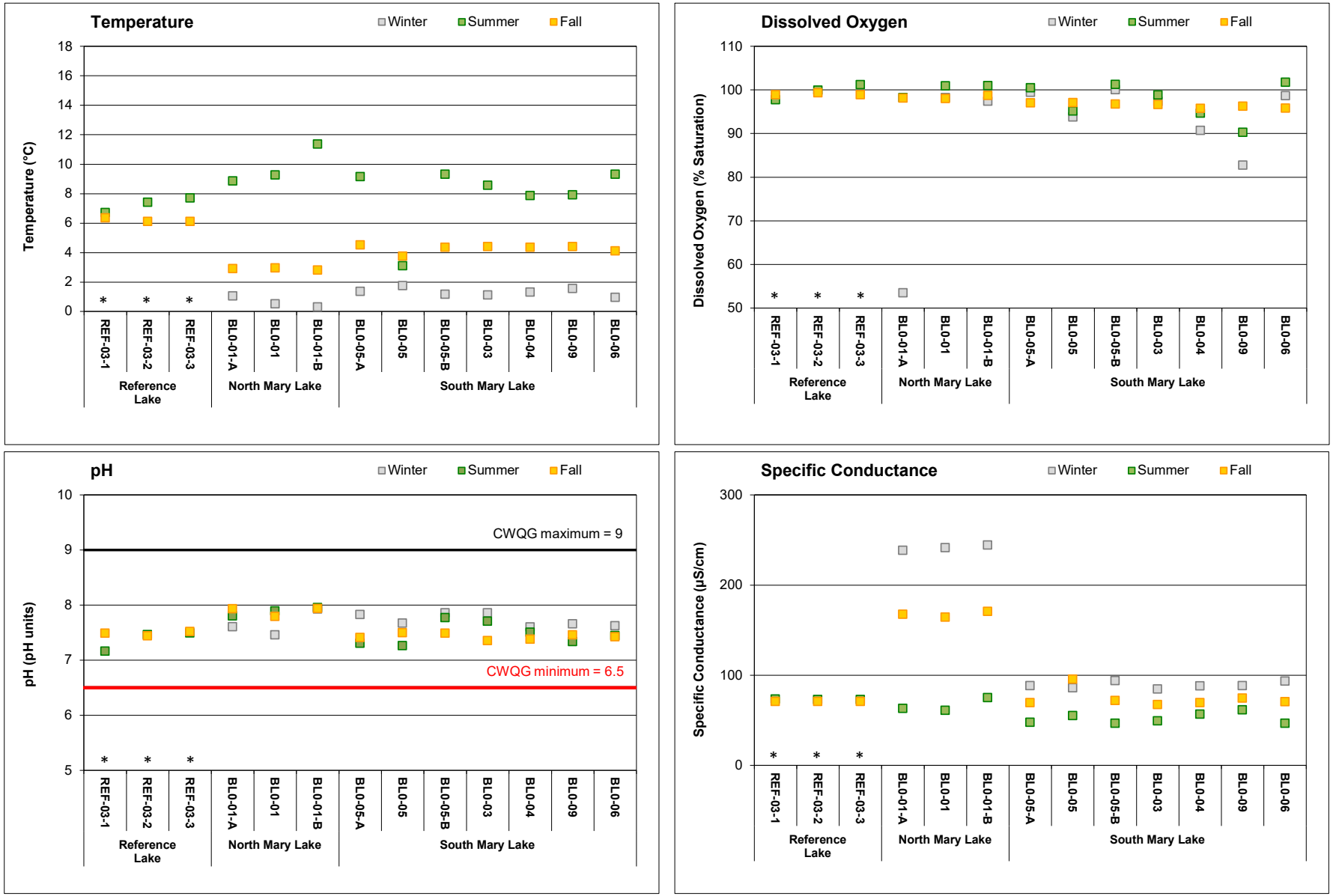

Figure C.24: Comparison of *In Situ* Water Quality Variables Measured at Mary Lake Water Quality Monitoring Stations in Winter, Summer, and Fall 2023, Mary River Project CREMP

Notes: Lake values represent mean of surface and bottom *in situ* water quality measurements. * Reference Lake 3 (REF-03) was not sampled in winter.

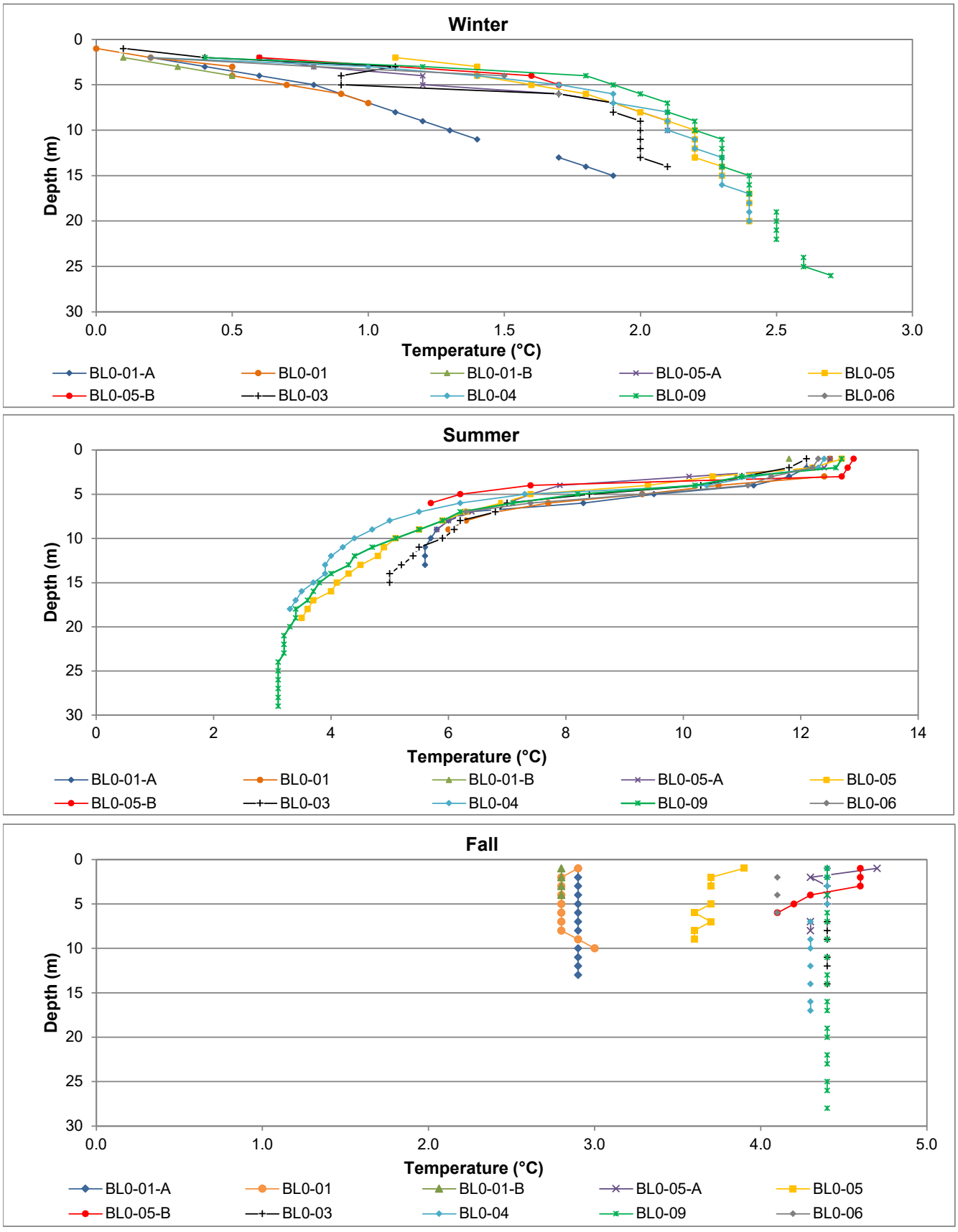

Figure C.25: Vertical Profiles of Temperature Measured at Mary Lake (BL0) in Winter, Summer, and Fall, Mary River Project CREMP, 2023

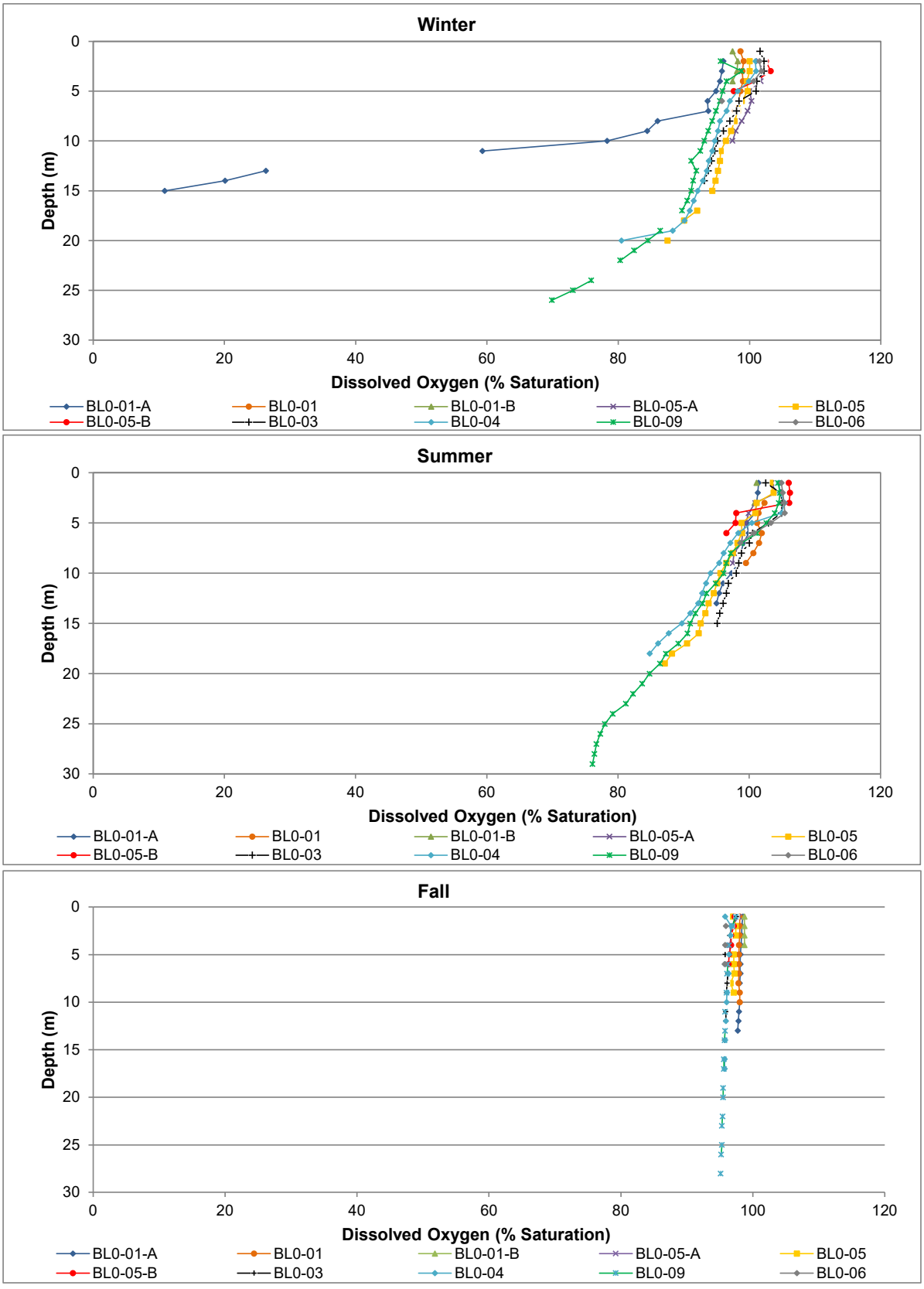

Figure C.26: Vertical Profiles of Dissolved Oxygen Measured at Mary Lake (BL0) in Winter, Summer, and Fall, Mary River Project CREMP, 2023

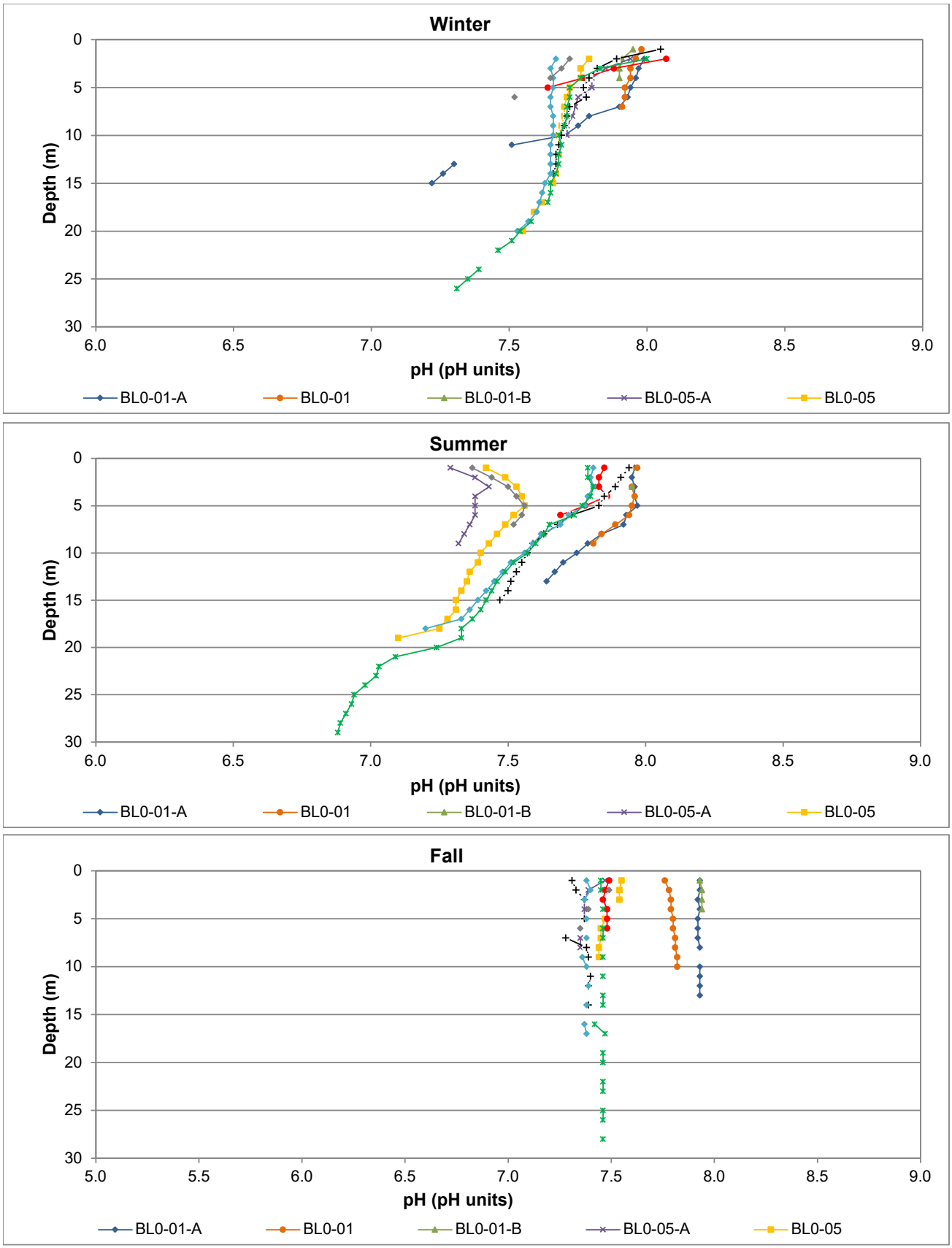

Figure C.27: Vertical Profiles of pH Measured at Mary Lake (BL0) in Winter, Summer, and Fall, Mary River Project CREMP, 2023

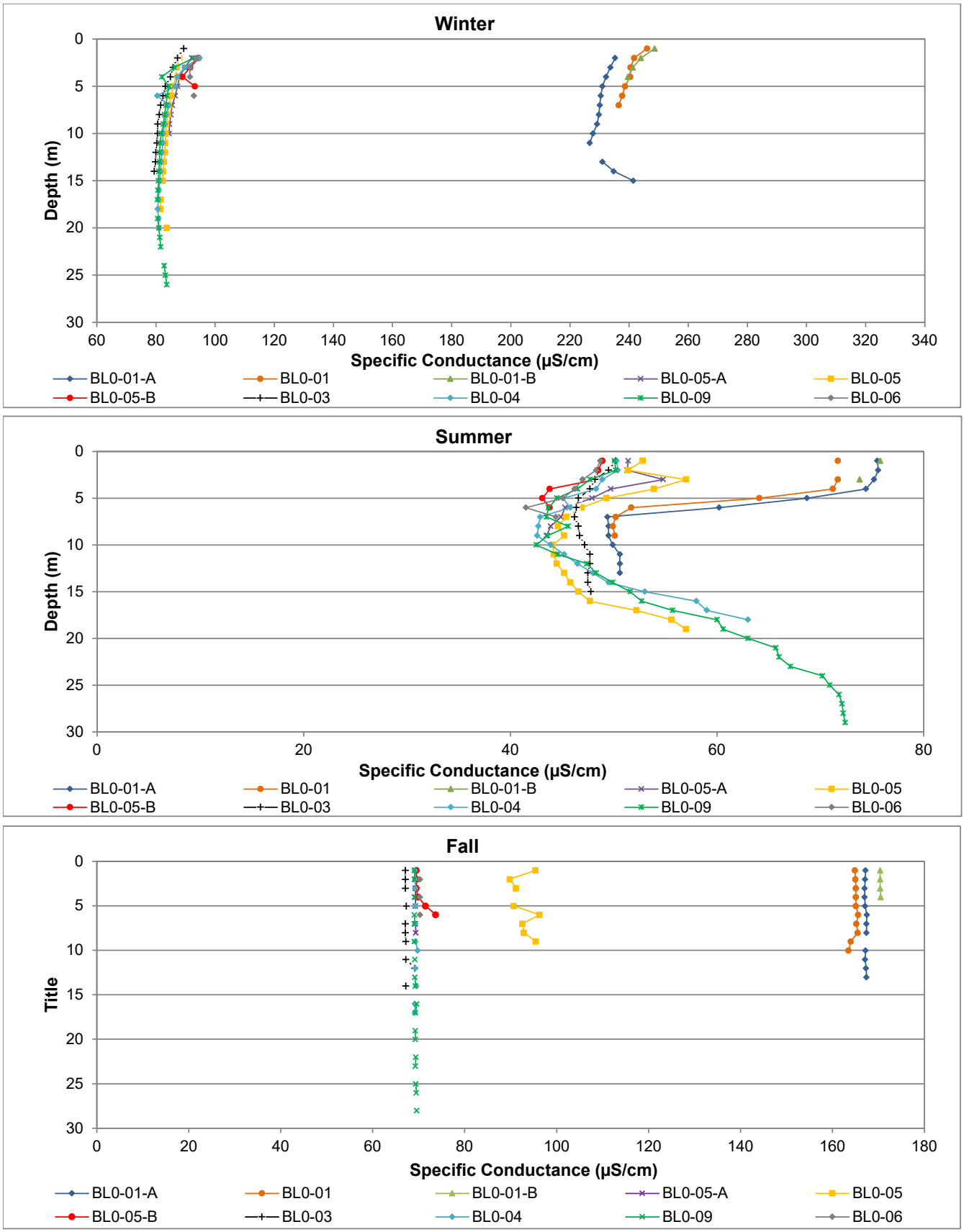

Figure C.28: Vertical Profiles of Specific Conductance Measured at Mary Lake (BL0) in Winter, Summer, and Fall, Mary River Project CREMP, 2023

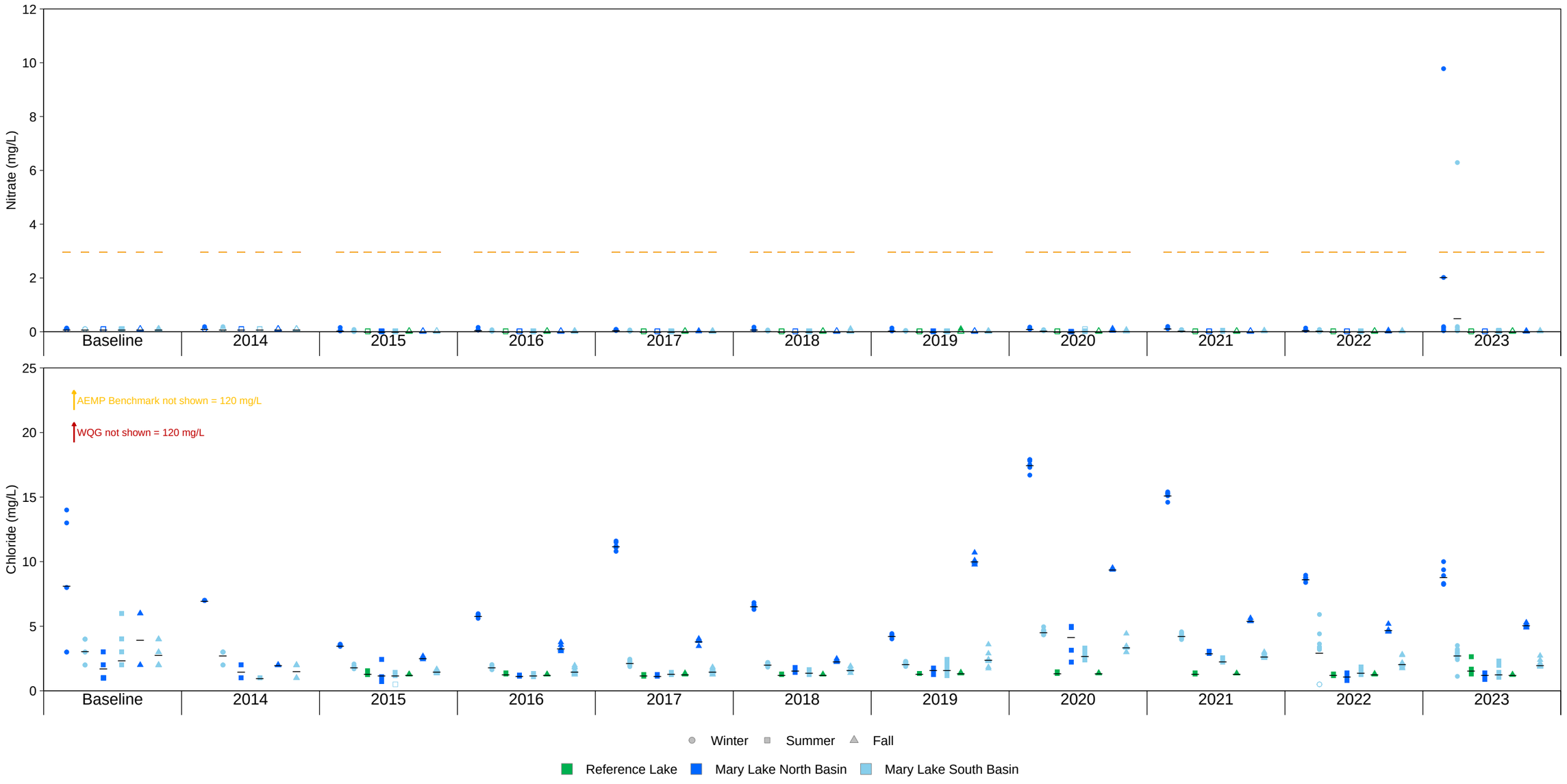

Figure C.29: Temporal Comparison of Water Chemistry at Mary Lake (BL0) Over Mine Baseline (2006 to 2013), Construction (2014), and Operations (2015 to 2023) Periods

Notes: Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Red lines indicate Water Quality Guidelines, some of which are dependent on concurrent hardness values; orange lines indicate AEMP Benchmarks. For each station, a concentration is provided for each of the bottom and the surface of the water column.

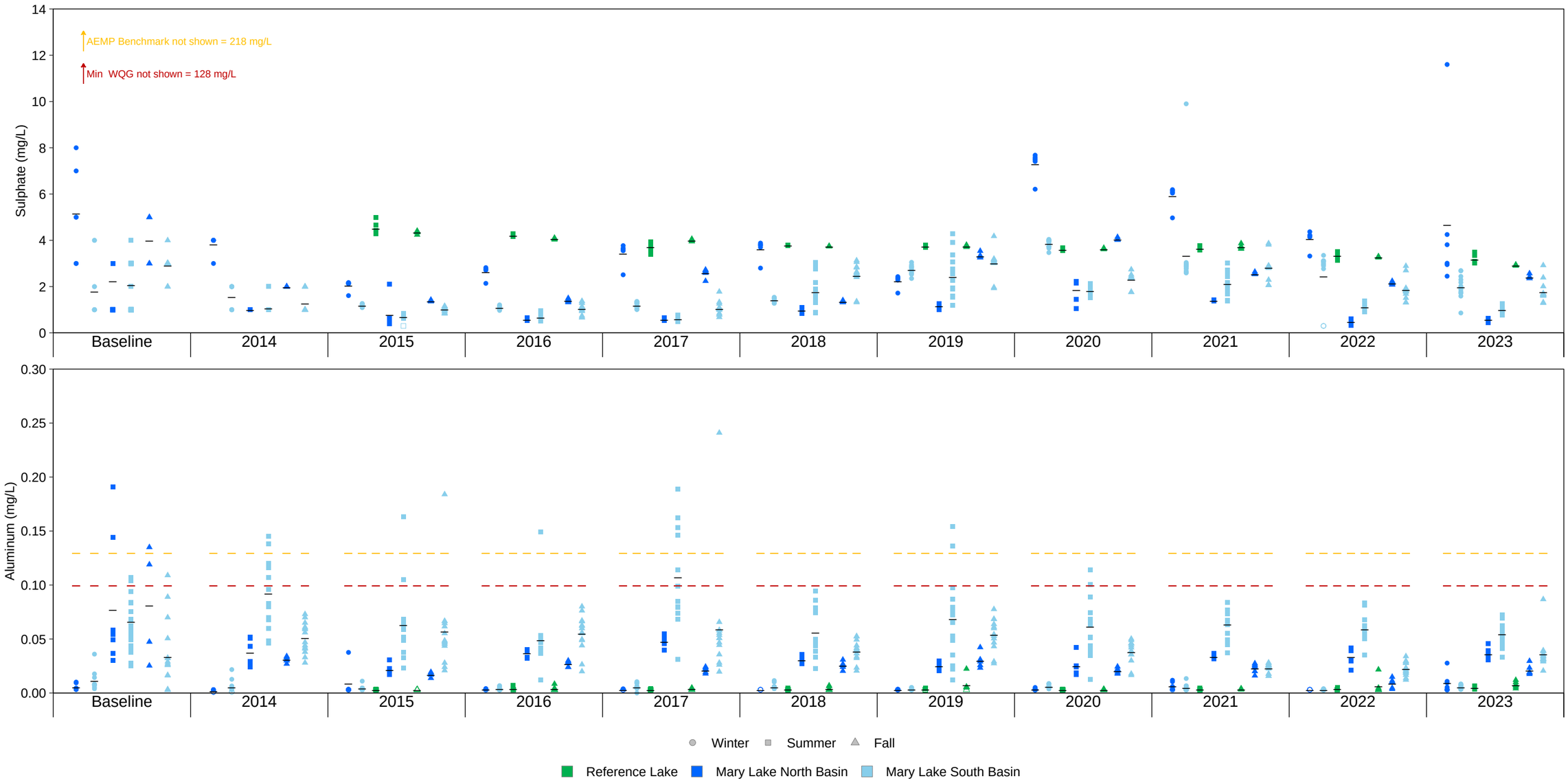

Figure C.29: Temporal Comparison of Water Chemistry at Mary Lake (BL0) Over Mine Baseline (2006 to 2013), Construction (2014), and Operations (2015 to 2023) Periods

Notes: Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Red lines indicate Water Quality Guidelines, some of which are dependent on concurrent hardness values; orange lines indicate AEMP Benchmarks. For each station, a concentration is provided for each of the bottom and the surface of the water column.

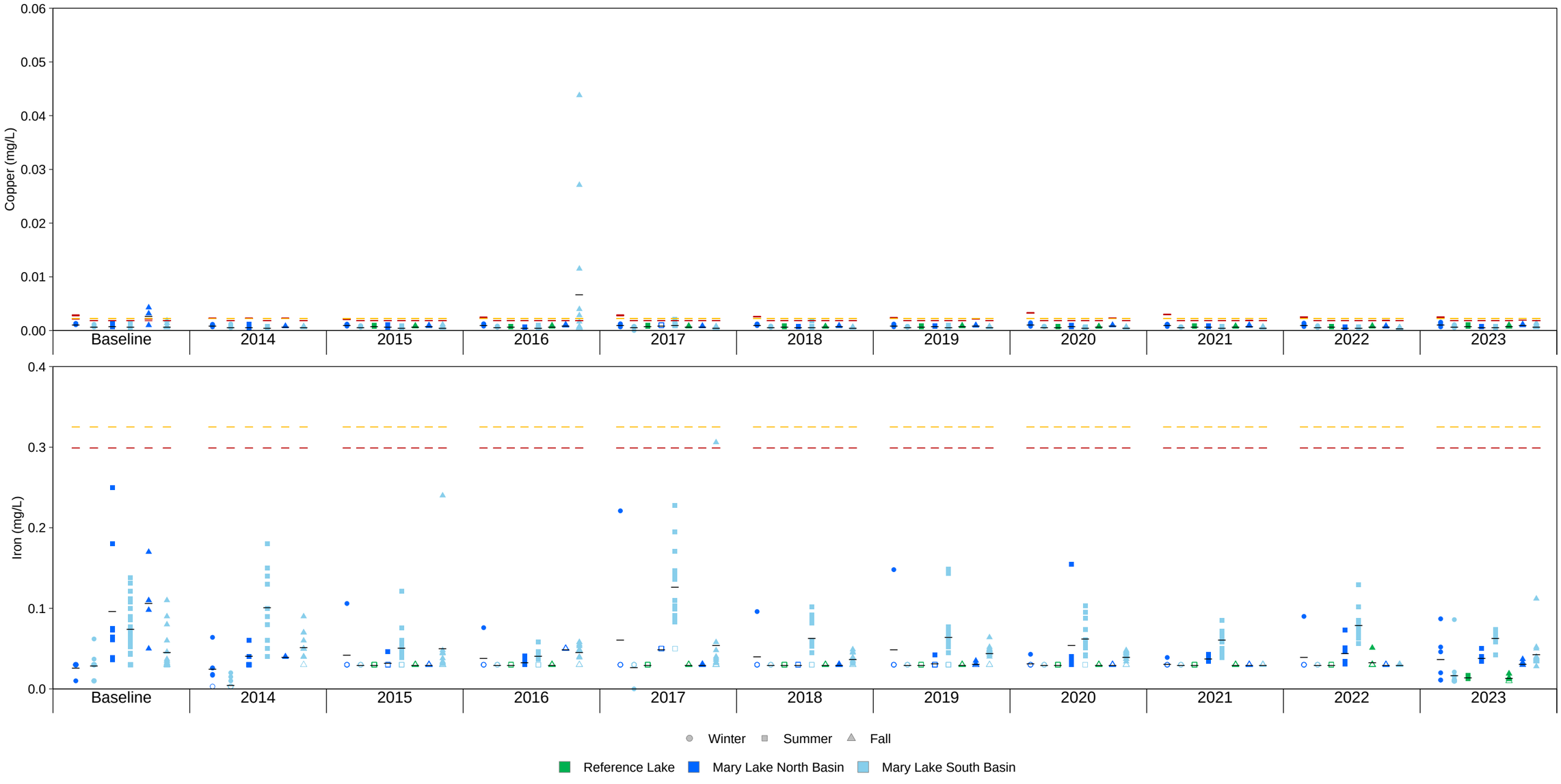

Figure C.29: Temporal Comparison of Water Chemistry at Mary Lake (BL0) Over Mine Baseline (2006 to 2013), Construction (2014), and Operations (2015 to 2023) Periods

Notes: Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Red lines indicate Water Quality Guidelines, some of which are dependent on concurrent hardness values; orange lines indicate AEMP Benchmarks. For each station, a concentration is provided for each of the bottom and the surface of the water column.

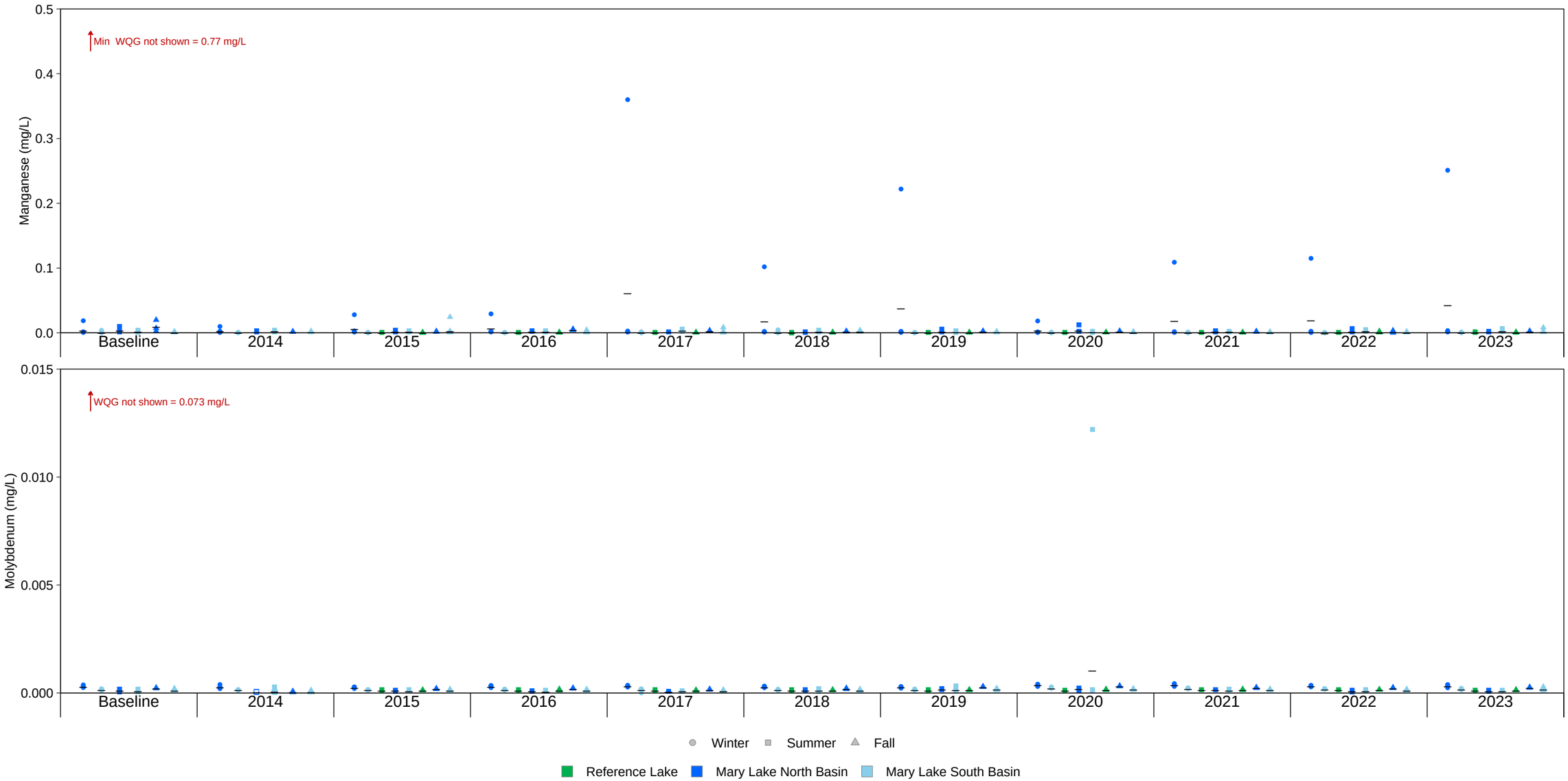

Figure C.29: Temporal Comparison of Water Chemistry at Mary Lake (BL0) Over Mine Baseline (2006 to 2013), Construction (2014), and Operations (2015 to 2023) Periods

Notes: Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Red lines indicate Water Quality Guidelines, some of which are dependent on concurrent hardness values; orange lines indicate AEMP Benchmarks. For each station, a concentration is provided for each of the bottom and the surface of the water column.

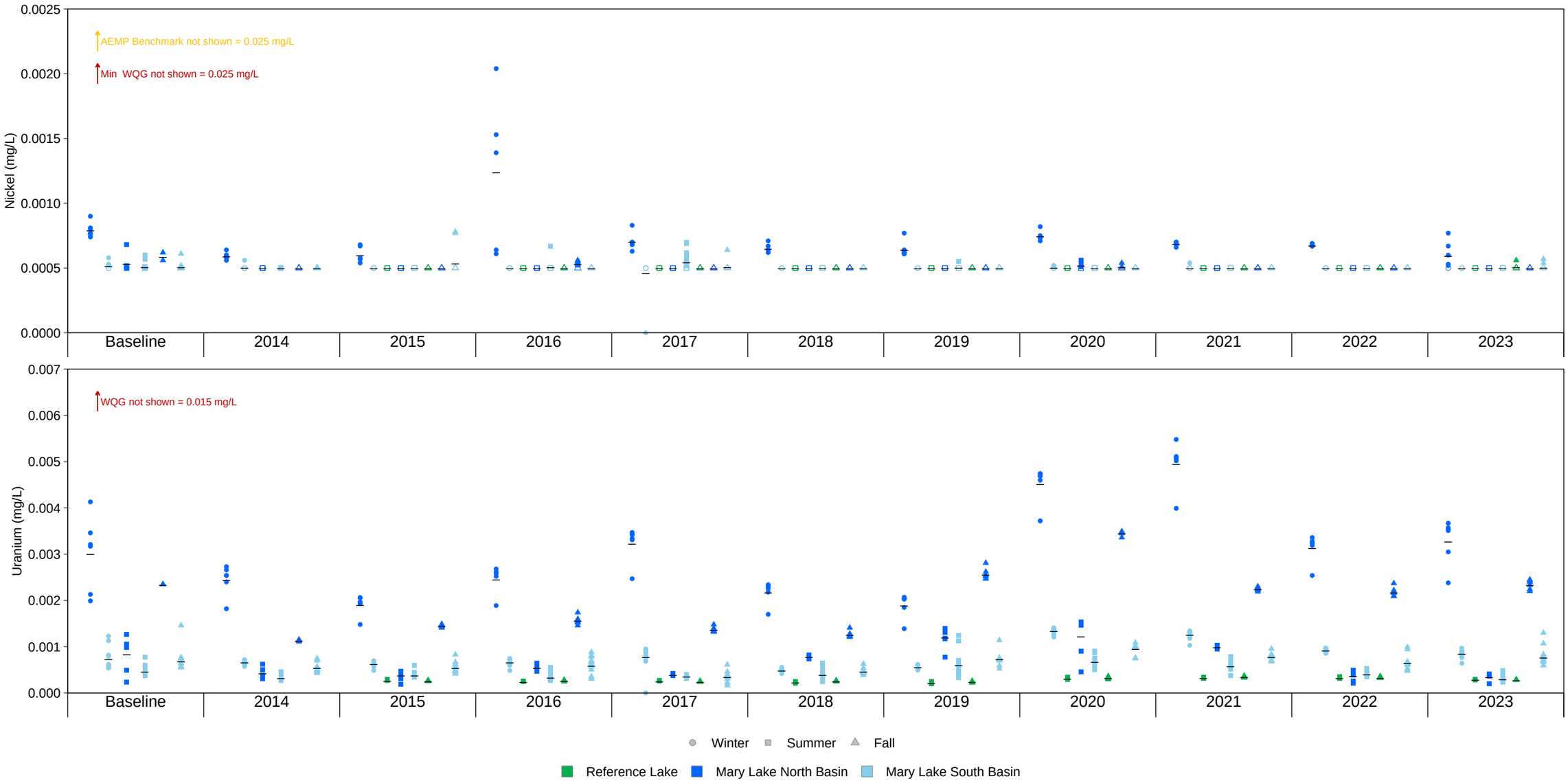

Figure C.29: Temporal Comparison of Water Chemistry at Mary Lake (BL0) Over Mine Baseline (2006 to 2013), Construction (2014), and Operations (2015 to 2023) Periods

Notes: Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Red lines indicate Water Quality Guidelines, some of which are dependent on concurrent hardness values; orange lines indicate AEMP Benchmarks. For each station, a concentration is provided for each of the bottom and the surface of the water column.

Table C.1: *In Situ* Water Quality Data Collected from Lotic Environments for the Mary River Project CREMP, Spring 2023

Study Area		Station	Sampling Date	*In Situ* Water Quality Parameter					
				Temperature (°C)	Dissolved Oxygen		pH	Specific Conductance (µS/cm)	Turbidity (NTU)
					(% saturation)	(mg/L)			
Camp Lake System	Reference Creek Stations	CLT-REF4	16-Jul-23	3.6	97.5	12.62	7.09	22.3	0.96
		CLT-REF3	16-Jul-23	3.3	90.1	11.71	7.66	34.6	0.17
		MRY-REF3	16-Jul-23	4.0	97.5	12.52	7.48	13.0	4.42
		MRY-REF2	16-Jul-23	6.0	98.8	12.07	7.31	41.1	0.40
	CLT-1	L1-08	17-Jul-23	4.1	96.7	12.19	7.81	84.5	1.12
		L1-02	16-Jul-23	9.1	100.8	11.37	8.04	84.6	0.40
		L2-03	17-Jul-23	18.3	102.5	9.40	8.05	158.5	7.93
		L1-09	16-Jul-23	-	-	-	-	-	-
		L1-05	16-Jul-23	9.9	101.1	11.20	8.02	92.2	0.93
		L0-01	16-Jul-23	10.1	100.6	11.12	7.96	98.8	3.97
	CLT-2	K0-01	16-Jul-23	12.1	100.6	10.62	7.94	95.1	0.96
	Camp Lake	J0-01	17-Jul-23	6.6	95.2	11.32	7.78	134.7	5.30
Sheardown Lake System	SDL Tribs	D1-05	16-Jul-23	7.7	97.8	11.41	7.77	230.2	21.33
		D1-00	16-Jul-23	11.7	101.5	17.93	8.06	224.9	17.93
		LDFG-OUT	16-Jul-23	10.9	102.1	11.04	8.26	276.6	2.22
		MS-C-G	16-Jul-23	6.1	76.6	9.34	7.56	147.0	0.14
Mary River/Lake System	Tom River	I0-01	17-Jul-23	2.8	94.6	12.63	8.01	30.5	1.65
	Mary River	GO-09-A	16-Jul-23	5.0	98.6	12.02	7.21	25.5	0.87
		G0-09	16-Jul-23	3.4	94.5	12.00	7.27	24.5	2.72
		G0-09-B	16-Jul-23	6.3	98.5	11.68	7.29	21.5	3.62
		G0-03	16-Jul-23	6.8	97.4	11.43	7.32	25.7	4.47
		G0-01	16-Jul-23	6.4	101.0	12.06	7.30	23.7	5.65
		F0-01	16-Jul-23	4.8	97.7	12.17	7.35	40.2	8.75
		E0-10	16-Jul-23	6.0	97.0	11.72	7.37	25.2	6.21
		E0-03	17-Jul-23	4.7	95.1	11.88	7.98	26.8	2.91
		E0-20	17-Jul-23	4.8	97.4	12.19	7.69	28.9	2.71
		E0-21	17-Jul-23	4.6	96.20	12.1	7.79	26.4	2.97
		C0-10	17-Jul-23	5.7	94.60	11.6	7.98	29.3	2.43
		C0-05	16-Jul-23	7.1	101.30	12.0	7.25	30.5	4.34
		C0-01	16-Jul-23	6.3	99.80	12.1	7.32	18.0	4.38

Note: "-" indicates no data are available.

Table C.2: *In Situ* Water Quality Data Collected from Lotic Environments for the Mary River Project CREMP, Summer 2023

Study Area		Station	Sampling Date	*In Situ* Water Quality Parameter					
				Temperature (°C)	Dissolved Oxygen		pH	Specific Conductance (µS/cm)	Turbidity (NTU)
					(% saturation)	(mg/L)			
Camp Lake System	Reference Creek Stations	CLT-REF4	24-Aug-23	4.3	98.0	12.20	7.97	118.3	0.94
		CLT-REF3	24-Aug-23	3.2	98.1	12.64	7.81	103.6	0.62
		MRY-REF3	24-Aug-23	5.1	97.1	12.02	7.97	81.5	8.25
		MRY-REF2	24-Aug-23	5.0	97.7	12.00	7.71	116.1	0.51
	CLT-1	L1-08	30-Aug-23	0.9	92.8	12.50	8.24	185.3	0.65
		L1-02	24-Aug-23	5.0	100.7	12.34	8.24	180.9	0.37
		L2-03	24-Aug-23	6.4	99.0	11.73	8.17	280.3	2.57
		L1-09	24-Aug-23	5.5	100.4	12.18	8.23	206.3	1.05
		L1-05	24-Aug-23	5.5	100.3	12.17	8.22	208.1	0.90
		L0-01	24-Aug-23	5.6	100.9	12.02	8.29	214.8	0.91
	CLT-2	K0-01	24-Aug-23	6.1	100.40	12.0	8.29	207.9	0.62
	Camp Lake	J0-01	30-Aug-23	7.9	99.7	12.81	8.10	141.7	0.76
Sheardown Lake System	SDL Tribs	D1-05	24-Aug-23	4.7	98.7	12.16	7.91	526.0	6.53
		D1-00	24-Aug-23	5.8	100.2	12.05	8.17	519.0	12.65
		LDFG-OUT	24-Aug-23	5.8	99.4	11.92	8.13	315.0	1.62
		MS-C-G	31-Aug-23	3.9	80.3	10.23	7.30	240.9	0.65
Mary River/Lake System	Tom River	I0-01	30-Aug-23	3.9	97.2	12.37	8.27	171.9	0.41
	Mary River	G0-09-A	24-Aug-23	4.4	97.0	11.80	7.92	123.5	5.25
		G0-09-B	24-Aug-23	4.6	100.0	12.13	7.85	137.7	3.89
		G0-09	24-Aug-23	4.9	99.6	11.94	7.97	154.1	2.26
		G0-03	24-Aug-23	4.2	99.1	12.19	7.69	137.7	5.38
		G0-01	24-Aug-23	4.8	101.0	12.35	7.92	132.1	5.10
		F0-01	24-Aug-23	5.0	99.7	12.11	8.08	231.1	13.48
		E0-10	30-Aug-23	3.9	100.1	12.58	8.19	173.8	1.94
		E0-03	30-Aug-23	2.6	98.7	12.90	8.18	173.0	1.73
		E0-20	30-Aug-23	3.1	100.1	12.90	8.22	161.8	1.58
		E0-21	30-Aug-23	2.4	99.2	13.06	8.23	168.5	2.52
		C0-10	30-Aug-23	3.8	101.0	12.82	8.38	154.9	1.74
		C0-05	30-Aug-23	3.0	100.0	13.00	8.35	150.9	1.83
		C0-01	30-Aug-23	2.6	96.9	12.73	8.35	153.5	3.31

Table C.3: *In Situ* Water Quality Data Collected From Lotic Environments for the Mary River Project CREMP, Fall 2023

Study Area		Station	Sampling Date	*In Situ* Water Quality Parameter					
				Temperature (°C)	Dissolved Oxygen		pH	Specific Conductance (µS/cm)	Turbidity (NTU)
					(% Saturation)	(mg/L)			
Camp Lake System	Reference Creek Stations	CLT-REF4	12-Sep-23	-0.1	98.5	14.02	7.80	75.1	0.41
		CLT-REF3	12-Sep-23	-0.1	98.8	14.05	7.86	62.7	0.21
		MRY-REF3	12-Sep-23	1.2	97.2	13.67	7.71	96.6	6.52
		MRY-REF2	12-Sep-23	-0.1	98.8	14.14	7.39	67.6	1.27
	CLT-1	L1-08	14-Sep-23	0.1	89.7	12.63	7.80	192.8	0.27
		L1-02	17-Sep-23	-0.2	103.0	14.44	7.99	233.0	3.61
		L2-03	16-Sep-23	4.0	96.9	12.40	7.98	355.9	9.04
		L1-09	16-Sep-23	1.8	98.2	13.32	7.89	148.2	0.61
		L1-05	16-Sep-23	1.1	100.0	13.90	8.08	257.8	1.16
		L0-01	16-Sep-23	1.1	101.0	13.94	8.13	264.8	1.69
	CLT-2	K0-01	16-Sep-23	0.6	102.0	14.14	8.00	264.9	0.83
	Camp Lake	J0-01	17-Sep-23	4.2	99.7	12.81	8.01	145.6	-3.40
Sheardown Lake System	SDL Tribs	D1-05	19-Sep-23	0.2	89.3	12.77	7.62	520.0	0.51
		D1-00	16-Sep-23	5.4	101.1	12.48	7.94	531.0	1.14
		LDFG-OUT	-	-	-	-	-	-	-
		MS-C-G	17-Sep-23	0.4	72.4	10.22	7.45	145.5	0.97
Mary River/Lake System	Tom River	I0-01	17-Sep-23	0.1	100.5	14.43	8.06	240.2	-3.68
	Mary River	G0-09-A	12-Sep-23	-0.1	99.3	13.83	7.94	176.6	0.99
		G0-09	12-Sep-23	-0.1	99.6	13.89	8.03	186.7	1.21
		G0-09-B	12-Sep-23	-0.1	98.1	13.69	7.99	188.8	1.12
		G0-03	12-Sep-23	0.0	97.4	13.65	7.95	200.8	1.11
		G0-01	12-Sep-23	-0.1	98.8	13.98	8.00	188.5	0.86
		F0-01	12-Sep-23	-0.1	98.6	13.95	7.98	327.8	0.89
		E0-10	18-Sep-23	-0.2	100.8	14.41	8.11	246.6	1.48
		E0-03	18-Sep-23	-0.2	100.6	14.48	8.09	207.8	1.60
		E0-20	18-Sep-23	-0.1	100.3	14.46	8.05	199.3	1.62
		E0-21	18-Sep-23	-0.2	100.7	14.54	8.03	206.6	1.62
		C0-10	18-Sep-23	0.0	101.2	14.50	8.02	106.9	1.50
		C0-05	18-Sep-23	0.3	99.6	14.18	7.87	102.3	1.25
		C0-01	18-Sep-23	2.6	98.4	13.07	7.69	109.4	1.89

Note: "-" indicates no data available. Station LDFG-OUT (Sheardown Lake Tributary 12) was dry at the time of sampling.

Table C.4: Dissolved Metal Concentrations at Reference Creek Monitoring Stations, Mary River Project CREMP, 2023

Parameters		Units	Spring Sampling Event				Summer Sampling Event				Fall Sampling Event			
			CLT-REF4	CLT-REF3	MRY-REF3	MRY-REF2	CLT-REF4	CLT-REF3	MRY-REF3	MRY-REF2	CLT-REF4	CLT-REF3	MRY-REF3	MRY-REF2
			12-Jul-23	12-Jul-23	16-Jul-23	16-Jul-23	24-Aug-23	24-Aug-23	24-Aug-23	24-Aug-23	12-Sep-23	12-Sep-23	12-Sep-23	12-Sep-23
Dissolved Metals	Aluminum (Al)	mg/L	0.0091	0.0088	0.0255	0.0083	0.0678	0.0411	0.7340	0.1610	0.0037	0.0049	0.0287	0.0088
	Antimony (Sb)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00012	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)	mg/L	0.00986	0.00142	0.00151	0.00206	0.00519	0.00557	0.01150	0.00741	0.00564	0.00672	0.0084	0.00732
	Beryllium (Be)	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	0.000026	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
	Bismuth (Bi)	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)	mg/L	0.0000244	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Calcium (Ca)	mg/L	16.3	2.25	1.08	4.13	11.7	9.97	6.66	11.3	14.9	12.4	8.0	13.5
	Chromium (Cr)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00154	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Cobalt (Co)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00035	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)	mg/L	0.00104	0.00042	0.00032	0.00034	0.00067	0.00134	0.00199	0.00076	0.00060	0.00125	0.00120	0.00082
	Iron (Fe)	mg/L	<0.010	<0.010	0.019	<0.010	0.069	0.053	0.967	0.221	<0.010	0.01	0.021	0.015
	Lead (Pb)	mg/L	<0.000050	0.000061	<0.000050	<0.000050	0.000074	0.000192	0.000607	0.0001	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)	mg/L	0.0044	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Magnesium (Mg)	mg/L	10.7	1.22	0.539	2.3	7.09	6.29	3.80	7.11	9.03	7.78	4.03	7.91
	Manganese (Mn)	mg/L	0.00203	0.00024	0.00127	0.00047	0.00123	0.00121	0.011000	0.003540	0.000260	0.000330	0.000340	0.001070
	Mercury (Hg)	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)	mg/L	0.00513	0.000094	0.000074	0.000063	0.000316	0.000669	0.000486	0.000224	0.000456	0.000661	0.000465	0.000240
	Nickel (Ni)	mg/L	0.00054	<0.00050	<0.00050	<0.00050	<0.00050	0.00082	0.00119	<0.00050	<0.00050	0.00074	<0.00050	<0.00050
	Potassium (K)	mg/L	3.78	0.225	0.196	0.297	0.622	0.694	1.14	0.79	0.67	0.78	0.86	0.74
	Selenium (Se)	mg/L	0.00011	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Silicon (Si)	mg/L	1.08	0.308	0.243	0.323	0.92	1.08	2.45	1.10	0.86	1.06	1.04	0.90
	Silver (Ag)	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)	mg/L	1.52	0.188	0.46	0.516	1.04	1	3.16	1.64	1.37	1.06	3.42	1.76
	Strontium (Sr)	mg/L	0.049	0.00143	0.00218	0.00306	0.01	0.00739	0.0159	0.01010	0.0126	0.00845	0.0179	0.0114
	Thallium (Tl)	mg/L	0.00001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	0.000027	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Tin (Sn)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)	mg/L	<0.00030	<0.00030	0.00096	<0.00030	0.00346	0.00144	0.0604	0.0104	<0.00030	<0.00030	0.00113	<0.00030
	Uranium (U)	mg/L	0.00193	0.000127	0.00014	0.000291	0.00433	0.00253	0.001300	0.00180	0.01070	0.00395	0.00121	0.00215
	Vanadium (V)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00138	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0030	<0.0030	<0.0030	<0.0030	<0.0010	<0.0010	<0.0010	<0.0010

Table C.5: ***In Situ*** **Water Quality Profile Data Collected at Reference Lake 3 (REF3) Water Quality Monitoring Stations, Mary River Project CREMP, Summer 2023**

Depth (m)	Temperature (°C)			Dissolved Oxygen (mg/L)			Dissolved Oxygen (% Saturation)			pH (pH units)			Specific Conductance (µS/cm)		
	REF3-03	REF3-02	REF3-01	REF3-03	REF3-02	REF3-01	REF3-03	REF3-02	REF3-01	REF3-03	REF3-02	REF3-01	REF3-03	REF3-02	REF3-01
	7-Aug-23	7-Aug-23	7-Aug-23	7-Aug-23	7-Aug-23	7-Aug-23	7-Aug-23	7-Aug-23	7-Aug-23	7-Aug-23	7-Aug-23	7-Aug-23	7-Aug-23	7-Aug-23	7-Aug-23
1.0	9.1	9.5	9.5	11.66	11.54	11.74	101.5	101.5	103.20	7.40	7.58	7.54	72.6	72.5	72.50
2.0	9.1	9.3	9.4	11.72	11.61	11.72	102.0	101.6	102.70	7.43	7.59	7.57	72.5	72.5	72.60
3.0	8.8	9.2	9.3	11.76	11.64	11.71	101.6	101.6	102.60	7.48	7.59	7.58	72.5	72.5	72.60
4.0	8.5	9.1	9.3	11.84	11.67	11.70	101.7	101.8	102.30	7.50	7.60	7.59	72.5	72.5	72.50
5.0	8.2	9.0	9.2	11.95	11.70	11.66	101.7	101.8	101.70	7.50	7.61	7.61	72.5	72.5	72.60
6.0	8.1	8.8	8.9	12.01	11.75	11.74	102.0	101.3	101.70	7.49	7.61	7.61	72.5	72.6	72.60
7.0	8.0	8.0	7.4	12.01	11.93	12.40	101.9	100.5	100.10	7.50	7.58	7.60	72.5	72.6	73.00
8.0	7.9	6.7	6.8	12.03	12.10	12.23	101.6	98.6	100.50	7.50	7.54	7.56	72.5	72.6	72.60
9.0	7.5	6.0	6.5	12.07	12.29	12.32	100.7	99.0	100.40	7.51	7.49	7.51	72.7	72.7	72.60
10.0	6.7	5.8	6.2	12.25	12.4	12.37	100.2	99.3	100.30	7.48	7.43	7.47	72.6	72.7	72.60
11.0	6.4	5.7	6.2	12.29	12.4	12.37	100.1	99.1	100.20	7.44	7.40	7.46	72.5	72.7	72.70
12.0	6.3	5.5	5.9	12.31	12.4	12.36	100.0	98.8	99.20	7.42	7.39	7.44	72.6	72.7	73.00
13.0	6.1	5.4	-	12.32	12.4	-	99.7	98.4	-	7.41	7.36	-	72.6	72.8	-
14.0	6.0	5.4	-	12.31	12.4	-	99.5	98.4	-	7.40	7.36	-	72.6	72.8	-
15.0	5.5	5.3	-	12.34	12.4	-	98.3	98.3	-	7.34	7.34	-	72.7	72.8	-
16.0	5.3	-	-	12.36	-	-	97.9	-	-	7.13	-	-	72.6	-	-
17.0	5.2	-	-	12.39	-	-	98.0	-	-	7.07	-	-	72.6	-	-
18.0	5.1	-	-	12.4	-	-	97.9	-	-	7.07	-	-	72.5	-	-
19.0	4.8	-	-	12.36	-	-	96.9	-	-	7.03	-	-	72.9	-	-
20.0	4.8	-	-	12.31	-	-	96.4	-	-	7.01	-	-	73.0	-	-
21.0	4.8	-	-	12.30	-	-	96.2	-	-	7.00	-	-	73.0	-	-
22.0	4.7	-	-	12.29	-	-	96.0	-	-	6.99	-	-	73.1	-	-
23.0	4.6	-	-	12.28	-	-	95.8	-	-	6.98	-	-	73.0	-	-
24.0	4.6	-	-	12.28	-	-	95.7	-	-	6.97	-	-	73.0	-	-
25.0	4.6	-	-	12.26	-	-	95.4	-	-	6.96	-	-	73.3	-	-
26.0	4.5	-	-	12.22	-	-	96.9	-	-	6.95	-	-	73.4	-	-
27.0	4.4	-	-	12.19	-	-	94.5	-	-	6.94	-	-	73.6	-	-
28.0	4.4	-	-	12.17	-	-	94.3	-	-	6.93	-	-	73.6	-	-
29.0	4.3	-	-	12.15	-	-	94.0	-	-	6.92	-	-	73.8	-	-

Notes: "-" = data not available. The total depth of the water column at each sampling station was not recorded but deepest measurements are within 1 m of lake bottom.

Table C.6: ***In Situ*** **Water Quality Profile Data Collected at Reference Lake 3 (REF3) Water Quality Monitoring Stations, Mary River Project CREMP, Fall 2023**

Depth (m)	Temperature (°C)			Dissolved Oxygen (mg/L)			Dissolved Oxygen (% Saturation)			pH (pH units)			Specific Conductance (µS/cm)		
	REF3-03	REF3-02	REF3-01	REF3-03	REF3-02	REF3-01	REF3-03	REF3-02	REF3-01	REF3-03	REF3-02	REF3-01	REF3-03	REF3-02	REF3-01
	5-Sep-23	5-Sep-23	5-Sep-23	5-Sep-23	5-Sep-23	5-Sep-23	5-Sep-23	5-Sep-23	5-Sep-23	5-Sep-23	5-Sep-23	5-Sep-23	5-Sep-23	5-Sep-23	5-Sep-23
1.0	6.4	6.1	6.1	11.97	12.1	11.97	98.7	99.7	98.7	7.48	7.44	7.50	70.5	70.5	70.6
2.0	6.4	6.1	6.1	11.97	12.1	12.01	98.7	99.6	99.0	7.49	7.46	7.50	70.6	70.5	70.6
3.0	6.4	6.1	6.2	11.97	12.1	12.01	98.7	99.6	99.0	7.50	7.45	7.50	70.5	70.5	70.6
4.0	6.4	6.1	6.2	12.03	12.09	12.03	99.0	99.5	99.2	7.48	7.44	7.51	70.5	70.5	70.7
5.0	6.4	6.1	6.1	12.03	12.08	12.11	99.2	99.5	99.8	7.51	7.45	7.53	70.5	70.5	70.7
6.0	-	6.1	6.1	-	12.08	12.06	-	99.4	99.4	-	7.45	7.53	-	70.5	70.7
7.0	6.4	6.1	6.1	11.97	12.08	12.04	98.7	99.4	99.2	7.50	7.46	7.53	70.5	70.6	70.7
8.0	6.4	6.1	6.1	12.02	12.08	12.01	99.1	99.4	99.2	7.48	7.47	7.53	70.6	70.5	70.7
9.0	6.4	6.1	6.1	12.03	12.08	12.03	99.2	99.4	99.1	7.48	7.45	7.52	70.5	70.5	70.7
10.0	6.4	6.1	6.1	12.04	12.08	12.04	99.0	99.4	99.1	7.49	7.45	7.53	70.5	70.5	70.7
11.0	6.4	6.1	6.1	12	12.08	12.03	99.0	99.4	99.0	7.50	7.45	7.53	70.5	70.5	70.7
12.0	6.5	6.1	-	11.98	12.05	-	98.7	99.1	-	7.49	7.42	-	70.5	70.6	-
13.0	6.5	6.1	-	12.03	12.04	-	99.2	99.1	-	7.48	7.43	-	70.5	70.6	-
14.0	6.5	6.1	-	12.03	12.04	-	99.2	99.0	-	7.49	7.43	-	70.5	70.6	-
15.0	6.5	6.1	-	12.01	12.03	-	99.0	99.0	-	7.48	7.45	-	70.6	70.6	-
16.0	6.4	6.1	-	12.04	12.03	-	99.0	98.9	-	7.48	7.44	-	70.6	70.6	-
17.0	6.4	-	-	12.04	-	-	99.0	-	-	7.49	-	-	70.5	-	-
18.0	6.4	-	-	12.03	-	-	99.2	-	-	7.49	-	-	70.5	-	-
19.0	6.4	-	-	12.04	-	-	99.0	-	-	7.49	-	-	70.6	-	-
20.0	6.3	-	-	12.04	-	-	99.0	-	-	7.48	-	-	70.6	-	-
21.0	6.3	-	-	12.04	-	-	99.0	-	-	7.49	-	-	70.6	-	-
22.0	6.3	-	-	12.04	-	-	99.0	-	-	7.48	-	-	70.5	-	-
23.0	6.3	-	-	12.04	-	-	99.0	-	-	7.49	-	-	70.5	-	-
24.0	6.3	-	-	11.97	-	-	98.7	-	-	7.49	-	-	70.6	-	-
25.0	6.3	-	-	11.97	-	-	98.7	-	-	7.48	-	-	70.5	-	-
26.0	6.3	-	-	11.98	-	-	99.0	-	-	7.49	-	-	70.6	-	-

Notes: "-" = data not available. The total depth of the water column at each sampling station was not recorded but deepest measurements are within 1 m of lake bottom.

Table C.7: Sampling Depth, Water Clarity Measures, and Surface and Bottom *In Situ* Water Quality Measures Collected at Reference Lake 3 (REF3) Benthic Invertebrate Community Stations, Mary River Project CREMP, August 2023

Replicate ID	Date Sampled	Station Depth (m)	Secchi Depth (m)	Colour/ Clarity	Depth Sampled	Temperature (°C)	Dissolved Oxygen		pH (units)	Specific Conductance (µS/cm)	Turbidity (NTU)
							(mg/L)	(% saturation)			
REF-03-1	23-Aug-23	10.5	6.23	Dark Blue/Green/ Clear	Surface	8.4	11.29	98.4	7.74	72.8	0.15
					Bottom	8.3	11.17	97.1	7.56	72.8	0.22
REF-03-2	23-Aug-23	9.1	5.7	Dark Blue/Green/ Clear	Surface	8.4	11.33	99.0	7.79	72.8	0.19
					Bottom	8.4	11.24	98.1	7.70	72.7	0.18
REF-03-3	29-Aug-23	8.8	-	Dark Blue/Black/ Clear	Surface	7.2	11.50	97.7	7.77	72.9	0.20
					Bottom	7.2	11.40	96.8	7.67	72.9	0.22
REF-03-4	29-Aug-23	8.5	-	Dark Blue/Black/ Clear	Surface	7.2	11.46	97.3	7.77	72.9	0.22
					Bottom	7.2	11.38	96.6	7.66	72.9	0.28
REF-03-5	28-Aug-23	13.1	-	Dark Blue/Green/ Clear	Surface	7.2	11.47	98.4	7.73	72.8	-0.16
					Bottom	7.2	11.38	97.5	7.62	72.8	-0.03
REF-03-6	29-Aug-23	19.3	-	Dark Blue/Black/ Clear	Surface	7.3	11.42	97.2	7.71	73.0	0.23
					Bottom	7.0	11.33	95.9	7.50	73.3	0.27
REF-03-7	29-Aug-23	23.6	-	Dark Blue/Black/ Clear	Surface	7.3	11.46	97.6	7.83	72.0	0.20
					Bottom	7.2	11.30	96.0	7.66	73.0	0.28
REF-03-8	28-Aug-23	17.4	-	Dark Blue/Clear	Surface	7.3	11.61	98.9	7.78	73.0	-0.16
					Bottom	7.2	11.36	97.3	7.64	72.9	-0.16
REF-03-9	29-Aug-23	20.6	-	Dark Blue/Black/ Clear	Surface	7.2	11.13	94.6	7.84	72.8	0.20
					Bottom	7.1	11.21	95.1	7.24	72.9	0.26
REF-03-10	28-Aug-23	19.2	-	Dark Blue/Black/ Clear	Surface	7.4	11.47	98.7	7.77	72.8	-0.18
					Bottom	7.2	11.32	97.2	7.62	72.8	-0.14

Notes: "-" indicate data not available. Windy conditions prohibited the effective use of secchi discs at most sampling stations

Table C.8: Statistical Comparison of Bottom *In Situ* Water Quality Between Littoral and Profundal Stations of Reference Lake 3 (REF3), Mary River Project CREMP, August 2023

Parameter	Statistical Test Results				Summary Statistics						
	Statistical Test	Transformation	Significant Difference Between Areas?	P-value	Station Type	Sample Size	Mean	Standard Deviation	Standard Error	Minimum	Maximum
Secchi Depth (m)	-	-	-	-	Littoral	2	5.97	0.364	0.258	5.71	6.22
					Profundal	-	-	-	-	-	-
Temperature (˚C)	tequal	None	NO	0.105	Littoral	5	7.66	0.631	0.282	7.20	8.40
					Profundal	5	7.14	0.0894	0.0400	7.00	7.20
Dissolved Oxygen (mg/L)	tequal	None	NO	0.854	Littoral	5	11.3	0.103	0.0460	11.2	11.4
					Profundal	5	11.3	0.0568	0.0254	11.2	11.4
Dissolved Oxygen (% saturation)	tequal	None	NO	0.101	Littoral	5	97.2	0.597	0.267	96.6	98.1
					Profundal	5	96.3	0.935	0.418	95.1	97.3
pH (units)	tequal	None	NO	0.215	Littoral	5	7.64	0.0540	0.0242	7.56	7.70
					Profundal	5	7.53	0.175	0.0781	7.24	7.66
Specific Conductance (µS/cm)	tequal	None	NO	0.126	Littoral	5	72.8	0.0837	0.0374	72.7	72.9
					Profundal	5	73.0	0.192	0.0860	72.8	73.3

Shaded values indicate significant difference between study areas based on test p-value less than 0.05.

Notes: "-" = no data."tequal" = Student's t-test assuming equal variance.

Table C.9: Dissolved Metal Concentrations at Reference Lake 3 (REF3) Monitoring Stations, Mary River Project CREMP, 2023

	Parameters	Units	Summer Sampling Event						Fall Sampling Event					
			REF3-01	REF3-01	REF3-02	REF3-02	REF3-03	REF3-03	REF3-01	REF3-01	REF3-02	REF3-02	REF3-03	REF3-03
			Bottom	Surface	Bottom	Surface	Bottom	Surface	Bottom	Surface	Bottom	Surface	Bottom	Surface
			07-Aug-23	07-Aug-23	07-Aug-23	07-Aug-23	07-Aug-23	07-Aug-23	05-Sep-23	05-Sep-23	05-Sep-23	05-Sep-23	05-Sep-23	05-Sep-23
Dissolved Metals	Aluminum (Al)	mg/L	0.0014	0.003	0.0019	0.0015	0.0015	0.0014	0.0038	0.0016	0.0098	0.0011	0.0016	0.0022
	Antimony (Sb)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)	mg/L	0.00606	0.00622	0.00628	0.00590	0.00616	0.00627	0.00612	0.00595	0.00597	0.00604	0.00582	0.00615
	Beryllium (Be)	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
	Bismuth (Bi)	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Calcium (Ca)	mg/L	6.73	6.82	6.76	6.78	6.88	6.54	6.62	6.69	6.58	6.69	6.49	6.58
	Chromium (Cr)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Cobalt (Co)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)	mg/L	0.00075	0.00075	0.00064	0.00066	0.00078	0.00066	0.00072	0.00083	0.00100	0.00070	0.00065	0.00067
	Iron (Fe)	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.025	<0.010	<0.010	<0.010
	Lead (Pb)	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Magnesium (Mg)	mg/L	4.25	4.25	4.26	4.24	4.24	4.32	4.56	4.44	4.35	4.41	4.28	4.43
	Manganese (Mn)	mg/L	0.000220	0.000420	0.000310	0.000350	0.000390	0.000300	0.000290	0.000210	0.001260	0.000170	0.000160	0.000230
	Mercury (Hg)	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)	mg/L	0.000132	0.000140	0.000133	0.000135	0.000146	0.000136	0.000149	0.000147	0.000134	0.000142	0.000133	0.000143
	Nickel (Ni)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Potassium (K)	mg/L	0.78	0.81	0.79	0.78	0.79	0.77	0.83	0.83	0.82	0.80	0.79	0.82
	Selenium (Se)	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Silicon (Si)	mg/L	0.45	0.45	0.43	0.45	0.49	0.46	0.44	0.44	0.43	0.43	0.42	0.42
	Silver (Ag)	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)	mg/L	0.870	0.881	0.864	0.866	0.852	0.861	0.895	0.869	0.899	0.861	0.853	0.916
	Strontium (Sr)	mg/L	0.00769	0.00786	0.00771	0.00755	0.00786	0.00770	0.00791	0.00780	0.00761	0.00763	0.00749	0.00769
	Thallium (Tl)	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Tin (Sn)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)	mg/L	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	0.00069	<0.00030	<0.00030	<0.00030
	Uranium (U)	mg/L	0.000274	0.000282	0.000276	0.000286	0.000278	0.000280	0.000275	0.000270	0.000287	0.000270	0.000264	0.000271
	Vanadium (V)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0011	<0.0010	<0.0010	<0.0010	<0.0010

Table C.10: Average Relative Percent Difference (RPD) Values between Water Chemistry Samples Taken at the Top and Bottom of the Water Column at Lake Monitoring Stations, Mary River Project CREMP, 2023

Parameters		Reference Lake		Camp Lake			Sheardown Lake Northwest			Sheardown Lake Southeast			Mary Lake North Basin			Mary Lake South Basin		
		Summer	Fall	Winter	Summer	Fall	Winter	Summer	Fall	Winter	Summer	Fall	Winter	Summer	Fall	Winter	Summer	Fall
Conventionals	Conductivity (lab)	0.75	0.32	5.3	0.39	1.8	5.5	0.93	1.7	2.0	3.3	1.1	9.3	15	1.2	9.5	9.7	4.2
	pH (lab)	2.2	0.39	1.9	1.2	0.18	1.1	0.79	1.1	1.3	2.0	0.48	2.0	1.8	0.17	1.0	2.1	0.47
	Hardness (as $CaCO_3$)	0.68	1.7	5.1	0.42	1.4	6.0	0.65	0.44	2.9	3.4	0.86	2.1	14	0.38	9.5	12	4.8
	Total Suspended Solids (TSS)	6.9	13	0	12	22	8.0	21	12	31	4.4	10	0	2.5	2.7	0	3.3	14
	Total Dissolved Solids (TDS)	11	5.3	11	11	5.7	7.1	5.2	4.1	9.4	6.1	14	29	12	5.2	73	21	8.3
	Turbidity	74	118	52	15	43	64	9.7	20	65	13	10	54	24	39	28	20	66
	Alkalinity (as $CaCO_3$)	7.8	9.5	6.3	6.2	3.8	3.6	7.7	5.8	2.7	13	9.7	13	18	5.4	15	21	26
Nutrients and Organics	Total Ammonia	0	0	33	0	0.40	77	16	0	58	32	4.9	44	22	0	50	0	4.4
	Nitrate	0	0	50	26	0	4.3	3.0	2.5	7.2	16	1.9	171	0	10	65	27	11
	Nitrite	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total Kjeldahl Nitrogen (TKN)	5.2	6.1	19	16	17	21	11	12	21	22	19	11	40	13	12	19	12
	Dissolved Organic Carbon	16	6.6	14	15	29	9.6	11	9.6	12	9.8	14	7.5	29	6.4	15	15	8.5
	Total Organic Carbon	3.5	1.7	13	4.6	5.9	4.1	7.1	4.0	6.1	8.9	5.6	7.7	14	3.5	20	11	5.3
	Total Phosphorus	41	55	43	24	32	64	30	33	28	4.4	80	17	37	110	26	24	38
	Phenols	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Anions	Bromide (Br)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Chloride (Cl)	16	0.80	12	0.74	1.1	7.0	0.88	0.39	2.7	4.0	0.56	8.3	15	0.61	23	21	4.1
	Sulphate (SO_4)	2.6	0.23	6.5	0.33	1.2	8.2	0.65	0.40	4.3	4.6	0.36	48	12	3.0	26	14	6.9
Total Metals	Aluminum (Al)	30	33	34	13	32	36	14	7.3	60	9.7	19	110	13	12	46	22	25
	Antimony (Sb)	0	0	0	0	0	0	0	0	0	0	0	3.2	0	0	0	0	0
	Arsenic (As)	0	0	0	0	3.6	0	6.7	0	0	0	0	3.2	0	0	0	0	0
	Barium (Ba)	2.5	2.0	7.0	1.1	2.9	5.2	3.1	2.1	2.2	5.4	2.5	3.7	12	1.3	15	7.4	5.6
	Boron (B)	0	0	0	0	0	4.3	2.2	2.1	2.3	3.3	1.4	0	0	0	0	0	0
	Cadmium (Cd)	0	0	0	7.5	0	3.6	17	22	0	7.6	0	42	7.7	0	0.56	0	0
	Calcium (Ca)	0.94	1.3	5.3	0.75	1.3	4.8	1.1	0.73	2.1	4.0	0.92	16	14	0.95	14	8.7	4.4
	Chromium (Cr)	0	0	0	0	0	0.40	0	0	0	0	0	8.7	0	0	5.9	0	0
	Cobalt (Co)	0	0	0	0	0	0	10	0	0	0	0	29	0	0	0	0	14
	Copper (Cu)	21	11	14	23	17	7.7	11	7.0	4.7	18	11	37	7.4	10	22	16	20
	Iron (Fe)	16	14	0	11	20	15	15	8.0	60	9.7	13	75	13	3.8	38	11	29
	Lead (Pb)	0	0	0	0	0	0	15	0.40	0	7.0	0	11	1.3	0	0	13	20
	Lithium (Li)	0	0	3.8	0	8.6	5.8	3.1	0.89	4.7	4.8	3.6	8.7	0	0	0	0	0
	Magnesium (Mg)	3.1	0.38	6.6	0.35	1.6	5.8	1.1	1.6	4.1	4.0	0.92	5.5	13	1.5	9.6	8.6	4.7
	Manganese (Mn)	13	44	88	8.2	11	31	12	4.6	64	4.6	9.8	87	4.7	6.5	69	41	30
	Mercury (Hg)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Molybdenum (Mo)	1.5	3.5	9.7	2.9	3.5	8.4	1.6	2.6	11	8.4	2.9	24	19	5.0	14	8.2	8.3
	Nickel (Ni)	0	3.8	12	6.9	7.0	5.9	4.4	6.3	5.2	6.5	4.3	11	0	0	0	0	3.0
	Potassium (K)	2.5	1.1	9.9	0.45	1.9	5.8	1.0	1.6	4.3	5.0	0.61	5.3	9.9	1.1	12	5.8	4.4
	Selenium (Se)	0	0	0	0	3.6	0.78	0	14	0	0	0.78	0	0	0	0	0	0
	Silicon (Si)	4.1	0.72	30	5.4	3.2	12	4.6	1.5	17	6.9	4.2	27	6.3	1.5	17	7.9	6.3
	Silver (Ag)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Sodium (Na)	0.40	0.95	15	0.49	0.92	4.5	1.1	2.0	4.9	3.3	0.89	8.9	19	0.96	13	15	3.9
	Strontium (Sr)	1.8	2.4	6.1	1.8	1.1	8.1	0.68	2.8	5.1	5.3	1.1	17	14	1.7	12	8.3	4.6
	Thallium (Tl)	0	0	0	0	0	0	5.7	0	0	0	0	0	0	0	0	0	0
	Tin (Sn)	0	0	0	0	0	0	0	0	0	0	0	22	0	0	1.4	0	0
	Titanium (Ti)	2.2	11	12	17	25	17	13	9.3	47	22	25	67	9.9	9.4	13	26	40
	Uranium (U)	2.2	2.1	14	2.1	2.5	5.5	0.84	1.0	7.4	7.2	1.6	9.9	25	1.9	14	19	8.3
	Vanadium (V)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Zinc (Zn)	13	29	0	0	0	0	0	0	0	0	0	33	0	0	6.4	11	0

Note: Shaded values indicate RDP >30%.

Table C.11: ***In Situ*** **Water Quality Measurements Collected at Camp Lake Tributary 1 (CLT1) and Tributary 2 (CLT2) Benthic Invertebrate Community Stations, Mary River Project CREMP, August 2023**

Study Area	Station	Sampling Date	Temperature (°C)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (% saturation)	pH (pH units)	Specific Conductance (µS/cm)
Unnamed Reference Creek	REF-CRK-B1	18-Aug-23	8.6	11.23	99.5	7.72	92.5
	REF-CRK-B2	18-Aug-23	8.5	11.31	99.0	7.73	92.7
	REF-CRK-B3	18-Aug-23	8.4	11.26	99.0	7.67	93.7
	REF-CRK-B4	18-Aug-23	8.4	11.34	99.1	7.65	94.0
	REF-CRK-B5	18-Aug-23	8.3	11.35	99.0	7.55	94.2
Camp Lake Tributary 1 North Branch	CLT1-US-B1	13-Aug-23	8.6	11.42	100.4	8.35	192.3
	CLT1-US-B2	13-Aug-23	8.7	11.40	100.4	8.33	193.1
	CLT1-US-B3	13-Aug-23	8.9	11.32	100.1	8.35	193.7
	CLT1-US-B4	13-Aug-23	9.0	11.34	100.7	8.37	193.4
	CLT1-US-B5	13-Aug-23	9.3	11.43	102.3	8.38	193.1
Camp Lake Tributary 1 Upper Main Stem	CLT1-L2-B1	16-Aug-23	15.8	9.94	103.1	8.35	279.4
	CLT1-L2-B2	16-Aug-23	16.0	10.02	104.4	8.33	279.2
	CLT1-L2-B3	16-Aug-23	15.8	10.00	103.9	8.32	279.7
	CLT1-L2-B4	16-Aug-23	15.5	10.10	104.2	8.31	278.8
	CLT1-L2-B5	16-Aug-23	15.2	10.14	104.0	8.27	279.5
Camp Lake Tributary 1 Lower Main Stem	CLT1-DS-B1	12-Aug-23	12.1	10.72	102.0	8.34	228.3
	CLT1-DS-B2	12-Aug-23	12.1	10.79	102.6	8.36	213.4
	CLT1-DS-B3	12-Aug-23	11.6	10.88	102.3	8.36	228.4
	CLT1-DS-B4	12-Aug-23	11.3	10.89	101.6	8.36	228.3
	CLT1-DS-B5	12-Aug-23	11.3	10.94	102.1	8.38	228.4
Camp Lake Tributary 2 Upstream	CLT2-US-B1	13-Aug-23	9.6	11.07	99.5	8.20	232.4
	CLT2-US-B2	13-Aug-23	9.7	11.15	100.6	8.44	232.7
	CLT2-US-B3	13-Aug-23	9.7	11.20	100.9	8.43	233.0
	CLT2-US-B4	13-Aug-23	9.5	11.24	100.7	8.41	232.9
	CLT2-US-B5	13-Aug-23	8.7	10.94	96.3	8.32	236.0
Camp Lake Tributary 2 Downstream	CLT2-DS-B1	13-Aug-23	8.6	11.46	100.5	8.31	173.7
	CLT2-DS-B2	13-Aug-23	8.5	11.60	101.6	8.30	237.2
	CLT2-DS-B3	13-Aug-23	8.2	11.63	101.0	8.26	237.7
	CLT2-DS-B4	13-Aug-23	8.2	11.69	101.4	8.28	237.7
	CLT2-DS-B5	13-Aug-23	7.9	11.73	101.1	8.22	237.7

Table C.12: *In Situ* Water Quality Summary Statistics for the Camp Lake Tributary (CLT1 and CLT2) Benthic Stations, Mary River Project CREMP, August 2023

Metric	Study Area	Sample Size	Mean	Standard Deviation	Standard Error	5th Percentile	95th Percentile	Minimum	Maximum
Water Temperature (°C)	REF-CRK Unnamed Reference Creek	5	8.44	0.114	0.0510	8.36	8.52	8.30	8.60
	CLT1-US North Branch	5	8.90	0.274	0.122	8.70	9.10	8.60	9.30
	CLT1-L2 Upper Main Stem	5	15.7	0.313	0.140	15.4	15.9	15.2	16.0
	CLT1-DS Lower Main Stem	5	11.7	0.402	0.180	11.4	12.0	11.3	12.1
	CLT2-US Upstream	5	9.44	0.422	0.189	9.13	9.75	8.70	9.70
	CLT2-DS Downstream	5	8.28	0.277	0.124	8.08	8.48	7.90	8.60
Dissolved Oxygen (mg/L)	REF-CRK Unnamed Reference Creek	5	11.3	0.0517	0.0231	11.3	11.3	11.2	11.3
	CLT1-US North Branch	5	11.4	0.0492	0.0220	11.3	11.4	11.3	11.4
	CLT1-L2 Upper Main Stem	5	10.0	0.0800	0.0358	9.98	10.1	9.94	10.1
	CLT1-DS Lower Main Stem	5	10.8	0.0879	0.0393	10.8	10.9	10.7	10.9
	CLT2-US Upstream	5	11.1	0.119	0.0532	11.0	11.2	10.9	11.2
	CLT2-DS Downstream	5	11.6	0.104	0.0464	11.6	11.7	11.5	11.7
Dissolved Oxygen (% saturation)	REF-CRK Unnamed Reference Creek	5	99.1	0.217	0.0970	99.0	99.3	99.0	99.5
	CLT1-US North Branch	5	101	0.876	0.392	100	101	100	102
	CLT1-L2 Upper Main Stem	5	104	0.497	0.222	104	104	103	104
	CLT1-DS Lower Main Stem	5	102	0.370	0.166	102	102	102	103
	CLT2-US Upstream	5	99.6	1.92	0.860	98.2	101	96.3	101
	CLT2-DS Downstream	5	101	0.421	0.188	101	101	100	102
pH (units)	REF-CRK Unnamed Reference Creek	5	7.66	0.0720	0.0322	7.61	7.72	7.55	7.73
	CLT1-US North Branch	5	8.36	0.0195	0.00872	8.34	8.37	8.33	8.38
	CLT1-L2 Upper Main Stem	5	8.32	0.0297	0.0133	8.29	8.34	8.27	8.35
	CLT1-DS Lower Main Stem	5	8.36	0.0141	0.00632	8.35	8.37	8.34	8.38
	CLT2-US Upstream	5	8.36	0.101	0.0453	8.29	8.43	8.20	8.44
	CLT2-DS Downstream	5	8.27	0.0358	0.0160	8.25	8.30	8.22	8.31
Specific Conductance (µS/cm)	REF-CRK Unnamed Reference Creek	5	93.4	0.773	0.346	92.8	94.0	92.5	94.2
	CLT1-US North Branch	5	193	0.522	0.233	193	194	192	194
	CLT1-L2 Upper Main Stem	5	279	0.342	0.153	279	280	279	280
	CLT1-DS Lower Main Stem	5	225	6.69	2.99	220	230	213	228
	CLT2-US Upstream	5	233	1.47	0.658	232	234	232	236
	CLT2-DS Downstream	5	225	28.6	12.8	204	246	174	238

Table C.13: *In Situ* Water Quality Statistical Comparisons among Camp Lake Tributary 1 (CLT1) and Unnamed Reference Creek (REF-CRK) Study Areas, Mary River Project CREMP, August 2023

Metric	Overall 4-group Comparison				Pair-wise, *post hoc* comparisons[a]			
	Statistical Test[a]	Transformation	Significant Difference Between Areas?	P-value	Area 1	Area 2	Significant Difference Between Areas?	P-value
Water Temperature (°C)	ANOVA	None	YES	0.001	REF-CRK Unnamed Reference Creek	CLT1 North Branch	NO	0.104
					REF-CRK Unnamed Reference Creek	CLT1 Upper Main Stem	YES	<0.001
					REF-CRK Unnamed Reference Creek	CLT1 Lower Main Stem	YES	<0.001
					CLT1 North Branch	CLT1 Upper Main Stem	YES	<0.001
					CLT1 North Branch	CLT1 Lower Main Stem	YES	<0.001
					CLT1 Upper Main Stem	CLT1 Lower Main Stem	YES	<0.001
Dissolved Oxygen (mg/L)	ANOVA	None	YES	0.001	REF-CRK Unnamed Reference Creek	CLT1 North Branch	NO	0.260
					REF-CRK Unnamed Reference Creek	CLT1 Upper Main Stem	YES	<0.001
					REF-CRK Unnamed Reference Creek	CLT1 Lower Main Stem	YES	<0.001
					CLT1 North Branch	CLT1 Upper Main Stem	YES	<0.001
					CLT1 North Branch	CLT1 Lower Main Stem	YES	<0.001
					CLT1 Upper Main Stem	CLT1 Lower Main Stem	YES	<0.001
Dissolved Oxygen (% saturation)	K-W	Rank	YES	0.001	REF-CRK Unnamed Reference Creek	CLT1 North Branch	NO	0.127
					REF-CRK Unnamed Reference Creek	CLT1 Upper Main Stem	YES	<0.001
					REF-CRK Unnamed Reference Creek	CLT1 Lower Main Stem	YES	0.013
					CLT1 North Branch	CLT1 Upper Main Stem	YES	0.013
					CLT1 North Branch	CLT1 Lower Main Stem	NO	0.335
					CLT1 Upper Main Stem	CLT1 Lower Main Stem	NO	0.127
pH (units)	K-W	Rank	YES	0.002	REF-CRK Unnamed Reference Creek	CLT1 North Branch	YES	0.002
					REF-CRK Unnamed Reference Creek	CLT1 Upper Main Stem	NO	0.126
					REF-CRK Unnamed Reference Creek	CLT1 Lower Main Stem	YES	<0.001
					CLT1 North Branch	CLT1 Upper Main Stem	NO	0.113
					CLT1 North Branch	CLT1 Lower Main Stem	NO	0.768
					CLT1 Upper Main Stem	CLT1 Lower Main Stem	NO	0.060
Specific Conductance (µS/cm)	K-W	Rank	YES	0.001	REF-CRK Unnamed Reference Creek	CLT1 North Branch	NO	0.181
					REF-CRK Unnamed Reference Creek	CLT1 Upper Main Stem	YES	<0.001
					REF-CRK Unnamed Reference Creek	CLT1 Lower Main Stem	YES	0.007
					CLT1 North Branch	CLT1 Upper Main Stem	YES	0.007
					CLT1 North Branch	CLT1 Lower Main Stem	NO	0.181
					CLT1 Upper Main Stem	CLT1 Lower Main Stem	NO	0.181

Highlighted values indicate significant difference between study areas based on test p-value less than 0.05.

[a] Statistical tests include Analysis of Variance (ANOVA) followed by Tukey's Honestly Significant Difference (HSD) post hoc tests, or Kruskal-Wallis H-test (K-W) followed by Mann-Whitney U-test (M-W).

Table C.14: Water Chemistry at Lotic Camp Lake Tributary (CLT) Monitoring Stations, Mary River Project CREMP, 2023

Parameters		Units	Water Quality Guideline (WQG)[a]	AEMP Benchmark[b]	Spring Sampling Event						
					CLT1 North Branch		CLT1 Upper Main Stem	CLT1 Lower Main Stem			CLT2
					L1-08	L1-02	L2-03	L1-09	L1-05	L0-01	K0-01
					17-Jul-23	16-Jul-23	17-Jul-23	16-Jul-23	16-Jul-23	16-Jul-23	16-Jul-23
Conventionals	Conductivity (lab)	µS/cm	-	-	86.8	92.4	166.0	98.6	98.4	105.0	102.0
	pH (lab)	pH	6.5 - 9.0	-	7.71	7.68	7.85	7.71	7.68	7.67	7.65
	Hardness (as $CaCO_3$)	mg/L	-	-	41.2	46	72.6	48.6	48.3	51.9	47.1
	Total Suspended Solids (TSS)	mg/L	-	-	1.0	<1.0	3.2	<1.0	<1.0	<1.0	<1.0
	Total Dissolved Solids (TDS)	mg/L	-	-	57	68	98	72	82	76	70
	Turbidity	NTU	-	-	1.01	1.61	8.56	0.98	1.45	1.51	0.96
	Alkalinity (as $CaCO_3$)	mg/L	-	-	53.5	52.0	82.6	54.4	61.1	56.4	52.6
Nutrients and Organics	Total Ammonia	mg/L	-	0.855	<0.0050	<0.0050	0.015	<0.0050	<0.0050	<0.0050	<0.0050
	Nitrate	mg/L	3	3	0.040	<0.020	0.096	<0.020	<0.020	<0.020	0.144
	Nitrite	mg/L	0.06	0.06	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Total Kjeldahl Nitrogen (TKN)	mg/L	-	-	0.075	0.066	0.270	0.084	0.082	0.057	0.052
	Dissolved Organic Carbon	mg/L	-	-	1.44	1.48	3.30	3.81	1.78	1.63	1.04
	Total Organic Carbon	mg/L	-	-	1.24	1.60	3.07	1.85	1.66	1.72	1.26
	Total Phosphorus	mg/L	0.030[α]	-	0.0041	0.0026	0.0131	0.0027	0.0142	0.0026	0.0037
	Phenols	mg/L	0.004[α]	-	0.0012	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Anions	Bromide (Br)	mg/L	-	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
	Chloride (Cl)	mg/L	120	120	3.36	1.58	6.54	1.99	2.02	2.12	1.19
	Sulphate (SO_4)	mg/L	218[β]	218	1.28	1.06	4.17	1.24	1.26	1.68	10.4
Total Metals	Aluminum (Al)	mg/L	0.100	0.179	0.0281	0.0087	***0.286***	0.0186	0.0165	0.0273	0.0260
	Antimony (Sb)	mg/L	0.020[α]	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)	mg/L	0.005	0.005	0.00011	<0.00010	0.00021	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)	mg/L	-	-	0.00639	0.00600	0.0111	0.00633	0.00640	0.00662	0.00561
	Beryllium (Be)	mg/L	0.011[α]	-	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
	Bismuth (Bi)	mg/L	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)	mg/L	1.5	-	<0.010	<0.010	0.013	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)	mg/L	0.00012	0.00008	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Calcium (Ca)	mg/L	-	-	8.03	8.50	14.4	9.23	9.22	9.86	8.47
	Chromium (Cr)	mg/L	0.001	0.003	<0.00050	<0.00050	0.00077	<0.00050	<0.00050	<0.00050	<0.00050
	Cobalt (Co)	mg/L	0.0009[α]	0.004	<0.00010	<0.00010	0.00021	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)	mg/L	0.002	0.0022	0.00156	0.00131	0.00152	0.00130	0.00134	0.00127	0.00084
	Iron (Fe)	mg/L	0.30	0.326	0.036	0.01	***0.462***	0.037	0.031	0.042	0.029
	Lead (Pb)	mg/L	0.001	0.001	0.000062	<0.000050	0.000424	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)	mg/L	-	-	<0.0010	<0.0010	0.0020	<0.0010	<0.0010	<0.0010	<0.0010
	Magnesium (Mg)	mg/L	-	-	5.11	5.64	9.1	6.08	6.06	6.51	6.30
	Manganese (Mn)	mg/L	0.935[β]	-	0.00112	0.000520	0.0234	0.00191	0.00184	0.00205	0.001200
	Mercury (Hg)	mg/L	0.000026	-	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)	mg/L	0.073	-	0.000359	0.000332	0.00172	0.000417	0.000403	0.000418	0.000220
	Nickel (Ni)	mg/L	0.025	0.025	<0.00050	<0.00050	0.00138	<0.00050	<0.00050	0.00052	<0.00050
	Potassium (K)	mg/L	-	-	1.22	1.03	2.44	1.13	1.11	1.17	0.87
	Selenium (Se)	mg/L	0.001	-	<0.000050	<0.000050	0.00006	<0.000050	<0.000050	<0.000050	0.000056
	Silicon (Si)	mg/L	-	-	0.69	0.54	1.12	0.60	0.57	0.60	0.46
	Silver (Ag)	mg/L	0.00025	0.0001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)	mg/L	-	-	0.43	0.55	4.66	0.88	0.88	1.02	0.87
	Strontium (Sr)	mg/L	-	-	0.00558	0.00454	0.0147	0.00569	0.00581	0.00643	0.00556
	Thallium (Tl)	mg/L	0.0008	0.0008	<0.000010	<0.000010	0.000012	<0.000010	<0.000010	<0.000010	<0.000010
	Tin (Sn)	mg/L	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)	mg/L	-	-	0.00131	<0.00030	0.0103	0.00051	<0.00060	0.00114	0.00108
	Uranium (U)	mg/L	0.015	-	0.000622	0.000372	0.0067	0.00071	0.00070	0.00070	0.000246
	Vanadium (V)	mg/L	0.006[α]	0.006	<0.00050	<0.00050	0.00062	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)	mg/L	0.030	0.030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030

Indicates parameter concentration above applicable Water Quality Guideline.

BOLD Indicates parameter concentration above the AEMP benchmark.

Note: "-" indicates no WQG benchmark applicable.

[a] Canadian Water Quality Guideline for the protection of aquatic life (CCME 1987, 1999) except those indicated by α (Ontario Provincial Water Quality Objective [PWQO]; OMOE 1994) and β (British Columbia Water Quality Guideline [BCWQG]; BCMOE 2022). See Table 2.2 for information regarding WQG criteria.

[b] AEMP Water Quality Benchmarks developed by Intrinsik (2013) using baseline water quality data specific to the Camp Lake Tributaries.

Table C.14: Water Chemistry at Lotic Camp Lake Tributary (CLT) Monitoring Stations, Mary River Project CREMP, 2023

	Parameters	Units	Water Quality Guideline (WQG)[a]	AEMP Benchmark[b]	Summer Sampling Event						
					CLT1 North Branch		CLT1 Upper Main Stem	CLT1 Lower Main Stem			CLT2
					L1-08	L1-02	L2-03	L1-09	L1-05	L0-01	K0-01
					30-Aug-23	24-Aug-23	24-Aug-23	24-Aug-23	24-Aug-23	24-Aug-23	24-Aug-23
Conventionals	Conductivity (lab)	µS/cm	-	-	178.0	193.0	293.0	221.0	223.0	231.0	222.0
	pH (lab)	pH	6.5 - 9.0	-	7.87	8.07	7.91	8.09	8.09	8.09	8.12
	Hardness (as $CaCO_3$)	mg/L	-	-	83.8	94.3	126	102	103	106	109
	Total Suspended Solids (TSS)	mg/L	-	-	<1.0	1.2	2.3	<1.0	<1.0	<1.0	<1.2
	Total Dissolved Solids (TDS)	mg/L	-	-	115	108	171	124	123	134	124
	Turbidity	NTU	-	-	1.14	0.36	4.2	1.54	1.06	0.96	1.18
	Alkalinity (as $CaCO_3$)	mg/L	-	-	69.0	88.2	119.0	97.8	99.4	102.0	103.0
Nutrients and Organics	Total Ammonia	mg/L	-	0.855	<0.0050	<0.0050	0.011	<0.0050	<0.0050	<0.0050	<0.0050
	Nitrate	mg/L	3	3	0.036	<0.020	0.349	0.071	0.081	0.075	0.0330
	Nitrite	mg/L	0.06	0.06	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Total Kjeldahl Nitrogen (TKN)	mg/L	-	-	0.149	0.087	0.287	0.118	0.120	0.137	0.093
	Dissolved Organic Carbon	mg/L	-	-	2.18	2.59	3.25	2.56	2.56	2.52	2.02
	Total Organic Carbon	mg/L	-	-	1.95	2.62	4.00	3.00	2.99	2.90	2.37
	Total Phosphorus	mg/L	0.030[α]	-	<0.0020	<0.0020	0.0037	<0.0020	<0.0020	<0.0020	0.0341
	Phenols	mg/L	0.004[α]	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Anions	Bromide (Br)	mg/L	-	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
	Chloride (Cl)	mg/L	120	120	13.50	4.93	15.3	7.21	7.39	7.85	3.91
	Sulphate (SO_4)	mg/L	218[β]	218	2.94	2.95	11.0	4.55	4.69	4.84	6.9
Total Metals	Aluminum (Al)	mg/L	0.100	0.179	0.0322	0.0138	0.077	0.0252	0.0218	0.0254	0.0114
	Antimony (Sb)	mg/L	0.020[α]	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)	mg/L	0.005	0.005	<0.00010	<0.00010	0.000120	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)	mg/L	-	-	0.01090	0.0112	0.0131	0.0119	0.0121	0.0125	0.0113
	Beryllium (Be)	mg/L	0.011[α]	-	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
	Bismuth (Bi)	mg/L	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)	mg/L	1.5	-	<0.010	<0.010	0.0160	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)	mg/L	0.00012	0.00008	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Calcium (Ca)	mg/L	-	-	17.1	17.0	25.0	19.1	19.4	20.0	20.1
	Chromium (Cr)	mg/L	0.001	0.003	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Cobalt (Co)	mg/L	0.0009[α]	0.004	<0.00010	<0.00010	0.000140	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)	mg/L	0.002	0.0022	***0.00246***	0.00209	0.00125	0.00195	0.00195	0.00193	0.00131
	Iron (Fe)	mg/L	0.30	0.326	0.041	0.018	***0.421***	0.098	0.094	0.089	0.016
	Lead (Pb)	mg/L	0.001	0.001	0.00005	<0.000050	0.000088	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)	mg/L	-	-	<0.0010	<0.0010	0.00360	<0.0010	<0.0010	<0.0010	<0.0010
	Magnesium (Mg)	mg/L	-	-	11.30	11.4	16.8	13.0	13.2	13.6	13.6
	Manganese (Mn)	mg/L	0.935[β]	-	0.000860	0.000690	0.0281	0.00632	0.00545	0.00453	0.0007
	Mercury (Hg)	mg/L	0.000026	-	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)	mg/L	0.073	-	0.001040	0.000849	0.00294	0.00122	0.00117	0.00113	0.000544
	Nickel (Ni)	mg/L	0.025	0.025	<0.00050	0.00067	0.00124	0.000750	0.000800	0.00085	0.00055
	Potassium (K)	mg/L	-	-	2.35	2.01	3.19	2.31	2.32	2.30	1.69
	Selenium (Se)	mg/L	0.001	-	0.000061	<0.000050	0.000106	0.000057	0.000065	0.000053	<0.000050
	Silicon (Si)	mg/L	-	-	1.00	1.04	1.12	1.090	1.100	1.140	0.940
	Silver (Ag)	mg/L	0.00025	0.0001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)	mg/L	-	-	0.748	1.48	10.0	3.49	3.52	3.60	2.67
	Strontium (Sr)	mg/L	-	-	0.01410	0.01120	0.0272	0.0164	0.0166	0.0172	0.0139
	Thallium (Tl)	mg/L	0.0008	0.0008	0.000014	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Tin (Sn)	mg/L	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)	mg/L	-	-	0.00147	0.00046	0.0036	0.00087	0.00075	<0.00120	0.000480
	Uranium (U)	mg/L	0.015	-	0.00450	0.00272	0.0165	0.00511	0.00497	0.00460	0.00239
	Vanadium (V)	mg/L	0.006[α]	0.006	0.00055	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)	mg/L	0.030	0.030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030

Indicates parameter concentration above applicable Water Quality Guideline.

BOLD Indicates parameter concentration above the AEMP benchmark.

Note: "-" indicates no WQG benchmark applicable.

[a] Canadian Water Quality Guideline for the protection of aquatic life (CCME 1987, 1999) except those indicated by α (Ontario Provincial Water Quality Objective [PWQO]; OMOE 1994) and β (British Columbia Water Quality Guideline [BCWQG]; BCMOE 2022). See Table 2.2 for information regarding WQG criteria.

[b] AEMP Water Quality Benchmarks developed by Intrinsik (2013) using baseline water quality data specific to the Camp Lake Tributaries.

Table C.14: Water Chemistry at Lotic Camp Lake Tributary (CLT) Monitoring Stations, Mary River Project CREMP, 2023

	Parameters	Units	Water Quality Guideline (WQG)[a]	AEMP Benchmark[b]	Fall Sampling Event						
					CLT1 North Branch		CLT1 Upper Main Stem	CLT1 Lower Main Stem			CLT2
					L1-08	L1-02	L2-03	L1-09	L1-05	L0-01	K0-01
					14-Sep-23	17-Sep-23	16-Sep-23	16-Sep-23	16-Sep-23	16-Sep-23	16-Sep-23
Conventionals	Conductivity (lab)	µS/cm	-	-	192	242	349	261	263	270	271
	pH (lab)	pH	6.5 - 9.0	-	7.61	8.03	7.95	7.99	8.07	8.08	8.09
	Hardness (as $CaCO_3$)	mg/L	-	-	92.2	120	152	124	126	129	131
	Total Suspended Solids (TSS)	mg/L	-	-	<1.0	<1.0	3.0	<1.0	1	1.6	1.6
	Total Dissolved Solids (TDS)	mg/L	-	-	110	124	193	138	148	151	145
	Turbidity	NTU	-	-	0.25	1.05	4.8	1.11	1.25	1.88	0.53
	Alkalinity (as $CaCO_3$)	mg/L	-	-	81	121	145	119	117	128	127
Nutrients and Organics	Total Ammonia	mg/L	-	0.855	<0.0050	<0.0050	0.0244	0.0100	0.0072	<0.0050	<0.0050
	Nitrate	mg/L	3	3	0.057	0.037	0.522	0.154	0.187	0.163	0.048
	Nitrite	mg/L	0.06	0.06	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Total Kjeldahl Nitrogen (TKN)	mg/L	-	-	0.112	0.085	0.287	0.122	0.112	0.100	0.105
	Dissolved Organic Carbon	mg/L	-	-	1.86	2.62	4.10	3.14	3.10	3.17	2.72
	Total Organic Carbon	mg/L	-	-	2.25	2.41	4.01	2.77	2.92	2.91	2.56
	Total Phosphorus	mg/L	0.030[α]	-	0.0039	<0.0020	0.0088	<0.0020	0.0020	0.0024	<0.0020
	Phenols	mg/L	0.004[α]	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Anions	Bromide (Br)	mg/L	-	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
	Chloride (Cl)	mg/L	120	120	9.95	4.09	17.6	8.44	9.04	9.88	7.42
	Sulphate (SO_4)	mg/L	218[β]	218	3.65	3.84	14.2	6.6	7.3	7.4	6.9
Total Metals	Aluminum (Al)	mg/L	0.100	0.179	0.0776	0.0059	***0.256***	0.0245	0.0235	0.0786	0.0490
	Antimony (Sb)	mg/L	0.020[α]	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)	mg/L	0.005	0.005	<0.00010	<0.00010	0.000120	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)	mg/L	-	-	0.0119	0.0130	0.0169	0.0144	0.0138	0.0137	0.0140
	Beryllium (Be)	mg/L	0.011[α]	-	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
	Bismuth (Bi)	mg/L	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)	mg/L	1.5	-	<0.010	<0.010	0.017	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)	mg/L	0.00012	0.00008	<0.0000050	<0.0000050	0.0000056	0.0000063	<0.0000050	<0.0000050	<0.0000050
	Calcium (Ca)	mg/L	-	-	18.2	23.5	29.8	24	24.6	25.1	25.8
	Chromium (Cr)	mg/L	0.001	0.003	0.00057	<0.00050	0.00081	<0.00050	<0.00050	<0.00050	<0.00050
	Cobalt (Co)	mg/L	0.0009[α]	0.004	<0.00010	<0.00010	0.000270	0.000110	<0.00010	<0.00010	<0.00010
	Copper (Cu)	mg/L	0.002	0.0022	***0.00232***	***0.00240***	0.00189	0.00208	0.00198	0.00179	0.00157
	Iron (Fe)	mg/L	0.30	0.326	0.113	<0.010	***0.768***	0.132	0.110	0.158	0.0670
	Lead (Pb)	mg/L	0.001	0.001	0.0001	<0.000050	0.000253	<0.000050	<0.000050	0.000068	<0.000050
	Lithium (Li)	mg/L	-	-	0.001	0.0016	0.00270	0.00210	0.00140	0.00220	<0.0010
	Magnesium (Mg)	mg/L	-	-	12.1	15.8	21.0	16.3	17.1	16.5	18.1
	Manganese (Mn)	mg/L	0.935[β]	-	0.002040	0.000360	0.0453	0.02900	0.00655	0.00530	0.001270
	Mercury (Hg)	mg/L	0.000026	-	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)	mg/L	0.073	-	0.00132	0.001060	0.00320	0.00133	0.00141	0.00122	0.000667
	Nickel (Ni)	mg/L	0.025	0.025	0.00056	0.00075	0.00162	0.00112	0.00097	0.00107	0.000710
	Potassium (K)	mg/L	-	-	2.50	2.18	3.50	2.43	2.52	2.33	2.06
	Selenium (Se)	mg/L	0.001	-	0.000088	<0.000050	0.00013	0.00005	0.000053	<0.000050	<0.000050
	Silicon (Si)	mg/L	-	-	1.11	1.38	1.92	1.39	1.46	1.51	1.230
	Silver (Ag)	mg/L	0.00025	0.0001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)	mg/L	-	-	0.762	2.36	12.9	5.34	5.62	5.17	5.30
	Strontium (Sr)	mg/L	-	-	0.0155	0.0145	0.0280	0.0220	0.0226	0.0226	0.0180
	Thallium (Tl)	mg/L	0.0008	0.0008	0.000017	<0.000010	0.0000110	<0.000010	<0.000010	<0.000010	<0.000010
	Tin (Sn)	mg/L	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)	mg/L	-	-	<0.00600	<0.00030	0.0122	0.00085	0.00125	0.00438	0.003030
	Uranium (U)	mg/L	0.015	-	0.00712	0.00453	0.0268	0.00962	0.00877	0.00810	0.00376
	Vanadium (V)	mg/L	0.006[α]	0.006	0.00073	<0.00050	0.00055	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)	mg/L	0.030	0.030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030

Indicates parameter concentration above applicable Water Quality Guideline.

BOLD Indicates parameter concentration above the AEMP benchmark.

Note: "-" indicates no WQG benchmark applicable.

[a] Canadian Water Quality Guideline for the protection of aquatic life (CCME 1987, 1999) except those indicated by α (Ontario Provincial Water Quality Objective [PWQO]; OMOE 1994) and β (British Columbia Water Quality

[b] AEMP Water Quality Benchmarks developed by Intrinsik (2013) using baseline water quality data specific to the Camp Lake Tributaries.

Table C.15: Magnitude of Elevation in Seasonal Average Water Chemistry and Total Metal Concentrations Between the Camp Lake Tributaries (CLT1 and CLT2) and Average Reference Creek Stations, and Mine Baseline (2005 to 2013) Period, Mary River Project CREMP, 2023

Parameter	2023 vs Reference (2023)											
	Spring				Summer				Fall			
	CLT1			CLT2	CLT1			CLT2	CLT1			CLT2
	North Branch (L1-08, L1-02)	Upper Main Stem (L2-03)	Lower Main Stem (L1-09, L1-05, L0-01)	Station K0-01	North Branch (L1-08, L1-02)	Upper Main Stem (L2-03)	Lower Main Stem (L1-09, L1-05, L0-01)	Station K0-01	North Branch (L1-08, L1-02)	Upper Main Stem (L2-03)	Lower Main Stem (L1-09, L1-05, L0-01)	Station K0-01
Conductivity (lab)	3.11	5.75	3.49	3.54	1.72	2.72	2.09	2.06	1.70	2.73	2.07	2.12
pH (lab)	1.04	1.06	1.04	1.03	1.05	1.04	1.06	1.06	1.02	1.03	1.05	1.05
Hardness (as $CaCO_3$)	3.35	5.58	3.81	3.62	1.75	2.47	2.03	2.14	1.77	2.53	2.10	2.18
Total Suspended Solids (TSS)	0.323	1.03	0.323	0.323	0.611	1.28	0.556	0.667	1.00	3.00	1.20	1.60
Total Dissolved Solids (TDS)	1.72	2.70	2.11	1.93	1.65	2.53	1.88	1.84	1.84	3.03	2.28	2.27
Turbidity	0.595	3.89	0.596	0.436	0.140	0.779	0.222	0.221	0.230	1.71	0.500	0.187
Alkalinity (as $CaCO_3$)	3.86	6.05	4.20	3.85	1.48	2.25	1.88	1.95	1.68	2.42	2.02	2.12
Total Ammonia	1.00	2.92	1.00	1.00	1.00	2.14	1.00	1.00	1.00	4.88	1.48	1.00
Nitrate	1.50	4.80	1.00	7.20	1.30	16.2	3.52	1.53	1.23	13.6	4.39	1.25
Nitrite	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Total Kjeldahl Nitrogen (TKN)	1.13	4.32	1.19	0.832	1.76	4.28	1.87	1.39	0.936	2.73	1.06	0.998
Dissolved Organic Carbon	1.17	2.64	1.93	0.832	0.770	1.05	0.822	0.652	1.32	2.41	1.85	1.60
Total Organic Carbon	1.27	2.75	1.56	1.13	1.24	2.17	1.61	1.29	1.66	2.86	2.04	1.83
Total Phosphorus	0.528	2.06	1.02	0.583	0.471	0.871	0.471	8.02	0.814	2.43	0.589	0.552
Phenols	1.10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Bromide (Br)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Chloride (Cl)	4.19	11.1	3.46	2.02	4.57	7.58	3.71	1.94	2.84	7.13	3.70	3.01
Sulphate (SO_4)	2.77	9.87	3.30	24.6	1.03	3.85	1.64	2.43	1.10	4.19	2.09	2.04
Aluminum (Al)	0.388	6.02	0.438	0.548	0.0916	0.305	0.0962	0.0454	0.415	2.54	0.419	0.487
Antimony (Sb)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Arsenic (As)	1.05	2.10	1.00	1.00	0.952	1.14	0.952	0.952	1.00	1.20	1.00	1.00
Barium (Ba)	3.10	5.55	3.22	2.80	1.49	1.77	1.64	1.52	1.70	2.31	1.91	1.92
Beryllium (Be)	1.00	1.00	1.00	1.00	0.930	0.930	0.930	0.930	1.00	1.00	1.00	1.00
Bismuth (Bi)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Boron (B)	1.00	1.30	1.00	1.00	1.00	1.60	1.00	1.00	1.00	1.70	1.00	1.00
Cadmium (Cd)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.948	1.06	1.03	0.948
Calcium (Ca)	3.05	5.32	3.49	3.13	1.72	2.52	1.97	2.03	1.68	2.40	1.98	2.08
Chromium (Cr)	1.00	1.54	1.00	1.00	0.658	0.658	0.658	0.658	0.380	0.575	0.355	0.355
Cobalt (Co)	1.00	2.10	1.00	1.00	0.615	0.862	0.615	0.615	0.952	2.57	0.984	0.952
Copper (Cu)	2.71	2.87	2.46	1.58	1.91	1.05	1.63	1.10	1.96	1.57	1.62	1.30
Iron (Fe)	0.434	8.72	0.692	0.547	0.0901	1.29	0.286	0.0489	0.656	8.19	1.42	0.715
Lead (Pb)	0.633	4.79	0.565	0.565	0.206	0.362	0.206	0.206	0.622	2.10	0.465	0.415
Lithium (Li)	1.00	2.00	1.00	1.00	1.00	3.60	1.00	1.00	1.30	2.70	1.90	1.00
Magnesium (Mg)	3.63	6.12	4.20	4.26	1.87	2.77	2.18	2.24	1.85	2.79	2.21	2.40
Manganese (Mn)	0.614	17.5	1.45	0.899	0.183	6.62	1.28	0.163	0.857	32.4	9.73	0.907
Mercury (Hg)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Molybdenum (Mo)	4.36	21.7	5.21	2.78	2.23	6.94	2.77	1.28	2.39	6.44	2.65	1.34
Nickel (Ni)	1.00	2.76	1.01	1.00	0.777	1.65	1.06	0.731	0.819	2.02	1.32	0.888
Potassium (K)	4.51	9.78	4.56	3.49	2.69	3.94	2.85	2.09	2.86	4.28	2.97	2.52
Selenium (Se)	1.00	1.20	1.00	1.12	1.11	2.12	1.17	1.00	1.38	2.60	1.02	1.00
Silicon (Si)	1.49	2.72	1.43	1.12	0.735	0.807	0.800	0.677	0.994	1.53	1.16	0.982
Silver (Ag)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Sodium (Na)	1.41	13.5	2.68	2.53	0.651	5.85	2.07	1.56	0.762	6.30	2.63	2.59
Strontium (Sr)	2.19	6.37	2.59	2.41	1.17	2.51	1.54	1.28	1.14	2.12	1.70	1.36
Thallium (Tl)	1.00	1.20	1.00	1.00	0.842	0.702	0.702	0.702	1.35	1.10	1.00	1.00
Tin (Sn)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Titanium (Ti)	0.291	3.72	0.260	0.390	0.0510	0.188	0.0428	0.0254	0.0755	3.07	0.544	0.763
Uranium (U)	2.26	30.3	3.18	1.12	1.45	6.63	1.97	0.960	1.07	4.94	1.63	0.693
Vanadium (V)	1.00	1.24	1.00	1.00	0.729	0.694	0.694	0.694	1.21	1.08	0.985	0.985
Zinc (Zn)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.741	0.741	0.741	0.741

Denotes parameter with an AEMP benchmark.
Denotes slight elevation (mean concentration three to five times higher than respective mean reference value).
Denotes moderate elevation (mean concentration five to 10 times higher than respective mean reference value).
Denotes highly elevated concentration (mean concentration greater than 10 times higher than respective mean reference value).
Denotes differences in method detection limit between the indicated study area and that of the reference creeks, precluding an evaluation of magnitude of elevation; or no data available for the analyte during comparison period.

Table C.15: Magnitude of Elevation in Seasonal Average Water Chemistry and Total Metal Concentrations Between the Camp Lake Tributaries (CLT1 and CLT2) and Average Reference Creek Stations, and Mine Baseline (2005 to 2013) Period, Mary River Project CREMP, 2023

Parameter	2023 vs Baseline (2005 to 2013)											
	Spring				Summer				Fall			
	CLT1			CLT2	CLT1			CLT2	CLT1			CLT2
	North Branch (L1-08, L1-02)	Upper Main Stem (L2-03)	Lower Main Stem (L1-09, L1-05, L0-01)	Station K0-01	North Branch (L1-08, L1-02)	Upper Main Stem (L2-03)	Lower Main Stem (L1-09, L1-05, L0-01)	Station K0-01	North Branch (L1-08, L1-02)	Upper Main Stem (L2-03)	Lower Main Stem (L1-09, L1-05, L0-01)	Station K0-01
Conductivity (lab)	1.83	1.63	1.22	1.33	1.71	1.44	1.39	1.58	1.29	0.976	1.19	1.31
pH (lab)	1.08	1.04	0.970	1.02	1.04	1.02	1.01	1.02	0.987	1.01	1.02	0.999
Hardness (as $CaCO_3$)	-	-	-	-	-	-	-	-	-	-	-	-
Total Suspended Solids (TSS)	0.429	1.60	0.308	0.417	0.550	1.15	0.467	0.600	0.286	1.50	0.480	0.800
Total Dissolved Solids (TDS)	1.74	1.63	1.43	1.38	1.71	1.39	1.20	1.38	1.11	0.868	1.03	1.15
Turbidity	2.57	10.8	1.64	1.05	3.63	5.35	2.48	1.01	1.41	5.85	2.89	0.901
Alkalinity (as $CaCO_3$)	2.29	1.78	1.44	1.37	1.44	1.39	1.27	1.45	1.27	1.22	1.19	1.23
Total Ammonia	0.0365	0.156	0.102	0.0603	0.0698	0.130	0.0922	0.0284	0.0636	0.160	0.110	0.0380
Nitrate	0.429	1.92	0.200	2.52	0.560	6.98	1.33	0.660	0.685	10.4	2.88	0.960
Nitrite	2.00	2.00	5.00	4.00	2.00	2.00	2.98	2.22	2.00	1.88	2.88	2.50
Total Kjeldahl Nitrogen (TKN)	0.338	0.900	0.380	0.295	0.922	1.13	0.641	0.410	0.844	1.46	0.684	0.677
Dissolved Organic Carbon	0.842	0.835	0.900	0.327	1.55	0.806	0.999	1.21	1.46	1.10	1.28	1.39
Total Organic Carbon	0.782	0.706	0.611	0.364	1.41	0.945	1.14	1.45	1.49	1.01	1.12	1.18
Total Phosphorus	0.773	1.06	0.824	0.298	0.588	0.854	0.509	3.46	0.885	2.93	0.296	0.400
Phenols	-	-	-	-	-	-	-	-	-	-	-	-
Bromide (Br)	0.400	0.400	2.00	1.20	0.400	0.400	2.00	2.00	0.400	0.400	2.00	2.00
Chloride (Cl)	1.85	1.82	1.04	1.30	6.01	1.16	1.77	2.18	1.59	0.449	1.09	2.26
Sulphate (SO_4)	0.867	3.13	0.729	6.83	1.58	8.38	1.89	3.85	1.02	4.18	1.65	1.81
Aluminum (Al)	0.344	12.0	0.449	0.595	1.40	5.79	1.19	0.292	2.11	35.8	5.26	2.31
Antimony (Sb)	1.00	1.00	0.575	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Arsenic (As)	1.05	2.10	0.385	1.00	0.723	1.17	1.00	1.00	1.00	1.20	1.00	1.00
Barium (Ba)	1.74	2.63	1.24	1.27	1.57	1.51	1.37	1.39	1.23	1.15	1.32	1.34
Beryllium (Be)	1.00	1.00	20.0	0.333	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Bismuth (Bi)	0.167	0.167	0.0329	0.147	0.167	0.167	0.167	0.167	0.167	0.167	0.167	0.167
Boron (B)	0.442	1.18	1.98	1.00	1.00	1.60	0.826	1.00	1.00	1.70	1.00	1.00
Cadmium (Cd)	0.500	0.500	0.500	0.500	0.500	0.500	0.344	0.500	0.500	0.560	0.543	0.500
Calcium (Ca)	1.77	1.38	1.20	1.06	1.59	1.18	1.15	1.38	1.27	0.765	1.05	1.19
Chromium (Cr)	1.72	3.79	2.36	3.04	3.33	1.61	3.61	11.9	3.67	5.89	1.80	0.453
Cobalt (Co)	1.00	2.10	1.00	0.930	1.00	1.40	1.00	1.00	1.00	2.45	1.03	1.00
Copper (Cu)	0.970	1.84	0.995	0.875	1.04	1.07	1.11	0.936	1.46	1.88	1.28	1.11
Iron (Fe)	0.365	5.57	0.512	0.478	1.50	2.24	1.98	0.396	2.42	4.10	2.54	2.23
Lead (Pb)	0.632	8.48	0.600	0.625	0.625	1.76	0.865	1.00	1.07	5.06	1.12	0.810
Lithium (Li)	2.47	2.45	1.58	3.64	1.29	1.33	0.712	0.957	1.62	0.449	1.07	0.781
Magnesium (Mg)	1.83	1.50	0.990	1.28	1.73	1.40	1.32	1.60	1.41	1.25	1.25	1.47
Manganese (Mn)	0.405	4.91	0.341	0.248	1.49	2.28	2.63	0.860	1.74	4.23	5.17	0.649
Mercury (Hg)	0.500	0.500	0.139	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500
Molybdenum (Mo)	2.25	10.7	1.16	1.83	2.29	14.0	2.82	1.88	1.85	8.37	2.65	1.78
Nickel (Ni)	0.909	1.45	0.445	0.687	1.08	1.08	0.896	1.07	1.17	1.39	1.14	1.06
Potassium (K)	1.61	3.19	1.50	1.33	1.70	3.28	1.86	1.69	1.45	2.39	1.73	1.62
Selenium (Se)	5.00	6.00	5.00	5.60	5.55	10.6	5.83	5.00	6.90	1.30	0.340	0.500
Silicon (Si)	1.20	1.70	0.840	0.704	1.79	1.28	1.27	1.34	1.60	1.71	1.35	1.51
Silver (Ag)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Sodium (Na)	1.44	5.80	0.0588	1.92	1.67	6.68	4.15	2.24	1.27	6.27	0.0517	3.25
Strontium (Sr)	2.10	1.40	1.02	1.38	2.29	0.942	1.45	1.71	1.61	0.374	1.10	1.47
Thallium (Tl)	1.74	12.0	0.0153	1.82	2.09	10.0	3.08	10.0	1.20	1.10	1.00	1.00
Tin (Sn)	1.00	1.00	1.00	1.00	1.00	1.00	0.763	1.00	1.00	1.00	1.00	1.00
Titanium (Ti)	0.268	3.43	0.0720	0.245	0.322	1.19	0.270	0.160	0.100	4.07	0.720	1.01
Uranium (U)	2.39	26.9	2.14	1.12	4.61	27.0	4.18	1.70	2.08	13.7	4.03	2.14
Vanadium (V)	0.556	0.689	0.500	0.547	0.583	0.556	0.556	0.556	0.683	0.611	0.552	0.556
Zinc (Zn)	3.00	3.00	1.40	1.29	1.00	1.94	1.13	3.00	9.09	2.00	3.15	2.20

Denotes parameter with an AEMP benchmark.
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Denotes highly elevated concentration (mean concentration greater than 10 times higher than respective mean reference value).
Denotes differences in method detection limit between the indicated study area and that of the reference creeks, precluding an evaluation of magnitude of elevation; or no data available for the analyte during comparison period.

Table C.16: Dissolved Metal Concentrations at Lotic Camp Lake Tributary (CLT) Water Quality Monitoring Stations, Mary River Project CREMP, 2023

	Parameters	Units	Spring Sampling Event							Summer Sampling Event							Fall Sampling Event						
			L1-08	L1-02	L2-03	L1-09	L1-05	L0-01	K0-01	L1-08	L1-02	L2-03	L1-09	L1-05	L0-01	K0-01	L1-08	L1-02	L2-03	L1-09	L1-05	L0-01	K0-01
			17-Jul-23	16-Jul-23	17-Jul-23	16-Jul-23	16-Jul-23	16-Jul-23	16-Jul-23	30-Aug-23	24-Aug-23	24-Aug-23	24-Aug-23	24-Aug-23	24-Aug-23	24-Aug-23	14-Sep-23	17-Sep-23	17-Sep-23	17-Sep-23	17-Sep-23	17-Sep-23	16-Sep-23
Dissolved Metals	Aluminum (Al)	mg/L	0.007	0.0053	0.0204	0.007	0.0063	0.0067	0.0071	0.0322	0.0138	0.0766	0.0252	0.0218	0.0254	0.0114	0.0047	0.0026	0.0050	0.0093	0.0040	0.0036	0.0024
	Antimony (Sb)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)	mg/L	<0.00010	<0.00010	0.00011	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.000120	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.000110	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)	mg/L	0.0063	0.00603	0.00968	0.00632	0.00624	0.0067	0.00602	0.01090	0.0112	0.0131	0.01190	0.01210	0.0125	0.0113	0.0120	0.0139	0.0146	0.0136	0.0134	0.0142	0.0139
	Beryllium (Be)	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
	Bismuth (Bi)	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)	mg/L	<0.010	<0.010	0.012	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.0160	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.0140	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Calcium (Ca)	mg/L	8.07	8.84	14.4	9.3	9.21	9.84	8.49	17.1	17.0	25.0	19.1	19.4	20.0	20.1	17.8	23.0	28.6	23.8	24.0	24.6	24.3
	Chromium (Cr)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Cobalt (Co)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.000140	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.000130	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)	mg/L	0.00143	0.00132	0.00118	0.00134	0.00129	0.00127	0.00072	0.00246	0.00209	0.00125	0.00195	0.00195	0.00193	0.00131	0.00196	0.00222	0.00125	0.00182	0.00185	0.00174	0.00139
	Iron (Fe)	mg/L	<0.010	<0.010	0.066	0.016	0.013	0.03	<0.010	0.041	0.018	0.4210	0.0980	0.0940	0.0890	0.0160	<0.010	<0.010	0.0850	0.0470	0.0320	0.0230	<0.010
	Lead (Pb)	mg/L	<0.000050	<0.000050	0.000063	<0.000050	<0.000050	<0.000050	<0.000050	0.00005	<0.000050	0.000088	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)	mg/L	<0.0010	<0.0010	0.002	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.00360	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0015	0.00320	0.00210	0.00200	0.00210	0.00160
	Magnesium (Mg)	mg/L	5.1	5.8	8.91	6.17	6.15	6.64	6.28	11.30	11.40	16.8	13.0	13.2	13.6	13.6	11.6	15.3	19.5	15.7	16.0	16.5	17.0
	Manganese (Mn)	mg/L	0.00044	0.00032	0.0182	0.00144	0.00112	0.00146	0.00037	0.000860	0.000690	0.0281	0.00632	0.00545	0.0045	0.0007	0.000220	0.000240	0.0395	0.00968	0.00579	0.00354	0.000350
	Mercury (Hg)	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)	mg/L	0.000368	0.000307	0.00174	0.000414	0.000376	0.000387	0.000223	0.001040	0.000849	0.00294	0.00122	0.00117	0.001130	0.000544	0.00122	0.000943	0.00299	0.00131	0.00124	0.00113	0.000590
	Nickel (Ni)	mg/L	<0.00050	<0.00050	0.00084	<0.00050	<0.00050	0.00067	<0.00050	<0.00050	0.00067	0.00124	0.000750	0.000800	0.00085	0.00055	<0.00050	0.00076	0.00115	0.000820	0.000890	0.00097	0.000530
	Potassium (K)	mg/L	1.22	1.08	2.32	1.14	1.16	1.18	0.976	2.35	2.01	3.19	2.31	2.32	2.30	1.69	2.47	2.20	3.31	2.40	2.28	2.35	1.87
	Selenium (Se)	mg/L	<0.000050	<0.000050	0.000063	<0.000050	<0.000050	<0.000050	0.000052	0.000061	<0.000050	0.000106	0.000057	0.000065	0.000053	<0.000050	0.000083	<0.000050	0.000135	0.000067	0.000051	<0.000050	<0.000050
	Silicon (Si)	mg/L	0.615	0.532	0.506	0.56	0.558	0.574	0.397	1.00	1.04	1.120	1.090	1.100	1.140	0.940	0.93	1.30	1.38	1.30	1.31	1.33	1.080
	Silver (Ag)	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)	mg/L	0.428	0.578	4.64	0.895	0.918	1.06	0.968	0.748	1.48	10.0	3.49	3.52	3.60	2.67	0.715	2.31	11.8	5.04	5.09	5.04	4.85
	Strontium (Sr)	mg/L	0.00559	0.0046	0.0147	0.00562	0.0057	0.00645	0.00625	0.01410	0.01120	0.0272	0.0164	0.0166	0.0172	0.0139	0.0149	0.0138	0.0268	0.0220	0.0224	0.0218	0.0177
	Thallium (Tl)	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	0.000014	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	0.000012	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Tin (Sn)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)	mg/L	<0.00030	<0.00030	0.00039	<0.00030	<0.00030	<0.00030	<0.00030	0.00147	0.00046	0.00356	0.000870	0.000750	<0.00120	0.000480	<0.00030	<0.00030	<0.00030	0.000530	<0.00030	<0.00030	<0.00030
	Uranium (U)	mg/L	0.000598	0.00035	0.00627	0.000697	0.000684	0.000688	0.000254	0.00450	0.00272	0.0165	0.00511	0.00497	0.00460	0.00239	0.00615	0.00376	0.0258	0.00814	0.00833	0.00694	0.00361
	Vanadium (V)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00055	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)	mg/L	<0.0010	<0.0010	0.001	<0.0010	<0.0010	0.0027	0.0011	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0010	<0.0010	<0.0010	0.001	<0.0010	<0.0010	0.00110

Table C.17: Magnitude of Elevation in Seasonal Average Dissolved Metal Concentrations Between the Camp Lake Tributaries (CLT1 and CLT2) and Average Reference Creek Stations, Mary River Project CREMP, 2023

Parameter	Spring				Summer				Fall			
	CLT1			CLT2	CLT1			CLT2	CLT1			CLT2
	North Branch (L1-08, L1-02)	Upper Main Stem L2-03	Lower Main Stem (L1-09, L1-05, L0-01)	Station K0-01	North Branch (L1-08, L1-02)	Upper Main Stem L2-03	Lower Main Stem (L1-09, L1-05, L0-01)	Station K0-01	North Branch (L1-08, L1-02)	Upper Main Stem L2-03	Lower Main Stem (L1-09, L1-05, L0-01)	Station K0-01
Aluminum (Al)	0.422	1.40	0.457	0.487	0.229	0.314	0.215	0.114	0.317	0.434	0.489	0.208
Antimony (Sb)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Arsenic (As)	1.00	1.10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.10	1.00	1.00
Barium (Ba)	3.46	5.44	3.61	3.38	2.00	2.27	2.11	2.07	1.85	2.08	1.96	1.98
Beryllium (Be)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Bismuth (Bi)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Boron (B)	1.00	1.20	1.00	1.00	1.00	1.50	1.00	1.00	1.00	1.40	1.00	1.00
Cadmium (Cd)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Calcium (Ca)	3.13	5.32	3.49	3.14	1.68	2.30	1.92	2.01	1.67	2.34	1.98	1.99
Chromium (Cr)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Cobalt (Co)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.30	1.00	1.00
Copper (Cu)	3.99	3.42	3.77	2.09	2.37	1.24	2.03	1.47	2.16	1.29	1.86	1.44
Iron (Fe)	0.800	5.28	1.57	0.800	0.541	9.95	2.34	0.541	0.714	6.07	2.43	0.714
Lead (Pb)	1.00	1.26	1.00	1.00	0.990	0.990	0.990	0.990	1.00	1.00	1.00	1.00
Lithium (Li)	1.00	2.00	1.00	1.00	1.00	3.20	1.43	1.20	1.25	3.20	2.07	1.60
Magnesium (Mg)	3.59	5.87	4.17	4.14	1.82	2.64	2.15	2.26	1.87	2.71	2.24	2.37
Manganese (Mn)	0.652	31.2	2.30	0.635	0.964	69.1	12.8	1.12	0.460	79.0	12.7	0.700
Mercury (Hg)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Molybdenum (Mo)	3.80	19.6	4.42	2.51	2.38	7.34	2.83	1.27	2.37	6.56	2.69	1.30
Nickel (Ni)	1.00	1.68	1.11	1.00	1.03	1.91	1.38	0.957	1.12	2.05	1.60	0.946
Potassium (K)	4.57	9.22	4.61	3.88	2.92	4.88	3.19	2.40	3.07	4.35	3.08	2.46
Selenium (Se)	1.00	1.26	1.00	1.04	1.43	2.51	1.33	0.980	1.33	2.70	1.12	1.00
Silicon (Si)	1.74	1.54	1.71	1.20	0.962	0.968	1.10	0.954	1.16	1.43	1.36	1.12
Silver (Ag)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Sodium (Na)	1.40	12.9	2.66	2.69	0.628	5.64	2.00	1.51	0.795	6.20	2.66	2.55
Strontium (Sr)	2.26	6.52	2.63	2.77	1.24	2.70	1.65	1.30	1.14	2.13	1.75	1.41
Thallium (Tl)	1.00	1.00	1.00	1.00	1.10	1.00	1.00	1.00	1.10	1.00	1.00	1.00
Tin (Sn)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Titanium (Ti)	0.638	0.830	0.638	0.638	0.346	0.346	0.354	0.346	0.591	0.591	0.742	0.591
Uranium (U)	2.70	35.7	3.93	1.45	1.55	7.12	2.09	1.01	1.10	5.73	1.73	0.802
Vanadium (V)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Zinc (Zn)	1.00	1.00	1.57	1.10	0.833	0.833	0.833	0.833	1.00	1.00	1.00	1.10

Denotes slight elevation (mean concentration three to five times higher than respective mean reference value).
Denotes moderate elevation (mean concentration five to 10 times higher than respective mean reference value).
Denotes highly elevated concentration (mean concentration greater than 10 times higher than respective mean reference value).

Table C.18: Magnitude of Elevation in Seasonal Average Dissolved Metal Concentrations Between the Camp Lake Tributaries (CLT1 and CLT2) in 2023 and Reference Creeks and Mine Baseline Period (2005 to 2013)

Variable	Spring				Summer				Fall			
	CLT1			CLT2	CLT1			CLT2	CLT1			CLT2
	North Branch vs Baseline	Upper Main Stem L2-03 vs Baseline	Lower Main Stem vs Baseline	Station K0-01 vs Baseline	North Branch vs Baseline	Upper Main Stem L2-03 vs Baseline	Lower Main Stem vs Baseline	Station K0-01 vs Baseline	North Branch vs Baseline	Upper Main Stem L2-03 vs Baseline	Lower Main Stem vs Baseline	Station K0-01 vs Baseline
Aluminum (Al)	0.848	6.48	0.955	1.39	1.32	1.19	1.46	0.562	0.985	1.88	2.04	0.683
Antimony (Sb)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.500	1.00	1.00	1.00	0.625
Arsenic (As)	1.00	1.10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.10	1.00	1.00
Barium (Ba)	1.80	2.14	1.30	1.45	1.59	1.42	1.33	1.66	1.29	0.869	1.29	1.41
Beryllium (Be)	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.0115	0.200	0.200	0.200	0.0185
Bismuth (Bi)	0.167	0.100	0.100	0.132	0.167	0.100	0.167	0.115	0.167	0.100	0.167	0.132
Boron (B)	1.00	1.20	1.00	1.00	1.00	1.50	1.00	1.00	1.00	1.40	1.00	1.00
Cadmium (Cd)	0.500	0.500	0.500	0.500	0.500	0.500	0.487	0.500	0.500	0.500	0.484	0.500
Calcium (Ca)	1.84	1.23	1.18	1.10	1.54	1.10	1.15	1.39	1.26	0.645	1.04	1.13
Chromium (Cr)	4.76	5.00	4.59	5.00	5.00	5.00	1.21	5.00	4.93	5.00	1.48	5.00
Cobalt (Co)	1.00	1.00	1.00	1.00	1.00	0.937	1.00	1.00	1.00	1.26	1.00	1.00
Copper (Cu)	0.000128	1.93	0.000659	0.914	0.000169	0.000648	0.000381	1.24	0.000137	1.78	0.000499	0.587
Iron (Fe)	0.667	1.89	0.828	0.368	1.00	0.968	1.60	0.500	1.00	0.823	1.16	0.467
Lead (Pb)	1.00	1.26	1.00	1.00	1.00	1.00	1.00	0.500	1.00	1.00	1.00	0.556
Lithium (Li)	2.00	1.97	1.20	1.89	1.42	1.27	1.10	1.22	1.49	0.486	0.914	1.57
Magnesium (Mg)	1.92	1.35	1.39	1.34	1.69	1.41	1.35	1.69	1.32	0.948	1.18	1.31
Manganese (Mn)	0.410	6.43	0.608	0.123	1.46	1.94	2.81	0.618	0.660	2.81	2.42	0.317
Mercury (Hg)	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500
Molybdenum (Mo)	2.10	12.0	2.05	1.60	2.31	13.9	2.66	1.60	1.60	11.4	2.35	1.39
Nickel (Ni)	0.990	1.08	0.719	0.265	1.08	0.943	0.846	0.326	1.19	0.915	0.959	0.290
Potassium (K)	1.68	2.92	1.71	1.58	1.67	3.49	1.79	1.65	1.38	2.20	1.48	1.37
Selenium (Se)	0.500	0.630	0.000106	0.520	0.730	1.28	0.677	0.500	0.665	1.35	0.560	0.500
Silicon (Si)	1.43	0.850	1.04	1.06	1.73	1.14	1.28	1.67	1.45	1.07	1.18	4.70
Silver (Ag)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Sodium (Na)	1.52	4.56	2.30	2.19	1.60	5.60	4.11	2.28	1.48	3.51	3.30	2.69
Strontium (Sr)	2.16	1.14	0.971	1.62	2.20	0.800	1.45	1.59	1.74	0.233	0.975	1.48
Thallium (Tl)	0.870	1.00	1.00	1.00	1.10	1.00	0.930	0.174	0.957	1.00	1.00	0.0205
Tin (Sn)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.863	1.00
Titanium (Ti)	0.100	0.0390	0.0300	0.0349	0.100	0.0300	0.102	0.0391	0.100	0.0300	0.126	0.0936
Uranium (U)	2.49	28.3	2.45	2.06	5.17	27.8	4.46	2.49	1.95	15.7	3.74	2.24
Vanadium (V)	0.556	0.500	0.500	0.556	0.410	0.500	0.459	0.500	0.437	0.500	0.476	0.500
Zinc (Zn)	0.721	0.714	0.768	0.567	1.12	0.833	0.464	0.588	1.16	0.714	0.586	1.42

Denotes slight elevation (mean concentration three to five times higher than respective mean reference value).
Denotes moderate elevation (mean concentration five to 10 times higher than respective mean reference value).
Denotes highly elevated concentration (mean concentration greater than 10 times higher than respective mean reference value).
Denotes differences in method detection limit between the 2023 and baseline data, precluding an evaluation of magnitude of elevation.

Table C.18: Magnitude of Elevation in Seasonal Average Dissolved Metal Concentrations Between the Camp Lake Tributaries (CLT1 and CLT2) in 2023 and Reference Creeks and Mine Baseline Period (2005 to 2013)

Spring				Summer				Fall			
CLT1			CLT2	CLT1			CLT2	CLT1			CLT2
North Branch vs Reference Creek	Upper Main Stem L2-03 vs Reference Creek	Lower Main Stem vs Reference Creek	Station K0-01 vs Reference Creek	North Branch vs Reference Creek	Upper Main Stem L2-03 vs Reference Creek	Lower Main Stem vs Reference Creek	Station K0-01 vs Reference Creek	North Branch vs Reference Creek	Upper Main Stem L2-03 vs Reference Creek	Lower Main Stem vs Reference Creek	Station K0-01 vs Reference Creek
0.422	1.40	0.457	0.487	0.229	0.314	0.215	0.114	0.317	0.434	0.489	0.208
1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.00	1.10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.10	1.00	1.00
3.46	5.44	3.61	3.38	2.00	2.27	2.11	2.07	1.85	2.08	1.96	1.98
1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.00	1.20	1.00	1.00	1.00	1.50	1.00	1.00	1.00	1.40	1.00	1.00
1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
3.13	5.32	3.49	3.14	1.68	2.30	1.92	2.01	1.67	2.34	1.98	1.99
1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.30	1.00	1.00
3.99	3.42	3.77	2.09	2.37	1.24	2.03	1.47	2.16	1.29	1.86	1.44
0.800	5.28	1.57	0.800	0.541	9.95	2.34	0.541	0.714	6.07	2.43	0.714
1.00	1.26	1.00	1.00	0.990	0.990	0.990	0.990	1.00	1.00	1.00	1.00
1.00	2.00	1.00	1.00	1.00	3.20	1.43	1.20	1.25	3.20	2.07	1.60
3.59	5.87	4.17	4.14	1.82	2.64	2.15	2.26	1.87	2.71	2.24	2.37
0.652	31.2	2.30	0.635	0.964	69.1	12.8	1.12	0.460	79.0	12.7	0.700
1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
3.80	19.6	4.42	2.51	2.38	7.34	2.83	1.27	2.37	6.56	2.69	1.30
1.00	1.68	1.11	1.00	1.03	1.91	1.38	0.957	1.12	2.05	1.60	0.946
4.57	9.22	4.61	3.88	2.92	4.88	3.19	2.40	3.07	4.35	3.08	2.46
1.00	1.26	1.00	1.04	1.43	2.51	1.33	0.980	1.33	2.70	1.12	1.00
1.74	1.54	1.71	1.20	0.962	0.968	1.10	0.954	1.16	1.43	1.36	1.12
1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.40	12.9	2.66	2.69	0.628	5.64	2.00	1.51	0.795	6.20	2.66	2.55
2.26	6.52	2.63	2.77	1.24	2.70	1.65	1.30	1.14	2.13	1.75	1.41
1.00	1.00	1.00	1.00	1.10	1.00	1.00	1.00	1.10	1.00	1.00	1.00
1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
0.638	0.830	0.638	0.638	0.346	0.346	0.354	0.346	0.591	0.591	0.742	0.591
2.70	35.7	3.93	1.45	1.55	7.12	2.09	1.01	1.10	5.73	1.73	0.802
1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.00	1.00	1.57	1.10	0.833	0.833	0.833	0.833	1.00	1.00	1.00	1.10

Denotes slight elevation (mean concentration three to five times higher than respective mean reference value).
Denotes moderate elevation (mean concentration five to 10 times higher than respective mean reference value).
Denotes highly elevated concentration (mean concentration greater than 10 times higher than respective mean reference value).
Denotes differences in method detection limit between the 2023 and baseline data, precluding an evaluation of magnitude of elevation.

Table C.19: In Situ Water Quality Statistical Comparisons among Camp Lake Tributary 2 (CLT2) and Unnamed Reference Creek (REF-CRK) Study Areas, Mary River Project CREMP, August 2023

Metric	Overall 3-group Comparison				Pair-wise, *post hoc* comparisons[a]			
	Statistical Test[a]	Transformation	Significant Difference Between Areas?	P-value	(I) Area	(J) Area	Significant Difference Between Areas?	P-value
Water Temperature (°C)	ANOVA	log10	YES	0.001	REF-CRK Unnamed Reference Creek	CLT2 Upstream	YES	<0.001
					REF-CRK Unnamed Reference Creek	CLT2 Downstream	NO	0.643
					CLT2 Upstream	CLT2 Downstream	YES	<0.001
Dissolved Oxygen (mg/L)	ANOVA	None	YES	0.001	REF-CRK Unnamed Reference Creek	CLT2 Upstream	YES	0.031
					REF-CRK Unnamed Reference Creek	CLT2 Downstream	YES	<0.001
					CLT2 Upstream	CLT2 Downstream	YES	<0.001
Dissolved Oxygen (% saturation)	K-W	Rank	YES	0.012	REF-CRK Unnamed Reference Creek	CLT2 Upstream	NO	0.227
					REF-CRK Unnamed Reference Creek	CLT2 Downstream	YES	0.003
					CLT2 Upstream	CLT2 Downstream	NO	0.082
pH (units)	ANOVA	None	YES	0.001	REF-CRK Unnamed Reference Creek	CLT2 Upstream	YES	<0.001
					REF-CRK Unnamed Reference Creek	CLT2 Downstream	YES	<0.001
					CLT2 Upstream	CLT2 Downstream	NO	0.204
Specific Conductance (µS/cm)	K-W	Rank	YES	0.005	REF-CRK Unnamed Reference Creek	CLT2 Upstream	YES	0.033
					REF-CRK Unnamed Reference Creek	CLT2 Downstream	YES	0.001
					CLT2 Upstream	CLT2 Downstream	NO	0.287

Highlighted values indicate that the significant difference between study areas was based on test p-value less than 0.05.

[a] Statistical tests include Analysis of Variance (ANOVA) followed by Tukey's Honestly Significant Difference (HSD) post hoc tests, or Kruskal-Wallis H-test (K-W) followed by Mann-Whitney U-test (M-W).

Table C.20: ***In Situ*** **Water Quality Profile Data Collected at Camp Lake (JL0) Water Quality Monitoring Stations in Winter, Mary River Project CREMP, April 2023**

Depth (m)	Temperature (°C)					Dissolved Oxygen (mg/L)					Dissolved Oxygen (% Saturation)					pH (pH units)					Specific Conductance (µS/cm)				
	JL0-02	JL0-10	JL0-01	JL0-07	JL0-09	JL0-02	JL0-10	JL0-01	JL0-07	JL0-09	JL0-02	JL0-10	JL0-01	JL0-07	JL0-09	JL0-02	JL0-10	JL0-01	JL0-07	JL0-09	JL0-02	JL0-10	JL0-01	JL0-07	JL0-09
	6-Apr-23	6-Apr-23	5-Apr-23	5-Apr-23	5-Apr-23	6-Apr-22	7-Apr-23	7-Apr-23	7-Apr-23	7-Apr-23	6-Apr-22	7-Apr-23	7-Apr-23	7-Apr-23	7-Apr-23	6-Apr-22	7-Apr-23	7-Apr-23	7-Apr-23	7-Apr-23	6-Apr-22	7-Apr-23	7-Apr-23	7-Apr-23	7-Apr-23
1.0	-	-	-	0.8	-	-	-	-	13.95	-	-	-	-	95.9	-	-	-	-	8.11	-	-	-	-	178.0	-
2.0	1.0	0.5	0.2	0.2	0.4	13.18	13.75	14.37	13.79	13.47	94.1	96.6	99.9	95.8	94.4	7.83	7.88	8.06	8.06	7.99	183.7	180.5	183.1	176.1	182.2
3.0	1.0	0.9	0.9	0.7	-	13.47	13.68	14.13	13.75	-	96.1	97.1	100.4	97.3	-	7.87	7.89	8.06	8.05	-	180.8	177.8	182.1	172.1	-
4.0	1.2	1.3	1.2	1.3	1.2	13.47	13.51	13.95	13.53	13.5	96.7	97.3	100.0	96.9	96.6	7.87	7.89	8.04	8.04	7.96	179.3	175.2	176.6	170.8	174.6
5.0	1.4	1.4	1.4	1.5	1.5	13.45	13.43	13.73	13.40	13.56	96.8	96.9	98.7	96.4	96.7	7.88	7.89	8.02	8.04	7.96	177.9	174.6	175.8	169.6	174.0
6.0	1.5	1.5	1.5	1.5	-	13.35	13.32	13.63	13.33	-	96.4	96.3	98.1	96.2	-	7.88	7.89	8.02	8.03	-	176.3	174.2	175.2	168.7	-
7.0	1.5	1.6	1.5	1.7	1.6	13.23	13.27	13.51	13.23	13.2	95.7	96.1	97.4	95.7	95.3	7.87	7.89	8.01	8.03	7.94	175.1	173.7	174.6	167.7	172.6
8.0	1.6	1.6	1.6	1.7	1.7	13.15	13.22	13.45	13.15	13.1	95.3	95.9	97.1	95.3	94.9	7.87	7.88	8.01	8.03	7.94	174.1	173.3	173.7	167.4	171.4
9.0	1.6	1.7	1.7	-	-	13.08	13.15	13.35	-	-	94.9	95.6	96.7	-	-	7.87	7.88	8	-	-	173.8	173.0	172.4	-	-
10.0	1.7	1.7	1.7	1.8	1.8	12.99	13.00	13.25	12.99	12.98	94.4	94.5	96.1	94.4	94.2	7.86	7.86	8	8.02	7.95	173.0	172.9	171.4	166.6	170.3
11.0	1.7	-	1.8	1.9	1.8	12.96	-	13.18	12.95	12.88	94.3	-	98.8	94.2	95.6	7.86	-	7.99	8.02	7.93	172.7	-	170.4	166.6	169.6
12.0	-	-	1.9	1.9	1.9	-	-	13.01	12.90	12.75	-	-	94.8	94.0	92.8	-	-	7.98	8.02	7.92	-	-	169.4	165.6	168.7
13.0	-	-	1.9	2.0	2.0	-	-	12.88	12.86	12.59	-	-	94.0	93.8	91.8	-	-	7.97	8.01	7.92	-	-	168.5	165.2	168.1
14.0	-	-	2.0	-	2.0	-	-	12.73	-	12.5	-	-	93.0	-	91.2	-	-	7.95	-	7.96	-	-	167.8	-	167.2
15.0	-	-	-	2.1	2.1	-	-	-	12.60	12.39	-	-	-	92.2	90.6	-	-	-	7.95	7.89	-	-	-	164.9	166.6
16.0	-	-	-	2.1	-	-	-	-	12.44	-	-	-	-	91.1	-	-	-	-	7.92	-	-	-	-	164.8	-
17.0	-	-	-	2.1	-	-	-	-	12.22	-	-	-	-	89.6	-	-	-	-	7.88	-	-	-	-	164.8	-
18.0	-	-	-	2.2	-	-	-	-	11.93	-	-	-	-	87.7	-	-	-	-	7.84	-	-	-	-	165.1	-
19.0	-	-	-	2.2	-	-	-	-	11.64	-	-	-	-	85.8	-	-	-	-	7.79	-	-	-	-	165.3	-
20.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
21.0	-	-	-	2.3	-	-	-	-	10.82	-	-	-	-	79.8	-	-	-	-	7.71	-	-	-	-	165.6	-
22.0	-	-	-	2.3	-	-	-	-	10.38	-	-	-	-	76.6	-	-	-	-	7.68	-	-	-	-	166.1	-
23.0	-	-	-	2.3	-	-	-	-	10.21	-	-	-	-	75.2	-	-	-	-	7.66	-	-	-	-	166.4	-
24.0	-	-	-	2.4	-	-	-	-	9.95	-	-	-	-	73.5	-	-	-	-	7.64	-	-	-	-	167.1	-
25.0	-	-	-	2.4	-	-	-	-	8.98	-	-	-	-	66.3	-	-	-	-	7.57	-	-	-	-	168.8	-
26.0	-	-	-	2.4	-	-	-	-	8.93	-	-	-	-	66.0	-	-	-	-	7.56	-	-	-	-	168.7	-
27.0	-	-	-	2.5	-	-	-	-	8.56	-	-	-	-	63.8	-	-	-	-	7.52	-	-	-	-	170.2	-
28.0	-	-	-	2.6	-	-	-	-	7.98	-	-	-	-	56.8	-	-	-	-	7.46	-	-	-	-	173.7	-
29.0	-	-	-	2.7	-	-	-	-	6.68	-	-	-	-	50.3	-	-	-	-	7.42	-	-	-	-	175.6	-
30.0	-	-	-	2.7	-	-	-	-	6.06	-	-	-	-	45.6	-	-	-	-	7.40	-	-	-	-	176.9	-
31.0	-	-	-	2.8	-	-	-	-	5.48	-	-	-	-	41.3	-	-	-	-	7.37	-	-	-	-	180.4	-

Notes: "-" = data not available. The total depth of the water column at each sampling station was not recorded but deepest measurements are within 1 m of lake bottom.

Table C.21: ***In Situ*** **Water Quality Profile Data Collected at Camp Lake (JL0) Water Quality Monitoring Stations in Summer, Mary River Project CREMP, July 2023**

Depth (m)	Temperature (°C)					Dissolved Oxygen (mg/L)					Dissolved Oxygen (% Saturation)					pH (pH units)					Specific Conductance (µS/cm)				
	JL0-02	JL0-10	JL0-01	JL0-07	JL0-09	JL0-02	JL0-10	JL0-01	JL0-07	JL0-09	JL0-02	JL0-10	JL0-01	JL0-07	JL0-09	JL0-02	JL0-10	JL0-01	JL0-07	JL0-09	JL0-02	JL0-10	JL0-01	JL0-07	JL0-09
	1-Aug-23	1-Aug-23	1-Aug-23	1-Aug-23	1-Aug-23	1-Aug-23	1-Aug-23	1-Aug-23	1-Aug-23	1-Aug-23	1-Aug-23	1-Aug-23	1-Aug-23	1-Aug-23	1-Aug-23	1-Aug-23	1-Aug-23	1-Aug-23	1-Aug-23	1-Aug-23	1-Aug-23	1-Aug-23	1-Aug-23	1-Aug-23	1-Aug-23	1-Aug-23
1.0	10.9	10.8	11.6	11.0	10.6	11.56	11.53	11.59	11.40	11.87	109.0	105.9	108.7	105.4	108.5	8.06	7.95	8.50	8.11	8.05	143.1	142.8	142.6	142.8	142.4
2.0	11.9	10.7	11.0	10.4	10.3	11.58	10.65	11.71	11.72	11.91	109.0	106.8	106.7	106.8	108.1	8.06	8.01	8.05	8.06	8.06	143.3	142.8	143.0	142.5	142.5
3.0	-	9.8	9.3	9.7	-	-	11.90	12.02	11.91	-	-	106.2	106.6	106.7	-	-	8.02	8.09	8.04	-	-	144.3	142.4	142.2	-
4.0	10.0	8.7	8.1	8.6	7.7	11.86	11.99	12.20	12.15	12.25	107.2	104.3	105.0	105.8	104.6	8.07	8.01	8.05	8.02	8.05	142.8	142.9	142.5	143.4	142.5
5.0	8.1	7.1	7.1	7.2	6.7	12.23	12.27	12.36	12.28	12.41	104.7	103.0	104.0	103.3	102.9	8.07	7.99	7.98	8.01	8.02	143.2	142.2	142.2	142.9	143.3
6.0	6.9	6.6	6.5	6.4	6.0	12.31	12.28	12.40	12.41	12.33	102.9	101.7	102.8	101.7	100.4	8.01	7.94	7.95	7.96	7.96	142.7	142.3	142.2	142.6	142.5
7.0	6.4	6.1	6.2	5.7	-	12.32	12.24	12.41	12.31	-	101.7	100.4	101.6	99.7	-	7.97	7.90	7.93	7.90	-	142.3	142.2	142.0	142.3	-
8.0	6.2	-	5.8	5.5	5.7	12.28	-	12.33	12.25	12.27	100.6	-	100.1	98.7	99.6	7.93	-	7.90	7.87	7.90	142.5	-	142.5	142.6	142.3
9.0	5.7	-	5.6	5.4	5.6	12.21	-	12.26	12.20	12.26	99.0	-	99.0	98.0	99.2	7.90	-	7.87	7.85	7.88	142.5	-	142.4	142.3	142.2
10.0	-	-	5.4	5.2	-	-	-	12.20	12.18	-	-	-	98.2	97.6	-	-	-	7.84	7.82	-	-	-	142.3	142.4	-
11.0	-	-	5.4	5.1	5.3	-	-	12.18	12.17	12.20	-	-	97.8	97.3	97.9	-	-	7.83	7.81	7.86	-	-	142.4	142.4	142.5
12.0	-	-	5.2	5.0	5.1	-	-	12.16	12.16	12.18	-	-	97.3	96.9	97.4	-	-	7.81	7.80	7.84	-	-	142.4	142.4	142.4
13.0	-	-	5.1	4.9	5.0	-	-	12.11	12.11	12.14	-	-	96.7	96.4	96.9	-	-	7.80	7.79	7.83	-	-	142.4	142.4	142.4
14.0	-	-	4.9	-	-	-	-	12.08	-	-	-	-	96.2	-	-	-	-	7.79	-	-	-	-	142.4	-	-
15.0	-	-	4.9	4.8	-	-	-	12.06	12.09	-	-	-	95.6	95.8	-	-	-	7.78	7.77	-	-	-	142.5	142.4	-
16.0	-	-	-	4.8	-	-	-	-	12.09	-	-	-	-	95.9	-	-	-	-	7.63	-	-	-	-	142.4	-
17.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
18.0	-	-	-	4.7	-	-	-	-	12.05	-	-	-	-	95.3	-	-	-	-	7.56	-	-	-	-	142.4	-
19.0	-	-	-	4.7	-	-	-	-	12.03	-	-	-	-	95.1	-	-	-	-	7.53	-	-	-	-	142.4	-
20.0	-	-	-	4.7	-	-	-	-	12.02	-	-	-	-	95.0	-	-	-	-	7.51	-	-	-	-	142.5	-
21.0	-	-	-	4.6	-	-	-	-	12.00	-	-	-	-	94.8	-	-	-	-	7.57	-	-	-	-	142.5	-
22.0	-	-	-	4.6	-	-	-	-	11.98	-	-	-	-	94.6	-	-	-	-	7.49	-	-	-	-	142.5	-
23.0	-	-	-	4.6	-	-	-	-	11.97	-	-	-	-	94.5	-	-	-	-	7.49	-	-	-	-	142.5	-
24.0	-	-	-	4.6	-	-	-	-	11.96	-	-	-	-	94.3	-	-	-	-	7.48	-	-	-	-	142.6	-
25.0	-	-	-	4.6	-	-	-	-	11.94	-	-	-	-	94.2	-	-	-	-	7.48	-	-	-	-	142.6	-
26.0	-	-	-	4.6	-	-	-	-	11.93	-	-	-	-	94.1	-	-	-	-	7.48	-	-	-	-	142.6	-
27.0	-	-	-	4.6	-	-	-	-	11.92	-	-	-	-	94.1	-	-	-	-	7.47	-	-	-	-	142.6	-
28.0	-	-	-	4.6	-	-	-	-	11.91	-	-	-	-	93.9	-	-	-	-	7.48	-	-	-	-	142.9	-
29.0	-	-	-	4.6	-	-	-	-	11.89	-	-	-	-	93.7	-	-	-	-	7.46	-	-	-	-	142.6	-
30.0	-	-	-	4.5	-	-	-	-	11.85	-	-	-	-	93.1	-	-	-	-	7.46	-	-	-	-	142.8	-
31.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes: "-" = data not available. The total depth of the water column at each sampling station was not recorded but deepest measurements are within 1 m of lake bottom.

Table C.22: ***In Situ*** **Water Quality Profile Data Collected at Camp Lake (JL0) Water Quality Monitoring Stations in Fall, Mary River Project CREMP, August 2023**

Depth (m)	Temperature (°C)					Dissolved Oxygen (mg/L)					Dissolved Oxygen (% Saturation)					pH (pH units)					Specific Conductance (µS/cm)				
	JL0-02	JL0-10	JL0-01	JL0-07	JL0-09	JL0-02	JL0-10	JL0-01	JL0-07	JL0-09	JL0-02	JL0-10	JL0-01	JL0-07	JL0-09	JL0-02	JL0-10	JL0-01	JL0-07	JL0-09	JL0-02	JL0-10	JL0-01	JL0-07	JL0-09
	13-Sep-23	16-Sep-23	16-Sep-23	14-Sep-23	14-Sep-23	13-Sep-23	16-Sep-23	16-Sep-23	14-Sep-23	14-Sep-23	13-Sep-23	16-Sep-23	16-Sep-23	14-Sep-23	14-Sep-23	13-Sep-23	16-Sep-23	16-Sep-23	14-Sep-23	14-Sep-23	13-Sep-23	16-Sep-23	16-Sep-23	14-Sep-23	14-Sep-23
1.0	4.6	4.27	4.3	4.4	4.4	11.95	12.59	12.38	13.12	12.80	94.7	98.4	97.0	103.0	100.6	8.11	7.89	7.58	7.84	7.79	143.1	143.7	143.1	143.1	143.0
2.0	-	4.2	4.3	4.4	-	-	12.55	12.41	13.12	-	-	98.2	97.2	103.9	-	-	7.90	7.63	7.86		-	143.7	143.1	143.1	-
3.0	4.5	4.2	4.3	-	4.4	12.07	12.53	12.42	-	12.93	95.5	98.0	97.4	-	101.5	8.02	7.91	7.65	-	7.86	143.1	143.8	143.1	-	143.1
4.0	4.5	4.2	4.3	4.4	-	12.09	12.52	12.43	13.11	-	95.6	98.0	97.4	102.9	-	8.00	7.92	7.69	7.86		143.2	143.8	143.1	143.1	-
5.0	-	4.2	4.3	-	4.4	-	12.52	12.44	-	12.97	-	97.9	97.4	-	101.8	-	7.92	7.73	-	7.83	-	143.8	143.2	-	143.1
6.0	4.5	4.2	4.3	4.4	4.4	12.11	12.51	12.43	13.10	12.87	95.8	97.8	97.4	102.7	101.8	7.98	7.92	7.77	7.88	7.80	143.2	143.9	143.1	143.2	143.1
7.0	-	4.2	4.3	-	-	-	12.50	12.43	-	-	-	97.8	97.4	-	-	-	7.93	7.79	-		-	143.9	143.2	-	-
8.0	4.5	4.2	4.3	4.4	4.4	12.11	12.49	12.43	13.22	12.99	95.8	97.7	97.4	102.7	101.9	7.95	7.93	7.81	7.88	7.73	143.2	144.1	143.2	143.2	143.1
9.0	4.5	-	4.3		4.4	12.11	-	12.43	-	12.97	95.8	-	97.4	-	101.9	7.94	-	7.82	-	7.73	143.2	-	143.2	-	143.1
10.0	4.5	-	4.3	4.4	-	12.12	-	12.42	13.08	-	95.8	-	97.3	102.6	-	7.93	-	7.84	7.88		143.2	-	143.2	143.2	-
11.0	-	-	4.3	-	4.4	-	-	12.42	-	12.99	-	-	97.3	-	101.9	-	-	7.84	-	7.74	-	-	143.2	-	143.1
12.0	-	-	4.3	-	4.4	-	-	12.41	-	12.99	-	-	97.2	-	101.9	-	-	7.85	-	7.75	-	-	143.2	-	143.1
13.0	-	-	4.3	4.4	4.4	-	-	12.41	13.22	12.99	-	-	97.2	102.6	101.9	-	-	7.86	7.81	7.76	-	-	143.2	143.2	143.1
14.0	-	-	4.3	-	-	-	-	12.40	-	-	-	-	97.2	-	-	-	-	7.87	-	-	-	-	143.2	-	-
15.0	-	-	-	4.4	-	-	-	-	13.08	-	-	-	-	102.5	-	-	-	-	7.88	-	-	-	-	143.2	-
16.0	-	-	-	4.4	-	-	-	-	13.02	-	-	-	-	102.5	-	-	-	-	7.88	-	-	-	-	143.2	-
17.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
18.0	-	-	-	4.4	-	-	-	-	13.07	-	-	-	-	102.4	-	-	-	-	7.87	-	-	-	-	143.2	-
19.0	-	-	-	4.4	-	-	-	-	13.06	-	-	-	-	102.4	-	-	-	-	7.86	-	-	-	-	143.2	-
20.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
21.0	-	-	-	4.4	-	-	-	-	13.04	-	-	-	-	102.2	-	-	-	-	7.87	-	-	-	-	143.2	-
22.0	-	-	-	4.4	-	-	-	-	13.03	-	-	-	-	102.1	-	-	-	-	7.88	-	-	-	-	143.2	-
23.0	-	-	-	4.4	-	-	-	-	13.04	-	-	-	-	102.6	-	-	-	-	7.79	-	-	-	-	143.2	-
24.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
25.0	-	-	-	4.4	-	-	-	-	13.01	-	-	-	-	101.9	-	-	-	-	7.80	-	-	-	-	143.2	-
26.0	-	-	-	4.4	-	-	-	-	13.00	-	-	-	-	101.3	-	-	-	-	7.85	-	-	-	-	143.2	-
27.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
28.0	-	-	-	4.4	-	-	-	-	13.01	-	-	-	-	101.6	-	-	-	-	7.81	-	-	-	-	143.1	-
29.0	-	-	-	4.4	-	-	-	-	13.03	-	-	-	-	101.9	-	-	-	-	7.81	-	-	-	-	143.2	-
30.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31.0	-	-	-	4.4	-	-	-	-	13.02	-	-	-	-	101.6	-	-	-	-	7.88	-	-	-	-	143.2	-
32.0	-	-	-	4.4	-	-	-	-	13.03	-	-	-	-	101.4	-	-	-	-	7.85	-	-	-	-	143.1	-

Notes: "-" = data not available. The total depth of the water column at each sampling station was not recorded but deepest measurements are within 1 m of lake bottom.

Table C.23: Sampling Depth, Water Clarity Measures, and Surface and Bottom *In Situ* Water Quality Measures Collected at Camp Lake (JL0) Benthic Invertebrate Community Stations, Mary River Project CREMP, August 2023

Categorization & Replicate ID		Date Sampled	Station Depth (m)	Secchi Depth (m)	Colour/ Clarity	Depth Sampled	Temperature (°C)	Dissolved Oxygen		pH (units)	Specific Conductance (µS/cm)	Turbidity (NTU)
								(mg/L)	(% saturation)			
Littoral (Shallow) Stations	JL0-02	18-Aug-23	10.0	-	Dark Greenish Blue	Surface	8.4	11.49	100.6	7.87	143.4	0.66
						Bottom	8.3	11.45	100.0	7.87	143.3	0.63
	JL0-21	19-Aug-23	9.0	-	Blueish Green	Surface	8.4	10.79	95.1	7.95	143.6	0.87
						Bottom	8.4	10.75	94.8	7.95	143.7	1.13
	JL0-20	20-Aug-23	-	-	Dark Greenish Blue	Surface	-	-	-	-	-	-
						Bottom	-	-	-	-	-	-
	JL0-19	20-Aug-23	-	-	Dark Greenish Blue	Surface	-	-	-	-	-	-
						Bottom	-	-	-	-	-	-
	JL0-18	19-Aug-23	12.0	-	Deep Blueish Green	Surface	8.4	10.78	95.1	7.92	143.2	0.74
						Bottom	8.4	10.76	95.0	7.94	143.3	0.79
Profundal (Deep) Stations	JL0-01	18-Aug-23	17.0	-	Dark Greenish Blue	Surface	8.6	11.45	100.8	7.62	143.2	0.65
						Bottom	8.0	11.46	99.3	7.63	142.9	0.64
	JL0-07	19-Aug-23	31.5	4.00	Dark Greenish Blue	Surface	8.5	10.53	93.9	7.95	143.1	-
						Bottom	8.4	10.60	93.8	7.65	143.3	-
	JL0-16	18-Aug-23	14.5	-	Dark Greenish Blue	Surface	9.0	11.24	99.6	7.79	143.7	0.99
						Bottom	9.0	11.33	100.4	7.76	143.7	0.67
	JL0-11	21-Aug-23	28.0	-	Dark Greenish Blue	Surface	8.4	11.24	99.0	7.90	142.9	0.60
						Bottom	8.3	11.08	97.8	7.55	143.3	0.72
	JL0-12	18-Aug-23	15.0	-	Dark Greenish Blue	Surface	8.7	11.45	100.7	7.90	143.1	0.62
						Bottom	8.6	11.39	100.2	7.91	143.1	0.63

Note: "-" indicate data not available. Windy conditions prohibited the effective use of secchi discs at most sampling stations

Table C.24: Statistical Comparison of Bottom *In Situ* Water Quality Between Camp Lake (JL0) Littoral and Profundal Stations, Mary River Project CREMP, August 2023

Parameter	Statistical Test Results				Summary Statistics						
	Statistical Test	Transformation	Significant Difference Between Areas?	P-value	Lake Zone	Sample Size	Mean	Standard Deviation	Standard Error	Minimum	Maximum
Secchi Depth (m)	-	-	-	-	Littoral	-	-	-	-	-	-
					Profundal	1	4.00	-	-	4.00	4.00
Temperature (˚C)	tequal	None	NO	0.690	Littoral	3	8.37	0.0577	0.0333	8.30	8.40
					Profundal	5	8.46	0.371	0.166	8.00	9.00
Dissolved Oxygen (mg/L)	tequal	None	NO	0.516	Littoral	3	11.0	0.401	0.232	10.8	11.4
					Profundal	5	11.2	0.350	0.157	10.6	11.5
Dissolved Oxygen (% saturation)	tequal	None	NO	0.437	Littoral	3	96.6	2.95	1.70	94.8	100
					Profundal	5	98.3	2.72	1.21	93.8	100
pH (units)	tequal	None	YES	0.041	Littoral	3	7.92	0.0436	0.0252	7.87	7.95
					Profundal	5	7.70	0.139	0.0623	7.55	7.91
Specific Conductance (µS/cm)	tequal	None	NO	0.424	Littoral	3	143	0.231	0.133	143	144
					Profundal	5	143	0.297	0.133	143	144

Shaded values indicate significant difference between study areas based on test p-value less than 0.05.

Notes: "-" = no data."tequal" = Student's t-test assuming equal variance.

Table C.25: Statistical Comparison of Bottom *In Situ* Water Quality Between Camp Lake (JL0) and Reference Lake 3 (REF3) Stations Collected at Littoral and Profundal Depths, Mary River Project CREMP, August 2023

Lake Zone	Parameter	Statistical Test Results				Summary Statistics						
		Statistical Test	Transformation	Significant Difference Between Areas?	P-value	Study Lake	Sample Size (n)	Mean	Standard Deviation	Standard Error	Minimum	Maximum
Littoral (Shallow) Stations	Station Depth (m)	tequal	None	NO	0.802	Reference	5	9.99	1.88	0.842	8.5	13.1
						Camp	3	10.3	1.53	0.882	9	12
	Secchi Depth (m)	-	-	-	-	Reference	2	5.97	0.364	0.258	5.71	6.22
						Camp	-	-	-	-	-	-
	Temperature (˚C)	tequal	None	NO	0.110	Reference	5	7.66	0.631	0.282	7.2	8.4
						Camp	3	8.37	0.0577	0.0333	8.3	8.4
	Dissolved Oxygen (mg/L)	tequal	None	NO	0.119	Reference	5	11.3	0.103	0.046	11.2	11.4
						Camp	3	11	0.401	0.232	10.8	11.4
	Dissolved Oxygen (% saturation)	tequal	None	NO	0.648	Reference	5	97.2	0.597	0.267	96.6	98.1
						Camp	3	96.6	2.95	1.7	94.8	100
	pH (units)	tequal	None	YES	0.001	Reference	5	7.64	0.054	0.0242	7.56	7.7
						Camp	3	7.92	0.0436	0.0252	7.87	7.95
	Specific Conductance (µS/cm)	tequal	None	YES	0.001	Reference	5	72.8	0.0837	0.0374	72.7	72.9
						Camp	3	143	0.231	0.133	143	144
Profundal (Deep) Stations	Station Depth (m)	tequal	None	NO	0.758	Reference	5	20	2.3	1.03	17.4	23.6
						Camp	5	21.2	7.96	3.56	14.5	31.5
	Secchi Depth (m)	-	-	-	-	Reference	-	-	-	-	-	-
						Camp	1	4	-	-	4	4
	Temperature (˚C)	tequal	None	YES	0.001	Reference	5	7.14	0.0894	0.04	7	7.2
						Camp	5	8.46	0.371	0.166	8	9
	Dissolved Oxygen (mg/L)	tequal	None	NO	0.430	Reference	5	11.3	0.0568	0.0254	11.2	11.4
						Camp	5	11.2	0.35	0.157	10.6	11.5
	Dissolved Oxygen (% saturation)	tequal	None	NO	0.158	Reference	5	96.3	0.935	0.418	95.1	97.3
						Camp	5	98.3	2.72	1.21	93.8	100
	pH (units)	tequal	None	NO	0.131	Reference	5	7.53	0.175	0.0781	7.24	7.66
						Camp	5	7.7	0.139	0.0623	7.55	7.91
	Specific Conductance (µS/cm)	tequal	None	YES	0.001	Reference	5	73	0.192	0.086	72.8	73.3
						Camp	5	143	0.297	0.133	143	144

Highlighted values indicate significant difference between study areas based on test p-value less than 0.05.

Notes: "-" = no data. "tequal" = Student's t-test assuming equal variance.

Table C.26: Water Chemistry at Camp Lake (JL0) Water Quality Monitoring Stations, Mary River Project CREMP, 2023

	Parameters	Units	Water Quality Guideline (WQG)[a]	AEMP Benchmark[b]	Winter Sampling Event										Spring Sampling Event	Summer Sampling Event					
					JL0-02	JL0-02	JL0-10	JL0-10	JL0-01	JL0-01	JL0-07	JL0-07	JL0-09	JL0-09	J0-01	JL0-02	JL0-02	JL0-10	JL0-10	JL0-01	JL0-01
					bottom	surface	bottom	surface	bottom	surface	bottom	surface	bottom	surface	outlet	bottom	surface	bottom	surface	bottom	surface
					06-Apr-23	06-Apr-23	06-Apr-23	06-Apr-23	05-Apr-23	05-Apr-23	05-Apr-23	05-Apr-23	05-Apr-23	05-Apr-23	17-Jul-23	01-Aug-23	01-Aug-23	01-Aug-23	01-Aug-23	01-Aug-23	01-Aug-23
Conventionals	Conductivity (lab)	µmho/cm	-	-	170	180	173	178	168	178	175	172	164	182	137	151	152	151	151	154	152
	pH (lab)	pH	6.5 - 9.0	-	7.79	7.78	7.86	7.86	7.79	7.94	7.38	7.93	7.82	7.83	7.69	7.81	7.93	7.82	7.81	7.78	7.93
	Hardness (as $CaCO_3$)	mg/L	-	-	80.1	84.6	82	81.7	78.8	84.6	80.8	83.8	75.6	82.8	64.4	70	70.2	70.7	71.1	71.3	70.9
	Total Suspended Solids (TSS)	mg/L	-	-	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	2.1	<1.4	<1.3	<1.3	<1.0	<1.3	<1.3
	Total Dissolved Solids (TDS)	mg/L	-	-	84	72	132	154	92	102	100	100	95	108	86	78	80	63	77	76	82
	Turbidity	NTU	-	-	0.1	0.13	0.22	0.15	0.46	0.23	0.46	0.15	0.21	0.16	2.58	1.63	1.51	1.49	1.27	2.18	1.54
	Alkalinity (as $CaCO_3$)	mg/L	-	-	78.6	83.1	76.2	81.7	74.9	80.4	75.8	77.4	73.5	81.1	73.5	82.3	84.6	82.1	79.0	79.3	81.8
Nutrients and Organics	Total Ammonia	mg/L	-	0.855	0.023	0.048	0.0293	0.033	0.0228	0.0343	0.0318	0.027	0.0172	0.023	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Nitrate	mg/L	3	3	<0.020	<0.020	<0.020	<0.020	0.026	0.028	0.117	<0.020	0.061	<0.020	0.025	0.026	0.021	0.024	<0.020	0.031	0.021
	Nitrite	mg/L	0.06	0.06	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Total Kjeldahl Nitrogen (TKN)	mg/L	-	-	0.113	0.170	0.133	0.146	0.119	0.131	0.121	0.138	0.122	0.154	0.088	0.085	0.082	0.107	0.159	0.074	0.090
	Dissolved Organic Carbon	mg/L	-	-	1.74	1.81	1.48	1.80	1.53	1.78	1.36	1.74	1.60	1.52	1.93	2.01	2.05	2.09	1.67	1.82	2.20
	Total Organic Carbon	mg/L	-	-	1.66	1.97	1.64	1.82	1.46	1.71	1.40	1.62	1.60	1.71	1.69	2.04	1.90	1.92	1.97	1.82	1.95
	Total Phosphorus	mg/L	0.020[α]	-	0.0021	0.004	0.0023	0.0025	0.0072	<0.0020	0.0027	<0.0020	<0.0020	<0.0020	0.0052	<0.0020	0.0042	0.0058	0.0043	0.003	0.0031
	Phenols	mg/L	0.004[α]	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Anions	Bromide (Br)	mg/L	-	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
	Chloride (Cl)	mg/L	120	120	5.26	5.88	5.51	5.78	5.29	5.58	7.85	5.38	5.53	5.48	3.93	4.30	4.26	4.30	4.31	4.35	4.30
	Sulphate (SO_4)	mg/L	218[β]	218	5.25	5.89	5.58	5.78	5.31	6.20	5.35	5.37	5.48	5.57	3.73	4.20	4.20	4.20	4.25	4.20	4.20
Total Metals	Aluminum (Al)	mg/L	0.100	0.100	0.0031	0.003	0.0030	0.0038	0.0101	0.0031	0.0036	0.004	<0.0030	0.0040	0.051	0.0263	0.0196	0.0225	0.0233	0.0234	0.0193
	Antimony (Sb)	mg/L	0.020[α]	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)	mg/L	0.005	0.005	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.0001	0.00017	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)	mg/L	-	-	0.00843	0.00916	0.0085	0.00922	0.00833	0.00892	0.00870	0.00851	0.00800	0.00877	0.00739	0.00743	0.00736	0.00734	0.00733	0.00733	0.00739
	Beryllium (Be)	mg/L	0.011[α]	-	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
	Bismuth (Bi)	mg/L	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)	mg/L	1.5	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)	mg/L	0.00012	0.0001	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.0000051	0.0000051	0.0000054	<0.0000050	0.000005	0.0000065
	Calcium (Ca)	mg/L	-	-	15.6	16.4	15.3	16.3	14.6	16.0	15.6	15.9	15.0	15.6	12.4	13.3	13.6	13.3	13.3	13.3	13.4
	Chromium (Cr)	mg/L	0.001	0.003	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Cobalt (Co)	mg/L	0.0009[α]	0.004	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)	mg/L	0.002	0.004	0.00130	0.00115	0.00115	0.00115	0.00110	0.00111	0.00106	0.00118	0.00090	0.00144	0.00094	0.00119	0.00106	0.00122	0.00110	0.00145	0.00100
	Iron (Fe)	mg/L	0.300	0.300	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.072	0.04	0.034	0.035	0.034	0.038	0.031
	Lead (Pb)	mg/L	0.001	0.001	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	0.000090	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)	mg/L	-	-	<0.0010	<0.0010	<0.0010	0.0011	<0.0010	0.0011	<0.0010	<0.0010	0.001	0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Magnesium (Mg)	mg/L	-	-	10.2	11.0	10.3	10.7	10.0	10.7	10.2	10.4	9.5	10.8	7.88	8.78	8.72	8.63	8.64	8.57	8.62
	Manganese (Mn)	mg/L	0.935[β]	-	0.000650	0.000560	0.0004	0.000560	0.000920	0.000280	0.02730	0.000270	<0.00010	0.000280	0.00488	0.00539	0.00493	0.00529	0.00500	0.00556	0.00474
	Mercury (Hg)	mg/L	0.000026	-	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)	mg/L	0.073	-	0.000475	0.000504	0.000478	0.000493	0.000443	0.000503	0.000414	0.000511	0.000445	0.000472	0.000407	0.000402	0.000408	0.000400	0.000399	0.000414	0.000400
	Nickel (Ni)	mg/L	0.025	0.025	0.00072	0.00077	0.00073	0.00076	0.00070	0.00076	0.00083	0.00071	0.00066	0.00084	0.00081	0.00070	0.00070	0.00071	0.00063	0.00070	0.00066
	Potassium (K)	mg/L	-	-	1.46	1.65	1.51	1.64	1.46	1.64	1.43	1.54	1.42	1.57	1.29	1.34	1.34	1.33	1.33	1.33	1.33
	Selenium (Se)	mg/L	0.001	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Silicon (Si)	mg/L	-	-	0.40	0.40	0.37	0.40	0.42	0.38	1.63	0.36	0.41	0.40	0.50	0.50	0.48	0.48	0.47	0.51	0.45
	Silver (Ag)	mg/L	0.00025	0.0001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)	mg/L	-	-	2.25	2.50	2.33	2.52	2.23	2.46	3.42	2.42	2.22	2.49	1.82	2.06	2.04	2.02	2.02	2.02	2.02
	Strontium (Sr)	mg/L	-	-	0.0127	0.0136	0.0132	0.0135	0.0124	0.0134	0.0142	0.0134	0.0124	0.0134	0.0103	0.0108	0.0111	0.0109	0.0108	0.0107	0.0108
	Thallium (Tl)	mg/L	0.0008	0.0008	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Tin (Sn)	mg/L	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)	mg/L	-	-	<0.00030	<0.00030	<0.00030	<0.00030	0.00056	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	0.00202	0.00104	0.00087	0.00094	<0.00090	0.00112	0.00085
	Uranium (U)	mg/L	0.015	-	0.00163	0.00181	0.00166	0.00176	0.00160	0.00175	0.001190	0.00168	0.00162	0.00177	0.00129	0.00131	0.00133	0.00132	0.00134	0.00130	0.00130
	Vanadium (V)	mg/L	0.006[α]	0.006	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)	mg/L	0.030	0.030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030

Indicates parameter concentration above applicable Water Quality Guideline.

BOLD Indicates parameter concentration above the AEMP benchmark.

Note: "-" indicates no WQG benchmark applicable.

[a] Canadian Water Quality Guideline for the protection of aquatic life (CCME 1987, 1999) except those indicated by α (Ontario Provincial Water Quality Objective [PWQO]; OMOE 1994) and β (British Columbia Water Quality Guideline [BCWQG]; BCMOE 2013). See Table 2.2 for information regarding WQG criteria.

[b] AEMP Water Quality Benchmarks developed by Intrinsik (2013) using baseline water quality data specific to the Camp Lake system.

Table C.26: Water Chemistry at Camp Lake (JL0) Water Quality Monitoring Stations, Mary River Project CREMP, 2023

	Parameters	Units	Water Quality Guideline (WQG)[a]	AEMP Benchmark[b]	Summer Sampling Event					Fall Sampling Event									
					JL0-07	JL0-07	JL0-09	JL0-09	J0-01	JL0-02	JL0-02	JL0-10	JL0-10	JL0-01	JL0-01	JL0-07	JL0-07	JL0-09	JL0-09	J0-01
					bottom	surface	bottom	surface	outlet	bottom	surface	bottom	surface	bottom	surface	bottom	surface	bottom	surface	outlet
					01-Aug-23	01-Aug-23	01-Aug-23	01-Aug-23	30-Aug-23	13-Sep-23	13-Sep-23	16-Sep-23	16-Sep-23	16-Sep-23	16-Sep-23	14-Sep-23	14-Sep-23	14-Sep-23	14-Sep-23	17-Sep-23
Conventionals	Conductivity (lab)	µmho/cm	-	-	151	151	151	151	149	150	150	152	150	151	156	150	150	157	150	149
	pH (lab)	pH	6.5 - 9.0	-	7.93	7.89	7.78	7.92	7.96	7.88	7.87	7.97	7.94	8	8	7.66	7.67	7.66	7.64	8.03
	Hardness (as $CaCO_3$)	mg/L	-	-	71	70.7	70.8	71	70.9	71.6	71.5	71.9	72.8	71.6	71.5	72.5	70.6	71	69	68.6
	Total Suspended Solids (TSS)	mg/L	-	-	<1.0	<1.3	<1.3	<1.3	<1.0	<1.0	<1.4	1.3	<1.0	<1.0	1.3	<1.0	1.3	<1.0	1	1
	Total Dissolved Solids (TDS)	mg/L	-	-	62	74	78	83	98	83	90	84	82	77	83	86	83	86	92	86
	Turbidity	NTU	-	-	1.20	1.12	1.43	1.31	2.28	0.92	0.56	1.10	0.77	0.36	0.63	0.58	0.82	0.76	0.49	1.57
	Alkalinity (as $CaCO_3$)	mg/L	-	-	91.70	75.10	82.40	81.30	68.30	68.3	68.4	68.3	68.5	68.6	80.6	68.6	68.3	69.4	68	76
Nutrients and Organics	Total Ammonia	mg/L	-	0.855	<0.0050	<0.0050	<0.0050	<0.0050	0.0051	0.005	<0.0050	<0.0050	<0.0050	0.0051	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Nitrate	mg/L	3	3	0.020	0.021	0.032	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
	Nitrite	mg/L	0.06	0.06	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Total Kjeldahl Nitrogen (TKN)	mg/L	-	-	0.089	0.075	0.108	0.105	0.122	0.137	0.103	0.065	<0.050	0.060	0.065	0.080	0.079	0.075	0.093	0.082
	Dissolved Organic Carbon	mg/L	-	-	1.78	2.09	1.79	2.06	2.24	1.82	1.76	1.91	2.01	2.06	2.24	4.29	1.98	5.58	9.90	1.89
	Total Organic Carbon	mg/L	-	-	1.87	1.88	1.87	1.98	1.87	2.04	1.80	1.69	1.73	1.69	1.84	2.18	2.12	2.26	2.18	1.78
	Total Phosphorus	mg/L	0.020[α]	-	0.0042	0.0037	0.0041	0.0039	<0.0020	0.0033	0.0028	0.0026	0.0031	0.0056	0.0023	0.0027	0.0031	0.0022	0.0030	0.0037
	Phenols	mg/L	0.004[α]	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Anions	Bromide (Br)	mg/L	-	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
	Chloride (Cl)	mg/L	120	120	4.28	4.29	4.34	4.29	4.32	4.36	4.36	4.34	4.33	4.30	4.38	4.32	4.32	4.47	4.31	4.25
	Sulphate (SO_4)	mg/L	218[β]	218	4.20	4.20	4.23	4.21	4.26	4.23	4.25	4.20	4.19	4.17	4.25	4.21	4.19	4.32	4.2	4.13
Total Metals	Aluminum (Al)	mg/L	0.100	0.100	0.0198	0.0216	0.0231	0.0217	0.0175	0.0310	0.0179	0.0330	0.0248	0.0156	0.0203	0.0174	0.0263	0.0212	0.0190	0.0142
	Antimony (Sb)	mg/L	0.020[α]	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)	mg/L	0.005	0.005	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.000120	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)	mg/L	-	-	0.00735	0.00749	0.00749	0.00738	0.00760	0.00735	0.00726	0.00770	0.00749	0.00769	0.00743	0.00730	0.00739	0.00776	0.00731	0.00763
	Beryllium (Be)	mg/L	0.011[α]	-	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
	Bismuth (Bi)	mg/L	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)	mg/L	1.5	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)	mg/L	0.00012	0.0001	0.0000052	<0.0000050	0.000005	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Calcium (Ca)	mg/L	-	-	13.4	13.3	13.4	13.4	14.3	13.8	13.8	14.2	14.4	14.4	14.0	14.0	14.0	14.5	14.2	14.2
	Chromium (Cr)	mg/L	0.001	0.003	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Cobalt (Co)	mg/L	0.0009[α]	0.004	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)	mg/L	0.002	0.004	0.00095	0.00101	0.00160	0.00098	0.00096	0.001320	0.000980	0.001140	0.000960	0.001170	0.001140	0.00124	0.001150	0.001300	0.001000	0.00095
	Iron (Fe)	mg/L	0.300	0.300	0.033	0.034	0.037	0.033	0.040	0.0250	0.0300	0.0400	0.0370	0.0240	0.0260	0.0250	0.0350	0.0330	0.0240	0.080
	Lead (Pb)	mg/L	0.001	0.001	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)	mg/L	-	-	<0.0010	<0.0010	<0.0010	<0.0010	0.0013	0.00120	0.00120	0.00110	0.00110	0.00110	<0.0010	0.00140	0.00130	<0.0010	0.00130	<0.0010
	Magnesium (Mg)	mg/L	-	-	8.74	8.77	8.73	8.73	9.73	9.08	9.03	9.15	8.96	9.17	9.55	9.01	9.05	9.20	9.14	9.59
	Manganese (Mn)	mg/L	0.935[β]	-	0.00492	0.00495	0.00542	0.00491	0.00270	0.00172	0.00164	0.00187	0.00172	0.00172	0.00157	0.00175	0.00198	0.00190	0.00158	0.00351
	Mercury (Hg)	mg/L	0.000026	-	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)	mg/L	0.073	-	0.000416	0.000428	0.000443	0.000415	0.000451	0.000459	0.000444	0.000434	0.000451	0.000439	0.000452	0.000458	0.000444	0.000471	0.000450	0.000462
	Nickel (Ni)	mg/L	0.025	0.025	0.00076	0.00068	0.00071	0.00067	0.00070	0.000640	0.000670	0.000680	0.000660	0.000670	0.000700	0.000640	0.000700	0.000760	0.000660	0.00080
	Potassium (K)	mg/L	-	-	1.33	1.35	1.35	1.36	1.47	1.37	1.36	1.40	1.37	1.38	1.43	1.36	1.36	1.42	1.38	1.43
	Selenium (Se)	mg/L	0.001	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	0.00006	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Silicon (Si)	mg/L	-	-	0.46	0.47	0.50	0.47	0.52	0.490	0.500	0.500	0.490	0.480	0.500	0.500	0.520	0.480	0.500	0.53
	Silver (Ag)	mg/L	0.00025	0.0001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)	mg/L	-	-	2.03	2.05	2.05	2.06	2.27	2.14	2.15	2.19	2.16	2.22	2.25	2.13	2.12	2.16	2.14	2.20
	Strontium (Sr)	mg/L	-	-	0.0108	0.0110	0.0111	0.0108	0.0116	0.0116	0.0114	0.0112	0.0114	0.0113	0.0114	0.0116	0.0115	0.0118	0.0118	0.0116
	Thallium (Tl)	mg/L	0.0008	0.0008	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Tin (Sn)	mg/L	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)	mg/L	-	-	0.00074	0.001	0.00106	<0.00100	0.00088	0.00071	0.00098	0.00153	0.00148	0.00073	0.00098	0.00075	0.001240	0.00100	<0.00090	<0.00060
	Uranium (U)	mg/L	0.015	-	0.00132	0.00135	0.00136	0.00129	0.00145	0.00155	0.00159	0.00147	0.00152	0.00150	0.00149	0.00158	0.00159	0.00151	0.00159	0.00151
	Vanadium (V)	mg/L	0.006[α]	0.006	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)	mg/L	0.030	0.030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030

Indicates parameter concentration above applicable Water Quality Guideline.

BOLD Indicates parameter concentration above the AEMP benchmark.

Note: "-" indicates no WQG benchmark applicable.

[a] Canadian Water Quality Guideline for the protection of aquatic life (CCME 1987, 1999) except those indicated by α (Ontario Provincial Water Quality Objective [PWQO]; OMOE 1994) and β (British Columbia Water Quality Guideline [BCWQG]; BCMOE 2013). See Table 2.2 for information regarding WQG criteria.

[b] AEMP Water Quality Benchmarks developed by Intrinsik (2013) using baseline water quality data specific to the Camp Lake system.

Table C.27: Magnitude of Elevation in Seasonal Average Parameter Concentrations (Total Metal Concentration Data Provided) Between Camp Lake (JL0) and Reference Lake 3 (REF3) in 2023, and Between Camp Lake in 2023 and Baseline (2005 to 2013) Data, Mary River Project CREMP

Parameter	Camp Lake vs Reference Lake 3 in 2023		Camp Lake in 2023 vs Baseline		
	Summer	Fall	Winter	Summer	Fall
Conductivity (lab)	2.02	2.05	1.34	1.33	1.26
pH (lab)	1.06	1.02	1.08	1.02	1.02
Hardness (as $CaCO_3$)	2.06	2.06	-	-	-
Total Suspended Solids (TSS)	0.769	1.02	0.500	0.500	0.550
Total Dissolved Solids (TDS)	1.52	1.59	1.23	1.01	1.08
Turbidity	2.13	0.879	1.73	0.466	1.98
Alkalinity (as $CaCO_3$)	1.89	1.50	1.18	1.42	1.19
Total Ammonia	1.00	1.00	0.358	0.0577	0.213
Nitrate	1.18	1.00	0.352	0.236	0.200
Nitrite	1.00	1.00	4.35	5.00	3.28
Total Kjeldahl Nitrogen (TKN)	0.666	0.583	0.674	0.451	0.272
Dissolved Organic Carbon	0.671	1.11	0.870	1.05	1.86
Total Organic Carbon	0.665	0.698	0.864	0.972	1.06
Total Phosphorus	1.24	0.608	0.565	0.884	0.698
Phenols	1.00	1.00	-	-	-
Bromide (Br)	1.00	1.00	2.00	2.00	2.00
Chloride (Cl)	2.68	3.47	3.38	2.20	1.97
Sulphate (SO_4)	1.32	1.45	3.28	3.56	1.64
Aluminum (Al)	4.35	2.93	2.54	1.78	3.68
Antimony (Sb)	1.00	1.00	1.00	0.963	1.00
Arsenic (As)	1.00	1.02	1.00	1.00	1.02
Barium (Ba)	1.23	1.22	1.44	1.40	1.42
Beryllium (Be)	1.00	1.00	0.200	1.00	1.00
Bismuth (Bi)	1.00	1.00	0.100	0.100	0.100
Boron (B)	1.00	1.00	1.00	1.00	1.00
Cadmium (Cd)	1.05	1.00	0.500	0.450	0.500
Calcium (Ca)	1.98	2.03	1.20	1.15	1.20
Chromium (Cr)	1.00	1.00	4.72	5.00	5.00
Cobalt (Co)	1.00	1.00	1.00	1.00	1.00
Copper (Cu)	1.34	1.28	1.03	0.434	1.30
Iron (Fe)	2.35	2.06	1.00	1.97	5.39
Lead (Pb)	1.00	1.00	0.531	0.605	1.00
Lithium (Li)	1.00	1.17	2.04	1.75	1.48
Magnesium (Mg)	2.10	2.04	1.30	1.23	1.29
Manganese (Mn)	5.52	2.41	3.78	2.52	1.12
Mercury (Hg)	1.00	1.00	0.500	0.486	0.500
Molybdenum (Mo)	3.12	3.18	2.21	2.14	2.19
Nickel (Ni)	1.38	1.33	1.07	0.963	1.12
Potassium (K)	1.77	1.68	1.52	1.63	1.62
Selenium (Se)	1.00	1.02	0.500	5.00	5.10
Silicon (Si)	0.991	1.06	1.05	1.08	1.17
Silver (Ag)	1.00	1.00	10	10	10
Sodium (Na)	2.46	2.46	2.20	2.28	2.18
Strontium (Sr)	1.41	1.47	1.73	1.50	1.49
Thallium (Tl)	1.00	1.00	1.00	10	10
Tin (Sn)	1.00	1.00	0.0798	0.857	1.00
Titanium (Ti)	3.06	3.02	0.0326	0.0928	0.101
Uranium (U)	4.53	5.39	3.35	2.87	3.03
Vanadium (V)	1.00	1.00	0.500	0.500	0.500
Zinc (Zn)	0.923	0.793	2.79	1.79	2.47

Denotes parameter with an AEMP benchmark.
Denotes slight elevation (mean concentration three to five times higher than respective mean reference or baseline period value).
Denotes moderate elevation (mean concentration five to 10 times higher than respective mean reference or baseline period value).
Denotes highly elevated concentration (mean concentration greater than 10 times higher than respective mean reference or baseline period value).
Denotes differences in method detection limit between the indicated study area and that of the reference area or baseline period, precluding an evaluation of magnitude of elevation; '-' = no data available for the analyte during comparison period.

Note: "-" indicates no data available.

Table C.28: Dissolved Metal Concentrations at Camp Lake (JL0) Water Quality Monitoring Stations, Mary River Project CREMP, 2023

	Parameters	Units	Winter Sampling Event										Spring Sampling Event	Summer Sampling Event					
			JL0-02	JL0-02	JL0-10	JL0-10	JL0-01	JL0-01	JL0-07	JL0-07	JL0-09	JL0-09	J0-01	JL0-02	JL0-02	JL0-10	JL0-10	JL0-01	JL0-01
			bottom	surface	bottom	surface	bottom	surface	bottom	surface	bottom	surface	outlet	bottom	surface	bottom	surface	bottom	surface
			06-Apr-23	06-Apr-23	07-Apr-23	07-Apr-23	05-Apr-23	05-Apr-23	05-Apr-23	05-Apr-23	05-Apr-23	05-Apr-23	17-Jul-23	01-Aug-23	01-Aug-23	01-Aug-23	01-Aug-23	01-Aug-23	01-Aug-23
Dissolved Metals	Aluminum (Al)	mg/L	0.0016	0.0011	0.002	0.0018	<0.0010	0.0014	0.0012	0.0026	0.0016	0.0027	0.0058	0.0031	0.0032	0.0034	0.0038	0.0049	0.0052
	Antimony (Sb)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)	mg/L	0.00848	0.00920	0.00834	0.00892	0.00812	0.0090	0.00880	0.00926	0.00826	0.00909	0.00706	0.00715	0.00712	0.00725	0.00729	0.00734	0.00720
	Beryllium (Be)	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
	Bismuth (Bi)	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Calcium (Ca)	mg/L	15.6	16.4	16.0	15.9	15.6	16.4	15.7	16.1	14.3	15.5	12.6	14.1	14.1	14.2	14.3	14.6	14.4
	Chromium (Cr)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Cobalt (Co)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)	mg/L	0.00086	0.00100	0.00093	0.00095	0.00084	0.00092	0.00087	0.00099	0.00139	0.00129	0.00081	0.00082	0.00080	0.00085	0.00084	0.00084	0.00085
	Iron (Fe)	mg/L	<0.010	<0.010	<0.010	0.021	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Lead (Pb)	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)	mg/L	0.0012	0.0013	0.0012	0.0011	0.0012	0.0012	0.0012	0.0013	0.0012	0.0011	<0.0010	0.0012	0.0012	0.0013	0.0013	0.0014	0.0014
	Magnesium (Mg)	mg/L	10.0	10.6	10.2	10.2	9.69	10.6	10.10	10.6	9.7	10.7	8.00	8.45	8.51	8.57	8.60	8.47	8.49
	Manganese (Mn)	mg/L	0.000200	0.000110	0.000110	0.00015	<0.00010	<0.00010	0.02320	<0.00010	0.00029	0.00032	0.00235	0.001680	0.002020	0.001820	0.001940	0.002100	0.002010
	Mercury (Hg)	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)	mg/L	0.000502	0.000469	0.000461	0.000494	0.000427	0.000507	0.000431	0.000458	0.000456	0.000498	0.000435	0.000413	0.000424	0.000430	0.000426	0.000421	0.000432
	Nickel (Ni)	mg/L	0.00064	0.00068	0.00067	0.00068	0.00064	0.00068	0.00078	0.00073	0.00064	0.00071	0.00057	0.00056	0.00055	0.00054	0.00068	0.00059	0.00057
	Potassium (K)	mg/L	1.56	1.65	1.54	1.61	1.48	1.63	1.49	1.64	1.46	1.64	1.32	1.33	1.35	1.36	1.36	1.34	1.35
	Selenium (Se)	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Silicon (Si)	mg/L	0.38	0.36	0.36	0.36	0.40	0.37	1.69	0.35	0.39	0.36	0.37	0.46	0.42	0.45	0.44	0.47	0.43
	Silver (Ag)	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)	mg/L	2.40	2.48	2.38	2.45	2.33	2.57	3.62	2.60	2.28	2.53	1.87	2.02	2.02	2.04	2.04	2.02	2.02
	Strontium (Sr)	mg/L	0.0131	0.0134	0.0126	0.0135	0.0125	0.0137	0.0144	0.0132	0.0126	0.0134	0.0104	0.0112	0.0113	0.0112	0.0114	0.0116	0.0113
	Thallium (Tl)	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Tin (Sn)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00011	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)	mg/L	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
	Uranium (U)	mg/L	0.00170	0.00182	0.00169	0.00176	0.00160	0.00173	0.00117	0.00172	0.00156	0.00171	0.00121	0.00129	0.00130	0.00133	0.00132	0.00133	0.00129
	Vanadium (V)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)	mg/L	0.0015	<0.0010	0.0011	<0.0010	<0.0010	<0.0010	<0.0010	0.0038	<0.0010	0.0015	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0028

Table C.28: Dissolved Metal Concentrations at Camp Lake (JL0) Water Quality Monitoring Stations, Mary River Project CREMP, 2023

	Parameters	Units	Summer Sampling Event					Fall Sampling Event										
			JL0-07	JL0-07	JL0-09	JL0-09	J0-01	JL0-02	JL0-02	JL0-10	JL0-10	JL0-01	JL0-01	JL0-07	JL0-07	JL0-09	JL0-09	J0-01
			bottom	surface	bottom	surface	outlet	bottom	surface	bottom	surface	bottom	surface	bottom	surface	bottom	surface	outlet
			01-Aug-23	01-Aug-23	01-Aug-23	01-Aug-23	30-Aug-23	13-Sep-23	13-Sep-23	16-Sep-23	16-Sep-23	16-Sep-23	16-Sep-23	14-Sep-23	14-Sep-23	14-Sep-23	14-Sep-23	17-Sep-23
Dissolved Metals	Aluminum (Al)	mg/L	0.0032	0.0040	0.0029	0.0055	0.0029	0.0027	0.0027	0.0031	0.0028	0.0055	0.0028	0.0030	0.0036	0.0046	0.0049	0.0026
	Antimony (Sb)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)	mg/L	0.00714	0.00715	0.00716	0.00723	0.00762	0.00773	0.00759	0.00741	0.00784	0.00773	0.00740	0.00780	0.00793	0.00718	0.00782	0.00754
	Beryllium (Be)	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
	Bismuth (Bi)	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Calcium (Ca)	mg/L	14.2	14.2	14.3	14.2	13.8	13.9	13.9	14.2	14.2	14.0	14.0	14.2	13.7	13.7	13.3	13.0
	Chromium (Cr)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	0.00102	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Cobalt (Co)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)	mg/L	0.00085	0.00085	0.00085	0.00086	0.00075	0.00087	0.000940	0.001020	0.000860	0.001110	0.000920	0.000860	0.000850	0.000940	0.000840	0.00080
	Iron (Fe)	mg/L	<0.010	<0.010	<0.010	<0.010	0.014	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.037
	Lead (Pb)	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)	mg/L	0.0013	0.0013	0.0012	0.0012	0.0010	0.00110	<0.0010	0.00120	0.00120	0.00110	0.00120	0.00120	0.00120	0.00120	0.00120	0.001
	Magnesium (Mg)	mg/L	8.63	8.56	8.51	8.62	8.84	8.96	8.93	8.85	9.08	8.90	8.87	9.00	8.85	8.94	8.68	8.77
	Manganese (Mn)	mg/L	0.001890	0.001910	0.001960	0.001760	0.00099	0.000140	0.000160	0.000180	0.000170	0.000330	0.000140	0.000160	0.000170	0.000170	0.000260	0.00256
	Mercury (Hg)	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)	mg/L	0.000426	0.000404	0.000415	0.000428	0.000434	0.000437	0.000445	0.000454	0.000450	0.000448	0.000416	0.000443	0.000438	0.000403	0.000421	0.000440
	Nickel (Ni)	mg/L	0.00057	0.00054	0.00052	0.00060	0.00061	0.000630	0.000620	0.000620	0.000600	0.000650	0.000550	0.000570	0.000590	0.000580	0.000600	0.00065
	Potassium (K)	mg/L	1.36	1.36	1.34	1.38	1.26	1.42	1.40	1.38	1.41	1.41	1.29	1.38	1.37	1.31	1.35	1.28
	Selenium (Se)	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Silicon (Si)	mg/L	0.44	0.44	0.46	0.43	0.44	0.424	0.439	0.489	0.426	0.429	0.410	0.415	0.413	0.426	0.412	0.44
	Silver (Ag)	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)	mg/L	2.04	2.02	2.02	2.04	2.00	2.14	2.12	2.10	2.14	2.10	2.11	2.13	2.11	2.13	2.04	2.04
	Strontium (Sr)	mg/L	0.0114	0.0115	0.0112	0.0113	0.0113	0.0115	0.0118	0.0117	0.0117	0.0116	0.0110	0.0117	0.0113	0.0110	0.0115	0.0114
	Thallium (Tl)	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Tin (Sn)	mg/L	0.00015	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)	mg/L	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
	Uranium (U)	mg/L	0.00130	0.00134	0.00128	0.00130	0.00136	0.00144	0.00150	0.00148	0.00147	0.00145	0.00138	0.00139	0.00134	0.00133	0.00133	0.00140
	Vanadium (V)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)	mg/L	<0.0010	<0.0010	0.0011	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0034	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010

Table C.29: Magnitude of Elevation in Seasonal Average Dissolved Metal Concentrations Between Camp Lake (JL0) and Reference Lake 3 (REF3) in 2023, and Between Camp Lake in 2023 and Baseline (2005 to 2013) Data, Mary River Project, CREMP

Parameter	Camp Lake vs Reference Lake 3 in 2023		Camp Lake in 2023 vs Baseline		
	Summer	Fall	Winter	Summer	Fall
Aluminum (Al)	2.20	1.07	0.00845	0.967	1.33
Antimony (Sb)	1.00	1.00	1.00	0.000194	1.00
Arsenic (As)	1.00	1.00	1.00	1.00	1.00
Barium (Ba)	1.17	1.27	0.00629	1.45	1.44
Beryllium (Be)	1.00	1.00	0.200	0.136	0.200
Bismuth (Bi)	1.00	1.00	0.100	0.100	0.100
Boron (B)	1.00	1.00	1.00	10.5	1.00
Cadmium (Cd)	1.00	1.00	0.256	0.500	0.500
Calcium (Ca)	2.11	2.10	1.20	1.26	1.18
Chromium (Cr)	1.00	1.00	5.00	4.46	5.00
Cobalt (Co)	1.00	1.00	1.00	10.0	1.00
Copper (Cu)	1.19	1.21	0.839	0.563	1.13
Iron (Fe)	1.00	0.800	1.11	16.4	1.00
Lead (Pb)	1.00	1.00	0.579	1.00	1.00
Lithium (Li)	1.28	1.16	1.24	0.0355	1.59
Magnesium (Mg)	2.00	2.02	1.27	1.29	1.27
Manganese (Mn)	5.76	0.486	4.27	0.103	0.278
Mercury (Hg)	1.00	1.00	0.500	0.500	0.500
Molybdenum (Mo)	3.08	3.08	2.05	0.00841	2.18
Nickel (Ni)	1.14	1.20	0.977	0.608	1.03
Potassium (K)	1.72	1.69	1.60	1.77	1.61
Selenium (Se)	1.00	1.00	0.500	0.500	5.00
Silicon (Si)	0.972	1.00	1.04	1.11	1.06
Silver (Ag)	1.00	1.00	10.0	10.0	10.0
Sodium (Na)	2.34	2.39	2.19	2.09	2.14
Strontium (Sr)	1.47	1.49	1.73	1.59	1.54
Thallium (Tl)	1.00	1.00	1.00	1.00	10.0
Tin (Sn)	1.05	1.00	0.0656	0.976	1.00
Titanium (Ti)	1.00	0.822	0.0300	0.0300	0.0300
Uranium (U)	4.68	5.17	3.36	2.90	2.83
Vanadium (V)	1.00	1.00	0.500	0.500	0.500
Zinc (Zn)	1.19	1.22	0.706	0.443	0.853

Denotes slight elevation (mean concentration three to five times higher than respective mean reference or baseline period value).

Denotes moderate elevation (mean concentration five to 10 times higher than respective mean reference or baseline period value).

Denotes highly elevated concentration (mean concentration greater than 10 times higher than respective mean reference or baseline period value).

Denotes differences in method detection limit between the 2023 and baseline data, precluding an evaluation of magnitude of elevation.

Table C.30: *In Situ* Water Quality Measurements Collected at Sheardown Lake Tributary 1 (SDLT1), Tributary 12 (SDLT12), and Tributary 9 (SDLT9) Benthic Invertebrate Community Stations, Mary River Project CREMP, August 2023

Study Area	Station	Sampling Date	Temperature (°C)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (% saturation)	pH (pH units)	Specific Conductance (µS/cm)
Unnamed Reference Creek	REF-CRK-B1	18-Aug-23	8.6	11.23	99.5	7.72	92.5
	REF-CRK-B2	18-Aug-23	8.5	11.31	99.0	7.73	92.7
	REF-CRK-B3	18-Aug-23	8.4	11.26	99.0	7.67	93.7
	REF-CRK-B4	18-Aug-23	8.4	11.34	99.1	7.65	94.0
	REF-CRK-B5	18-Aug-23	8.3	11.35	99.0	7.55	94.2
Sheardown Lake Tributary 1 Reach 1	SDLT-1-R1-B1	12-Aug-23	10.3	11.03	100.8	8.16	381.8
	SDLT-1-R1-B2	12-Aug-23	9.8	11.10	100.3	8.19	379.7
	SDLT-1-R1-B3	12-Aug-23	9.5	11.20	100.5	8.20	376.1
	SDLT-1-R1-B4	12-Aug-23	9.3	11.23	100.2	8.18	370.9
	SDLT-1-R1-B5	12-Aug-23	9.1	11.25	99.9	8.20	363.2
Sheardown Lake Tributary 9 Upstream	SDLT-9-DS-B1	16-Aug-23	8.4	8.05	70.6	7.51	209.8
	SDLT-9-DS-B2	16-Aug-23	8.5	9.12	80.5	7.59	202.8
	SDLT-9-DS-B3	16-Aug-23	8.6	9.09	79.8	7.58	207.2
	SDLT-9-DS-B4	16-Aug-23	8.4	9.45	82.8	7.63	206.2
	SDLT-9-DS-B5	16-Aug-23	8.2	10.12	88.1	7.75	206.0

Note: Due to limited availability of appropriate habitat area (i.e., the stream was not flowing), SDLT12 could not be sampled in 2023.

Table C.31: *In Situ* Water Quality Summary Statistics for the Sheardown Lake Tributary (SDLT1 and SDLT 9) Benthic Stations, Mary River Project CREMP, August 2023

Metric	Study Area	Sample Size	Mean	Standard Deviation	Standard Error	5th Percentile	95th Percentile	Minimum	Maximum
Water Temperature (°C)	Unnamed Reference Creek	5	8.44	0.114	0.0510	8.36	8.52	8.30	8.60
	Sheardown Lake Tributary 1 (SDLT1)	5	9.60	0.469	0.210	9.25	9.95	9.10	10.3
	Sheardown Lake Tributary 9 (SDLT9)	5	8.42	0.148	0.0663	8.31	8.53	8.20	8.60
Dissolved Oxygen (mg/L)	Unnamed Reference Creek	5	11.3	0.0517	0.0231	11.3	11.3	11.2	11.3
	Sheardown Lake Tributary 1 (SDLT1)	5	11.2	0.0936	0.0419	11.1	11.2	11.0	11.2
	Sheardown Lake Tributary 9 (SDLT9)	5	9.17	0.749	0.335	8.62	9.72	8.05	10.1
Dissolved Oxygen (% Saturation)	Unnamed Reference Creek	5	99.1	0.217	0.0970	99.0	99.3	99.0	99.5
	Sheardown Lake Tributary 1 (SDLT1)	5	100	0.336	0.150	100	101	99.9	101
	Sheardown Lake Tributary 9 (SDLT9)	5	80.4	6.35	2.84	75.7	85.0	70.6	88.1
pH (units)	Unnamed Reference Creek	5	7.66	0.0720	0.0322	7.61	7.72	7.55	7.73
	Sheardown Lake Tributary 1 (SDLT1)	5	8.19	0.0167	0.00748	8.17	8.20	8.16	8.20
	Sheardown Lake Tributary 9 (SDLT9)	5	7.61	0.0884	0.0395	7.55	7.68	7.51	7.75
Specific Conductance (µS/cm)	Unnamed Reference Creek	5	93.4	0.773	0.346	92.8	94.0	92.5	94.2
	Sheardown Lake Tributary 1 (SDLT1)	5	374	7.47	3.34	369	380	363	382
	Sheardown Lake Tributary 9 (SDLT9)	5	206	2.52	1.13	205	208	203	210

Note: Station LDFG-OUT (Sheardown Lake Tributary 12) was dry during August 2023 sampling, therefore no data are available.

Table C.32: *In Situ* Water Quality Statistical Comparisons among Sheardown Lake Tributaries (SDLT1 and SDLT9) and Unnamed Reference Creek (REF-CRK) Study Areas, Mary River Project CREMP, August 2023

Metric	Overall 3-group Comparison				Pair-wise, *post hoc* comparisons[a]			
	Statistical Test[a]	Transformation	Significant Difference Between Areas?	P-value	(I) Area	(J) Area	Significant Difference Between Areas?	P-value
Water Temperature (°C)	ANOVA	None	YES	0.001	Unnamed Reference Creek	Sheardown Tributary 1	YES	<0.001
					Unnamed Reference Creek	Sheardown Tributary 9	NO	0.994
					Sheardown Tributary 1	Sheardown Tributary 9	YES	<0.001
Dissolved Oxygen (mg/L)	K-W	Rank	YES	0.003	Unnamed Reference Creek	Sheardown Tributary 1	NO	0.119
					Unnamed Reference Creek	Sheardown Tributary 9	YES	<0.001
					Sheardown Tributary 1	Sheardown Tributary 9	NO	0.061
Dissolved Oxygen (% saturation)	K-W	Rank	YES	0.002	Unnamed Reference Creek	Sheardown Tributary 1	NO	0.076
					Unnamed Reference Creek	Sheardown Tributary 9	NO	0.076
					Sheardown Tributary 1	Sheardown Tributary 9	YES	<0.001
pH (units)	ANOVA	None	YES	0.001	Unnamed Reference Creek	Sheardown Tributary 1	YES	<0.001
					Unnamed Reference Creek	Sheardown Tributary 9	NO	0.456
					Sheardown Tributary 1	Sheardown Tributary 9	YES	<0.001
Specific Conductance (µS/cm)	ANOVA	None	YES	0.001	Unnamed Reference Creek	Sheardown Tributary 1	YES	<0.001
					Unnamed Reference Creek	Sheardown Tributary 9	YES	<0.001
					Sheardown Tributary 1	Sheardown Tributary 9	YES	<0.001

Highlighted values indicate significant difference between study areas based on test p-value less than 0.05.

Note: Station LDFG-OUT (Sheardown Lake Tributary 12) was dry during August 2023 smapling event, therefore no data are available.

[a] Statistical tests include Analysis of Variance (ANOVA) followed by Tukey's Honestly Significant Difference (HSD) post hoc tests, or Kruskal-Wallis H-test (K-W) followed by Mann-Whitney U-test (M-W).

Table C.33: Water Chemistry at Sheardown Lake Tributaries (SDLT1, SDLT12, and SDLT9) Water Quality Monitoring Stations, Mary River Project CREMP, 2023

	Parameters	Units	Water Quality Guideline (WQG)[a]	AEMP Benchmark[b]	Spring Sampling Event				Summer Sampling Event				Fall Sampling Event		
					Sheardown Lake Tributary 1		Sheardown Lake Tributary 12	Sheardown Lake Tributary 9	Sheardown Lake Tributary 1		Sheardown Lake Tributary 12	Sheardown Lake Tributary 9	Sheardown Lake Tributary 1		Sheardown Lake Tributary 9
					D1-05	D1-00	LDFG-OUT	MS-C-G	D1-05	D1-00	LDFG-OUT	MS-C-G	D1-05	D1-00	MS-C-G
					16-Jul-23	16-Jul-23	16-Jul-23	16-Jul-23	24-Aug-23	24-Aug-23	24-Aug-23	31-Aug-23	19-Sep-23	16-Sep-23	17-Sep-23
Conventionals	Conductivity (lab)	µmho/cm	-	-	245	236	294	154	552	544	332	234	521	521	267
	pH (lab)	pH	6.5 - 9.0	-	7.82	7.80	8.05	7.39	7.78	7.95	8.03	7.45	7.81	7.94	7.53
	Hardness (as $CaCO_3$)	mg/L	-	-	106	108	136	79.2	247	253	165	105	222	236	123
	Total Suspended Solids (TSS)	mg/L	-	-	5.1	4.4	1.2	<1.0	2.7	8.6	<1.0	<1.0	<1.0	1.8	<1.0
	Total Dissolved Solids (TDS)	mg/L	-	-	159	141	174	95	350	344	183	154	302	308	155
	Turbidity	NTU	-	-	19.80	18.90	1.58	0.14	7.40	10.60	1.62	0.79	1.27	1.94	0.12
	Alkalinity (as $CaCO_3$)	mg/L	-	-	67.9	63.1	130.0	80.0	85.9	100.0	148.0	90.2	98.7	118	101
Nutrients and Organics	Total Ammonia	mg/L	-	0.855	<0.0050	<0.0050	<0.0050	<0.0050	0.0288	0.0151	<0.0050	0.825	<0.0050	<0.0050	***1.24***
	Nitrate	mg/L	3	3	0.563	0.433	0.417	1.020	2.980	2.720	0.358	***7.080***	1.680	1.74	***8.260***
	Nitrite	mg/L	0.06	0.06	<0.010	<0.010	<0.010	<0.010	0.022	0.016	<0.010	0.038	<0.010	<0.010	0.024
	Total Kjeldahl Nitrogen (TKN)	mg/L	-	-	0.122	0.111	0.136	0.138	0.336	0.286	0.127	1.350	0.285	0.265	1.550
	Dissolved Organic Carbon	mg/L	-	-	1.40	1.89	1.20	1.66	2.77	2.31	2.58	2.91	2.21	2.52	2.75
	Total Organic Carbon	mg/L	-	-	1.48	1.60	2.38	1.72	2.10	2.51	2.90	2.71	2.51	2.53	2.39
	Total Phosphorus	mg/L	0.030[α]	-	0.0096	0.0069	0.0139	0.0024	0.005	0.0063	<0.0020	0.0022	0.0022	0.0033	<0.0020
	Phenols	mg/L	0.004[α]	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Anions	Bromide (Br)	mg/L	-	-	0.22	0.19	<0.10	<0.10	0.39	0.4	<0.10	<0.10	0.45	0.920	<0.10
	Chloride (Cl)	mg/L	120	120	18.50	15.40	5.43	1.02	36.40	31.30	4.18	1.15	51.1	44.4	1.22
	Sulphate (SO_4)	mg/L	218[β]	218	28.30	24.5	16.3	1.1	118.0	112.0	20.5	2.8	68.7	70.8	3.2
Total Metals	Aluminum (Al)	mg/L	0.100	0.179	***0.7650***	***0.2740***	0.0410	0.0057	***0.2080***	***0.3930***	0.0090	0.0052	0.028	0.0632	0.0046
	Antimony (Sb)	mg/L	0.020[α]	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)	mg/L	0.005	0.005	<0.00010	0.00011	0.00011	<0.00010	<0.00010	0.00011	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)	mg/L	-	-	0.01610	0.0152	0.0161	0.0086	0.0268	0.0269	0.0175	0.0139	0.0243	0.0247	0.0155
	Beryllium (Be)	mg/L	0.011[α]	-	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
	Bismuth (Bi)	mg/L	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)	mg/L	1.5	-	0.012	0.012	0.021	<0.010	0.0150	0.016	<0.010	<0.010	0.018	0.018	<0.010
	Cadmium (Cd)	mg/L	0.00012	0.00008	0.000036	0.000029	0.000029	<0.0000050	***0.0001740***	***0.000083***	<0.0000050	<0.0000050	0.0000473	0.0000354	<0.0000050
	Calcium (Ca)	mg/L	-	-	21.1	21.3	26.6	15.6	46.2	44.8	31.2	22.7	48	47	25.0
	Chromium (Cr)	mg/L	0.001	0.003	0.00056	0.00072	<0.00050	<0.00050	0.00064	0.001	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Cobalt (Co)	mg/L	0.0009[α]	0.004	0.00028	0.00027	0.0002	<0.00010	0.0008300	0.00075	<0.00010	<0.00010	0.000310	0.000320	<0.00010
	Copper (Cu)	mg/L	0.002	0.0022	0.00203	0.00207	0.00138	0.00103	***0.00250***	***0.00255***	0.00120	0.00108	***0.00236***	0.00210	0.00130
	Iron (Fe)	mg/L	0.30	0.326	***1.080***	***0.471***	0.077	<0.010	***0.3290***	***0.624***	0.022	0.038	0.040	0.150	0.013
	Lead (Pb)	mg/L	0.001	0.001	0.000640	0.000511	0.000128	<0.000050	0.000228	0.000382	<0.000050	<0.000050	0.000050	0.000067	<0.000050
	Lithium (Li)	mg/L	-	-	0.0049	0.0044	0.0036	0.0012	0.00520	0.0048	0.0017	0.0017	0.00830	0.00540	0.0016
	Magnesium (Mg)	mg/L	-	-	13.10	13.6	16.9	9.9	32.8	33.7	21.0	14.2	30.4	32.5	15.4
	Manganese (Mn)	mg/L	0.935[β]	-	0.014500	0.01180	0.00513	0.00024	0.10100	0.05330	0.00188	0.00141	0.00207	0.00891	0.00074
	Mercury (Hg)	mg/L	0.000026	-	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)	mg/L	0.073	-	0.00536	0.00448	0.00218	0.00047	0.01130	0.00906	0.00204	0.00069	0.00765	0.00548	0.00070
	Nickel (Ni)	mg/L	0.025	0.025	0.00126	0.00134	0.00160	0.00116	0.00147	0.00206	0.00135	0.00120	0.00116	0.00166	0.00142
	Potassium (K)	mg/L	-	-	3.87	3.62	2.91	1.19	5.54	5.38	2.47	1.56	4.82	4.41	1.58
	Selenium (Se)	mg/L	0.001	-	0.000142	0.000103	<0.000050	<0.000050	0.000641	0.000534	<0.000050	<0.000050	0.000287	0.000264	<0.000050
	Silicon (Si)	mg/L	-	-	1.54	1.45	0.66	1.09	1.95	2.35	1.24	1.01	1.84	1.87	1.09
	Silver (Ag)	mg/L	0.00025	0.0001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)	mg/L	-	-	1.80	2.02	9.55	0.86	5.87	6.34	4.09	1.60	4.98	6.04	1.98
	Strontium (Sr)	mg/L	-	-	0.0634	0.0557	0.0154	0.0085	0.1360	0.1110	0.0207	0.0134	0.1490	0.1140	0.0155
	Thallium (Tl)	mg/L	0.0008	0.0008	0.00002	0.000017	<0.000010	<0.000010	0.0000210	0.000022	<0.000010	<0.000010	0.0000200	0.0000150	<0.000010
	Tin (Sn)	mg/L	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)	mg/L	-	-	0.0309	0.013	0.00156	<0.00030	0.0106	0.0225	<0.00030	<0.00030	0.00126	<0.00330	<0.00030
	Uranium (U)	mg/L	0.015	-	0.00368	0.00351	0.00180	0.00033	0.01650	0.01580	0.00303	0.00068	0.02170	0.01620	0.00099
	Vanadium (V)	mg/L	0.006[α]	0.006	0.00068	0.0006	<0.00050	<0.00050	0.000550	0.00082	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)	mg/L	0.030	0.030	<0.0030	0.0035	<0.0030	<0.0030	<0.0030	0.0040	<0.0030	<0.0030	<0.0030	0.0052	<0.0030

Indicates parameter concentration above applicable Water Quality Guideline.

BOLD Indicates parameter concentration above the AEMP benchmark.

Note: "-" indicates no WQG benchmark applicable. Station LDFG-OUT (Sheardown Lake Tributary 12) was dry during Fall sampling event in 2023, therefore no data are available.

[a] Canadian Water Quality Guideline for the protection of aquatic life (CCME 1987, 1999) except α (Ontario Provincial Water Quality Objective [PWQO]; OMOE 1994) and β (British Columbia Water Quality Guideline [BCWQG]; BCMOE 2013). See Table 2.2 for WQG information.

[b] AEMP Water Quality Benchmarks developed by Intrinsik (2013) using baseline water quality data and adopted from the Camp Lake Tributaries.

Table C.34: Magnitude of Elevation in Seasonal Average Parameter Concentrations between Sheardown Lake Tributaries (SDLT1, SDLT 12 and SDLT9) and Reference Creek Stations in 2023, and between 2023 and the Baseline Period (2005 to 2013), Mary River Project CREMP

	Parameter	SDLT1 Station D1-05 (Reach 4) 2023 vs Reference Creek 2023			SDLT1 Station D1-00 (Reach 1) 2023 vs Reference Creek 2023			SDLT12 2023 vs Reference Creek 2023		SDLT9 2023 vs Reference Creek 2023		
		Spring	Summer	Fall	Spring	Summer	Fall	Spring	Summer	Spring	Summer	Fall
Total Metals	Conductivity (lab)	8.49	5.13	4.08	8.18	5.06	4.08	10.2	3.09	5.34	2.18	2.09
	pH (lab)	1.06	1.02	1.01	1.06	1.04	1.03	1.09	1.05	1.00	0.977	0.979
	Hardness (as $CaCO_3$)	8.15	4.85	3.69	8.30	4.97	3.93	10.5	3.24	6.09	2.06	2.05
	Total Suspended Solids (TSS)	1.65	1.50	1.00	1.42	4.78	1.80	0.387	0.556	0.323	0.556	1.00
	Total Dissolved Solids (TDS)	4.39	5.19	4.74	3.89	5.10	4.83	4.80	2.71	2.62	2.28	2.43
	Turbidity	8.99	1.38	0.449	8.58	1.98	0.686	0.717	0.303	0.0636	0.148	0.0424
	Alkalinity (as $CaCO_3$)	4.97	1.62	1.65	4.62	1.89	1.97	9.52	2.80	5.86	1.70	1.68
	Total Ammonia	1.00	5.76	1.00	1.00	3.02	1.00	1.00	1.00	1.00	165	248
	Nitrate	28.2	139	43.9	21.6	127	45.5	20.8	16.7	51.0	329	216
	Nitrite	1.00	2.20	1.00	1.00	1.60	1.00	1.00	1.00	1.00	3.80	2.40
	Total Kjeldahl Nitrogen (TKN)	1.95	5.01	2.71	1.78	4.27	2.52	2.18	1.90	2.21	20.1	14.7
	Dissolved Organic Carbon	1.12	0.894	1.30	1.51	0.746	1.48	0.960	0.833	1.33	0.939	1.62
	Total Organic Carbon	1.33	1.14	1.79	1.43	1.36	1.80	2.13	1.58	1.54	1.47	1.70
	Total Phosphorus	1.51	1.18	0.607	1.09	1.48	0.910	2.19	0.471	0.378	0.518	0.552
	Phenols	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	Bromide (Br)	2.20	3.90	4.50	1.90	4.00	9.20	1.00	1.00	1.00	1.00	1.00
	Chloride (Cl)	31.4	18.0	20.7	26.1	15.5	18.0	9.20	2.07	1.73	0.570	0.494
	Sulphate (SO_4)	67	41.3	20.3	58	39.2	20.9	38.6	7.18	2.65	0.967	0.947
	Aluminum (Al)	16.1	0.829	0.278	5.77	1.57	0.628	0.864	0.0359	0.120	0.0207	0.0457
	Antimony (Sb)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	Arsenic (As)	1.00	0.952	1.00	1.10	1.05	1.00	1.10	0.952	1.00	0.952	1.00
	Barium (Ba)	8.05	3.61	3.33	7.60	3.63	3.38	8.05	2.36	4.31	1.87	2.12
	Beryllium (Be)	1.00	0.930	1.00	1.00	0.930	1.00	1.00	0.930	1.00	0.930	1.00
	Bismuth (Bi)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	Boron (B)	1.20	1.50	1.80	1.20	1.60	1.80	2.10	1.00	1.00	1.00	1.00
	Cadmium (Cd)	7.16	34.8	8.97	5.72	16.6	6.71	5.72	1.00	1.00	1.00	0.948
	Calcium (Ca)	7.79	4.66	3.84	7.87	4.52	3.79	9.82	3.15	5.76	2.29	2.01
	Chromium (Cr)	1.12	0.842	0.355	1.44	1.32	0.355	1.00	0.658	1.00	0.658	0.355
	Cobalt (Co)	2.80	5.11	2.95	2.70	4.62	3.05	2.00	0.615	1.00	0.615	0.952
	Copper (Cu)	3.83	2.10	1.96	3.91	2.14	1.74	2.60	1.01	1.94	0.908	1.08
	Iron (Fe)	20.4	1.00	0.427	8.89	1.91	1.60	1.45	0.0672	0.189	0.116	0.139
	Lead (Pb)	7.23	0.937	0.415	5.77	1.57	0.556	1.45	0.206	0.565	0.206	0.415
	Lithium (Li)	4.90	5.20	8.30	4.40	4.80	5.40	3.60	1.70	1.20	1.70	1.60
	Magnesium (Mg)	8.86	5.40	4.03	9.20	5.55	4.31	11.4	3.46	6.68	2.34	2.04
	Manganese (Mn)	10.9	23.8	1.48	8.84	12.6	6.36	3.84	0.443	0.180	0.332	0.529
	Mercury (Hg)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	Molybdenum (Mo)	67.6	26.7	15.4	56.5	21.4	11.0	27.5	4.81	5.96	1.62	1.41
	Nickel (Ni)	2.52	1.95	1.45	2.68	2.74	2.08	3.20	1.79	2.32	1.59	1.78
	Potassium (K)	15.5	6.84	5.89	14.5	6.64	5.39	11.7	3.05	4.77	1.92	1.93
	Selenium (Se)	2.84	12.8	5.74	2.06	10.7	5.28	1.00	1.00	1.00	1.00	1.00
	Silicon (Si)	3.73	1.41	1.47	3.52	1.69	1.49	1.60	0.894	2.64	0.728	0.870
	Silver (Ag)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	Sodium (Na)	5.22	3.43	2.43	5.86	3.71	2.95	27.7	2.39	2.51	0.936	0.967
	Strontium (Sr)	27.5	12.5	11.3	24.1	10.2	8.64	6.67	1.91	3.70	1.24	1.17
	Thallium (Tl)	2.00	1.47	2.00	1.70	1.54	1.50	1.00	0.702	1.00	0.702	1.00
	Tin (Sn)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	Titanium (Ti)	11.2	0.560	0.317	4.69	1.19	0.831	0.563	0.0159	0.108	0.0159	0.0755
	Uranium (U)	16.7	6.63	4.00	15.9	6.35	2.99	8.17	1.22	1.51	0.273	0.183
	Vanadium (V)	1.36	0.764	0.985	1.20	1.14	0.985	1.00	0.694	1.00	0.694	0.985
	Zinc (Zn)	1.00	1.00	0.741	1.17	1.33	1.28	1.00	1.00	1.00	1.00	0.741

Denotes parameter with an AEMP benchmark.
Denotes slight elevation (mean concentration three to five times higher than respective mean reference or baseline period value).
Denotes moderate elevation (mean concentration five to 10 times higher than respective mean reference or baseline period value).
Denotes highly elevated concentration (mean concentration greater than 10 times higher than respective mean reference or baseline period value).
Denotes differences in method detection limit between the indicated study area and that of the reference creeks, precluding an evaluation of magnitude of elevation; or no data available for the analyte during comparison period.

Table C.34: Magnitude of Elev **Table C.34: Magnitude of Elevation in Seasonal Average Parameter Concentrations between (SDLT1, SDLT 12 and SDLT9) a Sheardown Lake Tributaries (SDLT1, SDLT 12 and SDLT9) and Reference Creek Stations in 2013), Mary River Project CRE 2023, and between 2023 and the Baseline Period (2005 to 2013), Mary River Project CREMP**

	Parameter	SDLT1 Station D1-05 (Reach 4) 2023 vs Baseline			SDLT1 Station D1-00 (Reach 1) 2023 vs Baseline			SDLT12 2023 vs Baseline		SDLT9 2023 vs Baseline		
		Spring	Summer	Fall	Spring	Summer	Fall	Spring	Summer	Spring	Summer	Fall
Total Metals	Conductivity (lab)	2.78	4.00	2.67	1.70	2.87	2.11	4.49	1.42	0.842	1.40	1.48
	pH (lab)	1.05	1.02	1.05	1.01	1.01	1.00	1.03	1.00	0.918	0.935	0.938
	Hardness (as $CaCO_3$)	-	-	-	-	-	-	3.39	1.25	0.815	1.16	1.25
	Total Suspended Solids (TSS)	2.55	1.35	0.500	2.20	4.30	0.900	0.600	0.500	0.500	0.500	0.286
	Total Dissolved Solids (TDS)	2.84	3.87	2.36	1.57	2.79	1.92	4.09	1.21	0.798	1.41	1.31
	Turbidity	34.1	19.5	3.85	8.04	12.7	5.54	2.87	16.2	0.280	3.95	0.400
	Alkalinity (as $CaCO_3$)	1.82	1.34	1.21	0.994	1.09	1.04	3.58	1.20	0.833	1.01	1.07
	Total Ammonia	0.0370	0.245	0.0676	0.0455	0.226	0.167	0.250	0.167	0.250	41.2	62.0
	Nitrate	9.01	59.6	16.5	4.33	27.2	16.6	4.17	2.15	10.2	70.8	82.6
	Nitrite	2.00	4.40	1.82	2.00	3.20	1.90	-	-	2.00	7.60	12.0
	Total Kjeldahl Nitrogen (TKN)	0.989	2.65	2.48	0.555	1.48	2.16	1.24	1.06	1.38	10.4	11.9
	Dissolved Organic Carbon	0.447	1.14	0.993	0.525	0.779	1.02	0.522	0.846	0.593	1.27	0.982
	Total Organic Carbon	0.467	0.829	1.09	0.400	0.827	0.983	0.952	0.935	0.555	1.13	0.784
	Total Phosphorus	0.960	1.07	0.733	0.986	1.11	0.471	4.63	0.167	0.800	0.733	0.667
	Phenols	-	-	-	-	-	-	1.00	1.00	1.00	1.00	1.00
	Bromide (Br)	0.880	1.56	1.80	0.760	1.60	3.68	2.00	0.400	0.400	0.400	0.400
	Chloride (Cl)	5.90	10.9	5.89	3.85	9.39	6.83	5.43	4.18	1.02	1.15	1.22
	Sulphate (SO_4)	35.4	27.8	9.59	4.90	21.0	8.09	16.3	6.83	1.12	2.76	1.60
	Aluminum (Al)	28.8	12.4	2.68	3.64	13.1	5.75	4.94	3.10	0.731	2.36	0.948
	Antimony (Sb)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	Arsenic (As)	1.00	1.00	1.00	1.10	1.06	1.00	1.10	1.00	1.00	1.00	1.00
	Barium (Ba)	3.22	3.67	2.66	1.89	2.43	2.00	4.40	1.58	1.13	1.67	1.93
	Beryllium (Be)	0.200	1.00	1.00	0.200	1.00	1.00	0.0400	0.0400	0.0400	0.0400	0.0400
	Bismuth (Bi)	0.143	0.167	0.167	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100
	Boron (B)	1.20	1.05	1.30	1.14	0.980	1.36	2.10	1.00	1.00	1.00	1.00
	Cadmium (Cd)	1.12	5.57	1.42	1.73	4.89	2.48	2.86	0.500	0.500	0.500	0.500
	Calcium (Ca)	2.53	3.46	2.69	1.53	2.33	1.91	4.08	1.26	0.792	1.25	1.26
	Chromium (Cr)	3.73	2.49	3.47	2.40	2.36	3.28	1.00	1.00	1.00	1.00	1.00
	Cobalt (Co)	2.80	8.30	3.10	2.45	7.50	3.20	1.33	0.667	1.00	1.00	1.00
	Copper (Cu)	0.690	0.771	1.01	0.787	1.01	1.23	2.19	1.01	2.45	1.16	1.20
	Iron (Fe)	24.0	17.9	3.00	3.58	5.67	2.84	2.57	0.733	0.270	1.27	0.433
	Lead (Pb)	3.74	1.86	0.870	2.62	6.37	1.28	-	-	-	-	-
	Lithium (Li)	9.80	5.98	9.07	8.80	3.79	4.74	0.720	0.340	0.240	0.340	0.320
	Magnesium (Mg)	2.36	3.70	2.66	1.51	2.69	2.31	4.34	1.40	0.830	1.30	1.22
	Manganese (Mn)	22.1	136	3.63	3.55	19.3	5.98	20.1	20.2	0.117	2.80	1.11
	Mercury (Hg)	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500
	Molybdenum (Mo)	5.06	4.50	3.17	3.15	4.19	2.89	4.94	1.57	1.29	2.21	1.27
	Nickel (Ni)	0.887	1.32	1.24	0.777	1.46	1.44	2.32	1.18	1.90	1.18	1.33
	Potassium (K)	3.78	3.42	2.80	2.84	3.08	2.55	6.84	2.52	1.54	2.32	2.07
	Selenium (Se)	1.42	64.1	2.87	1.03	53.4	2.64	0.0500	0.0500	0.0500	0.0500	0.0500
	Silicon (Si)	1.61	1.68	1.59	1.10	1.79	1.42	1.69	0.705	0.784	1.00	1.21
	Silver (Ag)	2.86	10.0	10.0	10.0	10.0	10.0	1.00	1.00	1.00	1.00	1.00
	Sodium (Na)	5.33	5.59	2.86	3.00	4.70	2.86	51.6	9.89	2.39	5.41	5.24
	Strontium (Sr)	15.0	17.4	13.3	6.93	9.24	8.00	4.96	1.82	1.05	1.64	1.80
	Thallium (Tl)	2.00	1.56	1.67	1.70	2.00	1.50	0.100	0.100	0.100	0.100	0.100
	Tin (Sn)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	Titanium (Ti)	6.51	3.53	0.420	1.30	2.25	0.330	0.156	0.0300	0.0300	0.0300	0.0300
	Uranium (U)	4.06	6.00	3.86	2.80	6.24	3.72	40.0	4.32	1.05	4.02	1.99
	Vanadium (V)	0.735	0.611	0.556	0.600	0.820	0.500	0.500	0.500	0.500	0.500	0.500
	Zinc (Zn)	2.40	1.30	2.90	1.04	1.11	2.89	3.00	3.00	3.00	3.00	2.14

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Denotes moderate elevation (mean concentration five to 10 times higher than respective mean reference or baseline period value).
Denotes highly elevated concentration (mean concentration greater than 10 times higher than respective mean reference or baseline period value).
Denotes differences in method detection limit between the indicated study area and that of the reference creeks, precluding an evaluation of magnitude of elevation; or no data available for the analyte during comparison period.

Table C.35: Magnitude of Elevation in Seasonal Average Parameter Concentrations between Sheardown Lake Tributaries (SDLT1, SDLT12 and SDLT9) and Reference Creek Stations in 2023, and at SDLT1 between 2023 and the Baseline Period (2005 to 2013), Mary River Project CREMP

	Parameter	SDLT1 Station D1-05 (Reach 4) 2023 vs Reference Creek 2023			SDLT1 Station D1-00 (Reach 1) 2023 vs Reference Creek 2023			SDLT12 2023 vs Reference Creek 2023		SDLT9 2023 vs Reference Creek 2023 vs Reference Creek 2023			SDLT1 Station D1-05 (Reach 4) 2023 vs Baseline			SDLT1 Station D1-00 (Reach 1) 2023 vs Baseline			SDLT12 2023 vs Baseline		SDLT9 2023 vs Baseline		
		Spring	Summer	Fall	Spring	Summer	Fall	Spring	Summer	Spring	Summer	Fall	Spring	Summer	Fall	Spring	Summer	Fall	Spring	Summer	Spring	Summer	Fall
Dissolved Metals	Aluminum (Al)	0.652	0.216	0.321	0.803	0.235	0.312	0.322	0.106	0.240	0.102	0.130	1.20	1.34	1.10	1.72	2.19	1.62	1.88	2.55	3.18	1.59	0.833
	Antimony (Sb)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	Arsenic (As)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	Barium (Ba)	6.97	4.36	3.55	6.91	4.11	3.46	8.99	3.09	5.00	2.59	2.35	2.71	3.30	2.65	3.08	2.88	2.43	4.41	1.34	1.20	1.60	2.02
	Beryllium (Be)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.200	0.200	0.200	0.0667	0.0857	0.0667	0.0400	0.0400	0.0400	0.0400	0.0400
	Bismuth (Bi)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.167	0.167	0.167	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100
	Boron (B)	1.20	1.40	1.40	1.10	1.60	1.40	1.90	1.00	1.00	1.00	1.00	1.20	1.40	1.27	1.10	1.23	1.40	1.90	1.00	1.00	1.00	1.00
	Cadmium (Cd)	5.02	30.2	8.54	3.38	14.6	6.70	5.24	1.00	1.00	1.00	1.00	1.36	15.1	4.27	1.69	6.64	3.35	2.62	0.500	0.500	0.500	0.500
	Calcium (Ca)	7.76	4.42	3.60	7.50	4.32	3.62	9.69	2.99	5.77	2.05	2.00	2.56	3.27	2.48	1.48	2.37	1.83	3.24	1.14	0.812	1.13	1.24
	Chromium (Cr)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	4.65	5.00	2.43	5.00	5.00	5.00	1.00	1.00	1.00	1.00	1.00
	Cobalt (Co)	1.00	6.40	2.80	1.00	4.90	2.70	1.00	1.00	1.00	1.00	1.00	1.00	6.40	2.00	1.00	4.90	2.70	1.00	1.00	1.00	1.00	1.00
	Copper (Cu)	3.39	2.29	2.17	3.71	2.16	1.94	3.62	1.34	2.93	1.08	1.23	0.416	0.692	0.805	0.511	0.848	0.968	1.95	0.801	2.89	1.00	1.08
	Iron (Fe)	0.800	0.541	0.714	1.20	0.811	2.14	0.800	0.541	0.800	1.41	0.714	0.375	0.571	0.500	0.323	0.321	0.632	0.333	0.333	0.333	0.867	0.333
	Lead (Pb)	1.00	0.990	1.00	1.00	0.990	1.00	1.86	0.990	1.00	0.990	1.00	0.536	1.00	0.625	1.00	1.00	1.00	1.86	1.00	1.00	1.00	1.00
	Lithium (Li)	4.80	5.40	7.20	4.40	5.30	6.20	3.70	2.20	1.40	1.10	1.50	2.40	2.29	2.39	5.24	3.93	4.43	0.740	0.440	0.280	0.220	0.300
	Magnesium (Mg)	8.63	5.27	3.81	9.10	5.59	4.26	11.3	3.49	6.44	2.07	2.10	2.36	3.75	2.27	1.56	2.94	1.96	3.56	1.37	0.821	1.18	1.25
	Manganese (Mn)	2.37	258	2.70	10.3	120	15.2	2.21	4.14	0.206	2.88	0.940	3.41	159	3.02	3.02	21.0	4.73	10.2	28.8	0.0984	2.62	2.40
	Mercury (Hg)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500
	Molybdenum (Mo)	66.8	27.4	15.6	56.7	21.7	11.0	24.6	4.91	5.65	1.74	1.37	7.30	6.23	2.54	4.09	3.96	2.21	4.61	1.50	1.36	1.99	0.960
	Nickel (Ni)	1.16	1.95	1.79	1.54	2.51	2.43	3.04	2.30	2.62	2.03	2.45	0.569	1.19	0.980	0.529	1.01	1.04	2.11	1.02	2.43	1.01	1.21
	Potassium (K)	15.9	7.99	6.19	14.2	7.79	5.62	11.8	3.47	4.81	1.94	2.09	3.95	3.68	2.44	2.87	3.26	2.21	6.73	2.05	1.69	1.81	2.09
	Selenium (Se)	3.30	14.5	6.56	2.28	12.5	5.68	1.00	0.980	1.00	0.980	1.00	1.65	7.42	3.28	1.14	6.35	2.84	0.0500	0.0500	0.0500	0.0500	0.0500
	Silicon (Si)	3.49	1.69	1.67	3.31	1.70	1.79	1.75	1.28	3.28	0.925	1.06	1.29	1.74	1.27	0.952	1.41	1.19	1.52	0.727	0.788	0.934	1.22
	Silver (Ag)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	10.0	10.0	10.0	10.0	10.0	10.0	1.00	1.00	1.00	1.00	1.00
	Sodium (Na)	5.16	3.29	2.36	5.46	3.51	2.87	26.7	2.32	2.45	0.819	1.01	5.59	5.61	2.79	2.88	4.58	2.84	54.7	8.02	2.62	4.53	5.01
	Strontium (Sr)	29.1	13.1	11.0	24.5	10.8	8.90	6.78	2.03	3.80	1.34	1.17	16.3	15.4	13.5	7.66	8.91	8.13	4.64	1.65	1.09	1.53	1.67
	Thallium (Tl)	1.20	1.50	1.60	1.20	1.40	1.20	1.00	1.00	1.00	1.00	1.00	0.300	1.50	1.33	0.218	0.350	0.218	0.100	0.100	0.100	0.100	0.100
	Tin (Sn)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	Titanium (Ti)	0.638	0.346	0.591	0.638	0.346	0.591	0.638	0.346	0.638	0.346	0.591	0.0462	0.0632	0.0417	0.0300	0.0300	0.0300	0.0300	0.0300	0.0300	0.0300	0.0300
	Uranium (U)	19.5	7.21	4.29	18.3	6.94	3.49	9.40	1.27	1.72	0.279	0.184	4.04	7.13	3.00	2.80	6.25	3.42	36.7	3.62	1.02	3.44	1.46
	Vanadium (V)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.541	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500
	Zinc (Zn)	1.00	0.833	1.00	1.30	1.83	3.70	1.90	0.833	1.40	0.833	1.00	0.800	0.500	1.00	0.243	0.825	1.18	1.90	1.00	1.40	1.00	1.00

Denotes parameter with an AEMP benchmark.
Denotes slight elevation (mean concentration three to five times higher than respective mean reference or baseline period value).
Denotes moderate elevation (mean concentration five to 10 times higher than respective mean reference or baseline period value).
Denotes highly elevated concentration (mean concentration greater than 10 times higher than respective mean reference or baseline period value).
Denotes differences in method detection limit between the 2022 and reference area or baseline data, precluding an evaluation of magnitude of elevation.

Table C.36: **Dissolved Metal Concentrations at Sheardown Lake Tributary 1 (SDLT1), Sheardown Lake Tributary 9 (SDLT9), and Sheardown Lake Tributary 12 (SDLT12) Water Quality Monitoring Stations, Mary River Project CREMP, 2023**

	Parameters	Units	Spring Sampling Event				Summer Sampling Event				Fall Sampling Event		
			Sheardown Lake Tributary 1		Sheardown Lake Tributary 12	Sheardown Lake Tributary 9	Sheardown Lake Tributary 1		Sheardown Lake Tributary 12	Sheardown Lake Tributary 9	Sheardown Lake Tributary 1		Sheardown Lake Tributary 9
			D1-05	D1-00	LDFG-OUT	MS-C-G	D1-05	D1-00	LDFG-OUT	MS-C-G	D1-05	D1-00	MS-C-G
			16-Jul-23	16-Jul-23	16-Jul-23	16-Jul-23	24-Aug-23	24-Aug-23	24-Aug-23	24-Aug-23	19-Sep-23	16-Sep-23	17-Sep-23
Dissolved Metals	Aluminum (Al)	mg/L	0.0091	0.0117	0.0047	0.0035	0.2080	0.3930	0.0028	0.0052	0.0037	0.0036	0.0015
	Antimony (Sb)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00011	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)	mg/L	0.00986	0.0123	0.0160	0.0089	0.0268	0.0269	0.0173	0.0139	0.0249	0.0243	0.0165
	Beryllium (Be)	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
	Bismuth (Bi)	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)	mg/L	<0.010	0.011	0.019	<0.010	0.015	0.016	<0.010	<0.010	0.0140	0.0140	<0.010
	Cadmium (Cd)	mg/L	0.0000244	0.0000169	0.0000262	<0.0000050	0.000174	0.000083	<0.0000050	<0.0000050	0.0000427	0.0000335	<0.0000050
	Calcium (Ca)	mg/L	16.3	20.3	26.2	15.6	46.2	44.8	30.2	22.7	43.9	44.2	24.4
	Chromium (Cr)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	0.00064	0.001	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Cobalt (Co)	mg/L	<0.00010	<0.00010	0.0001	<0.00010	0.00083	0.00075	<0.00010	<0.00010	0.0002800	0.000270	<0.00010
	Copper (Cu)	mg/L	0.00104	0.00128	0.00125	0.00101	0.00250	0.00255	0.00117	0.00108	0.00210	0.00188	0.00119
	Iron (Fe)	mg/L	<0.010	0.015	<0.010	<0.010	0.329	0.624	<0.010	0.038	<0.010	0.0300	<0.010
	Lead (Pb)	mg/L	<0.000050	<0.000050	0.000093	<0.000050	0.000228	0.000382	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)	mg/L	0.0044	0.0044	0.0037	0.0014	0.0052	0.0048	0.0022	0.0017	0.00720	0.00620	0.00150
	Magnesium (Mg)	mg/L	10.7	13.8	17.2	9.77	32.8	33.7	21.8	14.2	27.4	30.6	15.1
	Manganese (Mn)	mg/L	0.00203	0.006	0.00129	0.00012	0.101000	0.05330	0.00144	0.00141	0.001350	0.00760	0.00047
	Mercury (Hg)	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)	mg/L	0.00513	0.00503	0.00218	0.000501	0.01130	0.00906	0.00192	0.00069	0.00709	0.00501	0.00062
	Nickel (Ni)	mg/L	0.00054	0.00077	0.00152	0.00131	0.00147	0.00206	0.00120	0.00120	0.001000	0.00136	0.00137
	Potassium (K)	mg/L	3.78	3.57	2.96	1.21	5.54	5.38	2.42	1.56	4.71	4.28	1.59
	Selenium (Se)	mg/L	0.00011	0.000114	<0.000050	<0.000050	0.000641	0.000534	<0.000050	<0.000050	0.000328	0.000284	<0.000050
	Silicon (Si)	mg/L	1.08	1.09	0.58	1.08	1.95	2.35	1.28	1.01	1.61	1.72	1.02
	Silver (Ag)	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)	mg/L	1.52	1.97	9.62	0.883	5.87	6.34	4.10	1.60	4.49	5.46	1.92
	Strontium (Sr)	mg/L	0.049	0.0552	0.0153	0.00856	0.1360	0.1110	0.0200	0.0134	0.1390	0.1120	0.0147
	Thallium (Tl)	mg/L	0.00001	0.000012	<0.000010	<0.000010	0.000021	0.000022	<0.000010	<0.000010	0.0000160	0.0000120	<0.000010
	Tin (Sn)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)	mg/L	<0.00030	<0.00030	<0.00030	<0.00030	0.0106	0.0225	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
	Uranium (U)	mg/L	0.00193	0.00321	0.00165	0.000302	0.01650	0.01580	0.00280	0.00068	0.01930	0.01570	0.00083
	Vanadium (V)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	0.00055	0.00082	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)	mg/L	<0.0010	0.0013	0.0019	0.0014	<0.0030	0.0040	<0.0010	<0.0030	<0.0010	0.00370	<0.0010

Note: Station LDFG-OUT (Sheardown Lake Tributary 12) was dry during fall sampling event, therefore no data are available.

Table C.37: ***In Situ*** **Water Quality Profile Data Collected at Sheardown Lake NW (DL0-01) Water Quality Monitoring Stations in Winter, Mary River Project CREMP, April 2023**

Depth (m)	Temperature (°C)						Dissolved Oxygen (mg/L)						Dissolved Oxygen (% Saturation)					
	DD Hab9	DL0-01-5	DL0-01-1	DL0-01-4	DL0-01-2	DL0-01-7	DD Hab9	DL0-01-5	DL0-01-1	DL0-01-4	DL0-01-2	DL0-01-7	DD Hab9	DL0-01-5	DL0-01-1	DL0-01-4	DL0-01-2	DL0-01-7
	10-Apr-23	10-Apr-23	10-Apr-23	10-Apr-23	10-Apr-23	10-Apr-23	10-Apr-23	10-Apr-23	10-Apr-23	10-Apr-23	10-Apr-23	10-Apr-23	10-Apr-23	10-Apr-23	10-Apr-23	10-Apr-23	10-Apr-23	10-Apr-23
1.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2.0	0.3	0.2	0.6	0.6	0.6	0.5	13.82	13.40	13.44	14.02	14.53	12.87	98.1	95.1	96.0	100.1	97.0	92.5
3.0	0.6	0.6	0.7	0.6	0.8	0.7	13.66	13.33	13.41	14.04	13.48	13.06	98.2	96.3	96.7	100.8	97.3	94.0
4.0	1.1	1.3	1.0	1.0	1.2	1.1	13.45	13.22	13.34	13.90	13.37	13.06	97.7	96.2	96.9	100.6	97.1	94.7
5.0	1.3	0.3	1.3	1.1	1.3	1.3	13.36	13.15	13.22	13.77	13.22	13.03	97.4	95.9	96.4	100.0	96.3	95.0
6.0	1.3	1.4	1.4	-	1.3	1.3	13.27	13.08	13.17	-	13.00	13.05	96.8	95.5	96.2	-	96.1	95.2
7.0	1.4	1.4	1.4	-	1.4	1.4	13.01	13.04	13.12	-	13.06	13.03	95.2	95.3	95.9	-	95.5	95.2
8.0	1.4	1.5	1.4	-	1.4	1.4	12.11	12.97	13.06	-	13.03	12.98	94.4	94.9	95.5	-	95.3	94.8
9.0	-	1.5	1.5	-	1.5	1.4	-	12.84	12.95	-	12.96	12.96	-	94.1	94.8	-	94.9	94.8
10.0	-	1.5	1.5	-	1.5	1.5	-	12.73	12.76	-	12.84	12.89	-	93.3	93.7	-	94.1	94.4
11.0	-	1.6	1.6	-	1.6	1.5	-	12.58	12.62	-	12.71	12.70	-	92.4	93.4	-	93.3	93.0
12.0	-	1.6	1.6	-	1.6	-	-	12.45	12.23	-	12.62	-	-	91.5	89.8	-	92.7	-
13.0	-	1.7	1.7	-	1.6	-	-	12.32	12.07	-	12.45	-	-	90.6	88.7	-	91.4	-
14.0	-	1.7	-	-	1.6	-	-	12.14	-	-	12.20	-	-	89.4	-	-	89.6	-
15.0	-	1.8	1.7	-	1.6	-	-	11.85	11.30	-	11.89	-	-	87.4	87.0	-	87.3	-
16.0	-	1.8	1.8	-	-	-	-	11.60	11.43	-	-	-	-	85.8	84.4	-	-	-
17.0	-	1.9	1.8	-	-	-	-	11.42	11.34	-	-	-	-	84.6	83.8	-	-	-
18.0	-	1.9	1.9	-	-	-	-	11.30	11.26	-	-	-	-	83.8	83.4	-	-	-
19.0	-	2.0	1.9	-	-	-	-	11.08	11.14	-	-	-	-	82.3	82.5	-	-	-
20.0	-	2.0	2.0	-	-	-	-	10.67	10.77	-	-	-	-	79.3	80.0	-	-	-
21.0	-	2.1	2.0	-	-	-	-	10.33	10.75	-	-	-	-	76.8	79.9	-	-	-
22.0	-	2.2	-	-	-	-	-	8.94	-	-	-	-	-	65.6	-	-	-	-

Notes: "-" indicates no data available. The total depth of the water column at each sampling station was not recorded but deepest measurements are within 1 m of lake bottom.

Table C.37: ***In Situ*** **Water Quality Profile Data Collected at Sheardown Lake NW (DL0-01) Water Quality Monitoring Stations in Winter, Mary River Project CREMP, April 2023**

Depth (m)	pH (pH units)						Specific Conductance (µS/cm)					
	DD Hab9	DL0-01-5	DL0-01-1	DL0-01-4	DL0-01-2	DL0-01-7	DD Hab9	DL0-01-5	DL0-01-1	DL0-01-4	DL0-01-2	DL0-01-7
	10-Apr-23	10-Apr-23	10-Apr-23	10-Apr-23	10-Apr-23	10-Apr-23	10-Apr-23	10-Apr-23	10-Apr-23	10-Apr-23	10-Apr-23	10-Apr-23
1.0	-	-	-	-	-	-	-	-	-	-	-	-
2.0	7.87	7.83	7.85	7.83	7.89	7.98	215.0	213.3	212.4	226.4	212.4	219.0
3.0	7.86	7.85	7.85	7.83	7.88	7.93	211.0	208.3	208.6	222.5	209.0	211.0
4.0	7.84	7.85	7.85	7.82	7.87	7.90	206.7	205.9	206.3	215.4	207.0	209.1
5.0	7.85	7.85	7.84	7.83	7.86	7.89	205.8	204.2	205.4	213.2	206.4	208.0
6.0	7.85	7.84	7.84	-	7.86	7.88	204.9	204.1	204.8	-	205.5	207.7
7.0	7.84	7.84	7.85	-	7.85	7.87	204.3	203.9	204.5	-	205.0	207.3
8.0	7.81	7.84	7.84	-	7.84	7.85	206.7	202.8	203.9	-	204.2	206.9
9.0	-	7.82	7.83	-	7.84	7.85	-	202.1	203.0	-	203.3	206.1
10.0	-	7.81	7.81	-	7.82	7.84	-	201.6	202.5	-	202.8	205.3
11.0	-	7.80	7.78	-	7.81	7.81	-	200.9	202.6	-	202.2	205.3
12.0	-	7.79	7.73	-	7.79	-	-	200.3	202.2	-	201.8	-
13.0	-	7.77	7.71	-	7.77	-	-	199.8	201.3	-	202.2	-
14.0	-	7.75	-	-	7.72	-	-	199.2	-	-	204.0	-
15.0	-	7.72	7.69	-	7.67	-	-	198.6	201.1	-	205.5	-
16.0	-	7.70	7.65	-	-	-	-	198.0	200.7	-	-	-
17.0	-	7.67	7.64	-	-	-	-	197.6	199.9	-	-	-
18.0	-	7.67	7.63	-	-	-	-	197.2	199.6	-	-	-
19.0	-	7.65	7.62	-	-	-	-	196.8	199.9	-	-	-
20.0	-	7.62	7.58	-	-	-	-	196.8	200.9	-	-	-
21.0	-	7.58	7.57	-	-	-	-	196.7	201.7	-	-	-
22.0	-	7.51	-	-	-	-	-	198.7	-	-	-	-

Notes: "-" indicates no data available. The total depth of the water column at each sampling station was not recorded but deepest measurements are within 1 m of lake bottom.

Table C.38: ***In Situ*** **Water Quality Profile Data Collected at Sheardown Lake NW (DL0-01) Water Quality Monitoring Stations in Summer, Mary River Project CREMP, July 2023**

Depth (m)	Temperature (°C)						Dissolved Oxygen (mg/L)						Dissolved Oxygen (% Saturation)					
	DD Hab9	DL0-01-5	DL0-01-1	DL0-01-4	DL0-01-2	DL0-01-7	DD Hab9	DL0-01-5	DL0-01-1	DL0-01-4	DL0-01-2	DL0-01-7	DD Hab9	DL0-01-5	DL0-01-1	DL0-01-4	DL0-01-2	DL0-01-7
	29-Jul-23	30-Jul-23	30-Jul-23	29-Jul-23	30-Jul-23	30-Jul-23	29-Jul-23	30-Jul-23	30-Jul-23	29-Jul-23	30-Jul-23	30-Jul-23	29-Jul-23	30-Jul-23	30-Jul-23	29-Jul-23	30-Jul-23	30-Jul-23
1.0	12.2	13.1	12.9	14.0	12.8	12.9	11.05	10.71	11.03	10.86	10.89	11.01	105.5	104.8	107.2	107.6	105.6	107.1
2.0	11.2	12.9	12.3	13.3	12.2	12.9	11.21	10.93	11.16	10.96	11.13	11.04	104.3	106.0	106.9	107.1	106.6	107.3
3.0	9.3	12.0	10.6	10.4	10.8	12.7	11.45	11.16	11.45	11.39	11.47	11.10	101.9	106.2	105.5	103.3	105.4	106.8
4.0	8.6	9.0	9.2	9.0	9.2	10.5	11.52	11.57	11.63	11.46	11.75	11.55	100.9	103.0	103.8	101.2	103.9	105.7
5.0	7.6	7.7	7.6	-	8.2	9.5	11.54	11.76	11.78	-	11.77	11.70	98.5	101.1	100.9	-	102.6	105.1
6.0	7.2	7.4	7.3	-	-	7.6	11.54	11.78	11.81	-	-	11.77	97.6	100.3	100.5	-	-	100.7
7.0	7.0	7.0	7.1	-	7.2	6.9	11.54	11.81	11.80	-	11.79	11.80	97.2	99.7	100.0	-	100.0	99.5
8.0	6.9	6.7	6.8	-	6.7	6.7	11.51	11.82	11.81	-	11.80	11.81	96.6	99.2	99.3	-	99.0	99.2
9.0	-	6.5	6.7	-	6.5	6.7	-	11.85	11.81	-	11.82	11.82	-	98.7	99.0	-	98.6	99.0
10.0	-	6.4	6.5	-	6.3	6.6	-	11.82	11.80	-	11.84	11.83	-	98.4	98.6	-	98.5	99.2
11.0	-	6.2	6.4	-	6.2	-	-	11.83	11.83	-	11.83	-	-	98.1	98.4	-	98.2	-
12.0	-	6.2	6.3	-	6.2	-	-	11.81	11.85	-	11.81	-	-	97.7	98.3	-	97.9	-
13.0	-	6.1	6.1	-	6.1	-	-	11.81	11.84	-	11.80	-	-	97.6	97.8	-	97.6	-
14.0	-	6.0	6.0	-	6.0	-	-	11.82	11.85	-	11.82	-	-	97.5	97.7	-	97.5	-
15.0	-	6.0	6.0	-	5.9	-	-	11.82	11.85	-	11.81	-	-	97.3	97.5	-	97.0	-
16.0	-	6.0	5.9	-	5.8	-	-	11.81	11.84	-	11.78	-	-	97.3	97.4	-	96.7	-
17.0	-	5.9	5.9	-	-	-	-	11.81	11.85	-	-	-	-	97.2	97.4	-	-	-
18.0	-	5.9	5.9	-	-	-	-	11.81	11.83	-	-	-	-	97.1	97.1	-	-	-
19.0	-	5.9	5.9	-	-	-	-	11.79	11.81	-	-	-	-	96.8	97.0	-	-	-
20.0	-	5.8	-	-	-	-	-	11.78	-	-	-	-	-	96.6	-	-	-	-
21.0	-	5.8	-	-	-	-	-	11.75	-	-	-	-	-	96.4	-	-	-	-

Notes: "-" = no data available. The total depth of the water column at each sampling station was not recorded but deepest measurements are within 1 m of lake bottom.

Table C.38: ***In Situ*** **Water Quality Profile Data Collected at Sheardown Lake NW (DL0-01) Water Quality Monitoring Stations in Summer, Mary River Project CREMP, July 2023**

Depth (m)	pH (pH units)						Specific Conductance (µS/cm)					
	DD Hab9	DL0-01-5	DL0-01-1	DL0-01-4	DL0-01-2	DL0-01-7	DD Hab9	DL0-01-5	DL0-01-1	DL0-01-4	DL0-01-2	DL0-01-7
	29-Jul-23	30-Jul-23	30-Jul-23	29-Jul-23	30-Jul-23	30-Jul-23	29-Jul-23	30-Jul-23	30-Jul-23	29-Jul-23	30-Jul-23	30-Jul-23
1.0	8.02	8.11	8.09	8.03	8.02	8.08	162.9	163.1	162.9	163.2	162.7	162.7
2.0	7.95	8.12	8.09	8.04	8.05	8.07	164.6	163.4	163.1	164.1	163.2	162.7
3.0	7.71	8.11	8.08	8.04	8.03	8.07	163.9	163.5	166.3	164.4	163.4	162.9
4.0	7.55	8.05	7.97	7.94	7.99	8.06	163.8	163.2	164.0	163.8	164.7	163.8
5.0	7.67	7.94	7.92	-	7.87	7.98	164.4	164.4	164.5	-	163.6	163.2
6.0	7.57	7.88	7.85	-	-	7.68	164.4	164.1	164.0	-	-	163.8
7.0	7.51	7.84	7.82	-	7.80	7.50	164.2	164.3	164.2	-	164.5	164.3
8.0	7.47	7.80	7.80	-	7.59	7.49	164.4	164.4	164.4	-	164.3	164.2
9.0	-	7.79	7.78	-	7.45	7.47	-	164.6	164.6	-	164.4	164.3
10.0	-	7.78	7.77	-	7.42	7.45	-	164.7	164.6	-	164.6	164.4
11.0	-	7.76	7.76	-	7.42	-	-	164.9	164.6	-	164.7	-
12.0	-	7.75	7.75	-	7.40	-	-	164.9	164.7	-	164.7	-
13.0	-	7.75	7.74	-	7.38	-	-	164.9	164.9	-	164.8	-
14.0	-	7.74	7.73	-	7.37	-	-	165.0	165.0	-	165.0	-
15.0	-	7.73	7.72	-	7.37	-	-	165.0	165.1	-	165.2	-
16.0	-	7.70	7.71	-	7.36	-	-	165.1	165.1	-	165.2	-
17.0	-	7.62	7.70	-	-	-	-	165.1	165.1	-	-	-
18.0	-	7.57	7.68	-	-	-	-	165.1	165.2	-	-	-
19.0	-	7.51	7.65	-	-	-	-	165.2	165.2	-	-	-
20.0	-	7.49	-	-	-	-	-	165.2	-	-	-	-
21.0	-	7.48	-	-	-	-	-	165.2	-	-	-	-

Notes: "-" = no data available. The total depth of the water column at each sampling station was not recorded but deepest measurements are within 1 m of lake bottom.

Table C.39: ***In Situ*** **Water Quality Profile Data Collected at Sheardown Lake NW (DL0-01) Water Quality Monitoring Stations in Fall, Mary River Project CREMP, August 2023**

Depth (m)	Temperature (°C)						Dissolved Oxygen (mg/L)						Dissolved Oxygen (% Saturation)					
	DD Hab9	DL0-01-5	DL0-01-1	DL0-01-4	DL0-01-2	DL0-01-7	DD Hab9	DL0-01-5	DL0-01-1	DL0-01-4	DL0-01-2	DL0-01-7	DD Hab9	DL0-01-5	DL0-01-1	DL0-01-4	DL0-01-2	DL0-01-7
	11-Sep-23	11-Sep-23	11-Sep-23	11-Sep-23	11-Sep-23	11-Sep-23	11-Sep-23	11-Sep-23	11-Sep-23	11-Sep-23	11-Sep-23	11-Sep-23	11-Sep-23	11-Sep-23	11-Sep-23	11-Sep-23	11-Sep-23	11-Sep-23
1.0	5.1	5.2	5.1	4.7	5.1	5.0	12.21	12.20	12.34	12.36	12.80	12.50	98.3	98.4	99.1	98.4	97.0	96.4
2.0	-	5.2	5.1	-	5.1	5.0	-	12.19	12.25	-	12.90	12.08	-	98.3	98.5	-	97.1	96.7
3.0	5.1	5.2	5.1	4.7	5.1	5.0	12.18	12.18	12.21	12.35	12.10	12.10	98.0	98.1	98.2	98.2	97.1	96.8
4.0	5.1	-	5.1	4.7	5.1	5.0	12.17	-	12.32	12.34	12.10	12.11	97.9	-	98.9	98.2	97.1	96.9
5.0	5.1	5.2	5.1	4.5	5.1	5.0	12.16	12.16	12.20	12.35	12.10	12.11	97.9	98.0	98.0	98.1	97.1	96.9
6.0	-	5.2	5.1	-	5.1	5.0	-	12.15	12.17	-	12.10	12.12	-	97.9	97.8	-	97.1	97.0
7.0	5.1	5.2	5.1	-	-	5.0	12.14	12.15	12.16	-	-	12.12	97.7	97.9	97.7	-	-	97.0
8.0	-	-	5.1	-	5.1	5.0	-	-	12.14	-	12.90	12.11	-	-	97.6	-	97.1	96.9
9.0	-	5.2	5.1	-	5.1	5.0	-	12.14	12.13	-	12.09	12.12	-	97.8	97.5	-	97.1	97.0
10.0	-	5.2	5.1	-	5.1	-	-	12.13	12.13	-	12.09	-	-	97.8	97.5	-	97.1	-
11.0	-	-	5.1	-	5.1	-	-	-	12.12	-	12.08	-	-	-	97.4	-	97.0	-
12.0	-	5.2	5.1	-	5.1	-	-	12.12	12.11	-	12.08	-	-	97.7	97.4	-	97.0	-
13.0	-	5.2	-	-	5.1	-	-	12.12	-	-	12.08	-	-	97.7	-	-	97.0	-
14.0	-	5.2	5.1	-	-	-	-	12.12	12.10	-	-	-	-	97.7	97.3	-	-	-
15.0	-	5.2	5.1	-	-	-	-	12.11	12.10	-	-	-	-	97.6	97.2	-	-	-
16.0	-	-	5.1	-	-	-	-	-	12.09	-	-	-	-	-	97.2	-	-	-
17.0	-	5.2	5.1	-	-	-	-	12.10	12.09	-	-	-	-	97.5	97.1	-	-	-
18.0	-	5.2	5.1	-	-	-	-	12.09	12.08	-	-	-	-	97.5	97.1	-	-	-
19.0	-	5.2	-	-	-	-	-	12.08	-	-	-	-	-	97.5	-	-	-	-
20.0	-	5.2	-	-	-	-	-	12.08	-	-	-	-	-	97.4	-	-	-	-
21.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
22.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes: "-" indicates data not available. The total depth of the water column at each sampling station was not recorded but deepest measurements are within 1 m of lake bottom.

Table C.39: ***In Situ*** **Water Quality Profile Data Collected at Sheardown Lake NW (DL0-01) Water Quality Monitoring Stations in Fall, Mary River Project CREMP, August 2023**

Depth (m)	pH (pH units)						Specific Conductance (µS/cm)					
	DD Hab9	DL0-01-5	DL0-01-1	DL0-01-4	DL0-01-2	DL0-01-7	DD Hab9	DL0-01-5	DL0-01-1	DL0-01-4	DL0-01-2	DL0-01-7
	11-Sep-23	11-Sep-23	11-Sep-23	11-Sep-23	11-Sep-23	11-Sep-23	11-Sep-23	11-Sep-23	11-Sep-23	11-Sep-23	11-Sep-23	11-Sep-23
1.0	7.89	7.86	7.82	7.90	7.90	7.87	177.9	177.6	177.4	178.7	177.9	177.3
2.0	-	7.86	7.87	-	7.90	7.86	-	177.6	177.8	-	177.9	177.6
3.0	7.89	7.87	7.88	7.89	7.91	7.83	177.9	177.6	177.8	178.8	178.0	177.6
4.0	7.89	-	7.92	7.90	7.91	7.81	177.9	-	177.8	178.7	177.9	177.6
5.0	7.89	7.88	7.92	7.89	7.90	7.77	178.0	177.6	177.9	179.4	178.0	177.6
6.0	-	7.87	7.92	-	7.90	7.73	-	177.7	177.9	-	178.0	177.6
7.0	7.89	7.88	7.92	-	-	7.71	178.3	177.6	177.9	-	-	177.6
8.0	-	-	7.93	-	7.90	7.72	-	-	177.9	-	178.0	177.7
9.0	-	7.89	7.93	-	7.90	7.74	-	177.6	178.0	-	178.0	177.7
10.0	-	7.89	7.93	-	7.90	-	-	177.6	178.0	-	178.0	-
11.0	-	-	7.94	-	7.90	-	-	-	178.0	-	178.0	-
12.0	-	7.88	7.94	-	7.90	-	-	177.7	178.0	-	178.0	-
13.0	-	7.89	-	-	7.82	-	-	177.6	-	-	178.0	-
14.0	-	7.89	7.94	-	-	-	-	177.6	178.0	-	-	-
15.0	-	7.88	7.94	-	-	-	-	177.6	178.0	-	-	-
16.0	-	-	7.94	-	-	-	-	-	178.0	-	-	-
17.0	-	7.89	7.94	-	-	-	-	177.7	178.0	-	-	-
18.0	-	7.88	7.94	-	-	-	-	177.6	178.0	-	-	-
19.0	-	7.89	-	-	-	-	-	177.7	-	-	-	-
20.0	-	7.89	-	-	-	-	-	177.7	-	-	-	-
21.0	-	-	-	-	-	-	-	-	-	-	-	-
22.0	-	-	-	-	-	-	-	-	-	-	-	-

Notes: "-" indicates data not available. The total depth of the water column at each sampling station was not recorded but deepest measurements are within 1 m of lake bottom.

Table C.40: Sampling Depth, Water Clarity Measures, and Surface and Bottom *In Situ* Water Quality Measures Collected at Sheardown Lake NW (DL0-01) Benthic Invertebrate Community Stations, Mary River Project CREMP, August 2023

Categorization & Replicate ID		Date Sampled	Station Depth (m)	Secchi Depth (m)	Colour/ Clarity	Depth Sampled	Temperature (°C)	Dissolved Oxygen		pH (units)	Specific Conductance (µS/cm)	Turbidity (NTU)
								(mg/L)	(% saturation)			
Littoral (Shallow) Stations	DL0-01-9	13-Aug-23	8.0	3.04	Green/Clear	Surface	11.5	10.59	98.9	7.95	168.9	1.42
						Bottom	7.4	11.10	94.7	7.71	164.7	3.92
	DL0-01-4	13-Aug-23	8.0	2.95	Green/Clear	Surface	11.6	10.81	101.8	8.04	167.7	1.39
						Bottom	7.3	11.23	95.7	7.72	164.8	3.86
	DL0-01-3	21-Aug-23	8.5	2.45	Colourless/ Murky	Surface	8.9	11.23	100.7	7.90	168.5	2.17
						Bottom	8.9	11.06	98.9	7.92	166.8	1.83
	DL0-01-11	21-Aug-23	8.0	-	Colourless/ Murky	Surface	8.9	11.22	100.4	7.89	168.4	2.43
						Bottom	8.8	11.08	99.0	7.92	167.1	1.85
	DL0-01-10	21-Aug-23	8.0	-	Colourless/ Murky	Surface	8.9	11.21	100.3	7.57	166.0	2.36
						Bottom	8.9	11.02	98.6	7.87	167.1	2.14
Profundal (Deep) Stations	DL0-01-5	13-Aug-23	23.0	3.40	Green	Surface	12.3	10.75	102.8	8.06	167.2	1.24
						Bottom	5.8	11.42	93.5	7.36	165.3	8.01
	DL0-01-14	13-Aug-23	22.0	3.20	Clear/ Colourless	Surface	12.2	10.75	102.7	7.98	167.2	1.33
						Bottom	5.8	11.41	93.6	7.55	165.5	7.62
	DL0-01-15	13-Aug-23	22.0	3.90	Green/Clear	Surface	12.1	10.86	103.7	8.09	167.4	1.27
						Bottom	5.8	11.49	94.3	7.63	165.5	8.12
	DL0-01-2	21-Aug-23	18.5	-	Colourless/ Murky	Surface	9.0	11.23	100.7	7.89	168.8	2.26
						Bottom	8.7	10.89	96.9	7.72	175.9	2.92
	DL0-01-12	21-Aug-23	14.5	-	Colourless/ Murky	Surface	8.9	11.27	100.8	7.89	168.7	2.27
						Bottom	8.8	10.95	97.6	7.77	172.5	2.54

Table C.41: Statistical Comparison of Bottom *In Situ* Water Quality Between Sheardown Lake NW (DL0-01) Littoral and Profundal Stations, Mary River Project CREMP, August 2023

Parameter	Statistical Test Results				Summary Statistics						
	Statistical Test	Transformation	Significant Difference Between Areas?	P-value	Lake Zone	Sample Size	Mean	Standard Deviation	Standard Error	Minimum	Maximum
Secchi Depth (m)	tequal	None	NO	0.068	Littoral	3	2.81	0.316	0.182	2.45	3.04
					Profundal	3	3.50	0.361	0.208	3.20	3.90
Temperature (˚C)	tequal	log10	NO	0.134	Littoral	5	8.26	0.832	0.372	7.30	8.90
					Profundal	5	6.98	1.62	0.723	5.80	8.80
Dissolved Oxygen (mg/L)	tequal	None	NO	0.344	Littoral	5	11.1	0.0795	0.0356	11.0	11.2
					Profundal	5	11.2	0.287	0.128	10.9	11.5
Dissolved Oxygen (% saturation)	tequal	None	NO	0.117	Littoral	5	97.4	2.03	0.906	94.7	99.0
					Profundal	5	95.2	1.93	0.863	93.5	97.6
pH (units)	tequal	None	YES	0.033	Littoral	5	7.83	0.105	0.0471	7.71	7.92
					Profundal	5	7.61	0.161	0.0722	7.36	7.77
Specific Conductance (µmho/cm)	tequal	None	NO	0.249	Littoral	5	166	1.24	0.554	165	167
					Profundal	5	169	4.95	2.21	165	176

Shaded values indicate significant difference between study areas based on test p-value less than 0.05.

Notes: "-" = no data."tequal" = Student's t-test assuming equal variance.

Table C.42: Statistical Comparison of Bottom *In Situ* Water Quality Between Sheardown Lake NW (SDNW/DL0-01) and Reference Lake 3 (REF3) Stations Collected at Littoral and Profundal Depths, Mary River Project CREMP, August 2023

Lake Zone	Parameter	Statistical Test Results				Summary Statistics						
		Statistical Test	Transformation	Significant Difference Between Areas?	P-value	Study Lake	Sample Size (n)	Mean	Standard Deviation	Standard Error	Minimum	Maximum
Littoral (Shallow) Stations	Station Depth (m)	tequal	Median	YES	0.039	Reference	5	9.99	1.88	0.842	8.5	13.1
						SDNW	5	8.1	0.224	0.1	8	8.5
	Secchi Depth (m)	tequal	None	YES	0.002	Reference	2	5.97	0.364	0.258	5.71	6.22
						SDNW	3	2.81	0.316	0.182	2.45	3.04
	Temperature (˚C)	M-W	Rank	NO	0.090	Reference	5	7.66	0.631	0.282	7.2	8.4
						SDNW	5	8.26	0.832	0.372	7.3	8.9
	Dissolved Oxygen (mg/L)	tequal	None	YES	0.006	Reference	5	11.3	0.103	0.046	11.2	11.4
						SDNW	5	11.1	0.0795	0.0356	11	11.2
	Dissolved Oxygen (% saturation)	tequal	None	NO	0.870	Reference	5	97.2	0.597	0.267	96.6	98.1
						SDNW	5	97.4	2.03	0.906	94.7	99
	pH (units)	tequal	None	YES	0.008	Reference	5	7.64	0.054	0.0242	7.56	7.7
						SDNW	5	7.83	0.105	0.0471	7.71	7.92
	Specific Conductance (µS/cm)	tequal	None	YES	0.001	Reference	5	72.8	0.0837	0.0374	72.7	72.9
						SDNW	5	166	1.24	0.554	165	167
Profundal (Deep) Stations	Station Depth (m)	tequal	None	NO	0.992	Reference	5	20	2.3	1.03	17.4	23.6
						SDNW	5	20	3.52	1.57	14.5	23
	Secchi Depth (m)	-	-	-	-	Reference	-	-	-	-	-	-
						SDNW	3	3.5	0.361	0.208	3.2	3.9
	Temperature (˚C)	M-W	Rank	NO	0.668	Reference	5	7.14	0.0894	0.04	7	7.2
						SDNW	5	6.98	1.62	0.723	5.8	8.8
	Dissolved Oxygen (mg/L)	tequal	None	NO	0.597	Reference	5	11.3	0.0568	0.0254	11.2	11.4
						SDNW	5	11.2	0.287	0.128	10.9	11.5
	Dissolved Oxygen (% saturation)	tequal	None	NO	0.277	Reference	5	96.3	0.935	0.418	95.1	97.3
						SDNW	5	95.2	1.93	0.863	93.5	97.6
	pH (units)	tequal	None	NO	0.506	Reference	5	7.53	0.175	0.0781	7.24	7.66
						SDNW	5	7.61	0.161	0.0722	7.36	7.77
	Specific Conductance (µS/cm)	tequal	None	YES	0.001	Reference	5	73	0.192	0.086	72.8	73.3
						SDNW	5	169	4.95	2.21	165	176

Highlighted values indicate significant difference between study areas based on test p-value less than 0.05.

Notes: "-" = no data. "M-W" = Mann-Whitney U test; "tequal" = Student's t-test assuming equal variance.

Table C.43: Water Chemistry at Sheardown Lake NW (DL0-01) Water Quality Monitoring Stations, Mary River Project CREMP, 2023

	Parameters	Units	Water Quality Guideline (WQG)[a]	AEMP Benchmark[b]	Winter Sampling Event											
					DD-HAB9-STN1	DD-HAB9-STN1	DL0-01-5	DL0-01-5	DL0-01-1	DL0-01-1	DL0-01-4	DL0-01-4	DL0-01-2	DL0-01-2	DL0-01-7	DL0-01-7
					bottom	surface	bottom	surface	bottom	surface	bottom	surface	bottom	surface	bottom	surface
					10-Apr-23	10-Apr-23	10-Apr-23	10-Apr-23	10-Apr-23	10-Apr-23	10-Apr-23	10-Apr-23	10-Apr-23	10-Apr-23	10-Apr-23	10-Apr-23
Conventionals	Conductivity (lab)	µmho/cm	-	-	188	198	183	196	187	198	199	208	194	198	195	212
	pH (lab)	pH	6.5 - 9.0	-	7.71	7.76	7.56	7.75	7.55	7.78	7.73	7.72	7.75	7.74	7.73	7.73
	Hardness (as $CaCO_3$)	mg/L	-	-	91.9	97.7	89.3	96.6	86.4	94.7	96.1	99.6	92.9	96	91.7	97.7
	Total Suspended Solids (TSS)	mg/L	-	-	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.5
	Total Dissolved Solids (TDS)	mg/L	-	-	118	115	100	110	123	121	113	121	88	105	110	110
	Turbidity	NTU	-	-	0.13	0.14	0.18	<0.10	0.15	<0.10	<0.10	0.56	0.27	0.14	0.12	<0.10
	Alkalinity (as $CaCO_3$)	mg/L	-	-	75.4	79.2	73.2	77.1	76.3	78.9	72.4	78.4	81.9	81.9	77.1	78.2
Nutrients and Organics	Total Ammonia	mg/L	-	0.855	0.0209	0.0283	<0.0050	0.0312	<0.0050	0.0242	0.0462	0.0264	0.0249	0.0381	0.0285	0.0316
	Nitrate	mg/L	3	3	0.278	0.307	0.310	0.298	0.316	0.297	0.289	0.301	0.286	0.298	0.289	0.298
	Nitrite	mg/L	0.06	0.06	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Total Kjeldahl Nitrogen (TKN)	mg/L	-	-	0.124	0.150	0.111	0.154	0.175	0.132	0.206	0.166	0.129	0.139	0.133	0.158
	Dissolved Organic Carbon	mg/L	-	-	1.58	1.50	1.32	1.56	1.32	1.61	1.57	1.56	1.49	1.49	1.50	1.67
	Total Organic Carbon	mg/L	-	-	1.52	1.54	1.43	1.52	1.48	1.44	1.60	1.62	1.54	1.64	1.50	1.44
	Total Phosphorus	mg/L	0.020[α]	-	0.0049	<0.0020	0.0041	0.0038	<0.0020	0.0022	0.003	0.0138	0.0033	0.0028	<0.0020	0.0182
	Phenols	mg/L	0.004[α]	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Anions	Bromide (Br)	mg/L	-	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
	Chloride (Cl)	mg/L	120	120	7.38	8.17	7.150	8.10	7.29	7.99	7.71	8.06	7.52	8.13	7.77	7.84
	Sulphate (SO_4)	mg/L	218[β]	218	20.2	22.2	19.4	22.0	18.9	21.6	20.9	21.7	24.5	22.2	21.3	21.0
Total Metals	Aluminum (Al)	mg/L	0.100	0.179, 0.173[c]	0.0040	0.0036	0.0043	0.0041	0.0047	0.0037	0.0060	0.0141	0.0037	0.0063	0.0052	0.0042
	Antimony (Sb)	mg/L	0.020[α]	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)	mg/L	0.005	0.005	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)	mg/L	-	-	0.00988	0.01030	0.00970	0.01050	0.00982	0.01020	0.01030	0.01100	0.01030	0.01010	0.01000	0.01060
	Beryllium (Be)	mg/L	0.011[α]	-	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
	Bismuth (Bi)	mg/L	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)	mg/L	1.5	-	0.0240	0.0250	0.0220	0.0240	0.0220	0.0240	0.0240	0.0240	0.0240	0.0230	0.0240	0.0240
	Cadmium (Cd)	mg/L	0.00012	0.00009	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.000006
	Calcium (Ca)	mg/L	-	-	17.9	18.2	16.4	18.2	16.4	17.5	18.2	18.0	17.5	17.2	17.6	18.4
	Chromium (Cr)	mg/L	0.001	0.003	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00051	<0.00050
	Cobalt (Co)	mg/L	0.0009[α]	0.004	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)	mg/L	0.002	0.0024	0.001050	0.000950	0.000960	0.001320	0.000920	0.000920	0.000990	0.001020	0.000980	0.001000	0.001070	0.001050
	Iron (Fe)	mg/L	0.30	0.300	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.0220	<0.010	<0.010	<0.010	<0.010
	Lead (Pb)	mg/L	0.001	0.001	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)	mg/L	-	-	0.00260	0.00260	0.00230	0.00260	0.00220	0.00250	0.00260	0.00250	0.00250	0.00250	0.00260	0.00260
	Magnesium (Mg)	mg/L	-	-	12.4	13.0	11.8	12.9	11.6	12.6	12.8	13.4	12.5	12.4	12.3	13.1
	Manganese (Mn)	mg/L	0.935[β]	-	0.000380	0.000440	0.000520	0.000310	0.000520	0.000280	0.000440	0.000520	0.000320	0.000330	0.000430	0.000340
	Mercury (Hg)	mg/L	0.000026	-	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)	mg/L	0.073	-	0.00146	0.00155	0.00136	0.00154	0.00137	0.00154	0.00151	0.00165	0.00148	0.00155	0.00150	0.00157
	Nickel (Ni)	mg/L	0.025	0.025	0.000730	0.000880	0.000680	0.000750	0.000710	0.000720	0.000720	0.000810	0.000730	0.000740	0.000770	0.000730
	Potassium (K)	mg/L	-	-	1.86	1.97	1.75	1.93	1.79	1.88	1.90	2.05	1.92	1.91	1.84	1.96
	Selenium (Se)	mg/L	0.001	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	0.000052
	Silicon (Si)	mg/L	-	-	0.570	0.570	0.700	0.570	0.720	0.560	0.580	0.640	0.560	0.570	0.580	0.570
	Silver (Ag)	mg/L	0.00025	0.0001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)	mg/L	-	-	2.37	2.49	2.31	2.50	2.40	2.47	2.45	2.60	2.47	2.53	2.42	2.50
	Strontium (Sr)	mg/L	-	-	0.0201	0.0208	0.0187	0.0204	0.0189	0.0203	0.0199	0.0220	0.0195	0.0203	0.0192	0.0213
	Thallium (Tl)	mg/L	0.0008	0.0008	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Tin (Sn)	mg/L	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)	mg/L	-	-	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	0.00074	<0.00030	<0.00030	<0.00030	<0.00030
	Uranium (U)	mg/L	0.015	-	0.00235	0.00253	0.00221	0.00253	0.00227	0.00246	0.00257	0.00265	0.00249	0.00253	0.00243	0.00246
	Vanadium (V)	mg/L	0.006[α]	0.006	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)	mg/L	0.030	0.030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030

Indicates parameter concentration above applicable Water Quality Guideline.

BOLD Indicates parameter concentration above the AEMP benchmark.

Note: "-" indicates no WQG benchmark applicable.

[a] Canadian Water Quality Guideline for the protection of aquatic life (CCME 1987, 1999) except those indicated by α (Ontario Provincial Water Quality Objective [PWQO]; OMOE 1994) and β (British Columbia Water Quality Guideline [BCWQG]; BCMOE 2013). See Table 2.2 for information regarding WQG criteria.

[b] AEMP Water Quality Benchmarks developed by Intrinsik (2013) using baseline water quality data specific to Sheardown Lake.

[c] Benchmark is 0.179 mg/L and 0.173 mg/L for shallow and deep stations, respectively.

Table C.43: Water Chemistry at Sheardown Lake NW (DL0-01) Water Quality Monitoring Stations, Mary River Project CREMP, 2023

	Parameters	Units	Water Quality Guideline (WQG)[a]	AEMP Benchmark[b]	Summer Sampling Event											
					DD-HAB9-STN1	DD-HAB9-STN1	DL0-01-5	DL0-01-5	DL0-01-1	DL0-01-1	DL0-01-4	DL0-01-4	DL0-01-2	DL0-01-2	DL0-01-7	DL0-01-7
					bottom	surface	bottom	surface	bottom	surface	bottom	surface	bottom	surface	bottom	surface
					29-Jul-23	29-Jul-23	30-Jul-23	30-Jul-23	30-Jul-23	30-Jul-23	29-Jul-23	29-Jul-23	30-Jul-23	30-Jul-23	30-Jul-23	30-Jul-23
Conventionals	Conductivity (lab)	µmho/cm	-	-	175	173	173	171	173	172	175	173	172	172	174	171
	pH (lab)	pH	6.5 - 9.0	-	7.64	7.70	7.93	7.92	8.01	7.96	7.75	7.82	7.93	7.95	7.73	7.89
	Hardness (as $CaCO_3$)	mg/L	-	-	76.6	75.6	76.6	76.3	76.2	76.8	76.1	76	76.3	76.7	77.7	76.6
	Total Suspended Solids (TSS)	mg/L	-	-	<1.1	<1.4	1.4	2.2	2.2	<1.3	<1.1	<1.2	<1.3	<1.3	1.8	1.8
	Total Dissolved Solids (TDS)	mg/L	-	-	100	98	97	95	88	82	95	98	85	91	88	82
	Turbidity	NTU	-	-	8.58	7.42	6.98	6.17	6.68	6.73	8.21	7.36	6.63	6.46	7.63	6.11
	Alkalinity (as $CaCO_3$)	mg/L	-	-	69.6	67	78.1	75.7	64.5	72.1	65.0	76.9	72.5	74.3	77.5	73.6
Nutrients and Organics	Total Ammonia	mg/L	-	0.855	0.0076	0.0059	0.0071	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0058	0.0058	0.0081	<0.0050
	Nitrate	mg/L	3	3	0.260	0.248	0.244	0.248	0.246	0.244	0.251	0.245	0.244	0.241	0.262	0.240
	Nitrite	mg/L	0.06	0.06	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Total Kjeldahl Nitrogen (TKN)	mg/L	-	-	0.129	0.107	0.110	0.128	0.168	0.122	0.101	0.097	0.101	0.101	0.105	0.100
	Dissolved Organic Carbon	mg/L	-	-	1.90	1.93	1.49	1.71	1.75	1.80	1.69	2.19	1.70	1.75	1.70	1.84
	Total Organic Carbon	mg/L	-	-	1.64	1.65	1.61	1.63	1.63	1.69	1.70	1.60	1.90	1.65	1.56	1.73
	Total Phosphorus	mg/L	0.020[α]	-	0.005	0.0044	0.0053	0.0033	0.0042	0.0032	0.0085	0.0042	0.0044	0.0044	0.0044	0.0041
	Phenols	mg/L	0.004[α]	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Anions	Bromide (Br)	mg/L	-	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
	Chloride (Cl)	mg/L	120	120	6.16	6.14	6.10	6.13	6.16	6.13	6.10	6.09	6.12	6.07	6.22	6.07
	Sulphate (SO_4)	mg/L	218[β]	218	15.4	15.3	15.3	15.3	15.2	15.2	15.2	15.2	15.3	15.2	15.5	15.1
Total Metals	Aluminum (Al)	mg/L	0.100	0.179, 0.173[c]	0.1270	0.1130	0.1260	0.1110	0.1120	0.1230	0.1150	0.0989	0.1200	0.1200	0.1560	0.1100
	Antimony (Sb)	mg/L	0.020[α]	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)	mg/L	0.005	0.005	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.000140	<0.00010
	Barium (Ba)	mg/L	-	-	0.00952	0.00938	0.00966	0.00927	0.00958	0.00947	0.00966	0.00923	0.00964	0.00950	0.00992	0.00953
	Beryllium (Be)	mg/L	0.011[α]	-	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
	Bismuth (Bi)	mg/L	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)	mg/L	1.5	-	0.0180	0.0180	0.0170	0.0170	0.0170	0.0180	0.0190	0.0180	0.0180	0.0180	0.0180	0.0180
	Cadmium (Cd)	mg/L	0.00012	0.00009	0.000009	0.0000088	0.000011	0.0000115	0.0000109	0.0000076	0.0000092	0.0000074	0.0000114	0.0000106	0.000012	0.0000103
	Calcium (Ca)	mg/L	-	-	15.1	14.9	14.1	14.1	14.4	14.2	15.2	14.8	14.3	14.2	14.3	14.4
	Chromium (Cr)	mg/L	0.001	0.003	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Cobalt (Co)	mg/L	0.0009[α]	0.004	0.0001300	0.0001100	0.0001300	0.0001200	0.0001300	0.0001300	0.0001200	0.0001200	0.0001400	0.0001300	0.0001700	0.0001200
	Copper (Cu)	mg/L	0.002	0.0024	0.00139	0.001330	0.00122	0.001180	0.001200	0.001220	0.001350	0.001180	0.001150	0.001210	0.001710	0.001260
	Iron (Fe)	mg/L	0.30	0.300	0.1800	0.1540	0.1840	0.1600	0.1590	0.1720	0.1570	0.1380	0.1690	0.1700	0.2280	0.1550
	Lead (Pb)	mg/L	0.001	0.001	0.000184	0.000160	0.000168	0.000151	0.000159	0.000159	0.000188	0.000149	0.000157	0.000164	0.000217	0.000151
	Lithium (Li)	mg/L	-	-	0.00210	0.00220	0.00190	0.00180	0.00190	0.00190	0.00210	0.00200	0.00190	0.00190	0.00200	0.00190
	Magnesium (Mg)	mg/L	-	-	9.8	9.65	9.86	9.74	9.65	9.85	9.87	9.77	9.81	9.76	9.93	9.86
	Manganese (Mn)	mg/L	0.935[β]	-	0.00496	0.00433	0.00456	0.00436	0.00433	0.00441	0.00462	0.00393	0.00458	0.00445	0.00592	0.00416
	Mercury (Hg)	mg/L	0.000026	-	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)	mg/L	0.073	-	0.00142	0.00149	0.001380	0.00139	0.00135	0.00138	0.00142	0.001370	0.00142	0.00141	0.001390	0.001380
	Nickel (Ni)	mg/L	0.025	0.025	0.000870	0.000790	0.000910	0.000880	0.000870	0.000900	0.000850	0.000820	0.000880	0.000870	0.000990	0.000890
	Potassium (K)	mg/L	-	-	1.80	1.78	1.78	1.79	1.77	1.78	1.82	1.80	1.79	1.77	1.81	1.78
	Selenium (Se)	mg/L	0.001	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Silicon (Si)	mg/L	-	-	0.810	0.780	0.760	0.730	0.740	0.770	0.790	0.760	0.760	0.760	0.840	0.750
	Silver (Ag)	mg/L	0.00025	0.0001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)	mg/L	-	-	2.01	1.98	2.02	2.00	1.96	2.00	2.05	2.02	2.01	2.00	2.02	2.01
	Strontium (Sr)	mg/L	-	-	0.0176	0.0180	0.0178	0.0176	0.0177	0.0177	0.0178	0.0175	0.0178	0.0178	0.0178	0.0179
	Thallium (Tl)	mg/L	0.0008	0.0008	<0.000010	<0.000010	0.000011	0.00001	0.000011	<0.000010	<0.000010	<0.000010	0.000011	0.00001	<0.000010	<0.000010
	Tin (Sn)	mg/L	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)	mg/L	-	-	0.00623	0.00542	0.00644	0.00578	0.00590	0.00582	0.005650	0.00492	0.00611	0.00589	0.00806	0.00558
	Uranium (U)	mg/L	0.015	-	0.00195	0.00195	0.00187	0.00188	0.00189	0.00188	0.00195	0.00191	0.00189	0.00190	0.00188	0.00189
	Vanadium (V)	mg/L	0.006[α]	0.006	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)	mg/L	0.030	0.030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030

Indicates parameter concentration above applicable Water Quality Guideline.

BOLD Indicates parameter concentration above the AEMP benchmark.

Note: "-" indicates no WQG benchmark applicable.

[a] Canadian Water Quality Guideline for the protection of aquatic life (CCME 1987, 1999) except those indicated by α (Ontario Provincial Water Quality Objective [PWQO]; OMOE 1994) and β (British Columbia Water Quality Guideline [BCWQG]; BCMOE 2013). See Table 2.2 for information regarding WQG criteria.

[b] AEMP Water Quality Benchmarks developed by Intrinsik (2013) using baseline water quality data specific to Sheardown Lake.

[c] Benchmark is 0.179 mg/L and 0.173 mg/L for shallow and deep stations, respectively.

Table C.43: Water Chemistry at Sheardown Lake NW (DL0-01) Water Quality Monitoring Stations, Mary River Project CREMP, 2023

	Parameters	Units	Water Quality Guideline (WQG)[a]	AEMP Benchmark[b]	Fall Sampling Event											
					DD-HAB9-STN1	DD-HAB9-STN1	DL0-01-5	DL0-01-5	DL0-01-1	DL0-01-1	DL0-01-4	DL0-01-4	DL0-01-2	DL0-01-2	DL0-01-7	DL0-01-7
					bottom	surface	bottom	surface	bottom	surface	bottom	surface	bottom	surface	bottom	surface
					11-Sep-23	11-Sep-23	11-Sep-23	11-Sep-23	11-Sep-23	11-Sep-23	11-Sep-23	11-Sep-23	11-Sep-23	11-Sep-23	11-Sep-23	11-Sep-23
Conventionals	Conductivity (lab)	µmho/cm	-	-	186	185	186	186	185	185	174	187	186	186	188	186
	pH (lab)	pH	6.5 - 9.0	-	7.58	7.61	7.44	7.56	7.6	7.6	7.69	7.77	7.57	7.67	7.51	7.62
	Hardness (as $CaCO_3$)	mg/L	-	-	86.3	86.3	86.7	86.7	86.2	86.6	86.6	87.6	87.4	87	86.7	86.6
	Total Suspended Solids (TSS)	mg/L	-	-	<1.0	1	<1.4	<1.0	<1.0	<1.0	1.3	1	<1.0	<1.0	1	<1.0
	Total Dissolved Solids (TDS)	mg/L	-	-	108	107	93	90	107	105	102	109	107	107	88	96
	Turbidity	NTU	-	-	0.99	1.65	1.20	1.05	1.25	1.61	1.06	1.07	1.44	0.93	1.16	0.97
	Alkalinity (as $CaCO_3$)	mg/L	-	-	69.2	67.9	62.2	65.7	77.1	66.9	67.7	68.7	75.4	77.5	66.8	70.5
Nutrients and Organics	Total Ammonia	mg/L	-	0.855	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Nitrate	mg/L	3	3	0.362	0.380	0.357	0.366	0.365	0.389	0.367	0.363	0.370	0.361	0.356	0.355
	Nitrite	mg/L	0.06	0.06	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Total Kjeldahl Nitrogen (TKN)	mg/L	-	-	0.129	0.112	0.116	0.158	0.145	0.184	0.101	0.104	0.113	0.113	0.123	0.121
	Dissolved Organic Carbon	mg/L	-	-	1.60	1.58	1.67	1.45	1.75	1.70	1.98	1.70	1.60	1.80	1.65	1.72
	Total Organic Carbon	mg/L	-	-	1.54	1.87	1.58	1.62	1.53	1.48	1.65	1.83	1.56	1.52	1.62	1.60
	Total Phosphorus	mg/L	0.020[α]	-	<0.0020	<0.0020	<0.0020	0.0096	<0.0020	<0.0020	<0.0020	<0.0020	0.0023	<0.0020	0.0025	<0.0020
	Phenols	mg/L	0.004[α]	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Anions	Bromide (Br)	mg/L	-	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
	Chloride (Cl)	mg/L	120	120	7.26	7.24	7.22	7.27	7.23	7.26	7.32	7.27	7.24	7.25	7.20	7.20
	Sulphate (SO_4)	mg/L	218[β]	218	19.7	19.7	19.6	19.9	19.7	19.7	19.8	19.9	19.7	19.7	19.6	19.6
Total Metals	Aluminum (Al)	mg/L	0.100	0.179, 0.173[c]	0.0260	0.0243	0.0291	0.0260	0.0258	0.0293	0.0260	0.0265	0.026	0.0237	0.0274	0.0270
	Antimony (Sb)	mg/L	0.020[α]	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)	mg/L	0.005	0.005	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)	mg/L	-	-	0.00942	0.00942	0.00969	0.00940	0.00946	0.00969	0.00958	0.00939	0.00948	0.00938	0.00928	0.00949
	Beryllium (Be)	mg/L	0.011[α]	-	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
	Bismuth (Bi)	mg/L	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)	mg/L	1.5	-	0.0180	0.0190	0.0190	0.0190	0.0190	0.0180	0.0190	0.0190	0.0190	0.0190	0.0200	0.0190
	Cadmium (Cd)	mg/L	0.00012	0.00009	0.0000087	0.0000073	0.0000067	0.0000058	0.0000073	0.0000061	0.000007	0.0000052	0.0000071	0.0000074	0.0000109	0.0000071
	Calcium (Ca)	mg/L	-	-	16.6	16.5	16.5	16.4	16.4	16.2	16.7	16.6	16.5	16.4	16.7	16.6
	Chromium (Cr)	mg/L	0.001	0.003	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Cobalt (Co)	mg/L	0.0009[α]	0.004	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)	mg/L	0.002	0.0024	0.001140	0.000900	0.001090	0.001000	0.001150	0.001030	0.000970	0.000940	0.00108	0.001070	0.000930	0.001040
	Iron (Fe)	mg/L	0.30	0.300	0.0290	0.0280	0.0320	0.0290	0.0300	0.0330	0.0300	0.0290	0.031	0.0270	0.0300	0.0310
	Lead (Pb)	mg/L	0.001	0.001	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	0.000051	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)	mg/L	-	-	0.00230	0.00220	0.00220	0.00220	0.00220	0.00220	0.00230	0.00220	0.00220	0.00220	0.00230	0.00230
	Magnesium (Mg)	mg/L	-	-	11.3	11.10	11.00	11.40	11.10	11.30	11.30	11.2	11.1	10.9	11.50	11.50
	Manganese (Mn)	mg/L	0.935[β]	-	0.00192	0.00207	0.00195	0.00192	0.00197	0.00202	0.00190	0.00178	0.0021	0.00194	0.00195	0.002030
	Mercury (Hg)	mg/L	0.000026	-	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)	mg/L	0.073	-	0.00176	0.00174	0.00171	0.00168	0.00172	0.00177	0.00169	0.00175	0.00175	0.00171	0.00174	0.00170
	Nickel (Ni)	mg/L	0.025	0.025	0.000700	0.000720	0.000660	0.000750	0.000690	0.000720	0.000660	0.000670	0.00066	0.000670	0.000750	0.000670
	Potassium (K)	mg/L	-	-	1.85	1.85	1.81	1.86	1.83	1.84	1.84	1.88	1.86	1.81	1.84	1.84
	Selenium (Se)	mg/L	0.001	-	0.000074	0.000067	0.000052	0.000064	0.000072	0.000061	0.000058	0.000061	0.000074	0.000061	0.000065	0.00007
	Silicon (Si)	mg/L	-	-	0.690	0.680	0.680	0.690	0.690	0.680	0.690	0.680	0.680	0.670	0.700	0.690
	Silver (Ag)	mg/L	0.00025	0.0001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)	mg/L	-	-	2.29	2.25	2.23	2.34	2.27	2.25	2.28	2.31	2.28	2.25	2.36	2.32
	Strontium (Sr)	mg/L	-	-	0.0208	0.0213	0.0210	0.0211	0.0209	0.0215	0.0206	0.0216	0.0221	0.0213	0.0212	0.0217
	Thallium (Tl)	mg/L	0.0008	0.0008	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Tin (Sn)	mg/L	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)	mg/L	-	-	0.000820	0.000940	0.001090	0.000880	0.00103	<0.00100	0.000850	<0.00080	0.00094	0.000850	0.000920	0.000980
	Uranium (U)	mg/L	0.015	-	0.00246	0.00250	0.00254	0.00251	0.00250	0.00250	0.00247	0.00255	0.00249	0.00250	0.00246	0.00245
	Vanadium (V)	mg/L	0.006[α]	0.006	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)	mg/L	0.030	0.030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030

Indicates parameter concentration above applicable Water Quality Guideline.

BOLD Indicates parameter concentration above the AEMP benchmark.

Note: "-" indicates no WQG benchmark applicable.

[a] Canadian Water Quality Guideline for the protection of aquatic life (CCME 1987, 1999) except those indicated by α (Ontario Provincial Water Quality Objective [PWQO]; OMOE 1994) and β (British Columbia Water Quality Guideline [BCWQG]; BCMOE 2013). See Table 2.2 for information regarding WQG criteria.

[b] AEMP Water Quality Benchmarks developed by Intrinsik (2013) using baseline water quality data specific to Sheardown Lake.

[c] Benchmark is 0.179 mg/L and 0.173 mg/L for shallow and deep stations, respectively.

Table C.44: Summary of the Magnitude of Elevation in Seasonal Average Parameter Concentrations (Total Metal Concentration Data Provided) Between the Sheardown Lake (DL0) Basins and Reference Lake 3 (REF3) in 2023, and at the Sheardown Lake Basins Between 2023 and the Baseline Period, Mary River Project CREMP

Variable	Sheardown Lake NW					Sheardown Lake SE				
	2023 vs Reference Lake 3		2023 vs Baseline			2023 vs Reference Lake 3		2023 vs Baseline		
	Summer	Fall	Winter	Summer	Fall	Summer	Fall	Winter	Summer	Fall
Conductivity (lab)	2.30	2.50	1.51	1.54	1.56	1.52	1.94	1.22	1.19	1.27
pH (lab)	1.06	0.992	1.05	1.02	0.991	1.04	0.985	1.01	1.01	0.977
Hardness (as $CaCO_3$)	2.23	2.50	-	-	-	1.47	1.93	-	-	-
Total Suspended Solids (TSS)	1.15	0.954	0.500	0.447	0.464	1.05	1.02	0.569	0.603	0.443
Total Dissolved Solids (TDS)	1.81	1.89	1.30	1.23	1.30	1.12	1.58	0.979	0.889	1.14
Turbidity	9.99	1.48	0.00715	4.69	0.696	7.06	1.54	1.28	1.32	0.337
Alkalinity (as $CaCO_3$)	1.69	1.50	1.20	1.34	1.23	1.30	1.36	0.967	1.23	1.21
Total Ammonia	1.14	1.00	0.674	0.107	0.100	1.22	1.25	0.0739	0.244	0.192
Nitrate	12.3	18.2	2.98	2.46	3.58	6.46	12.1	2.90	1.29	2.42
Nitrite	1.00	1.00	5.00	5.00	4.18	1.00	1.00	4.00	5.00	5.00
Total Kjeldahl Nitrogen (TKN)	0.775	0.924	1.34	0.622	0.763	0.774	0.921	0.493	0.768	0.629
Dissolved Organic Carbon	0.604	0.561	0.846	0.989	1.01	0.527	0.537	0.748	1.01	1.10
Total Organic Carbon	0.579	0.572	0.869	0.911	0.898	0.498	0.597	0.717	0.914	1.04
Total Phosphorus	1.48	0.562	1.52	0.650	0.547	1.62	1.24	0.624	0.709	1.26
Phenols	1.00	1.00	-	-	-	1.00	1.00	-	-	-
Bromide (Br)	1.00	1.00	2.00	2.00	1.83	1.00	1.00	2.00	0.400	0.400
Chloride (Cl)	3.81	5.79	3.10	2.84	2.82	2.23	3.71	1.67	1.57	1.39
Sulphate (SO_4)	4.80	6.75	8.13	6.30	7.02	2.63	3.86	4.11	3.68	4.51
Aluminum (Al)	23.5	3.45	1.95	10.3	1.22	16.5	3.41	1.34	0.994	0.389
Antimony (Sb)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Arsenic (As)	1.04	1.00	1.00	1.04	1.00	1.00	1.00	0.988	1.00	1.00
Barium (Ba)	1.59	1.55	1.74	1.98	1.87	1.10	1.24	1.42	1.34	1.40
Beryllium (Be)	1.00	1.00	0.200	0.422	0.625	1.00	1.00	0.200	1.00	1.00
Bismuth (Bi)	1.00	1.00	0.100	0.100	0.100	1.00	1.00	0.100	0.100	0.100
Boron (B)	1.78	1.90	2.21	1.78	1.90	1.14	1.57	1.71	1.14	1.57
Cadmium (Cd)	2.04	1.41	0.510	1.02	0.706	1.12	1.00	0.500	0.558	0.500
Calcium (Ca)	2.13	2.37	1.36	1.28	1.41	1.47	1.88	1.04	1.15	1.15
Chromium (Cr)	1.00	1.00	4.22	4.62	2.82	1.00	1.00	3.85	4.00	2.01
Cobalt (Co)	1.31	1.00	1.00	1.31	0.946	1.00	1.00	1.00	0.990	0.984
Copper (Cu)	1.47	1.16	0.961	1.21	0.669	1.22	0.940	0.817	0.889	0.811
Iron (Fe)	11.4	2.08	0.373	7.66	1.01	7.22	2.01	0.761	0.971	0.380
Lead (Pb)	3.33	1.00	0.932	3.27	0.0600	2.16	1.00	0.533	0.935	0.550
Lithium (Li)	1.93	2.23	2.48	5.80	0.0294	1.11	1.65	1.64	22.2	1.89
Magnesium (Mg)	2.37	2.51	1.57	1.43	1.60	1.54	1.95	1.14	1.27	1.32
Manganese (Mn)	4.89	2.71	0.595	2.55	0.00962	4.05	2.39	0.557	0.653	0.522
Mercury (Hg)	1.00	1.00	0.500	0.500	0.127	1.00	1.00	0.500	0.500	0.500
Molybdenum (Mo)	10.5	12.2	2.12	2.26	2.69	5.72	6.88	1.63	2.21	2.28
Nickel (Ni)	1.77	1.35	0.924	1.37	0.952	1.12	1.09	0.863	0.858	0.882
Potassium (K)	2.36	2.23	1.89	2.26	2.18	1.51	1.59	1.49	2.01	1.69
Selenium (Se)	1.00	1.28	0.502	3.33	5.25	1.00	1.00	0.500	5.00	5.02
Silicon (Si)	1.58	1.46	0.750	1.23	1.06	1.30	1.23	0.721	0.898	0.781
Silver (Ag)	1.00	1.00	10.0	10.0	10.0	1.00	1.00	10.0	10.0	5.45
Sodium (Na)	2.42	2.60	1.60	1.86	1.94	1.63	2.05	1.81	2.13	1.77
Strontium (Sr)	2.29	2.72	2.21	2.40	2.78	1.41	1.80	1.27	1.39	1.47
Thallium (Tl)	1.03	1.00	1.00	1.55	2.88	1.00	1.00	1.00	10.0	10.0
Tin (Sn)	1.00	1.00	0.0879	0.967	0.998	1.00	1.00	0.142	0.595	1.00
Titanium (Ti)	19.8	2.75	0.0344	0.602	0.0887	14.0	2.83	0.0445	0.382	0.0811
Uranium (U)	6.49	8.74	3.09	2.66	3.14	3.59	5.12	1.92	1.97	2.00
Vanadium (V)	1.00	1.00	0.500	0.500	0.500	1.00	1.00	0.500	0.500	0.500
Zinc (Zn)	0.923	0.793	1.80	1.90	1.73	0.923	0.793	1.04	2.12	2.31

Denotes parameter with an AEMP benchmark.

Denotes slight elevation (mean concentration three to five times higher than respective mean reference or baseline period value).

Denotes moderate elevation (mean concentration five to 10 times higher than respective mean reference or baseline period value).

Denotes highly elevated concentration (mean concentration greater than 10 times higher than respective mean reference or baseline period value).

Denotes differences in method detection limit between the indicated study area and that of the reference area or baseline period, precluding an evaluation of magnitude of elevation; '-' = no data available for the analyte during comparison period.

Table C.45: Dissolved Metal Concentrations at Sheardown Lake NW (DL0-01) Water Quality Monitoring Stations, Mary River Project CREMP, 2023

	Parameters	Units	Winter Sampling Event												Summer Sampling Event					
			DD-HAB9-STN1	DD-HAB9-STN1	DL0-01-5	DL0-01-5	DL0-01-1	DL0-01-1	DL0-01-4	DL0-01-4	DL0-01-2	DL0-01-2	DL0-01-7	DL0-01-7	DD-HAB9-STN1	DD-HAB9-STN1	DL0-01-5	DL0-01-5	DL0-01-1	DL0-01-1
			bottom	surface	bottom	surface	bottom	surface	bottom	surface	bottom	surface	bottom	surface	bottom	surface	bottom	surface	bottom	surface
			10-Sep-23	10-Sep-23	10-Sep-23	10-Sep-23	10-Sep-23	10-Sep-23	10-Sep-23	10-Sep-23	10-Sep-23	10-Sep-23	10-Sep-23	10-Sep-23	29-Jul-23	29-Jul-23	30-Jul-23	30-Jul-23	30-Jul-23	30-Jul-23
Dissolved Metals	Aluminum (Al)	mg/L	0.0024	0.0023	0.0029	0.0023	0.0011	0.0026	0.0042	0.0025	0.0022	0.0018	0.0017	0.0019	0.0084	0.0089	0.0246	0.0125	0.0089	0.0115
	Antimony (Sb)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)	mg/L	0.00986	0.01070	0.00960	0.01020	0.00994	0.01020	0.01050	0.01080	0.00997	0.01030	0.00995	0.01030	0.00858	0.00835	0.00890	0.00849	0.00848	0.00856
	Beryllium (Be)	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
	Bismuth (Bi)	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)	mg/L	0.0220	0.0240	0.0210	0.0230	0.0210	0.0220	0.0230	0.0230	0.0230	0.0230	0.0220	0.0240	0.0180	0.0170	0.0180	0.0170	0.0180	0.0180
	Cadmium (Cd)	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.0000053	<0.0000050	0.0000065	<0.0000050	0.000005	<0.0000050
	Calcium (Ca)	mg/L	16.7	17.7	16.3	17.6	15.8	17.8	18.2	18.3	17.4	18.0	17.1	18.5	14.9	14.8	14.8	14.8	14.8	14.8
	Chromium (Cr)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Cobalt (Co)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)	mg/L	0.000810	0.000850	0.000770	0.000850	0.000760	0.000850	0.000860	0.000880	0.000820	0.000860	0.000850	0.000860	0.000830	0.000930	0.000830	0.000820	0.000820	0.000820
	Iron (Fe)	mg/L	<0.010	<0.010	0.012	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.0140	0.0100	<0.010	<0.010
	Lead (Pb)	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)	mg/L	0.00260	0.00280	0.00260	0.00270	0.00240	0.00250	0.00280	0.00270	0.00260	0.00270	0.00250	0.00280	0.00220	0.00210	0.00210	0.00220	0.00220	0.00220
	Magnesium (Mg)	mg/L	12.2	13.0	11.8	12.8	11.4	12.2	12.3	13.1	12.0	12.4	11.9	12.5	9.57	9.38	9.62	9.6	9.54	9.68
	Manganese (Mn)	mg/L	<0.00010	0.000180	0.000140	<0.00010	<0.00010	<0.00010	0.000110	0.000140	<0.00010	<0.00010	<0.00010	<0.00010	0.000240	0.000350	0.000630	0.000330	0.000230	0.000300
	Mercury (Hg)	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)	mg/L	0.00141	0.00157	0.00134	0.00154	0.00135	0.00150	0.00150	0.00155	0.00148	0.00152	0.00138	0.00149	0.00144	0.00140	0.001460	0.00148	0.00141	0.00145
	Nickel (Ni)	mg/L	0.000680	0.000730	0.000650	0.000680	0.000660	0.000720	0.000710	0.000730	0.000690	0.000710	0.000680	0.000700	0.000550	0.000560	0.000600	0.000550	0.000550	0.000560
	Potassium (K)	mg/L	1.88	1.97	1.76	1.94	1.73	1.90	1.92	1.99	1.86	1.89	1.82	1.92	1.76	1.73	1.80	1.78	1.75	1.79
	Selenium (Se)	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	0.000055	0.000052	0.000052	0.000058	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Silicon (Si)	mg/L	0.533	0.542	0.688	0.536	0.694	0.523	0.547	0.579	0.537	0.524	0.529	0.551	0.621	0.583	0.607	0.594	0.588	0.591
	Silver (Ag)	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)	mg/L	2.42	2.52	2.33	2.49	2.27	2.56	2.56	2.56	2.44	2.56	2.39	2.54	1.99	1.94	2.03	1.98	1.98	2.01
	Strontium (Sr)	mg/L	0.0189	0.0203	0.0184	0.0207	0.0185	0.0203	0.0197	0.0221	0.0192	0.0199	0.0188	0.0209	0.0174	0.0174	0.0177	0.0177	0.0175	0.0177
	Thallium (Tl)	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Tin (Sn)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)	mg/L	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	0.00041	0.00031	<0.00030	<0.00030
	Uranium (U)	mg/L	0.00237	0.00254	0.00219	0.00250	0.00218	0.00248	0.00254	0.00262	0.00246	0.00254	0.00235	0.00250	0.00181	0.00184	0.00185	0.00181	0.00183	0.00181
	Vanadium (V)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)	mg/L	0.00140	<0.0010	0.0015	<0.0010	<0.0010	<0.0010	0.0021	0.0012	<0.0010	0.00150	<0.0010	<0.0010	<0.0010	<0.0010	0.0222	<0.0010	<0.0010	<0.0010

Table C.45: Dissolved Metal Concentrations at Sheardown Lake NW (DL0-01) Water Quality Monitoring Stations, Mary River Project CREMP, 2023

	Parameters	Units	Summer Sampling Event						Fall Sampling Event											
			DL0-01-4	DL0-01-4	DL0-01-2	DL0-01-2	DL0-01-7	DL0-01-7	DD-HAB9-STN1	DD-HAB9-STN1	DL0-01-5	DL0-01-5	DL0-01-1	DL0-01-1	DL0-01-4	DL0-01-4	DL0-01-2	DL0-01-2	DL0-01-7	DL0-01-7
			bottom	surface	bottom	surface	bottom	surface	bottom	surface	bottom	surface	bottom	surface	bottom	surface	bottom	surface	bottom	surface
			29-Jul-23	29-Jul-23	30-Jul-23	30-Jul-23	30-Jul-23	30-Jul-23	11-Sep-23	11-Sep-23	11-Sep-23	11-Sep-23	11-Sep-23	11-Sep-23	11-Sep-23	11-Sep-23	11-Sep-23	11-Sep-23	11-Sep-23	11-Sep-23
Dissolved Metals	Aluminum (Al)	mg/L	0.0115	0.0117	0.0092	0.0103	0.0109	0.0170	0.0066	0.0065	0.0073	0.0069	0.0069	0.0072	0.0065	0.0068	0.0068	0.0069	0.0080	0.0081
	Antimony (Sb)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)	mg/L	0.00839	0.00844	0.00839	0.00852	0.00867	0.00862	0.00976	0.01000	0.00981	0.01030	0.00982	0.01020	0.00984	0.01000	0.01000	0.01000	0.01020	0.01020
	Beryllium (Be)	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
	Bismuth (Bi)	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)	mg/L	0.0180	0.0180	0.0180	0.0180	0.0180	0.0180	0.0190	0.0190	0.0190	0.0180	0.0190	0.0190	0.0190	0.0190	0.0200	0.0190	0.0180	0.0190
	Cadmium (Cd)	mg/L	<0.0000050	0.0000052	0.0000055	<0.0000050	0.0000053	0.0000051	0.0000058	<0.0000050	0.0000055	0.0000086	0.0000051	0.0000062	0.0000051	0.0000051	0.0000053	0.0000054	0.000007	0.0000055
	Calcium (Ca)	mg/L	14.6	14.7	14.9	14.9	14.9	14.7	16.1	16.1	16.1	16.1	16.2	16.2	16.2	16.3	16.2	16.2	16.1	16.2
	Chromium (Cr)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Cobalt (Co)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)	mg/L	0.000830	0.000820	0.000800	0.000820	0.000910	0.001050	0.000930	0.000870	0.000900	0.000890	0.000860	0.000810	0.000880	0.000930	0.000930	0.000980	0.000990	0.000890
	Iron (Fe)	mg/L	<0.010	0.0100	<0.010	<0.010	0.0110	0.0140	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Lead (Pb)	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)	mg/L	0.00220	0.00210	0.00220	0.00220	0.00220	0.00230	0.00220	0.00220	0.00210	0.00200	0.00220	0.00220	0.00220	0.00220	0.00220	0.00220	0.00200	0.00210
	Magnesium (Mg)	mg/L	9.63	9.53	9.49	9.60	9.83	9.68	11.20	11.20	11.30	11.30	11.10	11.20	11.20	11.40	11.40	11.3	11.30	11.20
	Manganese (Mn)	mg/L	0.000200	0.000420	0.000300	0.000280	0.000260	0.000410	0.00014	0.00012	0.000130	0.000220	0.000120	0.000110	0.000160	0.000200	0.000130	0.000160	0.000140	0.000140
	Mercury (Hg)	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)	mg/L	0.00146	0.00143	0.001480	0.00145	0.001450	0.001430	0.00173	0.00178	0.00176	0.00173	0.00174	0.00176	0.00175	0.00179	0.00177	0.00176	0.00177	0.00176
	Nickel (Ni)	mg/L	0.000550	0.000590	0.000580	0.000570	0.000600	0.000600	0.000640	0.000650	0.000670	0.000670	0.000640	0.000630	0.000660	0.000660	0.000660	0.000670	0.000650	0.000660
	Potassium (K)	mg/L	1.78	1.77	1.76	1.77	1.82	1.82	2.00	2.01	2.00	2.07	1.98	2.00	2.00	2.03	2.02	2.02	2.05	2.04
	Selenium (Se)	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	0.000084	0.000068	0.000075	0.000068	0.000065	0.000054	0.000063	0.000066	0.000085	0.000069	0.000069	0.000061
	Silicon (Si)	mg/L	0.598	0.595	0.591	0.604	0.632	0.606	0.651	0.657	0.640	0.645	0.636	0.641	0.650	0.653	0.656	0.658	0.641	0.649
	Silver (Ag)	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)	mg/L	2.00	1.97	1.98	2.01	2.06	2.02	2.30	2.32	2.32	2.35	2.28	2.30	2.30	2.33	2.34	2.34	2.33	2.32
	Strontium (Sr)	mg/L	0.0174	0.0176	0.0177	0.0176	0.0176	0.0174	0.0219	0.0219	0.0216	0.0219	0.0218	0.0218	0.0218	0.0219	0.0220	0.0220	0.0220	0.0221
	Thallium (Tl)	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Tin (Sn)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)	mg/L	<0.00030	<0.00030	<0.00030	<0.00030	0.00034	0.00042	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
	Uranium (U)	mg/L	0.00182	0.00183	0.00183	0.00182	0.00182	0.00181	0.00251	0.00250	0.00253	0.00248	0.00256	0.00255	0.00249	0.00252	0.00248	0.00248	0.00246	0.00247
	Vanadium (V)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	0.0022	0.0012	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010

Table C.46: Magnitude of Elevation in Seasonal Average Dissolved Metal Concentrations Between Sheardown Lake (DL0) Basins and Reference Lake 3 (REF3) in 2023, and at Sheardown Lake Basins Between 2023 and the Baseline Period (2005 to 2013)

Dissolved Metal	Sheardown Lake NW					Sheardown Lake SE				
	2023 vs Reference Lake 3 2023		2023 vs Baseline			2023 vs Reference Lake 3 2023		2023 vs Baseline		
	Summer	Fall	Winter	Summer	Fall	Summer	Fall	Winter	Summer	Fall
Aluminum (Al)	7.18	2.13	0.00309	6.06	2.59	7.73	3.17	0.00185	1.11	1.61
Antimony (Sb)	1.00	1.00	1.00	0.783	1.00	1.00	1.00	1.00	0.575	1.00
Arsenic (As)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Barium (Ba)	1.39	1.67	0.00663	1.79	2.05	0.958	1.36	0.00299	1.34	1.63
Beryllium (Be)	1.00	1.00	0.200	0.163	0.182	1.00	1.00	0.200	0.200	0.200
Bismuth (Bi)	1.00	1.00	0.100	0.100	0.100	1.00	1.00	0.100	0.100	0.100
Boron (B)	1.79	1.89	2.05	1.79	1.89	1.11	1.50	1.51	1.11	1.50
Cadmium (Cd)	1.05	1.18	0.233	0.514	0.588	1.00	1.00	0.500	0.500	0.500
Calcium (Ca)	2.19	2.45	1.37	1.34	1.37	1.48	1.91	1.05	1.06	1.10
Chromium (Cr)	1.00	1.00	4.65	5.00	4.86	1.00	1.00	4.76	5.00	5.00
Cobalt (Co)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Copper (Cu)	1.21	1.19	0.809	1.00	1.11	0.907	0.989	0.779	0.805	0.993
Iron (Fe)	1.09	0.800	0.340	0.984	0.955	1.18	0.800	0.814	0.694	1.00
Lead (Pb)	1.00	1.00	0.787	0.728	0.830	1.00	1.00	1.00	0.975	1.00
Lithium (Li)	2.19	2.14	2.84	1.66	2.72	1.23	1.51	2.30	1.41	1.81
Magnesium (Mg)	2.26	2.55	1.54	1.43	1.58	1.46	1.95	1.15	1.13	1.31
Manganese (Mn)	1.01	0.391	0.299	0.706	0.383	1.28	0.773	0.111	0.196	0.374
Mercury (Hg)	1.00	1.00	0.500	0.500	0.500	1.00	1.00	0.500	0.500	0.500
Molybdenum (Mo)	10.6	12.4	2.05	2.41	2.50	5.52	6.96	1.66	2.17	2.42
Nickel (Ni)	1.15	1.31	0.888	0.918	1.07	1.00	1.06	0.827	0.996	1.02
Potassium (K)	2.27	2.48	1.90	2.36	2.45	1.42	1.76	1.55	1.81	1.98
Selenium (Se)	1.00	1.35	0.517	0.500	0.675	1.00	1.00	0.500	0.500	0.500
Silicon (Si)	1.32	1.51	0.708	1.01	1.07	1.06	1.24	0.720	0.916	0.930
Silver (Ag)	1.00	1.00	10.0	10.0	10.0	1.00	1.00	10.0	10.0	10.0
Sodium (Na)	2.31	2.63	1.62	1.77	1.98	1.54	2.08	1.83	1.65	1.95
Strontium (Sr)	2.28	2.85	2.23	2.39	2.93	1.39	1.90	1.28	1.41	1.58
Thallium (Tl)	1.00	1.00	1.00	0.660	0.816	1.00	1.00	1.00	1.00	1.00
Tin (Sn)	1.00	1.00	0.103	1.00	0.993	1.00	1.00	0.125	0.885	0.133
Titanium (Ti)	1.09	0.822	0.0300	0.0328	0.0300	1.43	0.836	0.0300	0.0430	0.0305
Uranium (U)	6.53	9.17	3.12	2.58	3.22	3.54	5.31	1.91	1.93	2.13
Vanadium (V)	1.00	1.00	0.500	0.500	0.500	1.00	1.00	0.500	0.500	0.500
Zinc (Zn)	3.26	0.984	0.839	1.85	0.899	1.07	0.984	0.581	0.835	1.16

Denotes slight elevation (mean concentration three to five times higher than respective mean reference or baseline period value).
Denotes moderate elevation (mean concentration five to 10 times higher than respective mean reference or baseline period value).
Denotes highly elevated concentration (mean concentration≥ 10 times higher than respective mean reference or baseline period value).
Denotes differences in method detection limit between the indicated study area and that of the reference area or baseline period, precluding an evaluation of magnitude of elevation.

Table C.47: ***In Situ*** **Water Quality Profile Data Collected at Sheardown Lake SE (DL0-02) Water Quality Monitoring Stations in Winter, Mary River Project CREMP, April 2023**

Depth (m)	Temperature (°C)					Dissolved Oxygen (mg/L)					Dissolved Oxygen (% Saturation)				
	DL0-02-6	DL0-02-7	DL0-02-8	DL0-02-4	DL0-02-3	DL0-02-6	DL0-02-7	DL0-02-8	DL0-02-4	DL0-02-3	DL0-02-6	DL0-02-7	DL0-02-8	DL0-02-4	DL0-02-3
	9-Sep-23	9-Apr-23	9-Apr-23	9-Apr-23	9-Apr-23	9-Sep-23	9-Apr-23	9-Apr-23	9-Apr-23	9-Apr-23	9-Sep-23	9-Apr-23	9-Apr-23	9-Apr-23	9-Apr-23
1.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2.0	0.1	0.1	0.3	-	0.4	13.83	13.99	13.42	-	13.62	97.0	98.4	94.7	-	96.4
3.0	0.3	0.4	0.4	1.4	0.5	13.51	13.57	13.36	12.92	13.52	95.5	93.1	95.5	95.0	96.7
4.0	0.7	0.7	0.8	1.0	-	12.91	11.60	13.25	13.27	-	92.0	82.4	95.2	95.8	-
5.0	1.1	-	1.0	1.0	1.0	11.95	-	13.18	13.31	13.58	89.5	-	95.0	96.0	94.8
6.0	1.1	-	1.1	1.1	1.0	11.30	-	13.07	13.22	12.98	81.4	-	94.3	95.4	93.6
7.0	-	-	1.1	-	1.1	-	-	12.91	-	12.89	-	-	93.2	-	93.1
8.0	-	-	-	-	1.2	-	-	-	-	12.38	-	-	-	-	89.5
9.0	-	-	1.3	-	1.3	-	-	11.82	-	12.04	-	-	85.8	-	86.9
10.0	-	-	1.4	-	1.3	-	-	11.35	-	11.38	-	-	82.5	-	82.1
11.0	-	-	1.5	-	1.4	-	-	10.26	-	10.36	-	-	74.6	-	75.1
12.0	-	-	1.6	-	-	-	-	8.90	-	-	-	-	64.5	-	-
13.0	-	-	-	-	1.7	-	-	-	-	7.27	-	-	-	-	52.6
14.0	-	-	-	-	1.9	-	-	-	-	4.25	-	-	-	-	27.3

Notes: "-" indicates data not available. The total depth of the water column at each sampling station was not recorded but deepest measurements are within 1 m of lake bottom.

Table C.47: ***In Situ*** **Water Quality Profile Data Collected at Sheardown Lake SE (DL0-02) Water Quality Monitoring Stations in Winter, Mary River Project CREMP, April 2023**

Depth (m)	pH (pH units)					Specific Conductance (µS/cm)				
	DL0-02-6	DL0-02-7	DL0-02-8	DL0-02-4	DL0-02-3	DL0-02-6	DL0-02-7	DL0-02-8	DL0-02-4	DL0-02-3
	9-Sep-23	9-Apr-23	9-Apr-23	9-Apr-23	9-Apr-23	9-Sep-23	9-Apr-23	9-Apr-23	9-Apr-23	9-Apr-23
1.0	-	-	-	-	-	-	-	-	-	-
2.0	7.66	7.65	7.82	-	7.87	198.6	188.0	183.3	-	183.4
3.0	7.61	7.62	7.78	7.88	7.73	195.6	188.5	179.1	185.5	180.8
4.0	7.55	7.23	7.73	7.80	-	193.6	195.0	177.8	181.6	-
5.0	7.47	-	7.70	7.74	7.66	192.5	-	176.9	180.2	178.8
6.0	7.43	-	7.68	7.69	7.63	192.7	-	176.7	179.4	177.1
7.0	-	-	7.66	-	7.62	-	-	176.2	-	177.0
8.0	-	-	-	-	7.59	-	-	-	-	176.1
9.0	-	-	7.57	-	7.56	-	-	173.9	-	175.2
10.0	-	-	7.54	-	7.52	-	-	173.4	-	172.3
11.0	-	-	7.47	-	7.46	-	-	173.9	-	176.4
12.0	-	-	7.40	-	-	-	-	176.8	-	-
-	-	-	-	-	7.28	-	-	-	-	187.3
-	-	-	-	-	7.19	-	-	-	-	201.2

Notes: "-" indicates data not available. The total depth of the water column at each sampling station was not recorded but deepest measurements are within 1 m of lake bottom.

Table C.48: ***In Situ*** **Water Quality Profile Data Collected at Sheardown Lake SE (DL0-02) Water Quality Monitoring Stations in Summer, Mary River Project CREMP, July 2023**

Depth (m)	Temperature (°C)					Dissolved Oxygen (mg/L)					Dissolved Oxygen (% Saturation)					pH (pH units)					Specific Conductance (µS/cm)				
	DL0-02-6	DL0-02-7	DL0-02-4	DL0-02-8	DL0-02-3	DL0-02-6	DL0-02-7	DL0-02-4	DL0-02-8	DL0-02-3	DL0-02-6	DL0-02-7	DL0-02-4	DL0-02-8	DL0-02-3	DL0-02-6	DL0-02-7	DL0-02-4	DL0-02-8	DL0-02-3	DL0-02-6	DL0-02-7	DL0-02-4	DL0-02-8	DL0-02-3
	28-Jul-23	28-Jul-23	30-Jul-23	31-Jul-23	31-Jul-23	28-Jul-23	28-Jul-23	30-Jul-23	31-Jul-23	31-Jul-23	28-Jul-23	28-Jul-23	30-Jul-23	31-Jul-23	31-Jul-23	28-Jul-23	28-Jul-23	30-Jul-23	31-Jul-23	31-Jul-23	28-Jul-23	28-Jul-23	30-Jul-23	31-Jul-23	31-Jul-23
1.0	11.20	11.70	12.30	12.50	12.80	11.34	11.26	11.18	11.08	10.88	105.30	105.80	107.10	106.40	105.30	7.68	8.10	8.07	8.11	8.11	111.90	113.30	107.30	107.10	107.20
2.0	10.60	10.50	12.10	12.50	12.80	11.50	11.52	11.24	11.08	10.91	104.80	104.90	107.10	106.30	105.40	7.69	7.82	8.08	8.10	8.10	109.30	104.00	107.40	107.20	107.20
3.0	9.60	9.90	10.90	12.40	12.80	11.68	11.65	11.42	11.09	10.93	104.30	105.00	106.10	106.30	105.70	7.69	7.73	8.08	8.10	8.11	109.50	102.40	107.10	107.20	107.20
4.0	8.90	-	10.10	11.10	12.70	11.77	-	11.54	11.29	10.94	103.40	-	104.90	104.70	105.60	7.66	-	8.05	8.09	8.10	111.80	-	106.10	103.70	107.40
5.0	8.70	-	8.60	8.90	9.20	11.74	-	11.62	11.63	11.40	102.60	-	102.40	101.60	101.50	7.62	-	7.96	8.02	8.09	113.20	-	104.20	104.40	103.60
6.0	-	-	8.00	7.90	7.60	-	-	11.57	11.63	11.55	-	-	100.00	101.00	98.80	-	-	7.88	7.87	7.93	-	-	103.90	103.00	103.30
7.0	-	-	7.60	7.40	7.40	-	-	11.54	11.60	11.56	-	-	98.90	98.80	98.10	-	-	7.82	7.80	7.83	-	-	103.80	103.50	103.70
8.0	-	-	-	7.10	7.10	-	-	-	11.57	11.53	-	-	-	97.70	97.40	-	-	-	7.76	7.77	-	-	-	104.20	104.10
9.0	-	-	-	7.00	6.90	-	-	-	11.55	11.45	-	-	-	97.00	96.10	-	-	-	7.73	7.73	-	-	-	104.60	104.70
10.0	-	-	-	6.90	6.80	-	-	-	11.50	11.41	-	-	-	96.60	95.60	-	-	-	7.71	7.70	-	-	-	104.70	105.00
11.0	-	-	-	6.90	6.70	-	-	-	11.49	11.36	-	-	-	96.40	95.00	-	-	-	7.69	7.67	-	-	-	104.80	105.20
12.0	-	-	-	-	6.60	-	-	-	-	11.27	-	-	-	-	94.00	-	-	-	-	7.65	-	-	-	-	105.60

Notes: "-" indicates data not available. The total depth of the water column at each sampling station was not recorded but deepest measurements are within 1 m of lake bottom.

Table C.49: ***In Situ*** **Water Quality Profile Data Collected at Sheardown Lake SE (DL0-02) Water Quality Monitoring Stations in Fall, Mary River Project CREMP, September 2023**

Depth (m)	Temperature (°C)					Dissolved Oxygen (mg/L)					Dissolved Oxygen (% Saturation)					pH (pH units)					Specific Conductance (µS/cm)				
	DL0-02-6	DL0-02-7	DL0-02-8	DL0-02-3	DL0-02-4	DL0-02-6	DL0-02-7	DL0-02-8	DL0-02-3	DL0-02-2	DL0-02-6	DL0-02-7	DL0-02-8	DL0-02-3	DL0-02-2	DL0-02-6	DL0-02-7	DL0-02-8	DL0-02-3	DL0-02-2	DL0-02-6	DL0-02-7	DL0-02-8	DL0-02-3	DL0-02-2
	10-Sep-23	10-Sep-23	10-Sep-23	10-Sep-23	10-Sep-23	10-Sep-23	10-Sep-23	10-Sep-23	10-Sep-23	10-Sep-23	10-Sep-23	10-Sep-23	10-Sep-23	10-Sep-23	10-Sep-23	10-Sep-23	10-Sep-23	10-Sep-23	10-Sep-23	10-Sep-23	10-Sep-23	10-Sep-23	10-Sep-23	10-Sep-23	10-Sep-23
1.0	4.1	-	4.2	4.2	4.1	12.78	-	12.62	12.64	12.45	99.9	-	98.8	99.1	97.3	7.87	-	7.88	7.94	7.83	137.7	-	136.3	136.3	136.4
2.0	4.1	4.2	4.2	4.2	4.1	12.76	12.64	12.61	12.63	12.51	99.8	99.1	98.8	99.1	97.8	7.86	7.88	7.89	7.93	7.80	137.8	136.3	136.4	136.3	136.6
3.0	4.1	4.2	4.2	4.3	4.1	12.76	12.61	12.60	12.62	12.53	99.8	98.9	98.7	99.0	97.9	7.84	7.86	7.90	7.93	7.78	137.7	136.3	136.3	136.3	136.4
4.0	4.1	-	4.2	4.3	4.1	12.75	-	12.59	12.61	12.54	99.7	-	98.6	99.0	98.0	7.85	-	7.90	7.92	7.77	137.7	-	136.3	136.3	136.4
5.0	4.1	-	4.2	4.3	4.1	12.73	-	12.59	12.60	12.55	99.5	-	98.6	98.9	98.1	7.82	-	7.90	7.92	7.77	137.8	-	136.3	136.3	136.5
6.0	4.1	-	4.2	4.3	4.1	12.73	-	12.58	12.59	12.55	99.5	-	98.5	98.8	98.0	7.82	-	7.91	7.90	7.77	137.7	-	136.3	136.3	136.6
7.0	-	-	4.2	4.3	4.1	-	-	12.57	12.59	12.55	-	-	98.4	98.7	98.1	-	-	7.91	7.90	7.77	-	-	136.3	136.3	136.6
8.0	-	-	4.2	4.3	-	-	-	12.56	12.58	-	-	-	98.4	98.7	-	-	-	7.91	7.90	-	-	-	136.3	136.3	-
9.0	-	-	4.2	4.2	-	-	-	12.56	12.57	-	-	-	98.3	98.6	-	-	-	7.91	7.89	-	-	-	136.3	136.3	-
10.0	-	-	4.2	4.2	-	-	-	12.55	12.56	-	-	-	98.3	98.5	-	-	-	7.91	7.89	-	-	-	136.3	136.3	-
11.0	-	-	4.2	4.2	-	-	-	12.55	12.55	-	-	-	98.2	98.4	-	-	-	7.91	7.87	-	-	-	136.3	136.3	-
12.0	-	-	-	4.2	-	-	-	-	12.55	-	-	-	-	98.3	-	-	-	-	7.86	-	-	-	-	136.4	-
12.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes: "-" indicates data not available. The total depth of the water column at each sampling station was not recorded but deepest measurements are within 1 m of lake bottom.

Table C.50: Sampling Depth, Water Clarity Measures, and Surface and Bottom *In Situ* Water Quality Measures Collected at Sheardown Lake SE (DL0-02) Benthic Invertebrate Community Stations, Mary River Project CREMP, August 2023

Categorization & Replicate ID		Date Sampled	Station Depth (m)	Secchi Depth (m)	Colour/ Clarity	Depth Sampled	Temperature (°C)	Dissolved Oxygen		pH (units)	Specific Conductance (µS/cm)	Turbidity (NTU)
								(mg/L)	(% saturation)			
Littoral (Shallow) Stations	DL0-02-1	21-Aug-23	12.0	1.80	Dull green	surface	9.1	11.07	99.2	7.95	120.4	2.48
						bottom	8.6	11.01	97.7	7.84	118.7	3.38
	DL0-02-9	22-Aug-23	7.9	1.95	Green-grey-blue. Clear	surface	9.3	10.95	98.7	7.89	117.6	2.03
						bottom	9.0	10.81	96.8	7.84	122.2	2.28
	DL0-02-4	21-Aug-23	9.0	2.00	Colourless, murky	surface	9.4	11.09	100.5	7.86	118.1	2.30
						bottom	9.2	10.88	97.9	7.84	119.3	1.91
	DL0-02-10	21-Aug-23	6.8	2.10	Grey-green, clear	surface	9.3	10.97	98.7	7.91	117.8	1.97
						bottom	9.0	10.78	96.5	7.83	117.9	2.64
	DL0-02-11	22-Aug-23	7.0	2.25	Grey-green, clear	surface	9.3	10.93	98.3	7.90	117.8	1.96
						bottom	9.0	10.81	96.7	7.83	118.7	2.61
Profundal (Deep) Stations	DL0-02-3	21-Aug-23	12.0	2.10	Dull green	surface	9.3	11.00	99.4	7.92	117.4	1.97
						bottom	9.0	10.94	97.9	7.88	117.4	2.53
	DL0-02-12	21-Aug-23	9.0	1.95	Dull green	surface	9.4	11.01	99.5	7.94	117.3	1.82
						bottom	9.1	10.85	97.5	7.87	118.1	2.47
	DL0-02-2	21-Aug-23	13.0	1.79	Dull green	surface	9.3	11.00	99.4	7.91	117.4	1.99
						bottom	9.0	10.92	97.7	7.87	117.1	2.83
	DL0-02-8	21-Aug-23	12.0	1.95	Colourless, murky	surface	9.4	11.02	99.6	7.92	117.4	1.81
						bottom	9.0	10.92	97.8	7.86	117.2	2.64
	DL0-02-13	21-Aug-23	12.0	2.15	Dull green	surface	9.4	11.01	99.6	7.92	117.2	1.94
						bottom	9.0	10.91	97.9	7.88	117.3	2.72

Table C.51: Statistical Comparison of Bottom *In Situ* Water Quality Between Sheardown Lake SE (DL0-02) Littoral and Profundal Stations, Mary River Project CREMP, August 2023

Parameter	Statistical Test Results				Summary Statistics						
	Statistical Test	Transformation	Significant Difference Between Areas?	P-value	Lake Zone	Sample Size	Mean	Standard Deviation	Standard Error	Minimum	Maximum
Secchi Depth (m)	tequal	None	NO	0.747	Littoral	5	2.02	0.168	0.0752	1.80	2.25
					Profundal	5	1.99	0.144	0.0644	1.78	2.15
Temperature (˚C)	M-W	Rank	NO	0.797	Littoral	5	8.96	0.219	0.0980	8.60	9.20
					Profundal	5	9.02	0.0447	0.0200	9.00	9.10
Dissolved Oxygen (mg/L)	tequal	None	NO	0.290	Littoral	5	10.9	0.0926	0.0414	10.8	11.0
					Profundal	5	10.9	0.0342	0.0153	10.8	10.9
Dissolved Oxygen (% saturation)	tequal	None	NO	0.061	Littoral	5	97.1	0.634	0.284	96.5	97.9
					Profundal	5	97.8	0.167	0.0748	97.5	97.9
pH (units)	tequal	None	YES	0.001	Littoral	5	7.84	0.00548	0.00245	7.83	7.84
					Profundal	5	7.87	0.00837	0.00374	7.86	7.88
Specific Conductance (µmho/cm)	M-W	Rank	YES	0.021	Littoral	5	119	1.66	0.744	118	122
					Profundal	5	117	0.396	0.177	117	118

Shaded values indicate significant difference between study areas based on test p-value less than 0.05.

Notes: "-" = no data. "M-W" = Mann-Whitney U test; "tequal" = Student's t-test assuming equal variance.

Table C.52: Statistical Comparison of Bottom *In Situ* Water Quality Between Sheardown Lake SE (SDSE/DL0-02) and Reference Lake 3 (REF3) Stations Collected at Littoral and Profundal Depths, Mary River Project CREMP, August 2023

Lake Zone	Parameter	Statistical Test Results				Summary Statistics						
		Statistical Test	Transformation	Significant Difference Between Areas?	P-value	Study Lake	Sample Size (n)	Mean	Standard Deviation	Standard Error	Minimum	Maximum
Littoral (Shallow) Stations	Station Depth (m)	tequal	Median	NO	0.236	Reference	5	9.99	1.88	0.842	8.5	13.1
						SDSE	5	8.54	2.12	0.948	6.8	12
	Secchi Depth (m)	tequal	None	YES	0.001	Reference	2	5.97	0.364	0.258	5.71	6.22
						SDSE	5	2.02	0.168	0.0752	1.8	2.25
	Temperature (˚C)	tequal	None	YES	0.002	Reference	5	7.66	0.631	0.282	7.2	8.4
						SDSE	5	8.96	0.219	0.098	8.6	9.2
	Dissolved Oxygen (mg/L)	tequal	None	YES	0.001	Reference	5	11.3	0.103	0.046	11.2	11.4
						SDSE	5	10.9	0.0926	0.0414	10.8	11
	Dissolved Oxygen (% saturation)	tequal	None	NO	0.804	Reference	5	97.2	0.597	0.267	96.6	98.1
						SDSE	5	97.1	0.634	0.284	96.5	97.9
	pH (units)	tequal	None	YES	0.001	Reference	5	7.64	0.054	0.0242	7.56	7.7
						SDSE	5	7.84	0.00548	0.00245	7.83	7.84
	Specific Conductance (µS/cm)	M-W	Rank	YES	0.011	Reference	5	72.8	0.0837	0.0374	72.7	72.9
						SDSE	5	119	1.66	0.744	118	122
Profundal (Deep) Stations	Station Depth (m)	tequal	None	YES	0.001	Reference	5	20	2.3	1.03	17.4	23.6
						SDSE	5	11.6	1.52	0.678	9	13
	Secchi Depth (m)	-	-	-	-	Reference	-	-	-	-	-	-
						SDSE	5	1.99	0.144	0.0644	1.78	2.15
	Temperature (˚C)	tequal	None	YES	0.001	Reference	5	7.14	0.0894	0.04	7	7.2
						SDSE	5	9.02	0.0447	0.02	9	9.1
	Dissolved Oxygen (mg/L)	tequal	None	YES	0.001	Reference	5	11.3	0.0568	0.0254	11.2	11.4
						SDSE	5	10.9	0.0342	0.0153	10.8	10.9
	Dissolved Oxygen (% saturation)	tequal	None	YES	0.009	Reference	5	96.3	0.935	0.418	95.1	97.3
						SDSE	5	97.8	0.167	0.0748	97.5	97.9
	pH (units)	M-W	Rank	YES	0.012	Reference	5	7.53	0.175	0.0781	7.24	7.66
						SDSE	5	7.87	0.00837	0.00374	7.86	7.88
	Specific Conductance (µS/cm)	M-W	Rank	YES	0.012	Reference	5	73	0.192	0.086	72.8	73.3
						SDSE	5	117	0.396	0.177	117	118

Highlighted values indicatesignificant difference between study areas based on test p-value less than 0.05.

Notes: "-" = no data. "M-W" = Mann-Whitney U test; "tequal" = Student's t-test assuming equal variance.

Table C.53: Water Chemistry at Sheardown Lake SE (DL0-02) Water Quality Monitoring Stations, Mary River Project CREMP, 2023

	Parameters	Units	Water Quality Guideline (WQG)[a]	AEMP Benchmark[b]	Winter Sampling Event									
					DL0-02-6	DL0-02-6	DL0-02-7	DL0-02-7	DL0-02-4	DL0-02-4	DL0-02-8	DL0-02-8	DL0-02-3	DL0-02-3
					bottom	surface	bottom	surface	bottom	surface	bottom	surface	bottom	surface
					9-Apr-23	9-Apr-23	9-Apr-23	9-Apr-23	9-Apr-23	9-Apr-23	9-Apr-23	9-Apr-23	9-Apr-23	9-Apr-23
Conventionals	Conductivity (lab)	µmho/cm	-	-	196	203	191	191	184	189	181	186	188	190
	pH (lab)	pH	6.5 - 9.0	-	7.56	7.63	7.59	7.72	7.63	7.77	7.51	7.60	7.66	7.58
	Hardness (as $CaCO_3$)	mg/L	-	-	87.7	90.6	84.8	85.4	82	85.9	79.8	80.8	81.3	85.1
	Total Suspended Solids (TSS)	mg/L	-	-	<1.0	<1.0	<1.0	<1.0	1	<1.5	<1.0	<1.0	3.8	<1.0
	Total Dissolved Solids (TDS)	mg/L	-	-	88	102	112	105	107	102	98	90	88	100
	Turbidity	NTU	-	-	0.36	0.20	0.33	0.37	0.33	0.20	0.23	0.14	1.50	0.17
	Alkalinity (as $CaCO_3$)	mg/L	-	-	75.0	78.3	73.9	73.7	69.5	72.7	70.4	72.5	71.5	72.6
Nutrients and Organics	Total Ammonia	mg/L	-	0.855	<0.0050	0.0171	0.0082	<0.0050	0.0102	0.0124	0.0185	<0.0050	<0.0050	<0.0050
	Nitrate	mg/L	3	3	0.279	0.295	0.285	0.298	0.298	0.263	0.319	0.287	0.282	0.291
	Nitrite	mg/L	0.06	0.06	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Total Kjeldahl Nitrogen (TKN)	mg/L	-	-	0.129	0.1150	0.114	0.124	0.104	0.132	0.167	0.109	0.101	0.125
	Dissolved Organic Carbon	mg/L	-	-	1.39	1.50	1.37	1.39	1.24	1.40	1.15	1.50	1.25	1.40
	Total Organic Carbon	mg/L	-	-	1.36	1.40	1.30	1.39	1.32	1.38	1.17	1.36	1.36	1.34
	Total Phosphorus	mg/L	0.020[α]	-	0.0023	0.0034	0.0031	0.0026	0.0026	0.0043	0.003	0.0028	0.0031	0.004
	Phenols	mg/L	0.004[α]	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Anions	Bromide (Br)	mg/L	-	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
	Chloride (Cl)	mg/L	120	120	6.21	6.10	5.78	5.81	5.33	5.58	5.21	5.45	5.45	5.58
	Sulphate (SO_4)	mg/L	218[β]	218	14.2	14.4	13.6	13.8	12.0	12.6	10.9	12.2	12.2	12.5
Total Metals	Aluminum (Al)	mg/L	0.100	0.179, 0.173[c]	0.0038	<0.0030	0.0066	0.0224	0.0070	0.0050	0.0038	0.0043	0.0161	0.0039
	Antimony (Sb)	mg/L	0.020[α]	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)	mg/L	0.005	0.005	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)	mg/L	-	-	0.01060	0.0106	0.01040	0.01010	0.00924	0.00943	0.00900	0.00908	0.00973	0.00922
	Beryllium (Be)	mg/L	0.011[α]	-	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
	Bismuth (Bi)	mg/L	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)	mg/L	1.5	-	0.0210	0.0210	0.0200	0.0200	0.0180	0.0180	0.0160	0.0170	0.0190	0.0180
	Cadmium (Cd)	mg/L	0.00012	0.00009	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Calcium (Ca)	mg/L	-	-	17.8	18.0	16.7	17.1	15.7	15.9	15.0	15.7	15.9	15.7
	Chromium (Cr)	mg/L	0.001	0.003	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Cobalt (Co)	mg/L	0.0009[α]	0.004	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)	mg/L	0.002	0.0024	0.000840	0.000940	0.000880	0.000840	0.000890	0.000930	0.000820	0.000820	0.000890	0.000860
	Iron (Fe)	mg/L	0.30	0.300	0.0700	0.0330	0.0490	0.0540	0.0200	0.0130	0.0350	0.0140	0.0450	0.0170
	Lead (Pb)	mg/L	0.001	0.001	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)	mg/L	-	-	0.00160	0.00160	0.00130	0.00140	0.00130	0.00140	0.00110	0.00120	0.00120	0.00120
	Magnesium (Mg)	mg/L	-	-	11.8	12.0	11.7	11.2	10.0	10.6	9.6	10.0	10.8	10.4
	Manganese (Mn)	mg/L	0.935[β]	-	0.01480	0.00414	0.00633	0.00423	0.00393	0.00278	0.00761	0.00247	0.0037	0.00272
	Mercury (Hg)	mg/L	0.000026	-	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)	mg/L	0.073	-	0.000884	0.001000	0.000920	0.000895	0.000872	0.000922	0.000659	0.000890	0.000899	0.000929
	Nickel (Ni)	mg/L	0.025	0.025	0.000680	0.000720	0.000690	0.000680	0.000630	0.000630	0.000540	0.000620	0.000630	0.000600
	Potassium (K)	mg/L	-	-	1.67	1.72	1.66	1.60	1.43	1.52	1.37	1.45	1.53	1.48
	Selenium (Se)	mg/L	0.001	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Silicon (Si)	mg/L	-	-	0.730	0.600	0.560	0.540	0.480	0.490	0.870	0.500	0.51	0.490
	Silver (Ag)	mg/L	0.00025	0.0001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)	mg/L	-	-	2.54	2.68	2.57	2.54	2.17	2.33	2.20	2.22	2.48	2.24
	Strontium (Sr)	mg/L	-	-	0.0166	0.0171	0.0164	0.0157	0.0148	0.0154	0.0136	0.0150	0.0158	0.0151
	Thallium (Tl)	mg/L	0.0008	0.0008	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Tin (Sn)	mg/L	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)	mg/L	-	-	<0.00030	<0.00030	<0.00030	0.001020	0.000370	<0.00030	<0.00030	<0.00030	0.000960	<0.00030
	Uranium (U)	mg/L	0.015	-	0.00173	0.00187	0.00176	0.00180	0.00169	0.00174	0.00139	0.00171	0.00181	0.00175
	Vanadium (V)	mg/L	0.006[α]	0.006	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)	mg/L	0.030	0.030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030

Indicates parameter concentration above applicable Water Quality Guideline.

BOLD Indicates parameter concentration above the AEMP benchmark.

Note: "-" indicates no WQG benchmark applicable.

[a] Canadian Water Quality Guideline for the protection of aquatic life (CCME 1987, 1999) except those indicated by α (Ontario Provincial Water Quality Objective [PWQO]; OMOE 1994) and β (British Columbia Water Quality Guideline [BCWQG]; BCMOE 2013). See Table 2.2 for information regarding WQG criteria.

[b] AEMP Water Quality Benchmarks developed by Intrinsik (2013) using baseline water quality data specific to Sheardown Lak

[c] Benchmark is 0.179 mg/L and 0.173 mg/L for shallow and deep stations, respectively

Table C.53: Water Chemistry at Sheardown Lake SE (DL0-02) Water Quality Monitoring Stations, Mary River Project CREMP, 2023

	Parameters	Units	Water Quality Guideline (WQG)[a]	AEMP Benchmark[b]	Summer Sampling Event									
					DL0-02-6	DL0-02-6	DL0-02-7	DL0-02-7	DL0-02-4	DL0-02-4	DL0-02-8	DL0-02-8	DL0-02-3	DL0-02-3
					bottom	surface	bottom	surface	bottom	surface	bottom	surface	bottom	surface
					28-Jul-23	28-Jul-23	28-Jul-23	28-Jul-23	30-Jul-23	30-Jul-23	31-Jul-23	31-Jul-23	31-Jul-23	31-Jul-23
Conventionals	Conductivity (lab)	µmho/cm	-	-	120	120	110	122	109	113	111	113	112	113
	pH (lab)	pH	6.5 - 9.0	-	7.84	7.92	7.83	7.80	7.75	7.83	7.56	7.78	7.73	7.38
	Hardness (as $CaCO_3$)	mg/L	-	-	51.4	51.5	48	53.3	50.3	51.1	49.6	50.3	49.1	50.8
	Total Suspended Solids (TSS)	mg/L	-	-	<1.2	1.5	1.9	1.9	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3
	Total Dissolved Solids (TDS)	mg/L	-	-	55	61	57	55	53	58	52	55	54	55
	Turbidity	NTU	-	-	6.12	6.10	5.66	6.70	3.82	4.56	3.86	3.62	4.66	3.64
	Alkalinity (as $CaCO_3$)	mg/L	-	-	65.4	58.0	50.8	51.7	42.6	59.7	53.5	55.3	66.1	58.3
Nutrients and Organics	Total Ammonia	mg/L	-	0.855	0.0067	<0.0050	<0.0050	0.005	0.0066	<0.0050	0.0106	<0.0050	0.007	<0.0050
	Nitrate	mg/L	3	3	0.142	0.135	0.119	0.136	0.134	0.118	0.142	0.112	0.142	0.111
	Nitrite	mg/L	0.06	0.06	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Total Kjeldahl Nitrogen (TKN)	mg/L	-	-	0.082	0.093	0.081	0.097	0.092	0.100	0.093	0.154	0.190	0.149
	Dissolved Organic Carbon	mg/L	-	-	1.60	1.93	1.47	1.29	1.65	1.52	1.52	1.54	1.37	1.48
	Total Organic Carbon	mg/L	-	-	1.55	1.30	1.43	1.43	1.54	1.34	1.57	1.42	1.38	1.42
	Total Phosphorus	mg/L	0.020[α]	-	0.0053	0.0046	0.0051	0.005	0.0049	0.005	0.0049	0.0051	0.0052	0.0052
	Phenols	mg/L	0.004[α]	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.001
Anions	Bromide (Br)	mg/L	-	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
	Chloride (Cl)	mg/L	120	120	3.83	3.84	3.36	3.86	3.39	3.50	3.47	3.49	3.56	3.49
	Sulphate (SO_4)	mg/L	218[β]	218	9.06	8.95	7.82	9.17	7.92	8.22	8.06	8.16	8.07	8.16
Total Metals	Aluminum (Al)	mg/L	0.100	0.179, 0.173[c]	0.0908	0.1130	0.0896	0.0917	0.0833	0.0957	0.0634	0.0692	0.0702	0.0713
	Antimony (Sb)	mg/L	0.020[α]	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)	mg/L	0.005	0.005	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)	mg/L	-	-	0.00690	0.00732	0.00646	0.00708	0.00622	0.00662	0.00620	0.00637	0.00626	0.00645
	Beryllium (Be)	mg/L	0.011[α]	-	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
	Bismuth (Bi)	mg/L	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)	mg/L	1.5	-	0.0120	0.0130	0.0110	0.0120	0.0110	0.0110	0.0110	0.0110	0.0110	0.0110
	Cadmium (Cd)	mg/L	0.00012	0.00009	<0.0000050	0.0000057	<0.0000050	<0.0000050	0.0000085	0.0000066	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Calcium (Ca)	mg/L	-	-	10.5	10.7	9.5	10.60	9.38	9.7	9.5	9.7	9.6	9.8
	Chromium (Cr)	mg/L	0.001	0.003	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Cobalt (Co)	mg/L	0.0009[α]	0.004	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)	mg/L	0.002	0.0024	0.001510	0.001200	0.000910	0.000940	0.001020	0.000880	0.001020	0.000920	0.001220	0.000830
	Iron (Fe)	mg/L	0.30	0.300	0.1190	0.1530	0.1090	0.1080	0.1080	0.1250	0.0860	0.0830	0.0920	0.0880
	Lead (Pb)	mg/L	0.001	0.001	0.000122	0.000138	0.000112	0.000119	0.000107	0.000112	0.000094	0.000092	0.000088	0.000097
	Lithium (Li)	mg/L	-	-	0.00130	0.00140	0.00110	0.00130	<0.0010	0.00100	<0.0010	<0.0010	<0.0010	<0.0010
	Magnesium (Mg)	mg/L	-	-	6.79	6.92	6.11	6.94	6.22	6.42	5.98	6.07	6.10	6.14
	Manganese (Mn)	mg/L	0.935[β]	-	0.00464	0.00458	0.00382	0.00368	0.00382	0.00388	0.00331	0.00316	0.00354	0.00314
	Mercury (Hg)	mg/L	0.000026	-	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)	mg/L	0.073	-	0.000809	0.000856	0.000708	0.000824	0.000689	0.000761	0.000700	0.000747	0.000708	0.000742
	Nickel (Ni)	mg/L	0.025	0.025	0.000570	0.000610	0.000520	0.000590	0.000600	0.000610	0.000550	0.000520	0.000530	<0.00050
	Potassium (K)	mg/L	-	-	1.22	1.26	1.10	1.25	1.09	1.14	1.08	1.11	1.10	1.12
	Selenium (Se)	mg/L	0.001	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Silicon (Si)	mg/L	-	-	0.670	0.740	0.620	0.650	0.590	0.610	0.600	0.570	0.650	0.580
	Silver (Ag)	mg/L	0.00025	0.0001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)	mg/L	-	-	1.43	1.46	1.32	1.46	1.31	1.35	1.29	1.30	1.30	1.31
	Strontium (Sr)	mg/L	-	-	0.01170	0.01190	0.01040	0.01190	0.01020	0.01050	0.01040	0.01080	0.01040	0.01090
	Thallium (Tl)	mg/L	0.0008	0.0008	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Tin (Sn)	mg/L	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)	mg/L	-	-	0.00458	0.00657	0.00452	0.00406	0.00392	0.00562	0.00304	0.00342	0.00312	0.00359
	Uranium (U)	mg/L	0.015	-	0.001150	0.001160	0.001010	0.001170	0.000949	0.001020	0.000961	0.001030	0.000976	0.001040
	Vanadium (V)	mg/L	0.006[α]	0.006	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)	mg/L	0.030	0.030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030

Indicates parameter concentration above applicable Water Quality Guideline.

BOLD Indicates parameter concentration above the AEMP benchmark.

Note: "-" indicates no WQG benchmark applicable.

[a] Canadian Water Quality Guideline for the protection of aquatic life (CCME 1987, 1999) except those indicated by α (Ontario Provincial Water Quality Objective [PWQO]; OMOE 1994) and β (British Columbia Water Quality Guideline [BCWQG]; BCMOE 2013). See Table 2.2 for information regarding WQG criteria.

[b] AEMP Water Quality Benchmarks developed by Intrinsik (2013) using baseline water quality data specific to Sheardown Lak

[c] Benchmark is 0.179 mg/L and 0.173 mg/L for shallow and deep stations, respectively

Table C.53: Water Chemistry at Sheardown Lake SE (DLO-02) Water Quality Monitoring Stations, Mary River Project CREMP, 2023

	Parameters	Units	Water Quality Guideline (WQG)[a]	AEMP Benchmark[b]	Fall Sampling Event									
					DL0-02-6	DL0-02-6	DL0-02-7	DL0-02-7	DL0-02-4	DL0-02-4	DL0-02-8	DL0-02-8	DL0-02-3	DL0-02-3
					bottom	surface	bottom	surface	bottom	surface	bottom	surface	bottom	surface
					10-Sep-23	10-Sep-23	10-Sep-23	10-Sep-23	10-Sep-23	10-Sep-23	10-Sep-23	10-Sep-23	10-Sep-23	10-Sep-23
Conventionals	Conductivity (lab)	µmho/cm	-	-	144	150	142	142	144	143	143	142	142	142
	pH (lab)	pH	6.5 - 9.0	-	7.39	7.44	7.55	7.51	7.7	7.63	7.57	7.57	7.57	7.55
	Hardness (as $CaCO_3$)	mg/L	-	-	67.6	67.8	66.5	66.5	67.3	68.6	66.8	66	67.1	66.5
	Total Suspended Solids (TSS)	mg/L	-	-	<1.0	1	<1.0	<1.0	<1.4	1.4	<1.0	1.3	1.3	<1.0
	Total Dissolved Solids (TDS)	mg/L	-	-	82	76	100	78	76	98	85	81	79	86
	Turbidity	NTU	-	-	0.97	1.02	2.03	1.96	0.89	0.95	0.97	1.11	1.04	1.31
	Alkalinity (as $CaCO_3$)	mg/L	-	-	76.0	68.5	60.2	68.2	69	54.8	63.5	64.8	53.4	53.9
Nutrients and Organics	Total Ammonia	mg/L	-	0.855	0.0064	<0.0050	<0.0050	<0.0050	0.0105	0.0105	<0.0050	<0.0050	<0.0050	<0.0050
	Nitrate	mg/L	3	3	0.236	0.236	0.240	0.238	0.251	0.238	0.246	0.249	0.244	0.239
	Nitrite	mg/L	0.06	0.06	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Total Kjeldahl Nitrogen (TKN)	mg/L	-	-	0.117	0.142	0.154	0.134	0.141	0.100	0.145	0.122	0.116	0.103
	Dissolved Organic Carbon	mg/L	-	-	2.01	1.60	1.74	1.59	1.56	1.43	1.69	1.43	1.70	1.53
	Total Organic Carbon	mg/L	-	-	1.32	1.44	1.71	1.74	1.69	1.69	1.82	1.72	1.68	1.89
	Total Phosphorus	mg/L	0.020[α]	-	0.0037	<0.0020	0.0033	0.0294	0.0028	<0.0020	<0.0020	0.0027	0.0030	0.0119
	Phenols	mg/L	0.004[α]	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Anions	Bromide (Br)	mg/L	-	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
	Chloride (Cl)	mg/L	120	120	4.67	4.68	4.62	4.65	4.63	4.63	4.61	4.63	4.69	4.62
	Sulphate (SO_4)	mg/L	218[β]	218	11.5	11.5	11.2	11.3	11.2	11.2	11.2	11.2	11.3	11.2
Total Metals	Aluminum (Al)	mg/L	0.100	0.179, 0.173[c]	0.0218	0.0281	0.0321	0.0282	0.0214	0.0287	0.0277	0.0234	0.0250	0.0272
	Antimony (Sb)	mg/L	0.020[α]	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)	mg/L	0.005	0.005	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)	mg/L	-	-	0.00766	0.00772	0.00764	0.00735	0.00769	0.00757	0.00768	0.00743	0.00781	0.00760
	Beryllium (Be)	mg/L	0.011[α]	-	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
	Bismuth (Bi)	mg/L	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)	mg/L	1.5	-	0.0140	0.0150	0.0160	0.0160	0.0160	0.0160	0.0160	0.0160	0.0160	0.0160
	Cadmium (Cd)	mg/L	0.00012	0.00009	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Calcium (Ca)	mg/L	-	-	12.8	13.1	12.9	13.0	13.3	13.2	13.1	13.1	13.1	13.0
	Chromium (Cr)	mg/L	0.001	0.003	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Cobalt (Co)	mg/L	0.0009[α]	0.004	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)	mg/L	0.002	0.0024	0.000860	0.00081	0.000790	0.000860	0.000930	0.000750	0.000860	0.000740	0.000890	0.000860
	Iron (Fe)	mg/L	0.30	0.300	0.0230	0.0290	0.0350	0.0330	0.0260	0.0290	0.0320	0.0260	0.0300	0.0290
	Lead (Pb)	mg/L	0.001	0.001	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)	mg/L	-	-	0.00170	0.00160	0.00160	0.00160	0.00170	0.00180	0.00160	0.00170	0.00160	0.00160
	Magnesium (Mg)	mg/L	-	-	8.44	8.58	8.69	8.77	8.95	8.99	8.82	8.93	8.70	8.67
	Manganese (Mn)	mg/L	0.935[β]	-	0.00160	0.00167	0.00182	0.00178	0.00168	0.00154	0.00219	0.00157	0.00171	0.00170
	Mercury (Hg)	mg/L	0.000026	-	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)	mg/L	0.073	-	0.000949	0.001010	0.000987	0.000981	0.00097	0.000934	0.000930	0.000953	0.001020	0.001000
	Nickel (Ni)	mg/L	0.025	0.025	0.000530	0.000560	0.000610	0.000560	0.000570	0.000560	0.000550	0.000530	0.000560	0.000550
	Potassium (K)	mg/L	-	-	1.30	1.30	1.30	1.29	1.320000	1.32	1.30	1.31	1.33	1.31
	Selenium (Se)	mg/L	0.001	-	<0.000050	0.000052	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Silicon (Si)	mg/L	-	-	0.530	0.570	0.590	0.580	0.57	0.600	0.600	0.570	0.560	0.570
	Silver (Ag)	mg/L	0.00025	0.0001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)	mg/L	-	-	1.76	1.74	1.81	1.82	1.82	1.84	1.80	1.81	1.82	1.80
	Strontium (Sr)	mg/L	-	-	0.0144	0.0142	0.0141	0.0141	0.01	0.0140	0.0138	0.0139	0.0145	0.0142
	Thallium (Tl)	mg/L	0.0008	0.0008	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Tin (Sn)	mg/L	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)	mg/L	-	-	0.00080	0.00097	<0.00200	0.00099	0.00086	0.00091	0.00108	0.00087	0.00097	0.00107
	Uranium (U)	mg/L	0.015	-	0.00145	0.00149	0.00143	0.00146	0.00146	0.00147	0.00143	0.00145	0.00148	0.00150
	Vanadium (V)	mg/L	0.006[α]	0.006	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)	mg/L	0.030	0.030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030

Indicates parameter concentration above applicable Water Quality Guideline.

BOLD Indicates parameter concentration above the AEMP benchmark.

Note: "-" indicates no WQG benchmark applicable.

[a] Canadian Water Quality Guideline for the protection of aquatic life (CCME 1987, 1999) except those indicated by α (Ontario Provincial Water Quality Objective [PWQO]; OMOE 1994) and β (British Columbia Water Quality Guideline [BCWQG]; BCMOE 2013). See Table 2.2 for information regarding WQG criteria.

[b] AEMP Water Quality Benchmarks developed by Intrinsik (2013) using baseline water quality data specific to Sheardown Lak

[c] Benchmark is 0.179 mg/L and 0.173 mg/L for shallow and deep stations, respectively

Table C.54: Dissolved Metal Concentrations at Sheardown Lake SE (DL0-02) Water Quality Monitoring Stations, Mary River Project CREMP, 2023

	Parameters	Units	Winter Sampling Event										Summer Sampling Event					
			DL0-02-6	DL0-02-6	DL0-02-7	DL0-02-7	DL0-02-4	DL0-02-4	DL0-02-8	DL0-02-8	DL0-02-3	DL0-02-3	DL0-02-6	DL0-02-6	DL0-02-7	DL0-02-7	DL0-02-4	DL0-02-4
			bottom	surface	bottom	surface	bottom	surface	bottom	surface	bottom	surface	bottom	surface	bottom	surface	bottom	surface
			9-Apr-23	9-Apr-23	9-Apr-23	9-Apr-23	9-Apr-23	9-Apr-23	9-Apr-23	9-Apr-23	9-Apr-23	9-Apr-23	28-Jul-23	28-Jul-23	28-Jul-23	28-Jul-23	30-Jul-23	30-Jul-23
Dissolved Metals	Aluminum (Al)	mg/L	0.0010	<0.0010	0.0027	0.0015	0.0018	0.0013	0.0016	0.0040	0.002	0.0016	0.0167	0.0140	0.0122	0.0097	0.0102	0.0212
	Antimony (Sb)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)	mg/L	0.01030	0.01020	0.00979	0.00976	0.01030	0.00965	0.00923	0.00938	0.00956	0.00984	0.00611	0.00607	0.00559	0.00615	0.00575	0.00602
	Beryllium (Be)	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
	Bismuth (Bi)	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)	mg/L	0.0180	0.0190	0.0180	0.0180	0.0170	0.0180	0.0160	0.0170	0.0170	0.0180	0.0110	0.0110	0.0100	0.0110	0.0120	0.0120
	Cadmium (Cd)	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Calcium (Ca)	mg/L	16.5	17.3	16.3	16.4	15.7	16.6	15.5	15.2	15.4	16.6	10.2	10.30	9.53	10.5	9.83	10.10
	Chromium (Cr)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Cobalt (Co)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)	mg/L	0.000670	0.000760	0.000760	0.000820	0.000770	0.000780	0.000640	0.000790	0.000740	0.000750	0.000700	0.000820	0.000600	0.000640	0.000620	0.000650
	Iron (Fe)	mg/L	<0.010	<0.010	0.0230	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.0160	<0.010	<0.010	0.0110	<0.010	0.0180
	Lead (Pb)	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)	mg/L	0.00160	0.00180	0.00160	0.00170	0.00160	0.00170	0.00150	0.00140	0.00150	0.00170	0.00120	0.00110	0.00110	0.00130	0.00130	0.00130
	Magnesium (Mg)	mg/L	11.3	11.5	10.7	10.8	10.4	10.8	10.0	10.4	10.4	10.6	6.31	6.27	5.87	6.58	6.26	6.28
	Manganese (Mn)	mg/L	0.001330	0.000190	0.00232	0.00024	0.000240	0.000310	0.000270	0.000240	0.0015	0.000190	0.000780	0.000550	0.000370	0.000590	0.000240	0.000670
	Mercury (Hg)	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)	mg/L	0.000855	0.000922	0.000910	0.000881	0.000864	0.000943	0.000648	0.000907	0.000895	0.000912	0.000798	0.000821	0.000702	0.000840	0.000703	0.000777
	Nickel (Ni)	mg/L	0.000590	0.000610	0.000600	0.000610	0.000570	0.000570	<0.00050	0.000590	0.000560	0.000600	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Potassium (K)	mg/L	1.63	1.65	1.58	1.60	1.49	1.59	1.41	1.54	1.52	1.55	1.14	1.13	1.05	1.18	1.12	1.140
	Selenium (Se)	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Silicon (Si)	mg/L	0.680	0.576	0.524	0.493	0.451	0.476	0.859	0.486	0.48	0.484	0.490	0.502	0.455	0.484	0.480	0.476
	Silver (Ag)	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)	mg/L	2.36	2.52	2.36	2.35	2.21	2.43	2.31	2.37	2.26	2.26	1.34	1.34	1.25	1.40	1.34	1.35
	Strontium (Sr)	mg/L	0.0163	0.0160	0.0156	0.0152	0.0150	0.0156	0.0140	0.0152	0.0150	0.0152	0.01120	0.01140	0.01020	0.01160	0.01040	0.01090
	Thallium (Tl)	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Tin (Sn)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)	mg/L	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	0.000680	0.000350	0.000370	<0.00030	<0.00030	0.000860
	Uranium (U)	mg/L	0.00162	0.00175	0.00177	0.00170	0.00165	0.00174	0.00133	0.00169	0.00165	0.00172	0.001030	0.001080	0.000943	0.001090	0.000913	0.000992
	Vanadium (V)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)	mg/L	<0.0010	<0.0010	0.00150	<0.0010	<0.0010	<0.0010	<0.0010	0.0029	<0.0010	0.0025	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0017

Table C.54: Dissolved Metal Concentrations at Sheardown Lake SE (DL0-02) Water Quality Monitoring Stations, Mary River Project CREMP, 2023

	Parameters	Units	Summer Sampling Event				Fall Sampling Event									
			DL0-02-8	DL0-02-8	DL0-02-3	DL0-02-3	DL0-02-6	DL0-02-6	DL0-02-7	DL0-02-7	DL0-02-4	DL0-02-4	DL0-02-8	DL0-02-8	DL0-02-3	DL0-02-3
			bottom	surface	bottom	surface	bottom	surface	bottom	surface	bottom	surface	bottom	surface	bottom	surface
			31-Jul-23	31-Jul-23	31-Jul-23	31-Jul-23	10-Sep-23	10-Sep-23	10-Sep-23	10-Sep-23	10-Sep-23	10-Sep-23	10-Sep-23	10-Sep-23	10-Sep-23	10-Sep-23
Dissolved Metals	Aluminum (Al)	mg/L	0.0083	0.0172	0.0105	0.0179	0.0114	0.0088	0.0110	0.0091	0.0111	0.0109	0.0108	0.0100	0.0122	0.0108
	Antimony (Sb)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)	mg/L	0.00564	0.00587	0.00573	0.00600	0.00811	0.00815	0.00808	0.00824	0.00828	0.00840	0.00827	0.00800	0.00815	0.00800
	Beryllium (Be)	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
	Bismuth (Bi)	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)	mg/L	0.0110	0.0110	0.0110	0.0110	0.0160	0.0160	0.0150	0.0150	0.0140	0.0150	0.0150	0.0150	0.0140	0.0150
	Cadmium (Cd)	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Calcium (Ca)	mg/L	9.82	9.97	9.7	9.91	12.8	12.8	12.6	12.5	12.7	12.8	12.6	12.4	12.7	12.5
	Chromium (Cr)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Cobalt (Co)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)	mg/L	0.000600	0.000620	0.000550	0.000610	0.000810	0.000700	0.000730	0.000730	0.000800	0.000770	0.000840	0.000720	0.000750	0.000680
	Iron (Fe)	mg/L	<0.010	0.0110	<0.010	0.0120	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Lead (Pb)	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)	mg/L	0.00130	0.00130	0.00120	0.00120	0.00160	0.00160	0.00150	0.00150	0.00140	0.00160	0.00150	0.00140	0.00150	0.00150
	Magnesium (Mg)	mg/L	6.08	6.16	6.05	6.32	8.65	8.71	8.50	8.56	8.65	8.89	8.59	8.52	8.59	8.58
	Manganese (Mn)	mg/L	0.000200	0.000320	0.000210	0.000330	0.000320	0.000320	0.000290	0.00027	0.000310	0.00028	0.000290	0.000260	0.000310	0.000340
	Mercury (Hg)	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)	mg/L	0.000701	0.000756	0.000703	0.000759	0.000978	0.000985	0.000968	0.001000	0.000997	0.000988	0.001010	0.000958	0.000978	0.000977
	Nickel (Ni)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	0.000540	0.000550	0.000510	0.000510	0.000520	0.000550	0.000540	0.000540	0.000530	0.000520
	Potassium (K)	mg/L	1.08	1.11	1.07	1.13	1.42	1.44	1.42	1.41	1.42	1.46	1.43	1.43	1.44	1.42
	Selenium (Se)	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Silicon (Si)	mg/L	0.476	0.469	0.515	0.468	0.533	0.522	0.527	0.526	0.530	0.540	0.534	0.511	0.534	0.532
	Silver (Ag)	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)	mg/L	1.31	1.32	1.30	1.35	1.83	1.85	1.82	1.82	1.85	1.89	1.84	1.84	1.82	1.83
	Strontium (Sr)	mg/L	0.01030	0.01070	0.01020	0.01090	0.0148	0.0147	0.0146	0.0146	0.0146	0.0148	0.0144	0.0144	0.0146	0.0144
	Thallium (Tl)	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Tin (Sn)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)	mg/L	<0.00030	0.000400	<0.00030	0.000440	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	0.000350
	Uranium (U)	mg/L	0.000908	0.000998	0.000916	0.001020	0.00147	0.00150	0.00144	0.00144	0.00146	0.00144	0.00144	0.00144	0.00140	0.00147
	Vanadium (V)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.001	<0.0010	<0.0010	<0.0010

Table C.55: *In Situ* Water Quality Measurements Collected at Mary River (G0, E0, C0) Benthic Invertebrate Community Stations, Mary River Project CREMP, August 2023

Study Area	Station	Sampling Date	Temperature (°C)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (% saturation)	pH (pH units)	Specific Conductance (µS/cm)
Mary River Upstream	G0-09-B1	11-Aug-23	10.7	10.62	100.7	7.97	79.5
	G0-09-B2	11-Aug-23	10.4	10.75	101.2	7.96	79.4
	G0-09-B3	11-Aug-23	10.1	10.86	101.6	7.95	79.3
	G0-09-B4	11-Aug-23	9.4	10.99	101.1	7.86	78.8
	G0-09-B5	11-Aug-23	8.5	11.13	100.2	8.04	107.4
Mary River Upstream	G0-03-B1	11-Aug-23	13.7	10.09	101.4	8.10	91.4
	G0-03-B2	11-Aug-23	13.3	10.18	101.3	8.11	91.0
	G0-03-B3	11-Aug-23	13.0	10.25	101.5	8.09	90.8
	G0-03-B4	11-Aug-23	12.6	10.26	100.7	8.07	90.8
	G0-03-B5	11-Aug-23	12.0	10.35	100.2	8.04	90.1
Mary River Downstream	E0-01-B1	18-Aug-23	-	-	-	-	-
	E0-01-B2	18-Aug-23	-	-	-	-	-
	E0-01-B3	18-Aug-23	-	-	-	-	-
	E0-01-B4	18-Aug-23	8.9	11.11	99.0	8.01	113.1
	E0-01-B5	18-Aug-23	8.9	11.30	100.6	8.03	113.5
Mary River Downstream	E0-20-B1	15-Aug-23	8.1	11.48	100.2	8.00	123.6
	E0-20-B2	15-Aug-23	8.1	11.39	99.4	8.04	123.6
	E0-20-B3	15-Aug-23	8.1	11.46	99.9	7.99	120.1
	E0-20-B4	15-Aug-23	8.1	11.40	99.7	8.00	122.4
	E0-20-B5	15-Aug-23	8.1	11.40	99.5	7.81	116.0
Mary River Downstream	C0-05-B1	18-Aug-23	9.7	11.20	101.3	7.98	115.3
	C0-05-B2	18-Aug-23	9.7	11.21	101.4	8.00	116.2
	C0-05-B3	18-Aug-23	9.7	11.22	101.4	7.93	116.3
	C0-05-B4	18-Aug-23	9.7	11.11	100.5	8.00	116.7
	C0-05-B5	18-Aug-23	9.7	11.23	101.5	7.92	117.6

Note: '-' = Due to unsafe high and fast-flow conditions, sites E0-01-B1 to B3 were not sampled. High and fast flows represent unsuitable conditions for the effective use of a surber sampler.

Table C.56: *In Situ* Water Quality Summary for Mary River (G0, E0, C0) Benthic Invertebrate Community Study Areas, Mary River Project CREMP, August 2023

Metric	Station	Sample Size	Mean	Standard Deviation	Standard Error	95%		Minimum	Maximum
						Lower Bound	Upper Bound		
Temperature (˚C)	G0-09	5	9.82	0.881	0.394	9.17	10.5	8.5	10.7
	G0-03	5	12.9	0.653	0.292	12.4	13.4	12	13.7
	E0-01	2	8.9	0	0	8.9	8.9	8.9	8.9
	E0-20	5	8.1	0	0	8.1	8.1	8.1	8.1
	C0-05	5	9.7	0	0	9.7	9.7	9.7	9.7
Dissolved Oxygen (mg/L)	G0-09	5	10.9	0.199	0.0892	10.7	11	10.6	11.1
	G0-03	5	10.2	0.0971	0.0434	10.2	10.3	10.1	10.3
	E0-01	2	11.2	0.134	0.095	11.1	11.4	11.1	11.3
	E0-20	5	11.4	0.041	0.0183	11.4	11.5	11.4	11.5
	C0-05	5	11.2	0.0483	0.0216	11.2	11.2	11.1	11.2
Dissolved Oxygen (% saturation)	G0-09	5	101	0.532	0.238	101	101	100	102
	G0-03	5	101	0.554	0.248	101	101	100	102
	E0-01	2	99.8	1.13	0.8	98.5	101	99	101
	E0-20	5	99.7	0.321	0.144	99.5	100	99.4	100
	C0-05	5	101	0.409	0.183	101	102	100	102
pH (pH units)	G0-09	5	7.96	0.0643	0.0287	7.91	8	7.86	8.04
	G0-03	5	8.08	0.0277	0.0124	8.06	8.1	8.04	8.11
	E0-01	2	8.02	0.0141	0.01	8	8.04	8.01	8.03
	E0-20	5	7.97	0.0904	0.0404	7.9	8.03	7.81	8.04
	C0-05	5	7.97	0.0385	0.0172	7.94	7.99	7.92	8
Specific Conductance (µS/cm)	G0-09	5	84.9	12.6	5.63	75.6	94.1	78.8	107
	G0-03	5	90.8	0.471	0.211	90.5	91.2	90.1	91.4
	E0-01	2	113	0.283	0.2	113	114	113	114
	E0-20	5	121	3.21	1.44	119	124	116	124
	C0-05	5	116	0.835	0.373	116	117	115	118

Table C.57: Statistical Comparison of *In Situ* Water Quality Variables Among Mary River (G0, E0, C0) Benthic Invertebrate Community Study Areas, Mary River Project CREMP, August 2023

In Situ Variable	Overall 5-group Comparison				Pair-wise, *post hoc* comparisons[a]			
	Statistical Test[a]	Transformation	Significant Difference Between Areas?	P-value	(I) Area	(J) Area	Significant Difference Between Areas?	P-value
Temperature (˚C)	K-W	Rank	YES	0.001	G0-09	G0-03	NO	0.068
					G0-09	E0-10	NO	0.342
					G0-09	E0-20	YES	0.018
					G0-09	C0-05	NO	0.882
					G0-03	E0-10	YES	0.020
					G0-03	E0-20	YES	<0.001
					G0-03	C0-05	YES	0.049
					E0-10	E0-20	NO	0.402
					E0-10	C0-05	NO	0.402
					E0-20	C0-05	YES	0.027
Dissolved Oxygen (mg/L)	ANOVA	None	YES	0.001	G0-09	G0-03	YES	<0.001
					G0-09	E0-10	YES	0.023
					G0-09	E0-20	YES	<0.001
					G0-09	C0-05	YES	0.003
					G0-03	E0-10	YES	<0.001
					G0-03	E0-20	YES	<0.001
					G0-03	C0-05	YES	<0.001
					E0-10	E0-20	NO	0.203
					E0-10	C0-05	NO	1.000
					E0-20	C0-05	YES	0.041
Dissolved Oxygen (% Saturation)	ANOVA	None	YES	0.001	G0-09	G0-03	NO	1.000
					G0-09	E0-10	NO	0.108
					G0-09	E0-20	YES	0.014
					G0-09	C0-05	NO	0.933
					G0-03	E0-10	NO	0.084
					G0-03	E0-20	YES	0.010
					G0-03	C0-05	NO	0.973
					E0-10	E0-20	NO	1.000
					E0-10	C0-05	YES	0.035
					E0-20	C0-05	YES	0.003
pH (pH units)	K-W	Rank	YES	0.013	G0-09	G0-03	YES	0.002
					G0-09	E0-10	NO	0.190
					G0-09	E0-20	NO	0.525
					G0-09	C0-05	NO	0.961
					G0-03	E0-10	NO	0.327
					G0-03	E0-20	YES	0.017
					G0-03	C0-05	YES	0.003
					E0-10	E0-20	NO	0.406
					E0-10	C0-05	NO	0.202
					E0-20	C0-05	NO	0.557
Specific Conductance (uS/cm)	K-W	Rank	YES	0.001	G0-09	G0-03	NO	0.465
					G0-09	E0-10	NO	0.167
					G0-09	E0-20	YES	<0.001
					G0-09	C0-05	YES	0.004
					G0-03	E0-10	NO	0.407
					G0-03	E0-20	YES	0.003
					G0-03	C0-05	YES	0.032
					E0-10	E0-20	NO	0.156
					E0-10	C0-05	NO	0.428
					E0-20	C0-05	NO	0.407

Shaded values indicate significant difference between study areas based on test p-value less than 0.05.

[a] Statistical tests include Analysis of Variance (ANOVA) followed by Tukey's Honestly Significant Difference (HSD) post hoc tests, or Kruskal-Wallis H-test (K-W) followed by Mann-Whitney U-test (M-W).

Table C.58: Water Chemistry at Mary River (G0, E0, F0, C0) Water Quality Monitoring Stations, Mary River Project CREMP, 2023

	Parameters	Units	Water Quality Guideline (WQG)[a]	AEMP Benchmark[b]	Spring Sampling Event												
					G0-09-A	G0-09	G0-09-B	G0-03	G0-01	F0-01	E0-10	E0-03	E0-21	E0-20	C0-10	C0-05	C0-01
					16-Jul-23	16-Jul-23	16-Jul-23	16-Jul-23	16-Jul-23	16-Jul-23	16-Jul-23	17-Jul-23	17-Jul-23	17-Jul-23	17-Jul-23	16-Jul-23	16-Jul-23
Conventionals	Conductivity (lab)	µmho/cm	-	-	26.6	26.3	22.7	26.3	26.0	42.2	26.9	28.2	27.3	30.2	29.2	31.5	30.8
	pH (lab)	pH	6.5 - 9.0	-	7.55	7.59	7.31	7.53	7.62	7.60	7.51	7.38	7.40	7.47	7.62	7.64	7.26
	Hardness (as $CaCO_3$)	mg/L	-	-	12.1	11.9	10.2	11.8	11.1	20.3	11.8	12.4	12.2	13.5	13	14.5	13.5
	Total Suspended Solids (TSS)	mg/L	-	-	1.0	9.0	4.2	7.8	12.3	10.6	11.8	3.1	3.5	3.5	1.6	6.4	6.8
	Total Dissolved Solids (TDS)	mg/L	-	-	45	48	32	34	31	37	31	43	50	43	43	32	36
	Turbidity	NTU	-	-	2.59	1.78	3.73	4.17	5.09	2.75	4.57	2.92	2.88	3.57	3.15	3.25	5.14
	Alkalinity (as $CaCO_3$)	mg/L	-	-	12.7	11.9	10.6	11.7	11.5	19.7	12.0	12.6	12.2	13.2	12.6	12.6	12.2
Nutrients and Organics	Total Ammonia	mg/L	-	0.855	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.006	<0.0050	0.0062	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Nitrate	mg/L	3	3	<0.020	<0.020	<0.020	<0.020	<0.020	0.029	<0.020	<0.020	<0.020	<0.020	<0.020	0.024	0.023
	Nitrite	mg/L	0.06	0.06	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Total Kjeldahl Nitrogen (TKN)	mg/L	-	-	0.081	0.069	0.071	<0.050	0.076	0.114	0.058	<0.050	0.084	0.071	0.081	0.124	0.053
	Dissolved Organic Carbon	mg/L	-	-	1.57	1.36	1.43	1.40	1.26	0.81	0.98	0.91	1.16	1.09	1.05	1.06	1.17
	Total Organic Carbon	mg/L	-	-	1.74	1.56	1.56	1.41	1.17	0.93	1.20	1.30	1.00	1.04	1.11	1.14	1.33
	Total Phosphorus	mg/L	0.030[α]	-	0.0078	0.0081	0.0079	0.0078	0.0105	0.0076	0.0092	0.0023	0.0068	0.0052	0.0052	0.0108	0.0107
	Phenols	mg/L	0.004[α]	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0016	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Anions	Bromide (Br)	mg/L	-	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
	Chloride (Cl)	mg/L	120	120	<0.50	<0.50	<0.50	0.77	0.58	<0.50	<0.50	0.60	<0.50	0.52	<0.50	0.68	0.66
	Sulphate (SO_4)	mg/L	218[β]	218	<0.30	<0.30	<0.30	<0.30	<0.30	1.4	0.34	0.38	0.30	0.38	0.38	0.89	0.82
Total Metals	Aluminum (Al)	mg/L	0.100	0.966	0.035	0.059	0.091	0.1170	0.147	0.1320	0.1510	0.116	0.114	0.071	0.108	0.208	0.131
	Antimony (Sb)	mg/L	0.020[α]	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)	mg/L	0.005	0.005	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00011	0.0001	0.00011	0.00011	<0.00010	<0.00010
	Barium (Ba)	mg/L	-	-	0.00217	0.00203	0.00261	0.00275	0.00306	0.00284	0.00290	0.00285	0.00281	0.00271	0.00282	0.00367	0.00311
	Boron (B)	mg/L	1.5	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)	mg/L	0.00012	0.00006	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.0000066	<0.0000050	<0.0000050	<0.0000050
	Calcium (Ca)	mg/L	-	-	2.53	2.67	2.22	2.57	2.47	3.9	2.50	2.64	2.60	2.78	2.69	3.02	2.76
	Chromium (Cr)	mg/L	0.001	0.003	<0.00050	<0.00050	<0.00050	0.00058	0.00117	<0.00050	0.00053	<0.00050	<0.00050	<0.00050	0.00051	0.0007	0.00055
	Cobalt (Co)	mg/L	0.0009[α]	0.004	<0.00010	<0.00010	<0.00010	<0.00010	0.00011	0.00014	0.0001	<0.00010	<0.00010	<0.00010	<0.00010	0.00015	<0.00010
	Copper (Cu)	mg/L	0.002	0.0024	<0.00050	<0.00050	0.00055	0.00062	0.00059	<0.00050	0.00056	<0.00050	<0.00050	0.00051	<0.00050	0.00062	0.00053
	Iron (Fe)	mg/L	0.30	0.874	0.029	0.053	0.088	0.119	0.155	0.164	0.169	0.110	0.109	0.081	0.103	0.268	0.154
	Lead (Pb)	mg/L	0.001	0.001	<0.000050	0.000077	0.000098	0.000136	0.000190	0.000126	0.000164	0.000114	0.000110	0.000160	0.000101	0.000217	0.000151
	Magnesium (Mg)	mg/L	-	-	1.36	1.31	1.18	1.36	1.36	2.5	1.45	1.56	1.55	1.64	1.64	1.85	1.66
	Manganese (Mn)	mg/L	0.935[β]	-	0.00186	0.00326	0.00377	0.00301	0.00421	0.0108	0.00491	0.00243	0.00238	0.00209	0.00231	0.00671	0.00451
	Mercury (Hg)	mg/L	0.000026	-	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)	mg/L	0.073	-	<0.000050	<0.000050	<0.000050	0.000056	<0.000050	0.000065	<0.000050	0.00006	0.000050	0.000056	0.000065	0.000097	0.000075
	Nickel (Ni)	mg/L	0.025	0.025	<0.00050	<0.00050	<0.00050	0.00051	0.00104	<0.00050	<0.00050	0.00081	<0.00050	0.00068	<0.00050	0.00065	0.00053
	Potassium (K)	mg/L	-	-	0.28	0.24	0.27	0.31	0.32	0.33	0.31	0.33	0.34	0.32	0.34	0.40	0.35
	Selenium (Se)	mg/L	0.001	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Silicon (Si)	mg/L	-	-	0.38	0.38	0.50	0.55	0.55	0.47	0.55	0.57	0.53	0.44	0.54	0.68	0.51
	Silver (Ag)	mg/L	0.00025	0.0001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)	mg/L	-	-	0.256	0.224	0.250	0.286	0.378	0.193	0.312	0.354	0.352	0.364	0.358	0.377	0.356
	Strontium (Sr)	mg/L	-	-	0.00204	0.00189	0.00200	0.00336	0.00230	0.0026	0.00229	0.00272	0.00262	0.00269	0.00267	0.00280	0.00256
	Thallium (Tl)	mg/L	0.0008	0.0008	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Tin (Sn)	mg/L	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00013	<0.00010	<0.00010	<0.00010
	Titanium (Ti)	mg/L	-	-	0.00156	0.00268	<0.00600	0.0073	0.00824	0.00753	0.00983	0.00736	0.00624	0.004	0.00577	0.0136	0.009
	Uranium (U)	mg/L	0.015	-	0.000091	0.000115	0.000117	0.000119	0.000164	0.000089	0.000142	0.000131	0.000132	0.000141	0.000141	0.000220	0.000175
	Vanadium (V)	mg/L	0.006[α]	0.006	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00053	<0.00050
	Zinc (Zn)	mg/L	0.030	0.030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030

Indicates parameter concentration above applicable Water Quality Guideline.

BOLD Indicates parameter concentration above the AEMP benchmark.

Note: "-" indicates no WQG benchmark applicable.

[a] Canadian Water Quality Guideline for the protection of aquatic life (CCME 1987, 1999) except those indicated by α (Ontario Provincial Water Quality Objective [PWQO]; OMOE 1994) and β (British Columbia Water Quality Guideline [BCWQG]; BCMOE 2013). See Table 2.2 for information regarding WQG criteria.

[b] AEMP Water Quality Benchmarks developed by Intrinsik (2013) using baseline water quality data specific to the Mary River system.

Table C.58: Water Chemistry at Mary River (G0, E0, F0, C0) Water Quality Monitoring Stations, Mary River Project CREMP, 2023

	Parameters	Units	Water Quality Guideline (WQG)[a]	AEMP Benchmark[b]	Summer Sampling Event												
					G0-09-A	G0-09-B	G0-09	G0-03	G0-01	F0-01	E0-10	E0-03	E0-21	E0-20	C0-10	C0-05	C0-01
					24-Aug-23	24-Aug-23	24-Aug-23	24-Aug-23	24-Aug-23	24-Aug-23	30-Aug-23	30-Aug-23	30-Aug-23	30-Aug-23	30-Aug-23	30-Aug-23	30-Aug-23
Conventionals	Conductivity (lab)	µmho/cm	-	-	126.0	142.0	158.0	142.0	136.0	238.0	179.0	180.0	175.0	170.0	161.0	156.0	160.0
	pH (lab)	pH	6.5 - 9.0	-	7.97	8.04	8.00	8.02	8.02	8.08	7.98	7.99	7.97	7.98	7.99	7.94	7.94
	Hardness (as $CaCO_3$)	mg/L	-	-	54.8	63.7	73.3	64.6	62	118	85.5	85.8	81.7	78.5	74	73.8	76.2
	Total Suspended Solids (TSS)	mg/L	-	-	1.9	1.9	1.2	3.3	1.8	17.2	<1.0	<1.0	<1.0	<1.0	<1.0	<1.2	<1.0
	Total Dissolved Solids (TDS)	mg/L	-	-	92	98	98	98	82	145	111	115	110	102	102	100	96
	Turbidity	NTU	-	-	9.02	7.26	4.06	9.32	9.18	21.10	2.36	2.34	2.3	2.8	2.90	2.22	2.96
	Alkalinity (as $CaCO_3$)	mg/L	-	-	54.4	67.4	78.9	67.8	61.1	97.0	72.9	75.4	75.0	73.9	71.9	68.6	68.8
Nutrients and Organics	Total Ammonia	mg/L	-	0.855	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0064	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0052
	Nitrate	mg/L	3	3	0.029	0.024	<0.020	<0.020	<0.020	0.251	0.181	0.166	0.134	0.112	0.092	0.096	0.119
	Nitrite	mg/L	0.06	0.06	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Total Kjeldahl Nitrogen (TKN)	mg/L	-	-	0.066	0.056	0.077	0.069	0.06	0.090	0.088	0.101	0.084	0.088	0.089	0.101	0.101
	Dissolved Organic Carbon	mg/L	-	-	1.58	1.46	1.50	1.88	1.30	1.18	1.55	1.63	1.62	2.11	1.66	1.93	1.67
	Total Organic Carbon	mg/L	-	-	1.36	1.47	1.42	1.62	1.53	1.23	1.56	1.51	1.48	1.56	1.54	1.67	1.56
	Total Phosphorus	mg/L	0.030[α]	-	0.0071	0.0052	0.0036	0.0182	0.0050	0.0097	<0.0020	<0.0020	<0.0020	<0.0020	0.0025	0.0020	0.0021
	Phenols	mg/L	0.004[α]	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0011	<0.0010	<0.0010	<0.0010	<0.0010
Anions	Bromide (Br)	mg/L	-	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
	Chloride (Cl)	mg/L	120	120	4.45	4.71	3.57	5.72	4.27	3.21	4.31	4.35	4.43	3.97	4.08	4.26	4.02
	Sulphate (SO_4)	mg/L	218[β]	218	2.67	2.66	2.49	2.12	2.36	19.0	13.50	11.60	9.64	7.74	6.93	7.34	8.90
Total Metals	Aluminum (Al)	mg/L	0.100	0.966	0.299	0.159	0.083	0.169	0.136	***1.0400***	0.061	0.063	0.071	0.055	0.058	0.068	0.071
	Antimony (Sb)	mg/L	0.020[α]	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)	mg/L	0.005	0.005	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)	mg/L	-	-	0.00977	0.00914	0.00866	0.01000	0.00903	0.0179	0.00981	0.00992	0.00995	0.00957	0.00906	0.00894	0.00913
	Boron (B)	mg/L	1.5	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)	mg/L	0.00012	0.00006	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.0000068	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Calcium (Ca)	mg/L	-	-	10.80	12.50	14.70	12.70	12.10	19.6	16.50	16.70	16.60	16.00	15.40	14.70	14.90
	Chromium (Cr)	mg/L	0.001	0.003	0.00068	<0.00050	<0.00050	0.00052	0.00143	0.00199	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Cobalt (Co)	mg/L	0.0009[α]	0.004	0.00013	<0.00010	<0.00010	0.00011	<0.00010	0.00058	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)	mg/L	0.002	0.0024	0.00123	0.00111	0.00093	0.00120	0.00108	0.00210	0.00093	0.00095	0.00100	0.00094	0.00094	0.00094	0.00090
	Iron (Fe)	mg/L	0.30	0.874	0.302	0.190	0.098	0.225	0.194	***1.580***	0.054	0.054	0.061	0.048	0.053	0.072	0.066
	Lead (Pb)	mg/L	0.001	0.001	0.000248	0.000153	0.000087	0.000186	0.000162	0.000429	0.000052	<0.000050	0.000054	<0.000050	<0.000050	0.000054	0.000058
	Magnesium (Mg)	mg/L	-	-	6.53	7.61	8.70	7.65	7.40	17.3	11.90	11.80	11.20	10.80	10.40	9.94	10.40
	Manganese (Mn)	mg/L	0.935[β]	-	0.00387	0.00244	0.00147	0.00300	0.00263	0.01840	0.00539	0.00125	0.00123	0.00131	0.00165	0.00296	0.00364
	Mercury (Hg)	mg/L	0.000026	-	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)	mg/L	0.073	-	0.000439	0.000374	0.000282	0.000298	0.000340	0.000294	0.000348	0.000479	0.000538	0.000464	0.000428	0.000468	0.000432
	Nickel (Ni)	mg/L	0.025	0.025	<0.00050	<0.00050	<0.00050	0.00069	0.00051	0.00175	0.00052	0.00051	0.00052	0.00066	0.00061	0.00066	0.00065
	Potassium (K)	mg/L	-	-	1.19	1.10	1.00	1.11	1.02	1.59	1.14	1.15	1.15	1.10	1.09	1.13	1.11
	Selenium (Se)	mg/L	0.001	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	0.000125	0.000092	0.00009	0.000063	0.000059	<0.000050	<0.000050	0.00006
	Silicon (Si)	mg/L	-	-	1.59	1.23	1.11	1.27	1.15	2.55	1.15	1.16	1.18	1.17	1.15	1.13	1.14
	Silver (Ag)	mg/L	0.00025	0.0001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)	mg/L	-	-	3.14	3.17	2.67	2.56	2.69	1.52	2.77	2.74	2.82	2.62	2.75	2.66	2.64
	Strontium (Sr)	mg/L	-	-	0.0156	0.0156	0.0151	0.0189	0.0142	0.0179	0.01680	0.01690	0.01690	0.01520	0.01480	0.01450	0.01480
	Thallium (Tl)	mg/L	0.0008	0.0008	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	0.000021	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Tin (Sn)	mg/L	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)	mg/L	-	-	0.0181	0.0112	0.00613	0.0133	0.0111	0.058	0.003	0.00304	0.003	0.003	0.00283	0.00329	0.00337
	Uranium (U)	mg/L	0.015	-	0.00319	0.00320	0.00310	0.00248	0.00255	0.00248	0.00312	0.00308	0.00307	0.00267	0.002630	0.002440	0.002510
	Vanadium (V)	mg/L	0.006[α]	0.006	0.0007	<0.00050	<0.00050	0.00054	<0.00050	0.00183	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)	mg/L	0.030	0.030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	0.0032	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030

Indicates parameter concentration above applicable Water Quality Guideline.

BOLD Indicates parameter concentration above the AEMP benchmark.

Note: "-" indicates no WQG benchmark applicable.

[a] Canadian Water Quality Guideline for the protection of aquatic life (CCME 1987, 1999) except those indicated by α (Ontario Provincial Water Quality Objective [PWQO]; OMOE 1994) and β (British Columbia Water Quality Guideline [BCWQG]; BCMOE 2013). See Table 2.2 for information regarding WQG criteria.

[b] AEMP Water Quality Benchmarks developed by Intrinsik (2013) using baseline water quality data specific to the Mary River system.

Table C.58: Water Chemistry at Mary River (G0, E0, F0, C0) Water Quality Monitoring Stations, Mary River Project CREMP, 2023

	Parameters	Units	Water Quality Guideline (WQG)[a]	AEMP Benchmark[b]	Fall Sampling Event												
					G0-09-A	G0-09	G0-09-B	G0-03	G0-01	F0-01	E0-10	E0-03	E0-21	E0-20	C0-10	C0-05	C0-01
					12-Sep-23	12-Sep-23	12-Sep-23	12-Sep-23	12-Sep-23	12-Sep-23	18-Sep-23	18-Sep-23	18-Sep-23	18-Sep-23	18-Sep-23	18-Sep-23	18-Sep-23
Conventionals	Conductivity (lab)	µmho/cm	-	-	185	197	196	201	197	345	258	219	216	206	209	200	192
	pH (lab)	pH	6.5 - 9.0	-	7.97	8.03	7.99	7.99	7.99	8.15	8.07	8.03	8.02	7.99	8.00	7.91	7.96
	Hardness (as $CaCO_3$)	mg/L	-	-	83.3	91.6	89.7	94.2	91.6	168	125	104	103	100	102	96.3	93.6
	Total Suspended Solids (TSS)	mg/L	-	-	1.3	<1.0	<1.0	17.3	<1.0	<1.0	<1.0	1.3	<1.0	<1.0	<1.0	<1.3	3.3
	Total Dissolved Solids (TDS)	mg/L	-	-	78	95	100	102	100	172	136	115	115	118	114	116	112
	Turbidity	NTU	-	-	3.11	1.21	1.48	4.60	1.03	1.11	1.28	1.72	0.70	0.8	0.80	0.6	1.37
	Alkalinity (as $CaCO_3$)	mg/L	-	-	86.1	93.3	91.2	92.2	93.8	128.0	110.0	112.0	100.0	92.1	101.0	88.1	86.4
Nutrients and Organics	Total Ammonia	mg/L	-	0.855	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Nitrate	mg/L	3	3	0.059	0.051	0.046	0.036	0.04	0.06	0.192	0.117	0.115	0.123	0.120	0.120	0.120
	Nitrite	mg/L	0.06	0.06	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Total Kjeldahl Nitrogen (TKN)	mg/L	-	-	0.095	0.091	0.097	0.100	0.093	0.125	0.052	0.069	0.062	0.060	0.059	0.064	0.067
	Dissolved Organic Carbon	mg/L	-	-	1.92	1.47	1.70	1.73	1.48	1.60	1.72	1.63	1.50	1.90	1.99	1.88	2.12
	Total Organic Carbon	mg/L	-	-	1.33	1.44	1.38	1.51	1.63	1.14	1.70	1.83	1.82	1.84	2.01	1.98	2.02
	Total Phosphorus	mg/L	0.030[α]	-	0.0024	0.0021	0.0033	0.0034	0.0024	0.0029	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	0.0021
	Phenols	mg/L	0.004[α]	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Anions	Bromide (Br)	mg/L	-	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
	Chloride (Cl)	mg/L	120	120	5.58	5.35	5.82	7.51	5.63	6.48	5.95	6.44	6.35	5.32	5.50	5.34	5.36
	Sulphate (SO_4)	mg/L	218[β]	218	3.15	3.13	3.25	2.76	3.0	7.8	15.3	7.4	7.2	6.5	6.6	6.7	6.6
Total Metals	Aluminum (Al)	mg/L	0.100	0.966	0.0362	0.0162	0.0255	0.0376	0.0186	0.0305	0.0190	0.0199	0.0146	0.015	0.0196	0.013	0.042
	Antimony (Sb)	mg/L	0.020[α]	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)	mg/L	0.005	0.005	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)	mg/L	-	-	0.0108	0.0107	0.0106	0.0125	0.0117	0.0141	0.0126	0.0123	0.0126	0.0121	0.0124	0.0115	0.0113
	Boron (B)	mg/L	1.5	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)	mg/L	0.00012	0.00006	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.000009	0.0000068	0.0000078	<0.0000050	0.000006	<0.0000050
	Calcium (Ca)	mg/L	-	-	17.6	19.3	18.6	19.9	19.3	27.7	22.5	20.5	20.5	19.3	19.9	18.6	18.2
	Chromium (Cr)	mg/L	0.001	0.003	<0.00050	<0.00050	0.00065	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Cobalt (Co)	mg/L	0.0009[α]	0.004	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)	mg/L	0.002	0.0024	0.00119	0.00093	0.00097	0.00112	0.00111	0.00086	0.00093	0.00110	0.00106	0.00102	0.00111	0.00111	0.00100
	Iron (Fe)	mg/L	0.30	0.874	0.036	0.016	0.022	0.036	0.017	0.041	0.018	0.028	0.016	0.016	0.022	0.029	0.052
	Lead (Pb)	mg/L	0.001	0.001	0.000051	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Magnesium (Mg)	mg/L	-	-	10.70	11.60	11.1	11.9	11.9	25.6	17.2	13.2	13.4	12.7	13.0	12.2	12.0
	Manganese (Mn)	mg/L	0.935[β]	-	0.00080	0.000360	0.00046	0.000760	0.00055	0.00155	0.00044	0.000780	0.000540	0.0007	0.00118	0.0022	0.00175
	Mercury (Hg)	mg/L	0.000026	-	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)	mg/L	0.073	-	0.000553	0.000411	0.000434	0.000397	0.000398	0.000372	0.000398	0.000887	0.000907	0.000779	0.000729	0.000742	0.000682
	Nickel (Ni)	mg/L	0.025	0.025	<0.00050	<0.00050	<0.00050	0.00074	0.00068	0.00065	0.00058	0.00073	0.00071	0.00092	0.00096	0.00099	0.00095
	Potassium (K)	mg/L	-	-	1.26	1.15	1.17	1.26	1.18	1.47	1.26	1.28	1.27	1.19	1.23	1.19	1.21
	Selenium (Se)	mg/L	0.001	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	0.000192	0.000067	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Silicon (Si)	mg/L	-	-	1.15	1.18	1.18	1.37	1.22	1.20	1.19	1.15	1.14	1.17	1.19	1.10	1.11
	Silver (Ag)	mg/L	0.00025	0.0001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)	mg/L	-	-	4.10	3.76	3.88	3.05	3.27	3.05	3.13	3.13	3.22	2.96	3.02	2.91	2.90
	Strontium (Sr)	mg/L	-	-	0.0212	0.0198	0.0198	0.0247	0.0193	0.0255	0.0214	0.0219	0.0216	0.0191	0.0197	0.0183	0.0184
	Thallium (Tl)	mg/L	0.0008	0.0008	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Tin (Sn)	mg/L	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)	mg/L	-	-	0.0017	0.00085	0.00115	0.00211	0.00076	0.00156	<0.00090	0.00106	0.00062	<0.00060	0.00073	0.001	0.002
	Uranium (U)	mg/L	0.015	-	0.00701	0.00600	0.00617	0.00473	0.00481	0.00384	0.00449	0.00527	0.00510	0.00419	0.00424	0.00380	0.00390
	Vanadium (V)	mg/L	0.006[α]	0.006	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)	mg/L	0.030	0.030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030

Indicates parameter concentration above applicable Water Quality Guideline.

BOLD Indicates parameter concentration above the AEMP benchmark.

Note: "-" indicates no WQG benchmark applicable.

[a] Canadian Water Quality Guideline for the protection of aquatic life (CCME 1987, 1999) except those indicated by α (Ontario Provincial Water Quality Objective [PWQO]; OMOE 1994) and β (British Columbia Water Quality Guideline [BCWQG]; BCMOE 2013). See Table 2.2 for information regarding WQG criteria.

[b] AEMP Water Quality Benchmarks developed by Intrinsik (2013) using baseline water quality data specific to the Mary River system.

Table C.59: Summary of the Magnitude of Elevation in Seasonal Average Parameter Concentrations (Total Metal Concentration Data Provided) Between Mary River Mine-Exposed and Reference (G0-09) Stations in 2023, and Between Mary River 2023 and Mine Baseline (2005 to 2013) Periods, Mary River Project CREMP

Variable	2023 vs Reference (G0-09) 2023																													
	Spring										Summer										Fall									
	G0-03	G0-01	F0-01	E0-10	E0-03	E0-21	E0-20	C0-10	C0-05	C0-01	G0-03	G0-01	F0-01	E0-10	E0-03	E0-21	E0-20	C0-10	C0-05	C0-01	G0-03	G0-01	F0-01	E0-10	E0-03	E0-21	E0-20	C0-10	C0-05	C0-01
Conductivity (lab)	1.04	1.03	1.67	1.07	1.12	1.08	1.20	1.16	1.25	1.22	1.00	0.958	1.68	1.26	1.27	1.23	1.20	1.13	1.10	1.13	1.04	1.02	1.79	1.34	1.14	1.12	1.07	1.08	1.04	0.997
pH (lab)	1.01	1.02	1.02	1.00	0.986	0.989	0.998	1.02	1.02	0.970	1.00	1.00	1.01	0.997	0.998	0.996	0.997	0.998	0.992	0.992	0.999	0.999	1.02	1.01	1.00	1.00	0.999	1.00	0.989	0.995
Hardness (as $CaCO_3$)	1.04	0.974	1.78	1.04	1.09	1.07	1.18	1.14	1.27	1.18	1.01	0.970	1.85	1.34	1.34	1.28	1.23	1.16	1.15	1.19	1.07	1.04	1.90	1.42	1.18	1.17	1.13	1.16	1.09	1.06
Total Suspended Solids (TSS)	1.65	2.60	2.24	2.49	0.655	0.739	0.739	0.338	1.35	1.44	1.98	1.08	10.3	0.600	0.600	0.600	0.600	0.600	0.720	0.600	15.7	0.909	0.909	0.909	1.18	0.909	0.909	0.909	1.18	3.00
Total Dissolved Solids (TDS)	0.816	0.744	0.888	0.744	1.03	1.20	1.03	1.03	0.768	0.864	1.01	0.848	1.50	1.15	1.19	1.14	1.06	1.06	1.03	0.993	1.12	1.10	1.89	1.49	1.26	1.26	1.30	1.25	1.27	1.23
Turbidity	1.54	1.89	1.02	1.69	1.08	1.07	1.32	1.17	1.20	1.90	1.37	1.35	3.11	0.348	0.345	0.345	0.407	0.428	0.327	0.437	2.38	0.533	0.574	0.662	0.890	0.362	0.393	0.414	0.331	0.709
Alkalinity (as $CaCO_3$)	0.997	0.980	1.68	1.02	1.07	1.04	1.12	1.07	1.07	1.04	1.01	0.913	1.45	1.09	1.13	1.12	1.10	1.07	1.03	1.03	1.02	1.04	1.42	1.22	1.24	1.11	1.02	1.12	0.977	0.958
Total Ammonia	1.00	1.00	1.14	1.00	1.24	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.28	1.00	1.00	1.00	1.00	1.00	1.04	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Nitrate	1.00	1.00	1.45	1.00	1.00	1.00	1.00	1.00	1.20	1.15	0.822	0.822	10.3	7.44	6.82	5.51	4.60	3.78	3.95	4.89	0.692	0.692	1.08	3.69	2.25	2.21	2.37	2.31	2.31	2.31
Nitrite	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Total Kjeldahl Nitrogen (TKN)	0.679	1.03	1.55	0.787	0.679	1.14	0.964	1.10	1.68	0.719	1.04	0.905	1.36	1.33	1.52	1.27	1.33	1.34	1.52	1.52	1.06	0.986	1.33	0.551	0.731	0.657	0.636	0.625	0.678	0.710
Dissolved Organic Carbon	0.963	0.867	0.557	0.674	0.626	0.798	0.750	0.722	0.729	0.805	1.24	0.859	0.780	1.02	1.08	1.07	1.39	1.10	1.28	1.10	1.02	0.872	0.943	1.01	0.961	0.884	1.12	1.17	1.11	1.25
Total Organic Carbon	0.870	0.722	0.574	0.741	0.802	0.617	0.642	0.685	0.704	0.821	1.14	1.08	0.868	1.10	1.07	1.04	1.10	1.09	1.18	1.10	1.09	1.18	0.824	1.23	1.32	1.32	1.33	1.45	1.43	1.46
Total Phosphorus	0.983	1.32	0.958	1.16	0.290	0.857	0.655	0.655	1.36	1.35	3.43	0.943	1.83	0.377	0.377	0.377	0.377	0.472	0.377	0.396	1.31	0.923	1.12	0.769	0.769	0.769	0.769	0.769	0.769	0.808
Phenols	1.00	1.00	1.00	1.00	1.60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Bromide (Br)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Chloride (Cl)	1.54	1.16	1.00	1.00	1.20	1.00	1.04	1.00	1.36	1.32	1.35	1.01	0.756	1.02	1.03	1.04	0.936	0.962	1.00	0.947	1.35	1.01	1.16	1.07	1.15	1.14	0.953	0.985	0.956	0.960
Sulphate (SO_4)	1.00	1.00	4.53	1.13	1.27	1.00	1.27	1.27	2.97	2.73	0.813	0.905	7.29	5.18	4.45	3.70	2.97	2.66	2.82	3.41	0.869	0.951	2.46	4.82	2.31	2.27	2.06	2.07	2.09	2.08
Aluminum (Al)	1.89	2.38	2.13	2.44	1.88	1.84	1.14	1.75	3.36	2.12	0.938	0.755	5.77	0.337	0.347	0.393	0.306	0.321	0.378	0.394	1.45	0.716	1.17	0.732	0.766	0.562	0.582	0.755	0.493	1.63
Antimony (Sb)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Arsenic (As)	1.00	1.00	1.00	1.00	1.10	1.00	1.10	1.10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Barium (Ba)	1.21	1.35	1.25	1.28	1.26	1.24	1.19	1.24	1.62	1.37	1.09	0.983	1.95	1.07	1.08	1.08	1.04	0.986	0.973	0.993	1.17	1.09	1.32	1.18	1.15	1.18	1.13	1.16	1.07	1.06
Boron (B)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Cadmium (Cd)	1.00	1.00	1.00	1.00	1.00	1.00	1.32	1.00	1.00	1.00	1.00	1.00	1.36	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.80	1.36	1.56	1.00	1.20	1.00
Calcium (Ca)	1.04	0.999	1.58	1.01	1.07	1.05	1.12	1.09	1.22	1.12	1.00	0.955	1.55	1.30	1.32	1.31	1.26	1.22	1.16	1.18	1.08	1.04	1.50	1.22	1.11	1.11	1.04	1.08	1.01	0.984
Chromium (Cr)	1.16	2.34	1.00	1.06	1.00	1.00	1.00	1.02	1.40	1.10	0.929	2.55	3.55	0.893	0.893	0.893	0.893	0.893	0.893	0.893	0.909	0.909	0.909	0.909	0.909	0.909	0.909	0.909	0.909	0.909
Cobalt (Co)	1.00	1.10	1.40	1.00	1.00	1.00	1.00	1.00	1.50	1.00	1.00	0.909	5.27	0.909	0.909	0.909	0.909	0.909	0.909	0.909	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Copper (Cu)	1.20	1.14	0.968	1.08	0.968	0.968	0.987	0.968	1.20	1.03	1.10	0.991	1.93	0.853	0.872	0.917	0.862	0.862	0.862	0.826	1.09	1.08	0.835	0.903	1.07	1.03	0.990	1.08	1.08	0.971
Iron (Fe)	2.10	2.74	2.89	2.98	1.94	1.92	1.43	1.82	4.73	2.72	1.14	0.986	8.03	0.275	0.275	0.310	0.244	0.269	0.366	0.336	1.46	0.689	1.66	0.730	1.14	0.649	0.649	0.892	1.18	2.11
Lead (Pb)	1.81	2.53	1.68	2.19	1.52	1.47	2.13	1.35	2.89	2.01	1.14	0.996	2.64	0.320	0.307	0.332	0.307	0.307	0.332	0.357	0.993	0.993	0.993	0.993	0.993	0.993	0.993	0.993	0.993	0.993
Lithium (Li)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.40	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.20	1.00	2.00	1.40	1.00	1.00	1.00	1.00	1.00	1.00
Magnesium (Mg)	1.06	1.06	1.93	1.13	1.22	1.21	1.28	1.28	1.44	1.29	1.00	0.972	2.27	1.56	1.55	1.47	1.42	1.37	1.31	1.37	1.07	1.07	2.30	1.54	1.19	1.20	1.14	1.17	1.10	1.08
Manganese (Mn)	1.02	1.42	3.64	1.66	0.820	0.803	0.705	0.780	2.26	1.52	1.16	1.01	7.10	2.08	0.482	0.474	0.505	0.636	1.14	1.40	1.41	1.02	2.87	0.815	1.44	1.00	1.33	2.19	4.06	3.24
Mercury (Hg)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Molybdenum (Mo)	1.12	1.00	1.30	1.00	1.20	1.00	1.12	1.30	1.94	1.50	0.816	0.932	0.805	0.953	1.31	1.47	1.27	1.17	1.28	1.18	0.852	0.854	0.798	0.854	1.90	1.95	1.67	1.56	1.59	1.46
Nickel (Ni)	1.02	2.08	1.00	1.00	1.62	1.00	1.36	1.00	1.30	1.06	1.38	1.02	3.50	1.04	1.02	1.04	1.32	1.22	1.32	1.30	1.48	1.36	1.30	1.16	1.46	1.42	1.84	1.92	1.98	1.90
Potassium (K)	1.18	1.21	1.24	1.18	1.25	1.29	1.22	1.29	1.52	1.32	1.01	0.930	1.45	1.04	1.05	1.05	1.00	0.994	1.03	1.01	1.06	0.989	1.23	1.06	1.07	1.06	0.997	1.03	0.997	1.01
Selenium (Se)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.50	1.84	1.80	1.26	1.18	1.00	1.00	1.20	1.00	1.00	3.84	1.34	1.00	1.00	1.00	1.00	1.00	1.00
Silicon (Si)	1.31	1.31	1.12	1.31	1.36	1.26	1.05	1.29	1.62	1.21	0.969	0.878	1.95	0.878	0.885	0.901	0.893	0.878	0.863	0.870	1.17	1.04	1.03	1.02	0.983	0.974	1.00	1.02	0.940	0.949
Silver (Ag)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Sodium (Na)	1.18	1.55	0.793	1.28	1.45	1.45	1.50	1.47	1.55	1.46	0.855	0.899	0.508	0.925	0.915	0.942	0.875	0.919	0.889	0.882	0.779	0.836	0.779	0.800	0.800	0.823	0.756	0.772	0.744	0.741
Strontium (Sr)	1.70	1.16	1.34	1.16	1.38	1.33	1.36	1.35	1.42	1.30	1.22	0.920	1.16	1.09	1.10	1.10	0.985	0.959	0.940	0.959	1.22	0.952	1.26	1.06	1.08	1.07	0.942	0.972	0.903	0.908
Thallium (Tl)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Tin (Sn)	1.00	1.00	1.00	1.00	1.00	1.00	1.30	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Titanium (Ti)	3.44	3.89	3.55	4.64	3.47	2.94	1.99	2.72	6.42	4.05	1.13	0.940	4.91	0.247	0.257	0.294	0.227	0.240	0.279	0.285	1.71	0.616	1.26	0.730	0.859	0.503	0.486	0.592	0.414	1.52
Uranium (U)	1.11	1.52	0.827	1.32	1.22	1.23	1.31	1.31	2.04	1.63	0.784	0.806	0.784	0.986	0.974	0.970	0.844	0.831	0.771	0.793	0.740	0.752	0.601	0.702	0.824	0.798	0.655	0.663	0.594	0.610
Vanadium (V)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.06	1.00	0.953	0.882	3.23	0.882	0.882	0.882	0.882	0.882	0.882	0.882	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Zinc (Zn)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.07	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Denotes parameter with an AEMP benchmark.
Denotes slight elevation (mean concentration three to five times higher than respective mean reference or baseline period value).
Denotes moderate elevation (mean concentration five to 10 times higher than respective mean reference or baseline period value).
Denotes highly elevated concentration (mean concentration ≥ 10 times higher than respective mean reference or baseline period value).
Denotes differences in method detection limit between the indicated study area and that of the reference area or baseline period, precluding an evaluation of magnitude of elevation.

Note: '-' = no data available for the analyte during comparison period.

Table C.59: Summary of the Magnitude of Elevation in Seasonal Average Parameter Concentrations (Total Metal Concentration Data Provided) Between Mary River Mine-Exposed and Reference (G0-09) Stations in 2023, and Between Mary River 2023 and Mine Baseline (2005 to 2013) Periods, Mary River Project CREMP

Variable	2023 vs Baseline (2005 to 2013)																													
	Spring										Summer										Fall									
	G0-03	G0-01	F0-01	E0-10	E0-03	E0-21	E0-20	C0-10	C0-05	C0-01	G0-03	G0-01	F0-01	E0-10	E0-03	E0-21	E0-20	C0-10	C0-05	C0-01	G0-03	G0-01	F0-01	E0-10	E0-03	E0-21	E0-20	C0-10	C0-05	C0-01
Conductivity (lab)	0.757	0.643	0.649	0.553	0.649	1.21	1.08	0.579	0.426	0.624	1.43	1.52	1.47	1.80	1.69	2.02	1.89	1.49	1.80	1.59	1.24	1.29	1.50	1.46	0.999	1.17	1.11	1.04	1.07	1.09
pH (lab)	1.03	0.989	0.979	0.995	0.994	1.00	1.03	1.02	1.00	0.962	1.04	1.04	1.02	1.01	1.03	1.02	1.02	1.02	1.03	1.02	1.02	1.00	1.00	0.995	1.00	1.01	1.01	1.00	1.01	1.02
Hardness (as $CaCO_3$)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Suspended Solids (TSS)	1.03	5.06	1.67	1.90	0.483	0.167	0.259	0.291	3.20	0.780	0.647	0.568	8.60	0.366	0.211	0.500	0.500	0.255	0.267	0.219	7.90	0.414	0.452	0.343	0.502	0.300	0.429	0.486	0.650	1.15
Total Dissolved Solids (TDS)	1.51	1.16	0.885	0.975	1.47	3.33	2.32	1.32	0.667	1.04	1.52	1.39	1.40	1.72	1.66	1.95	1.73	1.50	1.79	1.45	0.925	1.02	1.19	1.19	0.822	0.956	0.981	0.889	0.961	1.01
Turbidity	1.66	1.82	1.70	1.79	0.974	0.914	1.05	1.01	1.17	1.92	0.877	1.04	33.8	0.306	0.211	0.377	0.521	0.294	0.165	0.317	1.29	0.180	2.25	0.243	0.350	0.104	0.185	0.240	0.163	0.473
Alkalinity (as $CaCO_3$)	0.762	0.603	0.660	0.553	0.753	1.44	1.15	0.521	0.415	0.555	1.60	1.46	1.26	1.57	1.77	1.88	1.76	1.61	1.72	1.54	1.34	1.38	1.25	1.43	1.50	1.28	1.16	1.40	1.21	1.28
Total Ammonia	0.0526	0.0413	0.0893	0.110	0.0798	0.111	0.0139	0.0429	0.107	0.0179	0.0556	0.0895	0.0759	0.158	0.0759	0.125	0.0588	0.0630	0.250	0.0699	0.0413	0.0860	0.0833	0.151	0.0928	0.136	0.214	0.0643	0.105	0.0505
Nitrate	0.400	0.286	0.351	0.179	0.220	0.200	0.200	0.374	0.240	0.272	0.400	0.358	4.44	1.81	3.05	1.34	1.12	1.84	0.960	2.38	0.608	0.670	0.554	1.80	1.77	1.15	1.23	2.21	1.14	1.54
Nitrite	5.00	5.00	4.44	4.29	5.00	2.00	2.00	4.33	3.00	5.00	3.33	1.53	3.06	1.90	1.60	2.00	2.00	2.04	1.67	2.29	3.60	2.88	2.23	2.42	2.58	1.76	1.76	2.69	5.00	3.00
Total Kjeldahl Nitrogen (TKN)	0.128	0.422	0.985	0.657	0.335	0.622	0.104	0.221	0.653	0.131	0.568	0.507	0.701	0.636	0.697	0.700	0.476	0.590	0.470	0.736	0.988	0.833	0.706	0.366	0.549	0.564	0.529	0.362	0.371	0.479
Dissolved Organic Carbon	0.808	0.779	0.549	0.707	0.607	0.703	0.661	0.568	0.448	0.656	1.78	1.22	1.19	1.31	1.53	2.02	2.22	1.44	1.68	1.46	1.47	1.19	1.43	1.35	1.26	1.29	1.68	1.33	1.30	1.45
Total Organic Carbon	0.783	0.669	0.581	0.764	0.791	0.526	0.578	0.575	0.456	0.671	1.53	1.47	1.28	1.30	1.40	1.85	1.49	1.20	1.59	1.19	1.21	1.23	0.985	1.37	1.37	1.56	1.58	1.31	1.28	1.32
Total Phosphorus	0.958	2.55	0.454	0.584	0.198	0.368	0.371	0.0618	1.62	1.21	1.33	0.521	2.84	0.235	0.158	0.200	0.333	0.175	0.250	0.100	0.516	0.262	0.375	0.223	0.162	0.222	0.353	0.278	0.276	0.441
Phenols	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bromide (Br)	2.00	2.00	1.20	2.00	1.76	0.400	0.400	1.51	2.00	2.00	2.00	2.00	1.00	2.00	1.82	0.400	0.400	2.00	0.400	2.00	2.00	2.00	0.919	2.00	0.994	0.400	0.400	1.67	0.400	2.00
Chloride (Cl)	0.745	0.405	0.198	0.260	0.178	0.500	0.520	0.120	0.136	0.316	1.10	1.70	0.667	1.53	0.603	1.77	1.59	0.616	1.22	0.749	1.43	0.924	0.641	0.921	0.290	0.762	0.665	0.329	0.427	0.462
Sulphate (SO_4)	0.323	0.231	0.887	0.234	0.306	0.100	0.127	0.247	0.668	0.442	1.66	1.13	9.36	5.91	5.96	2.75	2.21	2.72	2.94	4.14	0.649	0.696	2.16	3.26	1.59	1.03	0.933	1.43	1.21	1.61
Aluminum (Al)	0.755	1.28	1.40	1.07	0.855	0.395	1.38	0.881	2.34	0.926	0.489	0.439	39.8	0.254	0.181	0.243	0.274	0.164	0.300	0.240	0.322	0.115	2.45	0.0932	0.103	0.0476	0.0802	0.167	0.0849	0.467
Antimony (Sb)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.957	1.00	1.00	1.00	0.971	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Arsenic (As)	1.00	1.00	0.968	0.946	1.10	1.00	1.10	1.10	1.00	1.00	0.968	1.00	1.00	1.00	0.980	1.00	0.909	0.960	1.00	0.909	0.960	0.920	1.00	0.993	0.991	1.00	1.00	0.984	1.00	0.541
Barium (Ba)	0.799	0.756	0.697	0.695	0.793	0.817	1.26	0.715	0.681	0.740	1.12	1.12	2.28	1.23	1.15	1.37	1.38	1.07	1.23	1.12	1.21	1.18	1.48	1.30	0.973	0.990	1.01	1.08	1.00	1.10
Boron (B)	1.00	0.706	0.714	1.00	0.773	1.00	1.00	1.00	1.00	0.615	0.992	0.994	1.00	0.990	0.939	1.00	1.00	0.837	1.00	1.00	0.992	0.988	1.00	0.993	0.972	0.909	0.909	0.990	0.952	0.990
Cadmium (Cd)	0.470	0.500	0.493	0.500	0.500	0.500	0.660	0.500	0.500	0.500	0.232	0.425	0.680	0.475	0.427	0.500	0.500	0.497	0.500	0.484	0.409	0.500	0.500	0.488	0.783	0.680	0.780	0.452	0.500	0.489
Calcium (Ca)	0.770	0.671	0.597	0.523	0.607	1.24	1.11	0.513	0.407	0.577	1.29	1.35	1.12	1.62	1.50	1.92	1.78	1.35	1.72	1.43	1.24	1.24	1.14	1.33	0.881	1.18	1.10	0.927	0.970	1.00
Chromium (Cr)	1.43	2.96	1.82	1.76	1.85	0.585	1.96	1.95	7.00	2.25	0.616	2.99	10.1	1.25	0.759	0.0182	1.11	0.783	5.00	0.802	1.71	0.966	2.31	0.137	0.810	0.679	1.25	1.62	1.02	3.25
Cobalt (Co)	0.759	0.786	1.10	0.741	0.742	0.465	1.00	0.833	1.50	0.784	0.593	0.657	5.80	0.713	0.548	0.741	0.952	0.528	1.00	0.594	0.980	0.962	1.00	0.962	0.838	0.698	0.857	0.970	0.909	0.976
Copper (Cu)	0.743	0.619	0.575	0.683	0.466	0.680	1.20	0.605	0.800	0.772	0.778	0.704	2.74	0.565	0.618	0.435	0.764	0.708	0.959	0.692	1.06	0.986	1.22	0.789	0.932	0.738	1.03	1.06	1.05	1.02
Iron (Fe)	0.838	1.52	1.57	1.18	0.830	0.330	1.62	0.862	1.77	0.978	0.665	0.668	45.4	0.229	0.159	0.137	0.270	0.166	0.288	0.207	0.331	0.115	3.42	0.118	0.175	0.0686	0.0941	0.201	0.180	0.463
Lead (Pb)	0.785	0.776	0.307	0.407	0.444	0.367	2.13	0.514	1.50	0.639	0.550	0.460	5.27	0.206	0.127	0.251	0.312	0.128	0.338	0.193	0.472	0.392	0.923	0.444	0.288	0.254	0.395	0.543	0.366	0.488
Lithium (Li)	1.56	0.200	0.948	1.02	3.64	2.78	3.64	2.47	0.200	20.0	1.20	1.24	1.59	1.00	1.12	1.20	1.30	2.94	0.200	3.45	1.13	1.04	1.99	1.42	0.837	0.985	0.465	0.813	0.200	1.14
Magnesium (Mg)	0.728	0.641	0.676	0.550	0.701	1.10	1.04	0.677	0.446	0.709	1.36	1.49	1.81	2.09	2.15	2.33	2.14	1.83	2.20	1.90	1.29	1.35	1.89	1.76	1.24	1.27	1.04	1.21	1.63	1.30
Manganese (Mn)	0.629	1.12	1.80	0.684	0.522	0.277	0.618	0.434	1.11	0.549	0.641	0.568	21.6	1.35	0.222	0.234	0.571	0.279	0.717	0.758	0.514	0.317	2.85	0.284	0.341	0.191	0.150	0.534	0.705	0.694
Mercury (Hg)	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500
Molybdenum (Mo)	0.821	0.355	0.802	0.738	0.412	0.885	0.889	0.600	0.795	0.818	1.30	1.48	1.57	1.63	1.66	1.73	1.91	1.41	1.60	1.51	1.21	1.19	1.74	1.25	1.65	1.61	1.79	1.26	1.76	1.86
Nickel (Ni)	0.688	1.79	0.425	0.484	1.19	0.552	1.36	0.00883	0.807	0.579	0.689	0.601	3.41	0.542	0.520	0.488	1.06	0.547	1.05	0.659	1.19	1.23	1.24	1.05	0.999	0.986	1.08	1.09	1.19	1.32
Potassium (K)	0.721	0.771	0.852	0.842	0.814	0.934	1.06	0.830	0.651	0.803	1.23	1.24	2.21	1.47	1.32	1.35	1.35	1.30	1.45	1.29	1.26	1.26	1.32	1.29	1.18	0.860	0.913	1.17	1.06	1.29
Selenium (Se)	5.00	0.500	5.00	5.00	3.33	5.00	5.00	0.00340	0.500	2.50	5.00	5.00	1.25	9.20	9.00	6.30	5.90	5.00	0.500	6.00	2.50	5.00	19.2	6.70	5.00	0.500	0.500	0.500	0.500	5.00
Silicon (Si)	0.755	0.539	0.491	0.602	0.819	0.711	1.38	0.872	0.844	0.636	0.832	0.698	2.84	0.822	0.709	0.992	1.21	0.658	1.33	0.760	1.18	1.08	1.38	1.16	0.926	0.902	1.00	1.07	0.987	1.02
Silver (Ag)	10.0	1.00	10.0	10.0	1.47	10.0	10.0	0.000515	1.00	10.0	1.32	1.63	10.0	10.0	1.30	10.0	10.0	1.06	10.0	0.759	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Sodium (Na)	0.735	1.12	0.583	1.02	1.03	0.757	0.774	0.959	0.545	0.845	1.91	2.49	0.0119	2.78	2.26	2.09	1.90	2.40	2.53	2.29	1.34	1.64	2.23	1.52	1.25	1.02	0.857	1.61	1.14	1.41
Strontium (Sr)	1.16	0.734	0.638	0.638	0.342	1.04	1.13	0.300	0.320	0.464	2.00	1.63	1.49	1.85	0.939	1.99	1.84	0.881	1.37	1.06	1.70	1.35	1.39	1.45	0.490	1.34	0.686	0.590	0.744	0.671
Thallium (Tl)	1.67	0.100	0.625	0.909	1.82	1.54	1.82	10.0	0.100	1.67	1.67	10.0	10.0	10.0	1.82	1.43	1.82	10.0	0.100	10.0	1.54	10.0	10.0	10.0	1.18	0.769	1.00	1.00	0.100	10.0
Tin (Sn)	0.610	1.00	1.00	1.00	0.725	1.00	1.30	1.00	1.00	1.00	0.818	0.824	0.845	0.938	0.847	1.00	1.00	0.921	1.00	0.984	1.00	1.00	1.00	1.00	0.993	1.00	1.00	1.00	1.00	1.00
Titanium (Ti)	0.541	0.717	0.456	0.437	0.589	0.250	0.422	0.892	1.30	0.700	0.538	0.458	19.3	0.118	0.103	0.174	0.179	0.0997	0.329	0.152	0.281	0.0984	0.520	0.0744	0.123	0.0310	0.0450	0.153	0.0408	0.360
Uranium (U)	0.352	0.335	0.199	0.399	0.635	0.613	0.844	0.0509	0.621	0.585	1.65	1.62	1.61	2.12	2.16	3.42	3.27	1.72	2.78	1.80	1.26	1.27	1.58	1.27	1.35	1.31	1.21	1.26	1.17	1.44
Vanadium (V)	0.532	0.556	0.528	0.470	0.552	0.435	0.500	0.530	0.530	0.556	0.476	0.497	2.03	0.477	0.448	0.500	0.500	0.445	0.500	0.409	0.556	0.552	0.556	0.500	0.536	0.484	0.500	0.556	0.500	0.556
Zinc (Zn)	0.599	0.444	0.750	0.608	1.14	3.00	1.00	2.00	3.00	0.573	1.02	1.14	1.90	0.734	1.12	0.923	3.00	1.20	1.00	1.15	1.29	2.60	3.00	1.37	2.27	9.09	1.67	2.62	3.00	2.53

Denotes parameter with an AEMP benchmark.
Denotes slight elevation (mean concentration 3 to 5 times higher than respective mean reference or baseline period value).
Denotes moderate elevation (mean concentration 5 to 10 times higher than respective mean reference or baseline period value).
Denotes highly elevated concentration (mean concentration ≥ 10 times higher than respective mean reference or baseline period value).
Denotes differences in method detection limit between the indicated study area and that of the reference area or baseline period, precluding an evaluation of magnitude of elevation.

Note: '-' = no data available for the analyte during comparison period.

Table C.60: Dissolved Metal Concentrations at Mary River (G0, E0, F0, C0) Water Quality Monitoring Stations, Mary River Project CREMP, 2022

	Parameters	Units	Spring Sampling Event													Summer Sampling Event					
			G0-09-A	G0-09	G0-09-B	G0-03	G0-01	F0-01	E0-10	E0-03	E0-21	E0-20	C0-10	C0-05	C0-01	G0-09-A	G0-09	G0-09-B	G0-03	G0-01	F0-01
			16-Jul-23	16-Jul-23	16-Jul-23	16-Jul-23	16-Jul-23	16-Jul-23	16-Jul-23	17-Jul-23	17-Jul-23	17-Jul-23	17-Jul-23	16-Jul-23	16-Jul-23	24-Aug-23	24-Aug-23	24-Aug-23	24-Aug-23	24-Aug-23	24-Aug-23
Dissolved Metals	Aluminum (Al)	mg/L	0.0125	0.0102	0.0285	0.0235	0.0335	0.0094	0.0240	0.0129	0.0240	0.0156	0.0208	0.0228	0.0154	0.0334	0.0200	0.0240	0.0343	0.0281	0.0106
	Antimony (Sb)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)	mg/L	0.00191	0.00164	0.00184	0.00218	0.00219	0.00192	0.00201	0.00182	0.00186	0.00207	0.00207	0.00253	0.00224	0.00749	0.00826	0.00803	0.00895	0.00804	0.0088
	Beryllium (Be)	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
	Bismuth (Bi)	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Calcium (Ca)	mg/L	2.55	2.58	2.17	2.52	2.31	3.9	2.44	2.56	2.51	2.78	2.64	2.91	2.72	10.80	14.60	12.70	12.60	12.10	20.2
	Chromium (Cr)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00083	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Cobalt (Co)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)	mg/L	0.00031	0.00026	0.00042	0.00037	0.00032	<0.00020	0.00026	0.00032	0.0003	0.00036	0.00038	0.00036	0.00028	0.00083	0.00078	0.00084	0.00090	0.00079	0.00059
	Iron (Fe)	mg/L	0.01	<0.010	0.018	0.016	0.024	<0.010	0.019	0.01	0.014	0.013	0.015	0.064	0.013	0.019	0.01	0.016	0.019	0.014	<0.010
	Lead (Pb)	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	0.00006	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0011
	Magnesium (Mg)	mg/L	1.40	1.33	1.15	1.34	1.29	2.6	1.40	1.45	1.43	1.60	1.55	1.76	1.64	6.75	8.94	7.78	8.05	7.71	16.5
	Manganese (Mn)	mg/L	0.00136	0.00207	0.00148	0.001330	0.001520	0.00316	0.001690	0.00074	0.00077	0.00076	0.00084	0.00238	0.00149	0.000320	0.000200	0.000260	0.000560	0.000240	0.000330
	Mercury (Hg)	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)	mg/L	<0.000050	<0.000050	<0.000050	0.000053	0.000068	0.000088	<0.000050	<0.000050	<0.000050	<0.000050	0.000059	0.000116	0.000097	0.000446	0.000273	0.000368	0.000325	0.000320	0.000260
	Nickel (Ni)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00057	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Potassium (K)	mg/L	0.27	0.23	0.25	0.29	0.29	0.32	0.29	0.25	0.26	0.28	0.27	0.36	0.34	1.06	0.98	1.03	1.04	0.97	1.17
	Selenium (Se)	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	0.000144
	Silicon (Si)	mg/L	0.32	0.25	0.34	0.33	0.32	0.24	0.29	0.30	0.33	0.32	0.33	0.30	0.27	0.99	1.04	1.01	1.09	0.98	0.94
	Silver (Ag)	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)	mg/L	0.266	0.231	0.251	0.293	0.374	0.214	0.321	0.331	0.326	0.351	0.349	0.387	0.376	3.22	2.78	3.34	2.69	2.74	1.55
	Strontium (Sr)	mg/L	0.00201	0.00179	0.00183	0.00356	0.00232	0.0030	0.00232	0.00222	0.00221	0.00231	0.00229	0.00291	0.00271	0.0147	0.0149	0.0152	0.0180	0.0130	0.0171
	Thallium (Tl)	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Tin (Sn)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)	mg/L	0.00036	0.00032	0.0009	0.00082	0.00109	<0.00030	0.00086	0.0004	0.0007	0.00061	0.00072	0.00077	0.00059	0.00112	0.00062	0.00079	0.00103	0.00086	0.00042
	Uranium (U)	mg/L	0.000079	0.000087	0.000089	0.000091	0.000104	0.000067	0.000098	0.000084	0.000088	0.000095	0.000098	0.000167	0.000137	0.00286	0.00287	0.00295	0.00220	0.00234	0.00212
	Vanadium (V)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0011	<0.0010	0.0069	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010

Table C.60: Dissolved Metal Concentrations at Mary River (G0, E0, F0, C0) Water Quality Monitoring Stations, Mary River Project CREMP, 2022

	Parameters	Units	Summer Sampling Event							Fall Sampling Event												
			E0-10	E0-03	E0-21	E0-20	C0-10	C0-05	C0-01	G0-09-A	G0-09	G0-09-B	G0-03	GO-01	FO-01	EO-10	EO-03	EO-21	EO-20	C0-10	C0-05	C0-01
			30-Aug-23	30-Aug-23	30-Aug-23	30-Aug-23	30-Aug-23	30-Aug-23	30-Aug-23	12-Sep-23	12-Sep-23	12-Sep-23	12-Sep-23	12-Sep-23	12-Sep-23	18-Sep-23	18-Sep-23	18-Sep-23	18-Sep-23	18-Sep-23	18-Sep-23	18-Sep-23
Dissolved Metals	Aluminum (Al)	mg/L	0.0150	0.0152	0.0156	0.0086	0.0160	0.0159	0.0177	0.0079	0.0044	0.0079	0.0069	0.0069	0.0026	0.0052	0.0057	0.0057	0.0040	0.0032	0.0047	0.0095
	Antimony (Sb)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)	mg/L	0.00970	0.00992	0.00977	0.00946	0.00933	0.00898	0.00920	0.01100	0.0109	0.0115	0.0124	0.0120	0.0144	0.0128	0.0130	0.0129	0.0128	0.0127	0.0120	0.0113
	Beryllium (Be)	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
	Bismuth (Bi)	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.0000107	0.0000067	0.0000064	0.000005	<0.0000050	<0.0000050
	Calcium (Ca)	mg/L	16.10	16.40	15.40	15.00	14.10	14.30	14.30	16.7	18.7	18.1	19.4	18.2	27.4	22.5	20.7	20.3	19.3	20.0	18.6	18.2
	Chromium (Cr)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Cobalt (Co)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)	mg/L	0.00075	0.00076	0.00078	0.00078	0.00079	0.00075	0.00073	0.00104	0.00090	0.00093	0.00094	0.00093	0.00077	0.00087	0.00106	0.00098	0.00097	0.00102	0.00097	0.00092
	Iron (Fe)	mg/L	<0.010	<0.010	<0.010	<0.010	0.012	0.018	0.013	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.014	0.016
	Lead (Pb)	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0018	0.0012	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Magnesium (Mg)	mg/L	11.00	10.90	10.50	9.97	9.43	9.25	9.83	10.10	10.90	10.8	11.1	11.2	24.2	16.7	12.8	12.7	12.7	12.7	12.1	11.7
	Manganese (Mn)	mg/L	0.004370	0.000560	0.000480	0.000640	0.001010	0.00200	0.00268	0.000380	0.000190	0.000260	0.000300	0.000300	0.00039	<0.00010	0.000350	0.000330	0.000610	0.000980	0.00196	0.000970
	Mercury (Hg)	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)	mg/L	0.000343	0.000472	0.000526	0.000461	0.000453	0.000472	0.000417	0.000515	0.000389	0.000393	0.000375	0.000380	0.000371	0.000392	0.000908	0.000907	0.000747	0.000733	0.000724	0.000705
	Nickel (Ni)	mg/L	<0.00050	<0.00050	<0.00050	0.00056	0.00051	0.00053	0.00051	<0.00050	<0.00050	<0.00050	<0.00050	0.00052	<0.00050	<0.00050	0.00062	0.00064	0.00088	0.00091	0.00094	0.00086
	Potassium (K)	mg/L	0.98	0.98	0.99	0.96	0.95	0.98	0.94	1.20	1.09	1.17	1.20	1.14	1.41	1.30	1.27	1.26	1.26	1.26	1.22	1.20
	Selenium (Se)	mg/L	0.000119	0.0001	0.000093	0.000072	0.000076	0.000058	0.000075	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	0.000248	0.000093	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Silicon (Si)	mg/L	1.00	1.01	1.00	1.01	1.02	0.96	0.97	1.02	1.06	1.06	1.14	1.08	1.07	1.14	1.10	1.10	1.12	1.11	1.06	1.02
	Silver (Ag)	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)	mg/L	2.48	2.44	2.58	2.42	2.49	2.42	2.36	3.94	3.55	3.78	3.04	3.12	2.92	3.04	3.07	3.05	2.97	2.97	2.86	2.85
	Strontium (Sr)	mg/L	0.01760	0.01720	0.01730	0.01510	0.01460	0.01420	0.01430	0.0206	0.0192	0.0194	0.0235	0.0179	0.0253	0.0216	0.0221	0.0219	0.0190	0.0197	0.0185	0.0184
	Thallium (Tl)	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Tin (Sn)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)	mg/L	0.00038	0.00042	0.00041	<0.00030	0.00042	0.00047	0.00049	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	0.00036
	Uranium (U)	mg/L	0.00286	0.002840	0.002880	0.002400	0.002460	0.002260	0.002340	0.00587	0.00507	0.00516	0.00407	0.00388	0.00326	0.00421	0.00490	0.00490	0.00396	0.00402	0.00355	0.00361
	Vanadium (V)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010

Table C.61: Summary of the Magnitude of Elevation in Seasonal Average Dissolved Metal Concentrations Between Mary River Mine-Exposed and Reference (G0-09) Stations in 2023 and between Mary River Mine-Exposed and Mine Baseline Period (2005 to 2013), Mary River Project CREMP

Variable	Mary River and Mary River Tributary F 2023 vs Mary River Reference 2023																											
	Spring										Summer										Fall							
	G0-03	G0-01	F0-01	E0-10	E0-03	E0-21	E0-20	C0-10	C0-05	C0-01	G0-03	G0-01	F0-01	E0-10	E0-03	E0-21	E0-20	C0-10	C0-05	C0-01	G0-03	G0-01	F0-01	E0-10	E0-03	E0-21	E0-20	C0-10	C0-05	C0-01
Aluminum (Al)	1.38	1.96	0.551	1.41	0.756	1.41	0.914	1.22	1.34	0.902	1.33	1.09	0.411	0.581	0.589	0.605	0.333	0.620	0.616	0.686	1.02	1.02	0.386	0.772	0.847	0.847	0.594	0.475	0.698	1.41
Antimony (Sb)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Arsenic (As)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Barium (Ba)	1.21	1.22	1.07	1.12	1.01	1.04	1.15	1.15	1.41	1.25	1.13	1.01	1.12	1.22	1.25	1.23	1.19	1.18	1.13	1.16	1.11	1.08	1.29	1.15	1.17	1.16	1.15	1.14	1.08	1.01
Beryllium (Be)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Bismuth (Bi)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Boron (B)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Cadmium (Cd)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.14	1.34	1.28	1.00	1.00	1.00
Calcium (Ca)	1.04	0.949	1.58	1.00	1.05	1.03	1.14	1.08	1.20	1.12	0.992	0.953	1.59	1.27	1.29	1.21	1.18	1.11	1.13	1.13	1.09	1.02	1.54	1.26	1.16	1.14	1.08	1.12	1.04	1.02
Chromium (Cr)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.66	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Cobalt (Co)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Copper (Cu)	1.12	0.970	0.606	0.788	0.970	0.909	1.09	1.15	1.09	0.848	1.10	0.967	0.722	0.918	0.931	0.955	0.955	0.967	0.918	0.894	0.983	0.972	0.805	0.909	1.11	1.02	1.01	1.07	1.01	0.962
Iron (Fe)	1.26	1.89	0.789	1.50	0.789	1.11	1.03	1.18	5.05	1.03	1.27	0.933	0.667	0.667	0.667	0.667	0.667	0.800	1.20	0.867	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.40	1.60
Lead (Pb)	1.00	1.20	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lithium (Li)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.80	1.20	1.00	1.00	1.00	1.00	1.00	1.00
Magnesium (Mg)	1.04	0.997	2.01	1.08	1.12	1.11	1.24	1.20	1.36	1.27	1.03	0.986	2.11	1.41	1.39	1.34	1.27	1.21	1.18	1.26	1.05	1.06	2.28	1.58	1.21	1.20	1.20	1.20	1.14	1.10
Manganese (Mn)	0.813	0.929	1.93	1.03	0.452	0.470	0.464	0.513	1.45	0.910	2.15	0.923	1.27	16.8	2.15	1.85	2.46	3.88	7.69	10.3	1.08	1.08	1.41	0.361	1.27	1.19	2.20	3.54	7.08	3.51
Mercury (Hg)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Molybdenum (Mo)	1.06	1.36	1.76	1.00	1.00	1.00	1.00	1.18	2.32	1.94	0.897	0.883	0.718	0.947	1.30	1.45	1.27	1.25	1.30	1.15	0.867	0.879	0.858	0.907	2.10	2.10	1.73	1.70	1.67	1.63
Nickel (Ni)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.14	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.12	1.02	1.06	1.02	1.00	1.04	1.00	1.00	1.24	1.28	1.76	1.82	1.88	1.72
Potassium (K)	1.16	1.16	1.27	1.14	1.01	1.03	1.10	1.09	1.42	1.34	1.02	0.952	1.14	0.960	0.954	0.963	0.938	0.929	0.953	0.915	1.04	0.988	1.22	1.13	1.10	1.09	1.09	1.09	1.06	1.04
Selenium (Se)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.88	2.38	2.00	1.86	1.44	1.52	1.16	1.50	1.00	1.00	4.96	1.86	1.00	1.00	1.00	1.00	1.00	1.00
Silicon (Si)	1.11	1.08	0.799	0.979	1.01	1.09	1.06	1.09	0.986	0.912	1.08	0.972	0.924	0.986	0.998	0.988	0.998	1.01	0.949	0.960	1.09	1.03	1.02	1.09	1.05	1.05	1.07	1.06	1.01	0.975
Silver (Ag)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Sodium (Na)	1.18	1.50	0.858	1.29	1.33	1.31	1.41	1.40	1.55	1.51	0.864	0.880	0.498	0.797	0.784	0.829	0.777	0.800	0.777	0.758	0.809	0.831	0.777	0.809	0.817	0.812	0.791	0.791	0.761	0.759
Strontium (Sr)	1.90	1.24	1.57	1.24	1.18	1.18	1.23	1.22	1.55	1.44	1.21	0.871	1.15	1.18	1.15	1.16	1.01	0.978	0.951	0.958	1.19	0.907	1.28	1.09	1.12	1.11	0.963	0.998	0.938	0.932
Thallium (Tl)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Tin (Sn)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Titanium (Ti)	1.56	2.07	0.570	1.63	0.759	1.33	1.16	1.37	1.46	1.12	1.22	1.02	0.498	0.451	0.498	0.486	0.356	0.498	0.557	0.581	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.20
Uranium (U)	1.07	1.22	0.788	1.15	0.988	1.04	1.12	1.15	1.96	1.61	0.760	0.809	0.733	0.988	0.982	0.995	0.829	0.850	0.781	0.809	0.758	0.723	0.607	0.784	0.913	0.913	0.738	0.749	0.661	0.673
Vanadium (V)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Zinc (Zn)	1.00	1.00	1.00	1.00	1.00	1.00	1.10	1.00	6.90	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Denotes slight elevation (mean concentration three to five times higher than respective mean reference or baseline period value).
Denotes moderate elevation (mean concentration five to 10 times higher than respective mean reference or baseline period value).
Denotes highly elevated concentration (mean concentration ≥ 10 times higher than respective mean reference or baseline period value).
Denotes differences in method detection limit between the indicated study area and that of the reference area or baseline period, precluding an evaluation of magnitude of elevation.

Table C.61: Summary of the Magnitude of Elevation in Seasonal Average Dissolved Metal Concentrations Between Mary River Mine-Exposed and Reference (G0-09) Stations in 2023 and between Mary River Mine-Exposed and Mine Baseline Period (2005 to 2013), Mary River Project CREMP

Variable	Mary River and Mary River Tributary F 2023 vs Baseline																													
	Spring										Summer										Fall									
	G0-03	G0-01	F0-01	E0-10	E0-03	E0-21	E0-20	C0-10	C0-05	C0-01	G0-03	G0-01	F0-01	E0-10	E0-03	E0-21	E0-20	C0-10	C0-05	C0-01	G0-03	G0-01	F0-01	E0-10	E0-03	E0-21	E0-20	C0-10	C0-05	C0-01
Aluminum (Al)	0.152	0.292	1.04	0.170	0.0951	0.0832	0.305	0.117	0.256	0.0598	0.0992	0.0908	2.30	0.0629	0.0439	0.0536	0.0427	0.0455	0.0312	0.105	0.0591	0.0425	0.743	0.0255	0.0294	0.0186	0.0212	0.0272	0.0312	0.105
Antimony (Sb)	1.00	1.00	0.571	1.00	1.00	1.00	1.00	0.800	1.00	1.00	0.957	1.00	0.727	1.00	0.971	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Arsenic (As)	1.00	1.00	1.00	0.946	1.00	1.00	1.00	0.944	1.00	0.909	0.968	1.00	1.00	1.00	0.980	1.00	0.909	0.960	1.00	0.541	0.960	0.920	1.00	0.993	0.991	1.00	1.00	0.984	1.00	0.541
Barium (Ba)	0.634	0.541	0.277	0.482	0.506	0.541	0.963	0.0326	0.469	1.12	1.00	0.998	1.06	1.22	1.12	1.35	1.36	1.05	1.05	1.10	1.20	1.19	1.60	1.29	1.02	1.01	1.07	1.09	1.05	1.10
Beryllium (Be)	0.333	0.0400	0.0151	1.00	0.333	0.333	0.333	0.121	0.0400	1.00	1.00	1.00	0.0262	1.00	1.00	1.00	1.00	1.00	0.0400	1.00	0.500	1.00	0.0600	1.00	1.00	1.00	1.00	1.00	0.0400	1.00
Bismuth (Bi)	0.150	0.167	0.125	0.100	0.150	0.100	0.100	0.139	0.100	0.167	0.167	0.167	0.133	0.100	0.167	0.100	0.100	0.167	0.100	0.167	0.167	0.167	0.114	0.100	0.167	0.100	0.100	0.167	0.100	0.167
Boron (B)	1.00	0.706	1.00	1.00	0.773	1.00	1.00	0.937	1.00	1.00	0.992	0.994	1.00	0.990	0.939	1.00	1.00	0.837	0.952	0.990	0.992	0.988	1.00	0.993	0.972	0.909	0.909	0.990	0.952	0.990
Cadmium (Cd)	0.470	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.484	0.232	0.425	0.500	0.475	0.427	0.500	0.500	0.497	0.417	0.489	0.409	0.500	0.480	0.488	0.931	0.670	0.640	0.452	0.417	0.489
Calcium (Ca)	0.755	0.628	0.604	0.510	0.588	1.19	1.11	0.412	0.392	1.38	1.28	1.35	1.16	1.58	1.47	1.78	1.67	1.23	0.970	1.00	1.21	1.17	1.10	1.33	0.890	1.17	1.10	0.932	0.970	1.00
Chromium (Cr)	1.24	1.27	5.00	1.66	1.85	0.585	1.96	1.87	8.30	0.802	0.592	1.05	5.00	1.25	0.759	0.0182	1.11	0.783	1.02	3.25	1.71	0.966	1.61	0.137	0.810	0.679	1.25	1.62	1.02	3.25
Cobalt (Co)	0.759	0.714	0.824	0.741	0.742	0.465	1.00	0.833	1.00	0.594	0.539	0.657	0.842	0.713	0.548	0.741	0.952	0.528	0.909	0.976	0.980	0.962	0.783	0.906	0.838	0.698	0.857	0.970	0.909	0.976
Copper (Cu)	0.443	0.336	0.200	0.317	0.298	0.408	0.847	0.00189	0.465	0.561	0.583	0.515	0.000100	0.456	0.495	0.339	0.634	0.595	0.919	0.941	0.893	0.826	1.12	0.738	0.898	0.682	0.983	0.977	0.919	0.941
Iron (Fe)	0.166	0.235	0.366	0.133	0.0754	0.0424	0.260	0.0855	0.422	0.0407	0.102	0.0482	0.432	0.0424	0.0294	0.0225	0.0563	0.0377	0.0870	0.142	0.124	0.0678	0.394	0.0656	0.0626	0.0429	0.0588	0.0915	0.0870	0.142
Lead (Pb)	0.288	0.245	0.571	0.124	0.195	0.167	0.667	0.278	0.345	0.167	0.148	0.142	0.678	0.198	0.127	0.233	0.312	0.128	0.366	0.488	0.472	0.392	0.813	0.444	0.288	0.254	0.395	0.543	0.366	0.488
Lithium (Li)	1.56	0.200	2.00	1.02	3.64	2.78	3.64	0.554	0.200	3.45	1.20	1.24	0.556	1.00	1.12	1.20	1.30	2.94	0.200	1.14	0.939	1.04	1.32	1.22	0.837	0.985	0.465	0.813	0.200	1.14
Magnesium (Mg)	0.717	0.608	0.737	0.531	0.652	1.02	1.02	0.510	0.424	1.80	1.43	1.55	1.73	1.93	1.99	2.19	1.98	1.65	1.61	1.26	1.20	1.27	1.75	1.71	1.20	1.20	1.04	1.18	1.61	1.26
Manganese (Mn)	0.278	0.403	3.02	0.235	0.159	0.0897	0.225	0.138	0.393	0.558	0.120	0.0518	1.51	1.09	0.0995	0.0913	0.279	0.171	0.631	0.385	0.203	0.173	1.60	0.0646	0.153	0.117	0.127	0.443	0.631	0.385
Mercury (Hg)	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.469	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500
Molybdenum (Mo)	0.777	0.482	0.670	0.738	0.344	0.885	0.794	0.000295	0.951	1.46	1.42	1.39	1.37	1.61	1.63	1.69	1.90	1.49	1.72	1.92	1.14	1.13	1.64	1.24	1.69	1.61	1.72	1.27	1.72	1.92
Nickel (Ni)	0.674	0.862	0.141	0.484	0.735	0.552	1.00	0.00708	0.708	0.517	0.499	0.589	0.311	0.521	0.510	0.469	0.903	0.457	1.13	1.19	0.801	0.937	0.327	0.907	0.849	0.889	1.03	1.03	1.13	1.19
Potassium (K)	0.679	0.708	1.01	0.775	0.628	0.716	0.912	0.513	0.584	1.09	1.15	1.19	1.68	1.26	1.12	1.15	1.18	1.14	1.08	1.28	1.20	1.21	1.29	1.33	1.17	0.853	0.967	1.20	1.08	1.28
Selenium (Se)	5.00	0.500	0.500	5.00	3.33	5.00	5.00	0.00337	0.500	7.50	5.00	5.00	1.44	11.9	10.0	9.30	7.20	7.60	0.500	5.00	2.50	5.00	2.48	9.30	5.00	0.500	0.500	0.500	0.500	5.00
Silicon (Si)	0.459	0.318	0.876	0.322	0.435	0.438	0.997	0.310	0.367	0.648	0.714	0.597	1.32	0.714	0.617	0.840	1.04	0.583	0.952	0.939	0.982	0.959	1.33	1.11	0.886	0.871	0.957	0.996	0.952	0.939
Silver (Ag)	10.0	1.00	1.32	10.0	1.47	10.0	10.0	0.000515	1.00	0.759	1.32	1.63	1.47	10.0	1.30	10.0	10.0	1.06	10.0	10.0	10.0	10.0	0.424	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Sodium (Na)	0.753	1.11	0.662	1.05	0.961	0.701	0.746	0.660	0.559	2.05	2.01	2.54	2.37	2.49	2.02	1.91	1.76	2.17	1.12	1.39	1.33	1.57	2.16	1.48	1.23	0.967	0.860	1.58	1.12	1.39
Strontium (Sr)	1.23	0.741	0.748	0.647	0.279	0.880	0.967	0.0314	0.333	1.03	1.91	1.49	1.45	1.93	0.955	2.04	1.83	0.869	0.752	0.671	1.62	1.25	1.36	1.47	0.494	1.36	0.683	0.590	0.752	0.671
Thallium (Tl)	1.67	0.100	0.217	0.909	1.82	1.54	1.82	0.340	0.100	10.0	1.67	10.0	0.571	10.0	1.82	1.43	1.82	10.0	0.100	10.0	1.54	10.0	0.182	10.0	1.18	0.769	1.00	1.00	0.100	10.0
Tin (Sn)	0.610	1.00	0.132	1.00	0.725	1.00	1.00	0.750	1.00	0.984	0.818	0.824	0.0791	0.938	0.505	1.00	1.00	0.921	1.00	1.00	1.00	1.00	0.591	1.00	0.993	1.00	1.00	1.00	1.00	1.00
Titanium (Ti)	0.0607	0.0948	0.0462	0.0382	0.0320	0.0280	0.0610	0.0689	0.0733	0.0221	0.0412	0.0355	0.0509	0.0153	0.0143	0.0205	0.0200	0.0148	0.0240	0.0689	0.0480	0.0388	0.0336	0.0248	0.0348	0.0150	0.0225	0.0627	0.0240	0.0689
Uranium (U)	0.269	0.212	0.192	0.275	0.407	0.408	0.569	0.270	0.472	1.67	1.46	1.49	1.45	1.95	1.99	3.21	2.94	1.61	1.09	1.33	1.08	1.03	1.31	1.19	1.25	1.26	1.14	1.20	1.09	1.33
Vanadium (V)	0.532	0.556	0.547	0.470	0.552	0.435	0.500	0.494	0.500	0.409	0.441	0.497	0.472	0.477	0.448	0.500	0.500	0.445	0.500	0.556	0.556	0.552	0.452	0.500	0.536	0.484	0.500	0.556	0.500	0.556
Zinc (Zn)	0.200	0.148	0.755	0.203	0.381	1.00	0.367	0.533	6.90	0.382	0.339	0.380	0.640	0.245	0.374	0.308	1.00	0.400	1.00	0.843	0.429	0.865	0.000271	0.458	0.757	3.03	0.556	0.875	1.00	0.843

Denotes slight elevation (mean concentration three to five times higher than respective mean reference or baseline period value).
Denotes moderate elevation (mean concentration five to 10 times higher than respective mean reference or baseline period value).
Denotes highly elevated concentration (mean concentration ≥ 10 times higher than respective mean reference or baseline period value).
Denotes differences in method detection limit between the indicated study area and that of the reference area or baseline period, precluding an evaluation of magnitude of elevation.

Table C.62: ***In Situ*** **Water Quality Profile Data Collected at Mary Lake (BL0) Water Quality Monitoring Stations in Winter, Mary River Project CREMP, April 2023**

Depth (m)	Temperature (°C)										Dissolved Oxygen (mg/L)										Dissolved Oxygen (% Saturation)				
	BL0-01-A	BL0-01	BL0-01-B	BL0-05-A	BL0-05	BL0-05-B	BL0-03	BL0-04	BL0-09	BL0-06	BL0-01-A	BL0-01	BL0-01-B	BL0-05-A	BL0-05	BL0-05-B	BL0-03	BL0-04	BL0-09	BL0-06	BL0-01-A	BL0-01	BL0-01-B	BL0-05-A	BL0-05
	8-Apr-23	8-Apr-23	8-Apr-23	7-Apr-23	7-Apr-23	7-Apr-23	7-Apr-23	7-Apr-23	7-Apr-23	6-Apr-23	8-Apr-23	8-Apr-23	8-Apr-23	7-Apr-23	7-Apr-23	7-Apr-23	7-Apr-23	7-Apr-23	7-Apr-23	6-Apr-23	8-Apr-23	8-Apr-23	8-Apr-23	7-Apr-23	7-Apr-23
1	-	0	0.1	-	-	-	0.1	-	-	-	-	14.07	13.88	-	-	-	14.55	-	-	-	-	98.60	97.40	-	-
2	0.2	0.2	0.1	0.6	1.1	0.6	0.4	0.2	0.4	0.2	13.60	14.03	13.98	14.34	13.91	14.51	14.47	14.14	13.55	14.43	96.00	99.10	98.20	101.40	100.00
3	0.4	0.5	0.3	0.8	1.4	1.1	1.1	1	1.2	0.8	13.52	13.94	13.88	14.33	13.80	14.37	14.11	14.08	13.64	14.29	95.80	98.90	98.10	102.00	100.00
4	0.6	0.5	0.5	1.2	1.4	1.6	0.9	1.4	1.8	1.5	13.41	13.95	13.72	14.05	13.76	13.88	14.13	13.80	13.19	13.90	95.50	99.00	97.40	101.70	99.60
5	0.8	0.7	-	1.2	1.6	1.7	0.9	1.7	1.9	-	13.24	13.81	-	13.95	13.76	13.42	14.02	14.08	13.08	-	94.90	98.60	-	100.00	99.70
6	0.9	0.9	-	1.7	1.8	-	1.7	1.9	2	1.7	13.18	13.74	-	13.66	13.51	-	13.48	12.27	12.99	13.25	93.60	98.40	-	100.30	98.80
7	1	1	-	1.9	1.9	-	1.9	1.9	2.1	-	13.01	13.62	-	13.58	13.38	-	13.36	13.15	12.88	-	93.70	97.80	-	99.70	98.20
8	1.1	-	-	2	2	-	1.9	2.1	2.1	-	11.91	-	-	13.42	13.28	-	13.22	12.96	12.79	-	86.00	-	-	98.80	97.70
9	1.2	-	-	2.1	2.1	-	2	2.1	2.2	-	11.68	-	-	13.27	13.18	-	13.05	12.91	12.67	-	84.40	-	-	97.90	97.20
10	1.3	-	-	2.1	2.2	-	2	2.1	2.2	-	10.77	-	-	13.09	13.05	-	12.93	12.83	12.58	-	78.30	-	-	97.40	96.40
11	1.4	-	-	-	2.2	-	2	2.2	2.3	-	8.24	-	-	-	12.96	-	12.88	12.76	12.80	-	59.30	-	-	-	95.60
12	-	-	-	-	2.2	-	2	2.2	2.3	-	-	-	-	-	12.90	-	12.79	12.68	12.40	-	-	-	-	-	95.50
13	1.7	-	-	-	2.2	-	2	2.3	2.3	-	3.60	-	-	-	12.87	-	12.72	12.63	12.40	-	26.30	-	-	-	95.20
14	1.8	-	-	-	2.3	-	2.1	2.3	2.3	-	2.79	-	-	-	12.79	-	12.62	12.55	12.31	-	20.10	-	-	-	94.80
15	1.9	-	-	-	2.3	-	-	2.3	2.4	-	1.53	-	-	-	12.72	-	-	12.43	12.70	-	10.90	-	-	-	94.30
16	-	-	-	-	-	-	-	2.3	2.4	-	-	-	-	-	-	-	-	12.40	12.91	-	-	-	-	-	-
17	-	-	-	-	2.4	-	-	2.4	2.4	-	-	-	-	-	12.36	-	-	12.24	12.07	-	-	-	-	-	92.00
18	-	-	-	-	2.4	-	-	2.4	-	-	-	-	-	-	12.04	-	-	12.13	-	-	-	-	-	-	90.00
19	-	-	-	-	-	-	-	2.4	2.5	-	-	-	-	-	-	-	-	11.88	11.62	-	-	-	-	-	-
20	-	-	-	-	2.4	-	-	2.4	2.5	-	-	-	-	-	11.77	-	-	11.63	11.26	-	-	-	-	-	87.50
21	-	-	-	-	-	-	-	-	2.5	-	-	-	-	-	-	-	-	-	11.60	-	-	-	-	-	-
22	-	-	-	-	-	-	-	-	2.5	-	-	-	-	-	-	-	-	-	10.78	-	-	-	-	-	-
23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
24	-	-	-	-	-	-	-	-	2.6	-	-	-	-	-	-	-	-	-	10.18	-	-	-	-	-	-
25	-	-	-	-	-	-	-	-	2.6	-	-	-	-	-	-	-	-	-	9.79	-	-	-	-	-	-
26	-	-	-	-	-	-	-	-	2.7	-	-	-	-	-	-	-	-	-	9.35	-	-	-	-	-	-

Notes: "-" = data not available. The total depth of the water column at each sampling station was not recorded but deepest measurements are within 1 m of lake bottom.

Table C.62: ***In Situ*** **Water Quality Profile Data Collected at Mary Lake (BL0) Water Quality Monitoring Stations in Winter, Mary River Project CREMP, April 2023**

Depth (m)	Dissolved Oxygen (% Saturation)					pH (pH units)										Specific Conductance (µS/cm)									
	BL0-05-B	BL0-03	BL0-04	BL0-09	BL0-06	BL0-01-A	BL0-01	BL0-01-B	BL0-05-A	BL0-05	BL0-05-B	BL0-03	BL0-04	BL0-09	BL0-06	BL0-01-A	BL0-01	BL0-01-B	BL0-05-A	BL0-05	BL0-05-B	BL0-03	BL0-04	BL0-09	BL0-06
	7-Apr-23	7-Apr-23	7-Apr-23	7-Apr-23	6-Apr-23	8-Apr-23	8-Apr-23	8-Apr-23	7-Apr-23	7-Apr-23	7-Apr-23	7-Apr-23	7-Apr-23	7-Apr-23	6-Apr-23	8-Apr-23	8-Apr-23	8-Apr-23	7-Apr-23	7-Apr-23	7-Apr-23	7-Apr-23	7-Apr-23	7-Apr-23	6-Apr-23
1	-	101.60	-	-	-	-	7.98	7.95	-	-	-	8.05	-	-	-	-	246.10	248.70	-	-	-	89.40	-	-	-
2	102.50	102.20	100.90	95.60	101.50	7.99	7.96	7.91	7.94	7.79	8.07	7.89	7.67	8.00	7.72	235.30	241.70	244.00	92.10	87.90	94.50	87.30	94.70	92.70	93.60
3	103.20	102.20	101.00	98.80	101.80	7.97	7.94	7.90	7.85	7.76	7.88	7.82	7.65	7.83	7.69	233.70	240.50	241.30	89.80	87.00	91.60	85.80	89.70	86.30	91.50
4	100.90	101.10	99.90	96.50	100.60	7.96	7.94	7.90	7.80	7.76	7.77	7.79	7.66	7.76	7.65	232.20	240.40	239.60	88.00	86.80	88.90	84.90	87.20	82.00	91.50
5	97.60	101.00	98.20	95.90	-	7.94	7.92	-	7.80	7.72	7.64	7.77	7.66	7.72	-	231.00	238.60	-	87.30	85.80	93.10	83.20	86.50	84.40	-
6	-	98.40	97.00	95.50	95.80	7.93	7.92	-	7.75	7.71	-	7.78	7.65	7.72	7.52	230.40	237.70	-	86.50	85.20	-	82.40	80.40	83.80	92.80
7	-	98.00	96.50	94.90	-	7.90	7.91	-	7.74	7.70	-	7.72	7.65	7.71	-	230.10	236.50	-	85.50	84.40	-	81.60	84.30	83.40	-
8	-	97.00	95.50	94.30	-	7.79	-	-	7.73	7.70	-	7.71	7.66	7.71	-	229.80	-	-	85.00	84.00	-	81.10	83.50	82.90	-
9	-	96.00	95.20	93.70	-	7.75	-	-	7.71	7.69	-	7.70	7.66	7.70	-	229.20	-	-	84.60	83.50	-	80.60	83.00	82.50	-
10	-	95.10	94.70	93.10	-	7.70	-	-	7.71	7.68	-	7.69	7.66	7.68	-	227.80	-	-	84.40	83.30	-	80.50	82.40	81.80	-
11	-	94.70	94.30	92.50	-	7.51	-	-	-	7.68	-	7.68	7.65	7.69	-	226.70	-	-	-	83.10	-	80.30	82.30	81.40	-
12	-	94.20	93.80	91.10	-	-	-	-	-	7.68	-	7.67	7.65	7.68	-	-	-	-	-	83.00	-	80.00	82.00	81.30	-
13	-	93.70	93.50	91.90	-	7.30	-	-	-	7.67	-	7.67	7.65	7.68	-	231.00	-	-	-	82.70	-	79.80	81.80	81.20	-
14	-	93.10	92.90	91.40	-	7.26	-	-	-	7.67	-	7.66	7.65	7.67	-	234.80	-	-	-	82.40	-	79.40	81.50	81.00	-
15	-	-	92.10	91.10	-	7.22	-	-	-	7.66	-	-	7.63	7.65	-	241.40	-	-	-	82.20	-	-	81.30	80.80	-
16	-	-	91.50	90.50	-	-	-	-	-	-	-	-	7.62	7.65	-	-	-	-	-	-	-	-	81.00	80.70	-
17	-	-	90.90	89.70	-	-	-	-	-	7.62	-	-	7.61	7.64	-	-	-	-	-	81.60	-	-	80.80	80.50	-
18	-	-	90.10	-	-	-	-	-	-	7.59	-	-	7.60		-	-	-	-	-	81.50	-	-	80.60		-
19	-	-	88.30	86.40	-	-	-	-	-	-	-	-	7.57	7.58	-	-	-	-	-	-	-	-	80.90	80.60	-
20	-	-	80.50	84.50	-	-	-	-	-	7.55	-	-	7.53	7.54	-	-	-	-	-	83.60	-	-	81.00	81.00	-
21	-	-	-	82.40	-	-	-	-	-	-	-	-	-	7.51	-	-	-	-	-	-	-	-	-	81.30	-
22	-	-	-	80.30	-	-	-	-	-	-	-	-	-	7.46	-	-	-	-	-	-	-	-	-	81.60	-
23	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-
24	-	-	-	75.90	-	-	-	-	-	-	-	-	-	7.39	-	-	-	-	-	-	-	-	-	82.80	-
25	-	-	-	73.10	-	-	-	-	-	-	-	-	-	7.35	-	-	-	-	-	-	-	-	-	83.20	-
26	-	-	-	69.90	-	-	-	-	-	-	-	-	-	7.31	-	-	-	-	-	-	-	-	-	83.60	-

Notes: "- Notes: "-" = data not available. The total depth of the water column at each sampling station was not recorded but deepest measurements are within 1 m of lake bottom.

Table C.63: ***In Situ*** **Water Quality Profile Data Collected at Mary Lake (BL0) Water Quality Monitoring Stations in Summer, Mary River Project CREMP, Aug 2023**

Depth (m)	Temperature (°C)										Dissolved Oxygen (mg/L)									
	BL0-01-A	BL0-01	BL0-01-B	BL0-05-A	BL0-05	BL0-05-B	BL0-03	BL0-04	BL0-09	BL0-06	BL0-01-A	BL0-01	BL0-01-B	BL0-05-A	BL0-05	BL0-05-B	BL0-03	BL0-04	BL0-09	BL0-06
	2-Aug-23	2-Aug-23	2-Aug-23	3-Aug-23	3-Aug-23	2-Aug-23	3-Aug-23	3-Aug-23	3-Aug-23	3-Aug-23	2-Aug-23	2-Aug-23	2-Aug-23	3-Aug-23	3-Aug-23	2-Aug-23	3-Aug-23	3-Aug-23	3-Aug-23	3-Aug-23
1.0	12.10	12.50	11.80	12.50	12.70	12.90	12.10	12.40	12.70	12.30	10.68	10.69	10.73	10.79	10.72	10.98	10.79	10.93	10.85	11.00
2.0	12.10	-	-	12.40	12.20	12.80	11.80	12.30	12.60	12.20	10.69	-	-	10.88	10.89	11.02	11.11	10.99	10.90	11.06
3.0	11.80	12.40	10.90	10.10	10.50	12.70	11.00	11.20	11.00	11.50	10.73	10.93	10.92	11.13	11.08	11.06	11.37	11.32	11.29	11.25
4.0	11.20	10.60	-	7.90	9.40	7.40	10.30	10.40	10.20	11.10	10.86	11.07	-	11.64	11.31	11.72	11.53	11.51	11.48	11.36
5.0	9.50	9.30	-	7.40	7.40	6.20	8.40	7.30	8.20	9.30	11.17	11.38	-	11.73	11.64	11.94	11.86	11.88	11.86	11.72
6.0	8.30	7.70	-	7.00	6.90	5.70	7.00	6.20	7.10	7.40	11.54	11.93	-	11.81	11.80	11.97	11.96	11.96	12.02	11.94
7.0	6.30	6.80	-	6.40	6.30	-	6.80	5.50	6.20	6.30	11.99	12.15	-	11.93	11.89	-	11.97	11.99	12.01	11.96
8.0	6.00	6.30	-	6.00	5.90	-	6.20	5.00	5.90	-	12.06	12.20	-	11.95	11.92	-	11.99	12.03	11.91	-
9.0	5.80	6.00	-	5.80	5.50	-	6.10	4.70	5.50	-	12.06	12.16	-	11.96	11.91	-	11.99	12.02	11.92	-
10.0	5.70	-	-	-	5.10	-	5.90	4.40	5.10	-	11.98	-	-	-	11.94	-	12.01	11.98	12.01	-
11.0	5.60	-	-	-	4.90	-	5.50	4.20	4.70	-	11.85	-	-	-	11.94	-	11.97	11.94	11.99	-
12.0	5.60	-	-	-	4.80	-	5.40	4.00	4.40	-	11.77	-	-	-	11.91	-	11.96	11.92	11.87	-
13.0	5.60	-	-	-	4.50	-	5.20	3.90	4.30	-	11.72	-	-	-	11.91	-	11.96	11.88	11.85	-
14.0	-	-	-	-	4.30	-	5.00	3.90	4.00	-	-	-	-	-	11.90	-	11.94	11.73	11.78	-
15.0	-	-	-	-	4.10	-	5.00	3.70	3.80	-	-	-	-	-	11.86	-	11.91	11.63	11.75	-
16.0	-	-	-	-	4.00	-	-	3.50	3.70	-	-	-	-	-	11.86	-	-	11.42	11.72	-
17.0	-	-	-	-	3.70	-	-	3.40	3.60	-	-	-	-	-	11.74	-	-	11.24	11.60	-
18.0	-	-	-	-	3.60	-	-	3.30	3.40	-	-	-	-	-	11.48	-	-	11.09	11.42	-
19.0	-	-	-	-	3.50	-	-	-	3.40	-	-	-	-	-	11.34	-	-	-	11.29	-
20.0	-	-	-	-	-	-	-	-	3.30	-	-	-	-	-	-	-	-	-	11.10	-
21.0	-	-	-	-	-	-	-	-	3.20	-	-	-	-	-	-	-	-	-	11.00	-
22.0	-	-	-	-	-	-	-	-	3.20	-	-	-	-	-	-	-	-	-	10.79	-
23.0	-	-	-	-	-	-	-	-	3.20	-	-	-	-	-	-	-	-	-	10.67	-
24.0	-	-	-	-	-	-	-	-	3.10	-	-	-	-	-	-	-	-	-	10.42	-
25.0	-	-	-	-	-	-	-	-	3.10	-	-	-	-	-	-	-	-	-	10.27	-
26.0	-	-	-	-	-	-	-	-	3.10	-	-	-	-	-	-	-	-	-	10.19	-
27.0	-	-	-	-	-	-	-	-	3.10	-	-	-	-	-	-	-	-	-	10.11	-
28.0	-	-	-	-	-	-	-	-	3.10	-	-	-	-	-	-	-	-	-	10.07	-
29.0	-	-	-	-	-	-	-	-	3.10	-	-	-	-	-	-	-	-	-	10.02	-

Notes: "-" = data not available. The total depth of the water column at each sampling station was not recorded but deepest measurements are within 1 m of lake bottom.

Table C.63: ***In Situ*** **Water Quality Profile Data Collected at Mary Lake (BL0)Water Quality Monitoring Stations in Summer, Mary River Project CREMP, Aug 2023**

Depth (m)	Dissolved Oxygen (% Saturation)										pH (pH units)									
	BL0-01-A	BL0-01	BL0-01-B	BL0-05-A	BL0-05	BL0-05-B	BL0-03	BL0-04	BL0-09	BL0-06	BL0-01-A	BL0-01	BL0-01-B	BL0-05-A	BL0-05	BL0-05-B	BL0-03	BL0-04	BL0-09	BL0-06
	2-Aug-23	2-Aug-23	2-Aug-23	3-Aug-23	3-Aug-23	2-Aug-23	3-Aug-23	3-Aug-23	3-Aug-23	3-Aug-23	2-Aug-23	2-Aug-23	2-Aug-23	3-Aug-23	3-Aug-23	2-Aug-23	3-Aug-23	3-Aug-23	3-Aug-23	3-Aug-23
1.0	101.40	102.30	101.10	103.40	103.20	106.00	102.50	104.50	104.40	104.90	7.96	7.97	7.95	7.29	7.42	7.85	7.94	7.81	7.79	7.37
2.0	101.30	-	-	104.10	103.70	106.20	104.80	104.70	104.70	105.10	7.95	-	-	7.38	7.49	7.83	7.91	7.80	7.79	7.44
3.0	101.10	102.30	100.80	100.90	101.10	106.10	105.00	105.40	104.50	105.30	7.96	7.95	7.95	7.43	7.53	7.83	7.89	7.81	7.81	7.50
4.0	100.90	101.40	-	99.90	100.90	98.00	104.90	104.90	103.90	105.40	7.96	7.96	-	7.38	7.55	7.86	7.85	7.79	7.80	7.53
5.0	99.60	101.20	-	99.50	98.80	97.90	102.90	100.40	102.60	103.30	7.97	7.95	-	7.38	7.56	7.78	7.83	7.78	7.77	7.56
6.0	99.90	101.90	-	99.00	98.90	96.50	100.50	98.30	101.20	100.70	7.93	7.94	-	7.38	7.52	7.69	7.73	7.72	7.74	7.55
7.0	99.10	101.50	-	98.80	98.20	-	100.00	97.10	98.90	98.60	7.92	7.89	-	7.36	7.49	-	7.68	7.69	7.65	7.52
8.0	98.70	100.60	-	97.70	97.50	-	98.80	96.10	97.20	-	7.84	7.84	-	7.34	7.46	-	7.63	7.62	7.63	-
9.0	98.30	99.50	-	97.50	96.50	-	98.40	95.40	96.50	-	7.79	7.81	-	7.32	7.43	-	7.59	7.59	7.60	-
10.0	97.30	-	-	-	95.60	-	98.00	94.10	96.10	-	7.75	-	-	-	7.40	-	7.57	7.56	7.57	-
11.0	96.00	-	-	-	95.10	-	96.80	93.40	94.90	-	7.70	-	-	-	7.39	-	7.55	7.51	7.52	-
12.0	95.40	-	-	-	94.60	-	96.50	92.80	93.50	-	7.67	-	-	-	7.36	-	7.53	7.48	7.49	-
13.0	95.00	-	-	-	93.80	-	96.00	92.20	92.90	-	7.64	-	-	-	7.35	-	7.51	7.45	7.46	-
14.0	-	-	-	-	93.30	-	95.50	91.00	91.80	-	-	-	-	-	7.33	-	7.50	7.42	7.44	-
15.0	-	-	-	-	92.60	-	95.10	89.70	91.00	-	-	-	-	-	7.31	-	7.47	7.39	7.42	-
16.0	-	-	-	-	92.30	-	-	87.70	90.60	-	-	-	-	-	7.31	-	-	7.36	7.40	-
17.0	-	-	-	-	90.50	-	-	86.10	89.20	-	-	-	-	-	7.28	-	-	7.33	7.37	-
18.0	-	-	-	-	88.20	-	-	84.80	87.30	-	-	-	-	-	7.25	-	-	7.20	7.33	-
19.0	-	-	-	-	87.10	-	-	-	86.40	-	-	-	-	-	7.10	-	-	-	7.33	-
20.0	-	-	-	-	-	-	-	-	84.80	-	-	-	-	-	-	-	-	-	7.24	-
21.0	-	-	-	-	-	-	-	-	83.70	-	-	-	-	-	-	-	-	-	7.09	-
22.0	-	-	-	-	-	-	-	-	82.30	-	-	-	-	-	-	-	-	-	7.03	-
23.0	-	-	-	-	-	-	-	-	81.20	-	-	-	-	-	-	-	-	-	7.02	-
24.0	-	-	-	-	-	-	-	-	79.20	-	-	-	-	-	-	-	-	-	6.98	-
25.0	-	-	-	-	-	-	-	-	78.00	-	-	-	-	-	-	-	-	-	6.94	-
26.0	-	-	-	-	-	-	-	-	77.30	-	-	-	-	-	-	-	-	-	6.93	-
27.0	-	-	-	-	-	-	-	-	76.70	-	-	-	-	-	-	-	-	-	6.91	-
28.0	-	-	-	-	-	-	-	-	76.40	-	-	-	-	-	-	-	-	-	6.89	-
29.0	-	-	-	-	-	-	-	-	76.10	-	-	-	-	-	-	-	-	-	6.88	-

Notes: "-" = data not available. The total depth of the water column at each sampling station was not recorded but deepest measurements are within 1 m of lake bottom.

Table C.63: ***In Situ*** **Water Quality Profile Data Collected at Mary Lake (BL0)Water Quality Monitoring Stations in Summer, Mary River Project CREMP, Aug 2023**

Depth (m)	Specific Conductance (µS/cm)									
	BL0-01-A	BL0-01	BL0-01-B	BL0-05-A	BL0-05	BL0-05-B	BL0-03	BL0-04	BL0-09	BL0-06
	2-Aug-23	2-Aug-23	2-Aug-23	3-Aug-23	3-Aug-23	2-Aug-23	3-Aug-23	3-Aug-23	3-Aug-23	3-Aug-23
1.0	75.50	71.70	75.80	51.40	52.80	48.90	50.20	50.30	50.10	48.70
2.0	75.60	-	-	51.30	51.40	48.50	49.50	50.40	50.20	48.30
3.0	75.20	71.70	73.80	54.80	57.00	48.30	48.20	48.90	47.70	47.00
4.0	74.40	71.20	-	49.70	53.90	43.80	47.70	48.30	46.50	46.20
5.0	68.70	64.10	-	47.90	49.30	43.10	46.60	45.10	44.50	45.10
6.0	60.20	51.70	-	45.30	46.90	43.80	46.40	45.80	43.70	41.50
7.0	49.40	50.20	-	44.90	45.40	-	46.20	42.90	43.50	44.40
8.0	49.50	49.90	-	43.90	44.60	-	46.60	42.70	45.60	-
9.0	49.50	50.12	-	43.50	45.20	-	46.70	42.60	43.60	-
10.0	49.90	-	-	-	44.10	-	47.20	43.90	42.50	-
11.0	50.60	-	-	-	44.20	-	47.70	45.20	44.60	-
12.0	50.60	-	-	-	44.50	-	47.70	46.50	47.40	-
13.0	50.60	-	-	-	45.20	-	47.50	48.00	48.30	-
14.0	-	-	-	-	45.80	-	47.50	49.50	49.90	-
15.0	-	-	-	-	46.60	-	47.80	53.00	51.60	-
16.0	-	-	-	-	47.70	-	-	58.00	52.70	-
17.0	-	-	-	-	52.20	-	-	59.00	55.70	-
18.0	-	-	-	-	55.60	-	-	63.00	60.00	-
19.0	-	-	-	-	57.00	-	-	-	60.60	-
20.0	-	-	-	-	-	-	-	-	63.00	-
21.0	-	-	-	-	-	-	-	-	65.70	-
22.0	-	-	-	-	-	-	-	-	66.00	-
23.0	-	-	-	-	-	-	-	-	67.10	-
24.0	-	-	-	-	-	-	-	-	70.20	-
25.0	-	-	-	-	-	-	-	-	70.90	-
26.0	-	-	-	-	-	-	-	-	71.80	-
27.0	-	-	-	-	-	-	-	-	72.10	-
28.0	-	-	-	-	-	-	-	-	72.20	-
29.0	-	-	-	-	-	-	-	-	72.40	-

Notes: "-" = data not available. The total depth of the water column at each sampling station was not recorded but deepest measurements are within 1 m of lake bottom.

Table C.64: ***In Situ*** **Water Quality Profile Data Collected at Mary Lake (BL0) Water Quality Monitoring Stations in Fall, Mary River Project CREMP, August 2023**

Depth (m)	Temperature (°C)										Dissolved Oxygen (mg/L)									
	BL0-01-A	BL0-01	BL0-01-B	BL0-05-A	BL0-05	BL0-05-B	BL0-03	BL0-04	BL0-09	BL0-06	BL0-01-A	BL0-01	BL0-01-B	BL0-05-A	BL0-05	BL0-05-B	BL0-03	BL0-04	BL0-09	BL0-06
	7-Sep-23	7-Sep-23	7-Sep-23	15-Sep-23	15-Sep-23	15-Sep-23	15-Sep-23	15-Sep-23	15-Sep-23	15-Sep-23	7-Sep-23	7-Sep-23	7-Sep-23	15-Sep-23	15-Sep-23	15-Sep-23	15-Sep-23	15-Sep-23	15-Sep-23	15-Sep-23
1.0	2.90	2.90	2.80	4.70	3.90	4.6	4.40	4.40	4.40	-	13.06	13.01	13.15	12.52	12.70	12.36	12.47	12.08	12.47	-
2.0	2.90	2.80	2.80	4.30	3.70	4.6	4.40	4.40	4.40	4.10	13.04	13.02	13.13	12.38	12.68	12.35	12.31	12.38	12.40	12.39
3.0	2.90	2.80	2.80	4.40	3.70	4.6	4.40	4.40	-	-	13.03	13.03	13.13	12.37	12.65	12.37	12.36	12.37	-	-
4.0	2.90	2.80	2.80	4.40	-	4.3	-	-	4.40	4.10	13.02	13.20	13.14	12.36	-	12.36	-	-	12.35	12.38
5.0	2.90	2.80	-	4.40	3.70	4.2	4.40	4.40	-	-	13.01	13.02	-	12.36	12.64	12.39	12.31	12.05	-	-
6.0	2.90	2.80	-	-	3.60	4.1	-	-	4.40	4.10	13.02	13.02	-	-	12.68	12.41	-	-	12.32	12.37
7.0	2.90	2.80	-	4.30	3.70	-	4.40	4.30	4.40	-	13.01	13.02	-	12.36	12.66	-	12.32	12.34	12.31	-
8.0	2.90	2.80	-	4.30	3.60	-	4.40	-	-	-	13.01	13.06	-	12.32	12.36	-	12.31	-	-	-
9.0	-	2.90	-	-	3.60	-	4.40	4.30	4.40	-	-	12.99	-	-	12.16	-	12.30	12.32	12.29	-
10.0	2.90	3.00	-	-	-	-	-	4.30	-	-	12.99	12.97	-	-	-	-	-	12.32	-	-
11.0	2.90	-	-	-	-	-	4.40	-	4.40	-	12.98	-	-	-	-	-	12.28	-	12.28	-
12.0	2.90	-	-	-	-	-	4.40	4.30	-	-	12.98	-	-	-	-	-	12.28	12.30	-	-
13.0	2.90	-	-	-	-	-	-	-	4.40	-	12.97	-	-	-	-	-	-	-	12.24	-
14.0	-	-	-	-	-	-	4.40	4.30	4.40	-	-	-	-	-	-	-	12.26	12.29	12.26	-
15.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
16.0	-	-	-	-	-	-	-	4.30	4.40	-	-	-	-	-	-	-	-	12.28	12.24	-
17.0	-	-	-	-	-	-	-	4.30	4.40	-	-	-	-	-	-	-	-	12.27	12.24	-
18.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
19.0	-	-	-	-	-	-	-	-	4.40	-	-	-	-	-	-	-	-	-	12.23	-
20.0	-	-	-	-	-	-	-	-	4.40	-	-	-	-	-	-	-	-	-	12.23	-
21.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
22.0	-	-	-	-	-	-	-	-	4.40	-	-	-	-	-	-	-	-	-	12.22	-
23.0	-	-	-	-	-	-	-	-	4.40	-	-	-	-	-	-	-	-	-	12.21	-
24.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
25.0	-	-	-	-	-	-	-	-	4.40	-	-	-	-	-	-	-	-	-	12.20	-
26.0	-	-	-	-	-	-	-	-	4.40	-	-	-	-	-	-	-	-	-	12.19	-
27.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
28.0	-	-	-	-	-	-	-	-	4.40	-	-	-	-	-	-	-	-	-	12.19	-
29.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
30.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes: "-" = data not available. The total depth of the water column at each sampling station was not recorded but deepest measurements are within 1 m of lake bottom.

Table C.64: ***In Situ*** **Water Quality Profile Data Collected at Mary Lake (BL0) Water Quality Monitoring Stations in Fall, Mary River Project CREMP, August 2022**

Depth (m)	Dissolved Oxygen (% Saturation)										pH (pH units)									
	BL0-01-A	BL0-01	BL0-01-B	BL0-05-A	BL0-05	BL0-05-B	BL0-03	BL0-04	BL0-09	BL0-06	BL0-01-A	BL0-01	BL0-01-B	BL0-05-A	BL0-05	BL0-05-B	BL0-03	BL0-04	BL0-09	BL0-06
	7-Sep-23	7-Sep-23	7-Sep-23	15-Sep-23	15-Sep-23	15-Sep-23	15-Sep-23	15-Sep-23	15-Sep-23	15-Sep-23	7-Sep-23	7-Sep-23	7-Sep-23	15-Sep-23	15-Sep-23	15-Sep-23	15-Sep-23	15-Sep-23	15-Sep-23	15-Sep-23
1.0	98.50	98.00	98.70	97.90	97.00	97.2	97.50	95.80	97.40	-	7.93	7.76	7.93	7.47	7.55	7.49	7.31	7.38	7.45	-
2.0	98.30	98.00	98.70	96.80	97.40	97.1	96.80	96.70	96.90	95.90	7.93	7.78	7.94	7.39	7.54	7.47	7.33	7.40	7.45	7.49
3.0	98.30	98.00	98.70	96.70	97.40	96.7	96.50	96.60	-	-	7.92	7.79	7.94	7.37	7.54	7.46	7.37	7.37	-	-
4.0	98.20	97.90	98.70	96.50	-	96.7	-	-	96.40	95.80	7.93	7.79	7.94	7.37	-	7.48	-	-	7.46	7.39
5.0	98.10	97.90	-	96.50	97.10	96.4	95.80	96.40	-	-	7.92	7.80	-	7.37	7.47	7.48	7.37	7.38	-	-
6.0	98.10	97.90	-	-	97.10	96.3	-	-	96.20	95.70	7.92	7.80	-	-	7.45	7.48	-	-	7.46	7.35
7.0	98.10	97.90	-	96.20	97.20	-	96.20	96.30	96.10	-	7.92	7.81	-	7.35	7.45	-	7.28	7.38	7.46	-
8.0	98.00	97.80	-	96.10	96.60	-	96.10	-	-	-	7.93	7.81	-	7.35	7.44	-	7.38	-	-	-
9.0	-	98.00	-	-	97.10	-	96.00	96.10	96.00	-	-	7.82	-	-	7.44	-	7.39	7.36	7.46	-
10.0	98.00	98.00	-	-	-	-	-	96.00	-	-	7.93	7.82	-	-	-	-	-	7.38	-	-
11.0	97.90	-	-	-	-	-	95.90	-	95.80	-	7.93	-	-	-	-	-	7.40	-	7.46	-
12.0	97.80	-	-	-	-	-	95.90	95.90	-	-	7.93	-	-	-	-	-	7.39	7.39	-	-
13.0	97.70	-	-	-	-	-	-	-	95.80	-	7.93	-	-	-	-	-	-	-	7.46	-
14.0	-	-	-	-	-	-	95.70	95.80	95.70	-	-	-	-	-	-	-	7.39	7.38	7.46	-
15.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
16.0	-	-	-	-	-	-	-	95.70	95.60	-	-	-	-	-	-	-	-	7.37	7.42	-
17.0	-	-	-	-	-	-	-	95.70	95.60	-	-	-	-	-	-	-	-	7.38	7.47	-
18.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
19.0	-	-	-	-	-	-	-	-	95.50	-	-	-	-	-	-	-	-	-	7.46	-
20.0	-	-	-	-	-	-	-	-	95.50	-	-	-	-	-	-	-	-	-	7.46	-
21.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
22.0	-	-	-	-	-	-	-	-	95.40	-	-	-	-	-	-	-	-	-	7.46	-
23.0	-	-	-	-	-	-	-	-	95.30	-	-	-	-	-	-	-	-	-	7.46	-
24.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
25.0	-	-	-	-	-	-	-	-	95.30	-	-	-	-	-	-	-	-	-	7.46	-
26.0	-	-	-	-	-	-	-	-	95.20	-	-	-	-	-	-	-	-	-	7.46	-
27.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
28.0	-	-	-	-	-	-	-	-	95.10	-	-	-	-	-	-	-	-	-	7.46	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
29.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes: "-" = data not available. The total depth of the water column at each sampling station was not recorded but deepest measurements are within 1 m of lake bottom.

Table C.64: ***In Situ*** **Water Quality Profile Data Collected at Mary Lake (BL0) Water Quality Monitoring Stations in Fall, Mary River Project CREMP, August 2022**

Depth (m)	Specific Conductance (µS/cm)									
	BL0-01-A	BL0-01	BL0-01-B	BL0-05-A	BL0-05	BL0-05-B	BL0-03	BL0-04	BL0-09	BL0-06
	7-Sep-23	7-Sep-23	7-Sep-23	15-Sep-23	15-Sep-23	15-Sep-23	15-Sep-23	15-Sep-23	15-Sep-23	15-Sep-23
1.0	167.20	164.90	170.40	69.20	95.40	69.5	67.10	69.20	69.10	-
2.0	167.10	165.00	170.40	69.30	89.80	69.5	67.10	69.30	69.10	70.30
3.0	167.00	165.10	170.40	69.30	91.20	69.5	67.10	69.30	-	-
4.0	167.00	165.10	170.50	69.30	-	69.8	-	-	69.10	70.30
5.0	176.10	165.10	-	69.30	90.70	71.5	67.30	69.30	-	-
6.0	167.50	165.60	-	-	96.30	73.7	-	-	69.10	70.30
7.0	167.40	165.20	-	69.30	92.60	-	67.10	69.30	69.10	-
8.0	167.40	165.50	-	69.40	92.90	-	67.10	-	-	-
9.0	-	164.00	-	-	95.50	-	67.20	69.30	69.10	-
10.0	167.20	163.50	-	-	-	-	-	69.80	-	-
11.0	167.10	-	-	-	-	-	67.20	-	69.20	-
12.0	167.30	-	-	-	-	-	69.20	69.30	-	-
13.0	167.40	-	-	-	-	-	-	-	69.20	-
14.0	-	-	-	-	-	-	67.20	69.50	69.30	-
15.0	-	-	-	-	-	-	-	-	-	-
16.0	-	-	-	-	-	-	-	69.20	69.60	-
17.0	-	-	-	-	-	-	-	69.20	69.30	-
18.0	-	-	-	-	-	-	-	-	-	-
19.0	-	-	-	-	-	-	-	-	69.30	-
20.0	-	-	-	-	-	-	-	-	69.30	-
21.0	-	-	-	-	-	-	-	-	-	-
22.0	-	-	-	-	-	-	-	-	69.40	-
23.0	-	-	-	-	-	-	-	-	69.30	-
24.0	-	-	-	-	-	-	-	-	-	-
25.0	-	-	-	-	-	-	-	-	69.40	-
26.0	-	-	-	-	-	-	-	-	69.50	-
27.0	-	-	-	-	-	-	-	-	-	-
28.0	-	-	-	-	-	-	-	-	69.60	-
-	-	-	-	-	-	-	-	-	-	-
29.0	-	-	-	-	-	-	-	-	-	-

Notes: "-" = data not available. The total depth of the water column at each sampling station was not recorded but deepest measurements are within 1 m of lake bottom.

Table C.65: Sampling Depth, Water Clarity Measures, and Surface and Bottom *In Situ* Water Quality Measures Collected at Mary Lake (BL0) Benthic Invertebrate Community Stations, Mary River Project CREMP, August 2023

Categorization & Replicate ID		Date Sampled	Station Depth (m)	Secchi Depth (m)	Colour/ Clarity	Depth Sampled	Temperature (°C)	Dissolved Oxygen		pH (units)	Specific Conductance (µS/cm)	Turbidity (NTU)
								(mg/L)	(% saturation)			
Littoral (Shallow) Stations	BL0-11	12-Aug-23	8.0	3.40	Green/ Clear	Surface	13.7	10.57	103.8	7.20	70.1	1.50
						Bottom	6.7	11.53	96.1	7.41	50.5	2.51
	BL0-07	12-Aug-23	13.0	3.25	Green/ Clear	Surface	9.3	11.38	101.0	7.49	50.7	0.99
						Bottom	6.2	11.48	94.6	7.30	50.3	3.54
	BL0-06	12-Aug-23	9.4	3.17	Green/ Clear	Surface	9.7	11.28	101.2	7.53	51.1	1.02
						Bottom	7.1	11.54	97.4	7.42	50.3	1.38
Profundal (Deep) Stations	BL0-03	12-Aug-23	19.5	4.70	Green-Blue	Surface	12.0	11.15	105.6	7.14	52.3	0.71
						Bottom	4.9	11.55	91.9	6.83	53.9	1.43
	BL0-15	12-Aug-23	28.0	4.60	Green-Blue	Surface	12.1	11.14	105.7	7.58	52.3	0.68
						Bottom	3.7	11.18	86.4	6.83	60.5	1.23
	BL0-14	12-Aug-23	16.3	5.35	Green/ Slightly Murky	Surface	11.6	11.20	105.0	7.58	51.4	0.68
						Bottom	4.5	11.58	91.2	7.29	54.8	0.83
	BL0-05	12-Aug-23	19.5	4.00	Green-Blue/ Clear	Surface	12.5	10.91	104.6	7.44	58.4	0.91
						Bottom	3.9	11.01	85.5	7.27	57.6	1.18
	BL0-13	12-Aug-23	20.0	4.30	Green/ Clear	Surface	12.0	10.85	102.4	7.14	51.2	0.70
						Bottom	3.9	11.36	88.5	7.14	57.8	3.52
	BL0-04	12-Aug-23	21.0	3.90	Green/ Clear	Surface	11.2	11.24	104.4	7.58	51.2	0.81
						Bottom	3.5	10.73	82.4	7.15	63.2	1.22

Table C.66: Statistical Comparison of Bottom *In Situ* Water Quality Between Mary Lake (BL0) Littoral and Profundal Stations, Mary River Project CREMP, August 2023

Parameter	Statistical Test Results				Summary Statistics						
	Statistical Test	Transformation	Significant Difference Between Areas?	P-value	Lake Zone	Sample Size	Mean	Standard Deviation	Standard Error	Minimum	Maximum
Secchi Depth (m)	tequal	None	YES	0.007	Littoral	3	3.27	0.117	0.0674	3.17	3.40
					Profundal	6	4.47	0.533	0.217	3.90	5.35
Temperature (˚C)	tequal	None	YES	0.001	Littoral	3	6.67	0.451	0.260	6.20	7.10
					Profundal	6	4.07	0.528	0.216	3.50	4.90
Dissolved Oxygen (mg/L)	tunequal	None	NO	0.091	Littoral	3	11.5	0.0321	0.0186	11.5	11.5
					Profundal	6	11.2	0.329	0.134	10.7	11.6
Dissolved Oxygen (% saturation)	tequal	None	YES	0.007	Littoral	3	96.0	1.40	0.809	94.6	97.4
					Profundal	6	87.7	3.61	1.47	82.4	91.9
pH (units)	tequal	None	NO	0.054	Littoral	3	7.38	0.0666	0.0384	7.30	7.42
					Profundal	6	7.08	0.207	0.0844	6.83	7.29
Specific Conductance (µmho/cm)	tequal	None	YES	0.008	Littoral	3	50.4	0.115	0.0667	50.3	50.5
					Profundal	6	58.0	3.48	1.42	53.9	63.2

Shaded values indicate significant difference between study areas based on test p-value less than 0.05.

Notes: "-" = no data. "tequal" = Student's t-test assuming equal variance; "tunequal" = Welch's t-test for unequal variance.

Table C.67: Statistical Comparison of Bottom *In Situ* Water Quality Between Mary Lake (BL0) and Reference Lake 3 (REF3) Stations Collected at Littoral and Profundal Depths, Mary River Project CREMP, August 2023

Lake Zone	Parameter	Statistical Test Results				Summary Statistics						
		Statistical Test	Transformation	Significant Difference Between Areas?	P-value	Study Lake	Sample Size (n)	Mean	Standard Deviation	Standard Error	Minimum	Maximum
Littoral (Shallow) Stations	Station Depth (m)	tequal	None	NO	0.932	Reference	5	9.99	1.88	0.842	8.5	13.1
						Mary Lake	3	10.1	2.58	1.49	8	13
	Secchi Depth (m)	tunequal	None	YES	0.047	Reference	2	5.97	0.364	0.258	5.71	6.22
						Mary Lake	3	3.27	0.117	0.0674	3.17	3.4
	Temperature (˚C)	M-W	Rank	YES	0.032	Reference	5	7.66	0.631	0.282	7.2	8.4
						Mary Lake	3	6.67	0.451	0.26	6.2	7.1
	Dissolved Oxygen (mg/L)	tequal	None	YES	0.018	Reference	5	11.3	0.103	0.046	11.2	11.4
						Mary Lake	3	11.5	0.0321	0.0186	11.5	11.5
	Dissolved Oxygen (% saturation)	tequal	None	NO	0.136	Reference	5	97.2	0.597	0.267	96.6	98.1
						Mary Lake	3	96	1.4	0.809	94.6	97.4
	pH (units)	tequal	None	YES	0.001	Reference	5	7.64	0.054	0.0242	7.56	7.7
						Mary Lake	3	7.38	0.0666	0.0384	7.3	7.42
	Specific Conductance (µS/cm)	tequal	None	YES	0.001	Reference	5	72.8	0.0837	0.0374	72.7	72.9
						Mary Lake	3	50.4	0.115	0.0667	50.3	50.5
Profundal (Deep) Stations	Station Depth (m)	tequal	None	NO	0.734	Reference	5	20	2.3	1.03	17.4	23.6
						Mary Lake	6	20.7	3.9	1.59	16.3	28
	Secchi Depth (m)	-	-	-	-	Reference	-	-	-	-	-	-
						Mary Lake	6	4.47	0.533	0.217	3.9	5.35
	Temperature (˚C)	tequal	None	YES	0.001	Reference	5	7.14	0.0894	0.04	7	7.2
						Mary Lake	6	4.07	0.528	0.216	3.5	4.9
	Dissolved Oxygen (mg/L)	tunequal	None	NO	0.634	Reference	5	11.3	0.0568	0.0254	11.2	11.4
						Mary Lake	6	11.2	0.329	0.134	10.7	11.6
	Dissolved Oxygen (% saturation)	tunequal	None	YES	0.001	Reference	5	96.3	0.935	0.418	95.1	97.3
						Mary Lake	6	87.7	3.61	1.47	82.4	91.9
	pH (units)	M-W	Rank	YES	0.022	Reference	5	7.53	0.175	0.0781	7.24	7.66
						Mary Lake	6	7.08	0.207	0.0844	6.83	7.29
	Specific Conductance (µS/cm)	tunequal	None	YES	0.001	Reference	5	73	0.192	0.086	72.8	73.3
						Mary Lake	6	58	3.48	1.42	53.9	63.2

Highlighted values indicate significant difference between study areas based on test p-value less than 0.05.

Notes: "-" = no data. "M-W" = Mann-Whitney U test; "tequal" = Student's t-test assuming equal variance; "tunequal" = Welch's t-test for unequal variance.

Table C.68: Water Chemistry at Mary Lake North Basin (BL0-01) Water Quality Monitoring Stations, Mary River Project CREMP, 2023

	Parameter	Units	Water Quality Guideline (WQG)[a]	AEMP Benchmark[b]	Winter Sampling Event						Summer Sampling Event						Fall Sampling Event					
					BL0-01-A	BL0-01-A	BL0-01	BL0-01	BL0-01-B	BL0-01-B	BL0-01-A	BL0-01-A	BL0-01	BL0-01	BL0-01-B	BL0-01-B	BL0-01-A	BL0-01-A	BL0-01	BL0-01	BL0-01-B	BL0-01-B
					bottom	surface	bottom	surface	bottom	surface	bottom	surface	bottom	surface	bottom	surface	bottom	surface	bottom	surface	bottom	surface
					08-Apr-23	08-Apr-23	08-Apr-23	08-Apr-23	08-Apr-23	08-Apr-23	02-Aug-23	02-Aug-23	02-Aug-23	02-Aug-23	02-Aug-23	02-Aug-23	07-Sep-23	07-Sep-23	07-Sep-23	07-Sep-23	07-Sep-23	07-Sep-23
Conventionals	Conductivity (lab)	µmho/cm	-	-	234	291	237	251	237	238	53.9	81	74	74	77	80	174	175	174	170	179	178
	pH (lab)	pH	6.5 - 9.0	-	7.51	7.93	7.94	7.92	7.85	7.87	7.84	7.63	7.76	7.75	7.72	7.91	7.97	7.98	7.93	7.91	7.98	7.97
	Hardness (as $CaCO_3$)	mg/L	-	-	112	111	111	116	115	116	25.5	37.6	36.1	35.5	36.6	37.6	87.6	87.2	84.9	85.2	88.3	88
	Total Suspended Solids (TSS)	mg/L	-	-	131	108	98	186	118	126	44	40	50	44.0	50	44	100	90	95	100	95	95
	Total Dissolved Solids (TDS)	mg/L	-	-	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.4	<1.4	<1.4	<1.4	<1.4	<1.3	<1.2	<1.2	<1.2	<1.3	<1.2	<1.2
	Turbidity	NTU	-	-	0.73	<0.10	<0.10	0.11	<0.10	<0.10	1.69	1.92	1.31	1.45	2.16	1.32	0.77	1.44	0.82	0.65	1.15	0.83
	Alkalinity (as $CaCO_3$)	mg/L	-	-	109.0	79.5	110.0	105.0	111.0	113.0	40.1	55.2	61.3	53.5	59.9	64.9	90.3	85.8	81.3	84.4	95.1	88.3
Nutrients and Organics	Total Ammonia	mg/L	-	0.855	0.020	0.007	0.005	<0.0050	0.018	0.0125	0.0099	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Nitrate	mg/L	3	3	0.139	***9.780***	0.060	2.020	0.191	0.041	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.022	0.024	<0.020	<0.020	0.024	0.03
	Nitrite	mg/L	0.06	0.06	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Total Kjeldahl Nitrogen (TKN)	mg/L	-	-	0.103	0.092	0.085	0.073	0.101	0.094	0.152	<0.050	<0.050	<0.050	0.061	<0.050	0.077	0.092	0.084	0.095	0.082	0.075
	Dissolved Organic Carbon	mg/L	-	-	1.44	1.39	1.45	1.64	1.57	1.68	1.38	1.14	1.48	1.40	1.00	1.89	1.67	1.62	1.47	1.72	1.78	1.79
	Total Organic Carbon	mg/L	-	-	1.45	1.42	1.42	1.48	1.79	1.51	1.17	1.08	1.15	1.05	0.93	1.18	2.09	2.18	2.12	2.18	2.01	2.08
	Total Phosphorus	mg/L	0.020[α]	-	0.0030	<0.0020	<0.0020	<0.0020	0.0062	0.0069	0.0044	0.0026	0.0045	0.0041	0.005	0.0030	0.0192	<0.0020	<0.0020	0.0020	<0.0020	0.0238
	Phenols	mg/L	0.004[α]	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Anions	Bromide (Br)	mg/L	-	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
	Chloride (Cl)	mg/L	120	120	8.2	10.0	8.9	9.4	8.3	8.3	0.88	1.38	1.25	1.25	1.37	1.37	5.08	5.09	4.89	4.97	5.28	5.28
	Sulphate (SO_4)	mg/L	218[β]	218	2.45	11.60	3.81	4.25	3.01	2.95	0.45	0.62	0.61	0.62	0.62	0.60	2.36	2.36	2.57	2.36	2.41	2.42
Total Metals	Aluminum (Al)	mg/L	0.100	0.13	<0.0030	0.0277	0.0030	0.0108	0.0053	0.0094	0.0456	0.0367	0.0314	0.0307	0.0343	0.0394	0.0189	0.0175	0.0233	0.0296	0.0193	0.0186
	Antimony (Sb)	mg/L	0.020[α]	-	<0.00010	0.00011	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)	mg/L	0.005	0.005	0.00011	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)	mg/L	-	-	0.0123	0.0113	0.0112	0.0114	0.0115	0.0116	0.00309	0.00424	0.00406	0.00414	0.00420	0.00436	0.00789	0.00789	0.00801	0.00805	0.00822	0.00795
	Beryllium (Be)	mg/L	0.011[α]	-	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
	Bismuth (Bi)	mg/L	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)	mg/L	1.5	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)	mg/L	0.00012	0.00006	<0.0000050	0.0000129	<0.0000050	0.0000073	<0.0000050	<0.0000050	<0.0000050	0.0000053	0.0000053	<0.0000050	0.0000056	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Calcium (Ca)	mg/L	-	-	21.7	32.4	21.4	23.0	22.2	22.2	5.0	7.4	7.1	7.0	7.3	7.5	17.3	17.4	17.0	17.0	17.4	17.8
	Chromium (Cr)	mg/L	0.001	0.003	<0.00050	0.00065	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Cobalt (Co)	mg/L	0.0009[α]	0.004	0.00025	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)	mg/L	0.002	0.0024	0.00068	0.00152	0.00108	0.00154	0.00114	0.00114	0.00074	0.00067	0.00071	0.00069	0.00072	0.00079	0.00112	0.00100	0.00120	0.00105	0.00098	0.00104
	Iron (Fe)	mg/L	0.30	0.326	0.046	0.052	0.011	0.087	0.02	0.011	0.050	0.036	0.034	0.035	0.039	0.040	0.03	0.03	0.033	0.037	0.03	0.03
	Lead (Pb)	mg/L	0.001	0.001	<0.000050	0.00007	<0.000050	<0.000050	<0.000050	<0.000050	0.000052	<0.000050	<0.000050	<0.000050	<0.000050	0.00005	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)	mg/L	-	-	<0.0010	0.0013	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Magnesium (Mg)	mg/L	-	-	13.2	14.4	13.5	14.5	14.5	14.6	3.15	4.52	4.37	4.34	4.48	4.62	11.4	11.2	11.0	11.1	11.4	11.6
	Manganese (Mn)	mg/L	0.935[β]	-	0.251	0.003450	0.001520	0.002220	0.001900	0.00144	0.00212	0.00200	0.00185	0.00186	0.00198	0.00214	0.00227	0.00243	0.00226	0.00248	0.00233	0.00225
	Mercury (Hg)	mg/L	0.000026	-	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)	mg/L	0.073	-	0.000241	0.000378	0.000319	0.000389	0.000341	0.000313	0.000072	0.000114	0.000108	0.000113	0.000119	0.000110	0.000255	0.000249	0.000246	0.000256	0.000245	0.000267
	Nickel (Ni)	mg/L	0.025	0.025	0.00067	0.00077	<0.00050	0.00060	0.00052	0.00053	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Potassium (K)	mg/L	-	-	1.12	1.24	1.17	1.24	1.19	1.19	0.41	0.54	0.53	0.53	0.54	0.55	0.91	0.91	0.90	0.92	0.91	0.92
	Selenium (Se)	mg/L	0.001	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Silicon (Si)	mg/L	-	-	2.18	0.97	0.97	0.99	1.01	1.02	0.50	0.56	0.53	0.51	0.54	0.56	0.88	0.89	0.89	0.92	0.90	0.90
	Silver (Ag)	mg/L	0.00025	0.0001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)	mg/L	-	-	3.70	4.28	3.78	4.20	3.82	3.88	0.56	0.95	0.88	0.87	0.94	0.97	2.84	2.86	2.72	2.78	2.96	2.96
	Strontium (Sr)	mg/L	-	-	0.0161	0.0226	0.0157	0.0178	0.0167	0.0160	0.00360	0.00528	0.00505	0.00497	0.00515	0.00534	0.0121	0.0121	0.0116	0.0120	0.0122	0.0124
	Thallium (Tl)	mg/L	0.0008	0.0008	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Tin (Sn)	mg/L	-	-	<0.00010	0.0002	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)	mg/L	-	-	<0.00030	0.00114	<0.00030	0.00075	<0.00030	<0.00030	0.0021	0.00172	0.00147	0.00142	0.00172	0.00183	0.00076	0.00083	0.00107	0.00096	0.00073	0.00067
	Uranium (U)	mg/L	0.015	-	0.00238	0.00305	0.00355	0.00367	0.00357	0.00351	0.00020	0.00041	0.000365	0.000367	0.000391	0.000412	0.00233	0.00240	0.00220	0.00224	0.00245	0.00243
	Vanadium (V)	mg/L	0.006[α]	0.006	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)	mg/L	0.030	0.030	<0.0030	0.0084	<0.0030	0.0031	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030

Indicates parameter concentration above applicable Water Quality Guideline.

BOLD Indicates parameter concentration above the AEMP benchmark.

Note: "-" indicates no WQG benchmark applicable.

[a] Canadian Water Quality Guideline for the protection of aquatic life (CCME 1987, 1999) except those indicated by α (Ontario Provincial Water Quality Objective [PWQO]; OMOE 1994) and β (British Columbia Water Quality Guideline [BCWQG]; BCMOE 2013). See Table 2.2 for information regarding WQG criteria.

[b] AEMP Water Quality Benchmarks developed by Intrinsik (2013) using baseline water quality data specific to Mary Lake.

Table C.69: Summary of the Magnitude of Elevation in Seasonal Average Parameter Concentrations (Total Metal Concentration Provided) Between Mary Lake (BL0) and Reference Lake 3 (REF3) in 2023, and at Mary Lake Between 2023 and the Baseline Period (2005 to 2013), Mary River Project CREMP

Parameter	Mary Lake North Basin					Mary Lake South Basin				
	2023 vs Reference Lake 3 2023		2023 vs Baseline			2023 vs Reference Lake 3 2023		2023 vs Baseline		
	Summer	Fall	Winter	Summer	Fall	Summer	Fall	Winter	Summer	Fall
Conductivity (lab)	0.973	2.37	1.01	0.688	1.05	0.696	1.06	0.958	0.775	0.976
pH (lab)	1.04	1.04	1.00	1.01	0.983	0.996	0.997	1.07	1.01	1.03
Hardness (as $CaCO_3$)	1.01	2.51	-	-	-	0.669	1.03	-	-	-
Total Suspended Solids (TSS)	1.00	1.11	0.500	0.650	0.600	0.929	1.05	0.500	0.362	0.568
Total Dissolved Solids (TDS)	0.913	1.80	0.804	0.655	0.881	0.756	1.07	1.09	0.856	1.09
Turbidity	2.38	1.19	1.27	0.489	0.675	3.97	1.85	0.507	1.00	1.17
Alkalinity (as $CaCO_3$)	1.29	1.89	0.915	1.04	1.08	0.658	0.947	0.878	0.894	1.19
Total Ammonia	1.16	1.00	0.123	0.0637	0.0357	1.00	1.03	0.102	0.0717	0.0853
Nitrate	1.00	1.17	19.1	0.200	0.233	1.23	1.54	5.12	0.245	0.307
Nitrite	1.00	1.00	5.00	4.21	1.67	1.00	1.00	5.00	1.62	3.08
Total Kjeldahl Nitrogen (TKN)	0.471	0.608	0.438	0.219	0.344	0.428	0.414	0.657	0.391	0.349
Dissolved Organic Carbon	0.474	0.552	0.746	0.964	0.957	0.457	0.449	0.718	0.937	0.988
Total Organic Carbon	0.379	0.754	0.714	0.673	1.21	0.440	0.517	0.691	0.819	0.980
Total Phosphorus	1.27	1.68	0.594	0.470	2.12	2.34	0.666	0.716	1.32	0.555
Phenols	1.00	1.00	-	-	-	1.00	1.00	-	-	-
Bromide (Br)	1.00	1.00	2.00	2.00	2.00	1.00	1.00	2.00	1.73	1.60
Chloride (Cl)	0.778	4.07	1.08	0.714	1.27	0.813	1.62	0.892	0.548	0.720
Sulphate (SO_4)	0.185	0.826	0.905	0.261	0.603	0.317	0.608	1.10	0.534	0.645
Aluminum (Al)	7.17	2.74	1.69	0.470	0.260	10.9	4.71	0.497	0.830	1.09
Antimony (Sb)	1.00	1.00	1.02	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Arsenic (As)	1.00	1.00	1.00	1.00	0.506	1.00	1.00	1.00	1.00	0.960
Barium (Ba)	0.669	1.30	0.990	0.717	0.935	0.584	0.708	1.01	0.872	1.01
Beryllium (Be)	1.00	1.00	0.200	1.00	0.0400	1.00	1.00	0.200	1.00	1.00
Bismuth (Bi)	1.00	1.00	0.100	0.100	0.100	1.00	1.00	0.100	0.100	0.100
Boron (B)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Cadmium (Cd)	1.04	1.00	0.670	0.520	0.500	1.00	1.00	0.140	0.500	0.500
Calcium (Ca)	1.02	2.49	0.983	0.612	0.998	0.739	1.02	0.882	0.733	0.921
Chromium (Cr)	1.00	1.00	3.39	2.13	1.00	1.00	1.00	4.32	2.19	2.57
Cobalt (Co)	1.00	1.00	1.25	1.00	1.00	1.00	1.14	1.00	1.00	1.14
Copper (Cu)	0.837	1.20	0.983	0.766	0.377	0.778	0.893	1.04	0.841	0.973
Iron (Fe)	2.63	2.18	2.84	0.401	0.296	4.30	3.01	0.865	0.848	0.946
Lead (Pb)	1.01	1.00	0.970	0.704	0.719	1.20	1.33	0.856	0.727	1.19
Lithium (Li)	1.00	1.00	1.89	20.0	0.200	1.00	1.00	2.00	20.0	20.0
Magnesium (Mg)	1.02	2.52	0.970	0.668	1.11	0.758	1.01	0.914	0.843	1.05
Manganese (Mn)	2.15	3.23	10.7	0.500	0.235	3.16	2.81	0.653	1.35	1.72
Mercury (Hg)	1.00	1.00	0.500	0.500	0.500	1.00	1.00	0.500	0.500	0.500
Molybdenum (Mo)	0.803	1.79	1.07	0.794	1.10	0.804	1.21	1.20	0.989	1.21
Nickel (Ni)	1.00	0.980	0.754	0.935	0.847	1.00	0.996	0.967	0.984	0.997
Potassium (K)	0.681	1.10	0.926	0.868	1.17	0.619	0.710	0.965	0.979	1.16
Selenium (Se)	1.00	1.00	0.500	5.00	0.500	1.00	1.00	0.500	5.00	5.00
Silicon (Si)	1.10	1.91	0.973	0.779	0.978	0.964	1.13	0.680	0.879	1.20
Silver (Ag)	1.00	1.00	10.0	10.0	10.0	1.00	1.00	10.0	10.0	10.0
Sodium (Na)	1.04	3.24	1.14	1.03	1.36	0.978	1.38	1.03	1.05	1.24
Strontium (Sr)	0.633	1.54	1.10	0.694	1.02	0.553	0.836	0.785	0.667	0.870
Thallium (Tl)	1.00	1.00	1.00	10.0	0.100	1.00	1.00	1.00	10.0	10.0
Tin (Sn)	1.00	1.00	0.118	0.638	1.00	1.00	1.00	0.191	0.533	1.00
Titanium (Ti)	5.64	2.50	0.0515	0.171	0.0837	10.0	4.84	0.0323	0.304	0.162
Uranium (U)	1.22	8.20	1.09	0.424	0.996	1.06	2.71	1.15	0.646	1.11
Vanadium (V)	1.00	1.00	0.500	0.500	0.267	1.00	1.00	0.500	0.500	0.491
Zinc (Zn)	0.923	0.793	3.48	2.31	3.00	1.00	0.793	2.63	2.68	3.00

Denotes parameter with an AEMP benchmark.
Denotes slight elevation (mean concentration three to five times higher than respective mean reference or baseline period value).
Denotes moderate elevation (mean concentration five to 10 times higher than respective mean reference or baseline period value).
Denotes highly elevated concentration (mean concentration greater than 10 times higher than respective mean reference or baseline period value).
Denotes differences in method detection limit between the indicated study area and that of the reference area or baseline period, precluding an evaluation of magnitude of elevation; '-' = no data available for the analyte during comparison period.

Table C.70: Dissolved Metal Concentrations at Mary Lake North (BL0-01) Basin Water Quality Monitoring Stations, Mary River Project CREMP, 2023

	Parameters	Units	Winter Sampling Event						Summer Sampling Event						Fall Sampling Event					
			BL0-01-A	BL0-01-A	BL0-01	BL0-01	BL0-01-B	BL0-01-B	BL0-01-A	BL0-01-A	BL0-01	BL0-01	BL0-01-B	BL0-01-B	BL0-01-A	BL0-01-A	BL0-01	BL0-01	BL0-01-B	BL0-01-B
			bottom	surface	bottom	surface	bottom	surface	bottom	surface	bottom	surface	bottom	surface	bottom	surface	bottom	surface	bottom	surface
			08-Apr-23	08-Apr-23	08-Apr-23	08-Apr-23	08-Apr-23	08-Apr-23	02-Aug-23	02-Aug-23	02-Aug-23	02-Aug-23	02-Aug-23	02-Aug-23	07-Sep-23	07-Sep-23	07-Sep-23	07-Sep-23	07-Sep-23	07-Sep-23
Dissolved Metals	Aluminum (Al)	mg/L	<0.0010	0.0046	0.002	0.0058	0.005	0.0016	0.0146	0.0122	0.0106	0.0177	0.0104	0.0150	0.0090	0.0139	0.0068	0.0053	0.0055	0.0069
	Antimony (Sb)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)	mg/L	0.0128	0.0114	0.0118	0.0126	0.0120	0.0126	0.00279	0.00412	0.00397	0.00383	0.00388	0.00402	0.00869	0.00869	0.00834	0.00834	0.00883	0.00856
	Beryllium (Be)	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
	Bismuth (Bi)	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Calcium (Ca)	mg/L	22.7	21.7	22.6	23.6	23.1	22.8	5.2	7.7	7.4	7.3	7.5	7.7	16.8	16.6	16.2	16.3	16.9	17.1
	Chromium (Cr)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Cobalt (Co)	mg/L	0.00017	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)	mg/L	0.00050	0.00089	0.00083	0.00090	0.00088	0.00090	0.00044	0.00054	0.00061	0.00058	0.00050	0.00058	0.00094	0.00090	0.00094	0.00104	0.00097	0.00096
	Iron (Fe)	mg/L	<0.010	<0.010	<0.010	<0.010	0.011	<0.010	0.012	0.01	0.011	0.015	<0.010	0.036	0.019	0.033	0.011	0.01	0.01	0.012
	Lead (Pb)	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)	mg/L	<0.0010	<0.0010	0.001	0.0012	0.0011	0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Magnesium (Mg)	mg/L	13.5	13.8	13.3	14.0	14.0	14.4	3.05	4.44	4.30	4.21	4.34	4.47	11.1	11.1	10.8	10.8	11.2	11.0
	Manganese (Mn)	mg/L	0.2220	0.000420	0.000660	0.000620	0.001360	0.000940	0.00103	0.00127	0.00126	0.00127	0.00115	0.00154	0.00156	0.00407	0.00137	0.00142	0.00143	0.00142
	Mercury (Hg)	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)	mg/L	0.000272	0.000344	0.000336	0.000354	0.000342	0.000366	0.000075	0.000118	0.000116	0.000108	0.000104	0.000102	0.000270	0.000250	0.000255	0.000255	0.000248	0.000270
	Nickel (Ni)	mg/L	0.00064	<0.00050	<0.00050	0.00050	0.00051	0.00052	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00054
	Potassium (K)	mg/L	1.20	1.22	1.22	1.25	1.26	1.27	0.40	0.54	0.52	0.53	0.53	0.54	0.99	0.99	0.97	0.97	0.99	0.98
	Selenium (Se)	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Silicon (Si)	mg/L	2.22	0.95	0.98	1.00	1.02	1.06	0.43	0.49	0.47	0.49	0.47	0.49	0.86	0.86	0.85	0.85	0.85	0.86
	Silver (Ag)	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)	mg/L	4.05	4.04	3.99	4.07	4.07	4.19	0.57	0.96	0.89	0.87	0.93	0.97	2.85	2.86	2.74	2.77	2.94	2.88
	Strontium (Sr)	mg/L	0.0172	0.0174	0.0175	0.0177	0.0174	0.0180	0.00356	0.00534	0.00519	0.00503	0.00511	0.00532	0.0126	0.0126	0.0123	0.0123	0.0129	0.0127
	Thallium (Tl)	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Tin (Sn)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)	mg/L	<0.00030	<0.00030	<0.00030	0.0004	<0.00030	<0.00030	0.0004	<0.00030	<0.00030	0.00056	<0.00030	0.00034	0.00031	0.00068	<0.00030	<0.00030	<0.00030	<0.00030
	Uranium (U)	mg/L	0.00242	0.00364	0.00358	0.00364	0.00365	0.00363	0.000181	0.000396	0.000354	0.000353	0.000374	0.000404	0.00236	0.00236	0.00226	0.00227	0.00248	0.00243
	Vanadium (V)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)	mg/L	<0.0010	<0.0010	0.001	<0.0010	0.0022	0.0023	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0012	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0013

Table C.71: Magnitude of Elevation in Seasonal Average Dissolved Metal Concentrations Between Mary Lake (BL0) and Reference Lake 3 (REF3) in 2023, and at Mary Lake Between 2023 and the Baseline Period (2005 to 2013), Mary River Project CREMP

Dissolved Metal	Mary Lake North Basin					Mary Lake South Basin				
	2023 vs Reference Lake 3 2023		2023 vs Baseline			2023 vs Reference Lake 3 2023		2023 vs Baseline		
	Summer	Fall	Winter	Summer	Fall	Summer	Fall	Winter	Summer	Fall
Aluminum (Al)	7.52	2.36	0.00710	1.07	0.502	10.6	1.64	0.00621	1.57	0.441
Antimony (Sb)	1.00	1.00	1.00	0.741	1.00	1.00	1.00	1.00	0.736	0.609
Arsenic (As)	1.00	1.00	1.00	1.00	0.635	1.00	1.00	1.00	1.00	1.00
Barium (Ba)	0.613	1.43	0.00297	0.693	1.01	0.508	0.695	0.00439	0.853	0.981
Beryllium (Be)	1.00	1.00	0.200	0.200	0.0400	1.00	1.00	0.143	0.200	0.200
Bismuth (Bi)	1.00	1.00	0.100	0.100	0.100	1.00	1.00	0.100	0.100	0.100
Boron (B)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Cadmium (Cd)	1.00	1.00	0.242	0.500	0.500	1.00	1.00	0.435	0.478	0.500
Calcium (Ca)	1.06	2.52	0.919	0.641	0.957	0.695	1.06	0.879	0.707	0.898
Chromium (Cr)	1.00	1.00	5.0	5.0	5.0	1.00	1.00	3.57	5.0	5.0
Cobalt (Co)	1.00	1.00	1.12	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Copper (Cu)	0.767	1.26	0.689	0.635	0.439	0.643	0.683	0.728	0.787	0.671
Iron (Fe)	1.57	1.27	1.02	0.935	0.409	1.61	0.800	0.633	1.04	0.640
Lead (Pb)	1.00	1.00	1.00	0.829	0.840	1.00	1.00	0.973	0.738	0.592
Lithium (Li)	1.00	1.00	0.886	1.10	0.200	1.00	1.00	0.966	2.00	2.00
Magnesium (Mg)	0.971	2.49	0.962	0.643	1.08	0.643	1.00	0.938	0.740	1.04
Manganese (Mn)	3.78	4.86	18.3	0.711	0.600	3.53	0.676	0.441	1.34	0.410
Mercury (Hg)	1.00	1.00	0.500	0.500	0.500	1.00	1.00	0.500	0.500	0.500
Molybdenum (Mo)	0.758	1.83	1.06	0.738	1.11	0.744	1.09	1.14	0.955	0.935
Nickel (Ni)	1.00	1.01	0.673	0.875	0.719	1.00	1.00	0.960	0.975	0.609
Potassium (K)	0.647	1.21	0.978	0.889	1.26	0.586	0.668	1.01	1.04	1.08
Selenium (Se)	1.00	1.00	0.500	0.500	0.500	1.00	1.00	0.500	0.500	0.320
Silicon (Si)	1.04	1.99	0.990	0.758	0.981	0.841	1.00	0.649	0.910	1.08
Silver (Ag)	1.00	1.00	10.0	10.0	10.0	1.00	1.00	5.26	10.0	6.40
Sodium (Na)	0.999	3.22	1.21	0.994	1.71	0.866	1.32	1.05	0.980	1.19
Strontium (Sr)	0.637	1.63	1.09	0.713	1.16	0.536	0.795	0.781	0.667	0.812
Thallium (Tl)	1.00	1.00	1.00	1.00	0.100	1.00	1.00	0.526	1.00	0.609
Tin (Sn)	1.00	1.00	0.112	0.385	1.00	1.00	1.00	0.0929	0.369	0.609
Titanium (Ti)	1.22	1.00	0.0317	0.0367	0.0365	2.02	0.822	0.0311	0.0605	0.0280
Uranium (U)	1.23	8.65	1.15	0.416	1.00	1.05	2.45	1.16	0.669	0.983
Vanadium (V)	1.00	1.00	0.500	0.500	0.333	1.00	1.00	0.500	0.500	0.319
Zinc (Zn)	1.03	1.03	0.616	0.453	0.656	1.03	0.984	0.802	0.710	0.574

Denotes slight elevation (mean concentration three to five times higher than respective mean reference or baseline period value).
Denotes moderate elevation (mean concentration five to 10 times higher than respective mean reference or baseline period value).
Denotes highly elevated concentration (mean concentration ≥ 10 times higher than respective mean reference or baseline period value).
Denotes differences in method detection limit between the indicated study area and that of the reference area or baseline period, precluding an evaluation of magnitude of elevation; '-' = no data available for the analyte during comparison period.

Table C.72: Water Chemistry at Mary Lake South Basin (BL0) Water Quality Monitoring Stations, Mary River Project CREMP, 2023

	Parameters	Units	Water Quality Guideline (WQG)[a]	AEMP Benchmark[b]	Winter Sampling Event													
					BL0-05-A	BL0-05-A	BL0-05	BL0-05	BL0-05-B	BL0-05-B	BL0-03	BL0-03	BL0-04	BL0-04	BL0-09	BL0-09	BL0-06	BL0-06
					bottom	surface	bottom	surface	bottom	surface	bottom	surface	bottom	surface	bottom	surface	bottom	surface
					07-Apr-23	07-Apr-23	07-Apr-23	07-Apr-23	07-Apr-23	07-Apr-23	07-Apr-23	07-Apr-23	07-Apr-23	07-Apr-23	07-Apr-23	07-Apr-23	06-Apr-23	06-Apr-23
Conventionals	Conductivity (lab)	µmho/cm	-	-	90.6	98.2	85.6	93.7	92.0	99.5	83.0	92.1	83.0	107.0	86.4	91.0	94.1	95.0
	pH (lab)	pH	6.5 - 9.0	-	7.57	7.60	7.49	7.60	7.57	7.56	7.57	7.56	7.53	7.58	7.32	7.61	7.53	7.58
	Hardness (as $CaCO_3$)	mg/L	-	-	39.7	43.4	38.4	42.7	40.9	44.2	37.3	40.2	36.4	43.3	38.8	42.9	44.8	43.0
	Total Suspended Solids (TSS)	mg/L	-	-	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	Total Dissolved Solids (TDS)	mg/L	-	-	70	18	20	<10	<10	172	<10	18	155	65	138	150	58	60
	Turbidity	NTU	-	-	<0.10	0.12	0.17	<0.10	<0.10	0.10	0.11	0.12	0.26	<0.10	0.26	0.26	0.31	0.24
	Alkalinity (as $CaCO_3$)	mg/L	-	-	42.1	43.4	41.7	46.4	44.6	46.0	38.2	42.2	40.2	21.5	38.2	43.5	43.3	41.7
Nutrients and Organics	Total Ammonia	mg/L	variable[a]	0.855	0.0065	0.0110	<0.0050	0.0170	0.0054	<0.0050	<0.0050	0.0061	0.0343	<0.0050	<0.0050	0.0056	<0.0050	<0.0050
	Nitrate	mg/L	3	3	0.040	0.047	0.049	0.049	0.044	0.195	0.048	0.042	0.035	***6.290***	0.152	0.050	0.063	0.063
	Nitrite	mg/L	0.06	0.06	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Total Kjeldahl Nitrogen (TKN)	mg/L	-	-	0.065	0.088	0.064	0.082	0.081	0.089	0.1	0.102	0.135	0.159	0.087	0.088	0.074	0.074
	Dissolved Organic Carbon	mg/L	-	-	1.08	1.17	0.93	1.06	1.12	1.08	0.97	1.13	0.86	1.13	0.81	1.11	1.51	1.43
	Total Organic Carbon	mg/L	-	-	0.97	1.08	0.88	1.08	1.13	1.29	0.90	1.15	0.96	1.28	0.80	1.09	1.08	1.20
	Total Phosphorus	mg/L	0.020[α]	-	0.0028	0.0022	<0.0020	<0.0020	0.0049	0.002	<0.0020	0.0022	<0.0020	<0.0020	0.0024	0.0036	0.0028	0.0022
	Phenols	mg/L	0.004[α]	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Anions	Bromide (Br)	mg/L	-	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
	Chloride (Cl)	mg/L	120	120	2.65	2.96	2.56	2.85	2.79	3.51	2.41	2.69	1.12	3.22	2.99	2.83	3.13	2.99
	Sulphate (SO_4)	mg/L	218[β]	218	1.79	1.98	1.72	1.91	1.88	2.68	1.59	1.73	0.86	2.69	2.02	2.18	2.44	2.30
Total Metals	Aluminum (Al)	mg/L	0.100	0.130	0.0039	0.0056	0.0060	0.0035	0.0078	0.0035	0.0032	0.0084	0.0044	0.0074	0.0058	0.0056	0.0081	0.0073
	Antimony (Sb)	mg/L	0.020[α]	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)	mg/L	0.005	0.005	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)	mg/L	-	-	0.00456	0.00542	0.00472	0.00590	0.00491	0.00542	0.00450	0.00507	0.00463	0.00538	0.00506	0.00633	0.00527	0.00543
	Beryllium (Be)	mg/L	0.011[α]	-	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
	Bismuth (Bi)	mg/L	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)	mg/L	1.5	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)	mg/L	0.00012	0.00006	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.0000052	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Calcium (Ca)	mg/L	-	-	7.66	8.54	7.50	8.48	7.96	8.91	7.28	10.4	7.57	8.82	7.54	8.13	8.11	8.60
	Chromium (Cr)	mg/L	0.001	0.003	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00076
	Cobalt (Co)	mg/L	0.0009[α]	0.004	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)	mg/L	0.002	0.0024	0.00051	0.00073	0.00109	0.00056	0.00068	0.00075	0.00096	0.00071	0.00088	0.00089	0.00086	0.00082	0.00091	0.00101
	Iron (Fe)	mg/L	0.30	0.326	<0.010	<0.010	0.010	<0.010	0.011	<0.010	<0.010	0.016	<0.010	0.086	<0.010	0.012	0.015	0.021
	Lead (Pb)	mg/L	0.001	0.001	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)	mg/L	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Magnesium (Mg)	mg/L	-	-	4.66	5.10	4.45	5.16	4.93	5.28	4.35	4.95	4.49	5.14	4.45	4.86	5.40	5.32
	Manganese (Mn)	mg/L	0.935[β]	-	0.00048	0.00052	0.00098	0.00032	0.00070	0.00049	0.00041	0.00086	0.00041	0.00111	0.00118	0.00044	0.00107	0.000420
	Mercury (Hg)	mg/L	0.000026	-	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)	mg/L	0.073	-	0.000170	0.000187	0.000162	0.000180	0.000167	0.000191	0.000156	0.000178	0.000156	0.000186	0.000159	0.000185	0.000180	0.000222
	Nickel (Ni)	mg/L	0.025	0.025	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Potassium (K)	mg/L	-	-	0.615	0.718	0.595	0.684	0.667	0.712	0.587	0.725	0.601	0.696	0.603	0.664	0.673	0.710
	Selenium (Se)	mg/L	0.001	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Silicon (Si)	mg/L	-	-	0.29	0.32	0.36	0.30	0.30	0.31	0.29	0.31	0.33	0.31	0.64	0.29	0.32	0.32
	Silver (Ag)	mg/L	0.00025	0.0001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)	mg/L	-	-	1.34	1.51	1.30	1.44	1.37	1.52	1.24	1.73	1.31	1.53	1.45	1.38	1.41	1.49
	Strontium (Sr)	mg/L	-	-	0.00693	0.00774	0.00668	0.0075	0.0072	0.0078	0.00635	0.00826	0.00660	0.00784	0.00679	0.00723	0.00745	0.00782
	Thallium (Tl)	mg/L	0.0008	0.0008	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Tin (Sn)	mg/L	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00011	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)	mg/L	-	-	<0.00030	<0.00030	0.00037	<0.00030	0.00033	<0.00030	<0.00030	<0.00030	<0.00030	0.00041	<0.00030	<0.00030	0.00041	<0.00030
	Uranium (U)	mg/L	0.015	-	0.000855	0.000922	0.000780	0.000922	0.000883	0.000969	0.000764	0.000836	0.000819	0.000913	0.000642	0.000880	0.000831	0.000921
	Vanadium (V)	mg/L	0.006[α]	0.006	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)	mg/L	0.030	0.030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	0.0079	0.0062	<0.0030	<0.0030	<0.0030	0.0037	<0.0030	<0.0030

Indicates parameter concentration above applicable Water Quality Guideline.

BOLD Indicates parameter concentration above the AEMP benchmark.

Note: "-" indicates no WQG benchmark applicable.

[a] Canadian Water Quality Guideline for the protection of aquatic life (CCME 1987, 1999) except those indicated by α (Ontario Provincial Water Quality Objective [PWQO]; OMOE 1994) and β (British Columbia Water Quality Guideline [BCWQG]; BCMOE 2013). See Table 2.2 for information regarding WQG criteria.

[b] AEMP Water Quality Benchmarks developed by Intrinsik (2013) using baseline water quality data specific to Mary Lake.

Table C.72: Water Chemistry at Mary Lake South Basin (BL0) Water Quality Monitoring Stations, Mary River Project CREMP, 2023

	Parameters	Units	Water Quality Guideline (WQG)[a]	AEMP Benchmark[b]	Summer Sampling Event													
					BL0-05-A	BL0-05-A	BL0-05	BL0-05	BL0-05-B	BL0-05-B	BL0-03	BL0-03	BL0-04	BL0-04	BL0-09	BL0-09	BL0-06	BL0-06
					bottom	surface	bottom	surface	bottom	surface	bottom	surface	bottom	surface	bottom	surface	bottom	surface
					03-Aug-23	03-Aug-23	03-Aug-23	03-Aug-23	02-Aug-23	02-Aug-23	03-Aug-23	03-Aug-23	03-Aug-23	03-Aug-23	03-Aug-23	03-Aug-23	03-Aug-23	03-Aug-23
Conventionals	Conductivity (lab)	µmho/cm	-	-	48.9	52.7	59.0	54.5	46.4	52.0	49.2	52.3	65.4	51.5	51.7	51.3	45.8	50.8
	pH (lab)	pH	6.5 - 9.0	-	7.53	7.48	7.21	7.46	7.51	7.68	7.05	7.29	7.15	7.36	7.55	7.54	7.43	7.56
	Hardness (as $CaCO_3$)	mg/L	-	-	19.8	23.4	25.7	23.8	21	24.2	21.1	23.6	28.0	22.4	23.0	22.9	20.5	22.4
	Total Suspended Solids (TSS)	mg/L	-	-	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	1.2	<1.4	1.3	<1.3	<1.3	<1.3	<1.3	<1.4
	Total Dissolved Solids (TDS)	mg/L	-	-	52	44	37	36	20	28	40	27	46	40	37	46	33	40
	Turbidity	NTU	-	-	3.08	3.10	2.82	3.94	2.32	3.36	1.64	1.58	2.00	3.03	2.98	3.04	2.37	3.07
	Alkalinity (as $CaCO_3$)	mg/L	-	-	24.1	31.4	32.5	30.4	21.6	27.7	23.9	31.1	46.5	27.7	28.3	27.8	21.5	24.3
Nutrients and Organics	Total Ammonia	mg/L	variable[c]	0.855	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Nitrate	mg/L	3	3	<0.020	<0.020	0.044	<0.020	<0.020	<0.020	0.026	<0.020	0.053	<0.020	<0.020	<0.020	<0.020	<0.020
	Nitrite	mg/L	0.06	0.06	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Total Kjeldahl Nitrogen (TKN)	mg/L	-	-	0.071	<0.050	<0.050	0.061	0.062	0.059	0.096	0.076	0.059	0.052	0.058	0.069	0.051	0.061
	Dissolved Organic Carbon	mg/L	-	-	1.14	1.40	1.46	1.14	1.38	1.38	1.31	1.26	1.71	1.28	1.40	1.39	1.36	1.03
	Total Organic Carbon	mg/L	-	-	1.21	1.10	1.34	1.07	1.63	1.26	1.31	1.16	1.33	1.43	1.28	1.25	1.20	1.20
	Total Phosphorus	mg/L	0.020[α]	-	0.0082	0.0089	0.0082	0.0077	0.0074	0.0033	0.0081	0.0068	0.0076	0.0054	0.0082	0.0067	0.0076	0.0073
	Phenols	mg/L	0.004[α]	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Anions	Bromide (Br)	mg/L	-	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
	Chloride (Cl)	mg/L	120	120	1.16	1.13	1.96	1.16	1.11	1.05	1.42	1.34	2.29	1.11	1.12	1.12	1.22	1.10
	Sulphate (SO_4)	mg/L	218[β]	218	0.94	1.02	1.10	1.26	0.78	1.03	0.86	0.88	1.26	1.04	1.09	1.10	0.76	0.98
Total Metals	Aluminum (Al)	mg/L	0.100	0.130	0.0556	0.0570	0.0433	0.0695	0.0623	0.0724	0.0474	0.0331	0.0414	0.0616	0.0586	0.0625	0.0554	0.0508
	Antimony (Sb)	mg/L	0.020[α]	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)	mg/L	0.005	0.005	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)	mg/L	-	-	0.00356	0.00367	0.00388	0.00404	0.00300	0.00340	0.00312	0.00306	0.00409	0.00353	0.00381	0.00358	0.00301	0.00330
	Beryllium (Be)	mg/L	0.011[α]	-	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
	Bismuth (Bi)	mg/L	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)	mg/L	1.5	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)	mg/L	0.00012	0.00006	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Calcium (Ca)	mg/L	-	-	5.06	5.04	5.64	5.28	4.13	4.72	4.70	5.21	6.16	5.04	4.92	4.81	4.35	4.72
	Chromium (Cr)	mg/L	0.001	0.003	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Cobalt (Co)	mg/L	0.0009[α]	0.004	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)	mg/L	0.002	0.0024	0.00053	0.00072	0.00080	0.00070	0.00066	0.00068	0.00079	0.00060	0.00082	0.00064	0.00060	0.00060	0.00065	0.00058
	Iron (Fe)	mg/L	0.30	0.326	0.065	0.065	0.064	0.074	0.062	0.073	0.061	0.042	0.068	0.070	0.065	0.064	0.063	0.058
	Lead (Pb)	mg/L	0.001	0.001	0.000062	0.000059	<0.000050	0.000073	0.000064	0.000076	<0.000050	<0.000050	<0.000050	0.000064	0.000062	0.000064	0.000058	0.000056
	Lithium (Li)	mg/L	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Magnesium (Mg)	mg/L	-	-	3.27	3.28	3.62	3.37	2.44	2.79	2.94	3.17	3.91	3.16	3.10	3.14	2.78	3.06
	Manganese (Mn)	mg/L	0.935[β]	-	0.00225	0.00224	0.00520	0.00240	0.00258	0.00227	0.00374	0.00200	0.00682	0.00222	0.00206	0.00219	0.00296	0.00211
	Mercury (Hg)	mg/L	0.000026	-	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)	mg/L	0.073	-	0.000115	0.000111	0.000107	0.000117	0.000091	0.000101	0.000095	0.000106	0.000116	0.000103	0.000112	0.000112	0.000094	0.000106
	Nickel (Ni)	mg/L	0.025	0.025	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Potassium (K)	mg/L	-	-	0.472	0.478	0.512	0.516	0.422	0.470	0.438	0.416	0.534	0.471	0.478	0.471	0.424	0.462
	Selenium (Se)	mg/L	0.001	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Silicon (Si)	mg/L	-	-	0.47	0.47	0.50	0.51	0.43	0.50	0.41	0.38	0.57	0.47	0.46	0.48	0.42	0.45
	Silver (Ag)	mg/L	0.00025	0.0001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)	mg/L	-	-	0.794	0.768	1.08	0.863	0.657	0.688	0.808	0.666	1.26	0.778	0.778	0.753	0.709	0.750
	Strontium (Sr)	mg/L	-	-	0.00440	0.00448	0.00475	0.00469	0.00371	0.00427	0.00388	0.00381	0.00543	0.00416	0.00415	0.00424	0.00377	0.00418
	Thallium (Tl)	mg/L	0.0008	0.0008	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Tin (Sn)	mg/L	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)	mg/L	-	-	0.00322	0.00334	0.00244	0.00388	0.00311	0.00386	<0.00300	0.00159	0.00240	0.00373	0.00348	0.00337	0.00282	0.00292
	Uranium (U)	mg/L	0.015	-	0.000284	0.000279	0.000419	0.000303	0.000285	0.000277	0.000335	0.000241	0.000482	0.000281	0.000286	0.000282	0.000288	0.000270
	Vanadium (V)	mg/L	0.006[α]	0.006	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)	mg/L	0.030	0.030	<0.0030	<0.0030	0.0067	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030

Indicates parameter concentration above applicable Water Quality Guideline.

BOLD Indicates parameter concentration above the AEMP benchmark.

Note: "-" indicates no WQG benchmark applicable.

[a] Canadian Water Quality Guideline for the protection of aquatic life (CCME 1987, 1999) except those indicated by α (Ontario Provincial Water Quality Objective [PWQO]; OMOE 1994) and β (British Columbia Water Quality Guideline [BCWQG]; BCMOE 2013). See Table 2.2 for information regarding WQG criteria.

[b] AEMP Water Quality Benchmarks developed by Intrinsik (2013) using baseline water quality data specific to Mary Lake.

Table C.72: Water Chemistry at Mary Lake South Basin (BL0) Water Quality Monitoring Stations, Mary River Project CREMP, 2023

	Parameters	Units	Water Quality Guideline (WQG)[a]	AEMP Benchmark[b]	Fall Sampling Event													
					BL0-05-A	BL0-05-A	BL0-05	BL0-05	BL0-05-B	BL0-05-B	BL0-03	BL0-03	BL0-04	BL0-04	BL0-09	BL0-09	BL0-06	BL0-06
					bottom	surface	bottom	surface	bottom	surface	bottom	surface	bottom	surface	bottom	surface	bottom	surface
					15-Sep-23	15-Sep-23	15-Sep-23	15-Sep-23	15-Sep-23	15-Sep-23	15-Sep-23	15-Sep-23	15-Sep-23	15-Sep-23	15-Sep-23	15-Sep-23	15-Sep-23	15-Sep-23
Conventionals	Conductivity (lab)	µmho/cm	-	-	71.8	75.9	93.4	106.0	83.5	77.0	73.3	73.2	73.4	74.1	74.3	72.8	74.2	74.4
	pH (lab)	pH	6.5 - 9.0	-	7.67	7.68	7.74	7.75	7.68	7.65	7.62	7.61	7.63	7.60	7.54	7.62	7.63	7.55
	Hardness (as $CaCO_3$)	mg/L	-	-	34.5	33.0	42.1	47.3	37.8	33.3	32.8	32.7	34.8	34.2	34.0	34.4	35.2	34.6
	Total Suspended Solids (TSS)	mg/L	-	-	<1.0	1	1.3	<1.0	2.0	1.3	1.3	<1.0	1.0	<1.0	<1.0	1.0	<1.0	<1.0
	Total Dissolved Solids (TDS)	mg/L	-	-	56	55	62	67	61	56	55	52	52	60	52	58	58	53
	Turbidity	NTU	-	-	2.21	0.72	1.01	0.59	1.82	0.49	2.71	5.19	0.69	1.39	1.62	0.86	0.67	0.64
	Alkalinity (as $CaCO_3$)	mg/L	-	-	52.4	38.7	35.0	53.0	43.3	58.0	45.2	43.9	38.8	50.6	54.2	33.3	34.2	34.9
Nutrients and Organics	Total Ammonia	mg/L	variable[c]	0.855	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0068	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Nitrate	mg/L	3	3	0.028	0.031	0.042	0.050	0.036	0.033	0.024	0.021	0.026	0.027	0.029	0.026	0.027	0.030
	Nitrite	mg/L	0.06	0.06	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Total Kjeldahl Nitrogen (TKN)	mg/L	-	-	0.054	0.054	0.056	0.059	0.054	0.068	0.052	0.055	0.066	0.053	0.055	0.053	0.053	0.070
	Dissolved Organic Carbon	mg/L	-	-	1.38	1.49	1.77	1.66	1.44	1.23	1.18	1.24	1.31	1.22	1.30	1.22	1.24	1.39
	Total Organic Carbon	mg/L	-	-	1.39	1.27	1.39	1.38	1.29	1.22	1.32	1.16	1.67	1.62	1.63	1.67	1.59	1.64
	Total Phosphorus	mg/L	0.020[α]	-	0.0032	0.0021	0.0024	0.0046	0.0032	0.0027	0.0024	0.0023	0.0052	0.0033	0.0057	0.0041	<0.0020	0.0039
	Phenols	mg/L	0.004[α]	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Anions	Bromide (Br)	mg/L	-	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
	Chloride (Cl)	mg/L	120	120	1.92	1.93	2.39	2.72	2.15	1.95	1.86	1.91	1.91	1.91	1.94	1.89	1.93	1.94
	Sulphate (SO_4)	mg/L	218[β]	218	1.65	1.65	2.39	2.92	2.01	1.66	1.29	1.32	1.60	1.64	1.68	1.62	1.70	1.71
Total Metals	Aluminum (Al)	mg/L	0.100	0.130	0.0394	0.0301	0.0317	0.0363	0.0335	0.0311	0.0320	0.0206	0.0291	0.0315	0.0868	0.0388	0.0345	0.0348
	Antimony (Sb)	mg/L	0.020[α]	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)	mg/L	0.005	0.005	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)	mg/L	-	-	0.00400	0.00414	0.00511	0.00590	0.00467	0.00416	0.00393	0.00391	0.00407	0.00408	0.00442	0.00413	0.00418	0.00409
	Beryllium (Be)	mg/L	0.011[α]	-	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
	Bismuth (Bi)	mg/L	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)	mg/L	1.5	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)	mg/L	0.00012	0.00006	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Calcium (Ca)	mg/L	-	-	6.69	6.72	8.35	9.50	7.43	6.71	6.57	6.71	6.71	6.68	6.66	6.96	6.83	6.82
	Chromium (Cr)	mg/L	0.001	0.003	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Cobalt (Co)	mg/L	0.0009[α]	0.004	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00029	<0.00010	<0.00010	<0.00010
	Copper (Cu)	mg/L	0.002	0.0024	0.00073	0.00112	0.00081	0.00083	0.00066	0.00060	0.00080	0.00068	0.00067	0.00065	0.00082	0.00141	0.00071	0.00061
	Iron (Fe)	mg/L	0.30	0.326	0.050	0.037	0.037	0.052	0.039	0.038	0.035	0.028	0.036	0.035	0.112	0.040	0.034	0.039
	Lead (Pb)	mg/L	0.001	0.001	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	0.000282	0.000051	<0.000050	<0.000050
	Lithium (Li)	mg/L	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Magnesium (Mg)	mg/L	-	-	4.19	4.42	5.52	6.16	4.63	4.30	4.28	4.14	4.29	4.25	4.24	4.32	4.44	4.32
	Manganese (Mn)	mg/L	0.935[β]	-	0.00176	0.00154	0.00160	0.00180	0.00165	0.00142	0.00158	0.00133	0.00158	0.00148	0.00822	0.00147	0.00146	0.00152
	Mercury (Hg)	mg/L	0.000026	-	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)	mg/L	0.073	-	0.000151	0.000161	0.000234	0.000286	0.000190	0.000154	0.000128	0.000137	0.000156	0.000157	0.000164	0.000162	0.000162	0.000159
	Nickel (Ni)	mg/L	0.025	0.025	<0.00050	<0.00050	<0.00050	0.00054	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00057	<0.00050	<0.00050	<0.00050
	Potassium (K)	mg/L	-	-	0.549	0.583	0.662	0.733	0.608	0.573	0.559	0.541	0.558	0.566	0.573	0.564	0.575	0.561
	Selenium (Se)	mg/L	0.001	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Silicon (Si)	mg/L	-	-	0.53	0.50	0.59	0.65	0.52	0.49	0.49	0.48	0.50	0.53	0.58	0.52	0.52	0.54
	Silver (Ag)	mg/L	0.00025	0.0001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)	mg/L	-	-	1.13	1.20	1.44	1.57	1.23	1.16	1.13	1.09	1.16	1.15	1.15	1.17	1.20	1.19
	Strontium (Sr)	mg/L	-	-	0.00618	0.00631	0.00776	0.00897	0.00687	0.00625	0.00583	0.00594	0.00621	0.00612	0.00621	0.00640	0.00633	0.00632
	Thallium (Tl)	mg/L	0.0008	0.0008	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Tin (Sn)	mg/L	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)	mg/L	-	-	0.00220	0.00113	0.00142	0.00222	0.00142	0.00132	0.00134	0.00086	0.00134	0.00130	0.00388	0.00175	0.00120	<0.00180
	Uranium (U)	mg/L	0.015	-	0.000718	0.000678	0.00107	0.00130	0.000832	0.000671	0.000599	0.000594	0.000699	0.000698	0.000804	0.000725	0.000726	0.000724
	Vanadium (V)	mg/L	0.006[α]	0.006	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)	mg/L	0.030	0.030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030

Indicates parameter concentration above applicable Water Quality Guideline.

BOLD Indicates parameter concentration above the AEMP benchmark.

Note: "-" indicates no WQG benchmark applicable.

[a] Canadian Water Quality Guideline for the protection of aquatic life (CCME 1987, 1999) except those indicated by α (Ontario Provincial Water Quality Objective [PWQO]; OMOE 1994) and β (British Columbia Water Quality Guideline [BCWQG]; BCMOE 2013). See Table 2.2 for information regarding WQG criteria.

[b] AEMP Water Quality Benchmarks developed by Intrinsik (2013) using baseline water quality data specific to Mary Lake.

Table C.73: Dissolved Metal Concentrations at Mary Lake South Basin (BL0) Water Quality Monitoring Stations, Mary River Project CREMP, 2023

	Parameters	Units	Winter Sampling Event													
			BL0-05-A bottom	BL0-05-A surface	BL0-05 bottom	BL0-05 surface	BL0-05-B bottom	BL0-05-B surface	BL0-03 bottom	BL0-03 surface	BL0-04 bottom	BL0-04 surface	BL0-09 bottom	BL0-09 surface	BL0-06 bottom	BL0-06 surface
			07-Apr-23	07-Apr-23	07-Apr-23	07-Apr-23	07-Apr-23	07-Apr-23	07-Apr-23	07-Apr-23	07-Apr-23	07-Apr-23	07-Apr-23	07-Apr-23	06-Apr-23	06-Apr-23
Dissolved Metals	Aluminum (Al)	mg/L	0.0016	0.0022	0.0023	0.0022	0.0043	0.0019	0.0014	0.0032	0.0016	0.0018	0.0016	0.0018	0.0023	0.0064
	Antimony (Sb)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)	mg/L	0.00470	0.00512	0.00470	0.00495	0.00506	0.00524	0.00429	0.00470	0.00448	0.00533	0.00495	0.00511	0.00552	0.00539
	Beryllium (Be)	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
	Bismuth (Bi)	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Calcium (Ca)	mg/L	7.8	8.8	7.58	8.5	8.1	9.0	7.51	8.0	7.26	8.7	7.63	8.6	8.8	8.6
	Chromium (Cr)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Cobalt (Co)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)	mg/L	0.00048	0.00056	0.00050	0.00052	0.00054	0.00058	0.00046	0.00056	0.00048	0.00058	0.00056	0.00058	0.00065	0.00060
	Iron (Fe)	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.011
	Lead (Pb)	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Magnesium (Mg)	mg/L	4.90	5.22	4.72	5.22	5.02	5.29	4.50	4.92	4.43	5.23	4.79	5.21	5.54	5.24
	Manganese (Mn)	mg/L	0.000270	0.000320	0.000630	0.000240	0.000650	0.000390	0.000190	0.000230	0.000240	0.000220	0.000580	0.000200	0.000730	0.000400
	Mercury (Hg)	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)	mg/L	0.000170	0.000188	0.000142	0.000171	0.000174	0.000193	0.000156	0.000152	0.000158	0.000183	0.000156	0.000165	0.000191	0.000177
	Nickel (Ni)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Potassium (K)	mg/L	0.64	0.73	0.63	0.71	0.68	0.75	0.59	0.67	0.60	0.72	0.62	0.70	0.75	0.74
	Selenium (Se)	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Silicon (Si)	mg/L	0.26	0.29	0.34	0.27	0.29	0.29	0.27	0.29	0.30	0.29	0.64	0.27	0.31	0.29
	Silver (Ag)	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)	mg/L	1.39	1.51	1.38	1.48	1.43	1.59	1.27	1.39	1.29	1.53	1.52	1.48	1.66	1.56
	Strontium (Sr)	mg/L	0.00686	0.00788	0.00686	0.00751	0.0072	0.0080	0.00649	0.00703	0.00654	0.00765	0.00674	0.00723	0.00802	0.00796
	Thallium (Tl)	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Tin (Sn)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)	mg/L	<0.00030	<0.00030	<0.00030	<0.00030	0.00035	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	0.00041
	Uranium (U)	mg/L	0.00084	0.00094	0.00074	0.00090	0.00089	0.00095	0.00076	0.00081	0.00077	0.00090	0.00063	0.00091	0.00090	0.00093
	Vanadium (V)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0116	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010

Table C.73: Dissolved Metal Concentrations at Mary Lake South Basin (BL0) Water Quality Monitoring Stations, Mary River Project CREMP, 2023

	Parameters	Units	Summer Sampling Event													
			BL0-05-A bottom	BL0-05-A surface	BL0-05 bottom	BL0-05 surface	BL0-05-B bottom	BL0-05-B surface	BL0-03 bottom	BL0-03 surface	BL0-04 bottom	BL0-04 surface	BL0-09 bottom	BL0-09 surface	BL0-06 bottom	BL0-06 surface
			03-Aug-23	03-Aug-23	03-Aug-23	03-Aug-23	02-Aug-23	02-Aug-23	03-Aug-23	03-Aug-23	03-Aug-23	03-Aug-23	03-Aug-23	03-Aug-23	03-Aug-23	03-Aug-23
Dissolved Metals	Aluminum (Al)	mg/L	0.0154	0.0182	0.0109	0.0316	0.0170	0.0305	0.0085	0.0164	0.0057	0.0169	0.0216	0.0302	0.0131	0.0286
	Antimony (Sb)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)	mg/L	0.00269	0.00318	0.00348	0.00356	0.00265	0.00311	0.00270	0.00287	0.00373	0.00309	0.00333	0.00335	0.00279	0.00319
	Beryllium (Be)	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
	Bismuth (Bi)	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Calcium (Ca)	mg/L	4.08	4.83	5.23	4.90	4.22	4.90	4.32	4.77	5.80	4.59	4.65	4.70	4.19	4.55
	Chromium (Cr)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Cobalt (Co)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)	mg/L	0.00038	0.00048	0.00043	0.00049	0.0004	0.00050	0.00055	0.00046	0.00045	0.00045	0.00046	0.00047	0.00038	0.00046
	Iron (Fe)	mg/L	0.014	0.016	0.017	0.02	0.017	0.02	0.012	0.014	0.015	0.015	0.016	0.02	0.012	0.018
	Lead (Pb)	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Magnesium (Mg)	mg/L	2.34	2.76	3.06	2.80	2.55	2.90	2.50	2.83	3.29	2.67	2.78	2.72	2.44	2.69
	Manganese (Mn)	mg/L	0.001240	0.000900	0.002040	0.000870	0.001250	0.000880	0.001730	0.000850	0.002070	0.000800	0.000840	0.000890	0.001200	0.000830
	Mercury (Hg)	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)	mg/L	0.000088	0.000105	0.000111	0.000120	0.000086	0.000103	0.000084	0.000084	0.000121	0.000099	0.000117	0.000118	0.000088	0.000103
	Nickel (Ni)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Potassium (K)	mg/L	0.41	0.47	0.51	0.50	0.41	0.47	0.41	0.43	0.53	0.46	0.49	0.49	0.42	0.48
	Selenium (Se)	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Silicon (Si)	mg/L	0.32	0.38	0.44	0.44	0.31	0.41	0.32	0.34	0.48	0.37	0.39	0.42	0.32	0.41
	Silver (Ag)	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)	mg/L	0.65	0.71	0.99	0.75	0.67	0.73	0.72	0.64	1.13	0.69	0.73	0.72	0.68	0.70
	Strontium (Sr)	mg/L	0.00353	0.00416	0.00483	0.00459	0.00355	0.00425	0.00371	0.00366	0.00546	0.00396	0.00427	0.00424	0.00362	0.00411
	Thallium (Tl)	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Tin (Sn)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)	mg/L	0.00046	0.00064	0.00039	0.00088	0.00066	0.00089	<0.00030	0.00048	<0.00030	0.00062	0.00071	0.00088	0.00038	0.00088
	Uranium (U)	mg/L	0.000268	0.000267	0.000413	0.000287	0.000256	0.000262	0.000309	0.000242	0.000462	0.000259	0.000274	0.000273	0.000275	0.000264
	Vanadium (V)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0014	<0.0010	<0.0010	<0.0010

Table C.73: Dissolved Metal Concentrations at Mary Lake South Basin (BL0) Water Quality Monitoring Stations, Mary River Project CREMP, 2023

	Parameters	Units	Fall Sampling Event													
			BL0-05-A bottom	BL0-05-A surface	BL0-05 bottom	BL0-05 surface	BL0-05-B bottom	BL0-05-B surface	BL0-03 bottom	BL0-03 surface	BL0-04 bottom	BL0-04 surface	BL0-09 bottom	BL0-09 surface	BL0-06 bottom	BL0-06 surface
			15-Sep-23	15-Sep-23	15-Sep-23	15-Sep-23	15-Sep-23	15-Sep-23	15-Sep-23	15-Sep-23	15-Sep-23	15-Sep-23	15-Sep-23	15-Sep-23	15-Sep-23	15-Sep-23
Dissolved Metals	Aluminum (Al)	mg/L	0.0039	0.0043	0.0045	0.0050	0.0054	0.0075	0.0056	0.0048	0.0049	0.0066	0.0070	0.0047	0.0064	0.0065
	Antimony (Sb)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)	mg/L	0.00395	0.00395	0.00486	0.00562	0.00438	0.00387	0.00369	0.00373	0.00398	0.00404	0.00406	0.00397	0.00418	0.00422
	Beryllium (Be)	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
	Bismuth (Bi)	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Calcium (Ca)	mg/L	6.83	6.40	8.27	9.11	7.44	6.43	6.47	6.39	6.78	6.83	6.76	6.79	6.93	6.91
	Chromium (Cr)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Cobalt (Co)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)	mg/L	0.00056	0.00046	0.00059	0.00068	0.00057	0.00046	0.00045	0.00052	0.00054	0.00055	0.00051	0.00046	0.00047	0.00046
	Iron (Fe)	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Lead (Pb)	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Magnesium (Mg)	mg/L	4.24	4.14	5.22	5.96	4.66	4.18	4.04	4.07	4.35	4.17	4.16	4.25	4.36	4.21
	Manganese (Mn)	mg/L	0.000250	0.000280	0.000380	0.000510	0.000320	0.000230	0.000180	0.000180	0.000200	0.000250	0.000210	0.000180	0.000230	0.000260
	Mercury (Hg)	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)	mg/L	0.000136	0.000134	0.000214	0.000265	0.000166	0.000142	0.000122	0.000114	0.000148	0.000150	0.000149	0.000143	0.000141	0.000142
	Nickel (Ni)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Potassium (K)	mg/L	0.54	0.51	0.59	0.65	0.55	0.50	0.49	0.48	0.54	0.54	0.55	0.55	0.56	0.55
	Selenium (Se)	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Silicon (Si)	mg/L	0.41	0.41	0.49	0.55	0.45	0.42	0.41	0.41	0.41	0.42	0.41	0.41	0.42	0.41
	Silver (Ag)	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)	mg/L	1.13	1.11	1.38	1.55	1.22	1.11	1.04	1.09	1.09	1.13	1.10	1.10	1.15	1.13
	Strontium (Sr)	mg/L	0.00589	0.00583	0.00722	0.00845	0.00623	0.00573	0.00539	0.00531	0.00572	0.00592	0.00591	0.00593	0.00592	0.00611
	Thallium (Tl)	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Tin (Sn)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)	mg/L	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
	Uranium (U)	mg/L	0.000576	0.000618	0.000970	0.001230	0.000761	0.000616	0.000531	0.000533	0.000569	0.000591	0.00058	0.000582	0.000599	0.000608
	Vanadium (V)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010

APPENDIX D

Table D.1: Field Observations of Sediment Properties at Reference Lake 3 (REF-03) Benthic Stations[a], Mary River Project CREMP, August 2023

Station	Station Depth (m)	Colour and Texture Observations	Evidence of Anoxia[b]	Plant or Algae Presence
REF-03-1	10.5	Red-brown silt (soft sediment)	None	None
REF-03-2	9.1	Red-brown silt with macrophytes	None	Macrophytes common, no algae
REF-03-3	8.8	Light brown flocculent mud	None	None
REF-03-4	8.5	Light brown flocculent mud with small amounts of grey clay	None	None
REF-03-5	13.1	Silty, grainy mud, and clay	None	None
REF-03-6	19.3	Brown with flocculent	None	None
REF-03-7	23.6	Brown flocculent silt	None	None
REF-03-8	17.4	Mud and silt	None	None
REF-03-9	20.6	-	None	None
REF-03-10	19.2	Brown soft mud	None	None

Note: "-" = data not available.

[a] Sediment particle size and benthic invertebrate community samples were collected using a petite ponar.

[b] Evidence of anoxic sediments was assessed visually (presence of blackened substrate) and by smell (based on presence/strength of hydrogen sulphide odour).

Table D.2: Observations from Sediment Cores Collected at Reference Lake 3 (REF-03), Mary River Project CREMP, August 2023

Sample Station	Station Depth (m)	Station Type	Core Number	Core Length (cm)	Surficial Substrate Texture Description
REF-03-1	10.5	Littoral	1	20.5	Brown silt overlaying brown clay overlaying grey clay and sand
			2	14.0	
			3	31.5	
REF-03-2	9.1	Littoral	1	33.0	Brown silt overlaying grey clay
			2	37.0	
			3	19.0	
REF-03-3	8.8	Littoral	1	22.0	Light brown flocculent silt overlaying grey clay
			2	14.0	
			3	4.0	
REF-03-4	8.5	Littoral	1	4.0	Brown flocculent silt
REF-03-5	-	Littoral	1	37.5	Brown silt overlaying grey clay
			2	31.3	
			3	33.5	
REF-03-6	19.3	Profundal	1	28.0	Brown silt overlaying grey and dark grey clay overlaying light grey clay
			2	26.0	
REF-03-7	23.6	Profundal	1	17.5	Brown silt overlaying dark brown clay overlaying grey clay
			2	15.0	
			3	23.0	
REF-03-8	17.4	Profundal	1	25.5	Light brown silt overlaying redox boundary overlaying grey clay
			2	32.0	
			3	25.0	
REF-03-9	20.6	Profundal	1	32.5	Light brown silt overlaying red redox boundary overlaying grey silt
			2	27.0	
			3	15.5	
REF-03-10	-	Profundal	1	17.5	Light brown silt overlaying dark brown silt overlaying grey clay
			2	19.0	
			3	15.0	

Note: "-" = data not available.

Table D.3: Deposited Sediment Total Organic Carbon and Metal Concentrations at Unnamed Reference Creek (REF-CRK), Mary River Project CREMP, August 2023

Parameter	Units	SQG[a]	Unnamed Reference Creek Station			Study Area Summary Statistics		
			REF-CRK-B1	REF-CRK-B3	REF-CRK-B5	Mean	Standard Deviation	Standard Error
Total Organic Carbon	%	10[α]	<0.1	<0.1	<0.1	<0.1	-	-
Aluminum (Al)	µg/g	-	525	498	1,020	681	294	170
Antimony (Sb)	µg/g	-	<0.1	<0.1	<0.1	<0.1	-	-
Arsenic (As)	µg/g	17	0.13	0.18	0.26	0.19	0.0656	0.038
Barium (Ba)	µg/g	-	2.4	2.0	3.6	2.7	0.858	0.50
Beryllium (Be)	µg/g	-	<0.1	<0.1	<0.1	<0.1	-	-
Bismuth (Bi)	µg/g	-	<0.2	<0.2	<0.2	<0.2	-	-
Boron (B)	µg/g	-	<5	<5	<5	<5	-	-
Cadmium (Cd)	µg/g	3.5	<0.02	<0.02	<0.02	<0.02	-	-
Calcium (Ca)	µg/g	-	232	296	739	422	276	159
Chromium (Cr)	µg/g	90	2.0	1.4	3.4	2.2	1.01	0.58
Cobalt (Co)	µg/g	-	0.37	0.36	0.84	0.52	0.274	0.16
Copper (Cu)	µg/g	110[α]	0.50	0.73	1.1	0.77	0.297	0.17
Iron (Fe)	µg/g	40,000[α]	1,190	1,300	2,970	1,820	997	576
Lead (Pb)	µg/g	91.3	0.72	0.80	1.4	0.97	0.366	0.21
Lithium (Li)	µg/g	-	<2	<2	2.5	2.2	-	-
Magnesium (Mg)	µg/g	-	463	415	1,010	629	331	191
Manganese (Mn)	µg/g	1,100[α,β]	12	12	26	17	8.26	4.8
Mercury (Hg)	µg/g	0.486	<0.005	<0.005	<0.005	<0.005	-	-
Molybdenum (Mo)	µg/g	-	<0.1	<0.1	<0.1	<0.1	-	-
Nickel (Ni)	µg/g	75[α,β]	0.90	0.84	2.0	1.3	0.665	0.38
Phosphorus (P)	µg/g	2,000[α]	69	96	156	107	44.5	26
Potassium (K)	µg/g	-	120	110	200	143	49.3	28
Selenium (Se)	µg/g	-	<0.2	<0.2	<0.2	<0.2	-	-
Silver (Ag)	µg/g	-	<0.1	<0.1	<0.1	<0.1	-	-
Sodium (Na)	µg/g	-	<50	<50	<50	<50	-	-
Strontium (Sr)	µg/g	-	1.9	1.6	2.0	1.8	0.180	0.10
Sulphur (S)	µg/g	-	<1,000	<1,000	<1,000	<1,000	-	-
Thallium (Tl)	µg/g	-	<0.05	<0.05	<0.05	<0.05	-	-
Tin (Sn)	µg/g	-	<2	<2	<2	<2	-	-
Titanium (Ti)	µg/g	-	38	44	92	58	29.3	17
Uranium (U)	µg/g	-	0.18	0.23	0.54	0.32	0.196	0.11
Vanadium (V)	µg/g	-	1.9	2.0	4.1	2.7	1.24	0.72
Zinc (Zn)	µg/g	315	<2	<2	4.2	2.7	-	-
Zirconium (Zr)	µg/g	-	1.2	1.1	2.0	1.4	0.493	0.28

Indicates parameter concentration above SQG.

Notes: SQG = Sediment Quality Guidelines. "-" = no applicable SQG, or not enough uncensored data for summary statistics.

[a] Canadian SQG for the protection of aquatic life probable effects level (PEL; CCME 2020) except α = Ontario Provincial Sediment Quality Guideline (PSQG) severe effect level (SEL; OMOE 1993) and β = British Columbia Working SQG PEL (BC ENV 2020).

Table D.4: Sediment Particle Size, Total Organic Carbon, and Metal Concentrations at Reference Lake 3 (REF-03) Sediment Stations, Mary River Project CREMP, August 2023

	Analyte	Units	Sediment Quality Guideline (SQG)[a]	Reference Lake 3 Station										Summary Statistics		
				REF-03-1 (littoral)	REF-03-6 (profundal)	REF-03-2 (littoral)	REF-03-7 (profundal)	REF-03-3 (littoral)	REF-03-8 (profundal)	REF-03-4 (littoral)	REF-03-9 (profundal)	REF-03-5 (littoral)	REF-03-10 (profundal)	Mean	Standard Deviation	Standard Error
Non-metals	Sand	%	-	37.9	54.5	48.0	54.1	40.0	37.9	63.1	46.8	40.2	40.1	46.3	8.63	2.73
	Silt	%	-	48.7	34.7	39.9	34.1	47.2	49.1	32.4	41.6	48.7	45.8	42.2	6.61	2.09
	Clay	%	-	13.4	10.8	12.1	11.8	12.8	13.0	4.5	11.7	11.1	14.1	11.5	2.68	0.846
	Moisture	%	-	88.2	46.8	88.4	46.1	37.1	58.2	70.6	64.0	78.7	45.3	62.3	18.67	5.90
	Total Organic Carbon	%	10[α]	5.10	4.69	8.56	4.34	1.75	4.15	4.00	4.21	6.36	4.11	4.73	1.76	0.558
Metals	Aluminum (Al)	mg/kg	-	22,600	27,400	15,600	28,300	13,600	27,100	11,800	25,000	13,600	25,600	21,060	6,620	2,094
	Antimony (Sb)	mg/kg	-	<0.10	0.12	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0	0
	Arsenic (As)	mg/kg	17	4.94	6.56	3.64	6.60	4.38	6.40	2.50	5.65	6.54	5.78	5.30	1.41	0.447
	Barium (Ba)	mg/kg	-	133	176.0	126	166	71.9	170	65.4	140	139	150	134	38.0	12.03
	Beryllium (Be)	mg/kg	-	0.91	1.21	0.75	1.21	0.62	1.13	0.54	0.95	0.58	1.02	0.89	0.26	0.081
	Bismuth (Bi)	mg/kg	-	<0.20	0.23	<0.20	0.22	<0.20	0.2	<0.20	<0.20	<0.20	<0.20	<0.20	0	0
	Boron (B)	mg/kg	-	19.4	23.6	15.6	21.9	11.1	21.1	10.3	18.4	13.1	18.9	17.3	4.61	1.458
	Cadmium (Cd)	mg/kg	3.5	0.157	0.214	0.176	0.210	0.063	0.194	0.079	0.172	0.202	0.165	0.163	0.0523	0.0165
	Calcium (Ca)	mg/kg	-	5,680	7,200	5,990	6,550	3,660	6,340	3,490	5,560	4,940	5,720	5,513	1,191	377
	Chromium (Cr)	mg/kg	90	75.1	89.9	53.5	93.7	38.0	92.0	37.3	82.5	53.4	81.8	69.7	22.12	6.99
	Cobalt (Co)	mg/kg	-	16.4	20.6	8.26	20.9	10.2	20.0	9.0	17.5	14.50	17.8	15.5	4.83	1.53
	Copper (Cu)	mg/kg	110[α]	89.7	108.0	76.4	123.0	26.1	113.0	43.7	99.0	61.3	102.0	84.2	31.7	10.04
	Iron (Fe)	mg/kg	40,000[α]	46,700	63,600	24,500	61,900	24,200	58,400	25,600	52,900	86,900	53,500	49,820	20,279	6,413
	Lead (Pb)	mg/kg	91.3	17.1	26.0	14.4	23.8	12.7	22.4	11.0	19.4	14.0	20.1	18.1	5.06	1.60
	Lithium (Li)	mg/kg	-	37.5	50.1	29.5	48.8	29.7	44.3	24.3	39.0	24.3	41.6	36.9	9.55	3.02
	Magnesium (Mg)	mg/kg	-	15,600	18,800	10,800	19,000	9,660	18,700	8,340	16,900	10,500	17,000	14,530	4,225	1,336
	Manganese (Mn)	mg/kg	1,100[α,β]	1,280	3,430	314	1,510	401	1,710	533	1,250	1,070	1,270	1,277	893	282
	Mercury (Hg)	mg/kg	0.486	0.0646	0.1030	0.0539	0.0885	0.0061	0.0673	0.0154	0.0852	0.0710	0.0688	0.0624	0.0306	0.0097
	Molybdenum (Mo)	mg/kg	-	2.95	5.52	2.35	3.45	3.02	2.83	2.07	2.48	9.23	2.64	3.65	2.18	0.690
	Nickel (Ni)	mg/kg	75[α,β]	51.4	63.4	39.5	63.6	27.1	61.1	27.8	54.7	40.5	53.9	48.3	13.81	4.37
	Phosphorus (P)	mg/kg	2,000[α]	1,200	1,290	765	1,230	710	1,220	632	1,110	1,940	1,120	1,122	374	118
	Potassium (K)	mg/kg	-	5,650	6,650	3,910	6,920	4,000	6,670	3,310	6,110	3,730	6,100	5,305	1,406	445
	Selenium (Se)	mg/kg	-	0.87	1.51	0.71	0.91	<0.20	0.92	0.28	1.06	0.90	0.76	0.81	0.37	0.118
	Silver (Ag)	mg/kg	-	0.21	0.32	0.17	0.33	<0.10	0.29	<0.10	0.27	0.14	0.25	0.22	0.087	0.028
	Sodium (Na)	mg/kg	-	404	513	336	517	303	525	234	478	331	462	410	104	33
	Strontium (Sr)	mg/kg	-	13.7	19.0	13.3	18.0	10.3	16.8	9.1	14.8	12.6	14.9	14.2	3.17	1.002
	Sulphur (S)	mg/kg	-	1,700	2,700	2,000	1,800	<1000	1,800	<1000	1,800	1,600	1600	1,700	485	153
	Thallium (Tl)	mg/kg	-	0.634	1.000	0.394	0.900	0.271	0.869	0.270	0.734	0.416	0.734	0.622	0.268	0.0848
	Tin (Sn)	mg/kg	-	<2.0	2.2	<2.0	2.2	<2.0	2.2	<2.0	<2.0	<2.0	<2.0	<2.0	0.097	0.0305505
	Titanium (Ti)	mg/kg	-	1,170	1,510	909	1,470	1,300	1,540	990	1,420	1,010	1,380	1,270	234	74
	Uranium (U)	mg/kg	-	24.5	31.9	9.5	33.4	10.7	30.4	12.90	23.6	13.4	27.6	21.8	9.30	2.94
	Vanadium (V)	mg/kg	-	66.0	80.5	50.9	84.6	45.2	82.5	40.0	72.2	47.1	73.7	64.3	16.96	5.36
	Zinc (Zn)	mg/kg	315	90.3	113.0	74.6	120.0	51.1	117.0	52.6	101.0	68.4	103.0	89.1	25.94	8.20
	Zirconium (Zr)	mg/kg	-	3.1	4.1	5.8	5.1	13.3	4.5	5.0	4.2	4.0	4.0	5.3	2.9	0.92

Indicates parameter concentration above Sediment Quality Guideline (SQG).

Note: "-" indicates no SQG applicable.

[a] Canadian Sediment Quality Guideline for the protection of aquatic life probable effects level (PEL; CCME 2015) except α (Ontario Provincial Sediment Quality Guideline [PSQO] severe effect level [SEL]; OMOE 1993) and β (British Columbia Working Sediment Quality Guideline [BCSQG], probable effects level [PEL; BCMOE 2015]).

Table D.5: Statistical Comparison of Substrate Physical Sediment Quality between Littoral and Profundal Sediment Stations of Individual Study Lakes, Mary River Project CREMP, August 2023

Lake	Habitat Variable	Statistical Test Results					Summary Statistics						
		Statistical Analysis[a]	Transformation	Significant Difference Between Areas?	P-value	MOD[b]	Station Type	Sample Size (n)	Mean	Standard Deviation	Standard Error	Minimum	Maximum
Camp Lake	Sand-Sized Particles (% by weight)	M-W	Rank	NO	0.503	ns	Littoral	5	49.8	20.2	4.04	34.1	84.3
							Profundal	9	46.3	22.3	2.47	22.7	85.6
	Silt-Sized Particles (% by weight)	M-W	Rank	NO	0.797	ns	Littoral	5	46.0	18.6	3.72	14.4	61.5
							Profundal	9	43.4	17.7	1.96	12.6	63.6
	Clay-Sized Particles (% by weight)	M-W	Rank	NO	0.062	ns	Littoral	5	4.14	1.70	0.341	1.30	5.60
							Profundal	9	10.3	4.88	0.542	1.80	15.2
	Total Organic Carbon (%)	tequal	None	YES	0.046	-46.9	Littoral	5	1.84	0.784	0.157	0.590	2.58
							Profundal	9	0.979	0.652	0.0725	0.250	2.22
Sheardown Lake Northwest (SDNW)	Sand-Sized Particles (% by weight)	M-W	Rank	YES	0.038	-59.2	Littoral	7	42.9	22.1	3.16	21.4	89.8
							Profundal	7	25.6	21.1	3.02	13.7	71.6
	Silt-Sized Particles (% by weight)	M-W	Rank	NO	0.073	ns	Littoral	7	47.8	18.4	2.63	8.80	63.6
							Profundal	7	58.2	15.7	2.25	23.5	67.2
	Clay-Sized Particles (% by weight)	M-W	Rank	YES	0.026	87.2	Littoral	7	9.27	4.21	0.602	1.30	15.1
							Profundal	7	16.1	5.58	0.797	4.80	19.7
	Total Organic Carbon (%)	tunequal	None	NO	0.079	ns	Littoral	7	2.75	1.70	0.243	0.160	4.87
							Profundal	7	1.37	0.496	0.0708	0.620	2.08
Sheardown Lake Southeast (SDSE)	Sand-Sized Particles (% by weight)	M-W	Rank	NO	0.730	ns	Littoral	5	13.9	5.72	1.14	10.4	24.0
							Profundal	4	14.3	6.32	1.58	9.70	23.2
	Silt-Sized Particles (% by weight)	tequal	None	NO	0.966	ns	Littoral	5	71.5	4.10	0.819	66.7	77.0
							Profundal	4	71.3	5.99	1.50	63.6	76.7
	Clay-Sized Particles (% by weight)	tequal	None	NO	0.907	ns	Littoral	5	14.5	3.73	0.747	9.30	19.0
							Profundal	4	14.3	1.27	0.318	13.1	15.8
	Total Organic Carbon (%)	tequal	Median	NO	0.751	ns	Littoral	5	1.25	0.466	0.0932	0.760	1.74
							Profundal	4	1.33	0.423	0.106	0.900	1.72
Mary Lake	Sand-Sized Particles (% by weight)	tequal	Median	NO	0.770	ns	Littoral	3	27.2	39.8	13.3	4.00	73.2
							Profundal	11	20.9	23.5	2.14	4.00	84.2
	Silt-Sized Particles (% by weight)	M-W	Rank	NO	0.769	ns	Littoral	3	51.6	24.0	7.99	24.0	67.0
							Profundal	11	56.2	17.9	1.62	12.1	75.5
	Clay-Sized Particles (% by weight)	tequal	None	NO	0.836	ns	Littoral	3	21.1	16.0	5.34	2.70	31.7
							Profundal	11	22.9	11.7	1.07	3.70	41.2
	Total Organic Carbon (%)	tequal	None	YES	0.020	-41.8	Littoral	3	1.51	0.630	0.210	0.780	1.90
							Profundal	11	0.876	0.278	0.0252	0.560	1.38

Indicates negative MOD (profundal concentration significantly lower than littoral).

Indicates positive MOD (littoral concentration significantly lower than profundal).

Highlighted values indicate significant difference between study areas based on ANOVA p-value less than 0.05.

Note: MOD = magnitude of difference. MCT = measure of central tendency (i.e., mean). ANOVA = analysis of variance.

[a] Statistical tests included tequal (t-test assuming equal variance) and M-W (Mann-Whitney U-test).

[b] MOD is calculated as $(MCT_{profundal} - MCT_{littoral})/MCT_{littoral}*100$.

Table D.6: Deposited Sediment Field Sampling Observations from Camp Lake Tributary 1 and Camp Lake Tributary 2[a] and the Unnamed Reference Creek, Mary River Project CREMP, August 2023

Study Area	Station	Substrate Size (cm)[b]	Texture of Collected Sediment	Silt Presence[c]
Unnamed Reference Creek	REF-CRK-1	2 - 15	sand/gravel	none observed
	REF-CRK-3	5 - 15	sand/gravel	none observed
	REF-CRK-5	5 - 15	sand/gravel	none observed
Camp Lake Tributary 1 North Branch	CLT1 US-1	5 - 15	gravel/sand	none observed
	CLT1 US-3	5 - 15	gravel/sand	none observed
	CLT1 US-5	5 - 15	sand/gravel	none observed
Camp Lake Tributary 1 Upper Main Stem	CLT1-L2-B1	2 - 10	silt/gravel	thin layer
	CLT1-L2-B3	2 - 10	silt/gravel	thin layer
	CLT1-L2-B5	2 - 10	silt/gravel	thin layer
Camp Lake Tributary 1 Lower Main Stem	CLT1 DS-1	2 - 15	sand/gravel	none observed
	CLT1 DS-3	2 - 15	sand/gravel	none observed
	CLT1 DS-5	5 - 15	sand/gravel	none observed
Camp Lake Tributary 2 Upstream	CLT2 US-1	5 - 15	gravel/sand	none observed
	CLT2 US-3	5 - 15	sand/gravel	none observed
	CLT2 US-5	5 - 15	sand/gravel	none observed
Camp Lake Tributary 2 Downstream	CLT2 DS-1	5 - 15	sand	none observed
	CLT2 DS-3	2 - 15	sand/gravel	none observed
	CLT2 DS-5	5 - 15	sand/gravel	none observed

[a] Sediment samples collected using a stainless steel scoop directly from the streambed or shoreline, as available.

[b] Substrate size is represented by the intermediate axis of particles.

[c] Evidence of silt precipitate included fine material present on the surface of in-stream substrate and/or as interstitial deposits not otherwise expected to occur at such habitat.

Table D.7: Deposited Sediment Total Organic Carbon and Metal Concentrations at Camp Lake Tributary 1 North Branch (CLT1-US) Stations, Mary River Project CREMP, August 2023

Parameter	Units	SQG[a]	Camp Lake Tributary 1 North Branch			Study Area Summary Statistics		
			CLT1-US-B1	CLT1-US-B3	CLT1-US-B5	Mean	Standard Deviation	Standard Error
Total Organic Carbon	%	10[α]	0.67	0.72	3.0	1.5	1.33	0.77
Aluminum (Al)	µg/g	-	15,700	5,950	20,400	14,017	7,371	4,256
Antimony (Sb)	µg/g	-	0.12	<0.1	0.14	0.12	0.0133	0.0077
Arsenic (As)	µg/g	17	3.3	0.61	4.1	2.7	1.83	1.1
Barium (Ba)	µg/g	-	47	10	64	40	27.4	16
Beryllium (Be)	µg/g	-	0.62	0.28	0.85	0.58	0.287	0.17
Bismuth (Bi)	µg/g	-	0.32	<0.2	0.52	0.35	0.133	0.077
Boron (B)	µg/g	-	15	10	22	16	6.22	3.6
Cadmium (Cd)	µg/g	3.5	0.11	<0.02	0.19	0.11	0.0500	0.029
Calcium (Ca)	µg/g	-	4,340	992	6,630	3,987	2,835	1,637
Chromium (Cr)	µg/g	90	54	27	71	51	22.2	13
Cobalt (Co)	µg/g	-	15	4.9	19	13	7.32	4.2
Copper (Cu)	µg/g	110[α]	35	28	60	41	16.7	9.6
Iron (Fe)	µg/g	40,000[α]	101,000	13,200	124,000	79,400	58,473	33,759
Lead (Pb)	µg/g	91.3	8.7	2.3	13	8.1	5.57	3.2
Lithium (Li)	µg/g	-	21	14	28	21	7.05	4.1
Magnesium (Mg)	µg/g	-	15,500	8,270	20,300	14,690	6,056	3,496
Manganese (Mn)	µg/g	1,100[α,β]	463	81	613	386	274	158
Mercury (Hg)	µg/g	0.486	0.019	<0.005	0.038	0.020	0.0125	0.0072
Molybdenum (Mo)	µg/g	-	2.3	0.14	3.0	1.8	1.48	0.85
Nickel (Ni)	µg/g	75[α,β]	41	25	55	40	15.0	8.7
Phosphorus (P)	µg/g	2,000[α]	417	177	608	401	216	125
Potassium (K)	µg/g	-	2,500	950	3,420	2,290	1,248	721
Selenium (Se)	µg/g	-	0.33	<0.2	0.62	0.38	0.193	0.11
Silver (Ag)	µg/g	-	<0.1	<0.1	<0.1	<0.1	-	-
Sodium (Na)	µg/g	-	119	52	134	102	43.7	25
Strontium (Sr)	µg/g	-	4.6	1.9	6.0	4.2	2.06	1.2
Sulphur (S)	µg/g	-	<1,000	<1,000	<1,000	<1,000	-	-
Thallium (Tl)	µg/g	-	0.23	<0.05	0.32	0.20	0.0647	0.037
Tin (Sn)	µg/g	-	<2	<2	<2	<2	-	-
Titanium (Ti)	µg/g	-	750	237	974	654	378	218
Uranium (U)	µg/g	-	2.7	0.71	5.4	2.9	2.38	1.4
Vanadium (V)	µg/g	-	44	20	58	40	19.5	11
Zinc (Zn)	µg/g	315	41	13	58	37	22.9	13
Zirconium (Zr)	µg/g	-	4.6	3.7	7.1	5.1	1.76	1.0

Indicates parameter concentration above SQG.

Notes: SQG = Sediment Quality Guidelines. "-" = no applicable SQG, or not enough uncensored data for summary statistics.

[a] Canadian SQG for the protection of aquatic life probable effects level (PEL; CCME 2020) except α = Ontario Provincial Sediment Quality Guideline (PSQG) severe effect level (SEL; OMOE 1993) and β = British Columbia Working SQG PEL (BC ENV 2020).

Table D.8: Deposited Sediment Total Organic Carbon and Metal Concentrations at Camp Lake Tributary 1 Lower Main Stem (CLT1-DS) Stations, Mary River Project CREMP, August 2023

Parameter	Units	SQG[a]	Camp Lake Tributary 1 Lower Main Stem			Study Area Summary Statistics		
			CLT1-DS-B1	CLT1-DS-B3	CLT1-DS-B5	Mean	Standard Deviation	Standard Error
Total Organic Carbon	%	10[α]	0.29	0.11	0.17	0.19	0.0917	0.053
Aluminum (Al)	µg/g	-	5,560	3,040	3,540	4,047	1,334	770
Antimony (Sb)	µg/g	-	<0.1	<0.1	<0.1	<0.1	-	-
Arsenic (As)	µg/g	17	0.62	0.57	1.3	0.84	0.425	0.25
Barium (Ba)	µg/g	-	35	18	22	25	8.88	5.1
Beryllium (Be)	µg/g	-	0.22	0.14	0.16	0.17	0.0416	0.024
Bismuth (Bi)	µg/g	-	<0.2	<0.2	<0.2	<0.2	-	-
Boron (B)	µg/g	-	<5	<5	<5	<5	-	-
Cadmium (Cd)	µg/g	3.5	0.024	<0.02	0.026	0.023	0.00133	0.00077
Calcium (Ca)	µg/g	-	4,290	1,360	2,670	2,773	1,468	848
Chromium (Cr)	µg/g	90	28	22	24	25	2.78	1.6
Cobalt (Co)	µg/g	-	4.4	2.9	4.7	4.0	0.923	0.53
Copper (Cu)	µg/g	110[α]	6.7	4.2	6.8	5.9	1.45	0.84
Iron (Fe)	µg/g	40,000[α]	19,500	15,300	32,200	22,333	8,799	5,080
Lead (Pb)	µg/g	91.3	3.2	2.5	4.9	3.5	1.24	0.72
Lithium (Li)	µg/g	-	8.2	5.7	6.5	6.8	1.28	0.74
Magnesium (Mg)	µg/g	-	8,450	4,700	5,240	6,130	2,027	1,170
Manganese (Mn)	µg/g	1,100[α,β]	169	103	168	147	37.8	22
Mercury (Hg)	µg/g	0.486	<0.005	<0.005	<0.005	<0.005	-	-
Molybdenum (Mo)	µg/g	-	0.55	0.25	0.74	0.51	0.247	0.14
Nickel (Ni)	µg/g	75[α,β]	24	19	26	23	3.33	1.9
Phosphorus (P)	µg/g	2,000[α]	237	154	224	205	44.6	26
Potassium (K)	µg/g	-	1,800	1,060	1,270	1,377	381	220
Selenium (Se)	µg/g	-	<0.2	<0.2	<0.2	<0.2	-	-
Silver (Ag)	µg/g	-	<0.1	<0.1	<0.1	<0.1	-	-
Sodium (Na)	µg/g	-	<50	<50	<50	<50	-	-
Strontium (Sr)	µg/g	-	3.2	1.9	3.0	2.7	0.698	0.40
Sulphur (S)	µg/g	-	<1,000	<1,000	<1,000	<1,000	-	-
Thallium (Tl)	µg/g	-	0.087	0.056	0.068	0.070	0.0156	0.0090
Tin (Sn)	µg/g	-	<2	<2	<2	<2	-	-
Titanium (Ti)	µg/g	-	322	204	260	262	59.0	34
Uranium (U)	µg/g	-	0.95	0.88	1.1	0.98	0.113	0.065
Vanadium (V)	µg/g	-	13	8.2	16	12	3.80	2.2
Zinc (Zn)	µg/g	315	19	12	16	16	3.58	2.1
Zirconium (Zr)	µg/g	-	3.5	3.1	3.4	3.3	0.208	0.12

Indicates parameter concentration above SQG.

Notes: SQG = Sediment Quality Guidelines. "-" = no applicable SQG, or not enough uncensored data for summary statistics.

[a] Canadian SQG for the protection of aquatic life probable effects level (PEL; CCME 2020) except α = Ontario Provincial Sediment Quality Guideline (PSQG) severe effect level (SEL; OMOE 1993) and β = British Columbia Working SQG PEL (BC ENV 2020).

Table D.9: Deposited Sediment Total Organic Carbon and Metal Concentrations at Camp Lake Tributary 1 Upper Main Stem (CLT1-L2) Stations, Mary River Project CREMP, August 2023

Parameter	Units	SQG[a]	Camp Lake Tributary 1 Upper Main Stem			Study Area Summary Statistics		
			CLT1-L2-B1	CLT1-L2-B3	CLT1-L2-B5	Mean	Standard Deviation	Standard Error
Total Organic Carbon	%	10[α]	4.2	0.71	28	11	14.6	8.4
Aluminum (Al)	µg/g	-	12,200	2,440	5,930	6,857	4,946	2,856
Antimony (Sb)	µg/g	-	<0.1	<0.1	<0.15	<0.1	-	-
Arsenic (As)	µg/g	17	2.0	0.84	1.7	1.5	0.612	0.35
Barium (Ba)	µg/g	-	63	16	46	42	23.8	14
Beryllium (Be)	µg/g	-	0.66	0.14	0.49	0.43	0.265	0.15
Bismuth (Bi)	µg/g	-	0.29	<0.2	<0.31	0.24	-	-
Boron (B)	µg/g	-	18	<5	23	15	3.53	2.0
Cadmium (Cd)	µg/g	3.5	0.13	0.032	0.33	0.16	0.153	0.088
Calcium (Ca)	µg/g	-	4,290	1,870	10,900	5,687	4,674	2,699
Chromium (Cr)	µg/g	90	33	19	28	26	7.27	4.2
Cobalt (Co)	µg/g	-	10	3.3	4.2	6.0	3.87	2.2
Copper (Cu)	µg/g	197	23	5.3	90	39	44.7	26
Iron (Fe)	µg/g	40,000[α]	36,000	11,300	12,600	19,967	13,900	8,025
Lead (Pb)	µg/g	91.3	11	3.1	7.7	7.4	4.15	2.4
Lithium (Li)	µg/g	-	17	4.9	8.6	10	6.42	3.7
Magnesium (Mg)	µg/g	-	10,400	3,800	5,900	6,700	3,372	1,947
Manganese (Mn)	µg/g	1,100[α,β]	786	329	384	500	249	144
Mercury (Hg)	µg/g	0.486	0.021	<0.005	0.065	0.030	0.0295	0.017
Molybdenum (Mo)	µg/g	-	2.4	0.45	0.98	1.3	0.997	0.58
Nickel (Ni)	µg/g	75[α,β]	36	20	49	35	14.5	8.4
Phosphorus (P)	µg/g	2,000[α]	429	181	686	432	253	146
Potassium (K)	µg/g	-	3,700	650	1,580	1,977	1,563	902
Selenium (Se)	µg/g	-	0.43	<0.2	1.5	0.70	0.687	0.40
Silver (Ag)	µg/g	-	<0.1	<0.1	<0.15	<0.1	-	-
Sodium (Na)	µg/g	-	145	<50	152	116	4.67	2.7
Strontium (Sr)	µg/g	-	9.2	3.4	16	9.6	6.47	3.7
Sulphur (S)	µg/g	-	<1,000	<1,000	3,900	1,967	-	-
Thallium (Tl)	µg/g	-	0.23	0.053	0.30	0.19	0.128	0.074
Tin (Sn)	µg/g	-	<2	<2	<3.1	<2	-	-
Titanium (Ti)	µg/g	-	556	167	190	304	218	126
Uranium (U)	µg/g	-	8.1	1.2	23	11	11.0	6.4
Vanadium (V)	µg/g	-	29	11	16	18	9.24	5.3
Zinc (Zn)	µg/g	315	55	12	25	31	22.3	13
Zirconium (Zr)	µg/g	-	9.3	2.2	8.0	6.5	3.78	2.2

Indicates parameter concentration above SQG.

Notes: SQG = Sediment Quality Guidelines. "-" = no applicable SQG, or not enough uncensored data for summary statistics.

[a] Canadian SQG for the protection of aquatic life probable effects level (PEL; CCME 2020) except α = Ontario Provincial Sediment Quality Guideline (PSQG) severe effect level (SEL; OMOE 1993) and β = British Columbia Working SQG PEL (BC ENV 2020).

Table D.10: Magnitude of Elevation in Deposited Sediment Metal Concentrations between Camp Lake Tributary (CLT1 and CLT2) Study Areas and Average Lotic Reference Area Data, Mary River Project CREMP, August 2023

Parameter	Units	Reference Area Data		Camp Lake Tributary 1			Camp Lake Tributary 2	
		Reference Creek (REF-CRK)	Mary River Reference (GO-09)	North Branch (CLT1-US)	Upper Main Stem (CLT1-L2)	Lower Main Stem (CLT1-DS)	Upstream (CLT2-US)	Downstream (CLT2-DS)
Total Organic Carbon	%	<0.1	0.10	14	107	1.9	4.8	2.3
Aluminum (Al)	µg/g	1,173	1,030	16	8.0	4.7	8.2	4.8
Antimony (Sb)	µg/g	<0.1	<0.1	1.2	1.0	1.0	1.0	1.0
Arsenic (As)	µg/g	0.19	0.16	15	8.7	4.8	5.1	3.3
Barium (Ba)	µg/g	4.8	4.1	12	12	7.4	12	5.4
Beryllium (Be)	µg/g	<0.1	<0.1	5.8	4.3	1.7	2.7	1.7
Bismuth (Bi)	µg/g	<0.2	<0.2	1.7	1.2	1.0	1.2	1.0
Boron (B)	µg/g	<5	<5	3.2	3.0	1.0	1.2	1.0
Cadmium (Cd)	µg/g	<0.02	<0.02	5.3	8.2	1.2	1.7	1.3
Calcium (Ca)	µg/g	508	980	5.7	8.1	4.0	7.3	4.8
Chromium (Cr)	µg/g	5.4	3.9	17	8.7	8.2	7.2	6.6
Cobalt (Co)	µg/g	1.1	0.94	18	8.2	5.5	7.4	5.1
Copper (Cu)	µg/g	1.3	1.5	37	35	5.3	8.4	7.5
Iron (Fe)	µg/g	2,633	2,737	35	8.8	9.8	11	4.7
Lead (Pb)	µg/g	1.1	1.0	8.2	7.5	3.6	3.6	2.6
Lithium (Li)	µg/g	3.0	3.0	8.2	4.0	2.6	4.0	2.9
Magnesium (Mg)	µg/g	1,500	1,194	16	7.3	6.7	9.5	7.0
Manganese (Mn)	µg/g	36	28	17	22	6.5	8.1	4.7
Mercury (Hg)	µg/g	<0.005	<0.005	4.1	6.0	1.0	1.0	1.0
Molybdenum (Mo)	µg/g	<0.1	<0.1	18	13	5.1	7.6	2.4
Nickel (Ni)	µg/g	5.4	2.2	24	20	13	10	10
Phosphorus (P)	µg/g	77	111	3.7	4.0	1.9	3.7	1.7
Potassium (K)	µg/g	237	243	12	10	7.1	11	5.1
Selenium (Se)	µg/g	<0.2	<0.2	1.9	3.5	1.0	1.0	1.0
Silver (Ag)	µg/g	<0.1	<0.1	1.0	1.0	1.0	1.0	1.0
Sodium (Na)	µg/g	58	<50	2.0	2.3	1.0	1.5	1.1
Strontium (Sr)	µg/g	1.8	2.2	2.1	4.8	1.3	2.0	1.3
Sulphur (S)	µg/g	<1,000	<1,000	1.0	2.0	1.0	1.0	1.0
Thallium (Tl)	µg/g	<0.05	<0.05	4.0	3.9	1.4	2.1	1.2
Tin (Sn)	µg/g	<2	<2	1.0	1.0	1.0	1.0	1.0
Titanium (Ti)	µg/g	99	118	7.4	3.5	3.0	4.9	3.4
Uranium (U)	µg/g	0.28	0.27	10	37	3.4	2.9	1.9
Vanadium (V)	µg/g	4.3	5.0	10	4.8	3.2	4.9	4.0
Zinc (Zn)	µg/g	4.0	3.9	11	9.3	4.8	5.3	4.1
Zirconium (Zr)	µg/g	1.8	1.7	3.3	4.1	2.1	2.9	2.1

Denotes slight elevation (mean concentration 3 to 5 times higher than respective mean reference creek value).
Denotes moderate elevation (mean concentration 5 to 10 times higher than respective mean reference creek value).
Denotes highly elevated (mean concentration greater than 10 times higher than respective mean reference creek value).

Table D.11: Deposited Sediment Total Organic Carbon and Metal Concentrations at Camp Lake Tributary 2 Upstream (CLT2-US) Stations, Mary River Project CREMP, August 2023

Parameter	Units	SQG[a]	Camp Lake Tributary 2 Upstream Station			Study Area Summary Statistics		
			CLT2-US-B1	CLT2-US-B3	CLT2-US-B5	Mean	Standard Deviation	Standard Error
Total Organic Carbon	%	10[α]	0.46	0.56	0.45	0.49	0.0608	0.035
Aluminum (Al)	µg/g	-	6,990	6,980	7,040	7,003	32.1	19
Antimony (Sb)	µg/g	-	<0.1	<0.1	<0.1	<0.1	-	-
Arsenic (As)	µg/g	17	1.2	0.93	0.54	0.89	0.337	0.19
Barium (Ba)	µg/g	-	38	35	47	40	6.24	3.6
Beryllium (Be)	µg/g	-	0.30	0.27	0.24	0.27	0.0300	0.017
Bismuth (Bi)	µg/g	-	<0.2	0.33	<0.2	0.24	-	-
Boron (B)	µg/g	-	7.4	6.0	<5	6.1	0.933	0.54
Cadmium (Cd)	µg/g	3.5	0.035	0.043	0.023	0.034	0.0101	0.0058
Calcium (Ca)	µg/g	-	5,840	4,540	5,030	5,137	657	379
Chromium (Cr)	µg/g	90	25	20	20	22	2.54	1.5
Cobalt (Co)	µg/g	-	6.1	5.7	4.4	5.4	0.898	0.52
Copper (Cu)	µg/g	110[α]	9.9	11	6.9	9.4	2.28	1.3
Iron (Fe)	µg/g	40,000[α]	33,200	25,900	15,000	24,700	9,159	5,288
Lead (Pb)	µg/g	91.3	3.8	3.7	3.2	3.6	0.350	0.20
Lithium (Li)	µg/g	-	10	11	9.7	10	0.569	0.33
Magnesium (Mg)	µg/g	-	8,740	8,360	8,810	8,637	242	140
Manganese (Mn)	µg/g	1,100[α,β]	208	186	150	181	29.3	17
Mercury (Hg)	µg/g	0.486	<0.005	<0.005	<0.005	<0.005	-	-
Molybdenum (Mo)	µg/g	-	0.73	1.1	0.43	0.76	0.341	0.20
Nickel (Ni)	µg/g	75[α,β]	19	16	17	17	1.45	0.84
Phosphorus (P)	µg/g	2,000[α]	713	276	209	399	274	158
Potassium (K)	µg/g	-	1,950	1,820	2,370	2,047	287	166
Selenium (Se)	µg/g	-	<0.2	<0.2	<0.2	<0.2	-	-
Silver (Ag)	µg/g	-	<0.1	<0.1	<0.1	<0.1	-	-
Sodium (Na)	µg/g	-	76	80	72	76	4.00	2.3
Strontium (Sr)	µg/g	-	3.8	4.8	3.4	4.0	0.732	0.42
Sulphur (S)	µg/g	-	<1,000	<1,000	<1,000	<1,000	-	-
Thallium (Tl)	µg/g	-	0.098	0.10	0.12	0.10	0.0104	0.0060
Tin (Sn)	µg/g	-	<2	<2	<2	<2	-	-
Titanium (Ti)	µg/g	-	445	422	420	429	13.9	8.0
Uranium (U)	µg/g	-	0.92	0.85	0.78	0.85	0.0711	0.041
Vanadium (V)	µg/g	-	21	19	16	19	2.84	1.6
Zinc (Zn)	µg/g	315	18	18	17	18	0.458	0.26
Zirconium (Zr)	µg/g	-	4.4	4.9	4.1	4.5	0.404	0.23

Indicates parameter concentration above SQG.

Notes: SQG = Sediment Quality Guidelines. "-" = no applicable SQG, or not enough uncensored data for summary statistics.

[a] Canadian SQG for the protection of aquatic life probable effects level (PEL; CCME 2020) except α = Ontario Provincial Sediment Quality Guideline (PSQG) severe effect level (SEL; OMOE 1993) and β = British Columbia Working SQG PEL (BC ENV 2020).

Table D.12: Deposited Sediment Total Organic Carbon and Metal Concentrations at Camp Lake Tributary 2 Downstream (CLT2-DS) Stations, Mary River Project CREMP, August 2023

Parameter	Units	SQG[a]	Camp Lake Tributary 2 Downstream Station			Study Area Summary Statistics		
			CLT2-DS-B1	CLT2-DS-B3	CLT2-DS-B5	Mean	Standard Deviation	Standard Error
Total Organic Carbon	%	10[α]	0.28	0.30	0.12	0.23	0.0987	0.057
Aluminum (Al)	µg/g	-	5,410	4,340	2,500	4,083	1,472	850
Antimony (Sb)	µg/g	-	<0.1	<0.1	<0.1	<0.1	-	-
Arsenic (As)	µg/g	17	0.59	0.76	0.40	0.58	0.180	0.10
Barium (Ba)	µg/g	-	31	15	9.0	18	11.5	6.6
Beryllium (Be)	µg/g	-	0.20	0.19	0.11	0.17	0.0493	0.028
Bismuth (Bi)	µg/g	-	<0.2	<0.2	<0.2	<0.2	-	-
Boron (B)	µg/g	-	<5	<5	<5	<5	-	-
Cadmium (Cd)	µg/g	3.5	<0.02	0.036	<0.02	0.025	-	-
Calcium (Ca)	µg/g	-	4,350	3,160	2,590	3,367	898	518
Chromium (Cr)	µg/g	90	18	20	22	20	1.96	1.1
Cobalt (Co)	µg/g	-	4.2	4.0	2.9	3.7	0.702	0.41
Copper (Cu)	µg/g	197	6.6	13	5.1	8.3	4.38	2.5
Iron (Fe)	µg/g	40,000[α]	12,400	10,200	9,710	10,770	1,433	827
Lead (Pb)	µg/g	91.3	2.6	3.1	2.1	2.6	0.490	0.28
Lithium (Li)	µg/g	-	8.3	8.4	6.0	7.6	1.36	0.79
Magnesium (Mg)	µg/g	-	7,670	6,450	5,090	6,403	1,291	745
Manganese (Mn)	µg/g	1,100[α,β]	130	109	78	106	26.0	15
Mercury (Hg)	µg/g	0.486	<0.005	<0.005	<0.005	<0.005	-	-
Molybdenum (Mo)	µg/g	-	0.38	0.21	0.12	0.24	0.132	0.076
Nickel (Ni)	µg/g	75[α,β]	17	16	19	17	1.95	1.1
Phosphorus (P)	µg/g	2,000[α]	222	192	138	184	42.6	25
Potassium (K)	µg/g	-	1,550	860	530	980	520	300
Selenium (Se)	µg/g	-	<0.2	<0.2	<0.2	<0.2	-	-
Silver (Ag)	µg/g	-	<0.1	<0.1	<0.1	<0.1	-	-
Sodium (Na)	µg/g	-	56	55	<50	54	0.667	0.39
Strontium (Sr)	µg/g	-	2.8	3.0	2.2	2.6	0.433	0.25
Sulphur (S)	µg/g	-	<1,000	<1,000	<1,000	<1,000	-	-
Thallium (Tl)	µg/g	-	0.077	0.052	<0.05	0.060	0.0167	0.0096
Tin (Sn)	µg/g	-	<2	<2	<2	<2	-	-
Titanium (Ti)	µg/g	-	337	298	266	300	35.6	21
Uranium (U)	µg/g	-	0.60	0.62	0.46	0.56	0.0880	0.051
Vanadium (V)	µg/g	-	15	16	14	15	1.01	0.58
Zinc (Zn)	µg/g	315	15	13	12	14	1.67	0.96
Zirconium (Zr)	µg/g	-	3.5	3.9	2.6	3.3	0.666	0.38

Indicates parameter concentration above SQG.

Notes: SQG = Sediment Quality Guidelines. "-" = no applicable SQG, or not enough uncensored data for summary statistics.

[a] Canadian SQG for the protection of aquatic life probable effects level (PEL; CCME 2020) except α = Ontario Provincial Sediment Quality Guideline (PSQG) severe effect level (SEL; OMOE 1993) and β = British Columbia Working SQG PEL (BC ENV 2020).

Table D.13: Field Observations of Sediment Properties at Camp Lake (JL0) Benthic Stations[a], Mary River Project CREMP, August 2023

Station	Station Depth (m)	Colour and Texture Observations	Evidence of Anoxia[b]	Plant or Algae Presence
JL0-01	17.0	Slightly red-grey to brown, silty clay	None	None
JL0-02	10.0	Red top layer with grey silty sand and soil	None	None
JL0-07	31.5	Rusty brown and grey, silty smooth and very little sand	None	None
JL0-11	28.0	Rusty surface layer with brown-grey silt	None	None
JL0-12	15.0	Rusty red, silty with some sand and gravel	None	None
JL0-16	14.6	Rusty red silt	None	None
JL0-18	12.0	Dark brown, sandy	-	None
JL0-19	-	Red-brown silt	None	No macrophytes, sparse algae (organic orbs)
JL0-20	-	Dark red-brown with some grey; silty texture with some sand	None	Sparse macrophytes and algae (organic orbs)
JL0-21	9.0	Red top layer, dark grey with silky smooth texture	None	No macrophytes, common algae (organic orbs)

Note: "-" = data not available.

[a] Sediment particle size and benthic invertebrate community samples were collected using a petite ponar.

[b] Evidence of anoxic sediments was assessed visually (presence of blackened substrate) and by smell (based on presence/strength of hydrogen sulphide odour).

Table D.14: Observations from Sediment Cores Collected at Camp Lake (JL0), Mary River Project CREMP, August 2023

Sample Station	Station Depth (m)	Station Type	Core Number	Core Length (cm)	Surficial Substrate Texture Description
JL0-01	17.0	Profundal	1	18.5	Brown flocculent silt overlaying brown clay
			2	25.0	
			3	31.0	
JL0-02	12.0	Littoral	1	26.0	Organic orbs on top layer overlaying red-brown flocculent silt overlaying grey clay
			2	26.5	
			3	22.5	
JL0-07	33.0	Profundal	1	35.0	Organic orbs on top layer overlaying brown flocculent slit overlaying brown-grey clay
			2	29.0	
			3	31.0	
JL0-11	30.0	Profundal	1	11.0	Light brown flocculent silt overlaying red-brown overlaying grey and dark grey clay
			2	30.0	
			3	21.0	
JL0-12	16.5	Profundal	1	4.5	Brown flocculent silt overlaying grey clay with some sand. Redox boundary in second core
			2	5.0	
			3	5.5	
JL0-13	17.0	Profundal	1	23.5	Light brown flocculent silt overlaying grey and dark grey clay
			2	27.5	
			3	29.5	
JL0-14	26.5	Profundal	1	28.5	Brown flocculent silt overlaying grey and light grey clay overlaying dark grey clay
			2	26.5	
			3	13.5	
JL0-15	17.0	Profundal	1	27.0	Light brown silt overlaying light brown sand and silt overlaying grey clay and black redox layer overlaying grey clay
			2	28.5	
			3	17.0	
JL0-16	16.0	Profundal	1	34.5	Flocculent silt overlaying grey sand
			2	21.0	
			3	7.0	
JL0-17	16.0	Profundal	1	13.0	Light brown flocculent silt overlaying light brown silt and clay with sand
			2	14.0	
			3	7.0	

Table D.15: Statistical Comparison of Sediment Physical Properties Between Camp Lake (JL0) and Reference Lake 3 (REF3) Stations Collected at Littoral and Profundal Depths, Mary River Project CREMP, August 2023

Lake Zone	Sediment Variable	Statistical Test Results					Summary Statistics						
		Statistical Test[a]	Transformation	Significant Difference Between Areas?	P-value	MOD[b]	Study Lake	Sample Size (n)	MCT	Standard Deviation	Standard Error	Minimum	Maximum
Littoral (Shallow) Stations	Sand-Sized Material (%)	tequal	Median	NO	0.809	ns	Reference	5	45.8	10.4	2.08	37.9	63.1
							Camp	5	49.8	20.2	4.04	34.1	84.3
	Silt-Sized Material (%)	tequal	None	NO	0.773	ns	Reference	5	43.4	7.14	1.43	32.4	48.7
							Camp	5	46.0	18.6	3.72	14.4	61.5
	Clay-Sized Material (%)	M-W	Rank	YES	0.032	-63.6	Reference	5	10.8	3.61	0.723	4.50	13.4
							Camp	5	4.14	1.70	0.341	1.30	5.60
	Moisture (%)	tequal	None	NO	0.530	ns	Reference	5	72.6	21.2	4.24	37.1	88.4
							Camp	5	65.7	10.2	2.03	48.4	73.8
	Total Organic Carbon (TOC) Content (%)	tequal	None	YES	0.024	-64.2	Reference	5	5.15	2.55	0.510	1.75	8.56
							Camp	5	1.84	0.784	0.157	0.590	2.58
Profundal (Deep) Stations	Sand-Sized Material (%)	tequal	Median	NO	0.681	ns	Reference	5	46.7	7.69	1.54	37.9	54.5
							Camp	9	46.3	22.3	2.47	22.7	85.6
	Silt-Sized Material (%)	M-W	Rank	NO	0.240	ns	Reference	5	41.1	6.64	1.33	34.1	49.1
							Camp	9	43.4	17.7	1.96	12.6	63.6
	Clay-Sized Material (%)	M-W	Rank	NO	0.841	ns	Reference	5	12.3	1.28	0.257	10.8	14.1
							Camp	9	10.3	4.88	0.542	1.80	15.2
	Moisture (%)	tequal	None	NO	0.834	ns	Reference	5	52.1	8.50	1.70	45.3	64.0
							Camp	9	53.8	16.5	1.83	26.4	72.5
	Total Organic Carbon (TOC) Content (%)	tequal	None	YES	<0.001	-77.2	Reference	5	4.30	0.235	0.0469	4.11	4.69
							Camp	9	0.979	0.652	0.0725	0.250	2.22

Indicates negative MOD (mine-exposed concentration significantly lower than reference).

Indicates positive MOD (reference concentration significantly lower than mine-exposed).

Highlighted values indicate significant difference between study areas based on statistical p-value less than 0.05.

Note: MOD = magnitude of difference. MCT = measure of central tendency. ns = not significant.

[a] Statistical tests included tequal (t-test assuming equal variance) and M-W (Mann-Whitney U-test).

[b] MOD is calculated as $(MCT_{Exposed} - MCT_{Reference})/MCT_{Reference}*100$.

Table D.16: Sediment Particle Size, Total Organic Carbon, and Metal Concentrations at Camp Lake (JL0) Sediment Stations, Mary River Project CREMP, August 2023

	Analyte	Units	Sediment Quality Guideline (SQG)[a]	AEMP Benchmark[b]	Camp Lake Stations										Summary Statistics		
					JL0-02 (littoral)	JL0-01 (profundal)	JL0-14 (profundal)	JL0-17 (profundal)	JL0-07 (profundal)	JL0-16 (profundal)	JL0-15 (profundal)	JL0-11 (profundal)	JL0-13 (profundal)	JL0-12 (profundal)	Mean	Standard Deviation	Standard Error
Non-metals	Sand	%	-	-	50.4	22.7	38.1	37.6	38.1	85.6	43.9	37.2	30.7	82.7	46.7	21.0	6.65
	Silt	%	-	-	45.5	63.6	50.2	48.8	46.8	12.6	46.0	50.5	57.0	14.9	43.6	16.7	5.27
	Clay	%	-	-	4.1	13.7	11.7	13.6	15.2	1.8	10.1	12.2	12.2	2.4	9.70	5.00	1.58
	Moisture	%	-	-	73.8	69.8	54.9	45.1	72.5	30.3	61.1	60.2	63.8	26.4	55.8	16.8	5.31
	Total Organic Carbon	%	10[α]	-	2.42	1.44	0.36	0.77	2.22	0.25	0.96	1.29	1.26	0.26	1.12	0.765	0.242
Metals	Aluminum (Al)	mg/kg	-	-	17,700	20,000	8,600	15,400	19,200	6,970	16,600	16,500	18,500	6,520	14,599	5,195	1,643
	Antimony (Sb)	mg/kg	-	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	0.000	4.6259E-18
	Arsenic (As)	mg/kg	17	5.9	3.40	5.27	1.93	3.3	3.99	1.50	4.01	***8.05***	5.70	1.97	3.91	2.01	0.636
	Barium (Ba)	mg/kg	-	-	81.9	72.7	32.1	58.0	81.4	27.3	55.4	137.0	106.0	34.3	68.6	34.9	11.0
	Beryllium (Be)	mg/kg	-	-	0.82	1.13	0.44	0.83	1.09	0.35	0.86	0.96	1.09	0.34	0.79	0.31	0.097
	Bismuth (Bi)	mg/kg	-	-	0.25	0.27	<0.20	<0.20	0.31	<0.20	0.23	0.24	0.25	<0.20	0.24	0.037	0.012
	Boron (B)	mg/kg	-	-	18.5	31.4	12.6	22.0	30.1	10.5	23.1	27.2	30.3	10.1	21.6	8.33	2.63
	Cadmium (Cd)	mg/kg	3.5	1.5	0.141	0.162	0.055	0.108	0.192	0.052	0.121	0.140	0.173	0.034	0.118	0.0547	0.0173
	Calcium (Ca)	mg/kg	-	-	4,210	4,230	2,430	3,110	4,280	7,570	3,520	4,260	4,220	1,840	3,967	1,534	485
	Chromium (Cr)	mg/kg	90	98	70.2	77.7	38.3	58.5	79.6	35.4	69.5	68.0	71.8	29.4	59.8	18.59	5.88
	Cobalt (Co)	mg/kg	-	-	15.50	18.50	7.92	13.30	15.80	7.24	15.80	22.30	19.70	6.85	14.3	5.41	1.71
	Copper (Cu)	mg/kg	110[α]	50	39.2	45.6	18.6	31.4	***52.4***	15.7	36.8	39.4	42.4	12.3	33.4	13.6	4.29
	Iron (Fe)	mg/kg	40,000[α]	52,400	40,600	34,200	17,200	25,400	37,100	15,200	29,200	***62,400***	38,100	18,300	31,770	14,166	4,480
	Lead (Pb)	mg/kg	91.3	35	15.70	21.60	7.75	14.20	21.70	6.32	15.80	18.00	19.50	5.65	14.6	6.09	1.92
	Lithium (Li)	mg/kg	-	-	30.1	39.2	15.4	29.8	39.6	12.5	30.5	32.7	35.5	11.8	27.7	10.61	3.35
	Magnesium (Mg)	mg/kg	-	-	15,500	14,700	6,880	11,000	14,800	12,000	13,000	12,400	13,000	5,910	11,919	3,228	1,021
	Manganese (Mn)	mg/kg	1,100[α,β]	4,370	734	1,070	536	872	365	227	847	4,150	***6,870***	1,560	1,723	2,129	673
	Mercury (Hg)	mg/kg	0.486	0.17	0.0309	0.0389	0.0090	0.0151	0.0580	0.0094	0.0236	0.0303	0.0275	0.0065	0.0249	0.0160	0.0050
	Molybdenum (Mo)	mg/kg	-	-	1.22	0.81	0.29	0.65	0.74	0.41	0.60	1.96	2.47	0.41	0.96	0.72	0.228
	Nickel (Ni)	mg/kg	75[α,β]	72	59.3	67.8	29.6	50.1	65.4	38.9	60.1	63.2	68.5	26.8	53.0	15.81	5.00
	Phosphorus (P)	mg/kg	2,000[α]	1,580	848	955	692	715	1,220	404	845	***2,130***	1,110	601	952	478	151
	Potassium (K)	mg/kg	-	-	3,920	5,400	1,950	3,700	5,400	1,670	4,330	4,590	5,400	1,520	3,788	1,555	492
	Selenium (Se)	mg/kg	-	-	0.29	0.32	<0.20	<0.20	0.48	<0.20	0.21	0.37	0.31	<0.20	0.28	0.09	0.030
	Silver (Ag)	mg/kg	-	-	<0.10	0.12	<0.10	<0.10	0.17	<0.10	<0.10	0.11	0.11	<0.10	0.11	0.022	0.007
	Sodium (Na)	mg/kg	-	-	176	229	139	174	354	84	180	224	210	73	184	80	25
	Strontium (Sr)	mg/kg	-	-	7.64	12.90	7.39	9.71	17.40	6.47	10.40	12.50	13.70	4.72	10.3	3.88	1.23
	Sulphur (S)	mg/kg	-	-	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	1,000.0	0	0
	Thallium (Tl)	mg/kg	-	-	0.387	0.544	0.171	0.327	0.450	0.136	0.373	0.465	0.529	0.141	0.4	0.155	0.0491
	Tin (Sn)	mg/kg	-	-	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	0	0
	Titanium (Ti)	mg/kg	-	-	1,140	1,030	553	867	991	461	913	859	918	425	816	248	78
	Uranium (U)	mg/kg	-	-	4.94	5.66	2.49	4.58	7.19	1.610	4.36	5.46	5.16	1.36	4.3	1.88	0.60
	Vanadium (V)	mg/kg	-	-	58.2	65.0	28.5	47.2	61.4	22.4	54.9	56.0	59.7	22.1	47.5	16.75	5.30
	Zinc (Zn)	mg/kg	315	135	57.1	59.4	26.2	45.0	63.7	23.0	49.1	51.3	54.0	19.6	44.8	16.07	5.08
	Zirconium (Zr)	mg/kg	-	-	7.7	5.9	3.1	5.3	8.7	4.4	4.6	4.8	5.0	2.1	5.2	1.9	0.62

Indicates parameter concentration above Sediment Quality Guideline (SQG).
BOLD Indicates parameter concentration above the AEMP Benchmark.

Note: "-" indicates no SQG applicable, or that Standard Deviation and Standard Error could not be calculated.

[a] Canadian Sediment Quality Guideline for the protection of aquatic life probable effects level (PEL; CCME 2015) except those indicated by α (Ontario Provincial Sediment Quality Guideline [PSQG] severe effect level [SEL]; OMOE 1993) and β (British Columbia Working Sediment Quality Guideline [BCSQG] probable effects level [PEL; BCMOE 2015]).

[b] AEMP Sediment Quality Benchmarks developed by Intrinsik (2013) using sediment quality guidelines, background sediment quality data, and method detection limits. The indicated values are specific to Camp Lake.

Table D.17: Magnitude of Elevation in Mean Sediment Metal Concentrations between Camp Lake (JL0) and Reference Lake 3 (REF3) 2023 Data, and between Camp Lake 2023 and Baseline Data, Mary River Project CREMP

Parameter	Camp Lake 2023 versus Reference Lake 3 2023				Camp Lake 2023 versus Baseline Period			
	Littoral Stations		Profundal Stations		Littoral Stations		Profundal Stations	
	Reference Lake Concentration (µg/g)	Magnitude of Elevation	Reference Lake Concentration (µg/g)	Magnitude of Elevation	Camp Lake Baseline Concentration (mg/kg)	Magnitude of Elevation	Camp Lake Baseline Concentration (mg/kg)	Magnitude of Elevation
Aluminum (Al)	15,440	1.15	26,680	0.534	18,267	0.969	15,175	0.939
Antimony (Sb)	<0.1	1.00	0.104	0.962	1.0	0.100	1.0	0.100
Arsenic (As)	4.40	0.773	6.20	0.640	2.80	1.21	3.5	1.13
Barium (Ba)	107	0.765	160	0.419	105	0.780	68	0.987
Beryllium (Be)	0.680	1.21	1.10	0.714	1.0	0.820	1.0	0.788
Bismuth (Bi)	<0.2	1.25	0.210	1.11	-	-	-	-
Boron (B) [a]	13.9	1.33	20.8	1.05	1.0	18.5	2.0	11.0
Cadmium (Cd)	0.135	1.04	0.191	0.603	0.5	0.282	0.5	0.230
Calcium (Ca)	4,752	0.886	6,274	0.628	3,130	1.35	2,857	1.38
Chromium (Cr)	51.5	1.36	88.0	0.667	81.0	0.867	71	0.827
Cobalt (Co)	11.7	1.33	19.4	0.731	18.0	0.861	17	0.833
Copper (Cu)	59.4	0.659	109	0.300	45.0	0.871	40	0.818
Iron (Fe)	41,580	0.976	58,060	0.530	36,133	1.12	33,206	0.927
Lead (Pb)	13.8	1.13	22.3	0.649	18.0	0.872	19	0.763
Lithium (Li)	29.1	1.04	44.8	0.613	-	-	-	-
Magnesium (Mg)	10,980	1.41	18,080	0.637	13,967	1.11	10,113	1.14
Manganese (Mn)	720	1.02	1,834	1.00	699	1.05	942	1.95
Mercury (Hg)	0.0422	0.732	0.0826	0.294	0.1	0.309	0.1	0.243
Molybdenum (Mo)	3.92	0.311	3.38	0.274	1.0	1.22	1.0	0.927
Nickel (Ni)	37.3	1.59	59.3	0.881	67.0	0.885	63	0.830
Phosphorus (P)	1,049	0.808	1,194	0.807	800	1.06	1,125	0.856
Potassium (K)	4,120	0.951	6,490	0.581	3,450	1.14	3,771	1.00
Selenium (Se)	0.592	0.490	1.03	0.268	1.0	0.290	1.0	0.277
Silver (Ag)	0.144	0.694	0.292	0.384	0.30	0.333	0.3	0.374
Sodium (Na)	322	0.547	499	0.371	279	0.631	254	0.729
Strontium (Sr)	11.8	0.648	16.7	0.633	9.30	0.822	12	0.881
Sulphur (S)	1,460	0.685	1,940	0.515	-	-	-	-
Thallium (Tl)	0.397	0.975	0.847	0.411	1.0	0.387	1.0	0.348
Tin (Sn)	<2	1.00	2.12	0.943	-	-	-	-
Titanium (Ti)	1,076	1.06	1,464	0.533	-	-	-	-
Uranium (U)	14.2	0.348	29.4	0.143	-	-	-	-
Vanadium (V)	49.8	1.17	78.7	0.589	69.0	0.843	57	0.813
Zinc (Zn)	67.4	0.847	111	0.392	67.0	0.852	57	0.763
Zirconium (Zr)	6.24	1.23	4.38	1.11	-	-	-	-

Denotes slight elevation (concentration three to five times higher than respective mean reference lake value or baseline period, as applicable).
Denotes moderate elevation (concentration five to 10 times higher than mean reference area value or baseline period value, as applicable).
Denotes high elevation (concentration is ≥ 10 times higher than mean reference area value or baseline period value, as applicable).

Note: '-' indicates parameter not measured, and therefore magnitude of elevation could not be determined.

[a] Boron concentrations in sediment from 2015 to 2022 were considerably higher (i.e., 10- to 70-times) than those reported during both the baseline and 2014 studies at all mine-exposed lakes. The lack of any distinct gradient in the magnitude of the elevation in boron concentrations among stations within each lake and among study lakes suggested that the stark contrast in boron concentrations between recent data and data collected prior to 2015 was likely due to laboratory based analytical differences.

Table D.18: Deposited Sediment Field Sampling Observations at Sheardown Lake Tributaries 1 and 9 (SDLT1 and SDLT9)[a] and the Unnamed Reference Creek, Mary River Project CREMP, August 2023

Study Area	Station	Substrate Size (cm)[b]	Texture of Collected Sediment	Silt Presence[b]
Unnamed Reference Creek	REF-CRK-1	2 - 15	sand/gravel	none observed
	REF-CRK-3	5 - 15	sand/gravel	none observed
	REF-CRK-5	5 - 15	sand/gravel	none observed
Sheardown Lake Tributary 1 (SDLT1)	SDLT1-1	5 - 15	red-brown silt	precipitate and deposits (<1 mm)
	SDLT1-3	5 - 15	silt/gravel	precipitate and deposits (<1 mm)
	SDLT1-5	5 - 15	silt/gravel	precipitate and deposits (<1 mm)
Sheardown Lake Tributary 9 (SDLT9)	SDLT9-1	2 - 15	sand/gravel	none observed
	SDLT9-3	2 - 15	sand/gravel	none observed
	SDLT9-5	2 - 10	gravel/sand	none observed

Note: Station LDFG-OUT (Sheardown Lake Tributary 12) was not flowing during sampling event in 2023, therefore no data are available.

[a] Sediment samples collected using a stainless steel scoop directly from the streambed or shoreline, as available.

[b] Substrate size is represented by the intermediate axis of particles.

[c] Evidence of silt precipitate included fine material present on the surface of in-stream substrate and/or as interstitial deposits not otherwise expected to occur at such habitat.

Table D.19: Deposited Sediment Total Organic Carbon and Metal Concentrations at Sheardown Lake Tributary 1 (SDLT1) Stations, Mary River Project CREMP, August 2023

Parameter	Units	SQG[a]	Sheardown Lake Tributary 1			Study Area Summary Statistics		
			SDLT1-R1-B1	SDLT1-R1-B3	SDLT1-R1-B5	Mean	Standard Deviation	Standard Error
Total Organic Carbon	%	10[α]	1.1	0.52	0.91	0.83	0.283	0.16
Aluminum (Al)	µg/g	-	31,400	31,200	20,900	27,833	6,005	3,467
Antimony (Sb)	µg/g	-	0.15	0.12	0.11	0.13	0.0208	0.012
Arsenic (As)	µg/g	17	4.5	4.3	3.8	4.2	0.374	0.22
Barium (Ba)	µg/g	-	209	206	164	193	25.2	15
Beryllium (Be)	µg/g	-	1.3	1.2	0.94	1.1	0.172	0.099
Bismuth (Bi)	µg/g	-	0.79	0.73	0.56	0.69	0.119	0.069
Boron (B)	µg/g	-	14	13	10	12	1.89	1.1
Cadmium (Cd)	µg/g	3.5	0.50	0.54	0.29	0.44	0.135	0.078
Calcium (Ca)	µg/g	-	5,650	4,260	3,650	4,520	1,025	592
Chromium (Cr)	µg/g	90	67	60	48	58	9.77	5.6
Cobalt (Co)	µg/g	-	24	22	18	21	2.88	1.7
Copper (Cu)	µg/g	110[α]	48	44	35	42	6.62	3.8
Iron (Fe)	µg/g	40,000[α]	141,000	139,000	112,000	130,667	16,197	9,351
Lead (Pb)	µg/g	91.3	19	17	13	16	3.00	1.7
Lithium (Li)	µg/g	-	36	37	28	34	4.58	2.6
Magnesium (Mg)	µg/g	-	26,400	25,600	19,100	23,700	4,004	2,312
Manganese (Mn)	µg/g	1,100[α,β]	1,070	1,030	815	972	137	79
Mercury (Hg)	µg/g	0.486	0.0098	0.0061	0.0058	0.0072	0.00223	0.0013
Molybdenum (Mo)	µg/g	-	7.8	7.5	6.6	7.3	0.604	0.35
Nickel (Ni)	µg/g	75[α,β]	58	54	42	51	8.15	4.7
Phosphorus (P)	µg/g	2,000[α]	592	598	448	546	84.9	49
Potassium (K)	µg/g	-	10,300	10,000	7,760	9,353	1,388	801
Selenium (Se)	µg/g	-	0.32	0.30	0.31	0.31	0.0100	0.0058
Silver (Ag)	µg/g	-	0.20	0.18	0.17	0.18	0.0153	0.0088
Sodium (Na)	µg/g	-	242	234	183	220	32.0	18
Strontium (Sr)	µg/g	-	8.9	7.7	6.1	7.6	1.38	0.80
Sulphur (S)	µg/g	-	<1,000	<1,000	<1,000	<1,000	-	-
Thallium (Tl)	µg/g	-	0.51	0.48	0.39	0.46	0.0634	0.037
Tin (Sn)	µg/g	-	<2	<2	<2	<2	-	-
Titanium (Ti)	µg/g	-	1,530	1,440	1,090	1,353	232	134
Uranium (U)	µg/g	-	5.9	5.1	4.0	5.0	0.983	0.57
Vanadium (V)	µg/g	-	54	50	40	48	7.16	4.1
Zinc (Zn)	µg/g	315	144	134	90	123	28.6	17
Zirconium (Zr)	µg/g	-	16	15	10	14	2.84	1.6

Indicates parameter concentration above SQG.

Notes: SQG = Sediment Quality Guidelines. "-" = no applicable SQG, or not enough uncensored data for summary statistics.

[a] Canadian SQG for the protection of aquatic life probable effects level (PEL; CCME 2020) except α = Ontario Provincial Sediment Quality Guideline (PSQG) severe effect level (SEL; OMOE 1993) and β = British Columbia Working SQG PEL (BC ENV 2020).

Table D.20: Deposited Sediment Total Organic Carbon and Metal Concentrations at Sheardown Lake Tributary 9 (SDLT9) Stations, Mary River Project CREMP, August 2023

Parameter	Units	SQG[a]	Sheardown Lake Tributary 9			Study Area Summary Statistics		
			SDLT9-DS-B1	SDLT9-DS-B3	SDLT9-DS-B5	Mean	Standard Deviation	Standard Error
Total Organic Carbon	%	10[α]	3.5	3.3	1.9	2.9	0.866	0.50
Aluminum (Al)	µg/g	-	3,960	3,550	6,120	4,543	1,381	797
Antimony (Sb)	µg/g	-	<0.1	<0.1	<0.1	<0.1	-	-
Arsenic (As)	µg/g	17	1.3	1.1	1.7	1.4	0.298	0.17
Barium (Ba)	µg/g	-	22	16	34	24	8.82	5.1
Beryllium (Be)	µg/g	-	0.19	0.17	0.30	0.22	0.0700	0.040
Bismuth (Bi)	µg/g	-	<0.2	<0.2	<0.2	<0.2	-	-
Boron (B)	µg/g	-	8.5	<5	7.8	7.1	0.467	0.27
Cadmium (Cd)	µg/g	3.5	0.048	0.045	0.077	0.057	0.0177	0.010
Calcium (Ca)	µg/g	-	3,780	1,500	3,010	2,763	1,160	670
Chromium (Cr)	µg/g	90	18	14	22	18	3.70	2.1
Cobalt (Co)	µg/g	-	3.5	3.7	6.1	4.4	1.44	0.83
Copper (Cu)	µg/g	110[α]	28	10	16	18	8.86	5.1
Iron (Fe)	µg/g	40,000[α]	20,600	24,800	53,100	32,833	17,677	10,206
Lead (Pb)	µg/g	91.3	4.5	2.9	4.7	4.0	0.981	0.57
Lithium (Li)	µg/g	-	7.1	5.3	8.4	6.9	1.56	0.90
Magnesium (Mg)	µg/g	-	4,050	3,490	5,950	4,497	1,289	744
Manganese (Mn)	µg/g	1,100[α,β]	126	178	294	199	86.0	50
Mercury (Hg)	µg/g	0.486	0.021	0.0074	0.013	0.014	0.00703	0.0041
Molybdenum (Mo)	µg/g	-	0.52	0.69	1.5	0.89	0.501	0.29
Nickel (Ni)	µg/g	75[α,β]	30	16	25	24	7.02	4.1
Phosphorus (P)	µg/g	2,000[α]	460	280	322	354	94.2	54
Potassium (K)	µg/g	-	850	810	1,400	1,020	330	191
Selenium (Se)	µg/g	-	0.32	0.20	0.24	0.25	0.0611	0.035
Silver (Ag)	µg/g	-	<0.1	<0.1	<0.1	<0.1	-	-
Sodium (Na)	µg/g	-	<50	<50	53	51	-	-
Strontium (Sr)	µg/g	-	4.5	2.5	3.7	3.6	1.01	0.58
Sulphur (S)	µg/g	-	<1,000	<1,000	<1,000	<1,000	-	-
Thallium (Tl)	µg/g	-	0.17	0.090	0.16	0.14	0.0431	0.025
Tin (Sn)	µg/g	-	<2	<2	<2	<2	-	-
Titanium (Ti)	µg/g	-	354	285	357	332	40.7	23
Uranium (U)	µg/g	-	0.92	0.67	1.1	0.91	0.231	0.13
Vanadium (V)	µg/g	-	13	11	15	13	1.99	1.1
Zinc (Zn)	µg/g	315	16	13	20	17	3.71	2.1
Zirconium (Zr)	µg/g	-	3.0	1.0	2.3	2.1	1.01	0.58

Indicates parameter concentration above SQG.

Notes: SQG = Sediment Quality Guidelines. "-" = no applicable SQG, or not enough uncensored data for summary statistics.

[a] Canadian SQG for the protection of aquatic life probable effects level (PEL; CCME 2020) except α = Ontario Provincial Sediment Quality Guideline (PSQG) severe effect level (SEL; OMOE 1993) and β = British Columbia Working SQG PEL (BC ENV 2020).

Table D.21: Magnitude of Elevation in Deposited Sediment Metal Concentrations at the Sheardown Lake Tributaries (SDLT1 and SDLT9) Compared to Average Lotic Reference Area Data, Mary River Project CREMP, August 2023

Parameter	Units	Reference Area Data		SDLT1-R1 Magnitude of Elevation	SDLT9-DS Magnitude of Elevation
		Reference Creek (REF-CRK)	Mary River Reference (GO-09)		
Total Organic Carbon	%	<0.1	0.10	8.2	28
Aluminum (Al)	µg/g	1,173	1,030	33	5.3
Antimony (Sb)	µg/g	<0.1	<0.1	1.3	1.0
Arsenic (As)	µg/g	0.19	0.16	24	7.9
Barium (Ba)	µg/g	4.8	4.1	57	7.2
Beryllium (Be)	µg/g	<0.1	<0.1	11	2.2
Bismuth (Bi)	µg/g	<0.2	<0.2	3.5	1.0
Boron (B)	µg/g	<5	<5	2.4	1.4
Cadmium (Cd)	µg/g	<0.02	<0.02	22	2.8
Calcium (Ca)	µg/g	508	980	6.4	3.9
Chromium (Cr)	µg/g	5.4	3.9	19	5.8
Cobalt (Co)	µg/g	1.1	0.94	29	6.1
Copper (Cu)	µg/g	1.3	1.5	38	16
Iron (Fe)	µg/g	2,633	2,737	57	14
Lead (Pb)	µg/g	1.1	1.0	16	4.1
Lithium (Li)	µg/g	3.0	3.0	13	2.7
Magnesium (Mg)	µg/g	1,500	1,194	26	4.9
Manganese (Mn)	µg/g	36	28	43	8.9
Mercury (Hg)	µg/g	<0.005	<0.005	1.4	2.8
Molybdenum (Mo)	µg/g	<0.1	<0.1	73	8.9
Nickel (Ni)	µg/g	5.4	2.2	30	14
Phosphorus (P)	µg/g	77	111	5.0	3.2
Potassium (K)	µg/g	237	243	48	5.3
Selenium (Se)	µg/g	<0.2	<0.2	1.6	1.3
Silver (Ag)	µg/g	<0.1	<0.1	1.8	1.0
Sodium (Na)	µg/g	58	<50	4.4	1.0
Strontium (Sr)	µg/g	1.8	2.2	3.7	1.8
Sulphur (S)	µg/g	<1,000	<1,000	1.0	1.0
Thallium (Tl)	µg/g	<0.05	<0.05	9.2	2.8
Tin (Sn)	µg/g	<2	<2	1.0	1.0
Titanium (Ti)	µg/g	99	118	15	3.8
Uranium (U)	µg/g	0.28	0.27	17	3.1
Vanadium (V)	µg/g	4.3	5.0	12	3.3
Zinc (Zn)	µg/g	4.0	3.9	37	5.0
Zirconium (Zr)	µg/g	1.8	1.7	8.7	1.3

Denotes slight elevation (mean concentration 3 to 5 times higher than respective mean reference creek value).

Denotes moderate elevation (mean concentration 5 to 10 times higher than respective mean reference creek value).

Denotes highly elevated (mean concentration greater than 10 times higher than respective mean reference creek value).

Table D.22: Field Observations of Sediment Properties at Sheardown Lake Northwest (DL0-01) Benthic Stations[a], Mary River Project CREMP, August 2023

Station	Station Depth (m)	Colour and Texture Observations	Evidence of Anoxia[b]	Plant or Algae Presence
DL0-01-2	18.5	Red silt and clay with some sand and detritus	None	None
DL0-01-3	8.5	Red silt and clay overlaying brown silt and fine sand	None	Abundant root-like macrophytes and common algae orbs
DL0-01-4	8.0	Red-brown silt overlaying grey-brown silt	None	Sparse stick-like marcophytes and sparse algae orbs
DL0-01-5	23.0	Red-brown silt overlaying grey silt	None	None
DL0-01-9	8.0	Red-brown silt overlaying brown-grey silt	None	Common macrophytes and algae orbs
DL0-01-10	8.0	Red coarse sand with silt and clay or fine sand and some small gravel pieces	None	None
DL0-01-11	8.0	Red-brown silt and clay	-	Sparse moss-like macrophytes and sparse algae orbs
DL0-01-12	14.5	Red fine sand and clay with brown medium sand	None	None
DL0-01-14	22.0	Orange-brown silt overlaying brown-grey silt and clay	None	No macrophytes, sparse algae
DL0-01-15	22.0	Red-brown silt overlaying light brown silt and clay	None	No macrophytes, sparse algae orbs

Note: "-" = data not available

[a] Sediment particle size and benthic invertebrate community samples were collected using a petite ponar.

[b] Evidence of anoxic sediments was assessed visually (presence of blackened substrate) and by smell (based on presence/strength of hydrogen sulphide odour).

Table D.23: Observations from Sediment Cores Collected at Sheardown Lake NW (DL0-01), Mary River Project CREMP, August 2023

Sample Station	Station Depth (m)	Station Type	Core Number	Core Length (cm)	Surficial Substrate Texture Description
DL0-01	20.8	Profundal	1	10.5	Red-brown flocculent silt overlaying brown clay
			2	7.0	
			3	7.0	
DL0-01-2	17.0	Profundal	1	4.5	Red-brown silt overlaying light brown clay
			2	13.0	
			3	10.0	
DL0-01-05	23.0	Profundal	1	23.0	Red-brown silt overlaying grey-brown silt
			2	18.0	
			3	18.0	
DL0-01-08	13.0	Littoral	1	23.5	Red-brown silt overlaying grey clay
			2	23.0	
			3	30.5	
DL0-01-9	8.0	Littoral	1	25.0	Red-brown silt overlaying brown silt overlaying brown-grey silt and clay
			2	25.0	
			3	22.0	
DD-HAB 9-STN2	11.0	Littoral	1	34.5	Red-brown silt with leaves and organics overlaying grey-brown clay
			2	26.5	
			3	29.5	
DL0-01-10	8.0	Littoral	1	19.5	Red-brown silt overlaying grey sand
			2	14.5	
			3	14.0	
DL0-01-13	18.0	Profundal	1	23.0	Silt overlaying brown clay
			2	35.1	
			3	24.0	

Table D.24: Statistical Comparison of Sediment Physical Properties Between Sheardown Lake Northwest (SDNW/DL0-01) and Reference Lake 3 (REF3)Stations Collected at Littoral and Profundal Depths, Mary River Project CREMP, August 2023

Lake Zone	Sediment Variable	Statistical Test Results					Summary Statistics						
		Statistical Test[a]	Transformation	Significant Difference Between Areas?	P-value	MOD[b]	Study Lake	Sample Size (n)	MCT	Standard Deviation	Standard Error	Minimum	Maximum
Littoral (Shallow) Stations	Sand-Sized Material (%)	tequal	Median	NO	0.533	ns	Reference	5	45.8	10.4	2.08	37.9	63.1
							SDNW	7	42.9	22.1	3.16	21.4	89.8
	Silt-Sized Material (%)	M-W	Rank	NO	0.143	ns	Reference	5	43.4	7.14	1.43	32.4	48.7
							SDNW	7	47.8	18.4	2.63	8.80	63.6
	Clay-Sized Material (%)	tequal	None	NO	0.532	ns	Reference	5	10.8	3.61	0.723	4.50	13.4
							SDNW	7	9.27	4.21	0.602	1.30	15.1
	Moisture (%)	tequal	None	NO	0.090	ns	Reference	5	72.6	21.2	4.24	37.1	88.4
							SDNW	7	53.0	15.1	2.16	28.7	73.5
	Total Organic Carbon (TOC) Content (%)	tequal	None	NO	0.077	ns	Reference	5	5.15	2.55	0.510	1.75	8.56
							SDNW	7	2.75	1.70	0.243	0.160	4.87
Profundal (Deep) Stations	Sand-Sized Material (%)	M-W	Rank	YES	0.048	-65.8	Reference	5	46.7	7.69	1.54	37.9	54.5
							SDNW	7	25.6	21.1	3.02	13.7	71.6
	Silt-Sized Material (%)	M-W	Rank	NO	0.051	ns	Reference	5	41.1	6.64	1.33	34.1	49.1
							SDNW	7	58.2	15.7	2.25	23.5	67.2
	Clay-Sized Material (%)	M-W	Rank	NO	0.106	ns	Reference	5	12.3	1.28	0.257	10.8	14.1
							SDNW	7	16.1	5.58	0.797	4.80	19.7
	Moisture (%)	tequal	None	NO	0.420	ns	Reference	5	52.1	8.50	1.70	45.3	64.0
							SDNW	7	46.5	13.0	1.85	30.3	67.2
	Total Organic Carbon (TOC) Content (%)	tequal	None	YES	<0.001	-68.0	Reference	5	4.30	0.235	0.0469	4.11	4.69
							SDNW	7	1.37	0.496	0.0708	0.620	2.08

Indicates negative MOD (mine-exposed concentration significantly lower than reference).

Indicates positive MOD (reference concentration significantly lower than mine-exposed).

Highlighted values indicate significant difference between study areas based on statistical p-value less than 0.05.

Note: MOD = magnitude of difference. MCT = measure of central tendency. ns = not significant.

[a] Statistical tests included tequal (t-test assuming equal variance) and M-W (Mann-Whitney U-test).

[b] MOD is calculated as $(MCT_{Exposed} - MCT_{Reference})/MCT_{Reference}*100$.

Table D.25: Sediment Particle Size, Total Organic Carbon, Metal Concentrations at Sheardown Lake Northwest (DL0-01) Sediment Stations, Mary River Project CREMP, August 2023

	Analyte	Units	Sediment Quality Guideline (SQG)[a]	AEMP Benchmark[b]	Sheardown Lake Northwest Stations								Summary Statistics		
					DL0-01-5 (profundal)	DD-HAB 9-STN2 (littoral)	DL0-01-08 (littoral)	DL0-01 (profundal)	DL0-01-13 (profundal)	DL0-01-02 (profundal)	DL0-01-9 (littoral)	DL0-01-10 (littoral)	Mean	Standard Deviation	Standard Error
Non-metals	Sand	%	-	-	16.0	34.5	21.4	17.7	15.6	31.1	39.2	89.8	33.2	24.58	8.69
	Silt	%	-	-	64.4	58.0	63.6	62.9	66.5	56.2	50.6	8.8	53.9	18.94	6.70
	Clay	%	-	-	19.5	7.5	15.1	19.4	17.8	12.7	10.2	1.3	12.9	6.39	2.259
	Moisture	%	-	-	38.1	47.5	46.5	42.9	51.0	37.6	56.4	28.7	43.6	8.71	3.08
	Total Organic Carbon	%	10[α]	-	1.59	2.59	1.80	1.20	1.42	0.95	4.45	0.16	1.77	1.29	0.455
Metals	Aluminum (Al)	mg/kg	-	-	24,900	20,300	22,800	24,400	25,800	20,600	22,000	2,320	20,390	7,566	2,675
	Antimony (Sb)	mg/kg	-	-	0.11	0.13	<0.10	<0.10	<0.10	<0.10	0.14	<0.10	0.11	0.016	0.0057
	Arsenic (As)	mg/kg	17	6.2	5.91	***13.4***	***10.90***	5.19	5.43	4.28	***8.3***	0.49	***6.73***	4.03	1.426
	Barium (Ba)	mg/kg	-	-	160	211	115	106	110.0	80	120	9.9	114	58.1	20.56
	Beryllium (Be)	mg/kg	-	-	1.25	1.05	1.21	1.34	1.31	1.07	1.15	0.16	1.07	0.38	0.135
	Bismuth (Bi)	mg/kg	-	-	0.32	0.40	0.27	0.29	0.31	0.24	0.34	<0.20	0.30	0.062	0.022
	Boron (B)	mg/kg	-	-	36.1	25.0	36.5	40.7	42.4	34.0	36.5	<5.0	32.0	12.09	4.274
	Cadmium (Cd)	mg/kg	3.5	1.5	0.288	0.359	0.272	0.314	0.296	0.297	0.497	0.020	0.293	0.1317	0.0466
	Calcium (Ca)	mg/kg	-	-	5,020	5,020	4,710	4,690	5,290	4,200	6,460	861	4,531	1,622	573
	Chromium (Cr)	mg/kg	90	97	88	67.8	84	93	96.1	80.0	82	12.0	75.4	27.05	9.56
	Cobalt (Co)	mg/kg	-	-	20.1	17.3	19.4	19.0	19.2	15.8	17.6	2.10	16.3	5.91	2.09
	Copper (Cu)	mg/kg	110[α]	58	54.5	52.3	48.9	***59.5***	55.0	46.2	***74.0***	4.22	49.3	20.1	7.10
	Iron (Fe)	mg/kg	40,000[α]	52,200	***73,300***	***130,000***	***84,400***	46,500	***53,100***	41,000	***102,000***	9,790	***67,511***	37,979	13,428
	Lead (Pb)	mg/kg	91.3	35	25.8	22.0	24.0	25.8	27.6	21.0	23.0	2.90	21.5	7.83	2.77
	Lithium (Li)	mg/kg	-	-	43.3	32.8	39.5	46.0	45.2	35.3	36.4	5.1	35.5	13.17	4.65
	Magnesium (Mg)	mg/kg	-	-	16,700	15,300	14,800	16,000	17,100	12,900	15,700	2,070	13,821	4,919	1,739
	Manganese (Mn)	mg/kg	1,100[α,β]	4,530	***6,690***	2,170	882	1,390	1,400	1,250	753	89.3	1,828	2,054	726
	Mercury (Hg)	mg/kg	0.486	0.17	0.0577	0.0479	0.0350	0.0344	0.0449	0.0204	0.0669	<0.0050	0.0390	0.0199	0.0070
	Molybdenum (Mo)	mg/kg	-	-	8.32	13.50	10.60	2.11	2.38	3.06	8.29	0.49	6.09	4.71	1.665
	Nickel (Ni)	mg/kg	75[α,β]	77	74.9	69.8	***82.6***	***77.9***	***78.4***	74.3	***90.6***	9.5	69.8	25.12	8.88
	Phosphorus (P)	mg/kg	2,000[α]	1,958	1,270	1,740	1,820	1,030	1,020	929	934	229	1,122	504	178
	Potassium (K)	mg/kg	-	-	6,360	5,510	5,790	6,330	6,940	5,140	5,850	590	5,314	1,988	703
	Selenium (Se)	mg/kg	-	-	0.61	0.62	0.50	0.27	0.46	0.28	0.88	<0.20	0.48	0.23	0.080
	Silver (Ag)	mg/kg	-	-	0.21	0.18	0.17	0.21	0.20	0.14	0.22	<0.10	0.18	0.041	0.015
	Sodium (Na)	mg/kg	-	-	372	250	311	337	381	262	326	<50	286	106	38
	Strontium (Sr)	mg/kg	-	-	14.30	10.50	12.30	13.90	15.80	11.60	13.20	3.40	11.9	3.80	1.344
	Sulphur (S)	mg/kg	-	-	<1000	<1000	<1000	<1000	<1000	<1000	2,600	<1000	1,200	566	200
	Thallium (Tl)	mg/kg	-	-	0.664	0.485	0.559	0.660	0.712	0.504	0.606	0.050	0.530	0.210	0.0741
	Tin (Sn)	mg/kg	-	-	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	0	0
	Titanium (Ti)	mg/kg	-	-	1,430	1,150	1,330	1,440	1,610	1,260	1,340	209	1,221	431	152
	Uranium (U)	mg/kg	-	-	10.40	11.50	6.42	11.10	9.86	6.45	16.70	0.86	9.16	4.66	1.65
	Vanadium (V)	mg/kg	-	-	67.7	51.9	65.1	70.5	73.1	59.3	62.4	8.3	57.3	20.89	7.39
	Zinc (Zn)	mg/kg	315	123	85	79.9	76.3	84	85.6	67.3	86.7	9.0	71.7	26.13	9.24
	Zirconium (Zr)	mg/kg	-	-	8.4	9.8	8.4	8.7	9.7	6.1	19.8	2.5	9.2	4.9	1.7

Indicates parameter concentration above Sediment Quality Guideline (SQG).

BOLD Indicates parameter concentration above the AEMP Benchmark.

Note: "-" indicates no SQG applicable, or that Standard Deviation and Standard Error could not be calculated.

[a] Canadian Sediment Quality Guideline for the protection of aquatic life probable effects level (PEL; CCME 2015) except α (Ontario Provincial Sediment Quality Guideline [PSQG] severe effect level [SEL]; OMOE 1993) and β (British Columbia Working Sediment Quality Guideline [BCSQG] probable effects level [PEL; BCMOE 2015]).

[b] AEMP Sediment Quality Benchmarks developed by Intrinsik (2013) using sediment quality guidelines, background sediment quality data, and method detection limits. The indicated values are specific to Sheardown Lake Northwest.

Table D.26: Magnitude of Elevation in Mean Sediment Metal Concentrations between Sheardown Lake NW (DL0-01) and Reference Lake 3 (REF3) 2023 Data, and between Sheardown Lake NW 2023 and Baseline Data, Mary River Project CREMP

Analyte	Sheardown Lake NW versus Reference Lake 3 in 2023				Sheardown Lake NW 2023 versus Baseline Period			
	Littoral Stations		Profundal Stations		Littoral Stations		Profundal Stations	
	Reference Lake Concentration (µg/g)	Magnitude of Elevation	Reference Lake Concentration (µg/g)	Magnitude of Elevation	Sheardown Lake NW Baseline Concentration (mg/kg)	Magnitude of Elevation	Sheardown Lake NW Baseline Concentration (mg/kg)	Magnitude of Elevation
Aluminum (Al)	15,440	1.09	26,680	0.897	11,792	1.43	17,745	1.35
Antimony (Sb)	<0.1	1.18	<0.10	0.986	1.0	0.118	1	0.103
Arsenic (As)	4.40	1.88	6.20	0.839	3.0	2.76	3.2	1.63
Barium (Ba)	107	1.06	160	0.710	78	1.46	93	1.23
Beryllium (Be)	0.680	1.31	1.10	1.13	1.0	0.893	1.0	1.24
Bismuth (Bi)	<0.2	1.51	<0.21	1.38	-	-	-	-
Boron (B) [a]	13.9	1.85	20.8	1.84	3.0	8.58	3.0	12.8
Cadmium (Cd)	0.135	2.12	0.191	1.56	0.5	0.574	0.5	0.598
Calcium (Ca)	4,752	0.897	6,274	0.765	2,697	1.58	3,558	1.35
Chromium (Cr)	51.5	1.19	88.0	1.02	53	1.16	81	1.10
Cobalt (Co)	11.7	1.21	19.4	0.957	10	1.41	15	1.24
Copper (Cu)	59.4	0.755	109	0.494	33	1.36	48	1.12
Iron (Fe)	41,580	1.96	58,060	0.921	28,120	2.90	40,382	1.32
Lead (Pb)	13.8	1.30	22.3	1.12	13	1.38	20	1.25
Lithium (Li)	29.1	0.979	44.8	0.948	-	-	-	-
Magnesium (Mg)	10,980	1.09	18,080	0.867	7,448	1.61	11,498	1.36
Manganese (Mn)	720	1.35	1,834	1.46	756	1.29	2,164	1.24
Mercury (Hg)	0.0422	0.917	0.0826	0.477	0.1	0.387	0.1	0.394
Molybdenum (Mo)	3.92	2.09	3.38	1.17	3.4	2.42	3.5	1.13
Nickel (Ni)	37.3	1.69	59.3	1.29	49	1.29	69	1.11
Phosphorus (P)	1,049	1.13	1,194	0.890	863	1.37	1,400	0.759
Potassium (K)	4,120	1.08	6,490	0.954	2,681	1.65	4,612	1.34
Selenium (Se)	0.592	0.929	1.03	0.392	1.0	0.550	1.0	0.405
Silver (Ag)	0.144	1.16	0.292	0.651	0.3	0.558	0.3	0.633
Sodium (Na)	322	0.728	499	0.677	249	0.941	342	0.988
Strontium (Sr)	11.8	0.835	16.7	0.832	7.2	1.37	11.4	1.22
Sulphur (S)	1,460	0.959	1,940	0.515	-	-	-	-
Thallium (Tl)	0.397	1.07	0.847	0.749	1.0	0.425	1.0	0.635
Tin (Sn)	<2	1.00	2.12	0.943	-	-	-	-
Titanium (Ti)	1,076	0.936	1,464	0.980	-	-	-	-
Uranium (U)	14.2	0.625	29.4	0.322	-	-	-	-
Vanadium (V)	49.8	0.941	78.7	0.860	37	1.27	58	1.17
Zinc (Zn)	67.4	0.934	111	0.726	51	1.23	76	1.06
Zirconium (Zr)	6.24	1.62	4.38	1.88	-	-	-	-

Denotes slight elevation (concentration 3 to 5 times higher than respective mean reference lake value or baseline period, as applicable).
Denotes moderate elevation (concentration 5 to 10 times higher than mean reference area value or baseline period value, as applicable).
Denotes high elevation (concentration is ≥ 10 times higher than mean reference area value or baseline period value, as applicable).

Note: '-' indicates baseline data not available.

[a] Boron concentrations in sediment from 2015 to 2022 were considerably higher (i.e., 10- to 70-times) than those reported during both the baseline and 2014 studies at all mine-exposed lakes. The lack of any distinct gradient in the magnitude of the elevation in boron concentrations among stations within each lake and among study lakes suggested that the stark contrast in boron concentrations between recent data and data collected prior to 2015 was likely due to laboratory based analytical differences.

Table D.27: Field Observations of Sediment Properties at Sheardown Lake Southeast (DL0-02) Benthic Stations[a], Mary River Project CREMP, August 2023

Station	Station Depth (m)	Colour and Texture Observations	Evidence of Anoxia[b]	Plant or Algae Presence
DL0-02-1	12.0	Grey-brown clay and silt	Sulphuric odour	No macrophytes, sparse algae orbs
DL0-02-2	15.0	Grey-brown clay and silt	None	None
DL0-02-3	12.0	Grey-brown clay and silt	None	None
DL0-02-4	9.0	Silt and clay with decayed detritus	None	None
DL0-02-8	12.0	Grey-brown clay and silt with decayed detritus	None	None
DL0-02-9	7.9	Rusty red surface layer overlaying grey-brown substrate with clay and silt	None	None
DL0-02-10	6.8	Red flocculent silt overlaying clay	None	Sparse macrophytes, no algae
DL0-02-11	7.0	Organic with flocculent silt and clay	None	No macrophytes, sparse algae
DL0-02-12	9.0	Grey-brown clay and silt	None	None
DL0-02-13	12.0	Rusty red surface layer overlaying grey-brown substrate with clay and silt	None	No macrophytes, sparse algae orbs

[a] Sediment particle size and benthic invertebrate community samples were collected using a petite ponar.

[b] Evidence of anoxic sediments was assessed visually (presence of blackened substrate) and by smell (based on presence/strength of hydrogen sulphide odour).

Table D.28: Observations from Sediment Cores Collected at Sheardown Lake Southeast (DL0-02), Mary River Project CREMP, August 2023

Sample Station	Station Depth (m)	Station Type	Core Number	Core Length (cm)	Surficial Substrate Texture Description
DL0-02-1	12.0	Littoral	1	21.0	Red-brown silt overlaying grey clay. Sulphuric odor
			2	16.0	
			3	20.0	
DL0-02-2	15.0	Profundal	1	21.5	Red-brown silt overlaying grey clay
			2	18.0	
			3	21.5	
DL0-02-3	14.5	Profundal	1	13.0	Red-brown silt overlaying grey clay
			2	13.5	
			3	12.5	
DL0-02-4	9.0	Littoral	1	27.0	Red-brown silt overlaying grey clay
			2	29.0	
			3	20.0	
DL0-02-11	7.0	Littoral	1	22.5	Macrophytes with sparse silt overlaying black and dark grey deposit overlaying grey clay
			2	28.5	
			3	27.5	

Table D.29: Statistical Comparison of Sediment Physical Properties Between Sheardown Lake Southeast (SDSE/DL0-02) and Reference Lake 3 (REF3) Stations Collected at Littoral and Profundal Depths, Mary River Project CREMP, August 2023

Lake Zone	Sediment Variable	Statistical Test Results					Summary Statistics						
		Statistical Test[a]	Transformation	Significant Difference Between Areas?	P-value	MOD[b]	Study Lake	Sample Size (n)	MCT	Standard Deviation	Standard Error	Minimum	Maximum
Littoral (Shallow) Stations	Sand-Sized Material (%)	M-W	Rank	YES	0.008	-70.9	Reference	5	45.8	10.4	2.08	37.9	63.1
							SDSE	5	13.9	5.72	1.14	10.4	24.0
	Silt-Sized Material (%)	tequal	None	YES	<0.001	64.8	Reference	5	43.4	7.14	1.43	32.4	48.7
							SDSE	5	71.5	4.10	0.819	66.7	77.0
	Clay-Sized Material (%)	tequal	None	NO	0.144	ns	Reference	5	10.8	3.61	0.723	4.50	13.4
							SDSE	5	14.5	3.73	0.747	9.30	19.0
	Moisture (%)	tequal	None	NO	0.066	ns	Reference	5	72.6	21.2	4.24	37.1	88.4
							SDSE	5	50.2	10.2	2.04	39.3	62.0
	Total Organic Carbon (TOC) Content (%)	tequal	None	YES	0.010	-75.7	Reference	5	5.15	2.55	0.510	1.75	8.56
							SDSE	5	1.25	0.466	0.0932	0.760	1.74
Profundal (Deep) Stations	Sand-Sized Material (%)	tequal	None	YES	<0.001	-69.4	Reference	5	46.7	7.69	1.54	37.9	54.5
							SDSE	4	14.3	6.32	1.58	9.70	23.2
	Silt-Sized Material (%)	tequal	None	YES	<0.001	73.8	Reference	5	41.1	6.64	1.33	34.1	49.1
							SDSE	4	71.3	5.99	1.50	63.6	76.7
	Clay-Sized Material (%)	tequal	None	NO	0.051	ns	Reference	5	12.3	1.28	0.257	10.8	14.1
							SDSE	4	14.3	1.27	0.318	13.1	15.8
	Moisture (%)	tequal	None	NO	0.854	ns	Reference	5	52.1	8.50	1.70	45.3	64.0
							SDSE	4	53.1	7.62	1.91	44.1	60.7
	Total Organic Carbon (TOC) Content (%)	tequal	None	YES	<0.001	-69.0	Reference	5	4.30	0.235	0.0469	4.11	4.69
							SDSE	4	1.33	0.423	0.106	0.900	1.72

Indicates negative MOD (mine-exposed concentration significantly lower than reference).

Indicates positive MOD (reference concentration significantly lower than mine-exposed).

Highlighted values indicate significant difference between study areas based on statistical p-value less than 0.05.

Note: MOD = magnitude of difference. MCT = measure of central tendency. ns = not significant.

[a] Statistical tests included tequal (t-test assuming equal variance) and M-W (Mann-Whitney U-test).

[b] MOD is calculated as $(MCT_{Exposed} - MCT_{Reference})/MCT_{Reference}*100$.

Table D.30: Sediment Particle Size, Total Organic Carbon, and Metal Concentrations at Sheardown Lake Southeast (DL0-02) Sediment Stations, Mary River Project CREMP, August 2023

	Parameter	Units	Sediment Quality Guideline (SQG)[a]	AEMP Benchmark[b]	Sheardown Lake Southeast Basin Station				Summary Statistics		
					DL0-02-1 (littoral)	DL0-02-11 (littoral)	DL0-02-4 (littoral)	DL0-02-2 (profundal)	Mean	Standard Deviation	Standard Error
Non-metals	Sand	%	-	-	24.0	12.9	10.6	23.2	17.7	6.9	3.46
	Silt	%	-	-	66.7	70.4	74.2	63.6	68.7	4.6	2.29
	Clay	%	-	-	9.3	16.6	15.2	13.1	13.55	3.18	1.59
	Moisture	%	-	-	41.2	39.3	49.4	44.1	43.5	4.4	2.20
	Total Organic Carbon	%	10[α]	-	0.78	1.34	0.76	0.90	0.95	0.270	0.135
Metals	Aluminum (Al)	mg/kg	-	-	15,300	23,600	20,700	20,400	20,000	3,450	1,725
	Antimony (Sb)	mg/kg	-	-	<0.10	<0.10	<0.10	<0.10	<0.10	0	0
	Arsenic (As)	mg/kg	17	5.9	2.95	4.76	5.08	3.34	4.03	1.05	0.52
	Barium (Ba)	mg/kg	-	-	73.8	114.0	109	98.3	99	17.9	8.95
	Beryllium (Be)	mg/kg	-	-	0.71	1.07	0.89	0.97	0.91	0.15	0.08
	Bismuth (Bi)	mg/kg	-	-	<0.20	0.26	0.24	0.26	0.24	0.028	0.01
	Boron (B)	mg/kg	-	-	21.0	32.2	26.8	28.2	27.1	4.64	2.32
	Cadmium (Cd)	mg/kg	3.5	1.5	0.095	0.147	0.126	0.120	0.122	0.0214	0.01
	Calcium (Ca)	mg/kg	-	-	4,700	4,850	7,030	6,600	5,795	1,192	596.19
	Chromium (Cr)	mg/kg	90	79	65.5	***98.9***	***94.9***	***83.3***	***85.7***	14.97	7.49
	Cobalt (Co)	mg/kg	-	-	12.0	18.3	15.4	15.4	15.3	2.58	1.29
	Copper (Cu)	mg/kg	110[α]	56	23.9	37.4	32.3	31.9	31.4	5.6	2.79
	Iron (Fe)	mg/kg	40,000[α]	34,400	***39,600***	***49,000***	***47,400***	***45,900***	***45,475***	4,116	2058.06
	Lead (Pb)	mg/kg	91.3	35	14.4	21.5	19.0	19.3	18.6	2.98	1.49
	Lithium (Li)	mg/kg	-	-	27.7	40.8	32.6	38.1	34.8	5.83	2.92
	Magnesium (Mg)	mg/kg	-	-	12,200	17,700	17,800	16,600	16,075	2,640	1319.96
	Manganese (Mn)	mg/kg	1,100[α,β]	657	590	598	***1,140***	***883***	***803***	263	131.45
	Mercury (Hg)	mg/kg	0.486	0.17	0.0242	0.0370	0.0237	0.0260	0.0277	0.0063	0.0
	Molybdenum (Mo)	mg/kg	-	-	1.31	2.39	1.51	1.65	1.72	0.47	0.2
	Nickel (Ni)	mg/kg	75[α,β]	66	50.5	***78.2***	***72.8***	63.0	***66.1***	12.17	6.08
	Phosphorus (P)	mg/kg	2,000[α]	1,278	925	1,100	1,220	995	1,060	129	64.32
	Potassium (K)	mg/kg	-	-	3,520	5,980	4,960	5,000	4,865	1,013	506.58
	Selenium (Se)	mg/kg	-	-	0.20	0.26	0.22	0.23	0.23	0.03	0.01
	Silver (Ag)	mg/kg	-	-	<0.10	0.13	0.10	0.13	0.12	0.017	0.01
	Sodium (Na)	mg/kg	-	-	236	386	334	332	322	63	31.27
	Strontium (Sr)	mg/kg	-	-	10.3	13.3	12.8	13.0	12.4	1.38	0.69
	Sulphur (S)	mg/kg	-	-	<1000	1,500	<1000	<1000	1,125	250	125.0
	Thallium (Tl)	mg/kg	-	-	0.339	0.506	0.437	0.444	0.432	0.069	0.03
	Tin (Sn)	mg/kg	-	-	<2.0	<2.0	<2.0	<2.0	<2.0	0	0.0
	Titanium (Ti)	mg/kg	-	-	1,260	1,760	1,550	1,600	1,543	209	104.3
	Uranium (U)	mg/kg	-	-	4.95	7.69	5.02	6.57	6.1	1.32	0.66
	Vanadium (V)	mg/kg	-	-	44.5	66.8	59.0	57.4	56.9	9.25	4.62
	Zinc (Zn)	mg/kg	315	135	51.6	75.3	65.3	67.6	65.0	9.87	4.94
	Zirconium (Zr)	mg/kg	-	-	17.1	26.5	18.6	23.3	21.4	4.32	2.16

Indicates parameter concentration above Sediment Quality Guideline (SQG).

BOLD Indicates parameter concentration above the AEMP Benchmark.

Note: '-' indicates no SQG applicable, or that Standard Deviation and Standard Error could not be calculated.

[a] Canadian Sediment Quality Guideline for the protection of aquatic life probable effects level (PEL; CCME 2015) except α (Ontario Provincial Sediment Quality Guideline [PSQG] severe effect level [SEL]; OMOE 1993) and β (British Columbia Working Sediment Quality Guideline [BCSQG] probable effects level [PEL; BCMOE 2015]).

[b] AEMP Sediment Quality Benchmarks developed by Intrinsik (2013) using sediment quality guidelines, background sediment quality data, and method detection limits. The indicated values are specific to Sheardown Lake Southeast.

Table D.31: Magnitude of Elevation in Mean Sediment Metal Concentrations between Sheardown Lake SE (DL0-02) and Reference Lake 3 (REF3) 2023 Data, and between Sheardown Lake SE 2023 and Baseline Data, Mary River Project CREMP

Parameter	Sheardown Lake SE versus Reference Lake 3 in 2023				Sheardown Lake SE 2023 versus Baseline Period			
	Littoral Stations		Profundal Stations		Littoral Stations		Profundal Stations	
	Reference Lake Concentration (µg/g)	Magnitude of Elevation	Reference Lake Concentration (µg/g)	Magnitude of Elevation	Sheardown Lake SE Baseline Concentration (mg/kg)	Magnitude of Elevation	Sheardown Lake SE Baseline Concentration (mg/kg)	Magnitude of Elevation
Aluminum (Al)	15,440	1.29	26,680	0.765	14,950	1.33	13,133	1.55
Antimony (Sb)	<0.1	1.00	0.104	0.96	1.0	0.100	1.0	0.100
Arsenic (As)	4.40	0.97	6.20	0.539	1.9	2.24	1.5	2.23
Barium (Ba)	107	0.924	160	0.613	81	1.22	64	1.54
Beryllium (Be)	0.680	1.31	1.10	0.879	1.0	0.890	1.0	0.97
Bismuth (Bi)	<0.2	1.17	<0.21	1.24	-	-	-	-
Boron (B) [a]	13.9	1.92	20.8	1.36	2.5	10.7	1.4	20.1
Cadmium (Cd)	0.135	0.906	0.191	0.628	0.5	0.245	0.6	0.200
Calcium (Ca)	4,752	1.16	6,274	1.05	6,310	0.876	8,925	0.739
Chromium (Cr)	51.5	1.68	88.0	0.947	78	1.11	72	1.16
Cobalt (Co)	11.7	1.31	19.4	0.795	13	1.17	12	1.28
Copper (Cu)	59.4	0.525	109	0.293	30	1.04	25	1.28
Iron (Fe)	41,580	1.09	58,060	0.791	32,284	1.40	29,117	1.58
Lead (Pb)	13.8	1.32	22.3	0.864	17	1.08	14	1.38
Lithium (Li)	29.1	1.16	44.8	0.851	-	-	-	-
Magnesium (Mg)	10,980	1.45	18,080	0.918	12,634	1.26	13,742	1.21
Manganese (Mn)	720	1.08	1,834	0.481	462	1.68	410	2.15
Mercury (Hg)	0.0422	0.671	0.0826	0.315	0.1	0.283	0.1	0.260
Molybdenum (Mo)	3.92	0.443	3.38	0.488	1.5	1.16	1	1.65
Nickel (Ni)	37.3	1.80	59.3	1.06	62	1.08	62	1.02
Phosphorus (P)	1,049	1.03	1,194	0.833	1,150	0.941	950	1.05
Potassium (K)	4,120	1.17	6,490	0.770	3,947	1.22	3,317	1.51
Selenium (Se)	0.592	0.383	1.03	0.223	1.0	0.227	1.0	0.230
Silver (Ag)	0.144	0.764	0.292	0.445	0.4	0.275	0.3	0.433
Sodium (Na)	322	0.99	499	0.665	353	0.903	330	1.01
Strontium (Sr)	11.8	1.03	16.7	0.778	16	0.758	11	1.18
Sulphur (S)	1,460	0.799	1,940	0.515	-	-	-	-
Thallium (Tl)	0.397	1.08	0.847	0.524	1.0	0.427	1.0	0.444
Tin (Sn)	<2	1.00	2.12	0.943	-	-	-	-
Titanium (Ti)	1,076	1.42	1,464	1.09	-	-	-	-
Uranium (U)	14.2	0.415	29.4	0.224	-	-	-	-
Vanadium (V)	49.8	1.14	78.7	0.729	52	1.09	44	1.30
Zinc (Zn)	67.4	0.95	111	0.610	51	1.26	51	1.33
Zirconium (Zr)	6.24	3.32	4.38	5.32	-	-	-	-

Denotes slight elevation (concentration three to five times higher than respective mean reference lake value or baseline period, as applicable).
Denotes moderate elevation (concentration five to 10 times higher than mean reference area value or baseline period value, as applicable).
Denotes high elevation (concentration is ≥ 10 times higher than mean reference area value or baseline period value, as applicable).

Note: '-' indicates parameter not measured, and therefore magnitude of elevation could not be determined.

[a] Boron concentrations in sediment from 2015 to 2022 were considerably higher (i.e., 10- to 70-times) than those reported during both the baseline and 2014 studies at all mine-exposed lakes. The lack of any distinct gradient in the magnitude of the elevation in boron concentrations among stations within each lake and among study lakes suggested that the stark contrast in boron concentrations between recent data and data collected prior to 2015 was likely due to laboratory based analytical differences.

Table D.32: Deposited Sediment Field Sampling Observations from Mary River Study Areas[a] and the Unnamed Reference Creek, Mary River Project CREMP, August 2020

Study Area	Station	Substrate Size (cm)[b]	Texture of Collected Sediment	Silt Presence[b]
Unnamed Reference Creek	REF-CRK-1	2 - 15	sand/gravel	none observed
	REF-CRK-3	5 - 15	sand/gravel	none observed
	REF-CRK-5	5 - 15	sand/gravel	none observed
G0-09 Upstream Reference	G0-09-1	-	sand/gravel	none observed
	G0-09-3	2 - 15	sand/gravel	none observed
	G0-09-5	2 -14	sand/gravel	none observed
G0-03 Upstream	G0-03-1	2 -15	sand/gravel	none observed
	G0-03-3	-	sand/gravel	none observed
	G0-03-5	4 - 17	sand	none observed
E0-01 Upper Mine-Exposed	E0-01-1	-	-	-
	E0-01-3		-	-
	E0-01-5	5 - 20	sand	none observed
E0-20 Middle Mine-Exposed	E0-20-1	5 - 20	gravel/sand	none observed
	E0-20-3	2 - 20	gravel/sand	none observed
	E0-20-5	5 - 15	gravel/sand	none observed
C0-05 Lower Mine-Exposed	C0-05-1	2 -15	sand/gravel	none observed
	C0-05-3	2 - 15	sand	none observed
	C0-05-5	2 -15	sand	none observed

Note: "-" = data not available.

[a] Sediment samples collected using a stainless steel scoop directly from the streambed or shoreline, as available.

[b] Substrate size is represented by the intermediate axis of particles.

[c] Silt observations described as fine material present on the surface of in-stream substrate and/or as interstitial deposits, occurring unusually.

Table D.33: Deposited Sediment Total Organic Carbon and Metal Concentrations at Mary River GO-09 Reference Stations, Mary River Project CREMP, August 2023

Parameter	Units	SQG[a]	Mary River G0-09 Reference Station			Study Area Summary Statistics		
			G0-09-B1	G0-09-B3	G0-09-B5	Mean	Standard Deviation	Standard Error
Total Organic Carbon	%	10[α]	0.11	<0.1	<0.1	0.10	-	-
Aluminum (Al)	µg/g	-	943	806	1,340	1,030	277	160
Antimony (Sb)	µg/g	-	<0.1	<0.1	<0.1	<0.1	-	-
Arsenic (As)	µg/g	17	0.21	0.11	0.16	0.16	0.050	0.029
Barium (Ba)	µg/g	-	4.2	3.3	4.7	4.1	0.71	0.41
Beryllium (Be)	µg/g	-	<0.1	<0.1	<0.1	<0.1	-	-
Bismuth (Bi)	µg/g	-	<0.2	<0.2	<0.2	<0.2	-	-
Boron (B)	µg/g	-	<5	<5	<5	<5	-	-
Cadmium (Cd)	µg/g	3.5	<0.02	<0.02	<0.02	<0.02	-	-
Calcium (Ca)	µg/g	-	1,260	620	1,060	980	327	189
Chromium (Cr)	µg/g	90	5.2	2.9	3.5	3.9	1.2	0.69
Cobalt (Co)	µg/g	-	1.1	0.60	1.1	0.94	0.30	0.17
Copper (Cu)	µg/g	110[α]	1.4	1.2	1.8	1.5	0.34	0.20
Iron (Fe)	µg/g	40,000[α]	2,990	2,100	3,120	2,737	555	320
Lead (Pb)	µg/g	91.3	1.1	0.88	1.0	1.0	0.13	0.076
Lithium (Li)	µg/g	-	2.5	<2	4.6	3.0	1.4	0.81
Magnesium (Mg)	µg/g	-	1,310	682	1,590	1,194	465	268
Manganese (Mn)	µg/g	1,100[α,β]	27	22	35	28	6.3	3.7
Mercury (Hg)	µg/g	0.486	<0.005	<0.005	<0.005	<0.005	-	-
Molybdenum (Mo)	µg/g	-	<0.1	<0.1	<0.1	<0.1	-	-
Nickel (Ni)	µg/g	75[α,β]	2.8	1.4	2.3	2.2	0.74	0.42
Phosphorus (P)	µg/g	2,000[α]	153	82	98	111	37	21
Potassium (K)	µg/g	-	240	180	310	243	65	38
Selenium (Se)	µg/g	-	<0.2	<0.2	<0.2	<0.2	-	-
Silver (Ag)	µg/g	-	<0.1	<0.1	<0.1	<0.1	-	-
Sodium (Na)	µg/g	-	<50	<50	<50	<50	-	-
Strontium (Sr)	µg/g	-	2.2	1.8	2.6	2.2	0.38	0.22
Sulphur (S)	µg/g	-	<1,000	<1,000	<1,000	<1,000	-	-
Thallium (Tl)	µg/g	-	<0.05	<0.05	<0.05	<0.05	-	-
Tin (Sn)	µg/g	-	<2	<2	<2	<2	-	-
Titanium (Ti)	µg/g	-	124	94	135	118	21	12
Uranium (U)	µg/g	-	0.29	0.22	0.29	0.27	0.040	0.023
Vanadium (V)	µg/g	-	5.3	4.8	4.9	5.0	0.29	0.17
Zinc (Zn)	µg/g	315	3.7	3.0	5.0	3.9	1.0	0.58
Zirconium (Zr)	µg/g	-	1.7	1.6	1.8	1.7	0.10	0.058

Indicates parameter concentration above SQG.

Notes: SQG = Sediment Quality Guidelines. "-" = no applicable SQG, or not enough uncensored data for summary statistics.

[a] Canadian SQG for the protection of aquatic life probable effects level (PEL; CCME 2020) except α = Ontario Provincial Sediment Quality Guideline (PSQG) severe effect level (SEL; OMOE 1993) and β = British Columbia Working SQG PEL (BC ENV 2020).

Table D.34: Deposited Sediment Total Organic Carbon and Metal Concentrations at Mary River GO-03 Upstream Stations, Mary River Project CREMP, August 2023

Parameter	Units	SQG[a]	Mary River G0-03 Upstream Station			Study Area Summary Statistics		
			G0-03-B1	G0-03-B3	G0-03-B5	Mean	Standard Deviation	Standard Error
Total Organic Carbon	%	10[α]	<0.1	0.10	<0.1	0.10	-	-
Aluminum (Al)	µg/g	-	828	1,350	859	1,012	293	169
Antimony (Sb)	µg/g	-	<0.1	<0.1	<0.1	<0.1	-	-
Arsenic (As)	µg/g	17	0.12	0.27	0.14	0.18	0.0814	0.047
Barium (Ba)	µg/g	-	3.6	5.9	3.9	4.5	1.28	0.74
Beryllium (Be)	µg/g	-	<0.1	<0.1	<0.1	<0.1	-	-
Bismuth (Bi)	µg/g	-	<0.2	<0.2	<0.2	<0.2	-	-
Boron (B)	µg/g	-	<5	<5	<5	<5	-	-
Cadmium (Cd)	µg/g	3.5	<0.02	<0.02	<0.02	<0.02	-	-
Calcium (Ca)	µg/g	-	438	970	528	645	285	165
Chromium (Cr)	µg/g	90	2.9	6.5	3.0	4.1	2.07	1.2
Cobalt (Co)	µg/g	-	0.66	1.4	0.70	0.90	0.387	0.22
Copper (Cu)	µg/g	110[α]	0.91	1.7	1.2	1.2	0.386	0.22
Iron (Fe)	µg/g	40,000[α]	1,980	6,340	2,110	3,477	2,481	1,432
Lead (Pb)	µg/g	91.3	0.83	1.5	1.1	1.2	0.360	0.21
Lithium (Li)	µg/g	-	2.7	3.3	2.1	2.7	0.600	0.35
Magnesium (Mg)	µg/g	-	856	1,220	844	973	214	124
Manganese (Mn)	µg/g	1,100[α,β]	23	38	22	27	8.78	5.1
Mercury (Hg)	µg/g	0.486	<0.005	<0.005	<0.005	<0.005	-	-
Molybdenum (Mo)	µg/g	-	<0.1	<0.1	<0.1	<0.1	-	-
Nickel (Ni)	µg/g	75[α,β]	1.7	2.8	1.9	2.1	0.605	0.35
Phosphorus (P)	µg/g	2,000[α]	63	227	105	132	85.2	49
Potassium (K)	µg/g	-	210	370	210	263	92.4	53
Selenium (Se)	µg/g	-	<0.2	<0.2	<0.2	<0.2	-	-
Silver (Ag)	µg/g	-	<0.1	<0.1	<0.1	<0.1	-	-
Sodium (Na)	µg/g	-	<50	<50	<50	<50	-	-
Strontium (Sr)	µg/g	-	1.2	2.5	1.9	1.9	0.671	0.39
Sulphur (S)	µg/g	-	<1,000	<1,000	<1,000	<1,000	-	-
Thallium (Tl)	µg/g	-	<0.05	<0.05	<0.05	<0.05	-	-
Tin (Sn)	µg/g	-	<2	<2	<2	<2	-	-
Titanium (Ti)	µg/g	-	82	192	116	130	56.2	32
Uranium (U)	µg/g	-	0.23	0.42	0.31	0.32	0.0954	0.055
Vanadium (V)	µg/g	-	2.9	11	3.5	5.8	4.38	2.5
Zinc (Zn)	µg/g	315	4.1	5.7	3.2	4.3	1.27	0.73
Zirconium (Zr)	µg/g	-	1.5	2.9	1.9	2.1	0.721	0.42

Indicates parameter concentration above SQG.

Notes: SQG = Sediment Quality Guidelines. "-" = no applicable SQG, or not enough uncensored data for summary statistics.

[a] Canadian SQG for the protection of aquatic life probable effects level (PEL; CCME 2020) except α = Ontario Provincial Sediment Quality Guideline (PSQG) severe effect level (SEL; OMOE 1993) and β = British Columbia Working SQG PEL (BC ENV 2020).

Table D.35: Deposited Sediment Total Organic Carbon and Metal Concentrations at Mary River EO-20 Mine-Exposed Stations, Mary River Project CREMP, August 2023

Parameter	Units	SQG[a]	Mary River Mine-Exposed Area		Study Area Summary Statistics		
			E0-20-B3	E0-20-B5	Mean	Standard Deviation	Standard Error
Total Organic Carbon	%	10[α]	<0.1	0.13	0.12	-	-
Aluminum (Al)	µg/g	-	876	6,270	3,573	3,814	2,697
Antimony (Sb)	µg/g	-	<0.1	<0.1	<0.1	-	-
Arsenic (As)	µg/g	17	0.14	0.79	0.46	0.460	0.33
Barium (Ba)	µg/g	-	4.0	40	22	25.3	18
Beryllium (Be)	µg/g	-	<0.1	0.25	0.18	-	-
Bismuth (Bi)	µg/g	-	<0.2	<0.2	<0.2	-	-
Boron (B)	µg/g	-	<5	6.4	5.7	-	-
Cadmium (Cd)	µg/g	3.5	<0.02	0.034	0.027	-	-
Calcium (Ca)	µg/g	-	437	4,180	2,308	2,647	1,872
Chromium (Cr)	µg/g	90	4.9	26	16	15.0	11
Cobalt (Co)	µg/g	-	3.2	5.0	4.1	1.27	0.90
Copper (Cu)	µg/g	110[α]	1.0	9.4	5.2	5.94	4.2
Iron (Fe)	µg/g	40,000[α]	5,270	26,300	15,785	14,870	10,515
Lead (Pb)	µg/g	91.3	0.96	5.0	3.0	2.86	2.0
Lithium (Li)	µg/g	-	<2	9.6	5.8	-	-
Magnesium (Mg)	µg/g	-	819	7,080	3,950	4,427	3,130
Manganese (Mn)	µg/g	1,100[α,β]	29	175	102	103	73
Mercury (Hg)	µg/g	0.486	<0.005	<0.005	<0.005	-	-
Molybdenum (Mo)	µg/g	-	<0.1	0.54	0.32	-	-
Nickel (Ni)	µg/g	75[α,β]	55	16	35	27.4	19
Phosphorus (P)	µg/g	2,000[α]	106	498	302	277	196
Potassium (K)	µg/g	-	230	2,140	1,185	1,351	955
Selenium (Se)	µg/g	-	<0.2	<0.2	<0.2	-	-
Silver (Ag)	µg/g	-	<0.1	<0.1	<0.1	-	-
Sodium (Na)	µg/g	-	<50	82	66	-	-
Strontium (Sr)	µg/g	-	1.6	5.0	3.3	2.46	1.7
Sulphur (S)	µg/g	-	<1,000	<1,000	<1,000	-	-
Thallium (Tl)	µg/g	-	<0.05	0.13	0.092	-	-
Tin (Sn)	µg/g	-	<2	<2	<2	-	-
Titanium (Ti)	µg/g	-	98	595	346	352	249
Uranium (U)	µg/g	-	0.26	1.5	0.88	0.868	0.61
Vanadium (V)	µg/g	-	6.2	24	15	12.3	8.7
Zinc (Zn)	µg/g	315	3.9	23	14	13.7	9.7
Zirconium (Zr)	µg/g	-	1.7	6.6	4.2	3.46	2.4

Indicates parameter concentration above SQG.

Notes: SQG = Sediment Quality Guidelines. "-" = no applicable SQG, or not enough uncensored data for summary statistics.

[a] Canadian SQG for the protection of aquatic life probable effects level (PEL; CCME 2020) except α = Ontario Provincial Sediment Quality Guideline (PSQG) severe effect level (SEL; OMOE 1993) and β = British Columbia Working SQG PEL (BC ENV 2020).

Table D.36: Deposited Sediment Total Organic Carbon and Metal Concentrations at Mary River Downstream (CO-05) Exposed Stations, Mary River Project CREMP, August 2023

Parameter	Units	SQG[a]	Mary River Downstream Mine-Exposed Area			Study Area Summary Statistics		
			C0-05-B1	C0-05-B3	C0-05-B5	Mean	Standard Deviation	Standard Error
Total Organic Carbon	%	10[α]	<0.1	<0.1	<0.1	<0.1	-	-
Aluminum (Al)	µg/g	-	894	916	1,710	1,173	465	268
Antimony (Sb)	µg/g	-	<0.1	<0.1	<0.1	<0.1	-	-
Arsenic (As)	µg/g	17	0.15	0.17	0.26	0.19	0.059	0.034
Barium (Ba)	µg/g	-	3.6	3.4	7.3	4.8	2.2	1.3
Beryllium (Be)	µg/g	-	<0.1	<0.1	<0.1	<0.1	-	-
Bismuth (Bi)	µg/g	-	<0.2	<0.2	<0.2	<0.2	-	-
Boron (B)	µg/g	-	<5	<5	<5	<5	-	-
Cadmium (Cd)	µg/g	3.5	<0.02	<0.02	<0.02	<0.02	-	-
Calcium (Ca)	µg/g	-	564	381	580	508	111	64
Chromium (Cr)	µg/g	90	4.3	4.6	7.2	5.4	1.6	0.93
Cobalt (Co)	µg/g	-	0.93	0.95	1.4	1.1	0.28	0.16
Copper (Cu)	µg/g	110[α]	1.2	1.1	1.6	1.3	0.25	0.14
Iron (Fe)	µg/g	40,000[α]	2,350	2,120	3,430	2,633	699	404
Lead (Pb)	µg/g	91.3	1.0	0.94	1.3	1.1	0.17	0.099
Lithium (Li)	µg/g	-	2.2	<2	4.9	3.0	1.8	1.0
Magnesium (Mg)	µg/g	-	1,320	1,240	1,940	1,500	383	221
Manganese (Mn)	µg/g	1,100[α,β]	28	25	56	36	17	9.8
Mercury (Hg)	µg/g	0.486	<0.005	<0.005	<0.005	<0.005	-	-
Molybdenum (Mo)	µg/g	-	<0.1	<0.1	<0.1	<0.1	-	-
Nickel (Ni)	µg/g	75[α,β]	4.4	6.3	5.6	5.4	0.92	0.53
Phosphorus (P)	µg/g	2,000[α]	74	68	88	77	10	5.9
Potassium (K)	µg/g	-	210	180	320	237	74	43
Selenium (Se)	µg/g	-	<0.2	<0.2	<0.2	<0.2	-	-
Silver (Ag)	µg/g	-	<0.1	<0.1	<0.1	<0.1	-	-
Sodium (Na)	µg/g	-	<50	<50	73	58	-	-
Strontium (Sr)	µg/g	-	1.3	1.5	2.7	1.8	0.73	0.42
Sulphur (S)	µg/g	-	<1,000	<1,000	<1,000	<1,000	-	-
Thallium (Tl)	µg/g	-	<0.05	<0.05	<0.05	<0.05	-	-
Tin (Sn)	µg/g	-	<2	<2	<2	<2	-	-
Titanium (Ti)	µg/g	-	87	78	132	99	29	17
Uranium (U)	µg/g	-	0.24	0.26	0.35	0.28	0.060	0.034
Vanadium (V)	µg/g	-	3.2	3.1	6.6	4.3	2.0	1.1
Zinc (Zn)	µg/g	315	3.6	3.5	4.8	4.0	0.72	0.42
Zirconium (Zr)	µg/g	-	1.5	2.0	1.9	1.8	0.26	0.15

Indicates parameter concentration above SQG.

Notes: SQG = Sediment Quality Guidelines. "-" = no applicable SQG, or not enough uncensored data for summary statistics.

[a] Canadian SQG for the protection of aquatic life probable effects level (PEL; CCME 2020) except α = Ontario Provincial Sediment Quality Guideline (PSQG) severe effect level (SEL; OMOE 1993) and β = British Columbia Working SQG PEL (BC ENV 2020).

Table D.37: Deposited Sediment Total Organic Carbon and Metal Concentrations at Mary River EO-01 Mine-Exposed Station, Mary River Project CREMP, August 2023

Parameter	Units	SQG[a]	Mary River Mine-Exposed Area
			E0-01-B5
Total Organic Carbon	%	10[α]	<0.1
Aluminum (Al)	µg/g	-	1,130
Antimony (Sb)	µg/g	-	<0.1
Arsenic (As)	µg/g	17	0.31
Barium (Ba)	µg/g	-	4.3
Beryllium (Be)	µg/g	-	<0.1
Bismuth (Bi)	µg/g	-	<0.2
Boron (B)	µg/g	-	<5
Cadmium (Cd)	µg/g	3.5	<0.02
Calcium (Ca)	µg/g	-	509
Chromium (Cr)	µg/g	90	4.2
Cobalt (Co)	µg/g	-	0.99
Copper (Cu)	µg/g	110[α]	2.4
Iron (Fe)	µg/g	40,000[α]	2,260
Lead (Pb)	µg/g	91.3	1.1
Lithium (Li)	µg/g	-	3.7
Magnesium (Mg)	µg/g	-	1,180
Manganese (Mn)	µg/g	1,100[α,β]	29
Mercury (Hg)	µg/g	0.486	<0.005
Molybdenum (Mo)	µg/g	-	<0.1
Nickel (Ni)	µg/g	75[α,β]	5.2
Phosphorus (P)	µg/g	2,000[α]	108
Potassium (K)	µg/g	-	270
Selenium (Se)	µg/g	-	<0.2
Silver (Ag)	µg/g	-	<0.1
Sodium (Na)	µg/g	-	<50
Strontium (Sr)	µg/g	-	1.6
Sulphur (S)	µg/g	-	<1,000
Thallium (Tl)	µg/g	-	<0.05
Tin (Sn)	µg/g	-	<2
Titanium (Ti)	µg/g	-	102
Uranium (U)	µg/g	-	0.30
Vanadium (V)	µg/g	-	3.0
Zinc (Zn)	µg/g	315	4.2
Zirconium (Zr)	µg/g	-	1.7

Indicates parameter concentration above SQG.

Notes: SQG = Sediment Quality Guidelines. "-" = no applicable SQG.

[a] Canadian SQG for the protection of aquatic life probable effects level (PEL; CCME 2020) except α = Ontario Provincial Sediment Quality Guideline (PSQG) severe effect level (SEL; OMOE 1993) and β = British Columbia Working SQG PEL (BC ENV 2020).

Table D.38: Magnitude of Elevation in Deposited Sediment Metal Concentrations at Mary River Upper and Mine-Exposed Study Areas Compared to Reference Area Data, Mary River Project CREMP, August 2023

Parameter	Units	Mary River Reference (GO-09)	Upstream (GO-03)	Upper Mine-Exposed (EO-01)	Middle Mine-Exposed (EO-20)	Lower Mine Exposed (CO-05)
Total Organic Carbon	%	0.10	0.97	0.97	1.1	0.97
Aluminum (Al)	µg/g	1,030	0.98	1.1	3.5	1.1
Antimony (Sb)	µg/g	<0.1	1.0	1.0	1.0	1.0
Arsenic (As)	µg/g	0.16	1.1	1.9	2.9	1.2
Barium (Ba)	µg/g	4.1	1.1	1.1	5.4	1.2
Beryllium (Be)	µg/g	<0.1	1.0	1.0	1.8	1.0
Bismuth (Bi)	µg/g	<0.2	1.0	1.0	1.0	1.0
Boron (B)	µg/g	<5	1.0	1.0	1.1	1.0
Cadmium (Cd)	µg/g	<0.02	1.0	1.0	1.4	1.0
Calcium (Ca)	µg/g	980	0.66	0.52	2.4	0.52
Chromium (Cr)	µg/g	3.9	1.1	1.1	4.0	1.4
Cobalt (Co)	µg/g	0.94	0.96	1.1	4.4	1.2
Copper (Cu)	µg/g	1.5	0.86	1.6	3.6	0.88
Iron (Fe)	µg/g	2,737	1.3	0.83	5.8	0.96
Lead (Pb)	µg/g	1.0	1.1	1.1	2.9	1.1
Lithium (Li)	µg/g	3.0	0.89	1.2	1.9	1.0
Magnesium (Mg)	µg/g	1,194	0.82	0.99	3.3	1.3
Manganese (Mn)	µg/g	28	0.98	1.0	3.6	1.3
Mercury (Hg)	µg/g	<0.005	1.0	1.0	1.0	1.0
Molybdenum (Mo)	µg/g	<0.1	1.0	1.0	3.2	1.0
Nickel (Ni)	µg/g	2.2	0.97	2.4	16	2.5
Phosphorus (P)	µg/g	111	1.2	0.97	2.7	0.69
Potassium (K)	µg/g	243	1.1	1.1	4.9	0.97
Selenium (Se)	µg/g	<0.2	1.0	1.0	1.0	1.0
Silver (Ag)	µg/g	<0.1	1.0	1.0	1.0	1.0
Sodium (Na)	µg/g	<50	1.0	1.0	1.3	1.2
Strontium (Sr)	µg/g	2.2	0.84	0.71	1.5	0.82
Sulphur (S)	µg/g	<1,000	1.0	1.0	1.0	1.0
Thallium (Tl)	µg/g	<0.05	1.0	1.0	1.8	1.0
Tin (Sn)	µg/g	<2	1.0	1.0	1.0	1.0
Titanium (Ti)	µg/g	118	1.1	0.87	2.9	0.84
Uranium (U)	µg/g	0.27	1.2	1.1	3.3	1.1
Vanadium (V)	µg/g	5.0	1.1	0.61	3.0	0.86
Zinc (Zn)	µg/g	3.9	1.1	1.1	3.5	1.0
Zirconium (Zr)	µg/g	1.7	1.2	1.0	2.4	1.1

Denotes slight elevation (mean concentration 3 to 5 times higher than respective mean reference creek value).
Denotes moderate elevation (mean concentration 5 to 10 times higher than respective mean reference creek value).
Denotes highly elevated (mean concentration greater than 10 times higher than respective mean reference creek value).

Table D.39: Field Observations of Sediment Properties at Mary Lake (BL0) Benthic Stations[a], Mary River Project CREMP, August 2023

Station	Station Depth (m)	Colour and Texture Observations	Evidence of Anoxia[b]	Plant or Algae Presence
BL0-03	19.5	Red-beige sand	None	None
BL0-04	21.0	Light brown silt and clay	None	None
BL0-05	19.5	Red-brown silt	None	None
BL0-06	9.4	Light brown silt	None	None
BL0-07	13.0	Light brown silt	None	None
BL0-11	8.0	Beige-brown sand with some organic detritus	None	None
BL0-13	20.0	Light brown dense silt	None	None
BL0-14	16.3	Light brown silt	None	None
BL0-15	28.0	Light brown silt	None	None

[a] Sediment particle size and benthic invertebrate community samples were collected using a petite ponar.

[b] Evidence of anoxic sediments was assessed visually (presence of blackened substrate) and by smell (based on presence/strength of hydrogen sulphide odour).

Table D.40: Observations from Sediment Cores Collected at Mary Lake (BL0), Mary River Project CREMP, August 2023

Sample Station	Station Depth (m)	Station Type	Core Number	Core Length (cm)	Surficial Substrate Texture Description
BL0-03	19.5	Profundal	1	11.0	Orange-brown silt overlaying grey silt and sand
			2	15.0	
			3	14.0	
BL0-04	19.9	Profundal	1	23.0	Light brown flocculent silt with thin black redox layer overlaying grey-brown clay and silt
			2	26.0	
			3	25.0	
BL0-06	9.4	Littoral	1	13.0	Light brown flocculent silt overlaying light brown clay
			2	22.0	
			3	7.0	
BL0-08	26.7	Profundal	1	27.0	Light brown silt overlaying light brown clay and silt overlaying light grey clay
			2	28.0	
			3	34.0	
BL0-09	29.8	Profundal	1	32.0	Light brown silt overlaying dark grey clay
			2	36.0	
			3	32.0	
BL0-10	19.0	Profundal	1	18.0	Light brown flocculent sediment overlaying light grey silt and clay
			2	25.0	
			3	27.0	
BL0-12	21.7	Profundal	1	9.0	Light brown flocculent sediment and silt overlaying light grey silt and clay
			2	16.0	
			3	29.0	
BL0-14	19.4	Profundal	1	35.0	Light brown flocculent silt overlaying light brown silt and clay overlaying grey silt and clay
			2	29.0	
			3	26.0	
BL0-16	33.0	Profundal	1	26.0	Orange-brown flocculent silt overlaying grey silt and clay
			2	35.0	
			3	19.0	

Table D.41: Statistical Comparison of Sediment Physical Properties Between Mary Lake (BL0) and Reference Lake 3 (REF3) Stations Collected at Littoral and Profundal Depths, Mary River Project CREMP, August 2023

Lake Zone	Sediment Variable	Statistical Test Results					Summary Statistics						
		Statistical Test[a]	Transform-ation	Significant Difference Between Areas?	P-value	MOD[b]	Study Lake	Sample Size (n)	MCT	Standard Deviation	Standard Error	Minimum	Maximum
Littoral (Shallow) Stations	Sand-Sized Material (%)	tequal	None	NO	0.338	ns	Reference	5	45.8	10.4	2.08	37.9	63.1
							Mary	3	27.2	39.8	13.3	4.00	73.2
	Silt-Sized Material (%)	tequal	None	NO	0.482	ns	Reference	5	43.4	7.14	1.43	32.4	48.7
							Mary	3	51.6	24.0	7.99	24.0	67.0
	Clay-Sized Material (%)	tequal	None	NO	0.195	ns	Reference	5	10.8	3.61	0.723	4.50	13.4
							Mary	3	21.1	16.0	5.34	2.70	31.7
	Moisture (%)	tequal	None	NO	0.197	ns	Reference	5	72.6	21.2	4.24	37.1	88.4
							Mary	3	52.2	14.8	4.93	36.2	65.4
	Total Organic Carbon (TOC) Content (%)	tequal	None	NO	0.056	ns	Reference	5	5.15	2.55	0.510	1.75	8.56
							Mary	3	1.51	0.630	0.210	0.780	1.90
Profundal (Deep) Stations	Sand-Sized Material (%)	tequal	Median	YES	0.014	-70.8	Reference	5	46.7	7.69	1.54	37.9	54.5
							Mary	11	20.9	23.5	2.14	4.00	84.2
	Silt-Sized Material (%)	M-W	Rank	YES	0.038	55.3	Reference	5	41.1	6.64	1.33	34.1	49.1
							Mary	11	56.2	17.9	1.62	12.1	75.5
	Clay-Sized Material (%)	tunequal	None	YES	0.014	86.2	Reference	5	12.3	1.28	0.257	10.8	14.1
							Mary	11	22.9	11.7	1.07	3.70	41.2
	Moisture (%)	tequal	None	NO	0.898	ns	Reference	5	52.1	8.50	1.70	45.3	64.0
							Mary	11	52.8	11.2	1.02	29.7	66.0
	Total Organic Carbon (TOC) Content (%)	tequal	None	YES	<0.001	-79.6	Reference	5	4.30	0.235	0.0469	4.11	4.69
							Mary	11	0.876	0.278	0.0252	0.560	1.38

Indicates negative MOD (mine-exposed concentration significantly lower than reference).

Indicates positive MOD (reference concentration significantly lower than mine-exposed).

Highlighted values indicate significant difference between study areas based on statistical p-value less than 0.05.

Note: MOD = magnitude of difference. MCT = measure of central tendency. ns = not significant.

[a] Statistical tests included tequal (t-test assuming equal variance), tunequal (t-test assuming unequal variance), and M-W (Mann-Whitney U-test).

[b] MOD is calculated as $(MCT_{Exposed} - MCT_{Reference})/MCT_{Reference}*100$.

Table D.42: Sediment Particle Size, Total Organic Carbon, and Metal Concentrations at Mary Lake (BL0) Sediment Stations, Mary River Project CREMP, August 2023

	Parameter	Units	Sediment Quality Guideline (SQG)[a]	AEMP Benchmark[b]	Mary Lake Stations									Summary Statistics		
					BL0-16 (profundal)	BL0-03 (profundal)	BL0-14 (profundal)	BL0-12 (profundal)	BL0-04 (profundal)	BL0-10 (profundal)	BL0-09 (profundal)	BL0-08 (profundal)	BL0-06 (littoral)	Mean	Standard Deviation	Standard Error
Non-metals	Sand	%	-	-	20.4	84.2	10.9	22.7	10.8	4.0	6.2	4.5	4.0	18.6	25.6	8.52
	Silt	%	-	-	45.4	12.1	47.9	64.6	71.2	65.2	69.0	65.3	67.0	56.4	18.9	6.31
	Clay	%	-	-	34.2	3.7	41.2	12.6	18.0	30.8	24.8	30.2	29.0	24.94	11.62	3.87
	Moisture	%	-	-	66.0	29.7	61.1	40.8	54.4	59.5	47.2	55.0	54.9	52.1	11.2	3.73
	Total Organic Carbon	%	10[α]	-	1.34	0.59	1.00	0.70	0.78	0.82	0.65	0.56	0.78	0.80	0.242	0.08
Metals	Aluminum (Al)	mg/kg	-	-	26,700	4,600	29,600	19,000	22,500	29,900	22,600	27,900	27,100	23,322	7,903	2,634.48
	Antimony (Sb)	mg/kg	-	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0	0	0.00
	Arsenic (As)	mg/kg	17	5.9	***6.99***	1.11	4.26	2.83	4.37	3.89	4.92	3.96	3.54	3.99	1.58	0.53
	Barium (Ba)	mg/kg	-	-	121.0	19.8	108	72.6	95.1	112.0	107	112.0	101	94.3	31.1	10.38
	Beryllium (Be)	mg/kg	-	-	1.40	0.25	1.55	0.90	1.08	1.43	1.15	1.35	1.20	1.15	0.39	0.13
	Bismuth (Bi)	mg/kg	-	-	0.27	<0.20	0.27	<0.20	0.24	0.26	0.28	0.27	<0.20	0.24	0.034	0.01
	Boron (B)	mg/kg	-	-	40.4	7.7	43.7	27.4	32.5	43.4	33.8	41.6	35.6	34.0	11.30	3.77
	Cadmium (Cd)	mg/kg	3.5	1.5	0.168	0.0300	0.160	0.107	0.121	0.161	0.123	0.162	0.098	0.126	0.0445	0.01
	Calcium (Ca)	mg/kg	-	-	3,860	946	4,680	4,410	4,520	5,070	4,660	4,960	4,080	4,132	1,255	418.32
	Chromium (Cr)	mg/kg	90	98	89.6	19.0	94	76.3	89.2	***99.6***	93	***101***	88	83.3	25.18	8.39
	Cobalt (Co)	mg/kg	-	-	17.4	3.58	18.9	13.9	16.4	19.0	18.0	19.3	16.9	15.9	4.92	1.64
	Copper (Cu)	mg/kg	110[α]	50	37.3	6.2	39.0	26.2	29.8	38.0	31.6	37.6	33.1	31.0	10.3	3.42
	Iron (Fe)	mg/kg	40,000[α]	52,400	***53,400***	12,400	45,900	32,600	44,100	45,500	47,700	44,400	41,000	40,778	12,001	4,000.27
	Lead (Pb)	mg/kg	91.3	35	25.8	4.35	27.2	16.2	19.8	25.5	22.8	24.5	20.5	20.7	7.06	2.35
	Lithium (Li)	mg/kg	-	-	52.4	8.9	57.3	34.8	39.8	54.9	45.1	51.9	43.9	43.2	14.83	4.94
	Magnesium (Mg)	mg/kg	-	-	17,200	3,830	18,500	14,200	16,000	19,100	16,400	18,600	17,100	15,659	4,687	1,562.28
	Manganese (Mn)	mg/kg	1,100[α,β]	4,370	701	179	1,290	1,860	2,720	828	***5,280***	2,910	719	1,832	1,597	532.19
	Mercury (Hg)	mg/kg	0.486	0.17	0.0733	0.0110	0.0730	0.0337	0.0434	0.0591	0.0439	0.0672	0.0260	0.0478	0.0219	0.01
	Molybdenum (Mo)	mg/kg	-	-	1.00	0.22	0.81	0.92	1.29	0.87	1.58	1.06	0.60	0.93	0.39	0.13
	Nickel (Ni)	mg/kg	75[α,β]	72	63.0	14.3	61.7	55.3	63.5	67.1	68.4	70.7	57.4	57.9	17.10	5.70
	Phosphorus (P)	mg/kg	2,000[α]	1,580	1,270	300	869	886	1,310	905	1,300	928	822	954	317	105.83
	Potassium (K)	mg/kg	-	-	6,720	1,220	7,470	4,690	5,520	7,380	5,720	7,330	7,060	5,901	2,008	669.38
	Selenium (Se)	mg/kg	-	-	0.27	<0.20	0.32	<0.20	0.27	0.26	<0.20	0.26	0.21	0.24	0.04	0.01
	Silver (Ag)	mg/kg	-	-	0.14	<0.10	0.16	0.11	0.12	0.16	0.12	0.14	<0.10	0.13	0.023	0.01
	Sodium (Na)	mg/kg	-	-	455	70	427	295	372	488	401	462	408	375	128	42.60
	Strontium (Sr)	mg/kg	-	-	18.7	3.32	18.1	12.0	14.1	17.2	14.8	16.2	14.2	14.3	4.64	1.55
	Sulphur (S)	mg/kg	-	-	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	1,000.0	0	0.00
	Thallium (Tl)	mg/kg	-	-	0.564	0.101	0.640	0.395	0.463	0.612	0.533	0.584	0.516	0.490	0.164	0.05
	Tin (Sn)	mg/kg	-	-	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	0.00	0.00
	Titanium (Ti)	mg/kg	-	-	1,520	357	1,790	1,470	1,540	1,930	1,540	1,800	1,790	1,526	467	155.80
	Uranium (U)	mg/kg	-	-	10.10	2.00	11.4	6.35	7.54	10.8	7.2	9.9	5.8	7.9	3.00	1.00
	Vanadium (V)	mg/kg	-	-	71.8	14.6	77.0	52.5	59.8	76.0	61.7	73.3	70.9	62.0	19.58	6.53
	Zinc (Zn)	mg/kg	315	135	82.0	16.9	91	60.6	67.5	88.6	69	86	81	71.4	22.92	7.64
	Zirconium (Zr)	mg/kg	-	-	24.9	4.2	29.5	17.6	19.7	28.9	20.4	24.2	18.8	20.9	7.59	2.53

Indicates parameter concentration above Sediment Quality Guideline (SQG).

BOLD Indicates parameter concentration above the AEMP Benchmark.

Note: "-" indicates no SQG applicable, or that Standard Deviation and Standard Error could not be calculated.

[a] Canadian Sediment Quality Guideline for the protection of aquatic life probable effects level (PEL; CCME 2015) except α (Ontario Provincial Sediment Quality Guideline [PSQG] severe effect level [SEL]; OMOE 1993) and β (British Columbia Working Sediment Quality Guideline [BCSQG] probable effects level [PEL; BCMOE 2015]).

[b] AEMP Sediment Quality Benchmarks developed by Intrinsik (2013) using sediment quality guidelines, background sediment quality data, and method detection limits. The indicated values are specific to Mary Lake.

Table D.43: Magnitude of Elevation in Mean Sediment Metal Concentrations between Mary Lake (BL0) and Reference Lake 3 (REF3) 2023 Data, and between Mary Lake 2023 and Baseline Data, Mary River Project CREMP

Parameter	Mary Lake versus Reference Lake 3 in 2023				Mary Lake 2023 versus Baseline Period			
	Littoral Stations		Profundal Stations		Littoral Stations		Profundal Stations	
	Reference Lake Concentration (µg/g)	Magnitude of Elevation	Reference Lake Concentration (µg/g)	Magnitude of Elevation	Mary Lake Baseline Concentration (mg/kg)	Magnitude of Elevation	Mary Lake Baseline Concentration (mg/kg)	Magnitude of Elevation
Aluminum (Al)	15,440	1.76	26,680	0.856	18,267	1.48	17,000	1.34
Antimony (Sb)	<0.1	1.00	<0.10	0.962	1.0	0.100	1.0	0.100
Arsenic (As)	4.40	0.805	6.20	0.652	2.8	1.26	3.7	1.09
Barium (Ba)	107	0.943	160	0.583	105	0.96	76	1.23
Beryllium (Be)	0.680	1.76	1.10	1.03	1.0	1.20	1.0	1.14
Bismuth (Bi)	<0.2	1.00	<0.21	1.18	-	-	-	-
Boron (B) [a]	13.9	2.56	20.8	1.63	1.0	35.6	2.0	16.9
Cadmium (Cd)	0.135	0.724	0.191	0.675	0.5	0.196	0.5	0.258
Calcium (Ca)	4,752	0.859	6,274	0.660	3,130	1.30	2,934	1.41
Chromium (Cr)	51.5	1.70	88.0	0.941	81	1.08	76	1.09
Cobalt (Co)	11.7	1.45	19.4	0.817	18	0.939	18	0.878
Copper (Cu)	59.4	0.557	109	0.282	45	0.736	44	0.698
Iron (Fe)	41,580	0.986	58,060	0.702	36,133	1.13	35,654	1.14
Lead (Pb)	13.8	1.48	22.3	0.930	18	1.14	21	0.99
Lithium (Li)	29.1	1.51	44.8	0.964	-	-	-	-
Magnesium (Mg)	10,980	1.56	18,080	0.856	13,967	1.22	10,903	1.42
Manganese (Mn)	720	1.00	1,834	1.07	699	1.03	991	1.99
Mercury (Hg)	0.0422	0.616	0.0826	0.613	0.1	0.260	0.1	0.506
Molybdenum (Mo)	3.92	0.153	3.38	0.286	1.0	0.600	1.0	0.97
Nickel (Ni)	37.3	1.54	59.3	0.977	67	0.857	65	0.892
Phosphorus (P)	1,049	0.783	1,194	0.813	800	1.03	1,325	0.733
Potassium (K)	4,120	1.71	6,490	0.887	3,450	2.05	4,287	1.34
Selenium (Se)	0.592	0.355	1.03	0.240	1.0	0.210	1.0	0.248
Silver (Ag)	0.144	0.694	0.292	0.449	0.3	0.333	0.4	0.328
Sodium (Na)	322	1.27	499	0.744	279	1.46	284	1.31
Strontium (Sr)	11.8	1.20	16.7	0.856	9.3	1.53	13.3	1.08
Sulphur (S)	1,460	0.685	1,940	0.515	-	-	-	-
Thallium (Tl)	0.397	1.30	0.847	0.574	1.0	0.516	1.0	0.487
Tin (Sn)	<2	1.00	<2.12	0.943	-	-	-	-
Titanium (Ti)	1,076	1.66	1,464	1.02	-	-	-	-
Uranium (U)	14.2	0.407	29.4	0.278	-	-	-	-
Vanadium (V)	49.8	1.42	78.7	0.773	69	1.03	63	0.97
Zinc (Zn)	67.4	1.20	111	0.633	67	1.21	64	1.10
Zirconium (Zr)	6.24	3.01	4.38	4.83	-	-	-	-

Denotes slight elevation (concentration three to five times higher than respective mean reference lake value or baseline period, as applicable).

Denotes moderate elevation (concentration five to 10 times higher than mean reference area value or baseline period value, as applicable).

Denotes high elevation (concentration is ≥ 10 times higher than mean reference area value or baseline period value, as applicable).

Note: '-' indicates parameter not measured, and therefore magnitude of elevation could not be determined.

[a] Boron concentrations in sediment from 2015 to 2022 were considerably higher (i.e., 10- to 70-times) than those reported during both the baseline and 2014 studies at all mine-exposed lakes. The lack of any distinct gradient in the magnitude of the elevation in boron concentrations among stations within each lake and among study lakes suggested that the stark contrast in boron concentrations between recent data and data collected prior to 2015 was likely due to laboratory based analytical differences.

APPENDIX E

Table E.1: Phytoplankton Monitoring Data (Chlorophyll-a and Phaeophytin-a Concentrations) Collected at Lotic Reference Stations, Camp Lake Tributaries, Sheardown Lake Tributaries, and Tom River, Mary River Project CREMP, 2023

Station		Reference Creek Stations				Camp Lake Tributary 1 (CLT1)						Camp Lake Tributary 2	Camp Lake Outlet	Sheardown Lake Tributary 1 (SDLT1)		Sheardown Tributary 12 (SDLT12)[a]	Sheardown Tributary 9 (SDLT9)	Tom River
						North Branch		Main Stem										
		CLT-REF4	CLT-REF3	MRY-REF3	MRY-REF2	L1-08	L1-02	L2-03	L1-09	L1-05	L0-01	K0-01	J0-01	D1-05	D1-00	LDFG-OUT	MS-C-G	I0-01
Sample Collection Date	Spring	16-Jul-23	16-Jul-23	16-Jul-23	16-Jul-23	17-Jul-23	16-Jul-23	17-Jul-23	16-Jul-23	16-Jul-23	16-Jul-23	16-Jul-23	17-Jul-23	16-Jul-23	16-Jul-23	16-Jul-23	16-Jul-23	17-Jul-23
	Summer	24-Aug-23	24-Aug-23	24-Aug-23	24-Aug-23	30-Aug-23	24-Aug-23	24-Aug-23	24-Aug-23	24-Aug-23	24-Aug-23	24-Aug-23	30-Aug-23	24-Aug-23	24-Aug-23	24-Aug-23	31-Aug-23	30-Aug-23
	Fall	12-Sep-23	12-Sep-23	12-Sep-23	12-Sep-23	14-Sep-23	17-Sep-23	16-Sep-23	16-Sep-23	16-Sep-23	16-Sep-23	16-Sep-23	17-Sep-23	19-Sep-23	16-Sep-23	-	17-Sep-23	17-Sep-23
Chlorophyll-a (µg/L)	Spring	0.31	0.27	0.23	0.39	0.23	0.42	0.63	0.34	0.45	0.34	0.35	0.97	0.40	0.38	1.9	0.18	0.31
	Summer	0.28	0.19	0.23	0.28	0.062	0.26	1.6	0.41	0.41	0.36	0.23	0.82	0.12	0.23	0.11	0.23	0.093
	Fall	0.13	0.099	0.076	0.13	0.078	0.10	0.41	0.38	0.16	0.17	0.11	0.86	0.048	0.11	-	0.086	0.10
	Average	0.24	0.18	0.18	0.27	0.12	0.26	0.88	0.38	0.34	0.29	0.23	0.88	0.19	0.24	1.0	0.16	0.17
	SD	0.095	0.084	0.089	0.13	0.093	0.16	0.64	0.035	0.16	0.11	0.12	0.075	0.18	0.14	1.3	0.071	0.12
	SE	0.055	0.048	0.052	0.076	0.054	0.092	0.37	0.020	0.090	0.062	0.068	0.043	0.11	0.080	0.90	0.041	0.072
Phaeophytin-a (µg/L)	Spring	0.65	0.60	0.59	0.70	0.59	0.70	1.0	0.64	0.73	0.63	0.65	0.94	0.64	0.63	1.4	0.51	0.65
	Summer	0.33	0.28	0.33	0.39	<0.2	0.31	0.72	0.33	0.37	0.32	0.26	0.95	<0.2	<0.2	<0.2	0.57	<0.2
	Fall	0.20	0.14	0.15	0.19	<0.1	0.12	0.21	0.19	0.12	0.11	0.10	0.85	<0.1	<0.1	-	0.18	0.10
	Average	0.39	0.34	0.36	0.43	0.26	0.38	0.66	0.39	0.40	0.35	0.34	0.91	0.28	0.28	0.80	0.42	0.29
	SD	0.23	0.23	0.22	0.26	-	0.30	0.42	0.23	0.31	0.26	0.28	0.055	-	-	-	0.21	0.36
	SE	0.14	0.14	0.13	0.15	-	0.17	0.24	0.13	0.18	0.15	0.16	0.032	-	-	-	0.12	0.21

Notes: SD = standard deviation. SE = standard error, "-" = value not available or not calculable.

[a] Station LDFG-OUT (Sheardown Lake Tributary 12) was dry during the fall sampling event in 2023, therefore no data are available for this sampling period.

Table E.2: Chlorophyll-a Concentration (µg/L) Data Summary and Statistical Comparison Results between Camp Lake Tributary 1 (CLT1) Main Stem Stations and Lotic Reference Creek Stations for Spring, Summer, and Fall Sampling Events, Mary River Project CREMP, 2023

Season	Two-Area Comparison			Study Area	Sample Size (n)	Mean	Standard Deviation	Standard Error	Minimum	Maximum
	Significant Difference between Areas?	P-value	Statistical Test							
Spring	NO	0.115	tequal	Reference	4	0.300	0.0688	0.0344	0.234	0.393
				CLT1 Main Stem	4	0.440	0.136	0.0678	0.340	0.630
Summer	YES	0.029	M-W	Reference	4	0.243	0.0436	0.0218	0.189	0.280
				CLT1 Main Stem	4	0.695	0.604	0.302	0.365	1.60
Fall	NO	0.083	tunequal	Reference	4	0.109	0.0265	0.0133	0.0760	0.131
				CLT1 Main Stem	4	0.278	0.134	0.0668	0.158	0.406

Indicates a statistically significant difference between areas (p-value ≤ 0.05).

Note: "tequal" = Student's t-test assuming equal variance; "tunequal" = Welch's t-test for unequal variance; "M-W" = Mann-Whitney U test.

Table E.3: Phytoplankton Monitoring Data (Chlorophyll-a and Phaeophytin-a Concentrations) Collected at Reference Lake 3 (REF-03), Mary River Project CREMP, 2023

Analyte		Chlorophyll-a (µg/L)						Phaeophytin-a (µg/L)					
Station		REF3-01	REF3-02	REF3-03	Average	Standard Deviation	Standard Error	REF3-01	REF3-02	REF3-03	Average	Standard Deviation	Standard Error
Sample Collection Date	Summer	7-Aug-23			-	-	-	7-Aug-23			-	-	-
	Fall	5-Sep-23			-	-	-	5-Sep-23			-	-	-
Summer	Surface	1.4	1.4	1.4	1.4	0.032	0.019	1.4	1.7	1.6	1.6	0.16	0.092
	Bottom	2.5	1.4	1.2	1.7	0.71	0.41	2.6	1.7	1.2	1.8	0.70	0.41
	Average	1.9	1.4	1.3	1.5	0.37	0.21	2.0	1.7	1.4	1.7	0.29	0.17
Fall	Surface	0.47	0.50	0.41	0.46	0.048	0.027	0.67	0.81	0.64	0.71	0.091	0.052
	Bottom	0.54	0.68	0.46	0.56	0.11	0.064	0.87	0.99	0.64	0.83	0.18	0.10
	Average	0.51	0.59	0.43	0.51	0.078	0.045	0.77	0.90	0.64	0.77	0.13	0.075

Note: '-' indicates value not applicable.

Table E.4: Statistical Comparison of Chlorophyll-a Concentrations at Reference Lake 3 (REF3) Among Years of Mine Operation (2015 to 2023)

Season	Data Transformation	Statistical Test[a]	Overall Ten-Year Comparison		Pair-wise, *post hoc* comparisons[b]				
			Significant Difference Among Years?	P-value	Year	Sample Size (n)	Mean	Standard Deviation	Pairwise Comparison[c]
Summer	log10	ANOVA	YES	0.001	2015	3	0.880	0.119	B
					2016	3	0.923	0.0839	B
					2017	3	0.640	0.0832	B
					2018	3	0.735	0.0737	B
					2019	3	0.680	0.213	B
					2020	3	0.780	0.0832	B
					2021	3	1.01	0.0701	AB
					2022	3	0.888	0.0448	B
					2023	3	1.52	0.369	A
Fall	rank	K-W	YES	0.002	2015	3	1.08	0.404	ABC
					2016	3	0.738	0.0708	ABCDE
					2017	3	0.917	0.0247	A
					2018	3	0.907	0.0388	AB
					2019	3	0.680	0.0695	CDE
					2020	3	0.605	0.0100	DE
					2021	3	0.693	0.00289	BCDE
					2022	3	0.772	0.0115	ABCD
					2023	3	0.508	0.0778	E
Annual	log10	ANOVA	NO	0.433	2015	6	0.982	0.289	A
					2016	6	0.831	0.123	A
					2017	6	0.778	0.161	A
					2018	6	0.821	0.108	A
					2019	6	0.680	0.142	A
					2020	6	0.693	0.110	A
					2021	6	0.851	0.178	A
					2022	6	0.830	0.0703	A
					2023	6	1.01	0.604	A

Indicates a statistically significant difference for respective comparison (p-value ≤ 0.05).

[a] Statistical tests include Analysis of Variance (ANOVA) or Kruskal Wallis H-test (K-W) for differences among years.

[b] *Post hoc* analysis of 1-way ANOVA or Kruskal Wallis H-test (KW) among all years protected for multiple comparisons.

[c] Years that do not share a letter are significantly different.

Table E.5: Phytoplankton Monitoring Data (Chlorophyll-a and Phaeophytin-a Concentrations) Collected at Camp Lake (JL0), Mary River Project CREMP, 2023

Analyte		Chlorophyll-a (µg/L)								Analyte		Phaeophytin-a (µg/L)							
Station		JL0-02	JL0-10	JL0-01	JL0-07	JL0-09	Average	Standard Deviation	Standard Error	Station		JL0-02	JL0-10	JL0-01	JL0-07	JL0-09	Average	Standard Deviation	Standard Error
Sample Collection Date	Winter	6-Apr-23	6-Apr-23	5-Apr-23	5-Apr-23	5-Apr-23	-	-	-	Sample Collection Date	Winter	6-Apr-23	6-Apr-23	5-Apr-23	5-Apr-23	5-Apr-23	-	-	-
	Summer	1-Aug-23	1-Aug-23	1-Aug-23	1-Aug-23	1-Aug-23	-	-	-		Summer	1-Aug-23	1-Aug-23	1-Aug-23	1-Aug-23	1-Aug-23	-	-	-
	Fall	13-Sep-23	16-Sep-23	16-Sep-23	14-Sep-23	14-Sep-23	-	-	-		Fall	13-Sep-23	16-Sep-23	16-Sep-23	14-Sep-23	14-Sep-23	-	-	-
Winter	Surface	0.44	0.49	0.39	0.29	0.12	0.34	0.14	0.065	Winter	Surface	0.38	0.50	0.46	0.48	0.29	0.42	0.086	0.039
	Bottom	0.15	0.20	0.13	0.13	0.10	0.14	0.034	0.015		Bottom	0.27	0.34	0.28	0.27	0.20	0.27	0.048	0.022
	Average	0.29	0.34	0.26	0.21	0.11	0.24	0.087	0.039		Average	0.33	0.42	0.37	0.37	0.24	0.35	0.066	0.030
Summer	Surface	0.78	1.4	0.83	1.3	1.3	1.1	0.28	0.13	Summer	Surface	0.85	1.2	0.80	1.2	1.3	1.1	0.22	0.097
	Bottom	2.2	3.7	1.8	0.91	1.4	2.0	1.0	0.47		Bottom	1.7	2.2	0.97	0.86	1.1	1.4	0.58	0.26
	Average	1.5	2.5	1.3	1.1	1.4	1.5	0.56	0.25		Average	1.3	1.7	0.88	1.0	1.2	1.2	0.31	0.14
Fall	Surface	0.86	1.1	1.1	1.0	1.0	1.0	0.10	0.047	Fall	Surface	1.1	1.2	1.3	1.1	1.2	1.2	0.062	0.028
	Bottom	0.88	1.2	1.1	1.0	0.84	0.99	0.13	0.059		Bottom	1.2	1.2	1.2	1.2	1.2	1.2	0.030	0.013
	Average	0.87	1.2	1.1	1.0	0.94	1.0	0.11	0.050		Average	1.2	1.2	1.2	1.1	1.2	1.2	0.040	0.018

Note: '-' indicates value not applicable.

Table E.6: Statistical Comparisons of Chlorophyll-a Concentrations Among Winter, Spring, Summer and/or Fall Sampling Events at Mine-Exposed and Reference Creek and Lake Study Areas, Mary River Project CREMP, 2023

Study Area	Overall Three-Group Comparison			Pair-wise, *post hoc* comparisons[a]			
	Significant Difference Among Seasons?	P-value	Statistical Test[b]	Season 1	Season 2	Significant Difference Between 3 Seasons?	P-value
Reference Creek Stations	YES	0.001	ANOVA	Spring	Summer	NO	0.286
				Spring	Fall	YES	0.001
				Summer	Fall	YES	0.010
Mary River GO-09 Reference Stations	YES	0.009	ANOVA	Spring	Summer	NO	0.051
				Spring	Fall	YES	0.008
				Summer	Fall	NO	0.306
Reference Lake 3	YES	0.010	tequal	Summer	Fall	YES	0.010
Camp Lake	YES	0.001	ANOVA	Winter	Summer	YES	<0.001
				Winter	Fall	YES	<0.001
				Summer	Fall	NO	0.168
Sheardown Lake NW	YES	0.001	ANOVA	Winter	Summer	YES	<0.001
				Winter	Fall	YES	0.018
				Summer	Fall	YES	0.012
Sheardown Lake SE	YES	0.002	K-W	Winter	Summer	YES	<0.001
				Winter	Fall	NO	0.077
				Summer	Fall	NO	0.077
Mary Lake North Basin	YES	0.001	ANOVA	Winter	Summer	YES	<0.001
				Winter	Fall	YES	<0.001
				Summer	Fall	NO	0.829
Mary Lake South Basin	YES	0.001	ANOVA	Winter	Summer	YES	<0.001
				Winter	Fall	YES	<0.001
				Summer	Fall	YES	0.012

Indicates a statistically significant difference for respective comparison (p-value ≤ 0.05).

[a] *Post hoc* analysis of 1-way ANOVA among all areas protected for multiple comparisons.

[b] Statistical tests include Analysis of Variance (ANOVA) and Kruskal Wallis H-test (KW H-test), as well as T-test (tequal) for Reference Lake 3 when only two seasons were sampled.

Table E.7: Summary Data and Statistical Results for Chlorophyll-a Concentration (mg/L) Comparisons between Individual Mine-Exposed Lakes and Reference Lake 3 (REF3) for Summer Sampling, Mary River Project CREMP, 2023

Study Lake	Two-Group Comparison to Reference				Number of Stations (n)	MCT	Standard Deviation	Standard Error	Minimum	Maximum
	Significant Difference Between Areas?	P-value	Statistical Test[a]	MOD[b]						
Reference Lake 03	-	-	-	-	3	1.52	0.369	0.213	1.27	1.95
Camp Lake	NO	0.973	tequal	ns	5	1.55	0.559	0.250	1.09	2.52
Sheardown Lake NW	NO	0.655	tequal	ns	6	1.71	0.618	0.252	0.790	2.39
Sheardown Lake SE	NO	0.065	tequal	ns	5	2.20	0.431	0.193	1.86	2.91
Mary Lake North	YES	0.013	tequal	-59	3	0.618	0.0373	0.0215	0.578	0.651
Mary Lake South	NO	0.067	M-W	ns	7	0.974	0.379	0.143	0.717	1.75

Indicates negative MOD (mine-exposed concentration significantly lower than reference).
Indicates positive MOD (reference concentration significantly lower than mine-exposed).
Indicates a statistically significant difference for respective comparison (p-value ≤ 0.05).

Note: MOD = Magnitude of Difference. MCT = Measure of Central Tendency. SD = standard deviation. '-' indicates no data available or no applicable data.

[a] Statistical Test was t-test or Mann-Whitney (M-W) U-test (normality not satisfied) between individual mine-exposed lakes and Reference Lake 3.

[b] MOD is calculated as (MCTreference - MCTmine-exposed)/MCTreference*100. MCT and SD reported as median and MAD (Median Absolute Deviation) for rank-transformed data, as transformed means and SD for log transformed data, and as untransformed means and SD for untransformed data..

Table E.8: Summary Data and Statistical Results for Chlorophyll-a Concentration (mg/L) Comparisons between Individual Mine-Exposed Lakes and Reference Lake 3 for Fall Sampling, Mary River Project CREMP, 2023

Study Lake	Two-Group Comparison to Reference				Number of Stations (n)	MCT	Standard Deviation	Standard Error	Minimum	Maximum
	Significant Difference Between Areas?	P-value	Statistical Test[a]	MOD[b]						
Reference Lake 03	-	-	-	-	3	0.508	0.0778	0.0449	0.431	0.587
Camp Lake	YES	0.001	tequal	99	5	1.01	0.111	0.0497	0.868	1.15
Sheardown Lake NW	YES	0.001	tequal	92	6	0.984	0.193	0.0787	0.775	1.35
Sheardown Lake SE	YES	0.001	tequal	182	5	1.43	0.0525	0.0235	1.38	1.50
Mary Lake North	NO	0.158	tequal	ns	3	0.599	0.0479	0.0277	0.566	0.654
Mary Lake South	YES	0.036	tequal	23	7	0.624	0.0630	0.0238	0.550	0.740

Indicates negative MOD (mine-exposed concentration significantly lower than reference).
Indicates positive MOD (reference concentration significantly lower than mine-exposed).
Indicates a statistically significant difference for respective comparison (p-value ≤ 0.05).

Note: MOD = Magnitude of Difference. MCT = Measure of Central Tendency. SD = standard deviation. '-' indicates no data available or no applicable data.

[a] Statistical Test was t-test or Mann-Whitney (M-W) U-test (normality not satisfied) between individual mine-exposed lakes and Reference Lake 3.

[b] MOD is calculated as (MCTreference - MCTmine-exposed)/MCTreference*100. MCT and SD reported as median and MAD (Median Absolute Deviation) for rank-transformed data, as transformed means and SD for log transformed data, and as untransformed means and SD for untransformed data..

Table E.9: Statistical Comparison of Chlorophyll-a Concentrations at Camp Lake (JL0) Among Years of Mine Construction (2014) and Operation (2015 to 2023)

Season	Data Transformation	Statistical Test[a]	Overall Ten-Year Comparison		Pair-wise, *post hoc* comparisons[b]				
			Significant Difference Among Years?	P-value	Year	Sample Size (n)	Mean	Standard Deviation	Pairwise Comparison[c]
Winter	rank	K-W	YES	0.001	2014	5	0.600	0.738	CD
					2015	5	0.744	0.151	AB
					2016	5	0.652	0.127	ABC
					2017	5	0.317	0.107	D
					2018	5	0.384	0.0416	BCD
					2019	5	0.474	0.123	BCD
					2020	5	0.468	0.239	BCD
					2021	5	0.360	0.240	D
					2022	5	1.03	0.141	A
					2023	5	0.243	0.0872	D
Summer	log10	ANOVA	YES	0.001	2014	1	0.200	-	E
					2015	5	1.26	0.166	BCD
					2016	5	1.50	0.322	ABC
					2017	5	1.24	0.154	BCD
					2018	5	2.00	0.0360	A
					2019	5	0.971	0.316	D
					2020	5	1.19	0.381	CD
					2021	5	1.44	0.0772	ABCD
					2022	5	1.90	0.300	AB
					2023	5	1.55	0.559	ABC
Fall	rank	K-W	YES	0.001	2014	5	1.59	0.726	ABCD
					2015	5	0.655	0.0668	E
					2016	5	1.06	0.216	CDE
					2017	5	1.18	0.142	BCD
					2018	5	2.13	0.0248	A
					2019	5	1.18	0.0805	BCD
					2020	5	1.19	0.0918	BCD
					2021	5	1.72	0.0526	AB
					2022	5	1.45	0.0449	ABD
					2023	5	1.01	0.111	CE
Annual	none	ANOVA	YES	0.008	2014	11	1.01	0.864	A
					2015	15	0.886	0.302	A
					2016	15	1.07	0.420	A
					2017	15	0.914	0.455	A
					2018	15	1.51	0.823	A
					2019	15	0.874	0.358	A
					2020	15	0.950	0.430	A
					2021	15	1.17	0.622	A
					2022	15	1.46	0.408	A
					2023	15	0.935	0.635	A

Indicates a statistically significant difference for respective comparison (p-value ≤ 0.05).

[a] Statistical tests include Analysis of Variance (ANOVA) or Kruskal Wallis H-test (KW) for differences among years.

[b] *Post hoc* analysis of 1-way ANOVA or Kruskal Wallis H-test (KW) among all years protected for multiple comparisons.

[c] Years that do not share a letter are significantly different.

Table E.10: Phytoplankton Monitoring Data (Chlorophyll-a and Phaeophytin-a Concentrations) Collected at Sheardown Lake Northwest (DL0-01), Mary River Project CREMP, 2023

Analyte		Chlorophyll-a (µg/L)									Analyte		Phaeophytin-a (µg/L)								
	Station	DD-HAB 9-STN1	DL0-01-5	DL0-01-1	DL0-01-4	DL0-01-2	DL0-01-7	Average	Standard Deviation	Standard Error		Station	DD-HAB 9-STN1	DL0-01-5	DL0-01-1	DL0-01-4	DL0-01-2	DL0-01-7	Average	Standard Deviation	Standard Error
Sample Collection Date	Winter	10-Apr-23	10-Apr-23	10-Apr-23	10-Apr-23	10-Apr-23	10-Apr-23	-	-	-	Sample Collection Date	Winter	10-Apr-23	10-Apr-23	10-Apr-23	10-Apr-23	10-Apr-23	10-Apr-23	-	-	-
	Summer	29-Jul-23	30-Jul-23	30-Jul-23	29-Jul-23	30-Jul-23	30-Jul-23	-	-	-		Summer	29-Jul-23	30-Jul-23	30-Jul-23	29-Jul-23	30-Jul-23	30-Jul-23	-	-	-
	Fall	11-Sep-23	11-Sep-23	11-Sep-23	11-Sep-23	11-Sep-23	11-Sep-23	-	-	-		Fall	11-Sep-23	11-Sep-23	11-Sep-23	11-Sep-23	11-Sep-23	11-Sep-23	-	-	-
Winter	Surface	0.38	0.22	0.36	0.38	0.55	0.64	0.42	0.15	0.061	Winter	Surface	0.40	0.38	0.44	0.44	0.49	0.49	0.44	0.044	0.018
	Bottom	0.15	0.12	0.12	0.25	0.30	0.14	0.18	0.076	0.031		Bottom	0.30	0.28	0.28	0.36	0.38	0.29	0.32	0.044	0.018
	Average	0.27	0.17	0.24	0.31	0.42	0.39	0.30	0.096	0.039		Average	0.35	0.33	0.36	0.40	0.44	0.39	0.38	0.038	0.016
Summer	Surface	1.0	2.0	2.2	0.78	2.4	1.8	1.7	0.67	0.27	Summer	Surface	0.61	1.4	1.5	0.57	1.4	1.3	1.1	0.42	0.17
	Bottom	0.56	2.1	2.3	2.0	2.3	0.92	1.7	0.76	0.31		Bottom	0.53	1.4	1.4	0.94	1.5	1.0	1.1	0.38	0.15
	Average	0.79	2.1	2.2	1.4	2.4	1.4	1.7	0.62	0.25		Average	0.57	1.4	1.4	0.76	1.5	1.1	1.1	0.38	0.16
Fall	Surface	0.89	1.6	0.96	0.73	0.90	1.0	1.0	0.31	0.13	Fall	Surface	0.96	0.68	0.96	0.72	0.88	0.72	0.82	0.13	0.053
	Bottom	0.98	1.1	0.88	0.82	0.99	0.92	0.94	0.091	0.037		Bottom	1.0	0.88	0.98	0.86	1.0	0.73	0.91	0.11	0.045
	Average	0.93	1.4	0.92	0.78	0.94	0.98	0.98	0.19	0.079		Average	0.99	0.78	0.97	0.80	0.94	0.72	0.87	0.12	0.047

Note: '-' indicates value not applicable.

Table E.11: Statistical Comparison of Chlorophyll-a Concentrations at Sheardown Lake NW (DL0-01) Among Years of Mine Construction (2014) and Operation (2015 to 2023)

Season	Data Transformation	Statistical Test[a]	Overall Ten-Year Comparison		Pair-wise, post-hoc comparisons[b]				
			Significant Difference Among Years?	P-value	Year	Sample Size (n)	Mean	Standard Deviation	Pairwise Comparison[c]
Winter	rank	K-W	YES	0.001	2014	6	2.55	1.34	A
					2015	6	1.11	0.0526	AB
					2016	6	0.875	0.315	ABC
					2017	6	0.790	0.268	BC
					2018	6	1.03	0.495	ABC
					2019	6	0.463	0.235	CD
					2020	6	0.495	0.269	CD
					2021	6	0.310	0.245	D
					2022	6	1.29	0.0640	AB
					2023	6	0.300	0.0958	D
Summer	rank	K-W	YES	0.001	2014	6	2.42	0.821	A
					2015	6	1.50	0.228	BCD
					2016	6	2.13	0.387	A
					2017	6	1.21	0.133	CD
					2018	6	2.01	0.185	AB
					2019	6	1.81	0.246	AB
					2020	6	1.57	0.456	ABC
					2021	6	1.50	0.197	BCD
					2022	6	0.959	0.141	D
					2023	6	1.71	0.618	ABC
Fall	rank	K-W	YES	0.001	2014	6	0.800	0.379	D
					2015	6	1.61	0.441	BC
					2016	6	1.53	0.183	BC
					2017	6	1.55	0.225	BC
					2018	6	1.75	0.136	AB
					2019	6	1.20	0.306	CD
					2020	6	1.79	0.129	AB
					2021	6	1.97	0.159	A
					2022	6	1.61	0.0740	BC
					2023	6	0.984	0.193	D
Annual	none	ANOVA	YES	0.003	2014	18	1.93	1.20	A
					2015	18	1.41	0.350	AB
					2016	18	1.51	0.601	AB
					2017	18	1.19	0.380	B
					2018	18	1.60	0.519	AB
					2019	18	1.16	0.619	B
					2020	18	1.28	0.653	AB
					2021	18	1.26	0.745	AB
					2022	18	1.29	0.288	AB
					2023	18	0.997	0.689	B

Indicates a statistically significant difference for respective comparison (p-value ≤ 0.05).

[a] Statistical tests include Analysis of Variance (ANOVA) or Kruskal Wallis H-test (KW) for differences among years.

[b] *Post hoc* analysis of 1-way ANOVA or Kruskal Wallis H-test (KW) among all years protected for multiple comparisons.

[c] Years that do not share a letter are significantly different.

Table E.12: Phytoplankton Monitoring Data (Chlorophyll-a and Phaeophytin-a Concentrations) Collected at Sheardown Lake SE (DL0-02), Mary River Project CREMP, 2023

Analyte		Chlorophyll-a (µg/L)								Analyte		Phaeophytin-a (µg/L)							
Station		DL0-02-06	DL0-02-07	DL0-02-4	DL0-02-8	DL0-02-03	Average	Standard Deviation	Standard Error	Station		DL0-02-06	DL0-02-07	DL0-02-4	DL0-02-8	DL0-02-03	Average	Standard Deviation	Standard Error
Sample Collection Date	Winter	9-Apr-23	9-Apr-23	9-Apr-23	9-Apr-23	9-Apr-23	-	-	-	Sample Collection Date	Winter	9-Apr-23	9-Apr-23	9-Apr-23	9-Apr-23	9-Apr-23	-	-	-
	Summer	28-Jul-23	28-Jul-23	30-Jul-23	31-Jul-23	31-Jul-23	-	-	-		Summer	28-Jul-23	28-Jul-23	30-Jul-23	31-Jul-23	31-Jul-23	-	-	-
	Fall	10-Sep-23	10-Sep-23	10-Sep-23	10-Sep-23	10-Sep-23	-	-	-		Fall	10-Sep-23	10-Sep-23	10-Sep-23	10-Sep-23	10-Sep-23	-	-	-
Winter	Surface	0.40	0.55	2.4	0.57	0.34	0.85	0.86	0.39	Winter	Surface	0.42	0.50	1.7	0.48	0.39	0.71	0.58	0.26
	Bottom	0.13	0.35	0.34	0.12	0.37	0.26	0.13	0.057		Bottom	0.30	0.40	0.40	0.28	0.41	0.36	0.063	0.028
	Average	0.26	0.45	1.4	0.34	0.36	0.55	0.46	0.20		Average	0.36	0.46	1.1	0.38	0.40	0.53	0.30	0.13
Summer	Surface	1.7	1.5	3.3	3.0	3.4	2.6	0.92	0.41	Summer	Surface	0.80	0.86	2.2	2.2	2.2	1.6	0.74	0.33
	Bottom	2.1	2.2	2.5	1.1	1.1	1.8	0.64	0.29		Bottom	1.1	1.2	2.0	1.3	1.2	1.4	0.38	0.17
	Average	1.9	1.9	2.9	2.1	2.3	2.2	0.43	0.19		Average	0.96	1.0	2.1	1.8	1.7	1.5	0.49	0.22
Fall	Surface	1.4	1.4	1.5	1.4	1.4	1.4	0.063	0.028	Fall	Surface	1.1	1.2	1.2	1.2	1.3	1.2	0.072	0.032
	Bottom	1.4	1.5	1.2	1.4	1.6	1.4	0.14	0.061		Bottom	1.2	1.2	1.2	1.2	1.3	1.2	0.054	0.024
	Average	1.4	1.5	1.4	1.4	1.5	1.4	0.052	0.023		Average	1.2	1.2	1.2	1.2	1.3	1.2	0.056	0.025

Note: '-' indicates value not applicable.

Table E.13: Statistical Comparison of Chlorophyll-a Concentrations at Sheardown Lake SE (DL0-02) Among Years of Mine Construction (2014) and Operation (2015 to 2023)

Season	Data Transformation	Statistical Test[a]	Overall Ten-Year Comparison		Pair-wise, *post hoc* comparisons[b]				
			Significant Difference Among Years?	P-value	Year	Sample Size (n)	Mean	Standard Deviation	Pairwise Comparison[c]
Winter	log10	ANOVA	YES	0.001	2014	5	2.67	1.01	A
					2015	5	1.57	0.525	ABC
					2016	5	1.90	0.648	ABC
					2017	5	1.36	0.415	ABC
					2018	5	2.19	0.879	A
					2019	5	1.91	0.425	ABC
					2020	5	0.859	0.162	BCD
					2021	5	0.955	0.548	BD
					2022	5	1.95	0.287	AC
					2023	5	0.554	0.455	D
Summer	rank	K-W	YES	0.001	2014	5	0.200	0	D
					2015	5	0.894	0.102	D
					2016	5	1.51	0.210	BCD
					2017	5	1.37	0.156	CD
					2018	5	2.12	0.0721	A
					2019	5	2.16	0.242	A
					2020	5	3.21	2.67	A
					2021	5	1.90	0.0835	ABC
					2022	5	1.36	0.361	CD
					2023	5	2.20	0.431	AB
Fall	rank	K-W	YES	0.001	2014	5	1.54	1.63	CDE
					2015	5	0.990	0.106	E
					2016	5	2.87	0.743	A
					2017	5	1.50	0.0757	BCD
					2018	5	2.03	0.115	AB
					2019	5	2.00	0.446	ABC
					2020	5	1.35	0.0767	DE
					2021	5	2.06	0.0735	AB
					2022	5	1.27	0.0293	DE
					2023	5	1.43	0.0525	BCDE
Annual	rank	K-W	YES	0.001	2014	15	1.47	1.47	BC
					2015	15	1.15	0.425	C
					2016	15	2.10	0.800	A
					2017	15	1.41	0.249	BC
					2018	15	2.11	0.480	A
					2019	15	2.03	0.370	A
					2020	15	1.81	1.77	BC
					2021	15	1.64	0.586	AB
					2022	15	1.53	0.399	BC
					2023	15	1.40	0.773	BC

Indicates a statistically significant difference for respective comparison (p-value ≤ 0.05).

[a] Statistical tests include Analysis of Variance (ANOVA) or Kruskal Wallis H-test (KW) for differences among years.

[b] *Post hoc* analysis of 1-way ANOVA or Kruskal Wallis H-test (KW) among all years protected for multiple comparisons.

[c] Years that do not share a letter are significantly different.

Table E.14: Phytoplankton Monitoring Data (Chlorophyll-a and Phaeophytin-a Concentrations) Collected at the Mary River (G0, F0, E0, C0), Mary River Project CREMP, 2023

	Station	Upstream Reference			Upstream Mine-Exposed								Downstream Mine-Exposed		
		G0-09-A	G0-09	G0-09-B	G0-03	G0-01	F0-01	E0-10	E0-03	E0-21	E0-20	F0-01	C0-10	C0-05	C0-01
Sample Collection Date	Spring	16-Jul-23	16-Jul-23	16-Jul-23	16-Jul-23	16-Jul-23	16-Jul-23	16-Jul-23	17-Jul-23	17-Jul-23	17-Jul-23	16-Jul-23	17-Jul-23	16-Jul-23	16-Jul-23
	Summer	24-Aug-23	24-Aug-23	24-Aug-23	24-Aug-23	24-Aug-23	24-Aug-23	30-Aug-23	30-Aug-23	30-Aug-23	30-Aug-23	24-Aug-23	30-Aug-23	30-Aug-23	30-Aug-23
	Fall	12-Sep-23	12-Sep-23	12-Sep-23	12-Sep-23	12-Sep-23	12-Sep-23	18-Sep-23	18-Sep-23	18-Sep-23	18-Sep-23	12-Sep-23	18-Sep-23	18-Sep-23	18-Sep-23
Chlorophyll-a (µg/L)	Spring	0.28	0.53	0.34	0.32	0.44	0.37	0.45	0.29	0.27	0.29	0.37	0.24	0.49	0.45
	Summer	0.23	0.18	0.16	0.23	0.19	0.18	0.099	0.12	0.10	0.14	0.18	0.12	0.24	0.19
	Fall	0.093	0.080	0.080	0.19	0.067	0.12	0.072	0.12	0.12	0.12	0.12	0.11	0.14	0.21
	Average	0.20	0.26	0.19	0.25	0.23	0.23	0.21	0.18	0.16	0.18	0.23	0.16	0.29	0.28
	Standard Deviation	0.097	0.24	0.13	0.065	0.19	0.13	0.21	0.096	0.091	0.094	0.13	0.074	0.18	0.15
	Standard Error	0.056	0.14	0.076	0.037	0.11	0.074	0.12	0.055	0.053	0.054	0.074	0.043	0.10	0.085
Phaeophytin-a (µg/L)	Spring	0.62	0.81	0.62	0.63	0.68	0.61	0.64	0.59	0.59	0.61	0.61	0.54	0.72	0.73
	Summer	0.30	0.24	<0.2	0.30	0.28	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.24	<0.2
	Fall	0.10	0.10	<0.1	0.18	<0.1	<0.1	<0.1	0.14	0.15	0.13	<0.1	0.14	0.16	0.16
	Average	0.34	0.38	0.27	0.37	0.35	0.27	0.28	0.29	0.30	0.29	0.27	0.28	0.37	0.35
	Standard Deviation	0.26	0.37	-	0.24	0.27	-	-	0.30	0.29	0.32	-	0.26	0.30	0.38
	Standard Error	0.15	0.22	-	0.14	0.15	-	-	0.17	0.17	0.18	-	0.15	0.18	0.22

Note: "-" = value not calculable.

Table E.15: Phytoplankton Monitoring Data (Chlorophyll-a and Phaeophytin-a Concentrations) Collected at Mary Lake (BL0), Mary River Project CREMP, 2023

Analyte		Chlorophyll-a (µg/L)												
Station		Mary Lake North			Mary Lake South							Average	Standard Deviation	Standard Error
		BL0-01-A	BL0-01	BL0-01-B	BL0-05-A	BL0-05	BL0-05-B	BL0-03	BL0-04	BL0-09	BL0-06			
Sample Collection Date	Winter	8-Apr-23	8-Apr-23	8-Apr-23	7-Apr-23	7-Apr-23	7-Apr-23	7-Apr-23	7-Apr-23	7-Apr-23	6-Apr-23	-	-	-
	Summer	2-Aug-23	2-Aug-23	2-Aug-23	3-Aug-23	3-Aug-23	2-Aug-23	3-Aug-23	3-Aug-23	3-Aug-23	3-Aug-23	-	-	-
	Fall	7-Sep-23	7-Sep-23	7-Sep-23	15-Sep-23	15-Sep-23	15-Sep-23	15-Sep-23	15-Sep-23	15-Sep-23	15-Sep-23	-	-	-
Winter	Surface	0.19	0.15	0.20	0.41	0.35	0.52	0.28	0.33	0.47	0.45	0.34	0.13	0.040
	Bottom	0.059	0.10	0.15	0.082	0.084	0.11	0.084	0.078	0.091	0.12	0.096	0.026	0.0081
	Average	0.12	0.13	0.18	0.24	0.22	0.32	0.18	0.21	0.28	0.28	0.22	0.066	0.021
Summer	Surface	0.50	0.59	0.61	0.85	0.96	1.5	0.93	0.94	0.86	0.94	0.87	0.29	0.091
	Bottom	0.65	0.66	0.69	0.67	0.47	2.0	0.65	0.53	0.90	1.4	0.86	0.47	0.15
	Average	0.58	0.62	0.65	0.76	0.72	1.8	0.79	0.74	0.88	1.2	0.87	0.35	0.11
Fall	Surface	0.59	0.61	0.53	0.62	0.63	0.50	0.63	0.57	0.74	0.64	0.61	0.065	0.021
	Bottom	0.72	0.55	0.60	0.60	0.53	0.60	0.64	0.60	0.58	0.84	0.63	0.091	0.029
	Average	0.65	0.58	0.57	0.61	0.58	0.55	0.64	0.59	0.66	0.74	0.62	0.058	0.018

Analyte		Phaeophytin-a (µg/L)												
Station		Mary Lake North			Mary Lake South							Average	Standard Deviation	Standard Error
		BL0-01-A	BL0-01	BL0-01-B	BL0-05-A	BL0-05	BL0-05-B	BL0-03	BL0-04	BL0-09	BL0-06			
Sample Collection Date	Winter	8-Apr-23	8-Apr-23	8-Apr-23	7-Apr-23	7-Apr-23	7-Apr-23	7-Apr-23	7-Apr-23	7-Apr-23	6-Apr-23	-	-	-
	Summer	2-Aug-23	2-Aug-23	2-Aug-23	3-Aug-23	3-Aug-23	2-Aug-23	3-Aug-23	3-Aug-23	3-Aug-23	3-Aug-23	-	-	-
	Fall	7-Sep-23	7-Sep-23	7-Sep-23	15-Sep-23	15-Sep-23	15-Sep-23	15-Sep-23	15-Sep-23	15-Sep-23	15-Sep-23	-	-	-
Winter	Surface	0.26	0.26	0.27	0.42	0.35	0.50	0.30	0.36	0.39	0.39	0.35	0.079	0.025
	Bottom	0.22	0.26	0.28	0.25	0.25	0.28	0.25	0.26	0.26	0.27	0.26	0.017	0.0054
	Average	0.24	0.26	0.28	0.34	0.30	0.39	0.28	0.32	0.32	0.33	0.30	0.044	0.014
Summer	Surface	0.45	0.52	0.40	1.0	1.0	1.3	1.2	1.2	1.1	1.2	0.95	0.35	0.11
	Bottom	0.52	0.54	0.56	1.1	0.47	1.6	0.75	0.48	1.1	1.7	0.87	0.46	0.15
	Average	0.48	0.53	0.48	1.0	0.74	1.4	0.98	0.86	1.1	1.5	0.91	0.36	0.11
Fall	Surface	0.68	0.71	0.59	1.1	0.83	0.96	1.1	1.1	1.1	1.0	0.91	0.19	0.060
	Bottom	0.70	0.68	0.62	1.0	0.88	1.1	1.1	1.0	1.0	1.1	0.92	0.18	0.059
	Average	0.69	0.70	0.60	1.1	0.85	1.0	1.1	1.0	1.0	1.0	0.91	0.19	0.059

Note: '-' indicates value not applicable.

Table E.16: Statistical Comparison of Chlorophyll-a Concentrations at Mary Lake North (BL0-01) Among Years of Mine Construction (2014) and Operation (2015 to 2023)

Season	Data Transformation	Statistical Test[a]	Overall Ten-Year Comparison		Pair-wise, *post hoc* comparisons[b]				
			Significant Difference Among Years?	P-value	Year	Sample Size (n)	Mean	Standard Deviation	Pairwise Comparison[c]
Winter	rank	K-W	YES	0.022	2014	3	0.583	0.664	AB
					2015	3	0.632	0.648	A
					2016	2	0.194	0.0412	ABC
					2017	3	0.178	0.0553	ABC
					2018	3	0.197	0.0425	ABC
					2019	3	0.498	0.422	A
					2020	3	0.235	0.0673	AB
					2021	3	0.110	0.00500	C
					2022	3	0.408	0.147	A
					2023	3	0.143	0.0294	BC
Summer	rank	K-W	YES	0.024	2014	3	0.917	0.725	ABC
					2015	3	0.827	0.246	AB
					2016	3	1.16	0.0950	A
					2017	3	0.267	0.0161	C
					2018	3	0.500	0.180	BC
					2019	3	0.737	0.118	ABC
					2020	3	1.67	0.475	A
					2021	3	0.688	0.0535	ABC
					2022	3	0.662	0.219	ABC
					2023	3	0.618	0.0373	BC
Fall	none	ANOVA	YES	0.001	2014	3	0.517	0.252	C
					2015	3	0.620	0.0966	BC
					2016	3	0.997	0.0909	A
					2017	3	0.900	0.128	AB
					2018	3	0.860	0.0661	AB
					2019	3	0.850	0.0757	AB
					2020	3	1.01	0.0275	A
					2021	3	0.832	0.0597	ABC
					2022	3	1.04	0.128	A
					2023	3	0.599	0.0479	BC
Annual	none	ANOVA	NO	0.130	2014	9	0.672	0.540	A
					2015	9	0.693	0.364	A
					2016	8	0.857	0.422	A
					2017	9	0.448	0.348	A
					2018	9	0.519	0.304	A
					2019	9	0.695	0.271	A
					2020	9	0.969	0.665	A
					2021	9	0.543	0.333	A
					2022	9	0.705	0.314	A
					2023	9	0.453	0.235	A

Indicates a statistically significant difference for respective comparison (p-value ≤ 0.05).

[a] Statistical tests include Analysis of Variance (ANOVA) or Kruskal Wallis H-test (KW) for differences among years.

[b] *Post hoc* analysis of 1-way ANOVA or Kruskal Wallis H-test (KW) among all years protected for multiple comparisons.

[c] Years that do not share a letter are significantly different.

Table E.17: Statistical Comparison of Chlorophyll-a Concentrations at Mary Lake South (BL0) Among Years of Mine Construction (2014) and Operation (2015 to 2023)

Season	Data Transformation	Statistical Test[a]	Overall Ten-Year Comparison		Pair-wise, *post hoc* comparisons[b]				
			Significant Difference Among Years?	P-value	Year	Sample Size (n)	Mean	Standard Deviation	Pairwise Comparison[c]
Winter	rank	K-W	YES	0.003	2014	7	0.879	1.46	BCD
					2015	7	0.651	0.345	A
					2016	7	0.306	0.197	BCD
					2017	7	0.351	0.209	ABCD
					2018	7	0.496	0.339	ABC
					2019	7	0.480	0.170	AB
					2020	7	0.592	0.242	A
					2021	7	0.249	0.0971	D
					2022	7	0.577	0.287	A
					2023	7	0.247	0.0485	CD
Summer	rank	K-W	YES	0.001	2014	7	0.864	0.594	ABC
					2015	7	0.781	0.107	BD
					2016	7	1.08	0.172	A
					2017	7	0.809	0.0859	BC
					2018	7	0.848	0.218	ABC
					2019	7	0.521	0.0254	D
					2020	7	1.02	0.130	AC
					2021	7	0.815	0.118	BC
					2022	7	0.946	0.143	ABC
					2023	7	0.974	0.379	ABC
Fall	rank	K-W	YES	0.001	2014	7	0.750	0.294	ABCD
					2015	7	0.896	0.120	ABC
					2016	7	0.763	0.224	ABDE
					2017	7	0.754	0.0746	ADE
					2018	7	0.901	0.0214	ABC
					2019	7	0.934	0.0449	BC
					2020	7	0.672	0.1000	DE
					2021	7	0.841	0.142	ABC
					2022	7	0.955	0.0906	C
					2023	7	0.624	0.0630	E
Annual	rank	K-W	NO	0.127	2014	21	0.831	0.878	A
					2015	21	0.776	0.232	A
					2016	21	0.715	0.375	A
					2017	21	0.638	0.246	A
					2018	21	0.748	0.288	A
					2019	21	0.645	0.231	A
					2020	21	0.761	0.248	A
					2021	21	0.635	0.302	A
					2022	21	0.826	0.257	A
					2023	21	0.615	0.371	A

Indicates a statistically significant difference for respective comparison (p-value ≤ 0.05).

[a] Statistical tests include Analysis of Variance (ANOVA) or Kruskal Wallis H-test (KW) for differences among years.

[b] *Post hoc* analysis of 1-way ANOVA or Kruskal Wallis H-test (KW) among all years protected for multiple comparisons.

[c] Years that do not share a letter are significantly different.